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The New Encyclopædia Britannica

Volume 8

MICROPÆDIA

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How to use the MICROPAEDIA

The 12 volumes of the MICROPAEDIA contain tens of thousands of shorter articles on specific persons, places, things, and ideas, arranged in alphabetical order. The MICROPAEDIA can be used as an information resource on its own; and it can function as support for the longer articles in the MACROPAEDIA (to which it refers whenever appropriate). The MICROPAEDIA in turn is supported by references in the INDEX and by the lists of suggested readings in the PROPAEDIA. Finally, the MICROPAEDIA is the portion of the *Encyclopædia Britannica* best suited for the reader who wishes to browse among the countless subjects in all fields of human learning and history in all times and places.

Alphabetization

Entry titles are alphabetized according to the English alphabet, A to Z. All diacritical marks (such as in ö, ł, or ñ) and foreign letters without parallels in English (such as ayin [ʿ] and hamza [ʾ]) are ignored in the alphabetization. Apostrophes likewise are ignored. Titles beginning with numbers, such as **1812, War of**, are alphabetized as if the numbers were written out (**Eighteen-twelve, War of**).

Alphabetization proceeds according to the "word-by-word" principle. Thus, **Mount Vernon** precedes **mountain**; any **John** entry precedes **John Henry**, which in turn precedes **Johne's disease**. Any character or string of characters preceding a space, hyphen, or dash is treated as a word and alphabetized accordingly. Thus, **De Broglie** precedes **debenture**, and **jack-o'-lantern** precedes **jackal**. Titles with identical spellings are arranged in the following order: (1) persons, (2) places, (3) things.

For many rulers and titled nobility, chronological order, as well as alphabetical order, governs placement. Rulers of the same given name (*e.g.,* William) may be grouped together, separate from other entries, and indicated by the symbol •. They may be subgrouped alphabetically by country and, within each country, arranged chronologically (**William I, William II**, etc.). Nobility or peers of the same titled name (*e.g.,* **Essex, EARLS OF**) are similarly grouped together, separate from other entries; they are indicated by the symbol • and arranged chronologically.

Places with identical names are arranged in the alphabetical order of the countries where they are located. Identical place-names in the same country are alphabetized according to the alphabetical order of the state, province, or other political subdivision where they are found.

Entry arrangement

The titles of entries are arranged according to the forms commonly found in indexes and dictionaries, with some special conventions.

Entry titles for certain physical features, institutions, structures, events, and concepts are ordinarily inverted to place the substantive word first. Thus, the Bay of Bengal is entered as **Bengal, Bay of**; the Bank of England as **England, Bank of**; the Tower of London as **London, Tower of**; the Siege of Vienna as **Vienna, Siege of**; and the balance of power as **power, balance of**. If the name of a physical feature, institution, structure, event, or concept has two or more descriptors, it is entered under the descriptor appearing first. Thus, the Episcopal Church in Scotland is entered as **Episcopal Church in Scotland** (not **Scotland, Episcopal Church in**); the Leaning Tower of Pisa as **Leaning Tower of Pisa**; and the kinetic theory of gases as **kinetic theory of gases**.

The entries for most Western persons are arranged so that one can read a name in correct order by beginning after the first comma, proceeding to the end of the boldface type, returning to the beginning word or words, and proceeding forward to the first comma. Thus, the entry **March, Patrick Dunbar, 2nd Earl of**, is read "Patrick Dunbar, 2nd Earl of March"; the entry **Orléans, Louis, duc d'**, is read "Louis, duc d'Orléans." Names of Far Eastern origin are given in Oriental order, with the surname preceding the personal name (*e.g.,* **Tōjō Hideki, Deng Xiaoping, Nguyen Cao Ky**).

Cross-references

Some cross-reference entries appear in the MICROPAEDIA for the purpose of leading a reader from names that are familiar to alternate names that may not be. Cross-references also appear frequently within or at the ends of standard entries, where they are identified by *see, see also, see under, q.v.* (*quod vide,* "which see"), or *qq.v.* (*quae vide,* "which see," plural).

Certain entries serve both as relatively brief essays on general subjects and as cross-references to the same subjects treated at greater length and in greater depth in the MACROPAEDIA. Such an entry (*e.g.,* **igneous rock**) begins with a definition of the subject and then provides the following cross-reference: "A brief treatment of igneous rocks follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

Entries on certain broad subjects (*e.g.,* **music**) direct the reader to several relevant articles in the MACROPAEDIA and also to the PROPAEDIA for listings of related articles in the MICROPAEDIA.

Abbreviations

Abbreviations used in the MICROPAEDIA are given in a list that appears at the end of every MICROPAEDIA volume.

Territorial boundaries

In articles and maps indicating disputed geopolitical boundaries and territories, the attribution of sovereignty or administrative subordination to any specific area does not imply recognition of the status claimed by an administering power.

Ménage, Gilles (b. Aug. 15, 1613, Angers, Fr.—d. July 23, 1692, Paris), French scholar and man of letters known for philological works as well as for the *mercuriales,* Wednesday literary meetings, he sponsored for a period of over 30 years.

A lawyer's son of strong and often controversial personality, Ménage practiced at the bar and frequented Mme de Rambouillet's circle of *précieuses,* who cultivated wit and the art of polite and elegant conversation. He subsequently abandoned law for the church, becoming prior of Montdidier.

The *mercuriales* began in 1656 and were attended by poets and critics. The great French letter writer Mme de Sévigné and the early novelist Mme de La Fayette enjoyed his society. Ménage was both humorous and quarrelsome and made many enemies, such as the playwright Jean Racine, who prevented his entry to the Académie Française in 1684. His *Requête des dictionnaires* criticized the academy. He wrote a history of woman philosophers (1690) and numerous critical works, including two studies of the French language. The pedant Vadius in Molière's play *Les Femmes savantes* is said to be a caricature of him. *Menagiana* (1693–1715) was a publication of his jokes and judgments, assembled by his friends after his death.

Menahem, also spelled MANAHEM (fl. mid-8th century BC), king of Israel whose 10-year reign was distinguished for its cruelty. Events of his rule are related in II Kings 15:14–22. In about 746 BC, Shallum ben Jabesh assassinated Zechariah, king of Israel (the northern kingdom of the Jews, as distinguished from the southern kingdom, Judah), and established his throne in the region of Samaria. One month later, Menahem advanced from his headquarters at Tirzah, the old royal city of Israel, against Shallum and killed him. Menahem assumed power but was not accepted by the district around the city of Tappuah; in revenge Menahem slaughtered the city's inhabitants, including pregnant women.

Toward the end of Menahem's reign, the Assyrian king Tiglath-pileser III (identified in the Bible as King Pul) advanced against Israel; he was deterred only by a large bribe, which Menahem extorted from his wealthy subjects. Israel remained subjugated to Assyria under Menahem's son and successor, Pekahiah, who was forced to continue tribute. The 19th-century Jewish historian Heinrich Graetz speculated that Menahem introduced licentious religious rites from Assyria into Israel.

Menahem ben Saruq, in full MENAHEM BEN JACOB IBN SARUQ, Saruq also spelled SARUK (b. *c.* 910, Tortosa, Independent Moorish States—d. *c.* 970, Córdoba?), Jewish lexicographer and poet who composed the first Hebrew-language dictionary, a lexicon of the Bible; earlier biblical dictionaries were written in Arabic and translated into Hebrew.

After travelling to Córdoba, a city in Moorish Spain, Menahem became a protégé of Isaac, the father of Ḥisdai ibn Shaprut, (*q.v.*) who was to become a powerful Jewish statesman in Córdoba. After Isaac's death, Ḥisdai employed Menahem as his literary secretary. Menahem composed the historic letter Ḥisdai sent to Joseph, king of the Khazars, inquiring about the Khazars' conversion to Judaism.

Ḥisdai also encouraged Menahem to compile his famous dictionary. It was severely criticized by a rival philologist and poet, Dunash ben Labrat, who, by his bitter attacks, succeeded in turning Ḥisdai against Menahem. Menahem probably died not long after his fall from favour. Dunash's attack provoked a counterattack by Menahem's pupils, one of whom, Judah ben David Ḥayyuj, was a major Hebrew grammarian.

Menahem's dictionary, the *Maḥberet* (from *ḥaber,* "to join"), despite its faults, did have many virtues and remained in use for many years. He established that Hebrew is a language with definite, discoverable rules, and he illustrated his principles with many elegantly phrased examples. His dictionary was an invaluable aid to Bible study for European Jews who could not read Arabic.

Menai Bridge, suspension bridge spanning the Menai Strait from Bangor, Wales, to the island of Anglesey, a distance of 580 feet (176 metres). Designed and built (1819–26) by Thomas Telford (*q.v.*), it was the first important modern suspension bridge. The deck, designed for two carriageways, was suspended by iron chains from masonry towers at either end. Sixteen chain cables were each composed of 935 iron bars, a total of 2,000 tons of wrought iron. Though damaged by storms, the bridge survived because of the addition of transverse bracing and trussed railings. In 1939, to accommodate increased automobile traffic, the chains were replaced by steel cables. *See also* Britannia Bridge.

Menai Bridge, Wales
BBC Hulton Picture Library

Menai Strait, channel of the Irish Sea separating the Isle of Anglesey (Ynys Môn) from the mainland of North Wales. It extends 15 mi (24 km), from Beaumaris to Abermenai Point, varying in width between 200 yd (180 m) and 2 mi. The strait comprises an eastern and a western reach, both trending northeast–southwest, linked by a short, north–south central section. These all originated in preglacial valleys, the two reaches forming part of a system of parallel northeast–southwest valleys; in late glacial times the north–south valley was enlarged as an overflow channel for an ice-dammed lake to the northeast. Postglacial subsidence created a continuous marine channel from the three sections.

Since the 19th century two famous bridges have spanned the strait: Thomas Telford's suspension road bridge (1827) and, two miles to the west, Robert Stephenson's Britannia tubular railway bridge (1849). They carry the modern ground transportation lines from London to Holyhead and Ireland.

Menam Khong (Southeast Asia): *see* Mekong River.

Menander (b. *c.* 342 BC—d. *c.* 292 BC), Athenian dramatist whom ancient critics considered the supreme poet of Greek New Comedy—*i.e.,* the last flowering of Athenian stage comedy. During his life, his success was limited; although he wrote more than 100 plays, he won only eight victories at Athenian dramatic festivals.

Comedy had by his time abandoned public affairs and was concentrating instead on fictitious characters from ordinary life; the role of the chorus was generally confined to the performance of interludes between acts. Actors' masks were retained but were elaborated to provide for the wider range of characters required by a comedy of manners and helped an audience without playbills to recognize these characters for what they were. Menander, who wrote in a refined Attic, by his time the literary language of the Greek-speaking world, was masterly at presenting such characters as stern fathers, young lovers, greedy demimondaines, intriguing slaves, and others.

Menander's nicety of touch and skill at comedy in a light vein is clearly evident in the *Dyscolus* in the character of the gruff misanthrope Knemon, while the subtle clash and contrast of character and ethical principle in such plays as *Perikeiromenē* (interesting for its sympathetic treatment of the conventionally boastful soldier) and *Second Adelphoe* constitute perhaps his greatest achievement.

Menander's works were much adapted by the Roman writers Plautus and Terence, and through them he influenced the development of European comedy from the Renaissance. Their work also supplements much of the lost corpus of his plays, of which no complete text exists, except that of the *Dyscolus,* first printed in 1958 from some leaves of a papyrus codex acquired in Egypt.

The known facts of Menander's life are few. He was allegedly rich and of good family, and a pupil of the philosopher Theophrastus, a follower of Aristotle. In 321 Menander produced his first play, *Orgē* ("Anger"). In 316 he won a prize at a festival with the *Dyscolus* and gained his first victory at the Dionysia festival the next year. By 301 Menander had written more than 70 plays. He probably spent most of his life in Athens and is said to have declined invitations to Macedonia and Egypt. He allegedly drowned while swimming at the Piraeus (Athens' port).

Menander, also spelled MINEDRA, or MENADRA, Pāli MILINDA (fl. 160 BC?—135 BC?), the greatest of the Indo-Greek kings and the one best known to Western and Indian classical authors; he is believed to have been a patron of the Buddhist religion and the subject of an important Buddhist work, the *Milinda-pañha* ("The Questions of Milinda").

Menander was born in the Caucasus; but the Greek biographer Plutarch calls him a king of Bactria, and Strabo, the Greek geographer and historian, includes him among the Bactrian Greeks "who conquered more tribes than Alexander." It is possible that he ruled over Bactria, and it has been suggested that he aided the Seleucid ruler Demetrius II against the Parthians. His kingdom in the Indian subcontinent consisted of an area extending from the Kābul Valley in the west to the Rāvi River in the east, and from the Swāt Valley (in modern Pakistan) in the north to Arachosia in Afghanistan to the south. Ancient Indian writers indicate that he probably led expeditions into Rājputāna and as far east along the Ganges Valley as Pāṭaliputra, in the present-day Indian state of Bihār.

Menander was probably the Indo-Greek king who was converted to Buddhism by the holy man Nāgasena after a prolonged and intelligent discussion, which has been recorded in the *Milinda-pañha.* The style may have been influenced by Plato's dialogues. The wheel engraved on some of Menander's coins is probably connected with Buddhism, and Plutarch's statement that when Menander died his earthly remains were divided equally among the cities of his kingdom and that monuments, possibly *stūpa*s, were to be erected to enshrine them indicates that he had probably become a Buddhist.

The only inscription referring to Menander has been found in Bājaur, the tribal territory between the Swāt and Kunār rivers; but large numbers of Menander's coins have been unearthed, mostly of silver and copper, attesting to both the duration of his reign and the flourishing commerce of his realm.

According to Buddhist tradition he handed over his kingdom to his son and retired from the world, but Plutarch relates that he died in camp while on campaign.

Menander PROTECTOR (fl. second half of 6th century AD), Byzantine historian whose surviving works are a valuable authority for the 6th century, especially on geography and ethnography. At the suggestion of the Emperor Maurice (582–602), he wrote a history modeled on that of Agathias. It begins at the point where Agathias left off, and the surviving text includes the period from the arrival of the Kotrigur Huns in Thrace in 558 down to the negotiations with the Avars about Sirmium in 582. Considerable fragments of the history are preserved.

Menard, John Willis (b. April 3, 1838, Kaskaskia, Ill., U.S.—d. Oct. 8, 1893, Washington, D.C.), first black elected to the U.S. Congress, who was denied his seat by that body.

During the Civil War (1861–65) he served as a clerk in the U.S. Department of the Interior. In 1865 he moved to New Orleans, where he became active in the Republican Party, serving as inspector of customs and later as a commissioner of streets. He also published a newspaper, *The Free South,* later named *The Radical Standard.* Elected to Congress from Louisiana in 1868 to fill an unexpired term, Menard failed to overcome an election challenge by the loser, and Congress refused to seat either man. In 1871 he moved to Florida, where he was again active in the Republican Party and published the *Island City News* in Jacksonville.

Ménard, Louis-Nicolas (b. Oct. 19, 1822, Paris, Fr.—d. Feb. 9, 1901, Paris), French writer whose vision of ancient Greek religion and philosophy influenced the Parnassian poets.

Educated at the Collège Louis-le-Grand and the École Normale, Ménard was a gifted chemist (an early investigator of collodion) as well as a painter and historian. He was a socialist republican and was condemned to prison in 1849 for his *Prologue d'une révolution,* which contained radical political opinions and his reminiscences of the June 1848 insurrections in Paris, in which he played an active part. He escaped abroad, returning to Paris in 1852. Thereafter he devoted himself to classical studies. He spent several years painting in Barbizon and exhibited in the Salons (1857–69). In 1871 he supported and defended the Commune and in 1876 published *Rêveries d'un païen mystique* ("Reveries of a Mystic Pagan"), which expounds his philosophy. He later held academic chairs in decorative art and universal history.

Ménard's poetic works pale beside those of Leconte de Lisle and José María de Heredia, both of whom he influenced considerably. His short novel *La Légende de Saint-Hilarion* (1875) inspired Anatole France's novel *Thaïs* (1890), and his long poem *Prométhée délivré* (1843) was a model for Flaubert's story *La Tentation de Saint Antoine* (1874). His importance can best be seen in his historical and critical works.

Menasha, city, Winnebago county, east-central Wisconsin, U.S. It lies along Lake Winnebago and the north channel of the Fox River, just south of Appleton. Menasha, with the adjoining city of Neenah on the south channel of the Fox River, forms a single economic and social unit. Settled in 1843, it took its name from the Winnebago Indian word for "island." The city developed sawmills and flour and paper mills using the river's waterpower and is now, together with Neenah, the nation's leading producer of paper products. Inc. village 1853; city 1874. Pop. (1991 est.) 14,901.

Menasseh ben Israel: *see* Manasseh ben Israel.

menat, in Egyptian religion, protective amulet, usually hung at the back of the neck as a counterpoise to the necklace worn in the front. Frequently made of glazed ware and quite often found buried with the dead, it was a symbol of divine protection. Among women it fostered fruitfulness and health, while among men it signified virility.

Menchik-Stevenson, Vera Francevna, *née* MENCHIK (b. Feb. 16, 1906, Moscow, Russia—d. June 27, 1944, London, Eng.), Russian-born British international chess master who was the women's world champion of the game from 1927 until her death.

Menchik learned to play chess from her father at the age of nine. In 1921 her family moved to England, where she studied with Géza Maróczy, whose style greatly influenced her. The first Women's World Championship, which Menchik won, was held in London in 1927, and she retained the championship until 1939, when World War II brought an end to the tournaments. She also played successfully in several men's tournaments, taking seconds and thirds. Upon marrying R.H. Stevenson in 1937, she became a British citizen. She was killed in an air raid in London during World War II.

Menchú, Rigoberta (b. 1959, Guatemala), Guatemalan Indian-rights activist who was awarded the Nobel Prize for Peace in 1992.

Menchú was a Mayan Indian of the Quiché group. Her father, a leader of a peasant organization opposed to Guatemala's military government, died in a fire while protesting human-rights abuses by the military. Her younger brother was kidnapped, tortured, and burned to death by a military death squad in 1979, and her mother was kidnapped, raped, mutilated, and murdered by soldiers the following year. Menchú fled to Mexico in 1981 and was cared for there by members of a liberal Roman Catholic group. She soon joined international efforts to make the Guatemalan government cease its brutal counterinsurgency campaigns against Indian peasants, becoming a skilled public speaker and organizer in the course of her efforts. Menchú gained international prominence in 1983 with her widely translated book *I, Rigoberta Menchú,* in which she tells the story of her impoverished youth and recounts in horrifying detail the torture-murders of her brother and mother. She received the Nobel Peace Prize in 1992 for her continuing efforts to achieve social justice and mutual reconciliation in Guatemala.

Mencius (Latin), Chinese (Wade-Giles) MENG-TZU, or (Pinyin) MENGZI, original name (Wade-Giles) MENG K'O, posthumous name TSOU KUNG, or DUKE OF TSOU (b. *c.* 372 BC, ancient state of Tsou, China—d. *c.* 289, China), early Chinese philosopher whose development of orthodox Confucianism earned him the title "second sage." Chief among his basic tenets was an emphasis on the obligation of rulers to provide for the common people. The book *Mencius* records his doings and sayings and contains statements on the innate goodness of human nature, a topic warmly debated by Confucianists up to modern times.

Mencius, detail, ink and colour on silk; in the National Palace Museum, Taipei

By courtesy of the National Palace Museum, Taipei, Taiwan, Republic of China

Early life. Of noble origin, the Meng family settled in the state of Tsou, a minor state in the present province of Shantung. Mencius was born there about 372 BC. In several respects his life was similar to that of Confucius. Tsou and Lu (the state of Confucius' origin) were adjacent states. Like Confucius, Mencius was only three when he lost his father. Mencius' mother paid special attention to the upbringing of her young son. A traditional story tells of her moving their home several times and finally settling near a school, so that the boy should have the right kind of environmental influence, and of her encouraging her son to persevere in his studies. Among the Chinese, the mother of Mencius has been for ages upheld as the model mother.

As a young scholar Mencius had for his mentor a pupil of Tzu Ssu, who was himself the grandson of Confucius. Thus, the continuity of the Confucian orthodoxy in all its purity was assured. In due time Mencius became a teacher himself and for a brief period served as an official in the state of Ch'i. He spent much time traveling, offering his advice and counsel to the various princes on government by *jen* ("human-heartedness"), or humane government. The effort was foredoomed because the times were chaotic, and the contending princes were interested not in humane government but in power.

The Chou dynasty (*c.* 1111–256/255 BC) was founded on the feudalistic principle of a sociopolitical hierarchy, with clearly defined prerogatives and obligations between those of high and low status. As time went on, however, ambition and intrigue resulted in usurpations and impositions, eroding the feudalistic system at the root and bringing on a condition of political and moral disorder. This trend, which caused alarm to Confucius, continued to worsen at an accelerating rate, and the age in which Mencius lived is known in Chinese history as the period of Warring States (475–221 BC). Under such conditions, Mencius' preachments to the princes on virtuous personal conduct and humane government fell on deaf ears; yet he continued to speak his mind, even though he knew that he was championing an unpopular cause.

Philosopher for the people. According to Mencius, the ruler was to provide for the welfare of the people in two respects: material conditions for their livelihood and moral and educational guidance for their edification. Mencius had worked out a definite program to attain economic sufficiency for the common people, and it is recorded in the book of *Mencius* three times. He also advocated light taxes, free trade, conservation of natural resources, welfare measures for the old and disadvantaged, and more nearly equal sharing of wealth. It was his fundamental belief that "only when the people had a steady livelihood would they have a steady heart."

While Mencius patiently exhorted the princes to cultivate the way of moral power and to forsake the way of force and intrigue, he also reminded them emphatically of the responsibility that came to them with the mandate of Heaven to govern for the good of the people. With unusual courage, Mencius declared: "The people are the most important element in a nation; the spirits of the land and grain come next; the sovereign counts for the least." He also quoted for all to hear from the *Shu Ching* ("Classic of History"), one of the Five Classics of Confucianism, the saying "Heaven sees as the people see; Heaven hears as the people hear." The outspoken sympathies of Mencius made him a champion of the common people and an advocate of democratic principles in government.

Mencius' sojourn covered several states, but nowhere did he find a prince willing to put his lofty principles of government into practice. His sense of disappointment grew with the years and finally brought him back to his native state of Tsou, where he devoted the remaining years of his life to the instruction of his pupils. The work *Mencius* is a collection of the records of the doings and sayings of the master by his disciples, arranged in seven books with two parts to each book.

Doctrine of human nature. The philosophic ideas of Mencius might be regarded as an amplification of the teachings of Confucius. Confucius taught the concept of *jen,* love or human-heartedness, as the basic virtue of manhood. Mencius made the original goodness of human nature the keynote to his system. That the four beginnings, or "four principles" (*ssu tuan*)—the feeling of commiseration, the feeling of shame, the feeling of courtesy, and the feeling of right and wrong—are all inborn in man was a self-evident truth to Mencius; and the "four beginnings," when properly cultivated, will develop into the four cardinal virtues of *jen,* righteousness, decorum, and wisdom. This doctrine of the goodness of human nature on the part of Mencius has become an enduring topic for debate among the Chinese thinkers throughout the ages.

Mencius went further and taught that man possessed intuitive knowledge and intuitive ability and that personal cultivation consisted in developing one's mind. Mencius said: "He who has developed his mind to the utmost, knows his nature. Knowing his nature, he knows Heaven." Hence, all men could become like the great sage-kings Yao and Shun, the legendary heroes of the archaic past, according to Mencius.

While Mencius has always been regarded as a major philosopher, special importance was attributed to him and his work by the Neo-Confucianists of the Sung dynasty (AD 960–1279). For the last 1,000 years, Mencius has been revered among the Chinese people as the cofounder of Confucianism, second only to Confucius himself.

Among the several translations of the *Mencius* into the English language, the one by James Legge, *The Chinese Classics,* vol. 2, *Mencius,* 2nd ed. (1893–95; 3rd ed., 1960), is the standard one. W.A.C.H. Dobson's translation, *Mencius: A New Translation Arranged and Annotated for the General Reader* (1963), is also worth consulting. (Y.P.M.)

BIBLIOGRAPHY. Studies of his life and thought include Albert F. Verwilghen, *Mencius: The Man and His Ideas* (1967); Fung Yu-lan (Yu-lan Feng), *A History of Chinese Philosophy,* 2nd ed., vol. 1 (1952, reissued 1983); and Philip J. Ivanhoe, *Ethics in the Confucian Tradition: The Thought of Mencius and Wang Yang-ming* (1990).

Mencius (Latin), Chinese (Wade-Giles) MENG-TZU, or (Pinyin) MENGZI, Chinese Confucian text, named for its author, that earned for the 4th-century-BC philosopher Mencius the title *ya sheng* ("second sage"). Though the book was not generally recognized as a classic until the 12th century, a doctoral chair was established as early as the 2nd century BC to teach the *Mencius.* When Chu Hsi, a great Neo-Confucian philosopher, published the *Mencius* together with three other Confucian texts (1190), he created the classic known as *Ssu shu* ("Four Books").

The book concerns government and maintains that the welfare of the common people comes before every other consideration. When a ruler no longer practices benevolence (*jen*) and righteousness (*i*), the mandate of Heaven (*t'ien ming*) has been withdrawn, and he should be removed. Mencius also declared filial piety (*hsiao*) to be the foundation stone of Chinese society. For him, the greatest act of *hsiao* was to honour parents, the greatest lack of *hsiao* was to have no offspring (thus ancestral rites were not perpetuated).

The fame of the *Mencius* is largely based on a doctrine novel in Chinese thought, namely, that because man is endowed by Heaven his nature tends toward good as naturally as water flows downhill. As proof, Mencius cited the natural love of children for their parents, man's universal sense of right and wrong, and the spontaneous alarm one experiences when one sees a small child in danger.

This doctrine of man's natural goodness was vigorously attacked in the 3rd century BC by Hsün-tzu who taught (in a work called *Hsün-tzu*) that man is selfish and evil by nature and must learn goodness through proper education. Mencius's philosophical position has long been accepted as an orthodox interpretation of Confucianism. *See also* Ssu shu.

Mencken, H.L., in full HENRY LOUIS MENCKEN (b. Sept. 12, 1880, Baltimore, Md., U.S.—d. Jan. 29, 1956, Baltimore), controversialist, humorous journalist, and pungent critic of American life who powerfully influenced U.S. fiction through the 1920s.

H.L. Mencken

By courtesy of the Enoch Pratt Free Library, Baltimore; photograph, Robert Kniesche

Mencken attended a Baltimore private school and the Baltimore Polytechnic. He became a reporter for the *Baltimore Morning Herald* in 1899 and in 1906 joined the staff of the Baltimore *Sun,* where he worked at intervals throughout most of his life. From 1914 to 1923 he coedited (with George Jean Nathan) *The Smart Set,* a witty, urban magazine influential in the growth of American literature, and in 1924 he and Nathan founded the *American Mercury,* which Mencken edited until 1933.

Mencken was probably the most influential American literary critic in the 1920s, and he often used his criticism as a point of departure to jab at various American social and cultural weaknesses. His reviews and miscellaneous essays filled six volumes aptly titled *Prejudices* (1919–27). In literature he fought against what he regarded as fraudulently successful writers and worked for the recognition of such outstanding newcomers as Theodore Dreiser and Sinclair Lewis. He jeered at American sham, pretension, provincialism, and prudery, and he ridiculed the nation's organized religion, business, and middle class (or "booboisie").

Mencken's caustic view of life remained with him throughout his career, and in the 1930s and '40s he altered considerably less than the world around him, with the result that his influence almost disappeared. Few people found the Great Depression a subject for satire of any sort, yet he was as satirical about President Franklin D. Roosevelt and the New Deal as he had been about President Herbert Hoover and Prohibition. Similarly, when the German culture that he had enjoyed was marred by Adolf Hitler and Nazism, Mencken was slower than some of his public to recognize it and to take the fact seriously.

Mencken made still another contribution to American culture. In 1919 he had published a solid volume, *The American Language,* an attempt to bring together examples of American, rather than English, expressions and idioms. The book at once attracted attention. It grew with each reissue through the years, and in 1945 and 1948 Mencken published substantial supplements. By the time of his death, he was perhaps the leading authority on the language of his country.

Mencken's autobiographical trilogy, *Happy Days* (1940), *Newspaper Days* (1941), and *Heathen Days* (1943), is devoted to his experiences in journalism.

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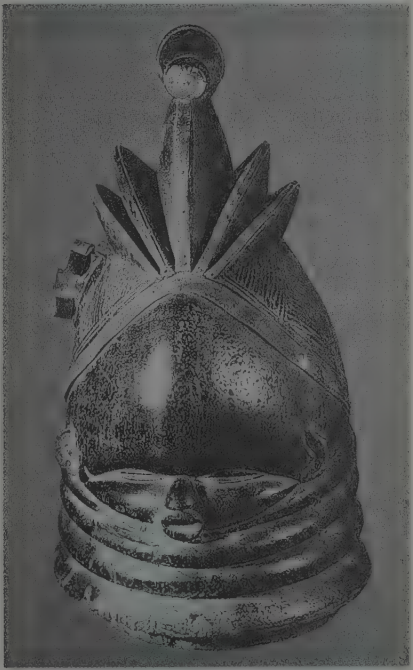
Mende, people of Sierra Leone, including also a small group in Liberia; they speak a language of the Mande branch of the Niger-Congo family. The Mende grow rice as their staple crop, as well as yams and cassava. Cash crops include cocoa, ginger, peanuts (groundnuts), and palm oil and kernels. They practice shifting agriculture, with the heads of families allocating land to individual households, which perform most of the work. Men fell trees and clear the fields, and women weed.

The Mende occupy small towns and villages. Groups of towns and villages form sections, and several sections make up the modern chiefdom. Each section is headed by a subchief, who is the eldest suitable descendant in the male line of the founder of the area; the chiefdom is headed by a paramount chief chosen on the same basis.



Bundu (ritual mask) of the Mende peoples, from Sierra Leone

Marc and Evelyne Bernheim—Woodfin Camp and Associates

The chief is a secular leader only; ritual power is in the hands of the secret *poro* society. Membership in the *poro* is necessary for anyone in a position of authority. In addition to enforcing Mende law, the *poro* and other secret societies educate boys and girls, regulate sexual conduct, and concern themselves with agricultural fertility and military training; men masked as spirits are prominent in these activities. The women's secret society is the *sande.*

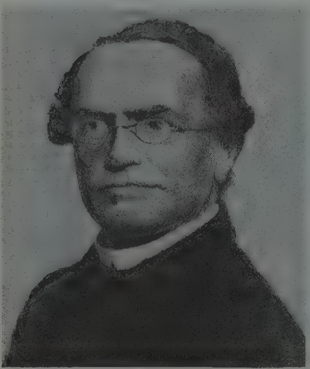
The traditional religion of the Mende includes belief in a supreme creator god, ancestral spirits, and nature deities. Diviners are consulted in times of illness or ominous experience, and the Mende believe in the power of witches. Many Mende are now Muslims or Christians, however.

Mende, town, capital of Lozère *département,* Languedoc-Roussillon region, southeastern France, lying south-southeast of Clermont-Ferrand. It is situated at 2,425 feet (739 m) above sea level in the Massif Central, on the left bank of the Lot River at the foot of a limestone plateau. With practically no industry, the town depends primarily on the tourist trade, being favoured by its position, which is 17 miles (28 km) from the magnificent Gorges of the Tarn. Surrounding mountain areas have been developed for winter sports.

The town's cathedral (restored in the 17th century) was built mainly in the 14th century, and a narrow 14th-century bridge over the Lot still stands. The seat of a bishopric since the 10th century, the town was sacked in 1579–80 by the Huguenots and was rebuilt early in the 17th century. Pop. (1990) 11,286.

Mendel, Gregor (Johann), original name (until 1843) JOHANN MENDEL (b. July 22, 1822, Heinzendorf, Austria—d. Jan. 6, 1884, Brünn, Austria-Hungary [now Brno, Czech Republic]), Austrian botanist and plant experimenter, the first to lay the mathematical foundation of the science of genetics, in what came to be called Mendelism.

Education and early career. Mendel's interest in natural science developed early. After two years' study at the Philosophical Institute at Olmütz (now Olomouc, Czech Republic), he entered the Augustinian monastery at Brünn, Moravia (later Brno, Czech Republic), in 1843, taking the name Gregor. He was ordained a priest in 1847. During the period of his monastic training he taught himself a certain amount of science. From 1849 he acted for a short time as a substitute teacher of Greek and mathematics in the secondary school at Znaim (Znojmo), near Brünn. In 1850 he took the examination for certification as a regular teacher but failed, his lowest marks being given, ironically, in biology and geology. He was then sent by his abbot to the University of Vienna, where he studied physics, chemistry, mathematics, zoology, and botany (1851–53). In 1854 Mendel returned to Brünn and taught natural science in the technical high school there until 1868, although he never succeeded in passing the examination for a teacher's license. In that year he was elected abbot of his monastery.


Gregor Mendel, etching by August Potuczek
By courtesy of the Osterreichische Nationalbibliothek, Vienna

The experiments that led to his discovery of the basic principle of heredity and, subsequently, to the science of genetics were begun in the small monastery garden in 1856. He worked for himself but in an atmosphere conducive to scientific interests. Among his colleagues at the high school were several men engaged in science, some of whom founded in Brünn, in 1862, the Natural Science Society, in whose meetings Mendel took an active part. The libraries of both monastery and school contained essential scientific books, especially on agriculture, horticulture, and botany, subjects in which Mendel's interest had been aroused by experience in his father's orchard and farm. That Mendel himself bought new books in these fields as they appeared is shown by his marginal notes in the works of Charles Darwin that appeared in the 1860s and 1870s. But it is also certain that he had begun his experiments before Darwin's first book was published and before the essential role assigned to heredity as the basis of evolutionary change had been widely recognized. In fact, when he reported the results of his experiments to the Brünn Society for the Study of Natural Science on Feb. 8 and March 8, 1865, he referred to his field of interest as "plant hybridization," and, after indicating his familiarity with the work of his predecessors in this field, he boldly stated that

> among all the numerous experiments made [by them], not one has been carried out to such an extent and in such a way as to make it possible to determine the number of different forms under which the offspring of hybrids appear, or to arrange these forms with certainty according to their separate generations, or definitely to ascertain their statistical relations.

It was this formulation by Mendel of the essential requirements for the experimental study of heredity and his provision of experimental data satisfying these requirements—both original achievements—that led him to the solution of a problem that underlies not only the understanding of heredity and of evolution but of biological processes generally.

Discovery of laws of heredity. Mendel crossed varieties of the garden pea that had maintained, under his observation, constant differences in such single alternative characters as tallness and dwarfishness, presence or absence of colour in the blossoms and axils of the leaves, and similar alternative differences in seed colour, seed shape, position of the flowers on the stem, and form of the pods. He theorized that the occurrence of the visible alternative characters of the plants, in the constant varieties and in their descendants, is due to the occurrence of paired elementary units of heredity, now known as genes. The novel feature of Mendel's interpretation of his data, amply confirmed by subsequent observations on other organisms, including man, is that these units obey simple statistical laws. The principle of these laws is that in the reproductive cells of the hybrids, half transmit one parental unit and half transmit the other. This separation of alternative characters in the reproductive cells, now known as Mendel's first law, or the principle of segregation, adequately accounts for the results when single pairs of alternative characters are observed through several generations and serves reliably as a basis of prediction. Mendel showed, moreover, that when several pairs of alternative characters are observed, the several pairs of elements enter into all possible combinations in the progeny. In the pea varieties at his disposal he observed that the seven pairs of differentiating characters recombined at random, according to the law, or principle of independent assortment, and he worked out the statistical consequences of this principle and confirmed them by experiment.

It is known now that Mendel's second principle (independent assortment) applies only to genes that are transmitted in different "linkage groups" or chromosomes in which genes are organized. Likewise the appearance (or dominance) in the hybrid of one of the alternative characters, which was true of all seven pairs observed by Mendel, proves, on wider experience, not to be true of all alternative characters. But neither of these limitations affects the fundamental truth of the system of particulate heredity by units or genes, which he was the first to prove. In the early years of the 20th century, while it was being tested and confirmed, this system was called Mendelism; it proved to be of general application and is one of the basic principles of biology.

This theory and the description of the experimental results from which it was deduced were presented in two papers that Mendel read at meetings of the Natural Science Society early in 1865 and published in detail in the transactions of the society in 1866. The article, entitled "Versuche über Pflanzenhybriden" ("Experiments with Plant Hybrids"), seems to have had no effect whatever on the biological thinking of his time in Brünn or elsewhere, although his publication reached the major libraries in Europe and America. Perhaps typical of the reception given Mendel's monumental publication was that of the eminent botanist Karl Wilhelm von Nägeli, at the University of Munich; from his correspondence with Mendel it appears that Nägeli neither fully understood the spare, mathematical logic of Mendel's paper nor adequately appreciated the implications of the monk-scientist's revolutionary discoveries.

Nevertheless, Mendel continued his research, attempting to test his theory by experiments with other plants. He published one further paper in 1869, but the plant he chose to investigate—the hawkweed (*Hieracium*), which Nägeli encouraged Mendel to work with—was inherently unsuited to serve as test material and no corroboration of Mendel's principles was obtained because in this genus the embryo is formed from the ovum without fertilization (somatic parthenogenesis). Although Mendel's interest and work in botany, bee culture, and meteorology continued almost until his death, science ceased to occupy the central position in his life, for his election as abbot of his monastery in 1868 brought with it a host of administrative duties and a protracted struggle with the Austrian government over the taxation of the monastery.

Mendel was respected and loved by his fellow monks and townsmen but unknown as the great biological scientist that he was. Fame came to him only after his death. In 1900 three other European botanists, Carl Erich Correns, Erich Tschermak von Seysenegg, and Hugo de Vries, independently obtained results similar to Mendel's and in searching the literature found that both the experimental data and the general theory had been published 34 years previously. What followed is now a part of the history of genetics: confirmation and extension of his theory by biologists in many countries and its incorporation as the basis of a rapidly developing science with primary influence on the understanding of evolution, development, physiology, biochemistry, medicine, agriculture, and social science.

(L.C.D./Ed.)

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Mendel, Lafayette Benedict (b. Feb. 5, 1872, Delhi, N.Y., U.S.—d. Dec. 9, 1935, New Haven, Conn.), American biochemist whose discoveries concerning the value of vitamins and proteins helped establish modern concepts of nutrition.

A professor of physiological chemistry at Yale from 1903 to 1935, he worked with the American biochemist Thomas Osborne to determine why rats could not survive on diets of pure carbohydrates, fats, and proteins alone. Simultaneously with the American biochemists Elmer McCollum and Marguerite Davis, he discovered a fat-soluble factor in cod liver oil and butter (1913; now known to be vitamin A) and a water-soluble factor in milk (1915; now known to be the vitamin B complex), both necessary to life. These researchers also proved that the nutritive value of proteins is determined by the amounts of essential amino acids they contain. Mendel wrote *Changes in the Food Supply and Their Relation to Nutrition* (1916) and *Nutrition: the Chemistry of Life* (1923).

Mendele Moykher Sforim, also spelled MENDELE MOKHER SEFORIM, pseudonym of SHALOM JACOB ABRAMOWITSCH (b. Nov. 20, 1835, Kopyl, near Minsk, Russia [now in Belarus]—d. Dec. 8, 1917, Odessa [now in Ukraine]), Jewish author, founder of both modern Yiddish and modern Hebrew narrative literature and the creator of modern literary Yiddish. He adopted his pseudonym, which means "Mendele the Itinerant Bookseller," in 1879.

Mendele published his first article, on the reform of Jewish education, in the first volume of the first Hebrew weekly, *ha-Maggid* (1856). At Berdichev in the Ukraine, where he lived from 1858 to 1869, he began to publish fiction both in Hebrew (a short story, 1863; the major novel *ha-Avot ve-ha-vanim* ["Fathers and Sons"], 1868) and in Yiddish (first story, "Dos klein mentshele" ["The Little Man"], 1864, in the Yiddish periodical *Koyl Mevasser,* which was itself founded at Mendele's suggestion). He also adapted into Hebrew H.O. Lenz's *Gemeinnützige Naturgeschichte*, 3 vol. (1862–72).

Disgusted with the woodenness of the Hebrew literary style of his time, which closely imitated that of the Bible, Mendele for a time concentrated on writing stories and plays of social satire in Yiddish. His greatest work, *Kitsur massous Binyomin hashlishi* (1875; *The Travels and Adventures of Benjamin the Third*), is a panorama of Jewish life in Russia. After living from 1869 to 1881 in Zhitomir (where he was trained as a rabbi), he became head of a traditional school (Talmud Torah) at Odessa and was the leading personality (known as "Grandfather Mendele") of the emerging literary movement. In 1886 he again published a story in Hebrew (in the first Hebrew daily newspaper, *ha-Yom*), but in a new style that was a mixture of all previous periods of Hebrew. While continuing to write in Yiddish, he gradually rewrote most of his former Yiddish works in Hebrew. His stories, written with lively humour and gentle satire, are an invaluable source for studying Jewish life in eastern Europe at the time when its traditional structure was giving way.

mendelevium (Md), synthetic chemical element of the actinide series in Group IIIb of the periodic table, atomic number 101. It was the first element to be synthesized and discovered one atom at a time. Not occurring in nature, mendelevium (as the isotope mendelevium-256) was discovered (1955) by Albert Ghiorso, Bernard G. Harvey, Gregory R. Choppin, Stanley G. Thompson, and Glenn T. Seaborg at the University of California, Berkeley, as a product resulting from the helium-ion bombardment of a minute quantity (1,000,000,000 atoms) of einsteinium-253 (atomic number 99).

In about a dozen repetitions of the experiment, the team of scientists produced 17 atoms of mendelevium, which were identified by the ion-exchange adsorption–elution method (mendelevium behaved like its rare-earth homologue thulium). Other isotopes of mendelevium, all radioactive, have been discovered. The stablest is mendelevium-258 (two-month half-life). Studied by means of radioactive tracer techniques, mendelevium exhibits a predominant +3 oxidation state, as would be expected by its position in the actinide series; a moderately stable +2 oxidation state is also known.

atomic number	101
stablest isotope	258
valence	2,3
electronic config.	2-8-18-32-31-8-2 or $(Rn)5f^{13}7s^2$

Mendeleyev, Dmitry Ivanovich, Mendeleyev also spelled MENDELEEV (b. Feb. 8 [Jan. 27, Old Style], 1834, Tobolsk, Siberia, Russia—d. Feb. 2 [Jan. 20], 1907, St. Petersburg), Russian chemist who developed the periodic classification of the elements. In his final version of the periodic table (1871) he left gaps, foretelling that they would be filled by elements not then known and predicting the properties of three of those elements.

Mendeleyev

By courtesy of the Mendeleyev All-Union Research Institute of Metrology, Moscow

Early life and education. Mendeleyev was the 17th and last child of the director of the gymnasium at Tobolsk. In the same year his father became blind, and, in order to support the family, his mother leased and operated a glass factory in a town 20 miles (32 km) away. At school Dmitry excelled in mathematics, physics, and geography but fared badly in the compulsory classical languages.

In 1847 his father died, and the next year fire destroyed the glass factory. Faced with these disasters, his mother made a brave decision: she turned her back on Tobolsk and, with her only two dependent children (Dmitry and his sister), set out for Moscow to place her son in the university.

Notwithstanding her good connections, she could not prevail in the face of the inflexible regulations that restricted admission according to place of origin: Siberia was outside the academic pale. She pressed on to St. Petersburg, but the university there, too, was closed to her son. Dmitry was also refused admission to the medical school, but, 10 weeks before her death, his mother finally secured him a place in the Pedagogic Institute.

In 1855 he qualified as a teacher, winning a gold medal for his academic achievements. On account of his health, he was posted, at his own request, to the Crimea, where he continued his chemical studies at Odessa; he returned to St. Petersburg in 1856 to obtain an advanced degree in chemistry. In 1857 he received his first university appointment.

In 1859 the government sent him for further study to the University of Heidelberg. Although Robert Bunsen, the chemist and inventor, and the physicist Gustav Kirchhoff were then the dominant figures in the natural sciences at Heidelberg, Mendeleyev preferred to work independently. His study of molecular cohesion was begun at this time, and while at Heidelberg he attended the celebrated Karlsruhe conference (September 1860) and made valuable contacts with French chemists and with the Italian chemist Stanislao Cannizzaro, whose insistence on the distinction between molecular and atomic weights influenced Mendeleyev considerably.

In 1861 Mendeleyev returned to St. Petersburg. The lack of a permanent position led him to take up editing and scientific writing. In 1864 he became professor of chemistry at the Technical Institute, and three years later he was made professor of general chemistry at the university there. Since he could not find a textbook that met his needs, he set about writing his own: the result was *The Principles of Chemistry* (1868–70), a classic textbook.

Formulation of the periodic law. In the course of writing the book, Mendeleyev probed deeply into the relationship between the properties of elements in an attempt to devise a system of classifying them. Other scientists had also tried to construct such a system of classification. After the English chemist and physicist John Dalton had developed the idea of atomic weights, chemists sought arithmetic connections between them, partly to see whether there was any likelihood of all elements being composed of a simple, common substance and partly to see whether occasional similarities in their properties pointed to similarities in structure. Johann Döbereiner and William Odling, both of whom had also done work with atomic weights, were the most prominent among the chemists who attempted to devise a logical order for the elements. It was Mendeleyev, however, who formulated the periodic law, according to which, when all known elements are arranged in order of increasing atomic weight, the resulting table shows a periodicity of properties and allows one to observe the many types of chemical relation hitherto studied only in isolation. The new system did not win wide acceptance at first, its validity becoming apparent only with time. The table of elements had gaps, but Mendeleyev predicted that they would be filled by elements not yet discovered; three were discovered within 20 years, and they possessed the properties he had predicted. Gradually the table became the framework for a great part of chemical theory and proved to be most useful in the interpretation of the processes of the natural transformation of one element into another, called radioactive decay, more than 20 years after the table's conception.

Although Mendeleyev's textbooks ran to many editions in many languages, the periodic theory remained his chief monument. Mendeleyev's mind, however, was not limited to theory and to classroom teaching. He was also by nature a practical man, aware of the necessity to use science in solving the problems of the world. In 1865 he farmed a small estate and improved the yield and quality of crops by the application of his scientific knowledge, a measure he knew was essential to the improvement of the general agricultural condition of Russia.

Other pursuits. In 1867 he was sent to organize the Russian pavilion at the Paris Exposition of that same year. His study of the French chemical industry during his stay helped him improve the Russian soda industry, and, later, he spent much time working on the problems of the Russian petroleum industry. During a visit to the United States in 1876, he criticized the manner in which American oil interests concentrated on mere expansion of production without giving attention to scientific improvements of either the efficiency of the industry or the quality of its products. At home he was equally critical of the way Russian oil was exploited by foreign interests, and he constantly urged that Russia develop its own oil for its own profit. His interest in aeronautics led him to make balloon ascents for scientific observation and to encourage his colleagues to pursue the possibilities of heavier-than-air flight.

Politically, Mendeleyev held progressive views and was much interested in social reform. The tsarist regime did not approve of his political views, and, although a man of his stature could not be suppressed, he was often snubbed—as, for example, in 1880, when he was ostentatiously refused advancement from corresponding to full membership of the Imperial Academy of Sciences. In 1890 Mendeleyev's transmittal of a request from students at the university for alleviation of unjust conditions led to an open clash between him and the government. For this allegedly improper action he was retired from the university. He held no further major academic post.

He was too useful, however, to be left idle. In 1891 he was officially employed in setting up a new system of import duties on heavy chemicals, and in 1893 he headed the Bureau of Weights and Measures, a post he filled efficiently until his death.

Mendeleyev's last years were saddened not only by declining health but by the political events that preceded the Russian Revolution of 1905. He had been greatly honoured by colleagues of many countries as a guest lecturer and as an honorary member of academies. He was recognized in his day as a leader of the movement to systematize and make cohesive the study of chemistry. He is recognized now as the discoverer of the interrelationship of chemical elements, which not only underlies most of chemistry but also unifies a great deal of modern physics. (F.Gre.)

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Mendelism, the principles of heredity formulated by the Austrian Augustinian monk Gregor Mendel in 1865. These principles compose what is known as the system of particulate inheritance by units, or genes. The later discovery of chromosomes as the carriers of genetic units supported Mendel's two basic laws, known as the law of segregation and the law of independent assortment. In modern terms, the first of these states that genes are transferred as separate and distinct units from one generation to the next. The two members (alleles) of a gene pair, one on each of paired chromosomes, separate during the formation of sex cells by a parent organism. One-half of the sex cells will have one form of the gene, one-half the other form; the offspring that result from these sex cells will reflect those proportions. A modern formulation of the second law, the law of independent assortment, is that the alleles of a gene pair located on one pair of chromosomes are inherited independently of the alleles of a gene pair located on another chromosome pair and that the sex cells containing various assortments of these genes fuse at random with the sex cells produced by the other parent.

Mendelsohn, Erich (b. March 21, 1887, Allenstein, Ger. [now Olsztyn, Pol.]—d. Sept. 15, 1953, San Francisco, Calif., U.S.), German architect known initially for his Einstein Tower in Potsdam, a notable example of German Expressionism in architecture, and later for his use of modern materials and construction methods to make what he saw as organically unified buildings.

While studying architecture at the Technical Academy in Munich, he supported himself by selling his paintings and by designing decorations for store windows and stage productions. During that period he had close contacts with the Blaue Reiter group of German Expressionist artists in Munich.

While serving in the German army during World War I, he made a series of highly imaginative architectural sketches that attracted widespread attention when they were exhibited in Berlin shortly after the war.

The sketches led to Mendelsohn's first commission after the war, the Einstein Tower, Potsdam (1919–21). This bizarre, highly sculptured structure caused an immediate sensation. He had intended the structure to convey the possibilities of poured concrete, but a shortage of this material necessitated the substitution of brick covered with cement. The hat factory of Steinberg, Hermann & Co. that he designed at Luckenwalde (1920–23) also had a striking appearance, and it was entirely functional as well.

During the 1920s Mendelsohn designed a number of structures that were particularly notable for their prominent and imaginative use of glass in strongly horizontal compositions; outstanding were the Schocken stores at Stuttgart (1927) and Chemnitz (1928).

Mendelsohn was forced to leave Germany in 1933, when the National Socialist (Nazi) Party came to power. He went first to Brussels and then to London. His most important work in England was the De La Warr Pavilion, Bexhill (with Serge Chermayeff, 1933), which had a glass-enclosed, semicircular stairway tower. During the same period, he carried out important commissions in Palestine, notably large hospitals at Haifa (1937) and Jerusalem (1938). In 1941 Mendelsohn went to the United States, and in 1945 he settled in San Francisco, where his important works include the Maimonides Hospital (1946). To his credit also are synagogues and community centres in St. Louis, Mo.; Cleveland, Ohio; Grand Rapids, Mich.; and St. Paul, Minn.

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Mendelssohn, Fanny, in full FANNY (CÄCILIE) MENDELSSOHN (-BARTHOLDY), married name FANNY HENSEL (b. Nov. 14, 1805, Hamburg [Germany]—d. May 14, 1847, Berlin, Prussia), German pianist and composer, the eldest sister and confidante of the composer Felix Mendelssohn.

Fanny is said to have been as talented musically as her brother, and the two children were given the same music teachers. Felix readily admitted that his sister played the piano better than he did, and Fanny remained his chief musical adviser until he left home. She is said to have memorized J.S. Bach's complete *Well-Tempered Clavier* by age 13.

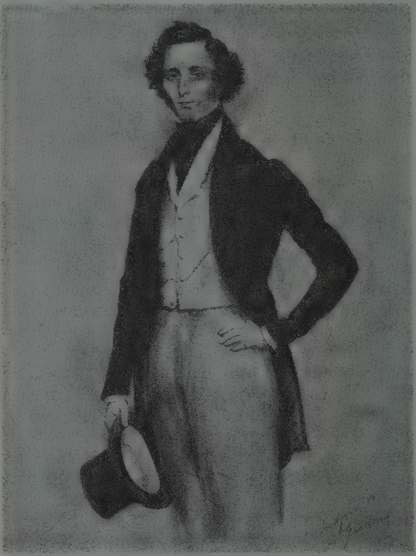
Fanny married the Prussian court painter Wilhelm Hensel in 1829. She traveled in Italy with her husband in 1839–40. Upon her mother's death in 1842 she took over the direction of the Mendelssohn family home in Berlin, in which role she organized local concerts and occasionally appeared as a pianist. Fanny remained very close to her brother, and her death in May 1847 greatly contributed to Felix's own demise six months later.

Fanny wrote about 500 musical compositions in all, including about 120 pieces for piano, many lieder (art songs), and chamber music, cantatas, and oratorios. Six of her songs were published under Felix's name in his two sets of *Twelve Songs* (Opuses 8 and 9), while the few works published under her own name include several collections of short piano pieces, some lieder, and a piano trio. Most of her remaining works exist only in manuscript. Stylistically her music is similar to that of her brother.

Fanny's son Sebastian wrote a biography of the Mendelssohn family based partly on Fanny's diaries and letters, which provide a great deal of information about her brother Felix.

Mendelssohn, Felix, in full JAKOB LUDWIG FELIX MENDELSSOHN-BARTHOLDY (b. Feb. 3, 1809, Hamburg—d. Nov. 4, 1847, Leipzig), German composer, pianist, musical conductor, and teacher, one of the most celebrated figures of the early Romantic period. In his music Mendelssohn largely observed Classical models and practices while initiating key aspects of Romanticism—the artistic movement that exalted feeling and the imagination above rigid forms and traditions. Among his most famous works are *Overture to A Midsummer Night's Dream* (1826), *Italian Symphony* (1833), a violin concerto (1844), two piano concerti (1831, 1837), the oratorio *Elijah* (1846), and several pieces of chamber music. He was a grandson of the philosopher Moses Mendelssohn.

Early life and works. Felix was born of Jewish parents, Abraham and Lea Salomon Mendelssohn, from whom he took his first piano lessons. Though the Mendelssohn family was proud of their ancestry, they considered it desirable, in accordance with 19th-century liberal ideas, to mark their emancipation from the ghetto by adopting the Christian faith. Accordingly Felix, together with his brother and two sisters, was baptized in his youth as a Lutheran Christian. The name Bartholdy, a family property on the river Spree, was held by a wealthy maternal uncle who had embraced Protestantism. When the fortune of this relative passed to the Mendelssohns, his name was adopted by them.



Felix Mendelssohn, watercolour by James Warren Childe, 1829; in a private collection

By courtesy of Hugo von Mendelssohn

In 1811, during the French occupation of Hamburg, the family had moved to Berlin, where Mendelssohn studied the piano with Ludwig Berger and composition with K.F. Zelter, who, as a composer and teacher, exerted an enormous influence on his development. Other teachers gave the Mendelssohn children lessons in literature and landscape painting, with the result that at an early age Mendelssohn's mind was widely cultivated. His personality was nourished by a broad knowledge of the arts and was also stimulated by learning and scholarship. He traveled with his sister to Paris, where he took further piano lessons and where he appears to have become acquainted with the music of Wolfgang Amadeus Mozart.

Mendelssohn was an extemely precocious musical composer. He wrote numerous compositions during his boyhood, among them 5 operas, 11 symphonies for string orchestra, concerti, sonatas, and fugues. Most of these works were long preserved in manuscript in the Prussian State Library in Berlin but are believed to have been lost in World War II. He made his first public appearance in 1818—at the age of nine—in Berlin.

In 1821 Mendelssohn was taken to Weimar to meet J.W. von Goethe, for whom he played works of J.S. Bach and Mozart and to whom he dedicated his *Piano Quartet No. 3. in B Minor* (1825). A remarkable friendship developed between the aging poet and the 12-year-old musician. In Paris in 1825 Luigi Cherubini discerned his outstanding gifts. The next year he reached his full stature as a composer with the *Overture to A Midsummer Night's Dream*. The atmospheric effects and the fresh lyrical melodies in this work revealed the mind of an original composer, while the animated orchestration looked forward to the orchestral manner of Nikolay Rimsky-Korsakov.

Mendelssohn also became active as a conductor. On March 11, 1829, at the Singakademie, Berlin, he conducted the first performance since Bach's death of the *St. Matthew Passion,* thus inaugurating the Bach revival of the 19th and 20th centuries. Meanwhile he had visited Switzerland and had met Carl Maria von Weber, whose opera *Der Freischütz,* given in Berlin in 1821, encouraged him to develop a national character in music. Mendelssohn's great work of this period was the *String Octet in E Flat Major* (1825), displaying not only technical mastery and an almost unprecedented lightness of touch but great melodic and rhythmic originality. Mendelssohn developed in this work the genre of the swift-moving scherzo (a playful musical movement) that he would also use in the incidental music to *A Midsummer Night's Dream* (1842).

In the spring of 1829 Mendelssohn made his first journey to England, conducting his *Symphony No. 1 in C Minor* (1824) at the London Philharmonic Society. In the summer he went to Scotland, of which he gave many poetic accounts in his evocative letters. He went there "with a rake for folksongs, an ear for the lovely, fragrant countryside and a heart for the bare legs of the natives." At Abbotsford he met Sir Walter Scott. The literary, pictorial, and musical elements of Mendelssohn's imagination are often merged. Describing, in a letter written from the Hebrides, the manner in which the waves break on the Scottish coast, he noted down, in the form of a musical symbol, the opening bars of the *Hebrides Overture* (1830–32; also known as *Fingal's Cave*). Between 1830 and 1832 he traveled in Germany, Austria, Italy, and Switzerland and, in 1832, returned to London, where he conducted the *Hebrides Overture* and where he published the first book of the piano music he called *Lieder ohne Worte* (*Songs Without Words*), completed in Venice in 1830. Gradually Mendelssohn, whose music in its day was held to be remarkable for its charm and elegance, was becoming the most popular of 19th-century composers in England. His main reputation was made in England, which, in the course of his short life, he visited no fewer than 10 times. At the time of these visits the character of his music was held to be predominantly Victorian, and indeed he eventually became the favourite composer of Queen Victoria herself.

Mendelssohn's subtly ironic account of his meeting with the queen and the prince consort at Buckingham Palace in 1843, to both of whom he was affectionately drawn, shows him also to have been alive to both the pomp and the sham of the royal establishment. His *Symphony No. 3 in A Minor–Major,* or *Scottish Symphony,* as it is called, was dedicated to Queen Victoria. And he became endeared to the English musical public in other ways. The fashion for playing the "Wedding March" from his *A Midsummer Night's Dream* at bridal processions originates from a performance of this piece at the wedding of the Princess Royal after Mendelssohn's death, in 1858. In the meantime he had given the first performances in London of Ludwig van Beethoven's *Emperor* and *G Major* concerti. He was among the first to play a concerto from memory in public—Mendelssohn's memory was prodigious—and he also became known for his organ works. Later the popularity of his oratorio *Elijah,* first produced at Birmingham in 1846, established Mendelssohn as a composer whose influence on English music equaled that of George Frideric Handel. After his death this influence was sometimes held to have had a stifling effect. Later generations of English composers, enamoured of Richard Wagner, Claude Debussy, or Igor Stravinsky, revolted against the domination of Mendelssohn and condemned the sentimentality of his lesser works. But there is no doubt that he had, nevertheless, succeeded in arousing the native musical genius, at first by his performances and later in the creative sphere, from a dormant state.

A number of new experiences marked the grand tour that Mendelssohn had undertaken after his first London visit. Lively details of this tour are found in his long series of letters. On Goethe's recommendation he had read Laurence Sterne's *Sentimental Journey,* and, inspired by this work, he recorded his impressions with great verve. In Venice he was enchanted by the paintings of Titian and Giorgione. The papal singers in Rome, however, were "almost all unmusical," and Gregorian music he found unintelligible. In Rome he describes a "haggard" colony of German artists "with terrific beards." Later, at Leipzig, where Hector Berlioz and Mendelssohn exchanged batons, Berlioz offered an enormous cudgel of lime tree covered with bark, whereas Mendelssohn playfully presented his brazen contemporary with a delicate light stick of whalebone elegantly encased in leather. The contrast between these two batons precisely reflects the violently conflicting characters of the two composers.

In 1833 he was in London again to conduct his *Italian Symphony* (*Symphony No. 4 in A Major–Minor*), and in the same year he became music director of Düsseldorf, where he introduced into the church services the masses of Beethoven and Luigi Cherubini and the cantatas of Bach. At Düsseldorf, too, he began his first oratorio, *St. Paul.* In 1835 he became conductor of the celebrated Gewandhaus Orchestra at Leipzig, where he not only raised the standard of orchestral playing but made Leipzig the musical capital of Germany. Frédéric Chopin and Robert Schumann were among his friends at Leipzig, where, at his first concert with the Gewandhaus Orchestra, he conducted his overture *Meeresstille und glückliche Fahrt* (1828–32; *Calm Sea and Prosperous Voyage*).

Marriage and maturity. In 1835 Mendelssohn was overcome by the death of his father, Abraham, whose dearest wish had been that his son should complete *St. Paul.* He accordingly plunged into this work with renewed determination and the following year conducted it at Düsseldorf. The same year at Frankfurt he met Cécile Jeanrenaud, the daughter of a French Protestant clergyman. Though she was 10 years younger than himself, that is to say, no more than 16, they became engaged and were married on March 28, 1837. His sister Fanny, the member of his family who remained closest to him, wrote of her sister-in-law: "She is amiable, childlike, fresh, bright and even-tempered, and I consider Felix most fortunate for, though inexpressibly fond of him, she does not spoil him, but when he is capricious, treats him with an equanimity which will in course of time most probably cure his fits of irritability altogether." This was magnanimous praise on the part of Fanny, to whom Mendelssohn was drawn by musical as well as emotional ties. Fanny was not only a composer in her own right—she had herself written some of the *Songs Without Words* attributed to her brother—but she seems to have exercised, by her sisterly companionship, a powerful influence on the development of his inner musical nature.

Works written over the following years include the *Variations sérieuses* (1841), for piano, the *Lobgesang* (1840; *Hymn of Praise*), *Psalm CXIV,* the *Piano Concerto No. 2 in D Minor* (1837), and chamber works. In 1838 Mendelssohn began the *Violin Concerto in E Minor–Major.* Though he normally worked rapidly, throwing off works with the same facility as one writes a letter, this final expression of his lyrical genius compelled his arduous attention over the next six years. Later, in the 20th century, the *Violin Concerto* was still admired for its warmth of melody and for its vivacity, and it was also the work of Mendelssohn's that, for nostalgic listeners, enshrined the elegant musical language of the 19th century. Nor was its popularity diminished by the later, more turgid, and often more dramatic violin concerti of Johannes Brahms, Béla Bartók, and Alban Berg. It is true that many of Mendelssohn's works are cameos, delightful portraits or descriptive pieces, held to lack the characteristic Romantic depth. But occasionally, as in the *Violin Concerto* and certain of the chamber works, these predominantly lyrical qualities, so charming, naive, and fresh, themselves end by conveying a sense of the deeper Romantic wonder.

In 1843 Mendelssohn founded at Leipzig the conservatory of music where, together with Schumann, he taught composition. Visits to London and Birmingham followed, entailing an increasing number of engagements. These would hardly have affected his normal health; he had always lived on this feverish level. But at Frankfurt in May 1847 he was greatly saddened by the death of Fanny. It is at any rate likely that for a person of Mendelssohn's sensibility, living at such intensity, the death of this close relative, to whom he was so completely bound, would undermine his whole being. In fact, after the death of his sister, his energies deserted him, and, following the rupture of a blood vessel, he soon died.

Assessment. Though the music of Mendelssohn, stylish and elegant, does not fill the entire musical scene, as it was inclined to do in Victorian times, it has elements that unite this versatile 19th-century composer to the principal artistic figures of his time. In the *Midsummer Night's Dream* music, with its hilarious grunting of an ass on the bassoon and the evocative effect of Oberon's horn, Mendelssohn becomes a partner in Shakespeare's fairyland kingdom. The blurred impressionist effects in *Fingal's Cave* foreshadow the later developments of the painter J.M.W. Turner. Wagner understood Mendelssohn's inventive powers as an orchestrator, as is shown in his own opera *The Flying Dutchman,* and, later, the French composers of the 20th century learned much from his grace and perfection of style.

In recent times the appeal of Mendelssohn's work has not dwindled. It is true that *Elijah* is not so frequently performed as it was and some of his fluent piano works are now overshadowed by the more enduring works of Beethoven and Schumann. But the great pictorial works of Mendelssohn, the *Scottish* and *Italian* symphonies, repeatedly yield new vistas. Mendelssohn was one of the first of the great 19th-century Romantic composers, and in this sense he remains even today a figure to be rediscovered. (E.L./Ed.)

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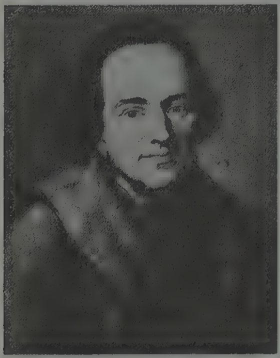
Mendelssohn, Moses (b. Sept. 26, 1729, Dessau, Anhalt [Germany]—d. Jan. 4, 1786, Berlin, Prussia), German-Jewish philosopher, critic, and Bible translator and commentator who greatly contributed to the efforts of Jews to assimilate to the German bourgeoisie.



Moses Mendelssohn, lithograph after a portrait by Anton Graff

Deutsche Fotothek Dresden

The son of an impoverished scribe called Menachem Mendel Dessau, he was known in Jewry as Moses Dessau but wrote as Mendelssohn, from the Hebrew *ben Mendel* ("the Son of Mendel"). His own choice of the German Mendelssohn over the Hebrew equivalent reflected the same acculturation to German life that he sought for other Jews. In 1743 he moved to Berlin, where he studied the thought of the English philosopher John Locke and the German thinkers Gottfried von Leibniz and Christian von Wolff.

In 1750 Mendelssohn became tutor to the children of the silk manufacturer Issak Bernhard, who in 1754 took Mendelssohn into his business. The same year, he met a major German playwright, Gotthold Ephraim Lessing, who had portrayed a noble Jew in his play *Die Juden* (1749; "The Jews") and came to see Mendelssohn as the realization of his ideal. Subsequently, Lessing modeled the central figure of his drama *Nathan der Weise* (1779; *Nathan the Wise,* 1781) after Mendelssohn, whose wisdom had caused him to be known as "the German Socrates." Mendelssohn's first work, praising Leibniz, was printed with Lessing's help as *Philosophische Gespräche* (1755; "Philosophical Speeches"). That year Mendelssohn also published his *Briefe über die Empfindungen* ("Letters on Feeling"), stressing the spiritual significance of feelings.

In 1763 Mendelssohn won the prize of the Prussian Academy of Arts in a literary contest; and as a result King Frederick the Great of Prussia was persuaded to exempt Mendelssohn from the disabilities to which Jews were customarily subjected. Mendelssohn's winning essay compared the demonstrability of metaphysical propositions with that of mathematical ones and was the first to be printed under his own name (1764). His most celebrated work, *Phädon, oder über die Unsterblichkeit der Seele* (1767; "Phaedo, or on the Immortality of the Soul"), defended the immortality of the soul against the materialism prevalent in his day; his title reflects his respect for Plato's *Phaedo.*

In 1771 Mendelssohn experienced a nervous breakdown as the result of an intense dispute over Christianity with the Swiss theologian J.C. Lavater, who two years earlier had sent him his own translation of a work by his compatriot Charles Bonnet. In his dedication, Lavater had challenged Mendelssohn to become a Christian unless he could refute Bonnet's arguments for Christianity. Although Mendelssohn deplored religious controversy, he felt compelled to reaffirm his Judaism. The strain was relaxed only when he began a translation of the Psalms in 1774. He next embarked on a project designed to help Jews relate their own religious tradition to German culture—a version of the Pentateuch, the first five books of the Old Testament, written in German but printed in Hebrew characters (1780–83). At the same time, he became involved in a new controversy that centred on the doctrine of excommunication. The conflict arose when his friend Christian Wilhelm von Dohm agreed to compose a petition for the Jews of Alsace, who originally had sought Mendelssohn's personal intervention for their emancipation. Dohm's *Über die bürgerliche Verbesserung der Juden* (1781; "On the Civil Improvement of the Jews") pleaded for emancipation but, paradoxically, added that the state should uphold the synagogue's right to excommunicate its members. To combat the resulting hostility to Dohm's book, Mendelssohn denounced excommunication in his preface (1782) to a German translation of *Vindiciae Judaeorum* ("Vindication of the Jews") by Manasseh ben Israel. After an anonymous author accused him of subverting an essential part of Mosaic law, Mendelssohn wrote *Jerusalem, oder über religiöse Macht und Judentum* (1783; "Jerusalem, or on Religious Power and Judaism"). This work held that force may be used by the state to control actions only; thoughts are inviolable by both church and state.

A final controversy, revolving around allegations that Lessing had supported the pantheism of Benedict de Spinoza, engaged Mendelssohn in a defense of Lessing, while he wrote his last work, *Morgenstunden* (1785; "Morning Hours"), in support of the theism of Leibniz. His collected works, which fill seven volumes, were published in 1843–45.

Through his own example Mendelssohn showed that it was possible to combine Judaism with the rationalism of the Enlightenment. He was accordingly one of the initiators and principal voices of the Haskala (*q.v.;* "Jewish Enlightenment"), which helped bring Jews into the mainstream of modern European culture. Through his advocacy of religious toleration and through the prestige of his own intellectual accomplishments, Mendelssohn did much to further the emancipation of the Jews from prevailing social, cultural, political, and economic restrictions in Germany. His son Abraham was the father of the composer Felix Mendelssohn.

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Mendenhall, Thomas Corwin (b. Oct. 4, 1841, Hanoverton, Ohio, U.S.—d. March 23, 1924, Ravenna, Ohio), American physicist and meteorologist, the first to propose the use of a ring pendulum for measuring absolute gravity.

Mendenhall was a professor at Ohio State University, Columbus, in 1873–78 and from 1881 until he was named professor emeritus in 1884, when he became a professor for the U.S. Signal Corps. In 1878–81 he was a visiting professor at the Tokyo Imperial University, where he helped develop the Japanese government's meteorological system, and in 1889 he was appointed superintendent of the U.S. Coast and Geodetic Survey; he served as president of the Worcester (Mass.) Polytechnic Institute from 1894 until 1901, when he moved to Europe for 11 years of work.

Mendenhall developed the state weather service of Ohio, and his work included studies in electricity, seismology, and atmospheric electricity.

Mendenhall Glacier, blue ice sheet, 12 miles (19 km) long, about 1.5 miles (2.4 km) wide, and more than 100 feet (30 m) high at its terminus. It flows from the southern half of the huge Juneau Icefield, which begins in the Boundary Ranges in southeastern Alaska, U.S. A relic of the Little Ice Age that lasted until the mid-18th century, the Mendenhall Glacier is an example of a receding glacier (about 90 feet [27 m] a year), displaying raw glacier moraine with exposed remnants of a long-buried forest. It lies adjacent to the Tongass National Forest and is the only glacier in the region that is readily accessible by highway the year round. Originally named Auke, for the Auke Indians, it was renamed in 1892 for Thomas Corwin Mendenhall of the U.S. Coast and Geodetic Survey. Adjacent Mendenhall Lake began to form about 1900 and has become about 1.5 miles (2.5 km) long, 1 mile (1.6 km) wide, and 115 feet (35 m) deep near the centre of the glacier's face.

Menderes, Adnan (b. 1899, Aydın, Tur.—d. Sept. 17, 1961, İmralı), Turkish politician who served as prime minister from 1950 until deposed by a military coup in 1960.

The son of a wealthy landowner, Menderes was educated at the American College in İzmir and the Faculty of Law at Ankara. Later in life he sold or distributed most of his estates to small shareholders, maintaining only one farm, which became a model of modern agricultural methods. In 1930 he entered parliament as a member of Kemal Atatürk's Republican People's Party (RPP). The RPP was at that time the only legal party in Turkey and was firmly pro-Western. It had broken drastically with many social and cultural traditions of the past and had introduced a rigidly controlled state economy.

In 1945 Menderes was expelled from the RPP, and he and three others founded (1946) the Democrat Party (DP), which became Turkey's first opposition party. The 1950 elections, which were the first free elections held in Turkey in more than 25 years, resulted in a landslide victory for Menderes and his party. Menderes was more tolerant than the RPP of traditional ways of life. While still pro-Western in foreign policy, he tried to establish closer ties with Muslim states. Recognizing the deep-seated religious fervour of the populace, Menderes relaxed much of the official antipathy of Atatürk and the RPP towards some of the more conservative manifestations of Islāmic religious feeling.

The DP encouraged private enterprise as opposed to a planned economy, but it eventually brought the country to insolvency by a policy of heedless importation of foreign goods and technology. While the lot of the average villager did improve, it was done at the sacrifice of national economic integrity.

In spite of Turkey's crushing economic problems, Menderes maintained his popularity with the peasantry, and in the 1954 elections the DP again won by a substantial majority, returning Menderes to office. Always intolerant of criticism, Menderes then set out to silence his opposition. Press censorship was instituted, journalists were jailed at whim, and local elections were rigged. These policies not only angered the intellectuals but alienated the military, a group that saw itself as the guardians of Kemalist ideals and felt that the Atatürk reforms were being directly challenged.

Although the national economy continued to decline, Menderes still had popular support and won the 1957 elections. But the opposition to him was intensifying, and on May 27, 1960, a military coup overthrew his government. Menderes and hundreds of Democrat Party leaders were arrested. During a trial lasting 11 months, Menderes was accused of embezzling state funds, extravagance, and corruption, among other charges. He was sentenced to death and, following a suicide attempt, was hanged.

Menderes River, Turkish BÜYÜK MENDERES NEHRİ, historically MAEANDER, river, southwestern Turkey. It rises on the Anatolian plateau south and west of Afyon and flows westward through a narrow valley and canyon. At Sarayköy it expands into a broad, flat-bottomed valley with a typical Mediterranean landscape, dotted with fig trees, olive groves, and vineyards. Near the town of Aydın the river turns southwest, emptying into the Aegean Sea after a course of about 363 miles (584 km). The ancient port of Miletus, which lay near its mouth, has long been landlocked and abandoned because of silting. The river's classical name, Maeander (whence the English *meander*), is derived from the winding course of its lower reaches.

Mendès, Catulle (b. May 22, 1841, Bordeaux, Fr.—d. Feb. 9, 1909, Paris), prolific French poet, playwright, and novelist, most noted for his association with the Parnassians, a group of French poets who advocated a controlled, formal art for art's sake in reaction to the formlessness of Romanticism.

A banker's son, Mendès founded in Paris *La Revue fantaisiste* (1861), which became a vehicle for the late works of Théophile Gautier (whose daughter Mendès married) and such poets as Charles Baudelaire and Villiers de L'Isle-Adam. Mendès edited *Le Parnasse contemporain* (1866, 1871, 1876; "The Contemporary Parnassians"), which named their movement, and he became their historian in *La Légende du Parnasse contemporain.* He also encouraged members of a younger generation of poets who were to found the important Symbolist movement.

Mendès
Harlingue—H. Roger-Viollet

Mendès' *Poésies* (1892) and *Poésies nouvelles* (1893) imitate many other poets, and it is difficult to tell his verse from theirs. His plays *Les Mères ennemies* (1882; "The Enemy Mothers") and *La Femme de Tabarin* (1887; "The Woman of Tabarin") were more successful. He also wrote several novels and licentious tales, such as *Pour lire au bain* ("Readings for the Bath"). His critical work *Rapport sur le mouvement poétique français de 1867–1900* (1902; "Thoughts on the French Poetic Movement of 1867–1900") is still read.

Mendes, Murilo (b. May 13, 1901, Juiz de Fora, Braz.—d. Aug. 14, 1975, Lisbon, Port.), Brazilian poet and diplomat who played an important role in Brazilian Modernism after 1930, though much of his life was spent as a teacher and as cultural attaché in the Brazilian embassy in Italy.

Mendes' early poems, characterized by ironic good humour and a colloquial vocabulary, illuminated the creative, chaotic forces within Brazilian everyday life. His later works show an increasing Surrealist influence. Following his conversion to Roman Catholicism (1934), he collaborated with Jorge de Lima in the creation of metaphysical poetry (*e.g., Tempo e Eternidade*, 1935; "Time and Eternity"), some of which is couched in allegorical terms.

Much of Mendes' subsequent poetry shows an almost dialectical tension between the worlds of forms and of religious transcendence. In poetry published during the last two decades of his life, he sought to incorporate the austere clarity and "dryness" of traditional Iberian Spanish verse, an influence which he communicated in turn to João Cabral de Melo Neto. He also experimented with certain Concretist techniques.

Mendès-France, Pierre (b. Jan. 11, 1907, Paris, Fr.—d. Oct. 18, 1982, Paris), French socialist statesman and premier (June 1954–February 1955) whose negotiations ended French involvement in the Indochina War. He was distinguished for his efforts to invigorate the Fourth Republic and the Radical Party.

Mendès-France
H. Roger-Viollet

Born into a Jewish family, Mendès-France became a lawyer and was a Radical–Socialist deputy for the Eure *département* from 1932 to 1940. He was undersecretary of state for finance under Léon Blum from March to June 1938. After serving in the air force in World War II and being imprisoned by the Vichy government, he escaped in June 1941, reached London in February 1942, and joined the Free French air force. From November 1943 to April 1945, he served under General Charles de Gaulle, first as commissioner for finance and then as minister of national economy. His austere policies, designed to halt inflation, alienated his colleagues and led to his resignation in April 1945.

A deputy again from June 1946, Mendès-France came to the fore as a severe critic of successive governments' policies on economics, the war in Indochina, and North Africa. After the French were defeated at Dien Bien Phu by the Viet Minh in May 1954, he became premier on the pledge that he would end France's involvement in Indochina within 30 days. His promise was fulfilled at the revitalized Geneva conferences, and an armistice line was drawn between the two halves of Vietnam at the 17th parallel. He then paved the way for Tunisian autonomy and assisted the defeat of the European Defense Community, accepting instead a British plan for German rearmament. Again Mendès-France's policies made him unpopular, and, on Feb. 5, 1955, he was defeated. The immediate cause of his fall was his proposed economic-reform program.

Mendès-France then worked to capture the Radical Party and at first succeeded. He wanted to make the party the centre of the noncommunist left. A leader of the left-centre Front Républicain in the general elections of 1956, he was deputy premier without portfolio in Guy Mollet's government from February to May 1956, when he resigned on Mollet's refusal to adopt a liberal policy in Algeria. Because he opposed de Gaulle's accession to power, Mendès-France was not reelected to the National Assembly in 1958. His influence in the Radical Party declining, he resigned in 1959.

In the presidential election of 1965 he supported François Mitterrand against de Gaulle, and in 1967 he regained his seat in the National Assembly; but he never attracted a substantial group of followers who shared his hostility to the Fifth Republic's presidential government.

Mendès-France published several books on political and economic topics.

Méndez, Aparicio (b. Aug. 24, 1904, Rivera, Uruguay—d. June, 1988, Montevideo), Uruguayan lawyer, legal scholar, and politician and, from September 1976 to September 1981, president of Uruguay.

Méndez was professor of administrative law at the University of the Republic in Montevideo from 1930 to 1955, minister of public health from 1961 to 1964, and member of the Council of State from 1973. He was appointed president by the military junta that overthrew President Juan María Bordaberry in the midst of civil strife between government authorities and the leftist guerrillas known as Tupamaros. Upon taking office Méndez published a decree depriving all politicians who took part in the 1966 and 1971 general elections of political rights for 15 years, a measure that affected several thousand people. Méndez' government was widely accused of the illegal detention and torture of political prisoners in its efforts to suppress the rebellion. In 1977 he announced that elections would be held in 1981, although he indicated that economic recovery took precedence over political liberties. As the announced elections approached, the government conducted a referendum on Nov. 30, 1980, on a new constitution that would have institutionalized the role of the armed forces in a "restricted democracy." This constitution was rejected by the voters.

Mendi, town, central Papua New Guinea. It lies at an elevation of 5,495 feet (1,675 m) in the Mendi River valley on a gentle volcanic slope with mountains to the west and east. The heavily populated area surrounding Mendi remains little-developed. Besides vegetable gardens, a tea plantation is located near Mendi, some coffee is grown nearby, and the town has a sawmill. Most transportation is by air, although a road links Mendi with the town of Mount Hagen and with a highway to the northeast. Pop. (1980) 4,130.

mendicant, member of any of several Roman Catholic religious orders who assumes a vow of poverty and supports himself or herself by work and charitable contributions. The mendicant orders surviving today are the Dominicans, Franciscans, Augustinians (Augustinian Hermits), Carmelites, Trinitarians, Mercedarians, Servites, Minims, Hospitalers of St. John of God, and the Teutonic Order.

The two great founders of the orders of mendicant friars were St. Dominic, who founded the Dominican order in 1216, and St. Francis of Assisi, who founded the Franciscan order in 1210. Within a generation of their deaths, their institutes had spread throughout Europe and into Asia, and their friars could be numbered by tens of thousands. In all the great cities of western Europe, friaries were established, and in the universities theological chairs were held by Dominicans and Franciscans. Later in the 13th century they were joined by the other great mendicant orders of Carmelites, Augustinian Hermits, and Servites.

The idea of poverty was St. Francis' root idea, and there is little doubt—though it has been disputed—that it was borrowed from him by St. Dominic and the other mendicant founders. St. Francis did not intend that begging and alms should be the normal means of sustenance for his friars; on the contrary, he intended them to live by the work of their hands and to have recourse to begging only when they could not earn their livelihood by work. But as the friars soon came nearly all to be priests devoted to spiritual ministrations and as the communities grew larger, it became increasingly difficult for them to support themselves by personal work; and so begging came to play a greater role than had been contemplated by St. Francis. But his idea certainly was that his friars should not only practice the utmost personal poverty and simplicity but that they should have the minimum of possessions—no lands, no funded property, no fixed sources of income.

The maintaining of this ideal proved unworkable in practice. In the Dominican order and the others that started as mendicant it has been mitigated or even abrogated. Among the Franciscans it was the occasion of endless strife and was kept alive only by dint of successive reforms and fresh starts, each successful for a time but doomed always, sooner or later, to yield to the inexorable facts. The Capuchins, a Franciscan offshoot, made the most permanently successful effort to maintain St. Francis' ideal; but even among them mitigations have had to be admitted.

Mendip, district, county of Somerset, southwestern England, occupying 285 sq mi (739 sq km) about 20 mi (32 km) south of the city of Bristol. It is named after the most prominent feature in the district, the Mendip Hills, a limestone tableland with a summit of more than 800 ft (240 m) elevation in the northwest. The Mendips extend for about 25 mi (40 km) from between the parishes (towns) of Frome and Bruton in the eastern part of the district to its northwestern corner and drop steeply to the south, forming many caves and combes (deep narrow valleys), the latter extending to the alluvium-filled easterly extension of the Sedgemoor Basin.

Pigs, sheep, poultry, and large herds of dairy and beef cattle are raised on the fertile lowlands. A variety of local industries are based on the processing of these animals' products; shoes are produced at Street and Shepton Mallet, woollen goods at Glastonbury, and cheese at Wells. Frome, the largest town in the district, has a light industrial base including printing, metal casting, and carpeting. Many of the district's villages, as well as the famous medieval cathedral at Wells and the abbey at Glastonbury, are built of the locally quarried, high-quality Doulting limestone. The district seat of Shepton Mallet is in the centre of a cider-apple-growing area. Pop. (1982 est.) 90,300.

Mendip Hills, range of hills lying mostly in the county of Somerset, England, and extending 23 mi (37 km) northwest from the Frome Valley; its northwestern slopes lie in the county of Avon. The Eastern Mendip is comparatively low, but the Western Mendip forms a plateau 6 mi wide and more than 800 ft (244 m) high. Farther west, the Wavering Down and Bleadon Hill continue the trend of the upland toward the Bristol Channel. Swallet holes and drainage (the sudden disappearance of streams and rivers underground) characterize the easily dissolved rocks of the limestone region. There are many caves such as those at Wookey Hole and at Cheddar Cliffs. Important traces of prehistoric settlement have been found in the area.

Mendocian Stage, lowermost and oldest major division of Lower Cretaceous rocks and time in Chile and Argentina (the Cretaceous Period began about 136,000,000 years ago and lasted about 71,000,000 years). It consists of about 300 metres (1,000 feet) of marine black shales and dark limestones that are rich in the remains of ammonite cephalopods (mollusks). To the east, thick shell beds represent the Mendocian Stage. The Mendocian Stage underlies the Huitrinian Stage.

Mendocino Fracture Zone, submarine fracture zone in the Earth's surface in the eastern Pacific Ocean, extending westward from about 120 mi (190 km) off Cape Mendocino, California, for at least 2,500 mi to latitude 38° N, longitude 175° W. In most places the fracture zone is expressed topographically as the steep southern slope of an asymmetric ridge with a gentler northern slope. Smaller, shorter ridges and scarps parallel the main scarp to the north and south along its length. Off California the main scarp is about 10,500 ft (3,200 m) high; toward its western end the height is only about 8,400 ft. Regional depths of the seafloor north of the fracture zone are consistently shallower than to the south, the difference varying between 2,600 and 3,900 ft.

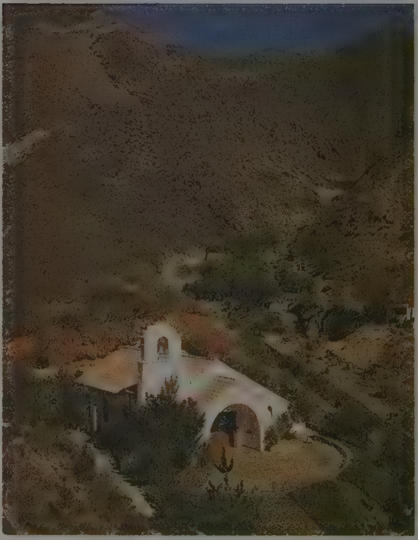
Magnetic intensities of seafloor rocks indicate an apparent lateral offset of 700 mi along the fracture zone; rocks north of the fracture zone are 23,000,000 to 27,000,000 years younger than rocks to the south. This apparent displacement is the scar of transform faulting that accompanied seafloor spreading, a process still going on along the Gorda Ridges north of the fracture zone. This spreading, estimated to proceed at a rate of 1.1 in. (2.9 cm) per year on either side of the Gorda Ridges, results in earthquakes along the fracture zone, from the crest of the ridge eastward to the coast.

Mendovg, also spelled MENDOG (Lithuanian ruler): *see* Mindaugas.

Mendoza, province, western Argentina, extending eastward from the high peaks of the Andes, which form its boundary with Chile. A considerable part of its area of 57,462 sq mi (148,827 sq km) is occupied by arid and semi-arid sections of sub-Andean ranges, foothills, and piedmont. The highest peak of the Andes (and Western Hemisphere), Cerro Aconcagua (22,831 ft [6,959 km]), is in its northwest corner at the Chilean border. The most heavily populated districts of the province are at the base of the cordillera, in the north, where the Río Mendoza, in particular, supplies water for irrigation. Toward the east are sandy plains with extensive saline basins, into which flow all the rivers, with the exception of the Río Grande in the southwest. Dams built on the Atuel and Diamante rivers in the foothills of central Mendoza province have also made the area around the city of San Rafael more agriculturally productive.

Mendoza was settled by Spanish from Chile in 1561. Throughout the colonial period it remained a sparsely populated frontier area, under constant threat of Indian raids, growing small amounts of produce. In 1776 it was detached from Chile to become part of the Viceroyalty of the Río de la Plata, and it attained the rank of province in 1820. Its development was hindered by its remoteness from the Atlantic and the Río de la Plata, but this was surmounted in 1885 by the completion of a railway to the provincial capital, Mendoza (*q.v.*). Subsequently, a trans-Andean railway was completed in 1910 to connect with the Chilean system.

Mendoza produces most of Argentina's grapes grown for wine; and numerous orchards are planted in apples, peaches, pears, apricots, plums, and olives. A major irrigation and hydroelectric project on the Río Diamante was built in the 1970s. Alfalfa is grown to fatten cattle for the Chilean markets, and cereals and soybeans are increasingly cultivated. Mineral resources include deposits of uranium, natural gas, manganese, gold, and copper. In the early 1980s Mendoza was the leading producer of petroleum in Argentina. Tourism is another source of income, based on mountain resorts, notably Villavicencio (thermal springs) and Potrerillos (skiing). An impressive border landmark at 13,450 ft in Uspallata Pass is the statue "Christ of the Andes," sculptured in 1902 by Mateo Alonso as a symbol of peace between Argentina and Chile. Pop. (1983 est.) 1,277,000.



Villavincencio Chapel in the Andes, Mendoza province, Argentina

A. D'Arazien—Shostal/EB Inc.

Mendoza, city, capital of Mendoza province, western Argentina, at an elevation of 2,497 ft (761 m), in the irrigated Río Mendoza Valley, at the foot of the secondary Andean range, Sierra de los Paramillos. The city was founded and relocated several times in the 1560s by Spaniards arriving from Chile. Not until 1776 did control of the region, then known as Cuyo, pass from Spanish Chilean administration to the newly created Viceroyalty of the

Monument to the Army of the Andes on Cerro de la Gloria, Mendoza city, Arg.

Walter Aguiar—EB Inc.

Río de la Plata, governed from Buenos Aires. During the movement for independence from Spain, Mendoza was the headquarters of General José de San Martín, who organized an expeditionary force to cross the Andes and liberate Chile in 1817. A monument commemorating this event is atop Gloria Hill, overlooking the city on the west. In 1861 Mendoza was destroyed by an earthquake, with heavy loss of life. A new city was planned (1863) with broad tree-lined streets, squares, and public parks, close to the ruins. An influx of immigrants, mostly Italians, in the late 19th century stimulated economic development.

Although the climate is dry, irrigation has permitted local cultivation of market gardens, orchards, and vineyards; water was diverted from the Mendoza River at Luján, 15 miles (25 km) south, via a natural channel called El Zanjón, which crosses the city. The wine, fruit-preserving, and petrochemical industries are important in the city and built-up environs. Rail lines and highways link Mendoza to Argentina's principal ports, and the city serves as a gateway to Chile. A major base of the Argentine Air Force is located there. The city has several theatres, a museum of anthropology and natural sciences, the National University of Cuyo (1939), and two other private universities. Pop. (1991) city, 121,739; (1980) Greater Mendoza, 605,623.

Mendoza, Antonio de (b. *c.* 1490, Granada, kingdom of Granada [Spain]—d. July 21, 1552, Lima, Viceroyalty of Peru [now in Peru]), the first and probably the most able viceroy of New Spain, who ruled the conquered Mexican territory with justice, efficiency, and a degree of compassion and established policies that endured until the colonies gained their independence.

Antonio de Mendoza, detail of a manuscript illumination, 16th century; in the Biblioteca Nacional, Madrid

Archivo Mas, Barcelona

The son of a distinguished family of soldiers and statesmen, Mendoza distinguished himself in the service of the Spanish king Charles I, who rewarded him by appointing him viceroy in 1535. In a land recovering from conquest (1519–21), Indian rebellion, and rivalries among the Spanish conquerors, his duties were to increase the royal revenues and regulate the affairs of the Indians.

An able administrator and loyal to his king, Mendoza collected the revenues with honesty and efficiency. In 1542 Charles issued the series of enactments known as the "New Laws," which attempted to limit the powers of the Spanish *encomiendas* (royal land grants) over the subject Indians. Mendoza was both unable and unwilling to enforce these laws but nevertheless tried to alleviate the lot of the Indians by limiting their exploitation in the mines by fixing the hours of work, by ordering payment for the labour of free Indians, and by protecting Indian lands from appropriation. His office was always open to their petitions. He also introduced the printing press, promoted the building of schools and hospitals, and encouraged the improvement of agricultural methods, stock raising, and mining.

The viceroy was the embodiment of the monarch, serving as chief executive, head of the judiciary, patron of the church, commander of the armed forces, and supervisor of the royal treasury. Governing for 15 years, the longest term of any viceroy, Mendoza did much to bring peace and stability to Mexico. As a reward for his effective service, he was promoted to the viceroyalty of Peru in 1551 but lived only long enough to take an extensive tour of the territory and outline the measures to be taken there.

Mendoza, Daniel (b. July 5, 1764, London, Eng.—d. Sept. 3, 1836, London), bareknuckle pugilist, 16th in the succession of English heavyweight champions and the first Jewish champion, the first important fighter to combine scientific boxing with rapid, rather than hard, punching—a great change from the mauling style used until his time. Not a very big man (height, 5 feet 7 inches; weight, 160 pounds), he relied on his courage, strong arms, and excellent physical condition as well as on his revolutionary boxing skill.

In 1791, after the retirement of champion Benjamin Brain, Mendoza was acknowledged as champion because of his victories over Richard Humphries, who had been considered the best heavyweight in England. Mendoza defended the title twice successfully before losing to John ("Gentleman") Jackson on April 15, 1795. Subsequently he became proprietor of a public house in the Whitechapel district of London and opened a highly successful school of boxing. His book *The Art of Boxing* was published in 1789.

Mendoza, Iñigo López de, marqués de Santillana: *see* Santillana, Iñigo López de Mendoza, marqués de.

Mendoza, Pedro de (b. 1487, Guadix, Granada [Spain]—d. June 23, 1537, on shipboard in the Atlantic Ocean), Spanish soldier and explorer, the first governor of the Río de la Plata region of Argentina and founder of Buenos Aires.

Born into a distinguished Spanish family, as a young man Mendoza served as an officer during the Spanish campaigns in Italy. Because the emperor Charles V (Charles I of Spain), spurred by reports of the great wealth of the Incas, wanted Spain to be the first nation to explore the interior of South America, he appointed Mendoza the head of an expedition of conquest and colonization in the Río de la Plata area, with instructions to found three cities and establish rule over an extensive region.

On Aug. 24, 1535, Mendoza sailed with about 2,000 men and 13 ships (three more were added in the Canary Islands, and two were lost during the voyage). Unfortunately, Mendoza was suffering from syphilis and was an ineffective commander. Rivalries ensued among his subcommanders, and one of the ringleaders was executed. The expedition arrived at the Río de la Plata early in 1536 and founded Buenos Aires. At first the Indians were helpful, but they soon turned against the invaders. Suffering from his disease and disheartened by the probable loss of an expeditionary party into the interior, Mendoza decided to return to Spain. The settlers who remained held off the Indians for five years and then moved upriver to Asunción. Mendoza died enroute home and was buried at sea.

Mendoza, Pedro González de: *see* González de Mendoza, Pedro.

Menedemus OF ERETRIA (b. *c.* 339 BC—d. *c.* 265), Greek philosopher who founded the Eretrian school of philosophy.

During a military expedition in Megara, he began attending the lectures of Stilpon and later joined the school founded by Phaedo at Elis. He became the leader of the school and transferred it to Eretria, where it became known as the Eretrian school. An active participant in political affairs, he was forced into exile by his opponents and several years later committed suicide. He is not to be confused with Menedemus of Pyrrha, a member of the Academy in Plato's lifetime.

Menelaus, in Greek mythology, king of Sparta and the younger son of Atreus, king of Mycenae; the abduction of his wife, Helen, led to the Trojan War. During the war Menelaus served under his elder brother Agamemnon, the commander in chief of the Greek forces. After the fall of Troy, Menelaus recovered Helen and brought her home. Menelaus was a prominent figure in the *Iliad* and the *Odyssey,* where he was promised a place in Elysium after his death because he was married to a daughter of Zeus. The poet Stesichorus (fl. 6th century BC) introduced a refinement to the story that was used by Euripides in his play *Helen:* it was a phantom that was taken to Troy, while the real Helen went to Egypt, from where she was rescued by Menelaus after he had been wrecked on his way home from Troy and the phantom Helen had disappeared.

Menelaus OF ALEXANDRIA (fl. late 1st century AD, Alexandria), Greek mathematician who first conceived and defined a spherical triangle (a triangle formed by three arcs of great circles on the surface of a sphere).

Menelaus' most important work is *Sphaerica,* on the geometry of the sphere. In Book I he established the basis for a mathematical treatment of spherical triangles analogous to Euclid's treatment of plane triangles. Furthermore, he originated the use of arcs of great circles instead of arcs of parallel circles on the sphere, a major turning point in the development of spherical trigonometry. Book II covers the application of spherical geometry and trigonometry to astronomical measurements and calculations. Book III, the last, concentrates on spherical trigonometry and introduces Menelaus' theorem. The form of this theorem for plane triangles, well known to his contemporaries, was expressed as follows: if the sides of a triangle are crossed by a straight line (one of the sides is extended beyond one of its vertices), then the product of three of the nonadjacent line segments thus formed is equal to the product of the three remaining line segments of the triangle.

Menelaus modified this theorem and applied it to spherical triangles. This form of the theorem became of fundamental importance in spherical trigonometry and astronomy, and the theorem has since been known by his name. Other notable works have been attributed to him, including one (in six books) on chords in a circle and one (in three books) on elements of geometry, but his only extant work is *Sphaerica.*

Menelik II (Ethiopian emperor): *see* Menilek II.

Menem, Carlos Saúl (b. July 2, 1930, Anillaco, Arg.), politician and lawyer who in 1989 became the first Peronist to be elected president of Argentina since Juan Perón in 1973. He was reelected in 1995.

Menem, the son of Syrian immigrants, was raised as a Muslim. His political aspirations, however, led him to convert to Roman Catholicism, the official religion of Argentina. He joined the Peronist movement in 1956. After obtaining a law degree from the National University of Córdoba in 1958, Menem began a career as a trade union lawyer in the northwestern city of La Rioja. He was elected governor of La Rioja province in 1973 and was expelled from office in 1976 by the military junta that had overthrown the government of

Isabel Perón. He regained his governorship in 1983. As governor, Menem expanded the size of government, gave favourable tax breaks to businesses, and pursued other policies typical of the Peronist movement. Menem was elected president in May 1989, amid the worst economic crisis in the history of Argentina. Inflation was so high that he was forced to abandon his party orthodoxy in favour of a fiscally conservative, market-oriented economic policy. With the aid of many non-Peronist cabinet members, Menem succeeded in stabilizing the economy. As president, he cultivated a flamboyant image and enjoyed great national popularity despite sharp criticism for pardoning convicted human-rights violators connected with the period of military rule (1976–83).

Menéndez de Avilés, Pedro (b. Feb. 15, 1519, Avilés, Spain—d. Sept. 17, 1574, Santander), Spanish sailor and founder of St. Augustine, Fla., who was a classic example of the conquistador—intrepid, energetic, loyal, and brutal.

Menéndez de Avilés, engraving
Archivo Mas, Barcelona

Born into the landed gentry, he ran away to sea at the age of 14. In 1549 he was commissioned by the Holy Roman emperor Charles V (Charles I of Spain) to drive pirates from the coasts of Spain. Five years later he was appointed captain of the Indies fleet. An impatient man who acted with dispatch and reluctantly concerned himself with administrative details, he made numerous enemies, who brought about his imprisonment in 1563. He was freed two years later after he had regained royal favour.

Because King Philip II was disturbed by the potential threat to Spain's possessions from a settlement of French Huguenots on a strategic part of the Florida coast, he sent Menéndez de Avilés to Florida to establish a colony there and deal with the French. The expedition sailed in July 1565, with 11 ships and about 2,000 men. On August 28 he entered and named the bay of St. Augustine and built a fort there. On September 20 he took the French colony, Fort Caroline, and massacred the entire population, hanging the bodies on trees with the inscription "Not as Frenchmen, but as heretics." Menéndez de Avilés then explored the Atlantic coast and established a string of forts as far north as the island of St. Helena (off present South Carolina). He was recalled to Spain in 1567 and later helped organize a squadron of ships against the English. He died while engaged in this task.

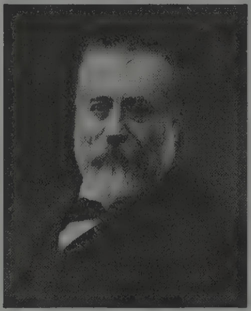
Menéndez Pidal, Ramón (b. March 13, 1869, La Coruña, Spain—d. Nov. 14, 1968, Madrid), scholar whose work on the origins of the Spanish language, as well as critical editions of texts, generated a revival of the study of medieval Spanish poetry and chronicles.

Professor of Romance philology at the University of Madrid (1899–1939), he was also director of the Centre of Historical Studies. Among his first notable works were *Manual de gramática histórica española elemental* (1904; "Manual of Historical Spanish Grammar") and the commentary *El cantar de mío Cid* (1908–11; "The Song of My Cid"). Founding editor in 1914 of the *Revista de filología española* ("Journal of Spanish Philology"), he was also twice president of the Spanish Academy (1929–39 and 1948–68).

Menéndez' vast and meticulous research included monographs on folklore, literary history, the stylistics of Theresa of Ávila, Lope de Vega, and others, and on etymology and place-names. Throughout all his works Menéndez Pidal stressed the native roots of Spanish culture, including the Basque, Gothic, and Arabic. *Origenes del español* (1926; "Origins of Spanish") was followed by *La España del Cid,* 2 vol. (1929; *The Cid and His Spain*). His monumental *Historia de España* ("History of Spain"), which he began to edit in the 1930s, was incomplete at the time of his death. Its introduction, however, *Los españoles en la historia y en la literatura* (1947; *The Spaniards in Their History: An Analysis of Spain's National Characteristics*), is one of his most accessible works for the general reader.

Menéndez y Pelayo, Marcelino (b. Nov. 3, 1856, Santander, Spain—d. May 19, 1912, Santander), Spanish literary critic and historian, remarkable for his vast erudition and his elegant and flexible prose. Although some of his judgments are no longer accepted, his studies of medieval, Renaissance, and Golden Age Spanish literature are still invaluable. The range and profundity of his knowledge enabled him to make valuable assessments of the Hispanic contribution to Western literature.

He was professor of Spanish literature at Madrid (1878–98) and director of the Biblioteca Nacional (1898–1912); his private library (of 45,000 volumes), which he bequeathed to Santander, forms part of the Biblioteca de Menéndez y Pelayo. His works are available in the *Edición nacional de las obras completas de Menéndez y Pelayo,* 43 vol. (1940–46).



Menéndez y Pelayo, detail of an oil painting by José Moreno Carbonero; in the Royal Academy of History, Madrid
Archivo Mas, Barcelona

Menes, also spelled MENA, MENI, or MIN (fl. *c.* 2925 BC), first king of unified Egypt, who, according to tradition, joined Upper and Lower Egypt in a single, centralized monarchy. Manetho, a 3rd-century-BC Egyptian historian, called him Menes; the 5th-century-BC Greek historian Herodotus referred to him as Min; and two native-king lists of the 19th dynasty (13th century BC) call him Meni. Modern scholars have inconclusively identified the traditional Menes with one or more of the archaic Egyptian kings bearing the names Scorpion, Narmer, and Aha.

In addition to crediting Menes with the unification of Egypt by war and administrative measures, tradition attributes to him the founding of the capital, Memphis, near modern Cairo. Excavations at Ṣaqqārah, the cemetery for Memphis, have revealed that the earliest royal tomb located there belongs to the reign of Aha. Manetho called Menes a Thinite—*i.e.,* a native of the Thinite province in Upper Egypt—and, in fact, monuments belonging to the kings Narmer and Aha, either of whom may be Menes, have been excavated at Abydos, a royal cemetery in the Thinite nome. Narmer also appears on a slate palette (a decorated stone on which cosmetics were pulverized) wearing the red and white crowns of Lower and Upper Egypt, a combination symbolic of unification; he is shown triumphant over his enemies, probably an allusion to the wars fought to attain unity. Actually, the whole process probably required several reigns, and the traditional Menes may well represent the kings involved. According to Manetho, Menes reigned 62 years and was killed by a hippopotamus.

Menes, victory tablet of King Narmer from Hierakonpolis, beginning of the Early Dynastic Period; in the Egyptian National Museum
By courtesy of the Egyptian National Museum; photograph, Hirmer Fotoarchiv, Munchen

Mēness (Latvian), Lithuanian MĖNUO, in Baltic religion, the moon, the god whose monthly renewal of strength is imparted to all growing things.

Mēness, dressed in a starry gown and riding in a chariot drawn by gray horses, displays traits of a war god but is known chiefly as the main suitor of Saule, the sun goddess, or as one of the rivals for the hand of Saule's daughter. In some traditions Mēness marries Saule but is unfaithful to her; for his infidelity he is punished by Pērkons, the Thunderer.

Meng T'ien, Pinyin MENG TIAN (d. 209 BC, China), famous general of the Ch'in dynasty who built the Great Wall of China.

As a general under Shih Huang-ti, the first noted emperor of the Ch'in dynasty, Meng was sent to subdue the nomadic central Asian tribesmen, who were overrunning north China, and to build a wall as a defense against these tribesmen. Other Chinese rulers are said to have built defensive walls in the north before this time, and Meng probably incorporated these lesser walls into his work. After the death of Shih Huang-ti, the minister Li Ssu and the eunuch Chao Kao usurped the government, forcing Meng T'ien and the legitimate heir apparent to take their own lives.

Meng is credited with inventing the *cheng,* a kind of harpsichord, and also a Chinese writing brush made of hair, used as a pen. The latter was almost certainly not his creation, although he may have somewhat improved or modified the standard writing brush.

Meng-tzu: *see* Mencius.

Mengelberg, Willem, in full JOSEF WILLEM MENGELBERG (b. March 28, 1871, Utrecht, Neth.—d. March 21, 1951, Chur, Switz.), symphonic conductor in the Romantic tradition who, during his tenure with the Amsterdam Concertgebouw Orchestra (1895–1945), developed it into one of the world's finest orchestras.

Trained as a pianist at the Cologne Conservatory, he became a conductor at Luzern, Switz., in 1891. He became renowned as an interpreter of Beethoven, Mahler, and Richard Strauss, who dedicated his tone poem *Ein Heldenleben* ("A Hero's Life") to Mengelberg. He toured widely with the Concertgebouw, was regular conductor (1911–14) of the London Symphony and the Royal Philharmonic Society, and was guest conductor (1921–30) of the New York Philharmonic (and of its predecessor, the National Symphony, before the merger of the two), serving for several years as coconductor with Arturo Toscanini.

Near the end of World War II, Mengelberg fled The Netherlands for Switzerland. In 1945 a Dutch council convicted him, in absentia, of having been a Nazi collaborator and sentenced him to exile for life (later reduced to exile for six years).

Mengele, Josef, byname ANGEL OF DEATH, German TODESENGEL (b. March 16, 1911, Günzburg, Ger.—d. Feb. 7, 1979, Enseada da Bertioga, near São Paulo, Brazil), Nazi doctor at Auschwitz extermination camp (1943–45), who directed the operation of the gas chambers and conducted medical experiments on inmates in pseudoscientific racial studies.

Mengele's father was founder of a farm machinery factory, Firma Karl Mengele & Söhne, in the village of Günzburg in Bavaria. Mengele studied philosophy in Munich in the 1920s, coming under the influence of the racial ideology of Alfred Rosenberg, and then took a medical degree at the University of Frankfurt am Main. He enlisted in the SA (German *Sturmabteilung,* "Assault Division") in 1933. Becoming an ardent Nazi, he joined (1934) the research staff of a newly founded Institute for Hereditary Biology and Racial Hygiene. During World War II, he served as a medical officer with the Waffen SS in France and Russia and in 1943 was appointed by Heinrich Himmler to be chief doctor at Birkenau, a supplementary extermination camp near Auschwitz, where he and his staff selected incoming Jews for labour or extermination and where he supervised medical experiments on inmates to discover means of increasing fertility (to increase the German race). His chief interest, however, was research on twins.

After the war Mengele escaped internment and went underground, serving four years as a farm stableman near Rosenheim in Bavaria. Then he reportedly escaped, via Genoa, to South America in 1949. He married (for a second time) under his own name in Uruguay in 1958 and, as "José Mengele," received citizenship in Paraguay in 1959. In 1961 he apparently moved to Brazil, reportedly becoming friends with an old-time Nazi, Wolfgang Gerhard, and over the years living in a succession of houses owned by a Hungarian couple. In 1985 a multinational team of Brazilian, West German, and American forensic experts determined that Mengele took Gerhard's identity, died in 1979 of a stroke while swimming, and was buried under Gerhard's name. Dental records later confirmed the forensic conclusion.

Menger, Carl (b. Feb. 23, 1840, Neu-Sandec, Galicia, Austrian Empire [now in Poland]—d. Feb. 26, 1921, Vienna, Austria), Austrian economist who contributed to the development of the marginal utility theory and to the formulation of a subjective theory of value.

Menger's value theory proceeded from an analysis of the behaviour of the individual to an explanation of economic phenomena; *e.g.,* the demonstration that exchange value can be explained in terms of use value, the concept that goods contribute to consumers' satisfactions. In his most important work, *Grundsätze der Volkswirtschaftslehre* (1871; *Principles of Economics*), Menger tried to show the relationships among utility, value, and price.

Menger received his Ph.D. degree from the Jagiellonian University in Kraków in 1867 and then accepted a position in the Austrian civil service. In 1873 he became a professor of political economy at the University of Vienna, where he remained, with brief interruptions, until 1903. He thereafter devoted himself to the completion of his studies in economics. Menger is widely known as the founder of the "Austrian school" of economists.

Menger, detail of a drawing by F. Schmutzer, 1910

By courtesy of Bildarchiv Preussischer Kulturbesitz BPK, Berlin (West)

Mengistu Haile Mariam (b. 1937, Kefa province, Eth.), Ethiopian army officer and head of state (1974–91), who helped overthrow the centuries-old monarchy and attempted to mold Ethiopia into a socialist state.

Mengistu received officer training at Holeta and additional training in the United States. Rising to the rank of major, he became one of a group of junior officers and enlisted men who, discontented with their lack of patronage and promotion within the military, plotted rebellion against the government of Emperor Haile Selassie I. In June 1974 he was made chairman of the Derg, a committee of revolutionary soldiers, and, after the arrest of the emperor in September, he was made a vice-chairman of the Provisional Military Administrative Council (PMAC; also commonly called the Derg), which assumed the functions of government. On Nov. 23, 1974, Mengistu ordered the assassination of the PMAC's moderate chairman and urged the killing of 60 aristocrats and former officials of the old imperial regime. By killing selected enemies within the PMAC, Mengistu then became the acknowledged strongman of a regime that proceeded to nationalize industries and farmlands.

In February 1977 Mengistu, now a lieutenant colonel, survived a battle between his supporters and those of rivals on the PMAC. The chairman and several other members were killed, and Mengistu became head of state and chairman. He then unleashed a bloody "Red Terror Campaign" to crush armed opponents among the civilian populace, and later that year he solicited Soviet weaponry and Cuban soldiers to repel an invasion by Somalia of the Somali-speaking Ogaden region. As undisputed ruler of the country, he oversaw the establishment of the Workers' Party of Ethiopia in 1984, the drafting of a constitution for Ethiopia in 1986 (endorsed in 1987), and the election by a new national legislature of himself as president in September 1987. By then, Mengistu faced armed rebellion in the northern regions of Tigray and Eritrea, a series of the worst droughts and famines ever to afflict Ethiopia, an agricultural economy ruined by the forced collectivization of farms and the relocation of entire populations, and occasional coup attempts by enemies within the regime. The withdrawal of Soviet support further weakened Mengistu's power, and in May 1991 he summarily resigned his post and fled to Zimbabwe.

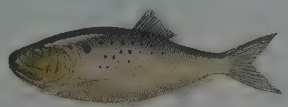
Mengs, Anton Raphael, Raphael also spelled RAFFAEL (b. March 22, 1728, Aussig, Bohemia [now Ústí nad Labem, Czech Republic]—d. June 29, 1779, Rome, Papal States [Italy]), painter who was perhaps the leading artist of early Neoclassicism.

Mengs studied under his father in Dresden, Saxony, and then in Rome. He became painter to the Saxon court in Dresden in 1745 and executed a large number of portraits, most in brightly coloured pastels. Mengs returned to Rome in the early 1750s, and about 1755 he became a close friend of the German archaeologist and art critic J.J. Winckelmann. He came to share Winckelmann's enthusiasm for classical antiquity, and upon its completion in 1761 his fresco "Parnassus" at the Villa Albani in Rome created a sensation and helped establish the ascendancy of Neoclassical painting. Mengs also continued to paint portraits during this period, competing with Pompeo Batoni, the leading Rococo portraitist of the Roman school. In 1761 he went to the Spanish court at Madrid, where he worked on the decoration of royal palaces. From 1769 to 1772 Mengs was in Rome, decorating the Camera dei Papiri in the Vatican, and he returned to Spain from 1773 to 1777.

Mengs was widely regarded in his day as Europe's greatest living painter. He eschewed the dramatic illusionism and dynamism of the Baroque style in his figural compositions, preferring instead to blend quotations from ancient sculptures with stylistic elements of Raphael, Correggio, and Titian. The results are generally cold, insipid, and contrived, however, and Mengs's reputation has declined precipitously since the 18th century. Some of his portraits display a freedom and sureness of touch entirely lacking in his more ambitious works.

Mengzi: *see* Mencius.

menhaden, also called POGY, FATBACK, or MOSSBUNKER, any of several species of valuable Atlantic coastal fishes in the genus *Brevoortia* of the herring family (Clupeidae), utilized for oil, fish meal, and fertilizer. Menhaden have a deep body, sharp-edged belly, large head, and tooth-edged scales. Adults are about 37.5 cm (about 15 inches) in length and 0.5 kg (1 pound) or less in weight. Dense schools of menhaden range from Canada to South America. When feeding, they swim with mouths agape and gill openings widespread to strain out plankton. Menhaden spawn at one place or another throughout the year. Their buoyant eggs hatch in about two days. The young grow rapidly and mature at about three years. Large numbers of menhaden are netted annually. The fish meal, mainly used as animal feed, may someday provide inexpensive and easily obtained protein for humans.



Atlantic menhaden (*Brevoortia tyrannus*)

Tom Dolan, under the supervision of Loren P. Woods, The Field Museum, Chicago

menhir, megalithic monument erected singly or in formations. *See* megalith.

Menia (Egypt): *see* Minyā, Al-.

Ménière's disease, recurrent and generally progressive group of symptoms that include loss of hearing, ringing in the ears, dizziness, and a full sensation or pressure in the ears. The disease is episodic, with attacks, accompanied by nausea and vomiting, seldom lasting longer than 24 hours. The apparent immediate cause of the disorder is excessive endolymph, the fluid in the cochlear duct of the inner ear. (The cochlear duct is the membranous tube inside the winding passage of the snaillike cochlea.) The reason for the excess of endolymph is not known. Administration of diuretics and a low-salt diet commonly are prescribed to control the symptoms.

Menilek II, also spelled MENELIK, original name SAHLE MIRIAM, also spelled SAHLÉ MARIAM (b. Aug. 17, 1844, Ankober, Shewa [Shoa], Ethiopia—d. Dec. 12, 1913, Addis Ababa), king of Shewa (or Shoa, 1865–89), and emperor of Ethiopia (1889–1913). One of Ethiopia's greatest rulers, he expanded the empire almost to its present-day borders, repelled an Italian invasion in 1896, and carried out a wide-ranging program of modernization.

Menilek II, detail of an oil painting by Paul Buffet, 1897; in the Senate Palace, Paris

J.E. Bulloz

Early life. Menilek's father was Haile Malakot, later *negus* (king) of Shewa. His mother was a court servant who married Haile Malakot shortly after Sahle Miriam was born. His forefathers had been rulers of Menz, the heartland of Shewa, since the 17th century, and it has been claimed that further back they were related to the Solomonid line of emperors who ruled Ethiopia between 1268 and 1854 (alternate dates 1270–1855). The crown name Menilek II was significant: Menilek I was the legendary son of Solomon and the Queen of Sheba (Makeda).

In 1855 the vigorous emperor of Ethiopia, Tewodros II, invaded the then semi-independent kingdom of Shewa. Early in the subsequent campaigns, Haile Malakot died, and Sahle Miriam was captured and taken to the emperor's mountain stronghold, Amba Magdela. In nearly 10 years of captivity, he had opportunity to observe Tewodros' dedication to the unification and modernization of the empire and also the heavy-handed and often violent methods that ultimately led to the emperor's failure and suicide.

King of Shewa. Sahle Miriam contrived to escape from Magdela in 1865 and returned to Shewa, which had remained in a state of sporadic unrest and revolt against Tewodros. Although only 21 years of age, he was able to displace Bezebeh, who had been appointed ruler by the emperor in 1859, and subsequently declared himself *negus* of the province. Sahle Miriam stood six feet tall and had a dark complexion and fine white teeth, but smallpox had left its marks on his face. As a diplomat he made a great impression on the foreign emissaries who visited his court. With their help he imported firearms, the better to equip his armies and the garrisons and settlers that came in their wake.

On the death of Tewodros in 1868, Sahle Miriam, as *negus* of Shewa, aspired to the position of emperor. But he was not the only claimant and had to submit first to Tekle Giorgis (1868–72) and Yohannes IV (1872–89). Before Yohannes died fighting the Sudanese in 1889, he obliged Sahle Miriam to direct his ambitions mainly to the south and east. Sahle Miriam subsequently incorporated Arusi, Harer (Harar), Jima, Kefa (Kaffa), and the several kingdoms and states of southern Ethiopia within his domains. By the time of Yohannes' death, Sahle Miriam had emerged as the strongest man in Ethiopia and was able to assume the imperial crown for which he had waited so long.

During the period of his rivalry with Emperor Yohannes IV and the latter's son, Mengesha, Menilek appeared to befriend the Italians, but a quarrel later developed. The Italians interpreted Article XVII of the Treaty of Wichale (Ucciali), concluded in 1889 by the Italians and Menilek, as giving Italy a protectorate over Ethiopia. It is quite inconceivable that Menilek would have agreed to his historic country becoming a protectorate. When he learned of the Italian interpretation, which was gaining some acceptance in Europe, he at once denied it and, in 1893, renounced the whole treaty.

Defeat of Italy at Adowa. The Italians had established themselves along the Red Sea coast, and the governor of the Italian colony of Eritrea, after much intrigue and several minor military skirmishes, risked a major confrontation. The Italian army was defeated by the Ethiopians in one of the greatest battles in the history of Africa—the Battle of Adowa (Adwa), on March 1, 1896. A settlement after the battle canceled the Treaty of Wichale and acknowledged the full sovereignty and independence of Ethiopia, but the Italians were allowed to retain Eritrea.

After Adowa, Menilek's Ethiopia was at once accepted by the European powers as a real political force. The crushing defeat of a European army greatly enhanced Menilek's international reputation, causing a host of foreign advisers, ambassadors, emissaries, and adventurers to flow into the country.

Menilek's later activities as emperor included the creation of ministries, the initiation of modern education, and the construction of telephone and telegraph systems and of a railway from Djibouti, on the Gulf of Aden, to Addis Ababa, the emperor's new capital in the highlands of Shewa. Beginning in 1906 or 1907, Menilek suffered a series of paralytic strokes, and power passed to his wife, Empress Taitu, to Ras Tesemma, who became regent, and to Lij Iyasu, the grandson who was to succeed him. The stricken emperor finally died in 1913. (Ri.G./Ed.)

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Menindee Lakes, series of reservoirs, part of the Darling River Conservation Scheme, western New South Wales, Australia, near the town of Menindee. Primarily natural features, the lakes are flooded through creeks linking them, at high water, eastward to the Darling River, which has been dammed for back drainage. They include Lakes Menindee, Tandou, Pamamaroo, and Cawndilla and several smaller lakes. The total capacity of the Menindee Lakes Storage Scheme (for domestic and industrial water and irrigation), which was begun in 1949 and completed in 1960, is 2,000,000 acre-feet (2,467,000,000 cubic m). Lakes Menindee and Cawndilla are part of Kinchega National Park. Menindee is an Aboriginal term meaning "egg yolk."

meninges, singular MENINX, three membranous envelopes—pia mater, arachnoid, and dura mater—that surround the brain and spinal cord. Cerebrospinal fluid fills the ventricles of the brain and the space between the pia mater and the arachnoid. The chief function of meninges and cerebrospinal fluid is to protect the central nervous system.

Pia mater. The pia mater is the meningeal envelope that firmly adheres to the surface of the brain and spinal cord. It is a very thin membrane composed of fibrous tissue covered on its outer surface by a sheet of flat, polygonal cells believed to be impermeable to fluid. Pierced by blood vessels that pass through it to reach the brain and spinal cord, the pia mater follows these blood vessels into the depth of the brain.

Arachnoid. Over the pia mater and separated from it by a space called the subarachnoid space is a second meningeal envelope of the central nervous system, the arachnoid, a thin membrane remarkable for its delicacy and transparency. It is composed of fibrous tissue and, like the pia, is covered by flat, polygonal cells also believed to be impermeable to fluid. The arachnoid does not follow the irregularities of the surface of the brain, and so looks like a loosely fitting sac with a variable distance, in certain regions relatively large and in others minute, between its walls and the surface of the nervous system.

In the region of the brain, particularly, a large number of fine filaments pass from the arachnoid through the subarachnoid space to blend with the tissue of the pia mater. These filaments are called arachnoid trabeculae. They are remnants from embryological life of the common origin of the arachnoid and pia mater, and they have the frail structure characteristic of these two of the meninges. The pia mater and arachnoid are called collectively the leptomeninges.

Dura mater. The outermost of the three meninges is the dura mater (or pachymeninx), a strong, thick, and dense membrane. It is composed of dense fibrous tissue, and its inner surface is covered by flattened polygonal cells like those present on the surfaces of the pia mater and arachnoid. It can be regarded as a sac that envelops the arachnoid and that has been modified to serve several functions.

Within the skull the dura mater surrounds and supports the large venous channels (dural sinuses) carrying blood from the brain toward the heart. It also is prolonged into several partitions, or septa, which lend support to the brain. One of these, the falx cerebri, is a sickle-shaped partition lying between the two hemispheres of the brain. Another, the tentorium cerebelli, provides a strong, membranous roof over the cerebellum. A third, the falx cerebelli, projects downward from the tentorium cerebelli between the two cerebral hemispheres. The outer portion of the dura mater over the brain serves as a covering, or periosteum, of the skull bones' inner surfaces.

Within the vertebral canal the dura mater splits into two sheets. These are separated by a space, called the epidural space, which is filled with fat and thin-walled veins. The outer of these two sheets constitutes the periosteum of the vertebral canal. The inner sheet is separated from the arachnoid by the narrow subdural space, which is filled with fluid.

In a few places, however, the subdural space is absent, and the arachnoid is intimately fused with the dura mater. The most important area of fusion between these two meninges is in the walls of the large venous channels of the dura mater. There elongations of the arachnoid, like fingers, penetrate the dura mater and project into the veins. These fingerlike processes of the arachnoid, which are referred to as arachnoid villi, or arachnoid granulations, are involved in the passage of cerebrospinal fluid from the subarachnoid space to the dural sinuses.

meningitis, inflammation of the meninges, the membranes covering the brain and spinal cord. It can be caused by various infectious agents, including viruses, fungi, and protozoa, but bacteria produce the most life-threatening forms.

Among the bacteria that can cause meningitis are the meningococcus (*Neisseria meningitidis*), the influenza bacillus (*Haemophilus influenzae*), and various strains of pneumococci, streptococci, or staphylococci. A bacterial infection elsewhere in the body may be carried to the meninges through the bloodstream itself or from an adjacent infected organ, such as the middle ear or the nasal sinuses. The infectious agents multiply in the meninges, where they produce a pus that thickens the cerebrospinal fluid, thereby causing various symptoms and complications.

Bacterial meningitis usually has three main stages. At first, the bacteria multiply in the nasal passages and throat, often causing no painful symptoms. Next, they invade the blood, introducing toxic substances into the circulation and causing fever; if the infection is caused by *N. meningitidis,* a rash may appear and develop into hemorrhagic spots (petechiae) in severe cases. In the third stage, meningitis develops when the bacteria multiply in the meninges, where they produce intense inflammatory changes and an exudate of pus.

A characteristic of meningitis is the rapid onset of symptoms, which may result in death within only a few hours. The first symptom of meningitis is usually vomiting. A severe bursting headache develops because the meninges have become inflamed and the pressure of the cerebrospinal fluid has increased. Stiffness of the neck then develops, due to irritation of the spinal nerves supplying those muscles. The degree of stiffness varies, but often the head is retracted, and in small children the head and spine may be drawn backward like a bow. Deep reflexes are exaggerated, and convulsions may occur in infants and small children. In more severe cases, the cerebrospinal fluid becomes so thickened by pus that the passages between the ventricles (cavities) of the brain and the spaces in the spinal meninges become blocked, causing fluid to accumulate. The accumulation of fluid in the ventricles may in turn result in internal hydrocephalus, which causes coma and death unless relieved.

A diagnosis of bacterial meningitis is made with certainty by obtaining a sample of cerebrospinal fluid by lumbar puncture and examining it microscopically for the presence of bacteria and for increases in certain types of cells.

The term meningitis most often refers to meningococcal meningitis, which is caused by *N. meningitidis*. Epidemics of this disease occurred at irregular intervals, with death occurring in 40–50 percent of cases, until the use of antibiotic drugs greatly reduced both mortality rates and the incidence of the disease. Meningococcal meningitis is worldwide in distribution and more likely to occur in cold weather. It is primarily a disease of youth and especially of children under age 10, though all ages may be affected. The disease is usually acquired by nasal droplet transmission. Another serious cause of meningitis is *Haemophilus influenzae;* it occurs in infants and young children but only rarely in older persons, and its course and symptoms resemble those of *N. meningitidis.* The bacterium *Streptococcus pneumoniae* is a common cause of meningitis in adults.

The early diagnosis and prompt treatment of meningitis is particularly important in preventing possible permanent damage to the brain, especially in affected children. Meningococcal meningitis is best treated with penicillin. Cases caused by *H. influenzae* are treated with ampicillin or chloramphenicol. These drugs have reduced mortality rates from bacterial meningitis to less than 5 percent in some areas. A vaccine that gives protection against the type b strain of *H. influenzae* became commercially available in the 1980s and has proved effective in safeguarding infants and children from the disease.

Various other forms of meningitis are caused by viruses and ordinarily have a short, uncomplicated, self-limited course that does not require therapy.

meningococcus, the bacterium *Neisseria meningitidis,* which causes meningococcal meningitis in humans, who are the only natural hosts in which it causes disease. The bacteria are spherical, ranging in diameter from 0.6 to 1.0 μm (micrometre; 1 $\mu m = 10^{-6}$ metre); they frequently occur in pairs, with adjacent sides flattened. They are strongly gram-negative. These bacteria enter the nasopharynx; meningococcal infections in the nasopharynx may cause no symptoms—up to 30 percent of the population may harbour them between epidemics—or may enter the bloodstream and produce the symptoms of meningitis.

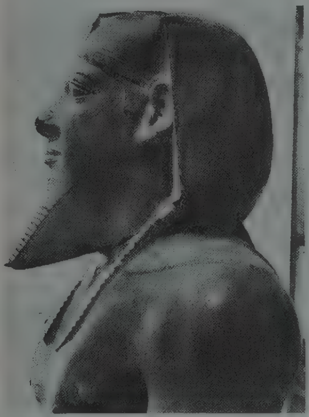
Menippus (fl. 3rd century BC), Greek philosopher from Gadara (modern Umm Qays, Jordan), who followed the cynic philosophy of Diogenes and who founded a seriocomic literary genre known as Menippean satire. It was imitated by Greek and Latin writers and influenced the development of Latin satire.

Menippus was allegedly a slave by birth who became rich by begging or by usury, afterward being made a citizen of Thebes, in Greece. His writings are lost, but some idea of their character can be gained from his Latin imitators, notably Varro, Seneca, and Lucian. His criticism was an innovation in the presentation of philosophic ideas because it was aimed at reaching as wide an audience as possible. It abandoned the serious form of dialogue or essay and instead conveyed its cynic message in a satiric style, mocking institutions, ideas, and conventions in a mixture of prose and verse. Unusual settings—including a descent into Hades, an auction, and a symposium—were employed with striking effect; they were used also by his Latin successors. The 1st-century-AD *Satyricon* of Petronius, a picaresque tale in verse and prose containing long digressions in which the author airs his views on topics having nothing to do with the plot, is in the Menippean tradition. A later example is the *Satire Ménippée* (1594), a French prose and verse satire on the Holy League, the political party of the Roman Catholics, written by several royalists.

Consult the INDEX *first*

Menkaure, also spelled MENKURE, Greek MYKERINOS (fl. late 26th century BC), fifth (according to some traditions, sixth) king of the 4th dynasty (*c.* 2575–*c.* 2465 BC) of Egypt; he built the third and smallest of the three Pyramids of Giza.

He was the son and probably the successor of Khafre and, according to the Turin papyrus, reigned for 18 (or 28) years. According to tradition, Menkaure was a pious and just king. Although his pyramid and mortuary temple were unfinished at his death, his successor, Shepseskaf, completed the stonework of the mortuary temple in brick. In the funerary complex were found some of the finest sculptures of the Pyramid Age, including a slate statue group of Menkaure and his sister-wife Khamerernebti II and a number of smaller slate triads representing Menkaure, the goddess Hathor, and various nome (district) deities.



Menkaure, detail of an alabaster statue from Giza; in the Egyptian Museum, Cairo

By courtesy of the Egyptian Museum, Cairo; photograph, Hirmer Fotoarchiv, Munchen

Menken, Adah Isaacs, original name DOLORES ADIOS FUERTES (b. June 15, 1835, near New Orleans, La., U.S.—d. Aug. 10, 1868, Paris, France), American actress and poet widely celebrated for her daring act of appearing virtually naked, strapped to a running horse.

Facts concerning her family name and early life are obscure. She was orphaned and left in poverty at an early age and later appeared on the stage in New Orleans and other American cities. In 1856 she married Alexander Isaacs Menken and thereafter bore his name through succeeding alliances, matrimonial and otherwise. In 1864 she appeared at Astley's Theatre in London as Mazeppa in a dramatization of Lord Byron's poem, a performance of an athletic type suited to her fine physique. She had previously played the role in the United States. In England and France she became a close friend of many literary men—Algernon Charles Swinburne, Charles Reade, Charles Dickens (to whom she dedicated in 1868 a volume of verse, *Infelicia*), Théophile Gautier, and Alexandre Dumas *père*. She performed extensively in Paris including a run of 100 nights, as well as in Vienna and London.

Adah Menken

BBC Hulton Picture Library

Menlo Park, city, San Mateo county, western California, U.S. It lies on the western shore of San Francisco Bay. Originally part of the Rancho de las Pulgas, a Mexican land grant of 1795, it derived its name from Menlough, in County Galway, Ire., and began as a village for railroad and estate workers. Brief incorporation (1874–76) included Fair Oaks (later Atherton). During World War II, Camp Fremont (for U.S. Army engineers) occupied most of the downtown area. Permanently incorporated in 1927, Menlo Park developed after World War II as a residential community with an office-building boom, highlighted by the Stanford Research Institute (1946) and industrial parks. It is also a publishing centre. Pop. (1992 est.) 28,687.

Menlo Park, unincorporated community, Middlesex county, northeast New Jersey, U.S. It lies 15 miles (24 km) southwest of Newark. Menlo Park is the site of the Edison Memorial Tower and State Park (and museum) on the grounds where Thomas A. Edison maintained his experimental laboratories from 1876 to 1887 and where he perfected many of his inventions. The 131-foot (40-metre) Edison Memorial Tower, on the spot where the first commercially practicable incandescent lamp was made, is capped by a light bulb 14 feet (about 4 m) high and 9 feet (about 3 m) across; a perpetual light was placed at the base of the tower in 1929. The laboratories were removed in 1929 by Henry Ford to his Greenfield Village Museum in Dearborn, Mich.

Menlo Park was established as a rural crossroad in the 17th century after the founding of the East Jersey colony in 1676. It was a part of Raritan township, which in 1954 was renamed Edison township in honour of the inventor. Lying approximately midway between Rahway and New Brunswick, Menlo Park has developed as a suburban community since World War II.

Mennecy porcelain, a soft-paste porcelain of a particularly light and translucent quality made at a French factory from the 1730s to 1806. The wares are generally small: vases or coffee- or dressing-table sets. Figures are of good quality. Mennecy has a distinctive greenish yellow and soft brown colouring.

Mennecy soft-paste porcelain group of children, *c.* 1760; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Menninger FAMILY, American physicians who pioneered methods of psychiatric treatment in the 20th century.

Charles Frederick Menninger (b. July 11, 1862, Tell City, Ind., U.S.—d. Nov. 28, 1953, Topeka, Kan.) began practicing general medicine in Topeka in 1889 and became convinced of the benefit of group medical practice after visiting the Mayo Clinic in Rochester, Minn., in 1908. In 1920 Menninger was joined in practice by his son Karl Augustus Menninger (b. July 22, 1893, Topeka—d. July 18, 1990, Topeka), who received his medical degree from Harvard Medical School in 1917 and who spent two years working under Ernest Southard at the Boston Psychopathic Hospital. The two Menningers established the Menninger Diagnostic Clinic in Topeka for the group practice of general medicine. Karl Menninger's strong interest in psychiatry and the Topeka area's lack of hospital care for the mentally ill led him to treat psychiatric patients as well. In 1924 Charles Menninger's youngest son, William Claire Menninger (b. Oct. 15, 1899, Topeka—d. Sept. 6, 1966, Topeka), received his M.D. from Cornell University Medical College (Ithaca, N.Y.) and served his internship at Bellevue Hospital in New York City. The following year, he joined the family practice. The family established the Menninger Sanitarium and Psychopathic Hospital, a 13-bed facility designed to apply group medical practice to psychiatric patients. In this and other facilities that followed, the Menningers linked two concepts: the psychoanalytic understanding of behaviour as applied to the treatment of hospitalized patients, and the use of the social environment of the hospital as an adjunct to therapy. Thus, in the Menningers' attempt to merge the psychiatric treatment of their patients with the local environment, all members of the clinic's staff—nurses, therapists, orderlies, and even the housekeepers—became an attentive and helpful part of the patients' milieu. From the onset, psychiatric research was an important part of the Menningers' total approach. The Menningers' care and treatment of the mentally ill began to draw scientists interested in their ideas and eager to study at the hospital. In 1926 the Menningers opened the Southard school for mentally retarded children, and in a matter of years they were accepting children with all types of mental disorders.

The Menningers' philosophy that psychiatry is a legitimate science and that the difference between a normal individual and a person with a mental illness is but a matter of degree was expounded in Karl Menninger's first book, *The Human Mind* (1930). In 1931 the Menninger Sanitarium became the first institution to gain approval as a training facility for nurses specializing in psychiatric care, and in 1933 it opened a neuropsychiatric residency program for physicians. To fulfill their goal to combine medical practice, research, and education, the family formed the Menninger Foundation in 1941 and four years later the Menninger School of Psychiatry. The foundation has been extensively involved in psychiatric education, training, and research on an international level. In 1974 the foundation established the Center for Applied Behavioral Sciences, an organization to provide current information on human behaviour and motivation to business, industry, and government.

Karl and William Menninger played guiding roles as the Menninger Foundation's activities and institutions grew and diversified. William served as medical director of the Menninger Psychiatric Hospital and as president of the Menninger Foundation. Karl founded and directed the Menninger School of Psychiatry from 1946 to 1969 and served as chairman of the board of trustees of the Menninger Foundation. He also continued to publish books that explored psychiatry's relation to society, as well as writing guides to psychoanalytic theory for laymen.

Menno Simonsz., in full MENNO SIMONSZOON, Simonsz. also spelled SIMONS (b. 1496, Witmarsum, Friesland [Netherlands]—d. Jan. 31, 1561, near Lübeck, Holstein [Germany]), Dutch priest, an early leader of the peaceful wing of Dutch Anabaptism, whose followers formed the Mennonite church.

Life. Little is known about Menno's early life. He was born into a Dutch peasant family; his father's name was Simon. At an early age he was enrolled in a monastic school, possibly at the Franciscan monastery in Bolsward, to prepare for the priesthood. In March 1524, at the age of 28, he was ordained at Utrecht and assigned to the parish at Pingjum near the place of his birth. Seven years later, in 1531, he became the village priest in his home parish at Witmarsum.

Menno Simonsz., engraving by Christopher van Sichem, 1605–08

By courtesy of the Mennonite Library and Archives, North Newton, Kansas

Though Menno was to become a major spokesman of ethical Christianity, his initial concern was doctrinal. During his first year as priest he began to question the real presence of Christ in the bread and wine of the Eucharist. This was probably owing largely to the antisacramental tendencies prevalent in the Netherlands at that time, tendencies that developed from Erasmian humanism and the ethical concerns of the Brethren of the Common Life. These doubts led Menno to read both the Bible and the writings of Martin Luther for the first time. At first he read the Bible with real fear, for he knew this step had driven Luther and the Swiss reformer Huldrych Zwingli out of the Roman Catholic church, but he soon agreed with them that biblical authority ought to be primary in the life of the believer and in the church. By 1528 he was known as an evangelical preacher, though he continued as parish priest.

From doubts about the Eucharist, Menno moved gradually to questions about infant Baptism and the meaning of church membership. His readings of the New Testament led him to the firm conviction that only persons of mature faith, who acknowledged Jesus as Lord and had counted the cost of following him, could be eligible for membership in the church. Only such persons could be baptized as a seal (sign of guarantee) of the covenant and a witness to all the world. The grace of Christ was sufficient for children until they reached the age of accountability and made a conscious choice either for or against him. The experience of conversion came to be central to all of Menno's life and theology.

Meanwhile, the revolutionary wing of early Dutch Anabaptism continued its agitation. On April 7, 1535, the Olde Klooster near Bolsward, which had been occupied by them as a staging area for aid to Münster, fell before the onslaught of the state militia. Among those killed were members of Menno's congregation and Peter Simons, who may have been his brother. This prompted him to preach openly against the errors of the revolutionaries. In doing so he articulated with increasing clarity what he believed to be the true nature of a believers' church: pure doctrine, scriptural use of sacraments, ethical obedience, love of neighbour, a clear and open witness to the faith, and a willingness to suffer. The fall of Münster on July 25, 1535, increased pressure within him to help those whom he considered to be misguided spirits. This bold and outspoken ministry soon jeopardized his safety, and in January 1536 he went into hiding after a spiritual struggle of 11 years.

In describing his decision he wrote,

> Pondering these things my conscience tormented me so that I could no longer endure it. . . . If I through bodily fear do not lay bare the foundation of the truth, nor use all my powers to direct the wandering flock who whould gladly do their duty if they knew it, to the true pastures of Christ—oh, how shall their shed blood, shed in the midst of transgression, rise against me at the judgment of the Almighty and pronounce sentence against my poor, miserable soul!

Menno spent a quiet year in hiding, finding a sense of direction for his future work. During this time he wrote "The Spiritual Resurrection," "The New Birth," and "Meditation on the Twenty-third Psalm." Late in 1536 or early 1537, he received believer's baptism, was called to leadership by the peaceful Anabaptist group founded in 1534 by Obbe Philips, and was ordained by Obbe. He also married. From this time on his life was in constant danger as a heretic. In 1542 the Holy Roman emperor Charles V (1500–58) himself issued an edict against him, promising 100 guilders reward for his arrest. One of the first Anabaptist believers to be executed for sheltering Menno was Tyaard Renicx of Leeuwarden, in 1539.

From 1543 to 1544 Menno worked in East Friesland, where in January 1544 he had a major interview or debate with the Polish reformer Johannes à Lasco (1499–1560). The next two years, 1544–46, were spent in the Rhineland, after which he travelled from his new home base in Holstein, near Oldesloe, northeast of Hamburg, until his death in 1561. Here he found time for extensive writing and established a printing press to circulate Anabaptist writings. His travels not only took him back to the Netherlands but also to Danzig.

Influence. Menno was not the founder of the Mennonite Church nor the most articulate spokesman of early Anabaptist theology. His greatness lay rather in the leadership he gave to northern Anabaptism during its formative first generation, a leadership maintained through his calm, biblically oriented approach and through his writings, which consolidated the insights of the movement. Though these writings often seem tedious and excessively polemical, they delineated the Anabaptist faith he defended against both Catholic and Protestant attacks on the one hand and distortions by zealots from within the movement on the other. During the last years of his life he was troubled particularly by some of his own brethren who pressed for great rigour in the application of the ban (expulsion from the church) and other measures of discipline. His more than 40 extant writings are all prefaced with First Letter of Paul to the Corinthians 3:11 "No other foundation can any one lay than that which is laid, which is Jesus Christ." (C.J.D.)

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Mennonite, member of a Protestant church rising out of the Anabaptists, a radical reform movement of the 16th century Reformation, and named for Menno Simons (*q.v.*), a Dutch priest who consolidated and institutionalized the work initiated by the moderate Anabaptist leaders. Mennonites are located in many countries of the world, with heaviest concentrations in the United States and Canada.

Reformation origins. Among the various Anabaptist groups, the Mennonites trace their origin particularly to the so-called Swiss Brethren, who formed their first congregation on January 21, 1525, in the face of imminent persecution for their nonconformity to the demands of the state church led by the Reformation theologian Huldrych Zwingli. Though these demands centred on infant Baptism, which Anabaptist leaders Conrad Grebel, Felix Manz, and others questioned on the basis of biblical studies, the real issue was the nature of the church. Christ, according to their view, is Lord of the church. Only those who submit to that lordship can be true members of his body. Furthermore, the body of Christ receives its guidance from Christ himself through the Scriptures and the Holy Spirit, not from or through the civil magistracy. Persecution soon scattered the Swiss Brethren across Europe; their doctrinal views found quick response among many people, and for a time the movement grew.

Though Mennonites are the direct descendents of the Anabaptists of the 16th century, the two movements are not identical. Menno Simons, a Dutch priest who joined the Anabaptist movement in 1536, gathered the scattered Anabaptists of northern Europe into vital congregations that were soon called by his name. These congregations led by Menno Simons were similar to another Anabaptist-related group organized in Strasbourg under Melchior Hofmann in 1530. Initially, Menno Simons was not directly influenced by the Swiss Brethren; but with the death of the first Swiss and south German Anabaptist leaders soon after the defeat of the peasant forces led by some radical revolutionary Anabaptists—such as Thomas Müntzer (*c.* 1490–1525)—in the Peasants' War (1525), Simons began to consolidate and institutionalize the work that the moderate Anabaptist leaders of Europe had begun. He represents a second generation of leaders in which the emerging tradition determined basic faith and doctrine.

Another Anabaptist movement flourished in central Germany under the leadership of Hans Hut (died 1527), Hans Denk (*c.* 1500–27), and especially Pilgram Marpeck (*c.* 1492–1556), a major early lay theologian. Still another movement came to be known as the Hutterian Brethren because of the coordinating leadership of Jakob Hutter (died 1536). The Hutterites were soon known for their communal living and for an intense missionary zeal that continued into the 17th century, after all other Anabaptist groups had found relative physical security by withdrawing geographically and socially from the mainstream of European life.

Developments from the 17th century to the 19th. Mennonites found political freedom first in The Netherlands, after their last martyr died there in 1574. Before that date, however, many had emigrated from there to the Vistula River area in what is now northern Poland, where their communities became large and flourishing. By 1700 there were 160,000 baptized members in the Mennonite churches of The Netherlands. Because many of the professions were legally closed to them, they turned to business and in the process became wealthy and urbanized. In matters of faith, they followed the Enlightenment, a 17th- and 18th-century intellectual movement that placed its hope for human betterment on the use of right reason. They became well known as artists, writers, and patrons of social programs; but membership declined to about 15,300 in 1837.

Persecutions that continued in Switzerland into the 18th century drove many Mennonites to southern Germany, Alsace, The Netherlands, and the United States. A major schism occurred (1693–97) when the Swiss Mennonite bishop left the Mennonites to form the Amish Church in an attempt to preserve biblical discipline among the membership. From the 17th to the 20th centuries, most Mennonites in Switzerland, southern Germany, and Alsace lived in semiclosed rural communities with a simple agrarian economy. Religiously, they were influenced by Pietism, a Lutheran-based movement that emphasized personal religious experience and reform.

In 1788 the first of a long stream of Mennonites left the Vistula Delta of northern Poland (Prussia) to settle in the Ukraine, where they acquired land and escaped military conscription. By 1835 about 1,600 families had settled in 72 villages with landholdings amounting to about 500,000 acres. In 1860 a small group within the Mennonite community in Russia underwent a religious awakening and demanded stricter discipline for church members. They founded the Mennonite Brethren Church, some of whose members joined an exodus of Mennonites from Russia in the 1870s that was provoked by the loss of their exemption from military service. Many of these emigrants resettled in the upper Middle West of the United States.

By World War I the Mennonite settlements in Russia included more than 120,000 members living in autonomous communities where religious, educational, social, economic, and even political affairs were under their own control. All Mennonite communities in Russia were either destroyed during World War II or dissolved by the Soviets soon after 1945. Mennonites today live scattered among the Russian population.

Beginning in 1663, Mennonites emigrated to North America to preserve the faith of their fathers, to seek economic opportunity and adventure, and especially to escape European militarism. Until the late 19th century, most Mennonites in North America lived in rural communities and engaged successfully in farming. They retained their German language, partly as a religious symbol and partly as insulation against their environment. Their main concern was to be left alone to worship God according to their conscience and tradition. In 1775 they addressed a statement to the Pennsylvania Assembly that read:

> It is our principle to feed the hungry and give the thirsty drink; we have dedicated ourselves to serve all men in everything that can be helpful to the preservation of men's lives, but we find no freedom in giving, or doing, or assisting in anything by which men's lives are destroyed or hurt.

In 1783 Mennonites in Lancaster County were accused of treason for feeding destitute British soldiers. During the U.S. Civil War, rather than fight, some hired substitutes or paid an exemption fee of $300 in the North and $500 in the South. Those who fought in the armed forces were usually excommunicated for doing so.

After 1850 the transition from the German language to English, the adoption of such institutions and practices as Sunday schools and evangelistic services, together with problems associated with the acculturation process, led to a number of divisions among the Mennonites; some branches were also imported from Europe. The largest single body is the (Old)

Mennonite Church; following are the General Conference Mennonite Church, the Mennonite Brethren, and the Old Order Amish. Most extreme are the Hutterian Brethren, who still live communally and practice community of goods; this relatively small group is concentrated in the upper Great Plains region of North America.

Beliefs and practices. Anabaptist and Mennonite thought has been characterized by a separation between religion and the world. Under the impact of severe persecution in the 16th century, Anabaptism was driven to a strategy of withdrawal from society in its attempt to survive, a strategy that became central in Mennonite theology. Consequently, most Mennonites have possessed a strong cultural cohesion that they maintained externally by withdrawal and internally by rigorous group discipline. This isolation encouraged the sectarian virtues of frugality, hard work, piety, and mutual helpfulness but frequently also led to schism. By the mid-20th century, however, Mennonites were deeply involved in the social, educational, and economic world around them, an involvement that led to revolutionary changes in their life and thought. It also led to a new search for identity as a distinct group in the modern world, through a study of their denominational history, sociological analysis, and theological interaction with other groups.

Mennonites are trinitarian (believing in the doctrine of the Trinity—*i.e.*, Father, Son, and Holy Spirit), affirm the Scriptures (especially the New Testament and the teachings of Jesus) as their final authority for faith and life, and appeal to the pattern of the early church as their congregational model. They stress the importance of Baptism on confession of faith and a symbolic understanding of the Lord's Supper. Some practice foot washing, a practice based on an act of Jesus with his disciples. The doctrines of nonconformity to the world, nonswearing of oaths, nonresistance in lieu of military service, and church discipline are generally affirmed but not practiced universally.

Mennonite worship services are sermon-centred. A simple, almost austere, liturgy surrounds the Gospel proclamation. In the late 20th century, however, there were many signs of experiment in worship similar to those found in other denominations.

Most Mennonite congregations are joined together into numerous conferences, seven of which are in North America. The Amish, Hutterian Brethren, and some conservative Mennonites do not form conferences. Since 1925 there has been a Mennonite World Conference that meets every five years for fellowship, study, and inspiration but does not make decisions binding on its member bodies.

The desire to express positively the ethic of love and nonresistance has historically given Mennonites a deep social concern. An emergency relief committee for national and international aid, founded by the Dutch Mennonites in 1725, is still active. In 1920 North American Mennonites founded the Mennonite Central Committee (MCC) for the same purpose, initially to relieve famine in Russia. Mennonite migrations continued during the 20th century, primarily from Russia to North and South America—to Brazil, Paraguay, Uruguay, Bolivia, Mexico, and British Honduras. Mennonite migrants and missionaries from North America and Europe planted numerous churches in Latin America, Africa, Oceania, and India and other parts of Asia.

In the 20th century, the Mennonites of North America gave new emphasis to higher education, especially by supporting their own colleges and seminaries, while continuing to maintain secondary and Bible schools. New interest in the faith of early Anabaptists was fostered by the scholarly work of both Mennonite and non-Mennonite historians. This activity not only offered new insights for the renewing of church life but accented the disparity between the 16th-century Anabaptist ideals and present Mennonite beliefs and practices. A rediscovery of their history also gave new meaning to urban social relationships; witness, service, discipleship, and evangelism became household words and shaped Mennonite identity. Instead of withdrawal, they found in witness and service a new way of relating to the world. *See also* Amish; Hutterite.

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Menodotus of Nicomedia (fl. *c.* AD 120), philosopher of the Skeptical school of empirical medicine, credited with elaborating the first scientific method of observation. Like many other physicians of the period, he considered medicine an art; this left him free to perfect his art while remaining a Skeptic. He also wrote against Asclepiades, who espoused Atomism and a theory of imbalance of corpuscles as the cause of illness. Some scholars think the voluminous writings of Menodotus, frequently mentioned by Galen, suggest two contemporary physicians of the same name.

Menominee, also spelled MENOMINI, Algonkian-speaking North American Indian tribe who lived along the Menominee River, now the eastern portion of the boundary between Wisconsin and the upper peninsula of Michigan, when first reported by the missionary-voyageur Jean Nicolet in 1639. The sedentary Menominee lived in villages of dome-shaped houses. Their economy was based on gathering wild rice and other plants; a limited amount of cultivation of corn (maize), squash, beans, and tobacco; fishing; and some hunting. They were divided into exogamous clans, which were grouped into two major divisions, or phratries. Their social organization changed, however, as a result of the fur trade, when the Menominee scattered in mobile bands over a wide territory, particularly for winter hunts.

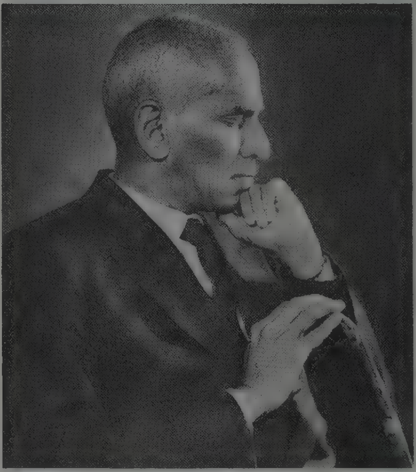
In a series of treaties in the 19th century, the Menominee sold their rights in lands to the United States. In 1852 the U.S. government moved some 2,000 members of the tribe to a reservation on the upper Wolf and Oconto rivers in Wisconsin. Beginning in 1872 a tribally owned lumber mill operated under government supervision, providing jobs and income. In 1961 the reservation was terminated; the area became a county of the state of Wisconsin, and a corporation, Menominee Enterprises, Inc., was created to hold and administer tribal assets. Soon after termination the Indians became concerned about the loss of such services as a free hospital (leaving them with no hospital and no resident physician) and a development project involving the sale of lands, which some Menominee feared as a step toward increasing white control. Agitation began for restoration of reservation status, and this was done (by Congress) in December 1973. The tribe began to organize a government and to cope with internal divisions and with growing antipathy from nearby whites.

Great Cloud, Menominee Indian, son of Grizzly Bear; painting by George Catlin, 1836; in the National Museum of American Art, Washington, D.C.

By courtesy of the National Museum of American Art (formerly National Collection of Fine Arts), Smithsonian Institution, Washington, D.C., gift of Mrs. Joseph Harrison

Menominee, city, seat (1864) of Menominee county and the southernmost city in the Upper Peninsula of Michigan, U.S.; it is located on Green Bay at the mouth of the Menominee River opposite Marinette, Wis., with which it is connected by a bridge. In 1796 a fur-trading post was established there. Lumbering began in 1832, reached its peak in the 1890s, and ended in 1930. Manufactures include paper products, furniture, electrical equipment, and helicopters. Dairying (notably cheese production) is important. Menominee (Indian for "wild rice," once gathered along the riverbanks) is also a hunting resort and fishing port. Inc. 1883. Pop. (1990) 9,398.

Menon, V(engalil) K(rishnan) Krishna (b. May 3, 1897, Calicut, India—d. Oct. 6, 1974, New Delhi), Indian nationalist and champion of India's anti-colonialism and neutralism.



Menon, 1962

Camera Press—Publix

After studying at the London School of Economics, Menon was called to the bar at the Middle Temple. He became an ardent Socialist and served as a Labour member of the St. Pancras Borough Council from 1934 to 1947. His primary political interest in England centred in the struggle for freedom in India, however, and he strove tirelessly in this cause as secretary of the India League from 1929. His long and close relationship with Jawaharlal Nehru, nationalist and first prime minister of independent India, began during that period.

With the coming of Indian independence in 1947, Krishna Menon was appointed high commissioner (ambassador) of India in London. He returned to India in 1952 after 27 years of residence in England, becoming a member of the Indian Parliament in 1953, minister without portfolio in 1956, and minister for defense in 1957. From 1952 to 1960 he represented India in the General Assembly of the United Nations, where his vigorous presentation of anti-colonial and neutralist policies of his government won him many admirers.

As minister of defense, he brought new vigour to his office and introduced many far-reaching changes, but his policies and methods received heavy criticism, and the military reverses suffered by India at the hands of the Chinese in the Himalayas in 1962 were attributed by some to his policies. Overwhelming opposition forced him to relinquish the Ministry of Defense in October 1962. Thereafter he devoted himself to left-wing political activity as an independent.

Menongue, formerly SERPA PINTO, town, southeastern Angola. It was named, previously, after Alexandre Alberto da Rocha de Serpa Pinto, a late 19th-century Portuguese explorer of the interior of southern Africa. Located on the Cuebe River (a tributary of the Okavango [Kubango] River) at an elevation of 4,462 feet (1,360 m), it is a garrison town and market centre for the surrounding sparsely populated, semiarid region. Cattle and subsistence crops of corn (maize) and other vegetables are raised by the Nganguela and Chokwe peoples, and trade in cattle and hides and skins is locally important. Chokwe artists are noted for their traditional masks and wooden sculptures of human beings. Menongue is the inland terminus of a 470-mile (756-kilometre) railway from the Atlantic port of Namibe (formerly Moçâmedes). The railway, however, has not functioned on a regular basis since the outbreak of civil war in Angola in 1975. A military headquarters of the South West Africa People's Organisation at Chitequeta, near Menongue, was destroyed in an incursion by South African forces in 1981. Pop. (latest est.) 3,000.

menopause, the period of time during a woman's life marked by cessation of menstruation and termination of the potential for reproduction. The average age of onset is about 48 years, but menopause may begin as early as age 40 or as late as the early 50s. Artificial menopause can be induced by surgically removing or by irradiating the ovaries.

A brief treatment of menopause follows. For full treatment, *see* MACROPAEDIA: Reproduction and Reproductive Systems.

The human ovaries function actively for about 35 years. Menopause is the result of a progressive decline in ovarian function due to aging. During a woman's reproductive years, the follicles of the ovaries, under the stimulation of hormones released by the pituitary gland, periodically rupture and discharge their ova (eggs). As menopause approaches, some follicles fail to rupture, and their ova are not discharged; later all the follicles fail to rupture. The cycle of menstruation is disturbed by this failure to ovulate. The continuing decline in ovarian activity may result in missed periods, longer intervals between periods, irregular bleeding, varying lengths of periods, or a decrease or increase in menstrual flow. In a minority of women, the menstrual periods cease abruptly.

During menopause the ovaries produce progressively smaller amounts of the hormone estrogen. This decrease affects the hormonal activity of other glands that regulate the reproductive function and disturbs the neurovascular mechanism of the hypothalamic region of the brain. These disturbances probably give rise to the brief flushes, or hot flashes, that are a characteristic symptom of menopause. A woman may begin experiencing hot flashes before the obvious onset of menopause and may continue to have them for a few months or for two or three years. The hot flash, often experienced as a sense of warmth, flushing of the face and body, a prickling sensation, and sweating, may occur several times a day.

Other symptoms of menopause such as nervousness, headaches, or dizziness may have a psychological origin stemming from a fear of aging or from changing patterns of life and family relationships. Weight gain may result from increased food intake and decreased physical activity. The medical management of menopause entails education to reduce fear or anxiety, periodic physical examination, and in some cases the administration of estrogenic hormones.

menorah, also spelled MENORA, multi-branched candelabrum used by Jews in rites during the eight-day festival of Ḥanukka. It has taken many forms throughout the ages, but its essential feature has always been eight receptacles for oil or candles (one lit the first day, two the second, etc.) and a further receptacle for the *shammash* ("servant") light, which is set apart and used for kindling the other lights.

Roman soldiers carrying the menorah from the Temple of Jerusalem, AD 70; detail of a relief on the Arch of Titus, Rome, AD 81

Alinari—Art Resource/EB Inc.

This menorah is an imitation of the seven-branched golden candelabrum of the Tabernacle, which signified, among other things, the seven days of creation. The cup atop the central shaft, which is somewhat elevated to signify the Sabbath, was flanked by three lights on each side. The seven-branched menorah is mentioned in the Talmud and has long been used in art as an iconographic symbol signifying Judaism.

Menorca (island, Spain): *see* Minorca.

Menotti, Gian Carlo (b. July 7, 1911, Cadegliano, Italy), Italian composer of operas of wider popularity than any others of their time. His realistic operas on his own librettos represent a successful combination of 20th-century dramatic situations with the traditional form of Italian opera. Menotti used largely traditional harmonies, resorting at times to dissonance and polytonality to heighten dramatic effect.

Menotti wrote his first opera, *The Death of Pierrot,* at the age of 11. He studied at the Milan Conservatory and in 1927 emigrated to the United States, where he continued his studies at the Curtis Institute of Music, Philadelphia (1927–33), at the suggestion of Arturo Toscanini. He retained his Italian citizenship.

Menotti

By courtesy of RCA Records

His opera *Amelia Goes to the Ball,* a witty satire on society manners and morals, was produced in Philadelphia in 1937 with great success and was transferred to the Metropolitan Opera in New York City in 1938. It was followed by a radio opera, *The Old Maid and the Thief* (1939), and *The Island God,* produced at the Metropolitan in 1942. These works were less successful, and Menotti turned to writing chamber operas—requiring fewer singers and smaller orchestras—on melodramatic subjects. His first opera of this type, *The Medium* (1946), was a tragedy about a medium who becomes a victim of her own fraudulent voices. It was followed by a one-act comic opera, *The Telephone* (1946). In 1947 the two operas were paired in an unprecedented Broadway run. In 1951 *The Medium* was made into a motion picture.

In 1950 his opera *The Consul,* which won a Pulitzer Prize, was produced on Broadway. Like all of his operas, it is a work of great theatrical effectiveness. Set in an unnamed country under totalitarian rule, it deals with the vain efforts of a woman to gain an exit visa to join her husband, an enemy of the state.

Amahl and the Night Visitors (1951), the first opera composed for television, is the story of a lame shepherd boy who gives his crutch to the Three Wise Men as a gift for the Christ child. With *The Saint of Bleecker Street* (1954) Menotti won a second Pulitzer Prize. In 1958 he wrote the libretto for Samuel Barber's opera *Vanessa.* His "madrigal fable" *The Unicorn, the Gorgon, and the Manticore,* for chorus, instruments, and dancers, was produced in 1956. His grand opera *Maria Golovin* (1958) was less successful than his earlier tragic operas. In 1963 he produced a cantata, *Death of the Bishop of Brindisi;* a television opera, *Labyrinth;* and a comic opera, *The Last Savage.* His instrumental works include the symphonic poem "Apocalypse" (1951) and concerti for piano and for violin. In 1958 Menotti established the Festival of Two Worlds, for opera, music, and drama, in Spoleto, Italy, and its New World branch in Charleston, S.C., in 1977. *Help! Help! The Globolinks!* (1968) is a satiric opera, and *Tamu-Tamu* (1973) is an antiwar opera that is sung in English and Indonesian. The opera *Goya* (1986) dealt with the life of the Spanish painter of that name.

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mens rea, in Anglo-American law, criminal intent or evil mind. In general, the definition of a criminal offense involves not only an act or omission and its consequences but also the accompanying mental state of the actor. All criminal systems require an element of criminal intent for most crimes. Only Anglo-American systems, however, employ the term *mens rea.* Countries such as France and Japan simply specify that there must be a criminal intent unless a specific statute directs otherwise.

Despite the evident importance of proper definition of the mental element, criminal statutes are frequently silent on what sort of *mens rea,* if any, must be shown. In other instances, a wide variety of terms are employed without any clear indication of how they are to be interpreted. The tentative draft of the American Law Institute's Model Penal Code reduces the *mens rea* terms to four: the criminal must act "purposely," meaning that he must have an actual, consciously formed intent to achieve the criminal consequence; "knowingly," meaning a conscious awareness that his conduct will produce the consequence; "recklessly," meaning conscious disregard of the fact that his conduct is creating an unreasonable peril; and "negligently," meaning inadvertence to peril that would have been apparent to a reasonable man.

In modern times a considerable body of penal offenses have been created in all countries in which no intent or other mental state need be shown. Absence of *mens rea* has always characterized a few offenses such as statutory rape, in which knowledge that the girl is below the age of consent is not necessary for liability, and bigamy, which often may be committed even though the parties believe in complete good faith that they are free to marry. *Mens rea* need not be shown in a number of statutes regulating economic or other activities, commonly termed public-welfare offenses, carrying minor penalties.

The justification for the elimination of proof of criminal intent in such cases is ordinarily made on the grounds of expediency. It is asserted that to require proof of intent or even recklessness would render some of these regulatory statutes largely ineffective or unenforceable. Laws regulating tobacco, alcohol, dangerous drugs, automobile traffic, and firearms would be useless if anyone who violated them could plead ignorance of the law. Australia, however, now allows a defendent to defeat a charge against him by a showing that he was not negligent in failing to observe the law. Supporters of this position argue that little is sacrificed in the way of effectiveness.

Another consideration in dispensing with a *mens rea* requirement is ignorance or mistake. It is commonly said that ignorance of fact excuses from liability, whereas ignorance of law does not. Although this simple formula holds true in wide areas of the criminal law, there are important exceptions, especially in the area of absolute liability offenses. In such cases mistake of law is increasingly being allowed as a defense, especially under statutes that impose harsh penalties.

Finally, all criminal systems make provision for certain types of diminished responsibility such as intoxication, infancy, or insanity. All countries specify a particular age at which a youth may be held responsible for the consequences of his acts. Intoxication is commonly held not to be a defense to a crime except insofar as it negates the existence of a particular mental state. Thus, in Anglo-American law one who commits murder while intoxicated is convicted of manslaughter rather than murder if it is found that he was incapable of entertaining the "malice aforethought" requisite to a finding of murder. *See also* diminished responsibility.

Menshevik (Russian: One of the Minority), plural MENSHEVIKS, or MENSHEVIKI, member of the non-Leninist wing of the Russian Social-Democratic Workers' Party, which evolved into a separate organization. It originated when a dispute over party membership requirements arose at the 1903 congress of the Social-Democratic Party. One group, led by L. Martov, opposed Lenin's plan for a party restricted to professional revolutionaries and called for a mass party modelled after western European social-democratic parties.

When Lenin's followers obtained a temporary majority on the central committee and on the editorial board of the newspaper *Iskra,* they appropriated for themselves the name Bolshevik (Those of the Majority); Martov and his followers became the Mensheviks. After the 1903 congress the differences between the two factions grew. In addition to disapproving of Lenin's emphasis on the dictatorial role of a highly centralized party, the Mensheviks maintained that the proletariat could not (nor should it) dominate a bourgeois revolution; therefore, unlike the Bolsheviks, they were willing to work with the bourgeois left to establish a liberal, capitalist regime, which they considered to be a necessary precursor to a Socialist society. They played active roles in the 1905 revolution, particularly in the St. Petersburg soviet, but afterward, like the Bolsheviks, they participated in the Dumas (parliaments), believing their success to be a step toward the creation of a democratic government. In 1912 the Social-Democratic Party was definitively split by Lenin; in 1914 the Mensheviks themselves became divided in their attitudes toward World War I.

Although they assumed leading roles in the soviets and provisional governments, created after the February Revolution (1917), and formally set up their own party in August, they were not sufficiently united to maintain a dominant position in the political developments of 1917. After the Bolshevik Revolution (October), they attempted to form a legal opposition but in 1922 were permanently suppressed; many Mensheviks went into exile.

Menshikov, Aleksandr Danilovich (b. Nov. 16 [Nov. 6, old style], 1673, Moscow—d. Nov. 23 [Nov. 12, O.S.], 1729, Berezov, Siberia, Russian Empire), prominent Russian political figure during and after the reign of Peter I the Great. A gifted general and administrator, he eventually became the most powerful official in the empire, but his insatiable greed and ambition ultimately resulted in his downfall.

Of humble origins, Menshikov became an orderly for Peter I in 1686 and soon became the tsar's favourite. As a commander during the Northern War against the Swedes after 1700, he scored a number of major victories, eventually receiving the title of field marshal. But he also gave increasing evidence of rapacity. As an administrator after 1714, he was under almost continuous investigation for corrupt practices; and, were it not for his indispensable abilities, he would likely have been stripped of power much earlier than he was.

Having fallen into disgrace toward the end of Peter's reign, Menshikov succeeded in having his ally Catherine, Peter's widow, named empress in 1725, at which point he became virtual ruler of Russia. When Catherine became mortally ill two years later he threw his support to Pyotr Alexeyevich, Peter the Great's grandson, and arranged to have his daughter marry the young tsar, now Peter II. However, his enemies managed to turn Peter II against him, whereupon he was arrested, stripped of his rank and property, and sent to Siberia, where he died.

Menshikov, Aleksandr Sergeyevich, Knyaz (Prince) (b. Aug. 26 [Aug. 15, old style], 1787—d. May 1 [April 19, O.S.], 1867, St. Petersburg, Russia), commander of the Russian forces in the first half of the Crimean War.

He began his army career in 1809 and achieved the rank of major general in 1816. In 1853, during the conflict over the protection of Christians' privileges at the holy places in Palestine, Menshikov was sent on a special mission to Istanbul; his insistence that the Russian government be recognized as the protector of the Ottoman Empire's Orthodox subjects led to the breakdown of negotiations between Russia and Turkey and to the beginning of the Crimean War (1854–56). Subsequently appointed supreme commander of the Russian land and sea forces in the Crimea, he was defeated by the British and French in the Battle of the Alma on Sept. 20, 1854. His attempt to relieve Sevastopol failed when he suffered severe losses at the Battle of Inkerman on November 5. Relieved of his command in March 1855, he was later appointed military governor general of Kronstadt.

menstruation, the periodic discharge from the vagina of blood, secretions, and disintegrating tissue that had lined the uterus. Menstruation takes place if the ovum (egg) released by the ovary has not been fertilized.

A brief treatment of menstruation follows. For full treatment, *see* MACROPAEDIA: Reproduction and Reproductive Systems.

The average human menstrual cycle is 28 days, but cycles ranging from 21 to 35 days are not uncommon. At the beginning of the cycle, the endometrium, or lining of the uterus, is thin, and the ovaries are quiescent. Under the influence of hormones from the pituitary gland, a follicle ripens in one of the ovaries. The follicle contains an ovum, surrounded by a group of cells that secrete an estrogenic hormone. This hormone causes the endometrium to become thicker and more vascular. At about mid-cycle ovulation occurs; the follicle ruptures and discharges the ovum, which enters the fallopian tube and travels to the uterus.

After ovulation the cells of the follicle that extruded the ovum form the so-called corpus luteum. This body continues to secrete estrogen and also begins to release progesterone, which induces the secretory phase in the endometrium. The glands and cells of the endometrium become swollen, and the entire uterine lining thickens in preparation for receiving the ovum. If the released ovum becomes fertilized, it embeds itself in the endometrium and begins to grow. If the ovum is not fertilized, it dies, and the ovary ceases to produce hormones, causing a spasm of the endometrial blood vessels and consequent breakdown of the uterine lining. Menstruation then occurs, and the disintegrating endometrium is sloughed off and discharged along with blood. The endometrial tissue regenerates during the proliferative phase of the next cycle.

Menstruation ordinarily begins between the ages of 11 and 13. The first menstrual periods may be somewhat erratic, or bleeding may be heavy. Usually regularity is established spontaneously. Each period lasts for about five days, but the duration and amount of flow vary considerably. Before the onset of a period, some women experience pelvic discomfort, soreness of the breasts, emotional tension, or tension due to fluid retention in the tissues. During the period, discomfort or some pain may be felt as the uterus contracts to expel the blood and disintegrating tissue. Menstruation continues on the average until the age of 45 or 50, when ovarian activity gradually declines and then ceases. The menstrual periods may stop abruptly, but often they become irregular and gradually diminish. The final cessation of the cycles, or menopause, marks the end of the reproductive period in a woman's life.

Disorders of the menstrual function include dysmenorrhea (painful menstruation); irregular or excessive bleeding due to a hormonal imbalance, disease of the pelvic organs, or emotional disturbance; and amenorrhea (absence of menstruation). Menstrual periods are normally absent throughout pregnancy and for a variable time after delivery. If a mother breast-feeds her baby, menstruation may not recur for as long as six months.

Ovulation occurs at about the midpoint of each menstrual cycle, and the ovum is capable of fertilization for about two days after that event. The rhythm method of contraception is based on the fact that for most women the time of ovulation is fairly constant. When cycles are of irregular length, however, the time of ovulation is uncertain and may vary unexpectedly in women with usually regular cycles. Infertility in some women is a consequence of cycles in which there is no ovulation although regular menstruation occurs. Cycles of this type take place in women who use oral contraceptives.

mensural notation, European system of musical notation used from *c.* 1260 to 1600. It evolved as a method to notate complex rhythms beyond the possibilities of previous notation (neumes) and reached its classical development after 1450. A major step forward was made by Philippe de Vitry in his highly influential treatise *Ars nova* ("New Art"), written about 1320.

Mensural notation was predicated on a single underlying musical pulse and the following divisions of time: *modus,* division of the longa (▜) into two or three breves (■); *tempus,* division of the breve into two or three semibreves (◆); and *prolatio,* division of the semibreve into two or three minima (𝆺𝅥). Time signatures (*q.v.*) showed *tempus* and *prolatio.* Coloration, at first red, then white, notes (such as ⊐, □, ◇, 𝆹𝅥) indicated specific changes in note value, *e.g.,* three coloured notes equaling two black notes. After about 1420, white void notes became the norm, black the coloration. Additional signs clarified more complex modifications of note value. In the late 16th century mensural notation gave way to the modern system.

mental age, intelligence test score, expressed as the chronological age for which a given level of performance is average or typical. An individual's mental age is then divided by his chronological age and multiplied by 100, yielding an intelligence quotient (IQ). Thus, a subject whose mental and chronological ages are identical has an IQ of 100, or average intelligence. However, if a 10-year-old has a mental age of 13, his IQ is 130, well above average. Since the average mental age of adults does not increase past age 18, an adult taking an IQ test is assigned the chronological age of 18.

Mental age was first defined by the French psychologist Alfred Binet, who introduced the intelligence test in 1905. Because the variation in scores for different age groups taking graded tests increases roughly in proportion to the increase in age, mental ages cannot be used accurately to compare the basic ability of children of different chronological ages.

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mental disorder, any illness with significant psychological or behavioral manifestations that is associated with either a painful or distressing symptom or impairment in one or more important areas of functioning.

A brief treatment of mental disorders follows. For full treatment, *see* MACROPAEDIA: Mental Disorders and Their Treatment.

There exists no widely accepted definition of mental disorders that clearly distinguishes them from the more "normal" or "healthy" mental states or behaviours the term is intended to exclude. Moreover, specific definitions of mental disorder will vary slightly from culture to culture because of differing social and cultural norms. A disturbance or conflict between an individual and society does not in itself signify a mental disorder but may rather simply be a form of social deviance on the individual's part. Mental disorders can vary greatly in their symptoms, severity, course, outcome, and amenability to treatment. They can adversely affect any and every aspect of a person's life, including his enjoyment, mood, and attitudes, and his occupation or career, sexual functioning, family and marital life, other interpersonal relations, and the management of his financial affairs.

Most mental disorders can be broadly classified as either psychoses or neuroses. Psychoses are major mental illnesses that are characterized by such severe symptoms as delusions, hallucinations, disturbances of the thinking process, serious defects in judgment and insight, and the inability to objectively evaluate reality. The psychoses can in turn be classified as either organic or functional ones. Alzheimer's disease and other organic brain diseases comprise the organic psychoses. Schizophrenia and manic-depressive psychosis are functional psychoses, *i.e.,* psychoses for which there is no palpable evidence of organic brain disease, though there may be undetermined biochemical or other abnormalities.

Neuroses are less severe and more treatable illnesses than are psychoses. It is sometimes difficult to clearly distinguish between a neurosis and simple unhappiness, fear, or problems in coping with everyday life. Simple unhappiness, however, can usually be ameliorated by a change in external circumstances, while a neurosis is more resistant to real-life improvements unaccompanied by psychic change. A neurosis may cause a person distress and may impair his functioning in certain ways, but the neurotic person is able to objectively evaluate reality and he can basically function in everyday life. The major types of neuroses are depressive disorders, anxiety disorders, obsessive-compulsive disorders, paranoid disorders, posttraumatic stress disorders, conversion hysteria and other somatoform disorders, and dissociative disorders.

There are other mental disorders that cannot be classified as either psychoses or neuroses. Chief among these are personality disorders, which are long-term, maladaptive accentuations of one or a set of particular personality traits. There are also various mental disorders that typically first become evident in infancy or childhood, and there are a variety of psychosexual disorders affecting an individual's gender identity or his sexual preferences.

Despite the psychiatric profession's attempt to clearly delineate distinct clinical categories of mental illness, in actuality a patient may show a mix of symptoms, and the illnesses of many patients constitute intermediate cases between clearly defined disease categories. Mental disorders occur worldwide and affect a small but proportionally significant segment of the population. Schizophrenia, the most prevalent psychosis, affects about 0.5 to 1 percent of the population, and anxiety and depressive disorders each affect about 5 percent of the population at any one time.

Some mental disorders, such as Alzheimer's disease, are clearly caused by organic disease of the brain, but the causes of most other mental disorders are either obscure, unknown, or clinically unverifiable. Schizophrenia appears to be partly caused by genetic factors that are inherited. Some mood disorders, such as mania (undue and prolonged excitement) and depression, appear to be caused in some instances by imbalances of certain chemicals called neurotransmitters in the brain, and they are treatable by drugs that act to correct these imbalances. In many cases, neuroses appear to be caused by primarily psychological factors such as emotional deprivation, frustration, or abuse during childhood, with the delayed effects of these traumas manifesting themselves indirectly many years later in the production of neurotic symptoms. Certain neuroses, particularly the anxiety disorders known as phobias, may in some cases represent maladaptive responses that have been built up into the human equivalent of conditioned reflexes.

Contemporary therapeutic techniques for treating mental disorders include psychotherapy, psychopharmacology, and in extreme cases, psychosurgery (*qq.v.*). *See also* psychoneurosis; psychosis.

mental hygiene, the science of maintaining mental health and preventing the development of psychosis, neurosis, or other mental disorders.

Since the founding of the United Nations the concepts of mental health and hygiene have achieved international acceptance. As defined in the 1946 constitution of the World Health Organization, "health is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." The term mental health represents a variety of human aspirations: rehabilitation of the mentally disturbed, prevention of mental disorder, reduction of tension in a stressful world, and attainment of a state of well-being in which the individual functions at a level consistent with his or her mental potential. As noted by the World Federation for Mental Health, the concept of optimum mental health refers not to an absolute or ideal state but to the best possible state insofar as circumstances are alterable. Mental health is regarded as a condition of the individual, relative to the capacities and social-environmental context of that person. Mental hygiene includes all measures taken to promote and to preserve mental health. Community mental health refers to the extent to which the organization and functioning of the community determines, or is conducive to, the mental health of its members.

Throughout the ages the mentally disturbed have been viewed with a mixture of fear and revulsion. Their fate generally has been one of rejection, neglect, and ill treatment. Though in ancient medical writings there are references to mental disturbance that display views very similar to modern humane attitudes, interspersed in the same literature are instances of socially sanctioned cruelty based upon the belief that mental disorders have supernatural origins such as demonic possession. Even reformers sometimes used harsh methods of treatment; for example, the 18th-century American physician Benjamin Rush endorsed the practice of restraining mental patients with his notorious "tranquilising chair."

Early institutions. The history of care for the mentally ill reflects human cultural diversity. The earliest known mental hospitals were established in the Arab world, in Baghdad (AD 918) and in Cairo, with that special consideration traditionally given disturbed people, the "afflicted of Allāh." Some contemporary African tribes benignly regard hallucinations as communications from the realm of the spirits; among others, Hindu culture shows remarkable tolerance for what is considered to be bizarre behaviour in Western societies. The Western interpretation of mental illness as being caused by demonic possession reached its height during a prolonged period of preoccupation with witchcraft (15th through 17th century) in Europe and in colonial North America.

So-called madhouses such as Bedlam (founded in London in 1247) and the Bicêtre (the Paris asylum for men) were typical of 18th-century mental institutions in which the sufferers were routinely shackled. Inmates of these places often were believed to be devoid of human feeling, and their management was indifferent if not brutal; the primary consideration was to isolate the mentally disturbed from ordinary society. In British colonial America, mentally deranged persons frequently were auctioned off to be cared for (or exploited) by farmers; some were driven from towns by court order, and others were placed in almshouses. Only after more than a century of colonization was the first British colonial asylum for the insane established in Williamsburg, Va., in 1773. In the 1790s, the French reformer Philippe Pinel scandalized his fellow physicians by removing the chains from 49 inmates of the Bicêtre. At about the same time, William Tuke, a Quaker tea and coffee merchant, founded the York (England) Retreat to provide humane treatment. Benjamin Rush, a physician and signer of the Declaration of Independence, also advocated protection of the rights of the insane. Despite this progress, more than half a century of independence passed in the United States before Dorothea Dix, a teacher from Maine, discovered that in Massachusetts the insane were being jailed along with common criminals. Her personal crusade in the 1840s led to a flurry of institutional expansion and reform in her own country, in Canada, and in Great Britain.

While these pioneering humanitarian efforts tended to improve conditions, one unplanned result was a gradual emphasis on centralized, state-supported facilities in which sufferers were sequestered, often far from family and friends. Largely kept from public scrutiny, the unfortunate inmates of what fashionably were being called mental hospitals increasingly became victims of the old forms of maltreatment and neglect.

Modern approaches. The modern mental-health movement received its first impetus from the energetic leadership of a former mental patient in Connecticut, Clifford Whittingham Beers. First published in 1908, his account of what he endured, *A Mind That Found Itself,* continues to be reprinted in many languages, inspiring successive generations of students, mental-health workers, and laymen to promote improved conditions of psychiatric care in local communities, in schools, and in hospitals. With the support of prominent persons, including distinguished professionals, Beers in 1908 organized the Connecticut Society for Mental Hygiene, the first association of its kind. In its charter, members were charged with responsibility for the same pursuits that continue to concern mental-health associations to this day: improvement of standards of care for the mentally disturbed, prevention of mental disorder and retardation, the conservation of mental health, and the dissemination of sound information. In New York City less than a year later, on February 19, 1909, Beers led in forming the National Committee for Mental Hygiene, which in turn was instrumental in organizing the National Association for Mental Health in 1950.

While philosophic and scientific bases for an international mental-health movement were richly available, Beers seems to have served as a catalytic spark. Charles Darwin and his contemporaries already had shattered traditional beliefs in an immutable human species with fixed potentialities. By the time Beers began his public agitation, it was beginning to be understood that developing children need not suffer some of the crippling constraints imposed on their parents. A newly emerging scientific psychology had revealed some of the mechanisms by which the environment had its effects on individual adjustment, fostering hopes that parents and community could provide surroundings that would enhance the growth and welfare of children beyond levels once thought possible. In this spirit, the mental-health movement early inspired the establishment of child-guidance clinics and programs of education for parents and for the public in general.

Psychiatric and psychological developments during and after World War I provided fresh impetus to the movement. Over the same period, the European development of psychoanalysis, initiated by Sigmund Freud in Vienna, placed heavy emphasis on childhood experiences as major determinants of psychiatric symptoms and led worldwide to increasing public awareness of psychological and social-environmental elements as primary factors in the development of mental disorders.

International organizations. Beers formed an International Committee for Mental Hygiene in 1919. By 1930, the time of the First International Congress of Mental Hygiene in Washington, D.C., there were mental-hygiene societies in 25 countries. In London at the third international congress in 1948, the World Federation for Mental Health was formed. It provides consultants and shares informal reciprocal functions with several United Nations agencies, including the World Health Organization (in which a mental-health unit was established in 1949). The federation has convened international study groups and expert committees, held regional and international meetings, and developed close contacts with mental-health workers worldwide. In almost every country there is increasing recognition of the interrelationship between mental health, population pressures, and social unrest. With growing urgency, people almost everywhere seek to promote mental health and to educate the public to pursue conditions conducive to individual growth and peaceful development.

National agencies. For more than a century before World War II, the mental hospitals of many countries had been the responsibility of local government. Under the British National Health Service Act of 1946, however, the task of providing hospital care fell almost completely on the national government through boards of hospital administration acting as regional agencies for the Ministry of Health. In the same year, existing privately supported mental-health organizations combined to form the (U.K.) National Association for Mental Health. This voluntary national group provides resident facilities for disturbed persons, offers follow-up services, and trains mental-health personnel, in addition to carrying on educational programs. The Mental Health Act of 1959 nullified earlier British laws governing policies toward psychiatric disturbance and retardation. The act provided that a person requiring treatment for a psychological disorder could obtain it in a hospital on the same basis as any medical complaint. Community mental-health services were placed under the jurisdiction of local health authorities working in close association with hospital and outpatient centres. British research into mental-health problems is mainly under the direction of the government-financed Medical Research Council.

Provisions for treating and caring for mentally disturbed persons and for encouraging mental hygiene are generally organized in this manner over most of the continent of Europe. In communist countries, the state, either through the central or regional governments, had the task of providing and maintaining facilities for disturbed or retarded persons. In countries of the European Economic Community, government shares its mental-health function with religious groups or with other nongovernmental agencies. Many innovative mental-health services have been initiated in Europe, including the concept of integrated community services, the use of tranquillizing drugs, the sheltered workshop, and the employment of nonprofessional workers in positions of responsibility.

Imported European ideas combined with the traditional reliance on self-improvement and adjustment already present in Canadian and U.S. culture to give the mental-health movement in those countries additional momentum in the 1930s and early 1940s.

World War II and the postwar problems of returning veterans stimulated further public interest in mental health. The mental-health movement and the mass media discovered each other, and a flood of exposés swept Canada and the United States, notably Albert Deutsch's *The Shame of the States* in 1948. Published in 1946, Mary Jane Ward's book *The Snake Pit* became a Hollywood film success and was followed by many more honestly realistic portrayals of mental problems on screen and television. A psychodynamic approach to the understanding and guidance of children infused North American popular culture. The introduction of pharmacotherapy (*e.g.,* tranquillizing and mood-elevating drugs) stimulated further progress.

In 1946 the passage of the National Mental Health Act in the United States made possible the creation of the National Institute of Mental Health (NIMH) in 1949 within what later became the Department of Health and Human Services. State hospital systems were reorganized with increased budgets, while significant federal funds were made available for research, training, and clinical facilities. NIMH is the major funding resource in the United States for basic and applied research in mental health and in the behavioral sciences, for demonstration projects, and for the training of mental-health professionals. It has developed special programs in a broad range of social problem areas, from drug addiction to suicide prevention. The National Clearinghouse for Mental Health Information, operated by NIMH, is a valuable resource, as is the periodical publication *Mental Health Digest.* Additional sources of support for mental health in the United States include the National Institute of Child Health and Human Development, the Veterans Administration, the Department of Education, the Social and Rehabilitation Service, the National Science Foundation, and the medical sections of the Department of Defense. Charitable foundations also have provided generous support over the years.

The situation in Australia and New Zealand is similar to that of North America and Europe. Developments in Latin America, Africa, and Asia commonly have been hampered by a shortage of trained institutional staff members and of local sources of support. In many so-called developing countries, mental health and hygiene depend heavily on missionaries, intergovernmental aid programs, and the efforts of agencies of the United Nations.

mental retardation, any of several conditions characterized by subnormal intellectual functioning and impaired adaptive behaviour that become manifest during the individual's developmental years.

Characterization. A standardized intelligence test is a common method of identification, a tested intelligence quotient of 70 being the usual upper borderline for those needing special care and training. Retardation is classified according to severity. The once standard labels—moron, imbecile, and idiot—have been abolished. Categories of retardation take into account an individual's physical and social development, and correspond roughly to IQ scores. Those with scores in the upper range of retardation, roughly 53 to 70, comprise the majority of retarded persons; they are able to learn academic and prevocational skills with some special training. Those in the moderate range, roughly 36 to 52, are able to talk and care for their own basic needs, to learn functional academic skills, and to undertake semi-skilled work under sheltered conditions. Those in the severe range, about 21 to 35, show slow motor development, limited communication skills, possible physical handicaps, and the ability to talk and care for their basic needs, as well as to contribute to their own maintenance with supervision in work and living situations. Finally, those in the profound range, comprising the smallest number of the retarded, demonstrate minimal responsiveness, secondary physical handicaps, poor motor development and communication skills, and the ability to perform only highly structured work activities. Institutionalization in this case is almost inevitable. Educators have coordinated IQ scores with school capabilities: educable, 50–75; trainable, 25–50; and custodial, 0–25.

Causes. Moderate to severe retardation can be caused by a number of mishaps that may occur before, during, or after birth, including: genetic disorders, such as Down's Syndrome (leading to cretinism or mongolism, for example); infectious diseases, such as meningitis; metabolic disorders; physical malformations; poisoning from radiation, lead, or other toxic agents; injuries to the head; and malnutrition. Milder cases of progressive retardation can be traced to economic and cultural deprivation early in childhood, mainly due to poverty.

Care and education. Care and treatment of the retarded in the past was mainly custodial. More recently, however, efforts have been directed toward improved medical treatment of organic conditions, parent education, special schooling, vocational training, and sheltered workshops. Many retarded persons have proved capable of becoming nearly independent and productive members of society, although in most cases specialized training and continuing guidance services are necessary to aid adjustment.

Residential care is often a necessity for the more severely retarded, who need constant attention, as well as for senior retarded persons. Psychologists believe the best kind of residential care is that most closely resembling family life. Residential-care facilities and group homes are normally located in apartments or individual houses.

For many school-agers, special education is one of the most important means to self-sufficiency. Federal legislation enacted in the United States in 1968 provides authority for the broadening of efforts in vocational education of the handicapped to include the mentally retarded. Mainstreaming, the integration of children from the special-education classes with those in the regular program, is an attempt to introduce retarded children to a normal school routine. Physical integration alone, however, does not guarantee acceptance by nonretarded youngsters. Psychological integration is also an important consideration.

Mentawai Islands, Dutch MENTAWEI EILANDEN, group of about 70 islands, Sumatera Barat *provinsi* ("province"), Indonesia. They lie off the western coast of Sumatra in the Indian Ocean. The major islands are Siberut, Sipura, Pagai Utara (North Pagai), and Pagai Selatan (South Pagai), the last two also known as the Nassau Islands. The principal town is Muarasiberut, in southeastern Siberut. The islands' western coasts are steep and rocky, and coral reefs and heavy surf make approach dangerous. Elevations are below 1,500 feet (450 m), and earthquakes are frequent. Most of the islands are covered with forest.

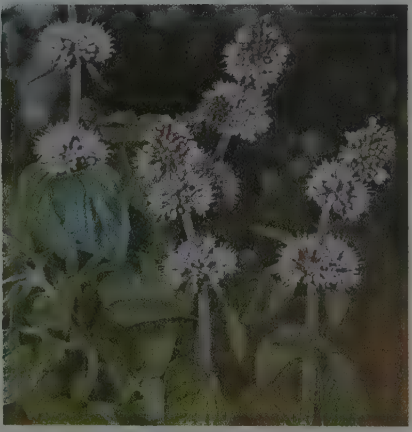
Racially the inhabitants seem to belong to the early (Proto-) Malays. Most are still animists and distrustful of Christian missionary activity. Their societies are usually subdivided into endogamous clan groups in which authority and inheritance are patrilineal. The villages are irregular groupings of small houses on stilts, usually along riverbanks, with occasional long houses. Tuber crops, chiefly taro and yams, are grown in temporary clearings. Flour from sago palms is also important. Pigs are kept but no large livestock. Hunting with bow and poisoned arrows, gathering of forest products, and fishing supplement agriculture. Coconuts are grown, and copra is the chief export. There are few roads. Pop. (latest est.) 14,732.

Menteşe DYNASTY, Turkmen dynasty (*c.* 1290–1425) that ruled in the Muğla-Milas region of southwestern Anatolia.

Founded by Menteşe, the dynasty's principality extended along the Aegean and the Mediterranean coasts, and its fleet engaged in trade and piracy. After repulsing a Byzantine attack in 1296, Menteşe's son Mesud occupied part of the island of Rhodes in 1300. Menteşe Ibrahim was compelled in 1355 to allow the Venetians to establish a trading colony at Balat (Miletus).

Divided in about 1360 into two major branches, with their respective centres at Balat and Beçin (Peçin), the principality came under Ottoman rule in 1390–91. Its independence was restored by the Central Asian ruler Timur (Tamerlane) in 1402, but it was permanently annexed by the Ottomans in 1425.

Mentha, the mint genus, containing 25 species of aromatic herbs native in temperate Eurasia, North America, southern Africa, and Australia. It belongs to the family Lamiaceae, order Lamiales, though the flowers are not typical of members of that family, having four rather than five united petals. The blue to lavender or white flowers bloom in whorls along the stem.



Wild mint (*Mentha arvensis*)

G.E. Hyde—EB Inc.

Spearmint (*M. spicata*), which grows to about 90 cm (3 feet) high, with open spikes of pink or lilac flowers and stalkless leaves, has the characteristic mint fragrance. Peppermint (*M. piperita*) has a heavier scent, stalked leaves, and reddish lilac flowers in denser spikes. Peppermint may be a hybrid between spearmint and water mint (*M. aquatica*), which has hairy stems, broadly oval, scented leaves, and a globed head of lavender flowers. Pennyroyal (*M. pulegium*) is a low plant with small, oval, scented leaves and bluish lilac flowers. All four species, native to Eurasia and naturalized in North America, are common in moist meadows. Wild mint (*M. arvensis*), native in North America and Eurasia, reaches about 1 m (over 3 feet) high. *See also* mint.

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menthol, also called PEPPERMINT CAMPHOR, a crystalline organic compound with a strong, minty, cooling odour and taste obtained for centuries from the oil of the Japanese mint; it is used in cigarettes, cosmetics, and flavourings. It belongs to the isoprenoid family, the empirical formula being $C_{10}H_{20}O$.

The most common of the optical isomers (identical formula but different structures) of menthol is the levorotatory form (*i.e.,* a compound that rotates the plane of polarized light to the left) *l*-menthol, present in mint oil; smaller amounts are produced from citronellal. Racemic menthol—*i.e.,* a mixture of equal amounts of *l*-menthol and *d*-menthol, the latter being the isomer that rotates the plane of polarized light to the right—is not equivalent to the natural product, because the cooling effect is peculiar to the levo isomer.

Menton, Italian MENTONE, town, Alpes-Maritimes *département,* Provence-Alpes-Côte-d'Azur region, southeastern France. Situated near the Italian border 17 miles (28 km) northeast of Nice and 6 miles (10 km) northeast of Monte-Carlo by road, it is reputedly the warmest winter resort on the French Riviera's Côte d'Azur; it is also a popular summer resort. The town stands below a rocky amphitheatre, along a wide crescent-shaped bay that is divided by a spur and bounded to the southwest by Cape Martin. Along the shore lie the tourists' quarter with tropical gardens, luxurious hotels, wide promenades, and the municipal casino. An artificial sand beach lies between the old harbour and the newer yacht marina in Garavan Bay. The narrow, vaulted streets of the old 17th-century section of Menton are cramped together on a narrow promontory above Garavan Bay. The town, which belonged to the counts of Ventimiglia, a noble Genoese family, was purchased in the 14th century by the Grimaldis, lords of Monaco. In 1860, Menton was purchased by France. Pop. (1999) 28,812.

Mentor, city, Lake county, northeastern Ohio, U.S. It lies near Lake Erie, 22 miles (35 km) northeast of Cleveland. Mentor Township, organized in 1815, was named for Hiram Mentor, an early settler. Mentor Village was separately incorporated in 1855. After World War II the area experienced rapid population and industrial growth, and in 1962 the township and village were consolidated. James A. Garfield, later U.S. president, bought a farm there in 1876, and his home, Lawnfield, has been preserved as a memorial museum depicting the history of the Western Reserve. The city is the site of Lakeland Community College (1966). There are many garden nurseries in the vicinity. Inc. city, 1963. Pop. (2000) 50,278.

Mentuhotep II, also called NEBHAPETRE, king of Egypt's 11th dynasty (ruled 2008–1957 BC) who, starting as the ruler of southernmost Egypt in about 2008, reunified the country by defeating his rivals and ushered in the period known as the Middle Kingdom.

At his accession, Mentuhotep, then called Sankhibtawy ("He Who Causes the Heart of the Two Lands to Live"), controlled Upper Egypt from Aswān to This, an ancient city about 90 miles (145 km) north of Thebes, his capital. He inherited a realm that had already spent some 60 years in intermittent warfare with the Heracleopolitan kingdom, which ruled Middle and Lower Egypt, as each state sought to control the whole country.

In the 14th year of his reign, Mentuhotep launched a drive against Heracleopolis. Nothing is known of the course of the war, but the Thebans were aided by a change of rulers in the enemy capital, and, by 1968 at the latest, Mentuhotep had captured Heracleopolis and reunited Egypt. In subsequent years, fighting continued in the north and against the Bedouin, who habitually raided the delta, and northern Nubia was annexed later in the reign. To consolidate the unification, Mentuhotep received the submission of Middle Egypt's local governors, most of whom he left in office, thereby establishing the feudal character of the early Middle Kingdom. Thebes became the national capital, and Mentuhotep's loyal supporters received the key government posts; he also accepted partisans of the defeated Heracleopolitans who demonstrated loyalty to the new order.

Reunification was followed by great expansion in trade and building. Mentuhotep built temples with reliefs of his victories at numerous Upper Egyptian sites, but little survives from them. At Thebes he built a magnificent temple and tomb complex. The hills around the monument were honeycombed with the tombs of his officials and soldiers who perished in the wars. He died about 1957, leaving a reunited and prosperous kingdom to his successor, Sankhkare Mentuhotep III. Tradition accorded Mentuhotep II an honoured place with Egypt's other unifiers, the founders of the 1st and 18th dynasties.

menues verdure: *see* millefleur tapestry.

Menuhin, Sir Yehudi (b. April 22, 1916, New York, N.Y., U.S.—d. March 12, 1999, Berlin, Ger.), one of the leading violin virtuosos of the 20th century.

Menuhin grew up in San Francisco, where he studied violin from age four and where his performance of Felix Mendelssohn's *Violin Concerto* at age seven caused a sensation. He studied in Paris under the violinist and composer Georges Enesco, who deeply influenced his playing style and who remained a lifelong friend. As a teenager he toured widely, winning admiration both for his technical proficiency and for his musical interpretation. In 1936 he retired from performing for 18 months of study, then resumed concert activity. He moved to London in 1959 and in 1963 opened the Yehudi Menuhin School for musically gifted children at Stoke d'Abernon, Surrey. In 1965 he was granted knighthood, but he did not receive the title until 1985, when he became a British citizen.

Menuhin

By courtesy of Columbia Artists Management Inc.

Menuhin gained note for introducing into his concerts rarely performed and new music; works he commissioned include Béla Bartók's *Sonata for Solo Violin.* He presided over the annual music festivals at Gstaad, Switz. (from 1957); Bath, Eng. (1959–68); and Windsor, Eng. (1969–72). In 1966 at Bath and in 1967 at the United Nations, Menuhin performed duets with the noted Indian sitarist and composer Ravi Shankar, who composed the solo piece *Prabhati* for him.

His publications include a collection of essays, *Theme and Variations* (1972); works for musical instruction, *Violin: Six Lessons* (1972) and *Violin and Viola* (1976; with W. Primrose and D. Stevens); an autobiography, *Unfinished Journey* (1977); and *The Music of Man* (1979; with Curtis W. Davis).

Menuis (Egyptian religion): *see* Mnevis.

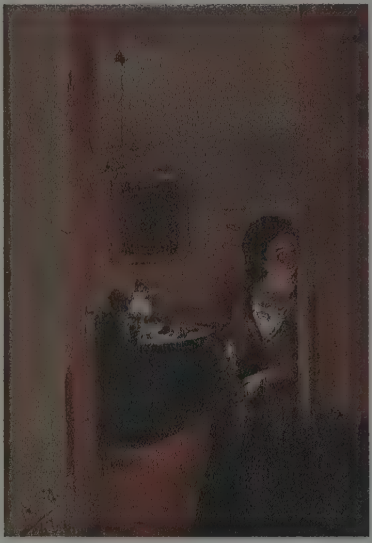
Menuisiers-Ébénistes, Corporation des, 18th-century French craft guild concerned with woodworking, the *menuisiers* doing principally the work of the carpenter and joiner and the *ébénistes* applying the veneered finish. Jean-Baptiste Colbert, the finance minister of Louis XIV, took the guild system from its medieval background and shaped it into an effective labour-control organization, inculcating a sense of professional pride among its members and encouraging a high degree of specialization. It was this attitude that produced the dynasties of superb craftsmen who made French furniture of the 18th century one of the glories of Western culture.

Although it was the *menuisier* who conceived and signed a piece of furniture, the end result was in fact brought about by a collective effort of various other craftsmen. As the art of veneering developed in the late 17th century, a new category appeared, the *menuisiers en ébène,* who were later known as *ébénistes;* and in 1743 the guild of *menuisiers* was reformed as the Corporation des Menuisiers-Ébénistes. Although the guilds were dissolved in 1791, their influence persisted into the 19th century.

Menzel, Adolf (Friedrich Erdmann) von (b. Dec. 8, 1815, Breslau, Prussia—d. Feb. 9, 1905, Berlin), German painter and printmaker, best known in his own day as a brilliant historical painter, whose patriotic works satisfied the public's taste for propagandistic art engendered by Prussia's continual expansion throughout the 19th century. In the 20th century he was chiefly esteemed for his sensitive treatment of light and the original compositions of his small genre pictures.

In 1832 Menzel took charge of his dead father's lithographic workshop and, self-taught, rapidly became famous in this medium by illustrating various histories of Prussia, especially those dealing with the reign of Frederick II the Great. These were followed by illustrations for similar publications, such as a lavish edition of Frederick's works with 200 plates (1844–49). In painting Menzel soon became famous for his glittering re-creations of such scenes as Frederick the Great's concerts at his palace, Sanssouci, and "The Ball Supper" (1878; Staatliche Museen zu Berlin), showing the court of King Wilhelm I vigorously refreshing itself.

In later times Menzel was most admired for small paintings and drawings dating from about 1840 onward. These interior, street, and landscape scenes show an unorthodoxy of vision and a refined feeling for the effects of light; such works as "Room with a Balcony" (1845; Staatliche Museen Preussischer Kulturbesitz, Berlin) and "The Artist's Sister in the Sitting Room" (1847; Neue Pinakothek, Munich) presage later developments of the Impressionist movement in France. Subjects are viewed from high or low angles, and there are departures from conventions of grouping and framing, as well as innovative excursions into industrial subjects, as in "Rolling Mill" (1875; Staatliche Museen Preussischer Kulturbesitz, Berlin).



"The Artist's Sister in the Sitting Room," oil on paper by Adolf von Menzel, 1847; in the Neue Pinakothek, Munich

By courtesy of the Bayerische Staatsgemaldesammlungen, Munich

Menzel-Bourguiba (Tunisia): *see* Manzil Bū Ruqaybah.

Menzies, Sir Robert Gordon (b. Dec. 20, 1894, Jeparit, Victoria—d. May 16, 1978, Melbourne), statesman who, as prime minister of Australia (1939–41, 1949–66), strengthened military ties with the United States and fostered industrial growth and immigration from Europe.

Sir Robert Gordon Menzies

By courtesy of the Australian Information Service

Menzies gave up a highly successful law practice in Victoria to serve in the state legislature (1929–34). He entered the federal Parliament in 1934, serving as attorney general (1934–39) under Joseph Lyons; and in 1939, as leader of the United Australia Party, he became prime minister. Pressure from various quarters forced his resignation in 1941, after he had initiated Australia's mobilization for World War II. Organizing the Liberal Party in 1944, he regained control of the government in 1949, campaigning in opposition to the Socialist policies of the Labor Party.

Menzies presided over rapid industrial growth in Australia during the 1950s, sponsoring the development of natural resources and transportation and encouraging foreign investment. He had a traditional concept of the British Commonwealth and gave controversial support to Britain's intervention in the Suez crisis of 1956 and in the Malaysia–Indonesia confrontation of the early 1960s. His strong belief in the United States as the bulwark of Australian security led to the alliance (1951) of Australia, New Zealand, and the United States (ANZUS) and to Australia's joining the South East Asia Treaty Organization in 1954. His anti-Communism was expressed in an unsuccessful attempt to dissolve the Australian Communist Party in 1951 and in his joining the United States in supporting the South Vietnamese war effort. After the longest continuous ministry in Australian history, Menzies retired in 1966. He was knighted in 1963.

Menzies, William Cameron (b. July 29, 1896, New Haven, Conn., U.S.—d. March 5, 1957, Beverly Hills, Calif.), one of the most influential set designers in Anglo-American filmmaking, whose work on *The Tempest* and *The Dove* in 1927–28 won the first Oscar awarded by the Motion Picture Academy of Arts and Sciences for art direction.

Menzies' reputation derives from the opulent fairy-tale settings of such films as *The Thief of Bagdad* (1924) and *The Beloved Rogue* (1927), as well as extravagantly detailed historical spectacles such as *Gone with the Wind* (1939). His work on the latter, for which he won a second Oscar, was so broad in scope that he got credit as "production designer." He directed several films, including *Things to Come* (1936), for which he also designed remarkable sets.

Menzies often used forced perspective: making actual depths appear much greater than they were. Another of his techniques was to use broken diagonal barriers—fences, walls, or railings—to emphasize tension, grief, or separation.

Meo (Southeast Asian people): *see* Miao.

Meo (Indian tribe, or caste): *see* Mina.

mepacrine (drug): *see* quinacrine.

meperidine, synthetic narcotic analgesic (pain-relieving drug) used to alleviate both acute and chronic pain. It is an opioid, and thus its effects on the body resemble those of opium or morphine, one of opium's purified constituents. A common trade name for meperidine is Demerol.

The drug acts principally on the central nervous system and on the neural elements of the bowel. It can be administered orally, in liquid or tablet form, or by intramuscular or subcutaneous injection. Its effects are felt within 15 minutes and last from 3 to 5 hours. Meperidine commonly is used to relieve pain during childbirth, although it may slow the respiratory rate of both mother and infant. Other side effects include drowsiness, lightheadedness, dryness of the mouth, weakness, and nausea. The drug is also highly addictive. Nevertheless, its side effects tend to be less severe than those of morphine, making it a preferable choice in many instances.

Mephistopheles, also called MEPHISTO, familiar spirit of the Devil in late settings of the legend of Faust. It is probable that the name Mephistopheles was invented for the historical Faust by the anonymous author of the first *Faustbuch* (1587). A latecomer in the infernal hierarchy, Mephistopheles never became an integral part of the tradition of magic and demonology that predated him by thousands of years. He is mentioned only in the magic manuals attributed to Faust. He belongs essentially to literature. In *Doctor Faustus* (1604), by the English dramatist Christopher Marlowe, Mephistopheles achieves tragic grandeur as a fallen angel, torn between satanic pride and dark despair. In the drama *Faust* (Part I, 1808; Part II, 1832), by J.W. von Goethe, he is cold-hearted, cynical, and witty—perhaps a more subtle but certainly a slighter creation. At the end of Goethe's drama, Faust's soul escapes from Mephistopheles while he is making improper advances to the angels that have come to rescue it.

"Mephistopheles Offering His Help to Faust," illustration to Goethe's *Faust,* lithograph by Eugène Delacroix

The Bettman Archive

Meppel, *gemeente* (commune), Drenthe *provincie,* east-central Netherlands. It is situated near the confluence of the Drentche Hoofd and Hoogeveensche canals and the Reest River, which empty into the Meppelerdiep before it flows into the IJsselmeer (Lake IJssel). Meppel is a marketing centre for peat and agricultural products from the surrounding area, including cereals, dairy products, and pigs. The commune's factories manufacture transport equipment, chemicals, printed materials, textiles, and leather products. Reserves of natural gas are found nearby, and Meppel has an electric-transformer station.

A 15th-century church is an architectural feature of the town. The lakes of Beulakewijde and Belterwijde are located nearby. Forests lie to the southeast, and regional parkland is found to the north. Meppel is a highway and railway junction. Pop. (1994 est.) 24,427.

meprobamate, tranquilizing drug taken orally primarily to treat anxiety and tension. Meprobamate also has been effective for relief of insomnia, muscular spasms, and dermatological conditions and gastrointestinal disturbances arising from anxiety and tension. Because of its anticonvulsant action, it sometimes is helpful in treating petit mal and related minor epilepsies.

A central-nervous-system depressant, meprobamate acts selectively upon the spinal cord and the higher centres in the brain. The drug is absorbed readily from the gastrointestinal tract and distributed rapidly.

Physical dependence may be produced after utilization of high doses for prolonged periods. Possible side effects include drowsiness, lethargy, and unsteadiness of stance and gait.

Meprobamate was introduced in the mid-1950s and was first marketed as Miltown, a trade name derived from the name of the village, Milltown, N.J., in which the drug was developed.

mepyramine (drug): *see* pyrilamine.

Meramec River, tributary of the Mississippi River rising in the Ozark Mountains, near Salem in Dent county, southeast Missouri, U.S. The river winds 207 miles (333 km) generally north, northeast, and southeast through the limestone Meramec Caverns and Meramec State Park (near Sullivan) to enter the Mississippi River 20 miles (32 km) below St. Louis. Lead was mined along its banks in the 1700s, and the river was used by settlers and traders. A ferry, said to be the first in Missouri, was established near its mouth in 1776. Its main tributaries are the Bourbeuse and Big rivers. The Meramecian series of limestone rocks was named for the river. Meramec is possibly derived from an Algonquin Indian word meaning "catfish."

Merano, German MERAN, city, Bolzano-Bozen *provincia,* Trentino-Alto Adige *regione,* northern Italy. It lies at the foot of the central chain of the Alps, at the confluence of the Passirio and Adige rivers, northwest of the city of Bolzano.

Merano, first mentioned in 857, is that part of the Tirol transferred from Austria to Italy in 1918. The city is dominated by the Gothic parish church (1367–1495) and the small Principesco Castle (1445–80), built by the Habsburgs. In the surrounding area are about 30 castles, the most celebrated of which is Tirolo, from which the Tirol took its name.

In the 19th and 20th centuries Merano was transformed from a small mountain town into a tourist and health resort noted for its therapeutic baths. Fruit is grown locally, and wine and chemicals are produced. Pop. (1993 est.) mun., 33,638.

Consult the INDEX *first*

Merapi, Mount, Indonesian GUNUNG MERAPI, volcanic mountain peak located near the centre of the island of Java, Indonesia. The volcano is about 20 miles (32 km) north of Yogyakarta and somewhat farther south of Semarang. Merapi ("Mountain of Fire") rises to 9,551 feet (2,911 m) and has steep slopes with dense vegetation on its lower flanks. It is the most active of Indonesia's 130 active volcanoes. One of its largest eruptions occurred in 1006 and spread ash all over central Java. Other major eruptions were those of 1786, 1822, 1872, 1930, and 1976. Almost half of Merapi's eruptions have been accompanied by pyroclastic flows, or *nuées ardentes,* which are clouds of superheated gases and incandescent solid particles. In the eruption of Nov. 22, 1994, the release of a pyroclastic flow killed 64 people.

Merbecke, John (English composer): *see* Marbeck, John.

merbromin, first of a series of antiseptics in which mercury was incorporated into an organic molecule in an attempt to obtain the antibacterial action of mercury without the irritant effects of mercuric chloride. Commonly marketed as Mercurochrome, merbromin is applied to small cuts and abrasions to prevent infection; it stains surrounding tissue a brilliant red tinged with a yellow-green fluorescence. It is only a weak antiseptic and has been displaced in medical practice by the more effective agents of the series, nitromersol (Metaphen) and thimerosal (Merthiolate), and by antibiotics.

Merca (Somalia): *see* Marca.

Mercadante, Saverio, in full GIUSEPPE SAVERIO RAFFAELE MERCADANTE (b. before Sept. 17, 1795, Altamura, near Bari [Italy]—d. Dec. 17, 1870, Naples), Italian composer and teacher who was a transitional figure in opera composition between Gaetano Donizetti, Gioacchino Rossini, and Vincenzo Bellini on the one hand and Giuseppe Verdi on the other. He is considered to have been an important reformer of Italian opera.

Mercadante was born out of wedlock. He was taken to Naples at the age of 11, and in 1808 he was enrolled in the San Sebastiano College under an altered name, date, and place of birth. While a student there, he wrote a number of instrumental pieces, including music for three ballets. His first opera premiered on Jan. 4, 1819, and, less than three years (and precisely five operas) later, his *Elisa e Claudio* successfully opened at La Scala in Milan. Mercadante composed another popular opera, *Caritea, regina di Spagna* ("Caritea, Queen of Spain"; better known as *Donna Caritea*), in 1826. He was involved with Italian opera in Spain and Portugal from about 1827 to 1830. He married in 1832 and from 1833 to 1840 was maestro di cappella at Novara Cathedral. In 1835 Mercadante came in contact with the music of Giacomo Meyerbeer, and his next opera, *Il giuramento* ("The Oath"; performed in 1837 and considered to be his best opera), reflects the lessons he learned from that composer. Thereafter he continued to attempt a more harmonious blend of drama and music and led the way toward simplified vocal lines, originality, and thoughtful, serious composition. From 1840 until his death, he served as head of the Naples Conservatory. In addition to operas, he wrote sacred music (including a number of masses), cantatas and hymns, orchestral pieces, and a variety of chamber music.

mercantile agency, specialized organization engaged in supplying information on the creditworthiness and financial strength of business firms in highly developed economies. The first such agency, the Mercantile Agency, was founded in New York City in 1841 to reduce credit losses. As businesses expanded from their local area to a national scale, many of them found it impossible to judge the creditworthiness of prospective customers in distant locations. The Mercantile Agency, which changed its name to R.G. Dun & Company after 1859, merged in 1933 with the Bradstreet Company to form the most widely known agency, Dun & Bradstreet, Inc.

Mercantile agencies may be general (providing information on all types of business firms) or specialized (limited to firms in a particular line of trade or in a particular region). Most agencies provide two kinds of reports. General reports, containing a rating based on the firm's financial statement and a rating of the credit to which the mercantile agency judges the firm to be entitled, are issued periodically on all firms investigated by the agency. Special reports, containing a firm's history, fire record, insurance record, financial statements, public records, and the opinion of other creditors, are issued to clients of the agency on request.

mercantilism, economic theory and practice common in Europe from the 16th to the 18th century that promoted governmental regulation of a nation's economy for the purpose of augmenting state power at the expense of rival national powers. It was the economic counterpart of political absolutism. Its 17th-century publicists—most notably Thomas Mun in England, Jean-Baptiste Colbert in France, and Antonio Serra in Italy—never, however, used the term themselves; it was given currency by the Scottish economist Adam Smith in his *Wealth of Nations* (1776).

Mercantilism contained many interlocking principles. Precious metals, such as gold and silver, were deemed indispensable to a nation's wealth. If a nation did not possess mines or have access to them, precious metals should be obtained by trade. It was believed that trade balances must be "favourable," meaning an excess of exports over imports. Colonial possessions should serve as markets for exports and as suppliers of raw materials to the mother country. Manufacturing was forbidden in colonies, and all commerce between colony and mother country was held to be a monopoly of the mother country.

A strong nation, according to the theory, was to have a large population, for a large population would provide a supply of labour, a market, and soldiers. Human wants were to be minimized, especially for imported luxury goods, for they drained off precious foreign exchange. Sumptuary laws (affecting food and drugs) were to be passed to make sure that wants were held low. Thrift, saving, and even parsimony were regarded as virtues, for only by these means could capital be created. In effect, mercantilism provided the favourable climate for the early development of capitalism, with its promises of profit.

Later, mercantilism was severely criticized. Advocates of laissez-faire argued that there was really no difference between domestic and foreign trade and that all trade was beneficial both to the trader and to the public. They also maintained that the amount of money or treasure that a state needed would be automatically adjusted and that money, like any other commodity, could exist in excess. They denied the idea that a nation could grow rich only at the expense of another and argued that trade was in reality a two-way street. Laissez-faire, like mercantilism, was challenged by other economic ideas. *Compare* laissez-faire.

mercaptan: *see* thiol.

Mercāra, also called MADHU-KERI, town, southern Karnātaka (formerly Mysore) state, southern India, in the Western Ghāts, at an elevation of 3,800 feet (1,160 m), on the national highway from Mysore city to Mangalore. In 1681 Mudda Raja selected the central but inaccessible site for the capital of the independent Hindu dynasty of Coorg. A fort built in 1812 by Linge Raja and the hilltop Onkeshwara Temple overlook the quiet town. Raja's Seat, a picturesque little garden, commands a panoramic view. A government and a law college are affiliated with the University of Mysore. Pop. (1981) 24,724.

Mercator, Gerardus, original name GERARD DE CREMER, or KREMER? (b. March 5, 1512, Rupelmonde, Flanders [now in Belgium]—d. Dec. 2, 1594, Duisburg, Duchy of Cleve [Germany]), Flemish cartographer whose most important innovation was a map, embodying what was later known as the Mercator projection, on which parallels and meridians are rendered as straight lines spaced so as to produce at any point an accurate ratio of latitude to longitude. He also introduced the term atlas for a collection of maps.

Mercator, engraving by Frans Hogenberg, 1574

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Mercator's family had moved from Germany to Flanders shortly before he was born. He was educated in Hertogenbosch (Neth.), receiving training in Christian doctrine, dialectics, and Latin. In 1530 he entered the University of Louvain (Belg.) to study the humanities and philosophy and graduated with a master's degree in 1532.

Religious doubts assailed him about this time, for he could not reconcile the biblical account of the origin of the universe with that of Aristotle. After two years of study which led him to Antwerp and Mechelen he emerged from his personal crisis, fortified in his faith, with less enthusiasm for philosophical speculation. Moreover, he brought back to Louvain a freshly acquired taste for geography.

Under the guidance of Gemma Frisius, the leading theoretical mathematician in the Low Countries, who was also a physician and astronomer, Mercator mastered the essentials of mathematics, geography, and astronomy. Frisius and Mercator also frequented the workshop of Gaspar à Myrica, an engraver and goldsmith. The combined work of these three men soon made Louvain an important centre for the construction of globes, maps, and astronomical instruments. In 1534 Mercator married Barbara Schellekens, by whom he had six children.

By the time he was age 24, Mercator was a superb engraver, an outstanding calligrapher, and a highly skilled scientific-instrument maker. In 1535–36 he cooperated with Myrica and Frisius in constructing a terrestrial globe and in 1537 its celestial counterpart. These globes demonstrate the free and graceful italic lettering with which Mercator was to change the face of 16th-century maps. During that period he also began to build his reputation as the foremost geographer of the century with a series of printed cartographic works: in 1537 a map of Palestine, in 1538 a map of the world on a double heart-shaped projection, and about 1540 a map of Flanders. In 1540 he also published a concise manual on italic lettering, the *Literarum Latinarum quas Italicas cursoriasque vocant scribende ratio,* for which he engraved the wood blocks himself.

In 1544 he was arrested and imprisoned on a charge of heresy. His inclination to Protestantism, and frequent absences from Louvain to gather information for his maps, had aroused suspicions; he was one of 43 citizens so charged. But the university authorities stood behind him. He was released after seven months and resumed his former way of life. He obtained a privilege to print and publish books and was free to continue his scientific studies.

In 1552 Mercator moved permanently to Duisburg in the Duchy of Cleve. Once there, he became a well-known figure. He assisted the duke in establishing a grammar school by helping to design its curriculum. After establishing a cartographic workshop and engaging his own engravers, he returned to his main interest.

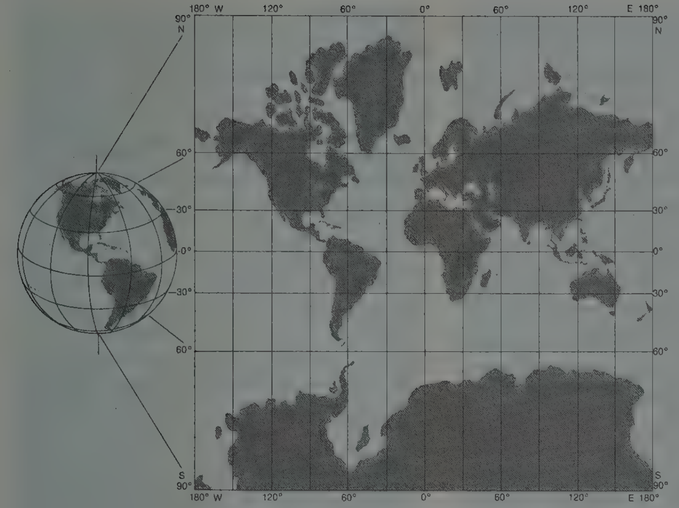
In 1554 he published a map of Europe that he had begun at Louvain, and between 1559 and 1562 he taught mathematics in the grammar school. During these busy years he also undertook genealogical research for Duke Wilhelm, drew up a Concordance of the Gospels, and composed a detailed commentary on the first part of the Letter of Paul to the Romans. In 1564 he completed a map of Lorraine (now lost) and another of the British Isles. Public recognition of his accomplishments came in 1564 with his appointment as court "cosmographer" to Duke Wilhelm of Cleve. During these years he perfected his projection, which enabled mariners to steer a course over long distances by plotting straight lines without continual adjustment of compass readings. This technique immortalized his name in the "Mercator projection," which he used on his map of the world in 1569.

Mercator then began to execute a series of publications intended to describe the creation of the world and its subsequent history. This *Atlas*—the term still used to indicate a collection of maps—was never fully realized.

In 1569, as the first section, he published a chronology of the world from the Creation to 1568. He then published 27 of the maps originally prepared by the Greek geographer Ptolemy, with corrections and commentary in 1578, under the title *Tabulae Geographicae C. Ptolemei ad mentem autoris restitutae et emendatae.* The next part of the *Atlas,* consisting of a set of new maps covering France, Germany, and the Netherlands, came out in 1585, with maps of Italy, "Sclavonia" (now the Balkan countries), and Greece following in 1589. A last section, on the British Isles, was included in an edition with the previous sections, which was seen through the press after his death by his son in 1595. Another printing followed in 1602, and further maps were added in a later edition of 1606, usually called the "Mercator–Hondius Atlas."

BIBLIOGRAPHY. A.S. Osley, *Mercator* (1969), contains a translation of Mercator's monograph on map lettering, and a translation of a biography written by his neighbour, as well as a general bibliography.

Mercator projection, type of map projection introduced in 1569 by Gerardus Mercator. It is often described as a cylindrical projection, but it must be derived mathematically. The meridians are equally spaced, parallel vertical lines, and the parallels of latitude are parallel, horizontal straight lines, spaced farther and farther apart as their distance from the Equator increases. This projection is widely used for navigation charts, because any straight line on a Mercator-projection map is a line of constant true bearing that enables a navigator to plot a straight-line course. It is less practical for world maps because the scale is distorted; areas farther away from the equator appear disproportionately large. On a Mercator pro-



(Left) Globe of the Earth with no land distortion and (right) the Mercator projection with increased land distortion, especially in the 60° to 90° latitudes

jection, for example, the landmass of Greenland appears to be greater than that of the continent of South America; in actual area, Greenland is smaller than Saudi Arabia.

Merced, city, Merced county, central California, U.S., on Bear Creek in the San Joaquin valley, 55 miles (89 km) northwest of Fresno. It was founded in 1872 by the Central Pacific Railroad, and it became county seat in the same year. It was named for the Nuestra Señora de la Merced River. It developed as a processing and shipping point for agricultural produce of the valley, irrigated by the Tri-Dam Project (18 miles [29 km] northeast). There is some light manufacturing, chiefly metal fabrication. Merced College was established in 1962. Lake Yosemite is 7 miles (11 km) northeast, Yosemite National Park 45 miles (72 km) northeast, and Merced National Wildlife Refuge 16 miles (26 km) southwest. Castle Air Force Base (1946) nearby is a significant economic asset. Inc. 1889. Pop. (2000) city, 63,893; Merced MSA, 210,554.

Mercedarian, also called NOLASCAN, member of ORDER OF OUR LADY OF MERCY, also called KNIGHTS OF SAINT EULALIA, religious order founded by St. Peter Nolasco in Spain in 1218, for the purpose of ransoming Christian captives from the Moors. It was originally a military order.

St. Raymond of Penafort, Nolasco's confessor and the author of the order's rule, based the rule on that of St. Augustine. In addition to the usual three religious vows of poverty, chastity, and obedience, the Mercedarians took a fourth vow, to offer themselves as hostages for Christian prisoners in danger of losing their faith.

The habit of a Mercedarian is white, originally to facilitate entrance into Muslim territory, and he wears a wide leather belt with a chain, suggesting the sword that all members once customarily carried.

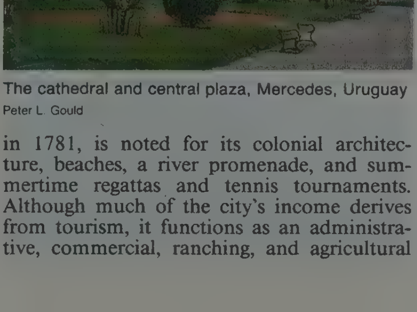
Pope Gregory IX approved the order in 1235, and it spread rapidly through Europe. During the founder's lifetime, the order freed 2,700 prisoners and, overall, claimed to have freed about 70,000 prisoners. In 1265 a second order of Mercedarians for women was founded in Spain by St. Mary de Cervello.

In 1318 Pope John XXII decreed that the leader of the order should be a priest, an action that caused lay knights to leave the Mercedarians and join a military order of Our Lady of Montesa. The Mercedarians subsequently became a mendicant order. Mercedarians accompanied Columbus to America and founded monasteries in Latin America. They also established themselves in Africa, Italy, France, and Ireland.

In 1602 a reform movement led by Juan Bautista Gonzalez resulted in the Discalced Mercedarians, whose rule was approved in 1606 by Pope Paul V. The anticlerical mood of the 19th century came close to extinguishing the Mercedarians. In 1880, however, Pedro Armengol Valenzuela became master general, revised their constitution, and guided the order to educational, charitable, and social work, activities which the Mercedarians continued to pursue in the 20th century.

Mercedes, also called VILLA MERCEDES, city of west-central Argentina, located on the Quinto River of east-central San Luis *provincia,* in a semiarid transition area between the Pampa (east) and the San Luis Mountains (northwest). It was founded in 1856 as Fuerte Constitucional, and the surrounding lands were distributed to veteran army officers who guarded the frontier. In 1861 the settlement was renamed Villa Mercedes in honour of the Virgen de la Merced (Spanish: "Virgin of Mercy"), its patroness. From 1863 to 1865, the city was constantly attacked by Indians and mountain rebels; they were finally repelled and the rebel leader, Puebla, was killed. Water for irrigation from the Quinto River has enabled the area to become an important grain (corn [maize], sorghum, and rye) and cattle-producing region. Incorporated as a city in 1896, Mercedes has a large grain mill and refrigerator plants to process beef for export. Pop. (1999 est.) 100,876.

Mercedes, city, southwestern Uruguay, on the Negro River. The city, which was founded in 1781, is noted for its colonial architecture, beaches, a river promenade, and summertime regattas and tennis tournaments. Although much of the city's income derives from tourism, it functions as an administrative, commercial, ranching, and agricultural centre and has several industries. Mercedes has a government-owned television station. Shallow-draft vessels operating from its port connect with larger craft serving cities on the Uruguay River and Río de la Plata. Mercedes is linked to Montevideo by highway, air, and rail. Pop. (1996) 50,800.



The cathedral and central plaza, Mercedes, Uruguay

Peter L. Gould

Mercedes, El de las (Spanish: "He of the Largesse"): *see* Henry II *under* Henry (Spain: Castile).

mercenary, hired professional soldier who fights for any state or nation without regard to political interests or issues. From the earliest days of organized warfare until the development of political standing armies in the mid-17th century, governments frequently supplemented their military forces with mercenaries.

Employment of mercenaries could be politically dangerous as well as expensive, as in the case of the early 14th-century *almogaváres,* Spanish frontiersmen hired by the Byzantine Empire to fight the Turks. After helping defeat the enemy, the *almogaváres* turned on their patrons and attacked the Byzantine town of Magnesia (modern Alaşehir, Tur.). After the assassination of their leader they spent two years ravaging Thrace and then moved on to Macedonia.

Following the Hundred Years' War (1337–1453), Europe was overrun with thousands of men who had been trained for nothing but fighting. During the 15th century "free companies" of Swiss, Italian, and German soldiers sold their services to various princes and dukes. These hired soldiers, often greedy, brutal, and undisciplined, were capable of deserting on the eve of battle, betraying their patrons, and plundering civilians. Much of their mutinous behaviour was the result of their employer's unwillingness or inability to pay for their services. When rigid discipline, sustained by prompt payment, was enforced (as in the army of Maurice of Nassau), mercenaries could prove to be effective soldiers. Swiss soldiers were hired out on a large scale all over Europe by their own cantonal governments and enjoyed a high reputation. In 18th-century France the Swiss regiments were elite formations in the regular army.

Since the late 18th century, however, mercenaries have been, for the most part, individual soldiers of fortune. Since World War II they have won some prominence for their exploits in certain Third World countries, especially in Africa, where they were hired both by government and by antigovernment groups.

Mercer, David (b. June 27, 1928, Wakefield, Yorkshire, Eng.—d. Aug. 8, 1980, Haifa, Israel), playwright who established his reputation on the London stage in the mid-1960s with plays that examine the decay he saw in English society.

Mercer left school at the age of 14 and became a medical laboratory technician. He eventually joined the Royal Navy and, after his discharge in 1948, studied painting at King's College, Newcastle upon Tyne, and took his B.A. in fine arts at Durham University (1953). He began to write while living in Paris but only became a full-time writer in the early 1960s, after a period of teaching.

Mercer's first play, written for television, was *Where the Difference Begins* (1961); it was the first part of a trilogy, *The Generations* (1964). His *Suitable Case for Treatment,* televised in 1962, won a Writer's Guild award and was filmed in 1965 as *Morgan—A Suitable Case for Treatment.* From that play emerged Mercer's view of the world as anarchic, despairing, and insane, a view also apparent in *The Governor's Lady,* his first stage play (performed 1965), about a man who in utter frustration turned into a baboon and attacked his frigid wife. His other full-length plays include *Ride a Cock Horse* (1965), *Belcher's Luck* (1966), *Flint* (1970), *After Haggerty* (1970), *Duck Song* (1974), and *Cousin Vladimir* (1978). He wrote the screenplay for the motion picture *Providence* (1977), which was directed by Alain Resnais.

Mercer, Johnny, byname of JOHN HERNDON MERCER (b. Nov. 18, 1909, Savannah, Ga., U.S.—d. June 25, 1976, Bel Air, Calif.), American lyricist, vocalist, and composer who contributed to many Broadway musical productions and Hollywood films.

Educated in Virginia, Mercer arrived in New York City in the late 1920s and acted in bit parts until his collaboration with Everett Miller on "Out of Breath and Scared to Death of You" was accepted for the revue *Garrick Gaieties* (1930). Mercer used his wit and Southern background to produce clever lyrics that could be breezy, romantic, or full of local colour. He worked through music publishers until 1934, when he joined Paul Whiteman's orchestra as master of ceremonies and featured vocalist, continuing meanwhile to write for motion-picture musicals. In 1939 he joined Benny Goodman's "Camel Caravan" radio show.

In 1942 Mercer founded Capitol Records with two partners, serving as talent scout and company president. For the Broadway stage, he collaborated with Harold Arlen on *St. Louis Woman* (1946) and *Saratoga* (1959) and wrote lyrics to Gene DePaul's score for *Li'l Abner* (1956) and to Robert Emmett Dolan's music for *Texas, Li'l Darlin'* (1949), and *Foxy* (1964). He also continued to write lyrics for such films as *Charade* (1963), *Barefoot in the Park* (1967), and *Darling Lili* (1970). He was the first president of the Songwriter's Hall of Fame.

Credited with over 1,000 lyrics, Mercer collaborated with such composers as Hoagy Carmichael, Harry Warren, Henry Mancini, Richard Whiting, Harold Arlen, Jerome Kern, Jimmy McHugh, and Jimmy Van Heusen to produce many enduring popular songs. They include "Lazy Bones," "I'm an Old Cowhand," "Goody Goody," "Jeepers Creepers," "Hooray for Hollywood," "You Must Have Been a Beautiful Baby," "Blues in the Night," "That Old Black Magic," "Laura," "Ac-cent-tchu-ate the Positive," "Come Rain or Come Shine," "On the Atchison, Topeka and the Santa Fe," "Autumn Leaves," "Moon River," "Charade," and "Days of Wine and Roses."

mercerization, in textiles, a chemical treatment applied to cotton fibres or fabrics to permanently impart a greater affinity for dyes and various chemical finishes. Mercerizing also gives cotton cloth increased tensile strength, greater absorptive properties, and, usually, a high degree of lustre, depending on the method used.

The treatment consists of immersing the yarn or fibre in a solution of sodium hydroxide (caustic soda) for short periods of time, usually less than four minutes. The material is then treated with water or acid to neutralize the sodium hydroxide. If the material is held under tension during this stage, it is kept from shrinking appreciably; if no tension is applied, the material may shrink by as much as one-fourth. Higher-quality cotton goods are usually mercerized; cloths so treated take brighter, longer-lasting colours from less dye. The effect of caustic soda on cotton was discovered in 1844 by John Mercer, an English calico printer, who received a patent for it in 1850.

merchandising, element of marketing that is concerned specifically with promoting the sale of goods and services to consumers. *See* marketing.

Merchant Adventurers, company of English merchants who engaged in trade with the Netherlands (and later with northwest Germany) from the early 15th century to 1806. The company, chartered in 1407, principally engaged in the export of finished cloth from the burgeoning English woolen industry. Its heyday extended from the late 15th century to 1564, during which period it sent its fleets to its market at Antwerp in the Spanish Netherlands with cloth to be sold at the annual fairs. By the middle of the 16th century, as much as three-fourths of English foreign trade was controlled by the London officers of the company, many of whom served as financiers and advisers to the Tudor monarchs. After 1564 the Merchant Adventurers lost its market in the Spanish Netherlands and a long search for a new one followed. After 1611 its foreign trading activities were centred at Hamburg and one or another town in the republican United Provinces. The company was criticized in Parliament as a monopoly, and it lost many of its privileges in the 17th century. Its charter was abrogated in 1689, but the company survived as a trading association at Hamburg until the outbreak of the Napoleonic Wars.

merchant guild, European medieval association composed of traders interested in international commerce. The privileged fraternity formed by the merchants of Tiel in Gelderland (in present-day Netherlands) about 1020 is the first undoubted precursor of the merchant guilds, and the statutes of a similar body at St. Omer, France, actually use the term *gilda mercatoria* before the end of the 11th century. Although associations of merchants from different towns continued to flourish in the later Middle Ages (the so-called Hanse of London is the best-known 12th-century example), most merchant guilds naturally confined their membership to the inhabitants of one city. In most European towns the imposition of a high entrance fee gave the merchant guild an exclusive character, although it is clear that the merchant patriciate normally exercised authority through its control of the urban constitution rather than through the merchant guild as such. It followed that such guilds were unlikely to survive the urban social upheavals of the late 13th and 14th centuries, the so-called *Zunftrevolution* ("guild revolution"), which transferred all or part of the political and economic powers of the patriciate to the craft guilds, or mysteries. By the early years of the 15th century most European merchant guilds had disappeared into oblivion or survived as attenuated bodies, deprived of any genuine economic function.

merchant marine, the commercial ships of a nation, whether privately or publicly owned. The term merchant marine also denotes the personnel that operate such ships, as distinct from the personnel of naval vessels. Merchant ships are used to transport people, raw materials, and manufactured goods. Merchant fleets can be important economic assets for nations that have limited natural resources or a relatively small industrial base. By carrying the commerce of other nations on the seas, a merchant fleet contributes to its home nation's foreign-exchange earnings, promotes trade, and provides employment.

At the end of World War II the United States operated nearly half the world's oceangoing merchant marine, and Great Britain had another major share. Both nations' fleets declined in the postwar years, however, and Japan and Greece had become the largest oceangoing shippers by the end of the 20th century. Many ships owned in other countries operate under Liberian or Panamanian registry to avoid the heavy taxes and intrusive regulations imposed by their home nations.

Merchant shipping includes cargo ships, passenger ships, and tankers. Cargo ships can be either liners, which travel on established routes at regular intervals between specified ports; or tramps, which instead take cargo where and when it offers and to any port. Some of the newer types of cargo ships are bulk carriers, which transport ores or other dry cargoes in bulk; container ships, which handle standardized containers in a highly mechanized fashion; and roll-on, roll-off ships, which handle cargoes through their bow or stern ports. Passenger ships include oceanliners (which have now largely been supplanted by jet aircraft for transoceanic travel), cruise ships, and ferries. Tankers are used to transport crude oil, oil-based fuels, and natural gas. *See also* ship.

merchant ship, also called MERCHANTMAN, a ship used in commerce. *See* ship.

Merchant Taylors' School, in London, one of the major public (privately endowed) schools in England, founded (1560–61) by the Merchant Taylors' Company of London, an incorporated group of craftsmen tailors. Richard Mulcaster was the first headmaster. From the beginning, the school's curriculum has been noted for following modern trends. Other schools with the same name, founded by other trade or craft associations, have existed in other parts of England.

Merchants Staplers, formally COMPANY OF THE MERCHANTS OF THE STAPLE, company of English merchants who controlled the export of English wool from the late 13th century through the 16th century. English wool exports were concentrated in one town (called the staple) in order to minimize the problems of collecting the export duties. The location of the staple varied, but in the 14th century it was fixed at Calais, then held by England. The crown granted the Merchants of the Staple a monopoly over the export of wool and in return collected the duties. The Staplers exerted their greatest influence in the 15th century, becoming one of the crown's most important financiers. In addition to carrying on financial activities, they established trade regulations at Calais, administered merchant law in the city, and exercised political and diplomatic functions for the crown. With the growth of English manufacturing in the 16th century and after, more wool was used domestically, and the Staplers became less important as the export trade diminished.

Merci, Claudius Florimund, Count (Graf) **von:** *see* Mercy, Claudius Florimund, Graf von.

Merci, Franz, Baron (Freiherr) **von:** *see* Mercy, Franz, Freiherr von.

Mercia (from Old English Merce, "People of the Marches [or Boundaries]"), one of the kingdoms of Anglo-Saxon England; it held a position of dominance for much of the period from the mid-7th to the early 9th century. Mercia originally comprised the border areas (modern Staffordshire, Derbyshire, Nottinghamshire, and northern West Midlands and Warwickshire) that lay between the districts of Anglo-Saxon settlement and the Celtic tribes they had driven to the west. It later absorbed the Hwicce territory (the rest of West Midlands and Warwickshire, eastern Hereford and Worcester, and Gloucestershire) and spread also into what was later Cheshire, Salop, and western Hereford and Worcester. Mercia eventually came to denote an area bounded by the frontiers of Wales, the River Humber, East Anglia, and the River Thames.

The first Mercian king of whom anything is known was Penda (d. 654), who became dominant throughout southern England. His sons Wulfhere and Aethelred maintained the tradition of Mercian belligerence, but under Aethelbald (reigned 716–757) and his cousin Offa (reigned 757–796), the kingdom reached its zenith. Offa created what was virtually a single state covering the whole country from the Humber to the English Channel and treated lesser kings (of west Sussex, East Anglia, Essex, and—for a time—Kent) as his subjects. His reign marked the greatest advance to date toward political unification of England, and this was perhaps reflected in his relations with continental rulers, notably Charlemagne, who treated him almost as an equal. After Offa's death, Mercia gradually declined before the rising power of Wessex. It suffered from the Danish attacks of the later 9th century, and from 877 it was divided into an English and a Danish area. After the reconquest of the Danish lands in the early 10th century by King Edward the Elder, Mercia was ruled by ealdormen for the Wessex kings, who became kings of all England.

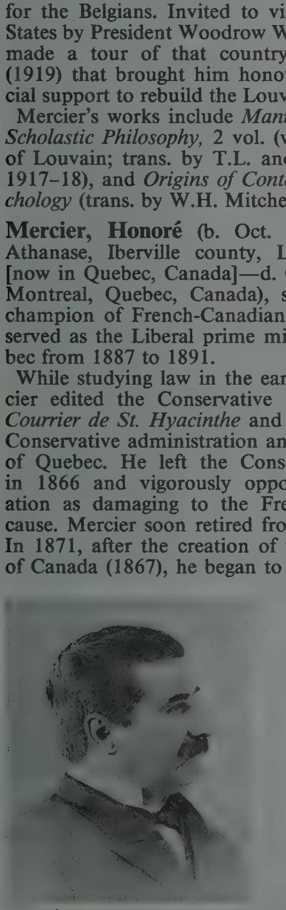
Mercier, Désiré-Joseph (b. Nov. 21, 1851, Braine-l'Alleud, Belg.—d. Jan. 23, 1926, Brussels), Belgian educator, cardinal, and a leader in the 19th-century revival of the philosophy of St. Thomas Aquinas.

Mercier was ordained in 1874 and taught philosophy at the seminary of Malines, Belg. (1877–82). In 1880 Pope Leo XIII requested that a program in Thomistic philosophy be offered at the University of Louvain, Belg., for which Mercier was appointed professor in 1882. His lectures there on Thomism in relation to modern philosophy and science attracted an international body of students. With the support of Leo, Mercier founded (1894) the Superior Institute of Philosophy at Louvain and served as its first president. The institute became a major centre of Thomism, publishing the *Revue Néoscolastique* (now *Revue Philosophique de Louvain*) and evaluating contemporary philosophies. Pope St. Pius X made Mercier archbishop (1906) of Malines and cardinal (1907). During World War I his stand against the Germans for their burning of the Louvain Library and for deporting workmen made him an international spokesman for the Belgians. Invited to visit the United States by President Woodrow Wilson, Mercier made a tour of that country and Canada (1919) that brought him honours and financial support to rebuild the Louvain Library.

Mercier's works include *Manual of Modern Scholastic Philosophy,* 2 vol. (with professors of Louvain; trans. by T.L. and S.A. Parker, 1917–18), and *Origins of Contemporary Psychology* (trans. by W.H. Mitchell, 1918).

Mercier, Honoré (b. Oct. 15, 1840, St. Athanase, Iberville county, Lower Canada [now in Quebec, Canada]—d. Oct. 30, 1894, Montreal, Quebec, Canada), statesman and champion of French-Canadian interests who served as the Liberal prime minister of Quebec from 1887 to 1891.

While studying law in the early 1860s Mercier edited the Conservative newspaper *Le Courrier de St. Hyacinthe* and supported the Conservative administration and the interests of Quebec. He left the Conservative Party in 1866 and vigorously opposed confederation as damaging to the French-Canadian cause. Mercier soon retired from journalism. In 1871, after the creation of the Dominion of Canada (1867), he began to help form the Parti National (National Party). In 1872 he was elected to the House of Commons for the county of Rouville, serving for two years.



Honoré Mercier

By courtesy of the Archives Nationales du Quebec

Mercier entered the legislative assembly of Quebec in 1879 and was made solicitor general, succeeding to the leadership of the Quebec Liberal Party in 1883. He succeeded in the 1886 provincial election largely because of his agitation on behalf of Louis Riel, French-speaking leader of the Northwest Rebellion, who was executed in 1885. As premier and attorney general of Quebec beginning in 1887, Mercier pursued a nationalist policy; he succeeded in passing the Jesuits' Estates Act to compensate the Society of Jesus for property formerly confiscated by the British crown.

While visiting Rome in 1891, Mercier was created a Roman count by Pope Leo XIII. Also in 1891, after several years of popularity, Mercier was accused of using railway subsidies for political purposes and was dismissed by the lieutenant governor. The Liberal Party was badly defeated in 1892, but the new government acquitted Mercier of the charges.

Mercier, Louis-Sébastien (b. June 6, 1740, Paris, France—d. April 25, 1814, Paris), one of the first French writers of *drames bourgeois* (middle-class tragedies). In *Du théâtre* (1773; "About the Theatre"), he emphasized the didactic function of the theatre, and in his plays he presented a thesis, subordinating dramatic considerations to the didactic end. He criticized traditional French tragedy as artificial and sterile, though he was not himself a technical innovator.

Mercier wrote about 60 plays, including a social comedy, *La Brouette du vinaigrier* (1775; "The Barrel-load of the Vinegar Merchant"); *Jenneval* (published 1767; performed 1781), adapted from George Lillo's *London Merchant* (1731); such dramas as *Le Faux Ami* (1772; "The False Friend") and the antimilitarist *Le Déserteur* (published 1770, performed 1782; "The Deserter"); and two historical dramas about the French religious wars, *Jean Hennuyer évêque de Lisieux* (1772; "Jean Hennuyer, Bishop of Lisieux") and *La Destruction de la ligue* (1782; "The Destruction of the League"), which were so anticlerical and antimonarchical that they were not performed until after the Revolution. Mercier also wrote a work of prophetic imagination, *L'An 2440* (1770; "The Year 2440"), and *Le Tableau de Paris* (2 vol., 1781; 12 vol., 1782–89; "The Tableau of Paris"), a work that classifies social types in a way that foreshadows the novels of Honoré de Balzac.

Mercier, nicknamed "Le Singe de Jean-Jacques" ("The Ape of Jean-Jacques"), was strongly influenced by Jean-Jacques Rousseau's views of society, rejecting the prevalent belief in progress. As a moderate member of the Convention, he opposed the death penalty for Louis XVI. He was imprisoned during the Terror but was released after Robespierre's death.

Mercoeur, Philippe-Emmanuel de Lorraine, Duke (duc) **de** (b. Sept. 9, 1558, Nomény, France—d. Feb. 19, 1602, Nürnberg [Germany]), prince who led the resistance in Brittany against King Henry IV of France when that monarch was trying to consolidate his kingdom.

Philippe was the son of Nicolas de Lorraine, who became Duke de Mercoeur in 1569, and was a half brother to Louise de Vaudémont, wife of Henry III of France. He succeeded to his father's duchy in 1577. Mercoeur served as governor of Brittany from 1582, but after Henry III had his cousins of the house of Guise assassinated in 1588, Philippe rebelled; when Henry III was himself assassinated (1589), Mercoeur rallied most of Roman Catholic Brittany against the Protestant Henry IV.

Mercoeur set up a *parlement* (high court) of his own at Nantes and put forward his son Philippe as "prince and duke of Brittany." Spain sent 7,000 men to help Mercoeur in October 1590, but England sent troops and ships against him. Mercoeur won a victory at Craon in Anjou in 1592 but lost ground in the years following Henry's conversion to Roman Catholicism (1593). Mercoeur at last submitted, received 4,000,000 livres, and agreed that his daughter and eventual heiress, Françoise, should marry Henry's illegitimate son César, Duke de Vendôme. Mercoeur then served with the army of the Holy Roman emperor Rudolf II against the Turks in Hungary and died of a fever on his way back to France. Two volumes of his *Correspondance* were published in 1899.

Mercoeur, portrait by Benjamin Foulon, 1600; in the Bibliothèque Nationale, Paris

Giraudon—Art Resource

Mercouri, Melina (b. Oct. 18, 1925, Athens, Greece—d. March 6, 1994, New York, N.Y., U.S.), Greek actress and political activist who was the minister of culture in her country's first Socialist government (1981).

Mercouri came from a politically prominent family. She graduated from the Drama School of the National Theatre of Greece. Her first major role, at the age of 20, was Lavinia in Eugene O'Neill's *Mourning Becomes Electra,* but perhaps her most memorable parts were Blanche in *A Streetcar Named Desire* and the good-hearted prostitute in the film *Never on Sunday* (1960). This film gained her an international reputation that would serve her well in politics. Her involvement in politics was triggered by her indignation over the military coup that brought a handful of army colonels to power in Greece in 1967.

Married to the French-born American film director Jules Dassin (who directed most of her films), she was abroad when the coup occurred. She dedicated herself to stimulating opposition against the junta in Europe and the United States, to the extent that she was deprived of her Greek citizenship by the colonels' regime. After the collapse of the dictatorship in 1974, she returned to Greece and promptly joined Andreas Papandreou's Panhellenic Socialist Movement (Pasok). She ran unsuccessfully that year for deputy from the same Piraeus district that had made her famous in *Never on Sunday,* but she was elected the second time around in 1977. Reelected in 1981 when Pasok won a general election, she was appointed by Papandreou to be his minister for culture. She served in the post until 1989, when the Socialists lost power, and was reappointed after their electoral victory in 1993. In 1971 Mercouri published an autobiography, *I Was Born Greek.*

Mercurochrome, trade name of merbromin (*q.v.*).

Mercury, Latin MERCURIUS, in Roman religion, god of merchandise and merchants, commonly identified with the Greek Hermes (*q.v.*), fleet-footed messenger of the gods. His worship was introduced early, and his temple on the Aventine Hill in Rome was dedicated in 495 BC. There he was associated with the goddess Maia, who became identified as his mother through her association with the Greek Maia, mother of Hermes. Both Mercury and Maia were honoured in a festival on May 15, the dedication day of Mercury's temple on the Aventine (built about 500 BC).

Mercury, with winged hat and staff, classical statue; in the Uffizi, Florence
Alinari—Art Resource

Mercury is sometimes represented as holding a purse, symbolic of his business functions. Usually, however, artists borrow the attributes of Hermes irrespective of their appropriateness and portray him wearing winged sandals or a winged cap and carrying a caduceus (staff).

Mercury, in astronomy, innermost planet of the solar system. Its average distance from the Sun is about 58 million km (35,960,000 miles). Except for Pluto, it is the smallest of the nine major planets, having a diameter of about 4,870 km (3,050 miles).

A brief treatment of Mercury follows. For full treatment, *see* MACROPAEDIA: Solar System.

Mercury's orbit around the Sun is highly elliptical. Its period of revolution—only 88 Earth days—is the shortest among the planets and its average orbital speed of 48 km per second the highest. The planet is thus aptly named after the god Mercury, Roman counterpart of the Greek Hermes, fleet-footed messenger of the gods. Mercury also has an extremely low rotation velocity. Because it turns about its axis so slowly, one day on Mercury (one complete rotation) is equal to 59 Earth days. A solar day on the planet (the time from one sunrise to the next, for example) is 176 Earth days, however, owing to the revolution of Mercury around the Sun.

Mercury is difficult to observe from Earth because of its proximity to the Sun. Relatively little was known about its topographic details until 1974, when the U.S. Mariner 10 space probe transmitted numerous closeup photographs of the planet.

Much of the Mercurian surface is heavily cratered like that of the Moon, but it differs from the latter in various ways. Because Mercury's surface gravity is considerably greater than the Moon's, ejecta reach only 65 percent of the distance they would reach on the Moon. Vast areas of the planet known as intercrater plains are peppered with small craters. They are, however, devoid of large ones. Some of these plains appear to be as old as the heavily cratered terrain, while others seem to be much younger. Their origin is still unknown. The most impressive feature imaged by Mariner 10 is the 1,300-kilometre Caloris basin, centred in Mercury's northern hemisphere. This large circular structure, formed by a huge meteorite impact, is bounded by a ring of mountains, which stands about 1 to 2 km high. Smooth plains appeared after the Caloris impact. Different in character from the intercrater plains, they resemble the lunar maria. Their volcanic origin, however, has not yet been confirmed. The only surface features younger than the smooth plains are certain impact craters, some of which have extensive rays. Still another kind of topographic feature detected on Mercury is sinuous scarps that extend for hundreds of kilometres. These long, steep cliffs may have originated as a result of crustal compression. Various investigators have hypothesized that Mercury's core once consisted of molten iron, which shrank by several kilometres upon cooling. The resultant settling of the planetary crust produced large-scale wrinkles in the form of the scarps.

That Mercury, like the Earth, has a large iron core has been suggested by the discovery of a magnetic field in its vicinity. The presence of such a core would account for the high mean density of the planet. Although Mercury is considerably smaller than the Earth, its mean density is about 5.44 grams per cubic cm, as compared to 5.5 grams per cubic cm for the Earth.

Mercury's atmosphere is negligible, consisting chiefly of a tenuous layer of hydrogen, helium, sodium, potassium, oxygen, and possibly neon. Trace amounts of argon, carbon dioxide, krypton, and xenon are also present. The planet's gravity is so weak that it cannot retain significant amounts of atmospheric gases. Temperatures at the surface of Mercury fluctuate drastically, ranging from a high of approximately 675 K to a low of about 100 K.

mercury (genus *Mercurialis*), group of eight annual and perennial weedy flowering-plant species of the spurge family (Euphorbiaceae), native to Europe, Asia, and North Africa but naturalized in North America. Herb mercury (*M. annua*) grows as a weed in cultivated areas and shaded woods. Dog's mercury (*M. perennis*), which is malodorous and poisonous to livestock, grows wild in European woodlands. Its leaves are the source of an unstable blue dye. The clusters of small, green, nonpetaled male and female flowers are borne on separate plants; pollination is by wind. Three-seeded mercury, also in this family, is the annual weed *Acalypha virginica.*

Dog's mercury (*Mercurialis perennis*)
G.E. Hyde

mercury (Hg), also called QUICKSILVER, chemical element, liquid metal of Group IIb, or the zinc group, of the periodic table. Mercury was known to the ancient Chinese and Hindus and has been found in an Egyptian tomb of about 1500 BC.

For treatment of the mining, recovery, and refining of mercury, *see* MACROPAEDIA: Industries, Extraction and Processing.

Properties, uses, and occurrence. Mercury is the only elemental metal that is liquid at ordinary temperatures (cesium melts at about 28.5° C [83° F], gallium at about 30° C [86° F], and rubidium at about 39° C [102° F]). Mercury is silvery white, slowly tarnishes in moist air, freezes into a soft solid like tin or lead at about −39° C (−38° F), and alloys with most metals (iron is a notable exception) to form amalgams. Mercury does not wet glass or cling to it, and this property, coupled with its uniform volume expansion throughout its liquid range, makes it useful in thermometers. Barometers and manometers utilize its high density and low vapour pressure. The good electrical conductivity of mercury makes it exceptionally useful in sealed electrical switches and relays. An electrical discharge through mercury vapour produces a bluish glow rich in ultraviolet light, a phenomenon exploited in ultraviolet, fluorescent, and high-pressure mercury-vapour lamps. Mercury's high thermal neutron-capture cross section (360 barns) and good thermal conductivity make it applicable as a shield and coolant in nuclear reactors. Much mercury is utilized in the preparation of pharmaceuticals, agricultural and industrial fungicides, as dental fillings, and in the electrolytic production of chlorine and caustic soda.

Mercury occurs in the Earth's crust on the average of about 0.08 gram (0.003 ounce) per ton of rock. The principal ore is the red sulfide, cinnabar. Native mercury occurs in isolated drops and occasionally in larger fluid masses, usually with cinnabar, near volcanoes or hot springs. The free metal has been found in Spain (Almadén); in Yugoslavia, at Mount Avala; in Slovenia, at Idrija; in Germany (Moschellandsberg); and in the United States (Terlingua, Texas, and New Almaden, Calif.). For mineralogical properties, *see* native element (table).

Extremely rare natural alloys of mercury have also been found: moschellandsbergite (with silver), potarite (with palladium), and gold amalgam. Mercury is extracted from cinnabar by roasting it in air, followed by condensation of the mercury vapour. Mercury is toxic. Poisoning may result from inhalation of the vapour, ingestion of soluble compounds, or absorption of mercury through the skin.

Natural mercury is a mixture of seven stable isotopes: ^{196}Hg (0.15 percent), ^{198}Hg (10.02 percent), ^{199}Hg (16.84 percent), ^{200}Hg (23.13 percent), ^{201}Hg (13.22 percent), ^{202}Hg (29.80 percent), and ^{204}Hg (6.85 percent). As a wavelength standard and for other precise work, isotopically pure mercury consisting of only mercury-198 is prepared by neutron bombardment of natural gold, gold-197.

Principal compounds. The compounds of mercury are either of +1 or +2 oxidation state. Mercury(II) or mercuric compounds predominate. Mercury does not combine with oxygen to produce mercury(II) oxide, HgO, at a useful rate until heated to the range of 300° to 350° C (572° to 662° F). At temperatures of about 400° C (752° F) and above, the reaction reverses with the compound decomposing into its elements. Antoine-Laurent Lavoisier and Joseph Priestley used this reaction in their study of oxygen.

There are relatively few mercury(I) or mercurous compounds. The mercury(I) ion, Hg_2^{2+}, is diatomic and stable. Mercury(I) chloride, Hg_2Cl_2 (commonly known as calomel), is probably the most important univalent compound. It is used in antiseptic salves. Mercury(II) chloride, $HgCl_2$ (also called bichloride of mercury or corrosive sublimate), is perhaps the commonest bivalent compound. Although extremely toxic, this odourless, colourless substance has a wide variety of applications. In agriculture it is used as a fungicide; in medicine it is sometimes employed as a topical antiseptic in concentrations of one part per 2,000 parts of water; and in the chemical industry it serves as a catalyst in the manufacture of vinyl chloride and as a starting material in the production of other mercury compounds. Mercury(II) oxide, HgO, provides elemental mercury for the preparation of various organic mercury compounds and certain inorganic mercury salts. This red or yellow crystalline solid is also used as an electrode (mixed with graphite) in zinc-mercuric oxide electric cells and in mercury batteries. Mercury(II) sulfide, HgS, is a black or red crystalline solid used chiefly as a pigment in paints, rubber, and plastics. The red form of the compound, occurring as the mineral cinnabar, is the world's primary source of mercury.

atomic number	80
atomic weight	200.59
melting point	−38.87° C (−38° F)
boiling point	356.9° C (674° F)
specific gravity	13.5 (20° C [68° F])
valence	1, 2
electronic config.	2-8-18-32-18-2 or $(Xe)4f^{14}5d^{10}6s^2$

Mercury, any of the first series of manned space flights conducted by the United States (1961–63). The series began with a suborbital flight about three weeks after the Soviet cosmonaut Yury Gagarin became the first human in space (*see* Vostok). Alan B. Shepard, Jr., rode a Mercury space capsule dubbed Freedom 7 on a 302-mile (486-kilometre) flight of 15-minute duration, attaining a maximum altitude of 116 mi (186 km). The Freedom 7, like its successor on the second suborbital flight, was launched by a Redstone rocket. Subsequent manned flights in the Mercury program were launched by more powerful Atlas rockets. All capsules in the Mercury series weighed about 3,000 pounds (1,400 kilograms). The first U.S. manned flight in orbit was that of the Friendship 7, commanded by John H. Glenn. Launched on Feb. 20, 1962, it successfully completed three orbits and landed in the Atlantic Ocean near the Bahamas. The last Mercury flight, Faith 7, launched May 15, 1963, carrying L. Gordon Cooper, Jr., was also the longest, achieving 22 orbits before its landing and successful recovery 34 hours and 20 minutes later.

mercury(I) chloride, also called MERCUROUS CHLORIDE (Hg_2Cl_2): *see* calomel.

mercury lamp, electric discharge lamp (*q.v.*) in which light is emitted by electrically excited atoms of vapourized mercury.

mercury poisoning, harmful effects of various mercury compounds on body tissues and functions. Certain modern industrial and biological processes concentrate mercury compounds to dangerous levels. Mercury is used on a substantial scale in numerous industries, such as the manufacture of chemicals, paints and various household items, pesticides, and fungicides. In addition to the danger from many consumer goods that contain potentially harmful levels of mercury, the air may be contaminated by mercury vapours, fumes, and dusts and the waters by effluent wastes containing mercury in various forms. The latter may then be converted by bacteria in the muddy sediments into organic mercurials, which may in turn be concentrated by the fishes and other aquatic forms of life that are foods for man.

Depending on the type of mercury compound and the mode of contact, the symptoms of intoxication in man vary. Acute mercury poisoning usually results from the accidental or suicidal ingestion of soluble mercury salts, such as mercuric chloride. The effect is severe inflammation of the digestive tract. Abdominal cramps with nausea and vomiting and bloody diarrhea commonly occur within hours. The absorbed mercury is concentrated in the kidneys, where it poisons the blood-filtering structures; as a result, there is first a decrease and then complete cessation of urine output, causing the accumulation of toxic substances in the blood (uremia) and death.

Chronic mercury poisoning may result from the occupational inhalation of mercury vapours, dusts, or volatile organic mercurials or from the absorption through the skin of various mercury salts (such as mercuric nitrate, used in making felt for hats). Symptoms may include a metallic taste and excessive production of saliva; inflammation of the membranes of the mouth; loosening of the teeth; the formation of a blue line on the gums; pain, numbness, and tremor in the extremities; loss of weight and appetite; and mental and personality changes marked by depression and a tendency to withdraw.

Certain mercurial compounds are used as diuretics; that is, are used to promote the production of urine. Sensitivity reactions to these diuretics may cause asthma, hives, other skin lesions, and sudden death. The use of ointments containing mercury or the long-term ingestion of calomel (mercurous chloride, a cathartic) may produce fever, rash, and enlargement of the spleen and lymph nodes. In infants and young children, a disorder known as acrodynia, or "pink disease," is believed to be caused by an organic mercury compound, phenylmercuric propionate, which is incorporated into house paints to prevent the growth of mold. Symptoms of acrodynia include irritability, insomnia, loss of appetite, loosening of teeth, inflammation of the mouth, and redness of the skin.

Poisoning with organic mercurial compounds is characterized by lesions of the central nervous system. This form of mercury poisoning became known as Minamata disease because of a dramatic outbreak that occurred in Minamata, Japan, in the early 1950s. There was progressive weakening of the muscles, loss of vision, impairment of the cerebral functions, eventual paralysis, and, in some cases, coma and death. Minamata seabirds and household cats, which, like the fishermen and their families, subsisted mainly on fish, showed signs of the same disease. This led to the discovery of high concentrations of methyl mercurials in fish and shellfish taken from the bay. The source of mercury was traced to the effluent from a factory. Other outbreaks of this disease involving large numbers of persons have taken place where farmers who received grain seeds treated with an organic mercury compound ate the seeds instead of planting them.

Mercy, Claudius Florimund, Graf von (count of), Mercy also spelled MERCI (b. 1666, Lorraine—d. June 29, 1734, Parma, Italy), Austrian field marshal and military governor of the Banat of Temesvár, one of the ablest commanders during the War of the Spanish Succession (1701–14) and the Turkish wars of 1716–18.

Mercy entered the Austrian army in 1682, and distinguished himself in Hungary and Italy as a resolute and versatile cavalry commander. After the outbreak of the War of the Spanish Succession (1701), which involved most European powers on the death of the last Habsburg king of Spain, Mercy's conduct at the Battle of Cremona (February 1702), on the Rhine front (1702–03), in Bavaria (1704), and in raids into France (1706–09) added to his reputation. When Austria resumed its struggle against the Ottoman Empire in 1716, Mercy contributed substantially to Prince Eugene of Savoy's victories at Peterwardein (August 1716), Belgrade (1717), and the conquest of the Banat of Temesvár. Named governor of that eastern frontier region, he remained in Hungary, except for a short campaign in Sicily (1719–20), until 1734. Mercy strengthened the Banat's defenses and rebuilt the economy through the introduction of new settlers, the construction of roads, and the institution of sound government. Once again called to Italy in 1734, he was killed in battle at Parma.

Mercy, Franz, Freiherr von (baron of), Mercy also spelled MERCI (b. *c.* 1590, Longwy, Duchy of Bar—d. Aug. 3, 1645, Alerheim, Swabia), Austrian and Bavarian field marshal during the Thirty Years' War (1618–48), whose defense of Bavaria made him one of the most successful imperial commanders of his time.

Mercy entered the Austrian army around 1606. Wounded in the Battle of Breitenfeld (1631), he made his name in the five-month defense of Rheinfelden (1634) against the formidable Bernhard of Saxe-Weimar. After campaigning in Alsace (1635–37) and the Franche-Comté, he entered the service of the elector Maximilian I of Bavaria (1638). An able strategist, he frustrated French invasion plans of Bavaria in 1643 and defeated the French at Tuttlingen in November of that year. In 1644 he saw action against the Duc d'Enghien (later the Great Condé) and the marshal Henri de Turenne. On July 27, 1644, Mercy took Freiburg im Breisgau, relieved by the French in August, and at the Battle of Mergentheim (May 1645) Turenne suffered his "first and only" defeat at the hands of the imperial commander. As in 1643, Mercy consistently outmanoeuvred his enemies and gave battle only on the terms most favourable to himself. He was finally caught by the combined armies of d'Enghien and Turenne at Alerheim in the second Battle of Nördlingen and killed at the head of his men. In recognition of his skill and bravery, d'Enghien set the inscription of his death, *Sta viator, heroem calcas* ("Halt, traveller, you are treading on a hero"), on the spot where Mercy fell.

Mercy, Sisters of (R.S.M.), Roman Catholic religious congregation founded in Dublin in 1831 by Catherine Elizabeth McAuley. By 1822 she had developed a program for instructing and training poor girls, distributing food and clothing to the needy, and performing other works of mercy. In 1827, assisted mainly by wealthy women attracted to the religious life, she opened a centre for charitable works on Baggot Street in Dublin. Although she had not intended to be a religious or to found a religious congregation, she acceded to the insistence of the Archbishop of Dublin that she embrace the religious life, and on Dec. 12, 1831, after 15 months of preparation, she and two companions pronounced the simple vows of poverty, chastity, and obedience. The growth and diffusion of the congregation throughout the English-speaking world was rapid. The congregation is not governed centrally, although in the course of time unions have been effected among groups of convents.

The Sisters of Mercy engage in a wide range of apostolic works, including education, the care of the sick in their homes and in hospitals, the care of the aged and of orphans, and other forms of social service. In the United States alone they operate a score of colleges and many high schools, grammar schools, and hospitals.

Mercy d'Argenteau, Florimund, Graf (Count) (b. April 20, 1727, Liège, Austrian Netherlands—d. Aug. 25, 1794, London), Austrian diplomat who, at the outset of the French Revolution, attempted to maintain the Austro-French alliance and to save the life of the Austrian-born French queen Marie-Antoinette.

Entering the diplomatic service in 1751, Mercy served at the Sardinian court, as ambassador to Russia, and, from 1766, as ambassador in Paris. An adviser to Marie-Antoinette, the daughter of Emperor Francis I and Maria Theresa of Austria, he was active on behalf of the French monarchy during the Revolutionary crisis of 1789–90, but he was recalled in 1790. After his efforts to save Marie-Antoinette from the guillotine had failed, he became political chargé d'affaires with the Austro-Prussian army in the Netherlands, and in July 1794 he became Austrian ambassador to London but died there shortly after his arrival.

mercy killing: *see* euthanasia.

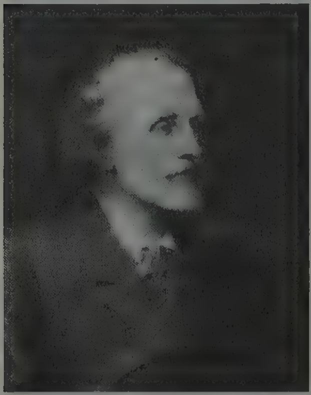
Merdjayoune (Lebanon): *see* Marj ʿUyūn.

Meredith, (Oliver) Burgess (b. Nov. 16, 1907, Cleveland, Ohio, U.S.), American actor and director, best known for stage, television, and motion-picture character roles.

During the 1920s he held a variety of jobs and sporadically attended college. Determined to become an actor, he began as an unpaid apprentice in 1929 with Eva Le Gallienne's Civic Repertory Company in New York City. He made his Broadway debut in 1933 in *Little Ol' Boy* and achieved great success in 1935 as Mio in the Maxwell Anderson play *Winterset,* repeating the role for the motion-picture version the following year. He was a founder of the New Stage Society in 1937 and in the following year served as vice president of Actors' Equity. Among his notable stage performances were roles in *High Tor* (1937), *Liliom* (1940), *Playboy of the Western World* (1946), and *Major Barbara* (1956).

Meredith was a captain in the U.S. Army Air Corps during World War II. His numerous film appearances included memorable roles in *Of Mice and Men* (1939), *Advise and Consent* (1962), and *Rocky* (1976). He was a staple character actor in American television and also directed motion-pictures (*The Man on the Eiffel Tower;* 1950) as well as such notable plays as *Macbeth* and the Broadway production of James Baldwin's play *Blues for Mr. Charlie.*

Meredith, George (b. Feb. 12, 1828, Portsmouth, Hampshire, Eng.—d. May 18, 1909, Box Hill, Surrey), English Victorian poet and novelist, whose novels are noted for their wit, brilliant dialogue, and aphoristic quality of language. Meredith's novels are also distinguished by psychological studies of character and a highly subjective view of life that, far ahead of his time, regarded women as truly the equals of men. His best known works are *The Ordeal of Richard Feverel* (1859) and *The Egoist* (1879).



George Meredith, detail of an oil painting by G.F. Watts, 1893; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early life. George Meredith, the son and grandson of tailors, was born above the family tailor shop in Portsmouth. The name Meredith is Welsh in origin, and family tradition held that its bearers were descendants of Welsh kings and chieftains. In keeping with this tradition, the young Meredith was proud and patrician in his bearing. A small inheritance from his mother, who died when he was five, enabled Meredith to attend a superior local seminary and thus early to assume the role of a young "gentleman." Yet the sensitive boy must gradually have become conscious of the contrast between this role and his actual social status. And the reality was to become even harsher with the bankruptcy of the tailoring shop when he was about 11 and his father's subsequent marriage to the young woman who had been their housekeeper.

In 1840 a second legacy, this time from an aunt, enabled him to go first to a boarding school and then, in 1842, to the Moravian School at Neuwied on the Rhine River, which was to leave its stamp upon the remainder of his life. The picturesque Rhineland, with its cliffs, its ruined castles, and its legends, stimulated the fancy of the already romantic youth. Tolerant religious instruction was combined with humanism: the boys were taught to think for themselves, to respect truth, to admire courage, to love nature, and to live in peace and amity with their fellows. The monotony of study was broken by daily sports, storytelling, and playacting and on vacations by week-long expeditions or boating trips down the Rhine. All of these influences except the religious remained with Meredith throughout life. After "a spasm of religion which lasted about six weeks," he later said, he never "swallowed the Christian fable" and thereafter called himself a freethinker.

Meredith's return to England in 1844, at the age of 16, ended his formal education. Like all of the other great Victorian novelists, he was to be largely self-educated. After several false starts, he was apprenticed at 18 to a London solicitor named Richard Charnock and was ostensibly launched upon a career in law. There is no evidence, however, that he ever pursued it. Probably, like the writer and politician Benjamin Disraeli, the novelist William Makepeace Thackeray, and others before him, he found it intolerably dull and abandoned it at the start. But if not the law, what profession offered hope to a young man who was brilliant but untrained, ambitious but without means? If to be a poet seems an unlikely choice, it nevertheless accorded with his romantic nature.

He was steeped in *The Arabian Nights* and German legends and literature; he had already written verse, and he soon found that Charnock's interests were more literary than legal and that he had gathered around him a coterie of young friends whose interests were also literary. Perhaps all of these were influences. At any rate, among the Charnock circle was Edward "Ned" Peacock, son of Thomas Love Peacock, the eccentric author, and through Edward he met Edward's sister, Mary Ellen Nicolls, a widow with a small daughter. She was brilliant, witty, handsome, and about eight years older than he. In the course of editing and writing for a manuscript literary magazine conducted by the Charnock circle, he fell in love with her. Shortly after he reached his majority and came into the remainder of his little inheritance, they were married.

Beginnings as poet and novelist. On their return, the Merediths took lodgings at Weybridge, Surrey, near Peacock's house at Lower Halliford, Middlesex, and George busied himself writing poems and articles and making translations. Unfortunately, they brought in little money. Somehow, nevertheless, he managed to pay the publication costs of a little collection of verse, entitled *Poems,* in 1851. Though the writer and critic William Michael Rossetti praised it, Charles Kingsley, the novelist, found "very high promise" in it, and the poet Alfred Tennyson said kindly that he wished he might have written the beautiful "Love in the Valley," praise added nothing to the family coffers.

Beset by creditors, the Merediths had to take refuge in Peacock's house, where their only child, Arthur, was born in 1853. Understandably, Peacock soon preferred to rent a cottage for them across the village green from him. As poetry did not pay, Meredith now in desperation turned his hand to prose, writing a fantasy entitled *The Shaving of Shagpat: An Arabian Entertainment,* published in 1855. Original in conception but imitative of *The Arabian Nights* in manner, it baffled most readers, who did not know whether to regard it as allegory or fairy tale. But the most perceptive of the critics, the novelist George Eliot, praised it as "a work of genius, and of poetical genius."

Poverty, disappointment, and the growing antagonism between two highly strung, critical natures placed an unbearable strain upon the marriage of the Merediths. Little more is known of this period in their lives, except that Mrs. Meredith was in Wales, in the company of an artist friend of the couple, Henry Wallis, during the summer of 1857. In April 1858 she gave birth to a son, whose father was registered as "George Meredith, author," but whose paternity Meredith always denied. Subsequently, Mrs. Meredith and Wallis went off to Capri together. She died in 1861, leaving Meredith with his eight-year-old son, Arthur.

Work was Meredith's only solace, and he was feverishly working upon a novel, *The Ordeal of Richard Feverel* (published in 1859), with which he hoped to win fame and fortune. It was characteristic of his best work in many respects: in form it is a romantic comedy (but with a tragic ending, as is frequent in Meredith); it deals with the relationship between a baronet and his son; the son falls in love with a lower class girl and is subjected to an ordeal—a recurring motif in Meredith—by his father; the novel is rich in allusion, image, and metaphor; the dialogue is sparkling, witty, and elliptical as in life; there are frequent intrusions by the author; three of the chapters are written in highly lyric prose; and the psychology of motive and rationalization is explored in depth. Father and son suffer from excessive pride and self-delusion (regarded by Meredith as forms of egoism), which it is the purpose of comedy, as he later said in his "Essay on Comedy," to purge and replace with sanity. Though not without faults, the novel nevertheless remains Meredith's most moving and most widely read novel. But delicate readers found it prurient and had it banned by the influential lending libraries, scattering Meredith's hopes of affluence. He was forced to accept employment as a reader of manuscripts for a publisher and as a writer of editorials and news items for a provincial newspaper. His own writing had to be done in what spare time remained.

Feverel was followed by *Evan Harrington* (1860), an amusing comedy in which Meredith used the family tailoring establishment and his own relatives for subject matter. The hero is the son of a tailor who has been brought up abroad as a "gentleman" and has fallen in love with the daughter of a baronet. His ordeal comes when he returns home to find his father dead and himself heir to the tailor shop and a considerable debt. Taking up poetry again, Meredith next published a volume of poems, *Modern Love, and Poems of the English Roadside, with Poems and Ballads,* in 1862. If *Evan Harrington* had exorcised the tailor demon that haunted him, "Modern Love" doubtless served a similar purpose for his own disastrous marriage. Semi-autobiographical, it is concerned with the tragedy of marital infidelity and its nemesis, though his own wound was now sufficiently healed for him to write compassionately. The poem deserves a place among his permanent contributions to English poetry.

After a walking tour on the Continent, he once more turned to prose. The theme of his next novel, *Emilia in England* (later renamed *Sandra Belloni*), was the contrast between a simple but passionate girl and some sentimental English social climbers—an excellent theme for Meredithian comedy. Its publication in 1864 was made the occasion of the first general consideration of all his works up to this point in an article in the *Westminster Review* by the Irish journalist and writer Justin M'Carthy. A second event of importance in 1864 was his remarriage. Arthur had been placed in boarding school, and Meredith's own loneliness was intensified. Luckily, he met an attractive, well-bred young woman of Anglo-French descent, Marie Vulliamy, fell in love with her, and, after undergoing his own ordeal in persuading her father of his respectability, married her in September 1864. Thus ended a period in his life: he was no longer unknown and no longer lonely.

A son was born to the couple in 1865 and a daughter in 1871. With a family to support and popularity still elusive, Meredith had to keep hard at work for the next 15 years, with only occasional walking expeditions on the Continent. In 1866, however, he was sent out by *The Morning Post* to report the Italian campaign in the Austro-Prussian War, which lasted only seven weeks but enabled him to spend three months in his beloved Italy. After his return he was able to purchase a comfortable cottage near the bottom of Box Hill, Surrey, where he was to live quietly until his death. It stands today much as when he lived in it.

Mature works. During the next 20 years, from 1865 to 1885, Meredith continued the drudgery of reading manuscripts but substituted weekly readings to an elderly rich widow for the newspaper work. It was, however, a period marked by the birth of the children, the publication of seven novels and a volume of poems, and, in the 1880s, by growing public recognition. The next two novels, *Rhoda Fleming* (1865) and a sequel to *Emilia*, entitled *Vittoria*, added nothing to his reputation. With *The Adventures of Harry Richmond* (1871), however, Meredith returned to what was his forte—romantic comedy. Once more he wrote a close study of a father–son relationship, only this time the father is an impostor who out-Micawbers Dickens' Mr. Micawber in his belief that something will "turn up" to make his fortune. The son's ordeal is that he must perceive and reject the world of fantasy in which his father lives and achieve maturity through painful experience. After an interval of about four years came *Beauchamp's Career*. Its hero is a self-deluded idealist who is converted to radicalism and whose ordeal is both political and personal. It is one of Meredith's better novels and confirmed what was clear by now, that one of his greatest strengths was the creation of spirited, flesh-and-blood women who think for themselves.

The next two novels of consequence, *The Egoist* (1879) and *Diana of the Crossways* (1885), marked the beginning of Meredith's acceptance by a wider reading public and a more favourable reception by critics. Both are comedies, full of Meredithian wit and brilliant dialogue and notable for women characters who prove their right to be accepted as individuals, equal with men, rather than puppets. In *The Egoist* the enemy is egoism, and the egoist is tested by a succession of ordeals before joining the ranks of humanity. While that novel is concerned with the dangers of wrong choice before marriage, *Diana* is the first of a series of studies of mismating in marriage. Diana herself is a memorable character of spirit and brains, although Meredith is less successful in persuading readers that she could naively be guilty of a grave breach of confidence. In both novels, however, the men that Meredith approves of and hands the heroines over to are rather flat and uninteresting.

A new period now began in Meredith's life. Fame, if not popularity, and financial independence had come at last. Yet his enjoyment of them was to be tempered by the death of his wife in 1885 and of Arthur in 1890, by the beginning of deafness, and by the onset of ataxia that was first to limit his ability to walk and finally to render him immobile. Honours and testimonials came in plenty: an honorary LL.D. degree from the University of St. Andrews, Fife, Scot.; election to the prestigious office of President of the Society of Authors; and in 1905 the Order of Merit, strictly limited to 24 members, was conferred upon him by order of the King. Meredith had become a public institution, his home at Box Hill almost a literary shrine.

After 1885 his work was done except for three novels and five volumes of poems that were increasingly more philosophic than poetic. *One of Our Conquerors* (1891) is probably the most difficult of his novels because of the indirect and cryptic style, metaphor, and long passages of interior monologue. *Lord Ormont and His Aminta* (1894), unlike its predecessor, was praised for the brilliancy and clarity of its style. The final novel, *The Amazing Marriage* (1895), repeats the theme of *Lord Ormont*—that a wife is free to leave a husband who does not recognize her as an equal.

In person Meredith was slightly built but athletic, remarkably handsome, and aristocratic in manner. Because of his concern with upper class life in his novels, he has sometimes been accused of being ashamed of his lowly birth and of being at heart a snob. The charge hardly bears inspection: he chose the fashionable world as a subject because it was fittest for his brand of comic treatment. His own tastes and manner of living were almost spartanly simple, his greatest pleasures being long walks and communion with nature. His friends, for the most part, were not aristocrats; they were chiefly writers and artists, along with a few professional men. It is true that in the years of his fame he was taken up by various fashionable ladies—usually young ones whom he had fascinated—and that journalists began to beat a path to his door. If he was not the oracle with all the answers, he was willing to play the role. A brilliant talker, he delighted in expressing radical and startling ideas to journalists—that the Boers should have been given their freedom; that Britain should join the United States; that marriage should be for a 10-year trial period, renewable by mutual consent; that there was no future life; and that Britain should arm itself against impending German aggression. On his 80th birthday he was presented with another testimonial, with 250 signatures of the great ones of the world, and both King Edward VII and Pres. Theodore Roosevelt sent congratulations.

Influence. On his 80th birthday the newspapers of the world saluted Meredith as "the Dean of English Writers," the "last Great Victorian," the "Grand Old Man of Letters," and the "Sage of Box Hill." Shortly after his death, *The Times Literary Supplement* said that his mind was "so rich, so full, that one wonders where there is another mind so rich, outside Shakespeare, in English literature." As not infrequently happens, however, his great reputation went into eclipse, and other gods—Henry James, James Joyce, Joseph Conrad, and D.H. Lawrence—replaced him. Ardent Meredithians remained, but the pendulum of popular taste has not swung back. *The Ordeal of Richard Feverel* and *The Egoist* will continue to have a share in college and university curricula, *The Adventures of Harry Richmond* and *Beauchamp's Career* may have limited appeal, and for the rest, Meredith will be left to scholars and the intellectual elite.

The influence of Meredith on the novel has been indirect rather than direct. Although his highly personal style was incapable of imitation, his extensive use of interior monologue anticipated the stream-of-consciousness technique of James Joyce and others. Moreover, with George Eliot he was creating the psychological novel and thus was an important link between his 18th-century precursors and 19th- and 20th-century followers. Among later novelists influenced by him the Marxist critic Jack Lindsay cites George Robert Gissing, Thomas Hardy, Henry James, and Robert Louis Stevenson; and the writer and critic J.B. Priestley points to Virginia Woolf, D.H. Lawrence, and E.M. Forster. (C.L.Cl.)

MAJOR WORKS. *Poetry. Poems* (1851), including the first version of "Love in the Valley"; *Modern Love, and Poems of the English Roadside, with Poems and Ballads* (1862); *Poems and Lyrics of the Joy of Earth* (1883); *Ballads and Poems of Tragic Life* (1887); *A Reading of Earth* (1888); *Poems. The Empty Purse. With Odes to the Comic Spirit, to Youth in Memory, and Verses* (1892); *Odes in Contribution to the Song of French History* (1898); *A Reading of Life, with Other Poems* (1901); *Last Poems* (1909).

Novels. The Shaving of Shagpat: An Arabian Entertainment (1885, dated 1856); *Farina: A Legend of Cologne* (1857); *The Ordeal of Richard Feverel: A History of Father and Son* (1859); *Evan Harrington; or, He Would Be a Gentleman* (1860); *Emilia in England* (1864; renamed *Sandra Belloni*, 1889); *Rhoda Fleming* (1865); *Vittoria* (1867); *The Adventures of Harry Richmond* (1871); *Beauchamp's Career* (1875, dated 1876); *The Egoist: A Comedy in Narrative* (1879); *The Tragic Comedians* (1880); *Diana of the Crossways* (1885); *One of Our Conquerors* (1891); *Lord Ormont and His Aminta* (1894); *The Amazing Marriage* (1895); *Celt and Saxon* (1910; unfinished).

Other works. The House on the Beach (1877); *The Case of General Ople and Lady Camper* (1890); and *The Tale of Chloe* (1890), three short stories; *An Essay on Comedy* (1897).

BIBLIOGRAPHY. M. Buxton Forman, *A Bibliography of the Writings in Prose and Verse of George Meredith* (1922, suppl. 1924) and C.L. Cline, "George Meredith," in Lionel Stevenson (ed.), *Victorian Fiction: A Guide to Research* (1964), provide a fairly complete listing of works by and about Meredith. The Altschul Collection at Yale University and the Morgan Library in New York hold most of his manuscripts and papers. The University of Texas at Austin holds several hundred Meredith letters. The Memorial Edition of the *Works of George Meredith*, 27 vol. (1909–11), is the standard edition. The *Letters of George Meredith*, 2 vol., ed. by his son, W.M. Meredith, was published in 1912. C.L. Cline, *The Letters of George Meredith*, 3 vol. (1970), is now the standard edition. Lionel Stevenson, *The Ordeal of George Meredith* (1953), is the standard biography; see also J.B. Priestley, *George Meredith* (1926), a biographical and critical study.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Meredith, Mary Gladys: *see* Webb, Mary (Gladys).

Meredith, Owen: *see* Lytton, (Edward) Robert Bulwer-Lytton, 1st earl of.

Meredith, Ted, byname of JAMES E. MEREDITH (b. Nov. 14, 1892, Chester Heights, Pa., U.S.—d. Nov. 2, 1957, Camden, N.J.), U.S. middle-distance runner, a world-record holder in the 800-metre (1912–26), 440-yard (1916–31), and 880-yard (1912–26) races and as a team member in the 4 × 400-metre relay race (1912–24) and the 4 × 440-yard relay race (1915–28).

Meredith began his running career at Mercersburg (Pennsylvania) Academy and continued it at the University of Pennsylvania (Philadelphia). In the 1912 Olympic Games at Stockholm, he won the gold medal in the 800-metre race, setting a world record of 1 min

51.9 sec, as well as a world record of 1 min 52.5 sec for the 880-yard race. He lowered the latter record to 1 min 52.2 sec in 1916.

Meredith served in the Aviation Section of the U.S. Signal Corps in World War I, wrote *Middle Distance and Relay Racing* (1924), and worked for the Internal Revenue Service.

Merelles (board game): *see* Nine Men's Morris.

merengue, French MÉRENGUE, couple dance originating in the Dominican Republic or Haiti and danced throughout Latin America. Originally, and still, a rural folk dance, and later a ballroom dance, the merengue is at its freest away from upper-class ballrooms. It is danced with a limping step, the weight always on the same foot. The music is in $\frac{4}{4}$ time with three sections: paseo, merengue, and jaleo. There are several varieties, some with other names, *e.g.*, jaleo and juangomero.

Merenptah (king of Egypt): *see* Merneptah.

Merenre, also spelled MERNERE, also called MERENRE ANTYEMSAF, fourth king of the 6th dynasty (*c.* 2325–*c.* 2150 BC) in Egypt who extended the authority of one official over all Upper (southern) Egypt and encouraged intensive exploration and trade in Nubia.

Merenre may have served briefly as coregent with Pepi I (his father) before succeeding to the kingship. In the first year of his independent reign, he visited the southern boundary of Egypt at Elephantine (modern Aswān) and received there the homage of the chiefs of Nubia. He shared his father's interest in the southern regions. He appointed a resident of Elephantine governor of the extreme south and led exploration and trade missions deep into Nubia.

Merenre elevated his father's trusted minister, Uni, to the post of governor of Upper Egypt, an unprecedented honour that placed all Upper Egypt under a single official. The king also expanded the authority of the son of his father's vizier over two nomes (administrative districts). These appointments undid a process of diffusion of government authority that had begun in the 5th dynasty (*c.* 2465–*c.* 2325 BC). In the process of conducting two major expeditions to Aswān to procure stone for his pyramid, Merenre cut five canals through the cataract rocks and recruited Nubian chieftains to cut timber and to build transport vessels for him. As suggested by a monument found in the Nile Delta, he possibly made his young half brother, Pepi II, his coregent, hoping to guarantee a smooth succession. Merenre ruled only four years alone and probably died at an early age.

mereology, branch of logic, founded by the 20th-century logician Stanisław Leśniewski, that tries to clarify class expressions and theorizes on the relation between parts and wholes. It attempts to explain Bertrand Russell's paradox of the class of all those classes that are not elements of themselves. Leśniewski claimed that a distinction should be made between the distributive and the collective interpretation of class expressions because failure to do so makes the presuppositions of Russell's paradox appear to be true. Once the distinction is made, however, some of those presuppositions are evidently false on either interpretation.

Meres, Francis (b. 1565, Kirton, Holland, Lincolnshire, Eng.—d. Jan. 29, 1647, Wing, Rutland), English author of *Palladis Tamia; Wits Treasury,* a commonplace book valuable for information on Elizabethan poets.

Meres was educated at the University of Cambridge and became rector of Wing, Rutland, in 1602. His *Palladis Tamia* (1598) is most important for its list of Shakespeare's dramatic output to 1598, but it also includes mention of the deaths of Christopher Marlowe, George Peele, and Robert Greene and briefly records the critical estimation of the poets of the day. Shakespeare is called "the most excellent in both kinds [comedy and tragedy] for the stage," and Chaucer, "the God of English poets."

Merezhkovsky, Dmitry Sergeyevich (b. Aug. 14 [Aug. 2, Old Style], 1865, St. Petersburg, Russia—d. Dec. 9, 1941, Paris), Russian poet, novelist, critic, and thinker who played an important role in the revival of religious-philosophical interests among the Russian intelligentsia.

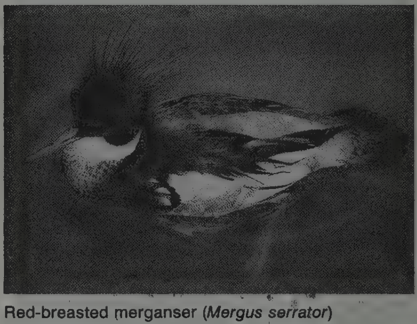
Merezhkovsky
By courtesy of the State Literature Museum, Moscow

After graduation from the University of St. Petersburg in history and philology, Merezhkovsky published his first volume of poetry in 1888. His essay *O prichinakh upadka i o novykh techeniyakh sovremennoy russkoy literatury* (1893; "On the Causes of the Decline and on the New Trends in Contemporary Russian Literature"), sometimes erroneously described as the manifesto of Russian Symbolism, was nevertheless a significant landmark of Russian modernism. At the beginning of the 20th century he and his wife, Zinaida Gippius, organized religious-philosophical colloquia and edited the magazine *Novy put* (1903–04; "The New Path").

With his trilogy *Khristos i Antikhrist* (1896–1905; "Christ and Antichrist"), Merezhkovsky revived the historical novel in Russia. Its three parts, set in widely separated epochs and geographical areas, reveal historical erudition and serve as vehicles for the author's historical and theological ideas. Another group of fictional works from Russian history—the play *Pavel I* (1908) and the novels *Aleksandr I* (1911–12) and *14 Dekabrya* (1918; *December the Fourteenth*)—also form a trilogy. Merezhkovsky's favourite method is that of antithesis. He applied it not only in his novels but also in his critical study *Tolstoy i Dostoyevsky* (1901–02), a work of seminal importance and enduring value. His *Gogol i chort* (1906; "Gogol and the Devil") is another noteworthy critical work.

Before the Revolution of 1917, Merezhkovsky was opposed to the existing regime (as can be seen from *Le Tsar et la révolution* [1907; written jointly with Gippius and Dmitry Filosofov]); he welcomed the February Revolution of 1917 but opposed the Bolshevik seizure of power. Emigrating in 1920, he eventually settled in Paris, where he published two more historical novels under the general title *Rozhdenie bogov* (1924–25; *Birth of the Gods*) and biographical studies of Napoleon, Jesus Christ, St. Augustine, St. Paul, St. Francis of Assisi, Joan of Arc, Dante, and many others; most of these have been translated into English. In later life he regarded Mussolini and Hitler as leaders capable of eradicating communism.

merganser, also called SAWBILL, FISH DUCK, or TRASH DUCK, any of several species of *Mergus,* long-bodied, more or less crested diving ducks; though essentially freshwater birds, they are classified with scoters and goldeneyes in the sea duck tribe, Mergini (family Anatidae, order Anseriformes). They are called trash ducks because their flesh is rank. Except for the rare Brazilian merganser (*Mergus octosetaceus*), all mergansers live in northern regions. The larger mergansers are seen most often on open reaches of lakes and rivers. The group is characterized by a distinctive narrow bill, with toothlike edges and hooked tip for catching fish.


Red-breasted merganser (*Mergus serrator*)
G. Ronald Austing from The National Audubon Society Collection/Photo Researchers

The common merganser, or goosander (*M. merganser*), is of mallard size; the male lacks a noticeable crest. It usually nests in hollow trees in north temperate to subarctic regions and migrates to more southerly rivers. The somewhat smaller and ground-nesting red-breasted merganser (*M. serrator*) has a similar range. In the United States, common and red-breasted mergansers are often called sheldrakes (properly a name for the shelducks).

Quite different is the hooded merganser (*M.*, or *Lophodytes, cucullatus*) of temperate North America, a small, tree-nesting species of woodland waterways.

The smew (*M. albellus*) is a small, compact merganser with a short bill; it breeds from Scandinavia to Siberia and south to Turkestan and winters on lakes and streams south to the Mediterranean and Central Asia.

Mergenthaler, Ottmar (b. May 11, 1854, Hachtel, Württemberg [Germany]—d. Oct. 28, 1899, Baltimore), German-born American inventor who developed the Linotype machine.

A precocious boy, Mergenthaler was anxious to study engineering, but his father, burdened with financing the higher education of older sons, found the expense beyond his means. He was apprenticed to a watchmaker at age 14 and attended technical school classes at night. In 1872 he emigrated to the United States, becoming a citizen in 1878. While employed in the Baltimore machine shop of a relative, he worked on plans for a device to make type molds of papier-mâché. This device proved impracticable, but Mergenthaler became dedicated to the problem involved—setting type by machine. In 1886 he produced his Linotype, which, by bringing copper matrices into brief contact with a molten but fast-cooling alloy, rapidly molded column widths of type. The machine reduced costs by speeding up the printing process; hence it fostered a dramatic expansion of all areas of publishing. Mergenthaler later patented other successful inventions, but developing the Linotype remained his life interest.

merger, corporate combination of two or more independent business corporations into a single enterprise, usually the absorption of one or more firms by a dominant one. A merger may be accomplished by one firm purchasing the other's assets with cash or its securities or by purchasing the other's shares or stock or by issuing its stock to the other firm's stockholders in exchange for their shares in the acquired firm (thus acquiring the other company's assets and liabilities).

Mergers are of several different types: horizontal, if both firms produce the same commodity or service for the same market; market-extensional, if the merged firms produce the same commodity or service for different markets; or vertical, if a firm acquires either a supplier or a customer. If the merged business is not related to that of the acquiring firm, the new corporation is called a conglomerate (*q.v.*).

The reasons for mergers are various. The acquiring firm may seek to eliminate a competitor; to increase its efficiency; to diversify its products, services, and markets; or to reduce its taxes. Merger activity varies with the business cycle, being higher when business is good.

Mergui, town, extreme southeastern Myanmar (Burma). It occupies an offshore island in the Andaman Sea at the mouth of the Great Tenasserim River. Mergui is a busy port engaged in coastal trade (rubber, tin ore, rattans, dried fish, edible birds' nests) north to Yangon (Rangoon) and south to Malaysia. Natural pearls are found offshore, and the Yatanabon tungsten (wolfram) mine is nearby. There is air service from Mergui to Yangon, Moulmein, and Singapore. Pop. (1983) 259,051.

Wharves along a tidal creek, Mergui town, Myanmar

Ivan Polunin—Bruce Coleman Inc./EB Inc.

Mergui Archipelago, group of more than 200 islands in the Andaman Sea off the Tenasserim coast of extreme southeastern Myanmar (Burma). The island cluster begins with Mali Kyun (Tavoy Island) in the north and ends beyond the southern limits of Myanmar. The group includes Kadan (King), Thayawthadangyi (Elphinstone), Daung (Ross), Sagantbit (Sellore), Bentinck, Letsok-aw (Domel), Kanmaw (Kisseraing), Lanbi (Sullivan's), and Zadetkyi (St. Matthew's) islands. Mountainous and jungle-covered, the islands of the archipelago are known for their scenic beauty. The islands' chief inhabitants are the Selungs, or Salons. Tin and tungsten (wolfram) are mined on some islands, and there is an old, established pearl-fishing industry. Other products include edible birds' nests and sea cucumbers.

Meri, Veijo (b. Dec. 31, 1928, Viborg, Fin.), Finnish novelist, poet, and dramatist of the generation of the 1960s.

Meri devoted many of his novels and dramas to the depiction of war. Unlike his many Finnish predecessors, however, he did not treat war in the heroic mode. His soldiers existed in an incoherent and farcical world. In *Manillaköysi* (1957; "The Manila Rope"), the main character deserts, taking with him a rope for which he is willing to risk his life, though he has no use for the rope. His journey home is interspersed with absurd stories from the war. *Vuoden 1918 taphatumat* (1960; "Incidents 1918") describes the Finnish civil war (1918) as a chain of confused and disconnected actions. Just as bizarre is *Everstin autonkuljettaja* (1966; "The Colonel's Driver"), in which a driver zigzags through the war zones across more than half of Finland to fetch an insignificant briefcase that a colonel has happened to forget. In *Peiliin piiretty nainen* (1963; "Woman in the Mirror") and *Suku* (1968; "The Family"), Meri dealt with contemporary psychological relationships. He also wrote a biography of the 19th-century Finnish writer Aleksis Kivi (1974).

Meri's most popular play, *Sotamies Jokisen vihkiloma* (1965; "Soldier Johkinen's Marriage Leave"), is set in the war years of the 1940s. An autobiography, *Kersantin poika,* was published in 1971.

Meriam, Junius L(athrop) (b. Oct. 28, 1872, Randolph, Ohio, U.S.—d. June 29, 1960, Los Altos, Calif.), American educator who, though highly critical of progressive education, was best known for his work in experimental schools and for his departure from traditional teaching methods.

Meriam was reared on a farm and attended Oberlin College, Oberlin, Ohio (A.B., 1895); New York State Normal College, Albany (B.Ph., 1898); Harvard University (M.A., 1902); and Columbia University (Ph.D., 1905). While pursuing his graduate education he held various administrative and teaching posts.

From 1904 to 1924 Meriam was professor of education at the University of Missouri, and he was superintendent of university schools there from 1905. In 1924 he moved to the University of California at Los Angeles, where he remained as professor of education until retirement in 1943.

Meriam was highly critical of traditional teaching methods that relied on a system of rewards and punishments, and he was equally opposed to many progressive practices. Instead, Meriam urged that elementary students be taught reading, writing, and arithmetic by tapping their natural interests through instructional activities appropriate to those interests. Children learn the formal disciplines, Meriam was convinced, while engaged in activities of interest to them.

Meriam articulated his views in scores of journal articles and five major books: *Normal School Education and Efficiency in Teaching* (1905), *Child Life and the Curriculum* (1920), *Catalog—Units of Work, Activities, Projects, etc., to 1932* (1932), *Activities, Projects, Units of Work Cataloged for 1932–1939* (1943), and *The Traditional and the Modern Curriculum, an Emerging Philosophy* (1960).

Merian, Matthäus (b. 1593, Basel, Switz.—d. 1650, Schwalbach, Fr. [now in Germany]), engraver, etcher, and book dealer, the leading German illustrator of the 17th century.

In 1609 Merian began studying with Dietrich Meyer, a painter and engraver of Zürich, and in 1613 he moved to Nancy. After studying in Paris, Stuttgart (1616), and the Low Countries, he went to Frankfurt, where in 1618 he married the eldest daughter of J.T. de Bry, publisher and engraver. He worked with his father-in-law at Oppenheim, then returned to Basel, but went back to Frankfurt after de Bry's death (1623) to take over his business.

Merian completed in 1624 the great record of discovery and travel *Collectiones Peregrinationum in Indiam* ("Collections of Travels in India"), begun by the de Brys in 1590. De Bry's business remained in Merian's family until 1726, when a fire destroyed it. From 1627 to 1629 the Bohemian etcher Wenzel Hollar was in Merian's studio in Frankfurt. Between 1625 and 1630 Merian published illustrations to the Bible. In 1635 he began the series *Theatrum Europaeum,* and between 1642 and 1688 he published Martin Zeiller's *Topographia Germaniae,* with more than 2,000 plates etched and engraved by himself and his sons Matthäus and Caspar. Among his last works was "Dance of Death" (1649).

His daughter, Anna Maria Sibylla(1647–1717), was noted for her accurate, detailed, and delicate drawings of subjects in the field of natural history.

Meriç (Europe): *see* Maritsa River.

Mérida, city, capital of Yucatán state, southeastern Mexico. It lies near the northwestern tip of the Yucatán Peninsula, 23 miles (37 km) south of Progreso, its port on the Gulf of Mexico. It stands at the northern end of a limestone plain well-suited for growing the cactuslike agave (*Agave fourcroyoides*), from which henequen, or sisal hemp, fibres are extracted. Founded in 1542 on the site of the ancient Mayan city of T'ho, Mérida is also a tourist base for trips to nearby ruined Mayan cities, including Chichén-Itzá, Dzibilchaltún, Uxmal, and Kabáh. Indian influence is still strong in the area and is most evident in language and dress. The most notable of the city's numerous colonial buildings is the House of Montejo, built in 1549. Mérida also has a 16th-century cathedral, an archaeological museum, Yucatán University (1624; refounded 1922), and the Regional Technical Institute of Mérida (1961). The city can be reached by highway, railroad, and air. Pop. (2000 prelim.) 660,848.

Mérida, town, Badajoz province, in the autonomous community (region) of Extremadura, western Spain, on the north bank of the Guadiana River. The town was founded by the Romans in 25 BC as Augusta Emerita. As the capital of Lusitania (a Roman province that encompassed modern Portugal), it became one of the most important towns in Iberia and was large enough to contain a garrison of 90,000 men. It prospered anew in the 7th century under the Visigoths.

Occupied in 713 by the Moors, who enlarged the alcazar, or citadel, originally the chief Roman fort, Mérida was recaptured in 1228 by Alfonso IX of Leon, who granted it to the Knights of Santiago. Chief among the town's Roman remains is a bridge constructed of granite near the end of the 1st century AD and restored by the Visigoths in 686 and by Philip III in 1610. It comprised 81 arches, 17 of which were destroyed during the siege of Badajoz (1812) by the French, and measured 2,575 feet (785 m) in length. There are a few remnants of Roman temples and of the colossal wall that encircled the town, as well as a Roman triumphal arch, commonly called the Arco de Trajano (Santiago), and a second Roman bridge. From the Pantano de Proserpina, also called Charca de la Albuera, a large Roman reservoir, 3 miles (5 km) north, water was conveyed to Mérida by a mighty aqueduct known as Los Milagros, of which there are extensive remains. The Roman theatre is well preserved; there are also vestiges of an amphitheatre and of a circus. The modern town's economy is based on agricultural trade and tourism. Pop. (1998 est.) 50,471.

Mérida, state, northwestern Venezuela. Except for a narrow neck extending northwestward to the shore of Lake Maracaibo, the territory of 4,400 square miles (11,300 square km) lies entirely within that portion of the Andes Mountains known as the Cordillera de Mérida. The cordillera, which rises to 16,427 feet (5,007 m) above sea level at Pico Bolívar (the highest point in Venezuela), is traversed from northeast to southwest by the Chama River. In the fertile Chama valley are most of the state's settlements, including Mérida (*q.v.*), the capital. Although it is known primarily for its agricultural produce (principally coffee, sugarcane, and corn [maize]) and livestock (cattle and goats), the state also contains minerals. Oil is found under and around Lake Maracaibo, and there are deposits of mica, gold, and emeralds. The dairy industry is well developed. The Pan-American Highway traverses the state from northeast to southwest, as does another highway along the Chama valley. The east–west road network is not well developed. Pop. (1997 est.) 706,870.

Mérida, city, capital of Mérida state, western Venezuela. The city lies on a large alluvial terrace near the Río Chama in the Cordillera de Mérida; at an elevation of 5,384 ft (1,641 m), it is the highest city in Venezuela and enjoys one of the most pleasant climates in the nation. In the vicinity are five snowcapped peaks exceeding 15,000 ft in height. To one of them, Pico Espejo (Mirror Peak; about 15,600 ft), runs a cable-car system 7⅔ mi (12 km) long, said to be the longest and highest in the world.

Bolívar Plaza, Mérida city, Venezuela
Jane Latta

Although Mérida was founded in 1558, frequent earthquakes and relative inaccessibility long hindered its development; it did become a religious and educational centre, with a cathedral, convents, and the Universidad de los Andes (founded in 1785). With the completion of all-weather highways to the major cities in the northeast, the northwest, and into the Llanos (plains) to the south, Mérida became a regional manufacturing and commercial centre. The city is renowned for its candied fruits, ruanas (Andean poncholike woolen cloaks), fishing, skiing, and mountaineering. Pop. (1981) 143,209.

Mérida, Carlos (b. Dec. 2, 1891, Guatemala—d. Dec. 22, 1984, Mexico), Guatemalan artist, known primarily as a muralist and printmaker.

From 1910 to 1914 Mérida traveled in Europe, where he studied art, becoming personally acquainted with such leaders of the avant-garde as Pablo Picasso and Amedeo Modigliani. He returned to Guatemala in 1919, had his first one-man show, and in 1920, attracted by the social and artistic revolution in Mexico, went to Mexico City, where he became one of the pioneers of that nation's mural-painting renaissance.

After a second trip to Europe in 1927 Mérida's art became less representational and eventually developed into his characteristic abstract style of geometrically conceived figures and forms. His later works show the influence not only of Cubism and such modern European artists as Paul Klee, Joan Miró, and Wassily Kandinsky but also of Mayan art. He executed important mosaic murals for the Benito Juárez housing development in Mexico City (1952) and a mosaic mural for the Municipal Building in Guatemala City (1956).

Meriden, city, coextensive with the town (township) of Meriden, New Haven county, south central Connecticut, U.S. Meriden is situated on the Quinnipiac River, with the Hanging Hills to the west. It was settled in 1661 by Jonathan Gilbert, who named it for his birthplace, Meriden Farm in Dorking, Eng. It became a separate parish in 1726 and was incorporated as a town and set off from Wallingford in 1806. The city was incorporated in 1867 and consolidated with the town in 1922. Industry is highly developed and is dominated by silverware and associated manufactures, which began in 1794 when Samuel Yale undertook pewter production there. In 1808 Ashbil Griswold began the manufacture of Britannia ware, made from an alloy of tin, antimony, and copper. The International Silver Company, one of the world's largest silverware manufacturers, was established in the city in 1898. The 1776 Bicentennial House is a replica of an 18th-century New England house and exhibits antique silver and pewter pieces. Pop. (1990) city, 59,479; New Haven–Meriden MSA, 530,180.

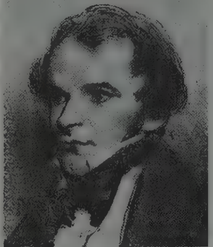
Meridian, city, seat of Lauderdale county, eastern Mississippi, U.S., lying 95 mi (153 km) east of Jackson. Settlement began in 1854 at the junction site of the Vicksburg–Montgomery and the Mobile and Ohio railway lines 20 mi (32 km) from the Alabama border. The name was chosen by a settler who thought "meridian" meant "junction." During the Civil War it was a Confederate military camp and served as the state capital for one month in 1863. General Sherman's Union troops destroyed the town the following February. Merrehope is a surviving stately 26-room antebellum mansion. The town recovered as a marketing centre for farm produce and timber and later acquired diversified manufactures, including textiles, wood and clay products, chemicals, and machinery. Meridian Junior College was opened in 1938. A naval air complex is 12 mi north. The Okatibbee Dam and Reservoir are 7 mi northwest.

Jimmie Rodgers (1897–1933), the "Singing Brakeman" of Meridian, is honoured by a memorial and an annual (May) country and western music festival. Inc. town, 1860; city, 1865. Pop. (1990) 41,036.

meridian, imaginary north–south line on the Earth's surface that connects both geographic poles; it is used to indicate longitude. The 40th meridian, for example, has a longitude of 40° E or 40° W. *See* latitude and longitude.

Mérimée, Prosper (b. Sept. 28, 1803, Paris—d. Sept. 23, 1870, Cannes, Fr.), French dramatist, historian, archaeologist, and master of the short story whose works—Romantic in theme but Classical and controlled in style—were a renewal of Classicism in a Romantic age.

Of a cultured, middle-class Norman background, Mérimée first studied law but was more devoted to learning the Greek, Spanish, English, and Russian languages and their literatures. At 19 he wrote his first play, *Cromwell* (1822); his close friend the novelist Stendhal encouraged him in this literary direction.


Mérimée, detail of an engraving after a drawing by A. Devéria, *c.* 1832
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

A collection of his plays, *Le Théâtre de Clara Gazul,* appeared in 1825. Indulging his taste for mystification, he presented them as translations by a certain Joseph L'Estrange of the work of a Spanish actress. His next hoax was *La Guzla* (1827), by "Hyacinthe Maglanowich," ballads about murder, revenge, and vampires, supposedly translated from the Illyrian. Both works deceived even scholars of the day.

Mérimée's passions were mysticism, history, and the unusual. Inspired by the vogue for historical fiction established by Sir Walter Scott, he wrote *La Jacquerie* (1828), 36 dramatic scenes about a peasant insurrection in feudal times, and the novel *La Chronique du temps de Charles IX* (1829), concerning French court life during war and peace.

Mérimée's short stories best illustrate his imagination and sombre temperament; many are mysteries, of foreign inspiration and local colour. Spain and Russia were his principal literary sources; he was the first interpreter of Russian literature in France. Pushkin was his master, especially for his themes of violence and cruelty and the human psychology behind them. In one of his best known stories, "Mateo Falcone" (1833), a father kills a son for betraying the family honour. The collection *Mosaïque* (1833) was followed by his most famous novellas: *Colomba* (1840), the story of a young Corsican girl who forces her brother to commit murder for the sake of a vendetta, and *Carmen* (1845), in which an unfaithful gypsy girl is killed by a soldier who loves her. The latter story is internationally known through the opera by Bizet. *Lokis* (1869) and *La Chambre bleue* (1872) show Mérimée's fascination with the supernatural.

In 1831 he met a young girl, Jenny Dacquin, with whom he engaged in a lifelong correspondence, which was published after his death as *Lettres à une inconnue* (1874; "Letters to an Unknown Girl"). Mérimée, who served in the French Admiralty as general inspector of historical monuments, wrote his *Notes de voyages . . .* (1835–40), covering his travels through Greece, Spain, Turkey, and France. He was also an excellent historian and archaeologist and wrote several works in these fields, as well as literary criticism.

Mérimée was a longtime friend of the Countess of Montijo, whom he met in Spain in 1830. Later, in 1853, when her daughter became the empress Eugénie of France, Mérimée was admitted to the royal circle and made a senator. He was not fond of Napoleon III, however, and never became a wholehearted courtier. His letters to Sir Anthony Panizzi, principal librarian of the British Museum and his closest friend in Mérimée's old age, have been described as a "history of the Second Empire." They were published posthumously as *Lettres à M. Panizzi: 1850–70* (1881).

Mérimée has been acclaimed for the precision and restraint of his writing style. Though his best stories are imbued with mystery and local colour, exoticism never seems to take precedence over the psychological delineation of character. His use of realistic detail and precise delineation to establish the presence of the supernatural and fantastic is also notable. Mérimée's works frequently feature exceptional characters whose forceful and passionate natures have something inhuman about them and which lift them above the common run of humanity.

Merina, also called ANTIMERINA, IMERINA, or HOVA, a Malagasy people primarily inhabiting the central plateau of Madagascar. They are the most populous ethnolinguistic group on the island.

The early Merina, whose origins are uncertain, entered the central plateau of Madagascar in the 15th century and soon established a small kingdom there. Early Merina rulers organized vast irrigation projects to drain the local marshes and make possible the practice of wet-rice cultivation in irrigated paddies. Under the early 16th-century queen Rafohy and her successors, the rule of the Merina people spread gradually through the central plateau. King Andrianampoinimerina (or Nampoina; ruled 1787–1810) was the first Merina monarch to consolidate his power and make Merina a unified kingdom. His armies, commanded by his son Radama, secured control over much of the central highlands.

Radama, as king from 1810 to 1828, continued his father's policies and made tributaries of most of the kingdoms of Madagascar. He also instituted a policy of westernization and modernization, welcoming missionaries, European advisers, and Western education. This policy was reversed by his wife and successor, the xenophobic Queen Ranavalona I (reigned 1828–61), but it was revived under King Radama II (reigned 1861–63). The authority of the crown over the contentious Merina nobility was reinforced during the reigns of queens Rasoherina (reigned 1863–68) and Ranavalona II (reigned 1868–83) by the creation of a royal bureaucracy of European-style ministers. The Merina monarchs had nearly completed the unification of Madagascar into a single, centralized state when French troops occupied the capital in 1895 and turned the island into a colony.

The Merina cultivate rice, cassava, potatoes, onions, and other crops and raise cattle and pigs. They constitute a large proportion of the educated middle-class and intellectual elite of Madagascar, serving as businessmen, technicians, managers, and government officials.

Mering, Joseph, Freiherr von (baron of) (b. Feb. 28, 1849, Cologne—d. Jan. 5, 1908, Halle an der Saale, Ger.), German physician, physiologist, pharmacologist, and experimental pathologist. His discovery (with Oskar Minkowski) that removing the pancreas from dogs produces the symptoms of diabetes led to the discovery that insulin, synthesized in the pancreas, is a hormone important to the body's utilization of sugar.

At the University of Strassburg (1886–90) Mering and Minkowski attempted in 1889 to disrupt fat digestion in dogs by removal of the pancreas, the only organ known to secrete a fat-degrading enzyme; instead, the animals exhibited the symptoms of diabetes, a disease resulting from retention in the blood of sugar. As director of the medical clinic in Halle (1900–08), Mering worked with the German chemist Emil Fischer to develop (1902–05) the barbiturates known as barbital, veronal, and proponal.

meringue, mixture of stiffly beaten egg whites and sugar that is used in confections and desserts. The invention of meringue in 1720 is attributed to a Swiss pastry cook named Gasparini. Meringues are eaten as small "kisses" or as cases and toppings for fruits, ice cream, puddings, and the like. Shapes are piped onto a baking sheet through a pastry bag and dried out thoroughly in a slow oven. They are not ordinarily browned but remain an ivory colour. *Vacherins* and *schaumtorten* are plain meringue shells; *dacquoise* is a meringue with ground nuts and cornstarch added. Italian meringue, in which the sugar takes the form of a hot syrup, is used to cover puddings and ice creams. In the United States, a soft, moist meringue is used to top pies, especially lemon cream. Another famous American meringue dessert is the baked Alaska. A hard-frozen block of ice cream is placed on a layer of spongecake, and the whole is covered with uncooked meringue. The meringue is quickly browned in a hot oven and the dish served immediately, so that the meringue is warm but the ice cream is still frozen.

Merino, breed of fine-wool sheep originating in Spain; it was known as early as the 12th century and may have been a Moorish importation. It was particularly well-adapted to semiarid climates and to nomadic pasturing. The breed has become prominent in many countries worldwide.

Merinos vary considerably in size, conformation, and extent of skin folds, but the prevailing trend in breeding is to develop sheep of medium size, with fair mutton conformation and a minimum of skin folds. The colour of their faces and legs is white. Although they have a considerable growth of wool on their faces, it is seldom extensive enough to cause wool blindness. The fine wool fibres of Merino fleeces are beautifully crimped. Through selective mating and crossing with other breeds, the Merino has served extensively as foundation stock in the creation of many useful breeds and strains of sheep.

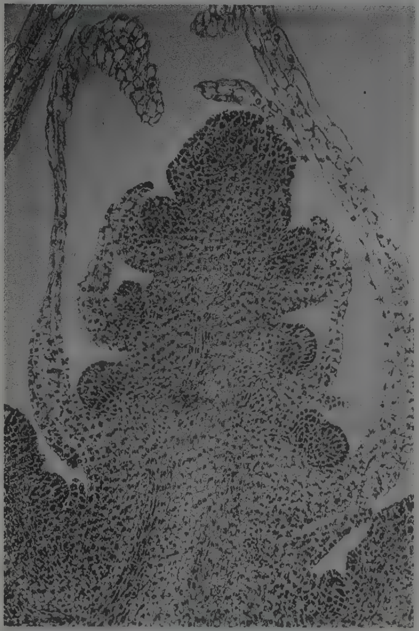
Merioneth (Wales): *see* Meirionnydd.

Merire, also spelled MERYRE (Egyptian kings): *see* Pepi.

Merisi, Michelangelo (painter): *see* Caravaggio.

meristem, region of cells capable of division and growth in plants. Meristem cells are typically small cells the diameters of which in different directions are about equal. They have a dense cytoplasm and relatively few small vacuoles (watery saclike enclosures).

Meristems are classified by their location in the plant as apical (located at root and shoot tips), lateral (in the vascular and cork cambia), and intercalary (at internodes, or stem regions between the places at which leaves attach, and leaf bases, especially of certain monocotyledons—*e.g.,* grasses). Apical meristems are also known as primary meristems because they give rise to the primary plant body. Lateral meristems are secondary meristems because they are responsible for secondary growth, or increase in stem girth and thickness. Meristems form anew from other cells in injured tissues and are responsible for wound healing.



Meristem

J.M. Langham

Merit, Legion of, the only U.S. military decoration that has distinct ranks, and the first U.S. medal to be awarded to citizens of other nations. It is awarded for outstanding service, fidelity, and loyalty in either combat or noncombat positions. Whereas U.S. military personnel qualify only for the lowest rank of legionnaire, any foreign citizen is eligible for the three higher ranks of officer, commander, and chief commander. These classifications are usually conferred upon foreign officials of high rank or on foreign military advisers.

The badge is a five-rayed white cross, edged with red, resting on a green wreath with a blue centre containing 13 white stars.

Merit, Medal for, U.S. civilian decoration established in 1942 by President Franklin D. Roosevelt to award civilians of the United States and its allies for exceptionally meritorious service or courageous acts in the furtherance of the war effort. No military personnel are eligible. Final authority to confer this award rests with the president. The badge consists of an eagle with outspread wings on a blue circle with 13 white stars.

Merit, Order for (Prussia): *see* Pour le Mérite.

Merit, Order of (O.M.), British honorary institution founded by Edward VII in 1902 to reward those who provided especially eminent service in the armed forces or particularly distinguished themselves in science, art, literature, or the promotion of culture. The order is limited to only 24 members, although the British monarch can appoint foreigners as "honorary members." The order carries no title of knighthood, but a member is entitled to add "O.M." after his name. It has a civilian and a military division. Both men and women are admitted into the order; Florence Nightingale was the first woman awarded the honour (1907), and not another woman received the order until the induction of Dorothy Hodgkin in 1965. The badge of the order portrays a crown with the motto "For Merit." An Indian Order of Merit (no longer in existence) was established in 1837.

Meriti (Brazil): *see* São João de Meriti.

Merjayun, also spelled MERJ ʿUYŪN (Lebanon): *see* Marj ʿUyūn.

Merka (Somalia): *see* Marka.

Merkava, also spelled MERKABAH (Hebrew: "Chariot"), the throne, or "chariot," of God as described by the prophet Ezekiel (Ezekiel 1); it became an object of visionary contemplation for early Jewish mystics. Merkava mysticism began to flourish in Palestine during the 1st century AD, but from the 7th to the 11th century its centre was in Babylonia.

Merkava mystics probably experienced ecstatic visions of the celestial hierarchies and the throne of God. In Merkava mystical literature the ascent of the visionary's soul is described as a perilous journey through seven spheres, or "heavenly dwellings," manned by hostile angels. The visionary's goal was to behold the divine throne situated on its chariot. Merkava mysticism was strongly influenced by Gnostic beliefs.

Merkava initiates (*tzenuʿim*), limited to a select few with specific moral qualities, were required to prepare themselves by fasting. A successful visionary journey depended, in part, on the use of certain magical formulas (called seals) that were used to placate the angelic gatekeeper of each heavenly dwelling. The use of an incorrect seal could result in severe injury or a fiery death. The Talmud warns that among four men who engaged in Merkava, one died, one went mad, one apostatized, and only Rabbi Akiba ben Joseph had a true visionary experience. Those who practiced Merkava were sometimes called Explorers of the Supernatural World (*Yorde Merkava*); Gershom Gerhard Scholem, a modern Jewish scholar of mysticism, suggests that the words may have implied a descent into the depths of self. The oldest literary sources of the movement are two *ḥekhalot* texts: the "Lesser" attributed to Rabbi Akiba, the "Greater" to Rabbi Ishmael ben Elisha. The Book of Enoch and the *Shiʿur qoma* ("Divine Dimensions") belong to this same tradition. The latter contains highly exaggerated anthropomorphic descriptions of God.

Merkle, Fred, byname of FREDERICK CHARLES MERKLE (b. Dec. 20, 1888, Watertown, Wis., U.S.—d. March 2, 1956, Daytona Beach, Fla.), American baseball player whose 16-year career (1,637 games) was overshadowed by his classic bonehead play in 1908.

In a pennant-deciding game, Merkle, first baseman for the National League New York Giants, had scored a single, but failed to touch second base and ran off the field as he saw the apparent winning run cross home plate. Chicago Cubs second baseman Johnnie Evers, a rule book fanatic, called for a ball from the home plate umpire and retired Merkle as a force out at second base. The game was declared a tie and the Giants lost the following game and the pennant. Merkle was subject to the derision of fans and sports writers thereafter.

After playing for the Giants (1907–16), the Brooklyn Dodgers (1916–17), and the Chicago Cubs (1917–20), Merkle was a coach and pinch hitter for the American League New York Yankees (1925–26). He batted and threw right-handed. After his retirement from baseball, Merkle was partner in an artificial bait manufacturing firm.

Merkys, Antanas (b. 1887, Bajorai, near Skapiskis, Lithuania, Russian Empire—d. 1955, U.S.S.R.), Lithuanian politician who was the last prime minister of Lithuania before its 1940 incorporation into the Soviet Union.

Educated in the law, Merkys served in the Russian Army during World War I (1914–18). In 1919 he entered the army of the newly independent Lithuania. A member of the right-wing Nationalist League, he served as Lithuanian defense minister on four occasions in the 1920s, and in 1927–32 he was governor of Klaipėda (Memel). Merkys became prime minister of an authoritarian Nationalist League government, formed in November 1939, but he was deported to the U.S.S.R. soon after the Soviets occupied Lithuania in June 1940.

Merle d'Aubigné, Jean-Henri (b. Aug. 16, 1794, Les Eaux-Vives, Switz.—d. Oct. 21, 1872, Geneva), Swiss Protestant minister, historian of the Reformation, and advocate of Evangelical (Free Church) Christianity.

The son of Protestant refugees from France, Merle d'Aubigné studied theology at Geneva and was ordained in 1817. While studying in Germany during the anniversary celebration of the German Reformation at Eisenach, he decided to write a history of Martin Luther and his era. After further work in Berlin, where he was influenced by the church historian J.A.W. Neander, he served as pastor at Hamburg and court preacher in Brussels. Returning to Geneva, he became a professor in the theological school of the Evangelical Society of Geneva.

Merle d'Aubigné's major work, in two parts, consisted of the popular *Histoire de la Réformation du seizième siècle,* 5 vol. (1835–53; *History of the Great Reformation of the Sixteenth Century,* 1838–41) and the more scholarly *Histoire de la Réformation en Europe au temps de Calvin,* 8 vol. (1863–78; "History of the Reformation in Europe at the Time of Calvin"). Although considered partisan toward the Presbyterian form of church structure, he revitalized church history and assembled more source documents than any other historian up to his time.

Merleau-Ponty, Maurice (b. March 14, 1908, Rochefort, Fr.—d. May 4, 1961, Paris), philosopher and man of letters, the leading exponent of Phenomenology in France.

Merleau-Ponty studied at the École Normale Supérieure in Paris and took his *agrégation* in philosophy in 1931. He taught in a number of lycées before World War II, during which he served as an army officer. In 1945 he was appointed professor of philosophy at the University of Lyon and in 1949 was called to the Sorbonne in Paris. In 1952 he received a chair of philosophy at the Collège de France. From 1945 to 1952 he served as unofficial co-editor (with Jean-Paul Sartre) of the journal *Les Temps Modernes.*

Merleau-Ponty's most important works of technical philosophy were *La Structure du comportement* (1942; *The Structure of Behavior,* 1965) and *Phénoménologie de la perception* (1945; *Phenomenology of Perception,* 1962). Though greatly influenced by the work of Edmund Husserl, Merleau-Ponty rejected his theory of the knowledge of other persons, grounding his own theory in bodily behaviour and in perception. He held that it is necessary to consider the organism as a whole to discover what will follow from a given set of stimuli. For him, perception was the source of knowledge and had to be studied before the conventional sciences.

Turning his attention to social and political questions, in 1947 Merleau-Ponty published a group of Marxist essays, *Humanisme et terreur* ("Humanism and Terror"), the most sophisticated defense of Soviet communism in the late 1940s. He argued for suspended judgment of Soviet terrorism and attacked what he regarded as Western hypocrisy. The Korean War disillusioned Merleau-Ponty and he broke with Sartre, who defended the North Koreans.

In 1955 Merleau-Ponty published more Marxist essays, *Les Aventures de la dialectique* ("The Adventures of the Dialectic"). This collection, however, indicated a change of position: Marxism no longer appears as the final word on history, but rather as a heuristic methodology. Later he returned to more strictly philosophical concerns.

Merlin, enchanter and wise man in Arthurian legend and romance of the Middle Ages, linked with personages in ancient Celtic mythology (especially with Myrddin in Welsh tradition). He appeared in Arthurian legend as an enigmatic figure, fluctuations and inconsistencies in his character being often dictated by the requirements of a particular narrative or by varying attitudes of suspicious regard toward magic and witchcraft. Thus, treatments of Merlin reflect different stages in the development of Arthurian romance itself.

Geoffrey of Monmouth, in *Historia regum Britanniae* (*c.* 1136), adapted a story, told by the Welsh antiquary Nennius (flourished *c.* 800), of a boy, Ambrosius, who had given advice to the legendary British king Vortigern. In Geoffrey's account Merlin-Ambrosius figured as adviser to Uther Pendragon (King Arthur's father) and afterward to Arthur himself. In a later work, *Vita Merlini,* Geoffrey further developed the story of Merlin by adapting a northern legend about a wild man of the woods, gifted with powers of divination. Early in the 13th century, Robert de Borron's verse romance *Merlin* added a Christian dimension to the character, making him the prophet of the Holy Grail (whose legend had by then been linked with Arthurian legend). The author of the first part of the Vulgate cycle (*see* Arthurian legend) made the demonic side of Merlin's character predominate, but in later branches of the Vulgate cycle, Merlin again became the prophet of the Holy Grail, while his role as Arthur's counsellor was filled out; it was Merlin, for example, who advised Uther to establish the knightly fellowship of the Round Table and who suggested that Uther's true heir would be revealed by a test that involved drawing a sword from a stone in which it was set. It also included a story of the wizard's infatuation with the Lady of the Lake, which eventually brought about his death.

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merlin, also called PIGEON HAWK (*Falco columbarius*), small blue-gray falcon, family Falconidae, with a narrowly white-banded tail. It is found at high latitudes throughout the Northern Hemisphere, occurring in the western United States south to Colorado and in Europe in the western parts of the British Isles and in Scandinavia. Dark-coloured populations breed near Vancouver, B.C., and in Iceland. Most migrate to regions just south of the breeding range, although some species go as far as northern South America. The merlin inhabits wet, open country or conifer and birch woods. It usually lays its eggs on the ground amid bushes but sometimes occupies an old rook or magpie nest in a tree. An aggressive hunter, the merlin was once much used in falconry.

Merlin (*Falco columbarius*)

Eric Hosking

Merlin, Antoine-Christophe, byname MERLIN DE THIONVILLE (b. Sept. 13, 1762, Thionville, Fr.—d. Sept. 14, 1833, Paris), democratic extremist during the early years of the French Revolution who became one of the leading organizers of the conservative Thermidorian reaction that followed the collapse of the radical democratic Jacobin regime of 1793–94.

Merlin was the son of an attorney and studied theology before becoming a lawyer in 1788. The Revolution broke out in the following year, and in 1791 Merlin was elected to the Legislative Assembly. He vigorously urged the Assembly to confiscate the property of émigrés and hold their wives and children as hostages, and he was one of the three deputies who joined the Club of the Cordeliers—then the most radical political society in Paris.

Elected to the Convention, which succeeded the Legislative Assembly in September 1792, Merlin was sent in December on a mission to Mainz. While there he wrote the Convention demanding that King Louis XVI be put to death; the King was guillotined in January 1793. Merlin displayed great courage during the siege of Mainz by Austro-Prussian forces, and, after the garrison fell in July 1793, he fought against the counterrevolutionary Roman Catholic peasant insurgents of the Vendée. Nevertheless, the Jacobin Committee of Public Safety, suspecting him of colluding with the enemy at Mainz, recalled him to Paris in November. As a result, Merlin joined the group of conspirators who brought about the downfall of the Jacobin leader Robespierre on 9 Thermidor (July 27, 1794). During the ensuing Thermidorian reaction he helped organize the jeunesse dorée ("gilded youth"), a movement of fashionably dressed young men of bourgeois background who terrorized Jacobin workmen. Merlin then sat in the Directory government's Council of the Five Hundred from 1795 until 1798, when he was appointed administrator general of posts. He took no part in public life during Napoleon's regime (1799–1815), and he managed to escape banishment after the restoration of King Louis XVIII in 1815.

Merlin, Philippe-Antoine, Comte (Count), byname MERLIN DE DOUAI (b. Oct. 30, 1754, Arleux, Fr.—d. Dec. 26, 1838, Paris), one of the foremost jurists of the French Revolutionary and Napoleonic periods.

As a deputy for the town of Douai in the revolutionary Constituent Assembly of 1789, he was instrumental in the passage of important legislation abolishing feudal and seignorial rights. Merlin was elected to a new assembly, the Convention, in September 1792, and he voted for the death sentence at Louis XVI's trial in January 1793.

After July 1794 Merlin was almost continuously a member of the Committee of Public Safety, in which he supported the reaction against the extreme revolutionary Jacobins. He also drew up the code of crimes and penalties enacted by the Convention in October 1795. On the inauguration of the Directory (November 1795), Merlin was appointed minister of justice. Two days after the coup d'état of 18 Fructidor (Sept. 4, 1797), he became one of the five directors, resigning in June 1799 under threat of impeachment.

Under Napoleon, Merlin became procurator-general (1804) and did more than any other lawyer to fix the interpretation of the Napoleonic Code. He was appointed a councillor of state in 1806 and created a count in 1810. At the first Restoration (1814) Merlin immediately went over to Louis XVIII but was removed from office in July 1815. During Napoleon's return in the Hundred Days, he was elected to the Chamber of Representatives and appointed minister of state. Banished at the time of the second Restoration, he went into exile in the Low Countries. He returned to France during the July Revolution of 1830.

Merlo, *cabacera* (county seat) and *partido* (county) of Gran Buenos Aires, Argentina, west of the city of Buenos Aires, in Buenos Aires *provincia.* The region of the present-day *partido* was colonized shortly after the second and permanent founding of Buenos Aires (1580). In 1730 an interim parish was founded near the estancia (landholding) of Francisco de Merlo. In the same year, Merlo founded the Villa de San Antonio del Camino, which was renamed later in his honour. For many years, the development of Merlo lagged behind the growth of nearby Morón. In 1865 the region was officially declared a *partido.* It covers 66 square miles (170 square km) and is bordered by the *partidos* of Morón (northeast), La Matanza (southeast), Marcos Paz (southwest), and Moreno and the Río de la Reconquista (northwest). Besides the *cabacera* of Merlo, the significant localities are San Antonio de Padua, Libertad, and Mariano Acosta. The *cabacera* of Merlo was formerly important solely as a railroad junction and trade centre for the surrounding agricultural and pastoral lands. About half of the *partido* now lies within the Gran Buenos Aires urban area, and the population density is less than that of most of the *partidos.* Pop. (1999 est.) 430,213.

mermaid, masculine MERMAN, a fabled marine creature with the head and upper body of a human being and the tail of a fish. Similar divine or semidivine beings appear in ancient mythologies (*e.g.,* the Chaldean sea god Ea, or Oannes). In European folklore, mermaids (sometimes called sirens) and mermen were natural beings who, like fairies, had magical and prophetic powers. They loved music and often sang. Though very long-lived, they were mortal and had no souls.

Many folktales record marriages between mermaids (who might assume human form) and men. In most, the man steals the mermaid's cap or belt, her comb or mirror. While the objects are hidden she lives with him; if she finds them she returns at once to the sea. In some variants the marriage lasts while certain agreed-upon conditions are fulfilled, and it ends when the conditions are broken.

Though sometimes kindly, mermaids and mermen were usually dangerous to man. Their gifts brought misfortune, and, if offended, the beings caused floods or other disasters. To see one on a voyage was an omen of shipwreck. They sometimes lured mortals to death by drowning, as did the Lorelei of the Rhine, or enticed young people to live with them underwater, as did the mermaid whose image is carved on a bench in the church of Zennor, Cornwall, Eng.

Mermaids and merman, illustration by Hans Tegner from the 1900 edition of *Fairy Tales*, by Hans Christian Andersen

By courtesy of the Folklore Society Library, University College, London; photograph, R.B. Fleming

Aquatic mammals, such as the dugong and manatee, that suckle their young in human fashion above water are considered by some to underlie these legends.

Mermaid Tavern, famous London meeting place of the Friday Street Club, of which William Shakespeare, Sir Walter Raleigh, John Donne, and Ben Jonson were notable members. It stood to the east of St. Paul's Cathedral, with entrances in Bread Street and Friday Street.

It has intrigued scholars interested in Shakespeare's personality and in those of other great men of Elizabethan and Jacobean letters, mainly because of a passage in a poem, "Letter of Ben Jonson" (1640), by the playwright Francis Beaumont (also a member of the club):

> What things we have seen
> Done at the *Mermaid!* heard words that
> have been
> So nimble, and so full of subtle flame,
> As if that every one (from whence
> they came)
> Had meant to put his whole wit in a jest,
> And had resolved to live a fool the rest
> Of his dull life.

mermaid's tresses (algae): *see* Spirogyra.

merman: *see* mermaid.

Merman, Ethel, byname of ETHEL AGNES ZIMMERMAN (b. Jan. 16, 1909, Astoria, N.Y., U.S.—d. Feb. 15, 1984, New York City), American singer, actress, and lead performer in more than a dozen Broadway musicals.

After working as a secretary and part-time singer, she began to get professional engagements in 1929. She made her stage debut in the George and Ira Gershwin musical *Girl Crazy* in 1930 and achieved notable success with her rendition of the song "I Got Rhythm." She became a favoured performer for many of the major songwriters of the period—including Irving Berlin, Cole Porter, and George Gershwin. She made her first appearance in a full-length motion picture in 1934 and starred in her own weekly radio show in 1935.

Merman continued to perform on Broadway, scoring her most notable successes in *Anything Goes* (1934), *Red, Hot and Blue* (1936), *Du Barry Was a Lady* (1939), *Panama Hattie* (1940), *Something for the Boys* (1943), *Annie Get Your Gun* (1946), *Call Me Madam* (1950), and *Gypsy* (1959). She was most memorable for her strong, clear vocalizations, though she never had voice lessons, and received many awards for her performances over the years, including a 1972 special Tony award in recognition of her lifetime contribution to show business.

Her autobiography, *Who Could Ask For Anything More?,* was published in 1955.

Merneptah, also spelled MENEPTAH, or MERENPTAH (d. 1204?), king of Egypt (reigned 1213–04 BC) who successfully defended Egypt against a serious invasion from Libya.

The 13th son of his long-lived father, Ramses II, Merneptah was nearing 60 years of age at his accession in about 1213. Toward the end of his father's reign, Egypt's military preparedness had deteriorated. Early in Merneptah's reign, his troops had to suppress a revolt in Palestine by the cities of Ashqelon, Gezer, and Yenoam. (The action is shown by battle reliefs at al-Karnak previously ascribed to Ramses II.) Merneptah's greatest challenge, however, came from the west. Libyans had penetrated the buffer territory west of the delta oases and were encroaching on Egyptian lands. About 1209 Merneptah learned that some Sea Peoples, wanderers who had been displaced from Asia Minor and the Aegean lands and were roving the Middle East, had joined and armed the Libyans and with them were conspiring to attack Memphis and Heliopolis, the great administrative and religious centres near the delta's apex.

After receiving assurances in a dream from Ptah, god of endangered Memphis, the aged king marshaled his forces and prepared to meet the enemy. The site of the battle is disputed, but a place somewhere west of the apex of the delta is suggested by references in the four accounts of the war. At dawn of a spring day in 1209, the Libyans and their allies appeared, evidently expecting a pitched battle. Merneptah, however, unleashed his archers against them, while his infantry and chariotry held fast. For six hours the bowmen massacred the foe, after which the latter's chief fled, and the Egyptian chariotry and infantry routed the demoralized enemy. It was a great victory in which the Libyans and Sea Peoples lost nearly 9,400 men. Egypt was relieved, and Merneptah ordered the carving of four great commemorative texts. One of these, the famous "Israel Stela," refers to the suppression of the revolt in Palestine. It contains the earliest-known reference to Israel, which Merneptah counted among the peoples that he defeated. Hebrew scholars suggest that the circumstances agree approximately with the period noted in biblical books from late Exodus to Judges. A fragmentary stela from the Sudan also suggests that the king quelled a rebellion in Lower Nubia, probably after his Palestinian exploits.

He probably died in about 1204. He left few monuments, but in his conduct of Egypt's defense and diplomacy he was at least the equal of his father.

Mernere (king of Egypt): *see* Merenre.

Merodach-Baladan II, Babylonian MARDUK-APAL-IDDINA II ("Marduk Has Given Me an Heir") (d. *c.* 694 BC), king of Babylonia 721–710 and for nine months in 703, who maintained Babylonian independence in the face of Assyrian military supremacy for more than a decade.

Commencing in 728 the king of Assyria also officially held the title of king of Babylonia.

During that time Merodach-Baladan, a member of the Yakin tribe, was a district ruler in Chaldea. During the unrest surrounding the accession of Sargon II of Assyria in 722, Merodach-Baladan entered Babylon and claimed the Babylonian throne, which had belonged to his forebear Eriba-Marduk. An attack by the Elamites two years later so weakened the Assyrians—though both sides claimed victory—that, as king of Babylonia, Merodach-Baladan remained unmolested by Assyria for the next 10 years.

Sargon's inscriptions portray Merodach-Baladan as a usurper who oppressed Babylonia and relied on Elamite military power. On the other hand, Merodach-Baladan claimed to be the legitimate heir who had driven the Assyrians from Babylonia. Contemporary Babylonian documents indicate that temples were repaired, irrigation projects were carried out, and life was normal during his reign.

According to Assyrian accounts, Sargon marched south against Babylonia in 710. After defeating the Elamites and Merodach-Baladan's other allies, he turned toward Babylon. Merodach-Baladan fled, and the leading citizens of Babylon brought Sargon unopposed into the city, where he officially became king of Babylonia. The next year Sargon captured and destroyed Merodach-Baladan's capital, Dur-Yakin. Sometime after the death (705) of Sargon, Merodach-Baladan sent an embassy to Hezekiah of Judah in an attempt to foment unrest against the new Assyrian monarch, Sennacherib. In 703 he again seized the Babylonian throne. Before the end of the year, however, Sennacherib marched south and defeated the Babylonian forces. In 700 Sennacherib marched to Bit-Yakin in pursuit of Merodach-Baladan, who again fled, this time to southern Elam, where he died sometime before 694.

Meroe, city of ancient Cush (Kush) the ruins of which are located on the east bank of the Nile about 4 miles (6.4 km) north of Kabūshīyah in the present-day Sudan; Meroe is also the name of the area surrounding the city.

The 25th, or "Ethiopian," dynasty of ancient Egypt is believed to have retired to Cush after 656 BC and established itself at Meroe, where it fostered an Egypto-Cushite culture that through the subsequent 1,000 years became increasingly cut off from its source. Meroe was the southern administrative centre for the kingdom of Cush, beginning *c.* 750 BC, at a time when Napata was still its capital. After the sack of Napata in *c.* 590 by the Egyptian pharaoh Psamtik II, Meroe became the capital of the kingdom and developed into a wide and prosperous area. It survived a Roman invasion—though its status was lowered thereby—but it later declined in the face of raiding Negroid and Nilotic tribes, to fall at the more determined invasions of the Aksumite armies, probably under Ella-Amida, whose reign ended between *c.* AD 320 and 325.

Excavations of Meroe, begun in 1902, have revealed the streets and buildings of a great and populous city. The chief features are a riverbank quay, with palaces nearby, and a great temple of Amon.

Meroitic language, language spoken in the ancient city of Meroe and the surrounding area (in present-day Sudan). Dating from a period extending from about 200 BC until the 4th century AD, Meroitic inscriptions are written in two types of script: linear, or demotic, for general records; and hieroglyphic for royal or religious inscriptions on stone. They were usually written from right to left, as with Egyptian hieratic and demotic scripts. Inscriptions were sometimes written vertically. These scripts seem to have been inspired and influenced by their Egyptian counterparts, and in some cases the signs used are identical in Egyptian and Meroitic. Extant texts in Meroitic include funerary inscriptions (which compose the largest group of texts), captions accompanying temple reliefs, graffiti, and several lengthy royal memorial texts; a few papyrus fragments have also been preserved in the relatively dry region of Lower Nubia. A number of new texts were discovered during the excavations occasioned by the building of the Aswān High Dam.

Although a small number of Meroitic words and a small portion of the grammar are known, the language remains largely undeciphered. Nothing is known for certain about the relation of Meroitic to other languages, although some scholars believe the language to be related either to Nubian or to the Eastern Sudanic languages.

Meron, also spelled MEIRON, noncollective agricultural settlement (moshava) and nearby mountain, Upper Galilee, northern Israel, northwest of Ẕefat (Safad). Nearby is a perennial spring, the likeliest location of the "waters of Merom," site of Joshua's victory over the pagan kings of Palestine under Jabin, king of Hazor (Joshua 11). Mount Meron (3,963 feet [1,208 m]), Israel's highest point in its pre-1967 boundaries, is 2 miles (3 km) northwest.

Meron is mentioned in the *History of the Jewish War* of Flavius Josephus (AD 37/38–after 93). It is the site of the tomb of Rabbi Simeon ben Yoḥai, 2nd-century rabbinic teacher and legendary author of the Kabbalistic *Zohar*. On the day of Lag ba-Omer, Orthodox Jews by the thousands make a joyous pilgrimage to Rabbi Simeon's tomb; the festivities there last all night. There are remains of a 3rd-century synagogue and ancient tombs attributed to various Talmudic scholars.

The modern settlement of Meron, adjacent to the old site, was founded in 1949 by ex-servicemen from Hungary and Czechoslovakia. Mount Meron (Hebrew: Har Meron, formerly Har ʿAtzmon; Arabic: Jabal Jarmaq) is covered with fine forests and commands a scenic view of the surrounding hilly area, which has been set aside as a nature reserve. Hill farming is the primary activity. Pop. (1983) 508.

Meropidae (bird family): *see* bee-eater.

Merovech, also spelled MEROVICH, MEROVEUS, MERWICH, or MEROWIG, French MÉROVÉE, German MEROWECH (fl. *c.* AD 450), king of the Salian Franks, from whom Frankish tradition held the Merovingian dynasty to have taken its name. He was the father of Childeric I (d. 481/482) and grandfather of Clovis I (*c.* 466–511).

Nothing definite is known of Merovech's life. He is mentioned in Gregory of Tours's *History of the Franks* and, according to later sources, fought against Attila the Hun at the Battle of the Catalaunian Plains (451).

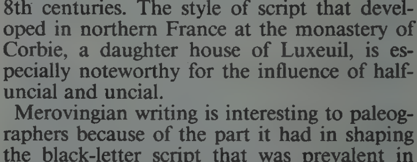
Merovingian DYNASTY, Frankish dynasty (AD 476–750) traditionally reckoned as the "first race" of the kings of France.

A brief treatment of the Merovingians follows. For full treatment, *see* MACROPAEDIA: France.

The name Merovingian derives from that of Merovech, of whom nothing is known except that he was the father of Childeric I, who ruled a tribe of Salian Franks from his capital at Tournai. Childeric was succeeded by his son Clovis I in 481 or 482. Clovis I extended his rule over all the Salian Franks, conquered or annexed the territories of the Ripuarian Franks and the Alemanni, and united nearly all of Gaul except for Burgundy and what is now Provence. Of equal importance, he was converted to Christianity in either 496 or 506. At Clovis I's death in 511, his realm was divided among his four sons, Theuderic I, Chlodomer, Childebert I, and Chlotar I. Despite the frequently bloody competition among the brothers, they managed among them to extend Frankish rule over Thuringia in approximately 531 and Burgundy in 534 and to gain sway over, if not possession of, Septimania on the Mediterranean coast, Bavaria, and the lands of the Saxons to the north. By 558 Chlotar I was the last suriviving son of Clovis I, and until his death in 561 the Frankish realm was once again united.

In 561 the realm was again divided among the brothers Charibert I, Guntram, Sigebert, and Chilperic I, and again family strife and intrigue ensued, particularly between Chilperic and his wife Fredegund in the northwest of Gaul and Sigebert and his wife Brunhilda in the northeast. Dynastic struggles and increasing pressures exerted on the realm by neighbouring peoples—Bretons and Gascons in the west, Lombards in the southeast, Avars in the east—prompted a reorganization of the Frankish kingdoms. Several eastern regions were merged into the kingdom of Austrasia, with its capital at Metz; in the west Neustria emerged, with its capital first at Soissons and later at Paris; to the south was the enlarged kingdom of Burgundy, with its capital at Chalon-sur-Saône. Overall Frankish unity was again achieved in 613, when Chlotar II, son of Chilperic I and king of Neustria, inherited the other two kingdoms as well. On the death of Chlotar's son Dagobert in 639 the realm was divided yet again, but by that time the kings of the two regions, Neustria and Burgundy on the one hand and Austrasia on the other, had been forced to yield much of their power to household officials known as mayors of the palace. The later Merovingian kings were little more than puppets and were enthroned and deposed at will by powerful mayors of the palace. The last Merovingian, Childeric III, was deposed in 750 by Pepin III the Short, one of a line of Austrasian mayors of the palace who finally usurped the throne itself to establish the Carolingian dynasty (*q.v.*).

Merovingian script, in calligraphy, the writing of the pre-Carolingian hands of France that were derived from Latin cursive script. Luxeuil, in Burgundy, was a particularly important centre in the development of a Merovingian cursive style during the 7th and 8th centuries. The style of script that developed in northern France at the monastery of Corbie, a daughter house of Luxeuil, is especially noteworthy for the influence of half-uncial and uncial.



Luxeuil cursive minuscule script from the *Moralia* by Gregory the Great, Merovingian, 8th century manuscript (British Library, Add. 11,878)

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Merovingian writing is interesting to paleographers because of the part it had in shaping the black-letter script that was prevalent in the Middle Ages. Like Visigothic script, the Merovingian hands inherited the dominant vertical rhythm of the Latin cursive script of the ancient Romans. Angularity as a prevailing tendency and an effect of lateral crowding, especially in the first lines of a Merovingian manuscript, led to the use of the term picket-fence style by some 20th-century scholars of calligraphy.

Merowech, also spelled MEROWIG (Frankish king): *see* Merovech.

Merriam, Clinton Hart (b. Dec. 5, 1855, New York City—d. March 19, 1942, Berkeley, Calif., U.S.), American biologist and ethnologist, who helped found the National Geographic Society (1888) and what is now the U.S. Fish and Wildlife Service.

Merriam studied at the Sheffield Scientific School of Yale University and at the College of Physicians and Surgeons of Columbia University (M.D., 1879). Between 1872 and 1876 he traveled as naturalist with the Hayden Geological Surveys in Utah, Idaho, Montana, and Wyoming. From 1885 to 1910 he headed the U.S. Department of Agriculture's Division of Ornithology and Mammalogy, which became the U.S. Biological Survey (1896) and is now known as the Fish and Wildlife Service. While a research associate with the Smithsonian Institution (1910–39) and chairman of the U.S. Board on Geographic Names (1917–25), he conducted a study of the Pacific Coast Indians, collecting data on 157 Indian tribes. Merriam's books include the *Geographic Distribution of Life in North America* (1893) and *The Dawn of the World* (1910).

Merriam

By courtesy of Keir B. Sterling

Merriam-Webster dictionary, any of various lexicographic works published by the G. & C. Merriam Company (renamed Merriam-Webster Inc. in 1982), which is located in Springfield, Mass., U.S., and which since 1964 has been a subsidiary of Encyclopædia Britannica, Inc. Among the dictionaries are *Webster's Third New International Dictionary of the English Language* (1961), which contains more than 470,000 entries and provides the most extensive record of American English now available, and *Merriam-Webster's Collegiate Dictionary, Tenth Edition*.

The G. & C. Merriam Company, founded in 1831, acquired the rights after the death of Noah Webster in 1843 to his *An American Dictionary of the English Language*. This work had first been published in 1828 and was the first American unabridged dictionary. A second edition had been published in 1840, and subsequent editions were published by the company in 1847 and 1864. The 1890 revision was given the title *Webster's International Dictionary* and was followed in 1909 by *Webster's New International Dictionary*, in 1934 by *Webster's New International Dictionary, Second Edition*, and in 1961 by *Webster's Third New International Dictionary*.

Merriam-Webster dictionaries began to be published in electronic formats, including CD-ROMs and handheld devices, in the 1980s. In 1996 Merriam-Webster introduced Merriam-Webster OnLine, a Web site offering language-related feaures, including access to the full text of *Merriam-Webster's Collegiate Dictionary* and *Merriam-Webster's Collegiate Thesaurus*.

Merrick, David, original name DAVID MARGULOIS (b. Nov. 27, 1912, St. Louis, Mo., U.S.—d. April 25, 2000, London, Eng.), prolific American theatrical producer who staged many of the most successful plays in American theatre during the 1960s.

Though he earned a law degree from St. Louis University, Mo., Merrick abandoned the practice of law after 1949 and became a full-time theatrical producer in New York City. His first independent production, *Clutterbuck* (1949), was followed over the next 40 years by more than 85 other Broadway shows, including *Look Back in Anger* (1957), *Gypsy* (1959), *A Taste of Honey* (1960), *Becket* (1960), *Hello, Dolly!* (1964), *Oh What a Lovely War!* (1964), *Cactus Flower* (1965), *Marat/Sade* (1965), *Play It Again, Sam* (1969), *42nd Street* (1980), and *Loot* (1986). He frequently had several productions running on Broadway at the same time. Besides his mastery of theatrical production, Merrick was known for his skillful use of publicity to draw theatregoers to his plays, many of which were significant critical and commercial successes. In 1983 Merrick suffered a stroke that rendered him wheelchair-bound and virtually unable to speak. He still continued to produce shows, such as *State Fair* (1996).

Merrick, Joseph Carey: *see* Elephant Man.

Merrifield, Bruce, in full ROBERT BRUCE MERRIFIELD (b. July 15, 1921, Fort Worth, Texas, U.S.), American biochemist who in 1984 received the Nobel Prize for Chemistry developing a simple and ingenious method for synthesizing chains of amino acids, or polypeptides, in any predetermined order.

Merrifield graduated from the University of California at Los Angeles (UCLA) in 1943 and earned a Ph.D. in biochemistry there in 1949. That same year he joined the staff of the Rockefeller Institute for Medical Research (now Rockefeller University), New York City, where he remained.

His innovative method, developed during the 1950s and '60s, grew from his idea that the key to the synthesis of polypeptides was the anchoring of the first amino acid to an insoluble solid. Other amino acids could then be joined, one by one, to the fixed terminus. At the end of the sequence of steps, the completed chain could be easily detached from the solid. The process, which can be carried out by machine, proved highly efficient and of great significance for research on such substances as hormones and enzymes, as well as in the commercial manufacture of such drugs as insulin and such substances as interferon.

Merrill, Charles E., in full CHARLES EDWARD MERRILL (b. Oct. 19, 1885, Green Cove Springs, Fla., U.S.—d. Oct. 6, 1956, Southampton, N.Y.), American investment banker who guided his company through a series of mergers that resulted in the creation of the brokerage firm of Merrill Lynch, Pierce, Fenner & Smith Inc.

After a series of jobs as a reporter, baseball player, and businessman, Merrill joined the commercial-paper house of George H. Burr & Company in New York City in 1911. He organized a bond department there, joined Eastman Dillon & Co. for one year, and in 1914 began his own investment-banking firm of Merrill, Lynch & Company, in partnership with Edmund C. Lynch. Merrill served as its director until his death.

With the successful underwriting of a $1,250,000 stock offering prior to World War I, Merrill Lynch earned a reputation and became the brokerage house for some of the largest chain-store securities, including S.S. Kresge Co., J.C. Penney Co., Safeway Stores, and First National Stores. Merrill played an important role in 1926 in the creation of Safeway Stores, Inc., under whose auspices he founded *Family Circle Magazine* six years later.

In 1930 the company left the brokerage field, concentrating instead on underwriting and investment banking; but it returned to brokerage in 1940, with amalgamations that resulted the following year in a change of company name to Merrill Lynch, Pierce, Fenner & Beane. (It became Merrill Lynch, Pierce, Fenner & Smith after Merrill's death.) One of the greatest contributions of Merrill Lynch was introducing stocks and bonds as an investment option to America's growing middle class.

Merrill, James, in full JAMES INGRAM MERRILL (b. March 3, 1926, New York, N.Y., U.S.—d. Feb. 6, 1995, Tucson, Ariz.), American poet especially known for the fine craftsmanship and wit of his lyric and epic poems.

Merrill was the son of Charles E. Merrill, a founder of Merrill Lynch, an investment-banking firm. He attended private schools and Amherst College (B.A., 1947), and inherited wealth enabled him to devote his life to his poetry. His first book, *First Poems* (1951), and subsequent collections revealed his formal mastery but were somewhat impersonal and artificial in tone. With *Water Street* (1962), critics noted a growing ease and the development of a personal vision in his writing. With *Nights and Days* (1966), *The Fire Screen* (1969), and *Braving the Elements* (1972), Merrill gained wider public appreciation. His verse in these books was more autobiographical and tended to focus on poignant moments in his romantic and domestic life. He skillfully combined lyric language with ordinary conversation and possessed a voice that could be witty, intimate, and colloquial while retaining a high degree of formal elegance.

The publication of the epic poetry in *Divine Comedies* (1976), *Mirabell: Books of Number* (1978), and *Scripts for the Pageant* (1980)—a trilogy later published in *The Changing Light at Sandover* (1982)—established Merrill as one of the leading American poets of his generation. This 17,000-line work presents a series of conversations held with various real and fictional persons in the spirit world by means of a Ouija board, a device that enabled Merrill to compose a serious yet witty summation of his lifelong concerns. A selection of his poetry, *From the First Nine: Poems 1946–1976,* was published in 1982. Merrill also wrote plays, novels, essays, and the memoir *A Different Person* (1993). His 15th and last book of poetry, *A Scattering of Salts,* appeared posthumously in 1995.

Merrill Lynch & Co., Inc., American financial-services holding company whose principal subsidiary, Merrill Lynch, Pierce, Fenner & Smith Inc., is the largest retail brokerage house in the United States. Headquarters are in New York City.

In 1914 Charles E. Merrill, a bond dealer, founded a small investment-banking firm and the next year took on a partner, Edmund C. Lynch. Merrill, Lynch & Company prospered by specializing in underwriting the securities of chain stores. Having helped organize Safeway Stores in 1926, Merrill sold his firm's retail brokerage operations to E.A. Pierce & Company in 1930 and concentrated on investment banking until 1940, when he merged his firm with that of Pierce to form Merrill Lynch, E.A. Pierce & Cassatt. In 1941 the company merged with the New Orleans-based brokers Fenner and Beane.

Under Merrill's leadership, the brokerage house (then called Merrill Lynch, Pierce, Fenner & Beane) set out after World War II to bring "Wall Street to Main Street," explaining to middle-income Americans how the stock market works and bringing average investors into the market in unprecedented numbers. Through innovative public-relations techniques, widely copied by other brokers, the company extensively advertised its services, cultivated small accounts, established a training school for stockbrokers, and paid brokers a salary instead of straight commission to reduce the incidence of needless portfolio churning to generate commissions. Merrill Lynch also was the first brokerage house to publicly disclose its own securities holdings. With the addition of Winthrop H. Smith to the partnership in 1958, the firm became Merrill Lynch, Pierce, Fenner & Smith.

In the 1970s, under Chairman Donald T. Regan (later treasury secretary under President Ronald Reagan), the firm moved aggressively into such other financial services as insurance and established the nation's largest money-market mutual fund. The holding company was created in 1973. Under Merrill Lynch International, it has several international operations, including Smith New Court PLC, a British securities firm acquired in 1995.

Merrimack and Monitor, Battle of: *see* Monitor and Merrimack, Battle of.

Merrimack River, stream in the northeastern United States, rising in the White Mountains of central New Hampshire at the confluence of the Pemigewasset and Winnipesaukee rivers and flowing southward into Massachusetts, then northeastward to its mouth on the Atlantic Ocean. Of its total length of 110 miles (177 km), the lower 22 miles (35 km) are tidal. The main cities along the river—Concord, Manchester, and Nashua in New Hampshire, and Lowell, Lawrence, and Haverhill in Massachusetts—used the Merrimack's waterpower to produce a large portion of the textiles and hosiery made in New England from about 1850 to the 1930s. While the river remains an important source of waterpower, its valley has become a central artery for tourist travel to the vacation centres in the White Mountains.

Merriman, John X., in full JOHN XAVIER MERRIMAN (b. March 15, 1841, Street, Somerset, Eng.—d. Aug. 1, 1926, near Stellenbosch, Union of South Africa), statesman who served South Africa as prime minister from 1908 to 1910.

In 1849 Merriman moved with his family to Cape Colony. He was educated at the diocesan college, Rondebosch, and at Radley College, England. He returned to the Cape in 1861, engaged in land surveying, and became a dealer in diamonds and a wine merchant.

Merriman's chief interest, however, was politics. He served as a member of the Cape House of Assembly from 1869 to 1910. An outspoken opponent of confederation, he served in two Cape ministries (1875–78 and 1881–84) and tried in vain to persuade the British government to proclaim a protectorate over South West Africa (Namibia). Advocating Anglo-Boer cooperation, Merriman held a post in the cabinet of his close friend Cecil Rhodes from 1890 to 1893; but after the abortive Jameson Raid (Dec. 29, 1895) into the Transvaal, he broke with Rhodes and became a vigorous opponent of the mining interests and British imperialism. Joining the William Schreiner ministry in 1898, he worked unsuccessfully to avert the South African War (1899–1902), resigning in 1900 over his government's harsh treatment of Cape rebels.

As a spokesman for the anti-imperialist English-speaking population with pro-Afrikaner sentiments, Merriman became the natural leader of the South African Party, which was founded in 1903. Becoming prime minister in February 1908, he undertook the twofold mission of restoring the colony's postwar finances and promoting a unitary constitution for South Africa. He was a member of the delegation that took the Union Bill to London in 1909. Passed over for the premiership in the new Union of South Africa, a disappointed Merriman rejected Louis Botha's offer to join his cabinet. As a private member of the Union Parliament, he supported the governments of Botha and Jan Smuts until he retired in 1924.

Merritt Parkway, innovative and widely copied American automobile highway built between Greenwich and Stratford, Conn., in the 1930s. The Merritt Parkway, a limited-access highway with two traffic lanes in each direction, was contemporary with the German autobahn system, the Pennsylvania Turnpike, and other limited-access highways but was outstanding in realizing the importance of aesthetics, achieved through a combination of an almost continuously curving roadway and attractive wooded and landscaped right-of-way. The parkway's extension inside New York state is the Hutchinson River Parkway and, in Connecticut, the Wilbur Cross Parkway.

Merryman, Ex Parte (1861), in U.S. legal history, American Civil War case contesting the president's power to suspend the writ of habeas corpus during a national emergency.

On May 25, 1861, a secessionist named John Merryman was imprisoned by military order at Fort McHenry, Baltimore, Md., for his alleged pro-Confederate activities. Supreme Court Chief Justice Roger B. Taney, sitting as a federal circuit court judge, issued a writ of habeas corpus on the grounds that Merryman was illegally detained. General George Cadwalader, in command of Fort McHenry, refused to obey the writ, however, on the basis that President Abraham Lincoln had suspended habeas corpus.

Taney cited Cadwalader for contempt of court and then wrote an opinion about Article I, Section 9, of the Constitution, which allows suspension of habeas corpus "when in cases of rebellion or invasion the public safety may require it." Taney argued that only Congress—not the president—had the power of suspension.

President Lincoln justified his action in a message to Congress in July 1861. More importantly, he ignored Taney's opinion and adhered to the suspension of habeas corpus throughout the Civil War. Merryman, however, was later released. The constitutional question of who has the right to suspend habeas corpus, Congress or the president, has never been officially resolved.

Mers el-Kebir, town and port, northwestern Algeria, at the western end of the Gulf of Oran. The town was an Almohad naval arsenal in the 12th century. It was under the rulers of Tlemcen in the 15th century and fell to corsairs in 1492. The town was later contested by the Spanish, Portuguese, and Turks until France gained control of it in 1830.

Mers el-Kebir (Arabic: "Great Harbour") was developed in 1939–56 as a major French naval base. In 1940 most of the French fleet at anchor there was destroyed by British warships to thwart a German takeover of them. Under the terms of the Evian Agreements for Algerian independence in 1962, France was to retain the port for 15 years. Control was relinquished to Algeria, however, in 1968.

Mers el-Kebir lies at the foot of Mount Santon, whose eastern projection forms Mers el-Kebir Point. The port's natural harbour is sheltered from east winds and protected by breakwaters. Pop. (1987 prelim.) 11,002.

Merseburg, city, Saxony-Anhalt *Land* (state), eastern Germany. It lies on the left bank of the Saale River, just south of Halle. Founded about 800 as a frontier fortress against the Slavs, it was a favourite residence of the German kings Henry I the Fowler (d. 936), Otto I, and Henry II. It was the seat of a bishop from 968 until the Reformation (1561) and was chartered in 1188. It passed to Saxony in 1561 and was captured (1631) by the Swedes in the Thirty Years' War. The residence of the dukes of Saxe-Merseburg from 1656 to 1738, it passed to Prussia in 1815. It was heavily bombed in World War II. Merseburg's most notable buildings are the imposing castle (1480–89) and the cathedral, begun in 1015 and dating mainly from the 13th and 16th centuries. The city's industries include brewing, brickmaking, paper milling, and aluminum foil. There is a large chemical works and a power station in adjoining Schkopau. Another large chemical complex is at Leuna, to the south, and there is a technical university (now part of Martin Luther University of Halle-Wittenberg) in Merseburg. Pop. (1994 est.) 41,528.

Mersenne, Marin (b. Sept. 8, 1588, near Oizé, Maine, France—d. Sept. 1, 1648, Paris), French mathematician, natural philosopher, and theologian whose discovery of the Mersenne numbers is considered to have been a pioneering effort to derive a formula that would represent all prime numbers. Although Mersenne numbers represent only some primes, their formula inspired great advances in the theory of numbers.

In 1611 Mersenne joined the Roman Catholic mendicant Order of Minims in Paris, and from 1614 to 1619, he taught philosophy at the Minim convent at Nevers. An ardent opponent of the mystical doctrines of alchemy, astrology, and related arcane arts, he vigorously supported science, defending the philosophy of René Descartes and the astronomical theories of Galileo. He held a post teaching philosophy at the convent L'Annonciade, Paris, and from 1620 he traveled extensively throughout western Europe.

The Mersenne numbers are generated from the formula $2^p - 1$, in which p is a prime. This formula, first proposed by Mersenne in 1644, does not yield a prime number for every prime value given to p, but it has long been of interest in studying primes and finding new ones.

One of Mersenne's most important contributions was his long service as a communication link between philosophers and scientists throughout Europe. Because there were then no scientific journals, men might work a lifetime on the same project, never knowing of one another's existence. Mersenne met regularly and corresponded at length with eminent figures, including Descartes, Girard Desargues, Pierre de Fermat, Blaise Pascal, and Galileo, and it was said that "to inform Mersenne of a discovery, meant to publish it throughout the whole of Europe."

In addition to his work on prime numbers, Mersenne investigated cycloids (certain geometric curves) and proposed to the Dutch physicist Christiaan Huygens the use of the pendulum as a timing device, thus inspiring the pendulum clock. His published works include *La Vérité dans les sciences* (1625; "Truth in the Sciences") and *Harmonie universelle* (1636–37; "Universal Harmony").

Mersey, River, river in northern Tasmania, Australia, rising in the lake district near Mount Pelion East on the Central Plateau. Fed by the Dasher and Fisher rivers, it flows 91 miles (146 km) north, east, and again north before entering its estuary at Latrobe, the head of navigation, and emptying into Bass Strait at Devonport. The stream cuts a gorge up to 2,000 feet (600 m) deep into the face of the plateau, where its steeply falling water is harnessed for hydroelectric power. The Mersey is linked with the Forth and Wilmot rivers and supplies water from its main storage reservoir, Lake Rowallan (1968), to hydroelectric-generating plants on the Forth. Named for the English river, the Mersey flows through a timber district before entering its lower valley, which supports dairying, sheep raising (wool), and fruit and potato farming.

Mersey, River, river formed at Stockport, Eng., by the junction of the Goyt and Tame, two headstreams that both rise at about 1,600 feet (490 m) on the west side of the Pennines, the upland spine of northern England. The Mersey lies entirely below 150 feet (45 m), draining large areas of the Lancashire and Cheshire plains. It flows in a westerly direction through the southern suburbs of Manchester and, at Flixton, receives its major right-bank tributary, the Irwell, in its canalized form as the

Manchester Ship Canal. The Mersey is itself artificially modified by the canal as far as Warrington, where it becomes tidal. At Runcorn, the river receives its major left-bank tributary, the Weaver, and opens out to form a wide estuary more than 30 square miles (75 square km) in area. The estuary is restricted at its seaward end, enabling the tidal movements to prevent the accumulation of silt and so reduce the dredging costs of the Port of Liverpool. This section of the estuary has been tunneled three times: two road tunnels (one opened in 1971) and one railway tunnel link Liverpool (north) with Birkenhead (south). The Mersey enters the Irish Sea after a total course of 70 miles (110 km).

Merseyside, metropolitan county in northwestern England, on both banks of the lower reaches of the River Mersey and centred on the city of Liverpool. It comprises five metropolitan boroughs: Knowsley, St. Helens, Sefton, Wirral, and the city of Liverpool. The areas to the north of the Mersey, including Liverpool, form part of the historic county of Lancashire, while the borough of Wirral to the south belongs to the historic county of Cheshire.

The Mersey estuary, a major inlet of the Irish Sea, is scoured by tides across its narrow neck so that the port of Liverpool, unlike many ports in the northwest, has not been silted up. Liverpool was seen by King John at the beginning of the 13th century as a convenient embarkation point for conquering Ireland. Until then the ill-drained marshlands with low cliffs of glacial till had not encouraged dense settlement, though place-names on the Wirral peninsula (west bank of the Mersey) are a reminder of the 10th-century invasion by Norsemen from Ireland and the Isle of Man.

By the late 17th century many ships sailing out of Liverpool were engaged in the slave trade with the West Indies; by the 19th century the ships were carrying emigrants en route to the New World, and cotton imports and other raw material from the United States were the principal cargoes. As a major centre for transatlantic shipping, Merseyside suffered heavy bomb damage during World War II.

The docks south of Liverpool Pierhead, although in decline after the Great Depression of the 1930s, remained open until 1973. In that year the Royal Seaforth Dock was opened at the estuary mouth, which helped Liverpool maintain its position as one of Britain's most important ports. Liverpool's port activities subsequently declined in the 1980s, however.

Shipbuilding and ship repair grew in the 19th century across the river from Liverpool at Birkenhead on the Wirral. Two ferries, two road tunnels, and an underground railway connect the two banks of the Mersey. The metropolitan area includes the coastal strip as far north as the resort of Southport.

Merseyside is famous for its contribution to national popular culture, not only for entertainers and singers (including the Beatles) but also for two internationally honoured association football (soccer) teams (Everton and Liverpool), the Grand National steeplechase run at Aintree racecourse, and championship golf at Hoylake and among the sand dunes at Royal Birkdale. The inheritance of cultural and religious ties with Ireland and a distinctive local dialect ("scouse") also provide the region with a strong identity. Area 247 square miles (642 square km). Pop. (1998 est.) 1,409,400.

Mersin, formerly MERSINA, also called İÇEL, city and seaport, south-central Turkey. It lies along the Mediterranean Sea at the extreme western end of the Cilician Plain, 40 miles (65 km) west-southwest of Adana.

A town of recent origin, Mersin stands near the site of an unidentified ancient settlement. The ruins of the Roman harbour town of Soli-Pompeiopolis lie immediately to the west. Excavations in a mound called Yümük Tepesi, 2 miles (3 km) north of the modern harbour, indicate settlements in the remote Neolithic (New Stone Age) Period: a village was fortified there as early as *c.* 3600 BC and again during the Old Hittite (*c.* 1750–1460 BC) and New Hittite (*c.* 1460–1200 BC) empires but was abandoned after the foundation of Pompeiopolis.

Mersin's artificial harbour is an outlet for the agricultural products and minerals of the Cilician Plain and southeastern Anatolia. The site was chosen because of its silt-free location and its rail and road connections with the interior. A branch line links Mersin with Adana and the Istanbul–Baghdad railway. The port is connected by ferry to Cyprus. Mersin is the site of one of Turkey's largest oil refineries. Pop. (1997 prelim.) 501,398.

Mersing, port, West Malaysia (Malaya). It lies along the South China Sea at the mouth of the Mersing River. Its predominantly Malay residents live in coastal and riverine fishing villages. There are some local tin-mining settlements and rubber estates. An embarcation point for Pulau Tioman and a regular port of call on the east coastal trade route, Mersing is linked by road inland to Batu Pahat and south to Johor Baharu and Singapore. Pop. (1980) 13,888.

Merta, town, central Rājasthān state, northwestern India. Founded *c.* 1480, it was at one time an important trade centre. The surrounding area was the scene of several battles, including the victory of the Marāṭhās over forces from the states of Jaipur and Jodhpur in 1790, and is the site of many memorial stone pillars. Captured by the Mughal emperor Akbar in 1562, Merta contains a mosque built by him. An agricultural distribution centre, the town has oilseed and cotton mills. Pop. (1991) 31,728.

Mertensia, genus of about 50 temperate North American and Eurasian species of plants in the family Boraginaceae, including the Virginia cowslip, or Virginia bluebell (*M. virginica*), a popular spring-blooming garden and wild flower with drooping, bell-shaped, pink flowers that turn blue. The Virginia cowslip is native in moist woods and wet meadows in eastern North America and has smooth, elliptical leaves and reaches approximately 60 cm (2 feet) high.

Northern shorewort, oyster plant, or sea-lungwort (*M. maritima*), a fleshy, grayish-leaved plant, is about the same height as Virginia bluebell but has smaller flowers that bloom in summer. It grows along pebbly coasts of northern North America and northern Europe. Languid ladies (*M. paniculata*), from western North America, is smaller, hairy, and summer blooming, and it has smaller, more nodding blooms.

Mertensia maritima, known variously as northern shorewort, oyster plant, and sea-lungwort

C. Foord—EB Inc.

Merthiolate (antiseptic): *see* thimerosal.

Merthyr Tydfil, also spelled MERTHYR TUDFUL, industrial town and county borough, southern Wales. It is named after a 5th-century Welsh Christian princess (Tydfil the Martyr) who was slain there. The county borough includes both sides of the deep valley of the River Taff and the surrounding steep hills. The town of Merthyr Tydfil is at the centre of the county borough, which extends in the north into Brecon Beacons National Park. Most of the county borough, including the town of Merthyr Tydfil, lies within the historic county of Glamorgan (Morgannwg), but it includes an area in the north that belongs to the historic county of Brecknockshire (Sir Frycheiniog).

Four large ironworks built after 1757 formed the basis for the town's modern growth. In 1804 Richard Trevithick built the world's first steam locomotive in Merthyr Tydfil. The ironworks were supplemented by coal mining. By 1850 the Dowlais ironworks were the largest in the world. After 1918 the area's coal mining gradually ceased, and the last surviving local steelworks, at Dowlais, closed.

The town's industrial revival dates from World War II, and Merthyr Tydfil now produces a wide range of manufactures, most notably Hoover washing machines. It is an important regional retail and services centre. Area county borough, 43 square miles (111 square km). Pop. (1991) town, 39,482; (1998 est.) county borough, 57,000.

Merton, outer borough of London. Located south of Wandsworth, it was established in 1965 by amalgamation of the boroughs of Mitcham and Wimbledon and the urban district of Merton and Morden. Merton is part of the historic county of Surrey.

The borough was occupied from Anglo-Saxon times or earlier, and remains of the Roman road, now called Stane Street, have been excavated in Morden. Until the dissolution of the monasteries in the 1530s, Morden was a parish under the control of Westminster Abbey, whereas Wimbledon was owned by the archbishop of Canterbury.

Between World Wars I and II substantial residential and industrial growth took place throughout the borough. Wimbledon is internationally known for its annual lawn tennis championships, which began in 1877. Pop. (1998 est.) 184,300.

Merton, Robert C. (b. July 31, 1944, New York, N.Y., U.S.), American economist known for his work on finance theory and risk management, especially in assessing the value of stock options and derivatives. Merton shared the Nobel Prize for Economics in 1997 with Myron S. Scholes (*q.v.*), whose option valuation model, the Black-Scholes formula (developed with economist Fischer Black), provided the foundation for Merton's work. (Upon his death in 1995, Black became ineligible for the Nobel Prize, which is not awarded posthumously.)

In 1966 Merton earned a B.S. in engineering mathematics from Columbia University, where his father, Robert K. Merton, had taught sociology from 1941. He also studied at the California Institute of Technology (M.S., 1967) and the Massachusetts Institute of Technology (Ph.D., 1970), where he taught at the Sloan School of Management (1970–88).

In 1988 he joined the faculty of the Harvard Graduate School of Business Administration and was named John and Natty McArthur University Professor in 1998.

The Black-Scholes formula, published in 1973, showed that a combination of shares and call options (options that give the holder the right to buy a share) could diminish the risk in an investment portfolio. Merton generalized the formula by relaxing certain restrictions set by Black and Scholes, thereby extending its application to other financial areas such as mortgages and student loans. Merton was a principal member of Long-Term Capital Management (LTCM), an investment firm in which Scholes was also a partner. LTCM went on to lose more than $4 billion in 1998 through highly leveraged investments.

Merton, Robert K(ing) (b. July 5, 1910, Philadelphia, Pa., U.S.), American sociologist whose diverse interests included the sociology of science and the professions, sociological theory, and mass communication.

After receiving his Ph.D. from Harvard University in 1936, Merton joined the Harvard faculty, where he developed a theory of deviant behaviour based on different types of social adaptation. He served on the faculty of Tulane University, New Orleans (1939–41), and then accepted an appointment at Columbia University (1941), becoming a full professor in 1947 and being named Giddings professor in 1963. He served as associate director of the university's Bureau of Applied Social Research (1942–71), working with Paul Lazarsfeld, who arrived a year earlier than Merton and headed the new bureau. Lazarsfeld's logic of concept clarification and his methodology of quantitative and qualitative research influenced Merton's orientation to historical studies, and Merton's gift for theory influenced Lazarsfeld's philosophic grasp of the discipline of sociology. They produced major research on methods of improving standards of training for the social sciences.

In *Social Theory and Social Structure* (1949; rev. ed. 1968), Merton defined the interrelationship between social theory and empirical research, advancing a structural-functional approach to the study of society and creating the concepts of manifest and latent function and dysfunction. In the sociology of science, he studied the relationship between Puritan thought and the rise of science, writing *Science, Technology and Society in Seventeenth Century England* (1938; reprinted 1970) and *The Sociology of Science* (1973).

Merton, Thomas, original name of FATHER M. LOUIS (b. Jan. 31, 1915, Prades, Fr.—d. Dec. 10, 1968, Bangkok, Thai.), Roman Catholic monk, poet, and prolific writer on spiritual and social themes, one of the most important American Roman Catholic writers of the 20th century.

Merton's early education was in England and France; after a year at the University of Cambridge, he entered Columbia University in New York, where he earned degrees in 1938 and 1939. After teaching English at Columbia (1938–39) and at St. Bonaventure University (1939–41), he entered the Trappist Abbey of Gethsemani near Louisville, Ky. He was ordained priest in 1949.

Merton's first published works were collections of poems, but international fame occurred after the publication of the autobiographical *Seven Storey Mountain* (1948). His early works were strictly spiritual, but in the early 1960s his writings tended toward social criticism, while many of his later works reveal an insight into Oriental philosophy and mysticism unusual in a Westerner. He was electrocuted by a faulty wire during an international monastic convention in Thailand.

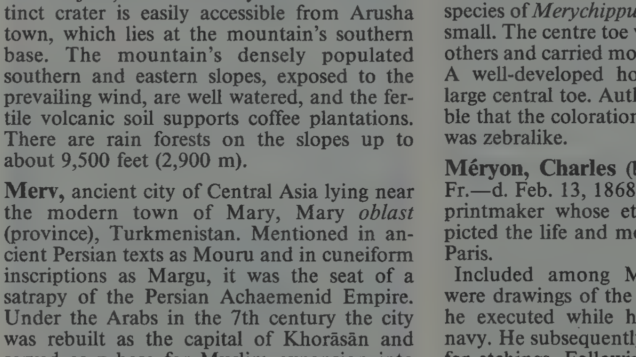
His writings include *Figures for an Apocalypse* (1948), a book of poems; *The Waters of Siloe* (1949), a history of the Trappists; *Seeds of Contemplation* (1949); *The Living Bread* (1956), a meditation on the Eucharist; *Contemplation in a World of Action* (1971), an insightful book of essays; and *The Asian Journal of Thomas Merton* (1973).

Meru, town, central Kenya, located about 110 miles (180 km) northeast of Nairobi. Situated in the Eastern Highlands at an elevation of about 5,300 feet (1,600 m), in a region known for its dense oak forests, Meru lies midway between Mount Kenya on the west and Meru National Park on the east. It is connected by road to Embu and is the tribal centre of the Meru people. Economic activities include the production of wooden and iron agricultural tools, earthenware pottery, and woven goods. Pop. (1989) 94,947.

Meru, Mount, in Hindu mythology, a golden mountain that stands in the centre of the universe and is the axis of the world. It is the abode of gods, and its foothills are the Himalayas, to the south of which extends Bhāratavarṣa ("Land of the Sons of Bharata"), the ancient name for India. The roof tower crowning the shrine in a Hindu temple represents Meru. As the world axis, Mount Meru reaches down below the ground, into the nether regions, as far as it extends into the heavens. All of the principal deities have their own celestial kingdoms on or near it, where their devotees reside with them after death, while awaiting their next reincarnation.

Meru, Mount, volcanic cone (14,978 feet [4,565 m]), northern Tanzania. It is situated 42 miles (68 km) west-southwest of Mount Kilimanjaro, near the Kenyan border. Its extinct crater is easily accessible from Arusha town, which lies at the mountain's southern base. The mountain's densely populated southern and eastern slopes, exposed to the prevailing wind, are well watered, and the fertile volcanic soil supports coffee plantations. There are rain forests on the slopes up to about 9,500 feet (2,900 m).

Merv, ancient city of Central Asia lying near the modern town of Mary, Mary *oblast* (province), Turkmenistan. Mentioned in ancient Persian texts as Mouru and in cuneiform inscriptions as Margu, it was the seat of a satrapy of the Persian Achaemenid Empire. Under the Arabs in the 7th century the city was rebuilt as the capital of Khorāsān and served as a base for Muslim expansion into Central Asia and later China. A great centre of Islāmic learning under the ʿAbbāsid caliphs, Merv attained the zenith of its glory as capital of the Seljuq sultan Sanjar (reigned 1118–57) and his successors. Destroyed by the Mongols in 1221, the city and its irrigation system were rebuilt in the 15th century, but it never regained its former prosperity. Merv was under the Tekke Turkmens when it was occupied by the Russians in 1884.



"L'Apsis de Notre Dame," etching by Charles Méryon, 1855; in the British Museum

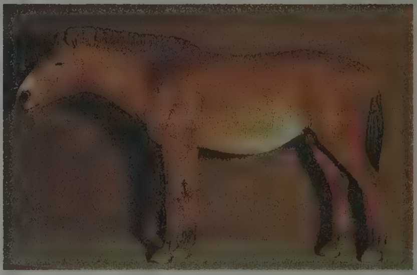
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Merwan Sheriar Irani (Indian religious leader): *see* Meher Baba.

Merwich (Frankish king): *see* Merovech.

Merychippus, extinct genus of early horses, found as fossils in deposits from the Middle and Upper Miocene epoch (23.7 to 5.3 million years ago). *Merychippus* descended from the earlier genus *Parahippus,* and a complete evolutionary series is known between the two forms.

The tooth pattern in *Merychippus* is basically the same as that in the modern horse; the teeth became higher and dental cement appeared, which allowed a grazing mode of life. Other developments in the skeleton are also evident: its size increased so that *Merychippus* was almost as large as a modern pony, and the skull became more elongated in a very horselike fashion. The limbs as well became more horselike in proportion and better adapted to running. In some forms the three toes remained comparatively large, but in progressive species of *Merychippus* the toes were short and small. The centre toe was much larger than the others and carried most of the animal's weight. A well-developed hoof was present on the large central toe. Authorities think it is probable that the coloration pattern of *Merychippus* was zebralike.



Merychippus model

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

Méryon, Charles (b. Nov. 23, 1821, Paris, Fr.—d. Feb. 13, 1868, Saint-Maurice), French printmaker whose etchings romantically depicted the life and mood of mid-19th-century Paris.

Included among Méryon's earliest works were drawings of the New Zealand coast that he executed while he was with the French navy. He subsequently employed these studies for etchings. Following his time in the navy, he entered the studio of Alexandre Bléry, who taught him the technique of etching, which, because of Méryon's colour blindness, became the medium of his talent. He earned his living by doing hackwork, and for practice he made studies after Dutch etchers, such as Zeeman and Adriaan van de Velde. He then began the series "Eaux-fortes sur Paris," executed from 1850 to 1854; although Méryon always considered these plates as a set, they were never published as such. Besides these 22 etchings, Méryon produced about 70 others.

Although Méryon is considered a great master of etching, striking in his originality and modernity, he was appreciated by only a few contemporary artists and critics. His prints sold for almost nothing. His life was one of great disappointments and terrible hardships; he became subject to hallucinations, and, shortly after the completion of the Paris series, he was committed to the Charenton mental institution at Saint-Maurice. A partial cure was effected, but he was returned to the asylum in 1867 and committed suicide a year later.

Méryon's rendering of architecture is often visionary, and generally his figures are incidental, like those of a landscape painter; but sometimes, as in his "La Morgue," they tell the story of the picture or, as in "La Rue des Mauvais Garçons," with the two women secretly conversing, at least suggest it. "L'Apsis de Notre Dame" (1855), considered to be Méryon's masterpiece, characterizes his great sensitivity to the effects of light and atmosphere.

Merzifonlu Kara Mustafa Paşa (Ottoman grand vizier): *see* Kara Mustafa Paşa, Merzifonlu.

Mesa, city, Maricopa county, south-central Arizona, U.S. A southeastern suburb of Phoenix, its "tableland" site was settled in 1878 by Mormons who used ancient Hohokam Indian canals for irrigation. The community became the focus of an agricultural and fruit-growing region, developed from a Salt River reclamation project. It experienced rapid growth after World War II; and its basic farm economy diversified to include manufacturing, tourism, and retail trade. It is the site of a Mormon Temple (1927), Mesa Community College (1966), and the University of Arizona's Agricultural Experimental Station. Salt River Indian Reservation is across the river to the north. The Oakland Athletics have their spring training camp there. Inc. town, 1883; city, 1930. Pop. (1990) 288,091.

mesa (Spanish: "table"), flat-topped tableland with one or more steep sides, common in the Colorado Plateau regions of the United States; a butte is similar but smaller. Both are formed by erosion; during denudation, or downcutting and stripping, areas of harder rock in a plateau act as flat protective caps for portions of underlying land situated between such places as stream valleys, where erosion is especially active. This results in a table mountain (mesa) or fortress hill (butte; *q.v.*).

Mesa Central, also called MESA DE ANÁHUAC, or MESA CENTRAL DEL SUR, high plateau region in central Mexico. The Mesa Central comprises the southern section of the Mexican Plateau extending south from the Zacatecas Mountains to the Bajío, a fertile region at the northern base of the Neo-Volcánica Range. Lying at elevations of 6,000 to 7,500 feet (1,800 to 2,300 m), the Mesa Central is considerably higher and wetter than the Mesa del Norte ("Northern Plateau"). In areas of high volcanic activity, numerous blocked streams and rivers have formed extensive shallow lakes and swamps on the mesa; the Toltec name, Anáhuac, means "land on the edge of the water." Significant lakes in the area include Chapala, Pátzcuro, and Cuitzeo. The Mesa Central was explored by the Aztecs in the early 1300s. The area is densely populated and encompasses urban centres such as Guadalajara, León, Queretaro, and Pachuca. A temperate climate, relatively abundant rainfall, and rich alluvial and volcanic soils create favourable agricultural conditions, and much of the land supports extensive farming as well as cattle grazing in some of the drier pockets. Significant crops include corn (maize), beans, wheat, and sugarcane; sugar refineries and grain mills are located in Guadalajara. Other important industries are textiles, cement, and chemicals.

Mesa del Norte, also called NORTHERN PLATEAU, the northern section of the Mexican Plateau, sloping gently upward to the south for more than 700 miles (1,100 km) from the U.S.–Mexico border to the Zacatecas Mountains. Mesa del Norte largely spans the country from coast to coast and is bordered by the Sierra Madre Oriental on the east and the Sierra Madre Occidental on the west. Much of the region is arid land broken by mountains and salt-encrusted flats or depressions, locally called *bolsónes;* the sparse population is largely concentrated in the few irrigable areas such as the upper part of the Salado River valley, where wheat is grown, and the Laguna Basin, which produces much of Mexico's cotton. Other crops include corn (maize), beans, and alfalfa, and large areas of the more arid land are utilized as rangeland. The area yields significant amounts of lead and zinc as well as some iron and silver.

Mesa Verde National Park, national park, in southwestern Colorado, U.S., established in 1906 to preserve notable prehistoric cliff dwellings. Occupying a high tableland area of 52,085 acres (21,078 hectares), it contains hundreds of pueblo (Indian village) ruins up to 13 centuries old. The most striking are multistoried apartments built under overhanging cliffs. Cliff Palace, the largest, was excavated in 1909 and contains hundreds of rooms, including kivas, the circular ceremonial chambers of the Pueblo Indians. Besides the ruins, the park has some very striking and rugged scenery.

Mesa Verde's plant life is adapted to the semiarid climate: piñon-juniper forest, shrubs, and wildflowers. Deer are the most common large animals, and there are a few bears and mountain lions and many smaller mammals. Snakes and lizards also abound, as do birds.

Mesabi Range, largest of three iron ranges in Minnesota, U.S. (the others are Vermilion and Cuyuna), extending for 110 miles (180 km) from Babbitt (east) to Grand Rapids (southwest) at heights varying from 200 to 500 feet (60 to 150 m) with a high point of 2,000 feet (610 m). The great bulk of its iron-ore formation is hard, magnetic taconite, which exists in thick layers up to 3 miles (5 km) wide. By the 1950s reserves of high-grade hematite ore, worked since 1892, were depleted, and the lower grade taconite was economically processed as pellets containing more than 60 percent iron. The chief mining centres are Hibbing and Virginia. Mesabi is an Ojibwa Indian name meaning "giant."

Pillsbury Mine in the Mesabi Range, near Hibbing, Minn.

Milt and Joan Mann from CameraMann

Mescalero, Eastern Apache of south-central New Mexico who formerly also had bands in the Davis Mountains of Texas and to the south in the Mexican state of Chihuahua (*see* Apache). The name Mescalero is taken from the mescal (peyote) cactus (species *Lophophora williamsii*), which provided fibre, food, and drink to these essentially hunting-and-gathering people. The Mescalero borrowed some elements of Plains Indian culture, such as the tepee.

Like the other Apachean groups, the Mescalero lacked any centralized tribal organization. The primary organizational unit was the band, which was in turn split into smaller local groups. The bands were small enough so that every individual was aware of his kinship with most if not all other members.

Though as a group they were not noted for their wars with pioneers, some Mescalero, such as Gomez and Chihuahua, resisted encroachment of the settlers. Geronimo's Chiricahua faction included Mescalero, but many Mescalero served as scouts for the frontiersmen.

mescaline, also called β-3,4,5-TRIMETHOXYPHENETHYLAMINE, naturally occurring alkaloid, the active principle contained in the flowering heads of the peyote (*q.v.*) cactus (species *Lophophora williamsii*) of Mexico and the southwestern United States, that has been used as a drug to induce hallucination. The mescaline molecule is related structurally to two hormones secreted by the adrenal glands, adrenaline and noradrenaline; both are catecholamine compounds that take part in the transmission of nerve impulses. Mescaline was isolated as the active principle of peyote in 1896, and its structural resemblance to adrenaline was recognized by 1919.

In experiments mescaline requires 2 to 3 hours for onset of action, and its effects sometimes last for more than 12 hours. The hallucinatory effects vary greatly among individuals and even for a particular individual from one drug session to the next. The variations seem to reflect such factors as the mood and personality of the subject and the setting in which the drug is administered. Hallucinations are usually visual, less often auditory. Side effects include nausea and vomiting. Mescaline is prepared from the peyote cactus by extraction and purification, but it can be synthesized.

Meschke, Michael (b. July 14, 1931, Danzig, Ger. [now Gdańsk, Pol.]), German-born founder and producer of the Marionetteatern ("Marionette Theatre") in Stockholm.

When Meschke was seven years old his family fled to Sweden from Danzig, which had elected a Nazi government. In his school years he became interested in puppetry and in 1951–52 studied in Braunschweig, W.Ger., with Harro Siegel, who at that time conducted the only puppet school in western Europe. Meschke then went to Paris (1953–54), studying with the mime Étienne Decroux, and became a close friend of the mime Marcel Marceau.

Returning to Sweden, he wrote and produced puppet plays and in 1958 acquired from the Stockholm municipal authorities an old theatre that he renamed the Marionetteatern. Over the years he produced dozens of plays, using his own handmade, highly stylized puppets, some operated by strings from above and others operated by rods from below. He also placed puppet operators onstage, dressed in black against black backgrounds or in white against white backgrounds and manipulating luminescent or colourful animated figures. His notable successes include productions of Alfred Jarry's *Ubu Roi* and Bertolt Brecht's *The Threepenny Opera.*

Meselson, Matthew Stanley (b. May 24, 1930, Denver, Colo., U.S.), American molecular biologist notable for his experimental confirmation of the Watson-Crick theory of the structure of deoxyribonucleic acid (DNA).

Meselson obtained his Ph.D. at the California Institute of Technology (Caltech), Pasadena, in 1957. His research, with Franklin W. Stahl, showed that during cell division, the replication of DNA in the cell is "semi-conservative"; that is, the DNA splits into its two component strands, each of which acquires a newly synthesized partner before passing into one of the daughter cells. Bacteria cultured in a nutrient containing a heavy isotope of nitrogen incorporated it in their DNA. When the bacteria were returned to nutrients containing ordinary nitrogen, their reproduction formed cells that had a new medium-weight DNA. (A new technique, density-gradient centrifugation, could be used to separate such molecules by weight.) On heating, this DNA separated into half heavy and half light strands. Meselson and Stahl concluded that the new DNA molecules were composed of one strand of each: the heavy inherited, the light newly synthesized. Meselson was on the staff at Caltech until 1960, when he was appointed associate professor of biology at Harvard University. He continued to study problems in the synthesis of DNA, RNA, and proteins.

Mesene, also called CHARACENE, Persian MESHAN, ancient Parthian vassal state located in the south of Babylonia (modern southern Iraq). After the fall of the Seleucid king Antiochus VII Sidetes in 129 BC, a local prince, Hyspaosines (also called Aspasine, or Spasines), founded the Mesene kingdom, which survived until the rise of the Sāsānian empire. Hyspaosines refortified a town originally founded by Alexander the Great near the junction of the Eulaeus (Kārūn) and Tigris rivers and called it Spasinou Charax ("Fort of Spasines"); in the following centuries it was the main mercantile centre on the Tigris estuary. The chief source of information about Mesene is the series of coins minted by the dynasty; they are dated according to the Seleucid era and make it possible to compile a fairly complete list of local kings, from Hyspaosines (reigned 127–*c.* 121 BC) to Thionesius IV (reigned *c.* AD 111–*c.* 112).

Meseta Central, great interior plateau (*meseta*) of the Iberian Peninsula. With Madrid at its centre, it extends over 81,000 square miles (210,000 square km) and has an average elevation of 2,300 feet (700 m). It constitutes the oldest and most complex geologic formation of the peninsula. Its western slope is gently inclined and forms the river basins of the Douro, Tagus, and Guadiana. The other borders rise abruptly into the Cantabrian Mountains (north) and a series of ranges on the east. A certain symmetry is provided by the tectonic troughs of the Ebro in the northeast and the Guadalquivir in the south, overlooked by various ranges on the east and by the Sierra Morena on the south. The Meseta Central is divided by the block mountains in the centre of the peninsula into the northern high basin of Old Castile and the lower plateaus of New Castile and Extremadura to the south.

There is also contrast in vegetation and economy between the western outcrops of crystalline rocks with poor soils and the eastern plains of limestones and marls that form the major agricultural zones. The southeastern section of the Meseta Central is occupied by the region of La Mancha.

Almanzor Peak in the Sierra de Gredos, one of the block mountain ranges of the Meseta Central, Spain
C.I.R.I.—EDISTUDIO

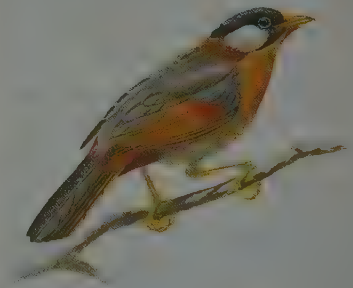
Meseta Central (Costa Rica): *see* Valle Central.

Meshed, also spelled MASHHAD, city, northeastern Iran, lying 3,231 feet (985 m) up in the valley of the Kashaf River. It is an important political and religious centre, visited annually by more than 100,000 pilgrims. The city is linked by rail with Tehrān and has an airport. Meshed serves a rich agricultural region in Iran and is the centre of the northern wool trade, manufacturing carpets for export.

Shrine of imam ʿAlī ar-Riḍā, Meshed, Iran
Fred J. Maroon—Photo Researchers/EB Inc.

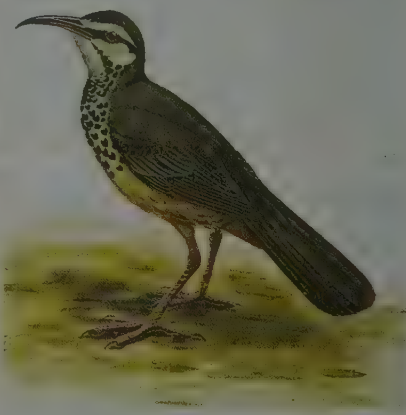
The city is an offshoot of the ancient city of Ṭūs and owes its historical importance to the burial place and shrine of the caliph Hārūn ar-Rashīd (d. AD 809) and that of ʿAlī ar-Riḍā (d. 818), the eighth imam of the Twelver Shīʿite sect of Islām. Although Meshed was severely damaged in a Mongol attack in 1220, the sacred buildings were partially spared, and traces of the earlier structures remain. Shāh Rokh, the son of the conqueror Timur (Tamerlane), did much to beautify Meshed, and his wife erected a mosque that is one of the finest architectural achievements of Iran. In the 16th and 17th centuries, Meshed was sacked by Turkmen and Uzbeks. It was restored by ʿAbbās I (reigned 1588–1629), who encouraged the pilgrimage and beautified the city. Nāder Shāh (reigned 1736–47) made it his capital and made several additions to its buildings. After Nāder's death, Meshed became the capital of a small state controlled by his grandson. Pop. (1986) 1,463,508.

mesia, also called SILVER-EARED MESIA, or SILVER-EAR (species *Leiothrix argentauris*), songbird of the babbler family Timaliidae (order Passeriformes). It is found from Pakistan through the Indochinese peninsula in scrub and secondary jungle. This 15-centimetre- (6-inch-) long bird is olive above and yellow below, with a black crown, silver ear patches, and some crimson on the tail. In groups of 6 to 30 it travels about the forest bushes and canopy seeking berries and peering under leaves for insects. Four eggs are laid in a cup-shaped nest. The mesia has a sweet, whistling song and is sometimes kept as a cage bird.



Silver-eared mesia (*Leiothrix argentauris*)
Drawing by John P. O'Neill

mesite, any of several species of small, brownish ground-dwelling birds constituting the family Mesitornithidae (sometimes Mesoenatidae), order Gruiformes. They are about 30 cm (12 inches) long, have short wings and a thick tail, and inhabit Madagascar. They differ from all other gruiform birds in possessing powder downs, areas of feathers that continuously disintegrate to a fine powder that is used for preening. Mesites go about in pairs or small flocks, picking up seeds and insects. They walk like pigeons, bobbing the head and tail. *Mesitornis* (sometimes *Mesoenas*) *unicolor* and *M. variegata* inhabit forests.

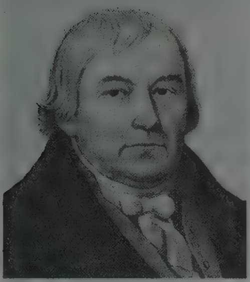


Monias (*Monias benschi*)
Painting by H. Douglas Pratt

Bensch's rail (not a true rail), also called Bensch's monias (*Monias*, or *Mesoenas, benschi*), inhabits brushland. All three species build platform nests low in bushes.

Mesmer, Franz Anton (b. May 23, 1734, Iznang, Swabia [Germany]—d. March 5, 1815, Meersburg, Swabia), German physician whose system of therapeutics, known as mesmerism, was the forerunner of the modern practice of hypnotism.

Mesmer's dissertation at the University of Vienna (M.D., 1766), which borrowed heavily from the work of the British physician Richard Mead, suggested that the gravitational attraction of the planets affected human health by affecting an invisible fluid found in the human body and throughout nature. In 1775 Mesmer revised his theory of "animal gravitation" to one of "animal magnetism," wherein the invisible fluid in the body acted according to the laws of magnetism. According to Mesmer, "animal magnetism" could be activated by any magnetized object and manipulated by any trained person. Disease was the result of "obstacles" in the fluid's flow through the



Mesmer, detail of a lithograph after a portrait, 1810

By courtesy of the Osterreichische Nationalbibliothek, Vienna

body, and these obstacles could be broken by "crises" (trance states often ending in delirium or convulsions) in order to restore the harmony of personal fluid flow. Mesmer devised various therapeutic treatments to achieve harmonious fluid flow, and in many of these treatments he was a forceful and rather dramatic personal participant.

Accused by Viennese physicians of fraud, Mesmer left Austria and settled in Paris in 1778. There he continued to enjoy a highly lucrative practice but again attracted the antagonism of the medical profession, and in 1784 King Louis XVI appointed a commission of scientists and physicians to investigate Mesmer's methods; among the commission's members were the American inventor and statesman Benjamin Franklin and the French chemist Antoine-Laurent Lavoisier. They reported that Mesmer was unable to support his scientific claims, and the mesmerist movement thereafter declined.

Whatever may be said about his therapeutic system, Mesmer did often achieve a close rapport with his patients and seems to have actually alleviated certain nervous disorders in them. More importantly, the further investigation of the trance state by his followers eventually led to the development of legitimate applications of hypnotism.

Mesoamerican civilization, the complex of aboriginal cultures that developed in parts of Mexico and Central America prior to Spanish exploration and conquest in the 16th century. In the organization of its kingdoms and empires, the sophistication of its monuments and cities, and the extent and refinement of its intellectual accomplishments, this civilization, along with the comparable Andean civilization (*q.v.*) farther south, constitutes a New World counterpart to those of ancient Egypt, Mesopotamia, and China.

A brief treatment of Mesoamerican civilization follows. For full treatment, *see* MACROPAEDIA: Pre-Columbian Civilizations.

Archaeologists have dated human presence in Mesoamerica to as early as 21,000 BC. By 11,000 BC, hunting-and-gathering peoples occupied most of the New World south of the glacial ice cap covering northern North America. The cooler climate of this period as compared with that of today supported a grassland vegetation, especially in the highland valleys, that was ideal for large herds of grazing animals. The shift toward sedentary agriculture apparently began after about 7000 BC, when a dramatic global warming caused the glaciers to retreat and tropical forests to overtake the Mesoamerican grasslands.

The gradual domestication of successful food plants—most notably a mutant corn (maize) with husks—over succeeding millennia gave rise to more or less permanent village farming life by about 1500 BC. In addition to corn, crops included beans, squashes, chili peppers, and cotton. As agricultural productivity improved, the rudiments of civilization emerged during the period designated by archaeologists as the Early Formative (1500–900 BC). Pottery, which had appeared in some areas of the region as early as 2300 BC, perhaps introduced from Andean cultures to the south, took on varied and sophisticated forms. The idea of the temple-pyramid seems to have taken root during this period.

Corn cultivation in one area—the humid and fertile lowlands of southern Veracruz and Tabasco, in Mexico—was sufficiently productive to permit a major diversion of human energy into other activities, such as the arts and commerce. Struggles for control of this rich but limited farmland resulted in a dominant landowning class that shaped the first great Mesoamerican civilization, the Olmec (*q.v.*).

San Lorenzo, the oldest known Olmec centre, dates to around 1150 BC, a time when the rest of Mesoamerica was at best on a Neolithic level. The site is most noted for its extraordinary stone monuments, especially the "colossal heads" measuring up to 9 feet (nearly 3 m) in height and possibly representing players in a sacred rubber-ball game.

The period known as the Middle Formative (900–300 BC), during which the La Venta urban complex rose and flourished, was one of increased cultural regionalism. The Zapotec people, for example, attained a high level of development at Monte Albán (*q.v.*), producing the first writing and written calendar in Meso-America. However, at this site, as well as in the Valley of Mexico, the Olmec presence can be widely detected.

In the subsequent Late Formative and Classic periods, lasting until about AD 700–900, the well-known Maya, Zapotec, Totonac, and Teotihuacán civilizations developed distinctive variations on their shared Olmec heritage. The Maya (*q.v.*), for example, brought astronomy, mathematics, calendar making, and hieroglyphic writing, as well as monumental architecture, to their highest expression in the New World. At the same time, Teotihuacán, in the Valley of Mexico, became the capital of a political and commercial empire encompassing much of Mesoamerica.

Teotihuacán power diminished after about 600, and for the next several centuries numerous states vied for supremacy. The Toltecs of Tula (*see* Toltec), in central Mexico, prevailed from about 900 to 1200 (the Early Postclassic Period). Following Toltec decline, a further period of unrest in the Late Postclassic Period lasted until 1428, when the Aztec (*q.v.*) defeated the rival city of Azcapotzalco and became the dominant force in central Mexico. This last native Mesoamerican empire fell to the Spaniards, led by Hernán Cortés (or Cortéz), in 1521.

mesoderm, the middle of the three germ layers, or masses of cells (lying between the ectoderm and endoderm), which appears early in the development of an animal embryo. In vertebrates it subsequently gives rise to muscle, connective tissue, cartilage, bone, notochord, blood, bone marrow, lymphoid tissue, and to the epithelia (surface, or lining, tissues) of blood vessels, lymphatic vessels, body cavities, kidneys, ureters, gonads (sex organs), genital ducts, adrenal cortex, and certain other tissues. *See also* ectoderm; endoderm.

mesofauna, also called MEIOFAUNA, in soil science, intermediate-sized animals (those greater than 40 microns in length, which is about three times the thickness of a human hair). Nematodes, mites, springtails, proturans, and pauropods are typical members of the mesofauna. These animals may feed upon microorganisms, other soil animals, decaying plant or animal material, living plants, or fungi. Most mesofauna feed on decaying plant material; by removing roots they open drainage and aeration channels in the soil. The channels contain mesofaunal fecal material that can be broken down by smaller organisms.

Mesohippus, genus of extinct early and middle Oligocene horses (the Oligocene Epoch occurred from 36.6 to 23.7 million years ago) commonly found as fossils in the rocks of the Badlands region of South Dakota, U.S. *Mesohippus* was the first of the three-toed horses and, although only the size of a modern collie dog, was very horselike in appearance. *Mesohippus* was still a browsing form; its teeth were unsuited to the grazing adopted by later, more advanced horses. *Mesohippus* gave rise to the next stage in horse evolution, the genus *Miohippus*, a larger form that was common in the Late Oligocene (30 to 23.7 million years ago).

mesolite, mineral of the zeolite family, similar to natrolite (*q.v.*).

Mesolithic Period, also called MIDDLE STONE AGE, ancient cultural stage, or level of human development, that existed between the Paleolithic Period (*q.v.*), with its chipped stone tools, and the Neolithic Period (*q.v.*), with its polished stone tools. Mesolithic tool kits are based on chipped stone and often include microliths, very small stone tools intended for mounting together on a shaft. Polished stone occurs in some Mesolithic assemblages, as do a variety of bone, antler, and wooden tools.

Mesolithic usually refers specifically to a development in northwestern Europe that began about 8000 BC, after the end of the Pleistocene Epoch, and lasted until about 2700 BC. Although culturally and technologically continuous with Paleolithic peoples, Mesolithic cultures developed diverse local adaptations to special environments. The Mesolithic hunter achieved a greater efficiency than did the Paleolithic and was able to exploit a wider range of animal and vegetable food sources.

Immigrant Neolithic farmers probably absorbed many indigenous Mesolithic hunters and fishers, and some Neolithic communities seem to have been composed entirely of Mesolithic peoples who adopted Neolithic equipment (these are sometimes called Secondary Neolithic).

There is no direct counterpart to the Mesolithic Period outside northwestern Europe, and the term is no longer used to reflect a hypothetical worldwide sequence of human cultural evolution. *See also* stone-tool industry.

Mesolóngion, also called MISSOLONGHI, town and capital of the *nomós* (department) of Aetolia and Acarnania, Greece. It lies along the Patraïkós Gulf on the shore of a large, shallow lagoon, which is partly given over to fish hatcheries. Seat of a metropolitan bishop of the Greek Orthodox church, the town is notable for two heroic actions in the War of Greek Independence (1821–29) and for its association with the English poet Lord Byron, who died there of fever in 1824. Byron is commemorated by a statue and a monument in the Heroon (war memorial). A long causeway extends southward across the lagoon to deep water at Tourlídha, a port of call. Pop. (1981) 10,164.

mesomorph, a human physical type (somatotype) that is marked by greater than average muscular development, as determined by the physique classification system developed by American psychologist W.H. Sheldon. Although the Sheldon system of classification does not make absolute distinctions between types, a person is classed as a mesomorph if mesomorphy predominates over endomorphy and ectomorphy in his body build. The extreme mesomorph has a square, massive head; broad, muscular chest and shoulders; a large heart; heavily muscled arms and legs; and minimal body fat. He tends to develop muscle easily. His muscular development can usually be distinguished from that of one who has developed his muscles through body-building exercises. *Compare* ectomorph; endomorph.

meson, any member of a family of subatomic particles composed of an even number of quarks and antiquarks. Mesons are sensitive to the strong force (the force that binds the components of the nucleus) because their constituent quarks are strongly interacting. Mesons consist of an even number of quarks with half-integral spin, and so they have integral spin. They vary widely in mass, ranging from 140 MeV to nearly 10 GeV. Various types of mesons have been discovered since their existence was first predicted in 1935 by the Japanese physicist Yukawa Hideki. Of those so far identified, the pi meson and the K meson are the most important. Pi mesons, also known as pions, are chiefly responsible for the strong interactions between the protons and neutrons in atomic nuclei. K mesons, or kaons, have several competing decay modes. Investigations of these processes have led to a better understanding of parity (the property of an elementary particle or physical system that indicates whether or not its mirror image occurs in nature) and its nonconservation.

Mesons serve as a useful tool for studying the properties and interactions of quarks, the fundamental units of matter that constitute all hadrons (any of the subatomic particles that react by the force of strong interaction). Although mesons are unstable, many last long enough (a few billionths of a second) to be observed with particle detectors, making it possible for researchers to reconstruct the motions of quarks. Any model attempting to explain quarks must correctly elucidate the behaviour of mesons. One of the early successes of the Eightfold Way, a forerunner of modern quark models devised by the physicists Murray Gell-Mann and Yuval Ne'eman, was the prediction and subsequent discovery of the eta meson (1962). Some years later the decay rate of the pi meson into two photons was used to support the hypothesis that quarks can take on one of three "colours" (*i.e.,* values of a quantum number). Surprises in meson behaviour are also important, as attested by the study of CP violation (the violation of the combined conservation laws associated with charge [C] and parity [P]) in the K-meson system.

Mesons also provide a means of identifying new quarks. The J/psi particle, discovered in 1974, proved to be a meson made up of a charmed quark and its antiquark. (Up to this time, three quark types had been postulated—namely up, down, and strange.) It was the first manifestation of charm, a new quantum number the existence of which implies that quarks are related in pairs. The subsequent discovery of another heavy meson, called upsilon, revealed the existence of the bottom quark and its accompanying antiquark and gave rise to speculation about the existence of a companion particle, the top quark. Efforts to find this sixth quark type have been unsuccessful. Conclusive proof of its existence would provide investigators with direct evidence in support of the underlying postulates of the prevailing quark model. *See also* quark.

mesonephros, permanent kidney of amphibians and most fish, developing posterior to and replacing the pronephros of the embryonic and larval stages. It is a paired organ consisting of a set of nephrons having capsules that filter blood from the glomerulus and tubules whose cells reabsorb water and nutrients and secrete nitrogenous wastes. Glomeruli are absent in some marine fish; urine then forms solely in the tubules, a process that conserves water. The tubules empty into a long tube, the Wolffian duct, a remnant of the pronephros. In more advanced vertebrates the mesonephros develops in the embryo but is replaced after the 10th week in humans by the metanephros.

Mesopotamia (Greek: "Land Between the Rivers"), region between the Tigris and Euphrates in western Asia. In a specific sense, Mesopotamia is the northern portion of that region from Baghdad, where the rivers come closest to one another, north to the foot of the Anti-Taurus Mountains; more generally, it is the northern portion and the southern portion down to the Persian Gulf including adjacent areas eastward to the Zagros Mountains and westward to the Arabian Plateau. Mesopotamia in general terms constitutes the greater part of what is now Iraq. It was one of the cradles of human civilization.

A brief treatment of Mesopotamia follows. For full treatment, *see* MACROPAEDIA: Mesopotamia, History of Ancient.

Archaeological excavations in Mesopotamia, conducted since about 1840, have revealed evidence of settlement back to about 10,000 BC. Favourable geographic circumstances allowed the peoples of Mesopotamia to pass from a hunter-gatherer culture to a culture based on husbandry, agriculture, and permanent settlements. Trade with other regions also flourished, as indicated by the presence in early burial sites of metals and precious stones not locally available. Irrigation techniques, pottery and other crafts, and building methods based on clay bricks were developed to a high level, and elaborate religious cults evolved. Two epochal developments occurred in relatively rapid succession during the 4th millennium BC: the birth of the city and, about 3000 BC, the invention of writing. Both took place in southern Mesopotamia in a region occupied by the Sumerians.

Excavations of Sumerian cities—Eridu, Kish, Uruk, Isin, Lagash, Ur, and others—have recovered thousands of clay tablets inscribed with the characteristic cuneiform writing of the region. The earliest tablets are inventories of goods and simple records of transactions. Later tablets are dictionaries, grammars, religious and scientific works, king lists, and literature. Many tablets record the triumphs of kings. One of those kings, Sargon of the city of Akkad, fought wars of conquest from the Mediterranean to the Zagros and ruled over history's first empire. The Akkadians were a Semitic people, and with their rise the Akkadian language became a major literary medium.

Akkadian rule lasted apparently little more than two centuries. Subsequently the chief power in Mesopotamia resided in the third dynasty of Ur (*c.* 2112–2004 BC), the more or less parallel dynasties of Isin and Larsa (to *c.* 1763 BC), and then in Babylon, which gave its name to the southern portion of Mesopotamia. The outstanding ruler of Babylon was Hammurabi (*c.* 1792–*c.* 1750 BC), who is best known for the code of laws he had inscribed on a great stela. In other areas as well the Old Babylonian Period was one of intellectual accomplishment.

From about 1600 to 1450 BC Babylonian culture declined as peoples known as the Hurrians and the Kassites migrated into Mesopotamia and established themselves as rulers. Some time after 1500 BC, the Mitanni kingdom extended its rule over much of northern Mesopotamia. The language of the kingdom was Hurrian, but its rulers may have been of Aryan origin. Toward the end of the 15th century BC, the city of Ashur in northern Mesopotamia, a region that came to be known as Assyria, began its rise. By 1350 BC the Assyrian empire was well-established, and successive kings, including Adad-nirari I (*c.* 1295–*c.* 1264), Shalmaneser I (*c.* 1263–*c.* 1234), and Tukulti-Ninurta I (*c.* 1238–*c.* 1197), conquered large areas from the Mitanni kingdom, the Kassites, and the Hittites. They achieved an uncertain dominance over much of Babylonia. Nonetheless, another Babylonian dynasty, known as the 2nd dynasty of Isin, revived the greatness of the Old Empire under Nebuchadrezzar I (*c.* 1119–*c.* 1098) and others. Assyria reached new heights of power under Tiglath-pileser I (*c.* 1115–*c.* 1077) and Ashurnasirpal II (883–859), the latter of whom also fostered great works of architecture in his capital, Kalakh.

An Assyrian usurper who took the name Tiglath-pileser III (746–727 BC) laid the foundation for the vast Neo-Assyrian empire by subduing the Aramaeans who had settled much of Babylonia and then conquering Urartu, Syria, Israel, and other areas. In 729 he took the crown of Babylon for himself. The empire reached its zenith under Esarhaddon, who conquered Egypt in 671, and Ashurbanipal (668–627), but its decline was remarkably rapid after that; under attack by Medes, Scythians, and Babylonians, the Assyrian empire was crushed in 609.

Babylon enjoyed one last period of glory under a dynasty of Chaldeans founded by Nabopolassar (626–605 BC). His son Nebuchadrezzar II (605–561) is best known for his destruction of Jerusalem in 588 or 587 and his forcing of thousands of Jews into the "Babylonian exile." The Neo-Babylonian empire ended in 539, when Nabonidus surrendered to Cyrus II of Persia.

Under the Persians and Alexander the Great, Babylon was a rich provincial capital whose cultural influence extended far beyond Mesopotamia. The Seleucid kings, who ruled Mesopotamia from about 312 BC until the middle of the 2nd century BC, patronized Mesopotamia's temples, and the cuneiform tradition continued. The interaction of Babylonian and Greek cultures in this period after Alexander was particularly fruitful in the field of astronomy, long a Babylonian specialty. In the 2nd century BC Mesopotamia became part of the Parthian empire. It became a buffer region between the Parthians and their successors the Sāsānians on one hand and the Roman Empire on the other. In the 7th century AD the region was conquered by Muslim Arabs. From that time forward the history of Mesopotamia is that of Iraq.

Mesopotamia, narrow, northeast-to-southwest-oriented geographic region of northeastern Argentina, comprising Misiones, Corrientes, and Entre Ríos *provincias,* bounded on the west by the Gran Chaco of Argentina, on the north by Paraguay, on the northeast by Brazil, and on the southeast by Uruguay. Its name, meaning "between the rivers" in Greek, is derived from its being between the Paraná River (on the southwest to north) and the Uruguay River (on the southeast to northeast). In the northeast (or Misiones *provincia*) Mesopotamia consists of a southeastward extension of the Paraná Plateau of Brazil covered with subtropical evergreen rain forest. Its several rivers plunge over the edges of the basalt plateau to create spectacular falls, such as Iguazú. Corrientes and Entre Ríos *provincias* differ from Misiones in several respects. Their land surface, like that of Uruguay to the east, consists of rolling, grass-covered hillocks rising from densely wooded and marshy lowlands. The region was originally colonized by Spanish settlers returning from Asunción, Paraguay, to refound Buenos Aires in the late 16th century; and in the 19th century many agriculturists of German, Italian, and Swiss descent settled in the region.

Southern Mesopotamia is one of Argentina's leading producers of wool and flax, and cattle are raised. The production of rice and oranges centres on the city of Corrientes. Rapids, sandbars, and shifting channels in the Paraná and the Uruguay rivers hinder their use as transportation arteries, necessitating transshipment of cargo to shallow-draft vessels. The highway network is fairly extensive, but roads are generally of poor quality. A rail line linking Buenos Aires and Asunción traverses eastern Mesopotamia. The hydroelectric potential of the rivers bordering Mesopotamia was finally being realized in the early 1980s with the completion of the Salto Grande complex on the lower Uruguay and the construction of the giant Apipê-Yaciretá complex on the upper Paraná. Pop. (1983 est.) 2,284,000.

Mesopotamian mythology, the myths, epics, hymns, lamentations, penitential psalms, incantations, wisdom literature, and handbooks dealing with rituals and omens of ancient Mesopotamia.

A brief treatment of Mesopotamian mythology follows. For full treatment, *see* MACROPAEDIA: Middle Eastern Religions, Ancient.

The literature that has survived from Mesopotamia was written primarily on stone or clay tablets. The production and preservation of written documents were the responsibility of scribes who were associated with the temples and the palace. A sharp distinction cannot be made between religious and secular writings. The function of the temple as a food redistribution centre meant that even seemingly secular shipping receipts had a religious aspect. In a similar manner, laws were perceived as given by the gods. Accounts of the victories of the kings often were associated with the favour of the gods and written in praise of the gods. The gods were also involved in the establishment and enforcement of treaties between political powers of the day.

A large group of texts related to the interpretation of omens has survived. Because it was felt that the will of the gods could be known through the signs that the gods revealed, care was taken to collect ominous signs and the events which they preached. If the signs were carefully observed, negative future events could be prevented by the performance of appropriate apotropaic rituals. Among the more prominent of the omen texts are the *shumma izbu* texts ("If a fetus . . . ") which observe the birth of malformed young of both animals and humans. Later a similar series of texts observed the physical characteristics of any person. Dream omens are represented but are relatively rare. There are also omen observations to guide the physician in the diagnosis and treatment of patients. The largest collection of omens, containing more than 100 tablets, is entitled "If a City is Situated on a Hill . . . "

Several types of prayers have also been preserved. Prayers begin with praise of the deity, then move to the request or complaint of the worshipper, and end with anticipatory praise of the deity for the deliverance which is expected. Other prayers were conjurations to rid the worshipper of various maladies through the intervention of the gods. Some prayers were laments while others praised a given deity.

A few explicitly ritual texts have survived. Significant in the Babylonian new year festival was the reading of the Creation Epic, entitled *Enuma Elish.* These tablets begin with a genealogy of the gods followed by an account of the creation of heaven and earth from the body of Tiamat who had been slain by Marduk. The rise of Marduk to rulership over the gods is the underlying theme of this epic. As part of his organization of the universe, mankind was created from the blood of Kingu, the cohort of Tiamat, and Babylon was established as Marduk's city.

Another famous text is the Gilgamesh Epic. The 12 tablets of this epic begin and end at the walls of Uruk, the city which Gilgamesh founded. The story itself tells of the exploits of Gilgamesh and his friend Enkidu. Prominent among these adventures is the defeat of the monster Humbaba, guardian of the Cedar Mountain. With the death of Enkidu, Gilgamesh turns his efforts toward a quest for immortality which eventually brings him into contact with such figures as Utnapishtim, who, because he had survived the Flood, was granted immortality. Three times Gilgamesh nearly attains his goal only to have it slip away.

Several other stories from Mesopotamia deal with the theme of immortality. In the Myth of Adapa, Adapa was summoned to the gods because he had broken the wings of the South Wind. Due to the warning of his divine father, Ea, he refused to eat or drink the food of the gods offered to him which would have granted him immortality. A different type of immortality was related in the story of Etana, the king of Kish, who was without children. In order to reach the Plant of Birth, he freed an eagle from captivity and rode its back to heaven.

Other Mesopotamian myths include the story of Atrahasis, a wise man who was saved from the Flood after being warned by one of the gods to build a ship to save himself. The myth of Ishtar's Descent and return from the underworld was evidently connected to the cycle of fertility. The story of Nergal and Ereshkigal told how Nergal became the ruler of the underworld. The Epic of Irra explained how Marduk, the god of Babylon, left the city in charge of other deities, which led to the destruction of the city. The epic ends with the return of Marduk and the renewed prosperity of the city. The work "Let Me Praise the Lord of Wisdom" has been compared to the Book of Job and describes the sufferings of a prince abandoned by his god. Praise to the god (Marduk) becomes the focus when the situation is later reversed.

Mesopotamian religion, the religious beliefs and practices of the Sumerians and Akkadians, and later their successors, the Babylonians and Assyrians, who inhabited ancient Mesopotamia.

A brief treatment of Mesopotamian religion follows. For full treatment, *see* MACROPAEDIA: Middle Eastern Religions, Ancient.

The deities of the earlier Sumerians tended to be localized, centring around the subsistence of the community. A primary concern in this and later periods was the fertility of the fields, waters, and flocks. During this period, the external manifestation of the deity took the form of the phenomenon which the deity represented. For example, the deity associated with the rain cloud was pictured as a dark, lion-headed bird hovering in the sky.

The Assyrian and Babylonian gods did not displace those of the Sumerians but were gradually assimilated into the older system. The gods were seen to be active in the history of the area and within the changing relationships of the various city-states in the Tigris–Euphrates Valley. With the development of the extensive empires of Babylon and Assur, the model of the king was used to express the transcendence of the deity. In this later period, the deities were conceived in anthropomorphic terms. The image of the deity, in which the presence of the deity resided, was fed and clothed and waited upon in a manner analogous to that of the king and his court. Just as for the king, the primary responsibilities of the deity were fertility and security.

National religion was organized around the care and feeding of the deity in his temple. In addition to its function as a religious centre, the temple also functioned as a food redistribution centre under royal control. While many of these temples may have been fairly modest, some, such as the temple of Marduk in Babylon named Esagila, achieved worldwide fame. The religion practiced in these temples was not generally public. Only on special days was the image of the deity brought out of the temple and paraded through the streets before the citizens. On a daily basis, worship was carried out by the priests within the temple which was conceived of as the house of the deity. Possibly the most notable of the religious buildings of Mesopotamia is the ziggurat. Unfortunately, its function in the religion of the area is not known.

Surrounding the deity in his temple were a number of officials connected with the cult. The first among these was the king himself, who functioned as the chief priest of the nation's deity. The king's role was particularly important at the new year festival held in the spring of the year in which the kingship was renewed and the triumph of the deity over the powers of chaos was celebrated. In these rituals it appears that the role of the deity was played by the king. Among the rituals was the "sacred marriage" which ensured fertility for the following year. Over 30 types of other cultic personnel are mentioned, including priests, priestesses, and personnel in charge of incantations and divination. An elaborate system of determining the will of the gods through the observation of omens was developed, a major element of which was haruspicy, the reading of the entrails of sacrificial animals.

Although the number of deities represented in the Mesopotamian pantheon numbered in the hundreds, a relatively small number of deities played a prominent role in the texts. Especially important among the older gods were Anu, the god of heaven, who was the oldest of the gods; Enki, later identified with the Akkadian god Ea, who was the god associated with water; and Enlil, the earth god who apparently presided over the divine assembly. As was common in the ancient Middle East, these deities were associated with particular cities: Anu with the city of Uruk, Enki with Eridu, and Enlil with Nippur.

In addition to these old, well-established deities, the pantheon also contained newer deities. As the political fortunes of a city increased, so did the stature of the associated deity. Marduk, the deity of Babylon, appears to have received many of the characteristics of an older god as the city of Babylon became predominant in the political affairs of Mesopotamia. A similar pattern can be observed for Ashur as Assyria gained political domination. It may be noted that while Mesopotamian religion remained polytheistic throughout, there were tendencies toward henotheism in which a deity such as Marduk was ascribed all the characteristics associated with the lesser gods.

A number of lesser deities were active in the Mesopotamian pantheon. Most prominent among the astral deities were Shamash, the sun deity worshipped in Larsa and Sippar, and Sin, the moon god associated with Ur and Harran. Because of their careful observation of the heavenly bodies, the Mesopotamians were famous in their day as astrologers. Other deities included Adad, the storm god worshipped under a variety of names, especially in Assyria and to the west; Nergal, who was regarded as the ruler of the underworld along with his consort Ereshkigal; and Tammuz (Dumuzi), who was a fertility god. Particular mountains, trees, rivers, and even certain man-made items such as the plow were also considered sacred.

Mesosaurus, extinct genus of early reptiles found as fossils in Late Pennsylvanian and Early Permian deposits (the Pennsylvanian Period ended 280,000,000 years ago and preceded the Permian Period). *Mesosaurus,* an elongated, slim, aquatic animal about one metre (3 feet) long, lived in freshwater lakes and ponds. It had a long and narrow skull and tail, which probably was employed for propelling the animal through the water. The many long, pointed teeth present may have strained small crustaceans from water drawn into its mouth;

they were too fragile to be effective for biting. The limbs and feet were primitive in form, but it is thought that webbing was present between the toes to aid in swimming. It is probable that the mesosaurs seldom, if ever, ventured onto land. Fossil mesosaurs occur only in South African and South American freshwater deposits. Because it is unlikely that the mesosaurs could have traversed broad stretches of open ocean, their geographic distribution corroborates other evidence that the continents of the Southern Hemisphere formerly were joined together. It is thought that the mesosaurs represent an early side branch of reptilian development.

Mesosaurus braziliensis

By courtesy of the American Museum of Natural History, New York

mesoscaphe, diving vessel built by the Swiss scientist Jacques Piccard that suspended itself automatically at predetermined depths. The first mesoscaphe was built for the 1964 Swiss National Exhibition in Lausanne and designed as a tourist submarine for 40 passengers. Although it could descend to more than 600 m (2,000 feet), most of the mesoscaphe's 1,100 descents into Lake Geneva during 1964 and 1965 reached only about 90 m (300 feet). A second and smaller mesoscaphe, equipped to remain submerged a month or more, was submerged in Florida and drifted underwater to Nova Scotia in a successful study of the Gulf Stream in the late 1960s.

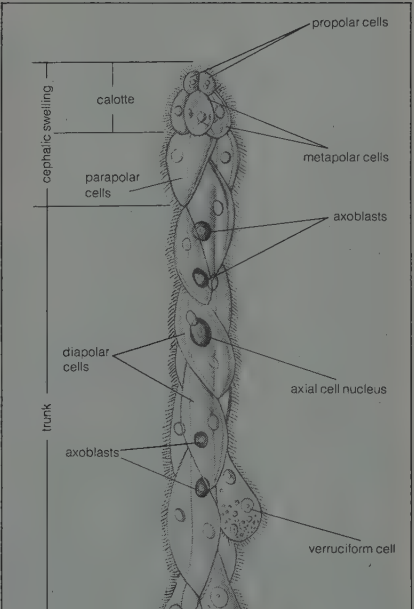
mesosphere, region of the upper atmosphere between about 50 and 80 km (30 and 50 miles) above the surface of the Earth. The base of the mesosphere is defined as the temperature maximum existing at the top of the stratosphere, with the boundary between the two regions usually called the stratopause but occasionally the mesopeak. The mesosphere extends upward to the next temperature minimum, which defines the base of the thermosphere; the boundary between the two regions is called the mesopause.

The amount of oxygen, nitrogen, and carbon dioxide in the mesosphere is essentially the same as that in the levels of the Earth's atmosphere immediately above the Earth's surface. The principal differences are that there is apparently very little water vapour in the mesosphere, and the mesosphere contains higher percentages of ozone than the lower levels.

mesozoan (phylum Mesozoa), any of approximately 50 species of small, ciliated, multicellular animals that are parasitic in marine invertebrates. These wormlike organisms lack digestive, respiratory, nervous, and excretory systems; their bodies consist of two layers of as few as 20 to 30 cells each. Both sexual and asexual reproduction occur. Their relationship to other phyla is obscure as it is not known whether their simple structure is primitive or, as a result of their parasitic existence, degenerate (*i.e.*, changed gradually into a lower form). Some authorities, however, have suggested a link with the phylum Platyhelminthes, a group of flatworms.

There are two distinct mesozoan classes, the Dicyemida and the Orthonectida, which are very different in morphology and life history. Dicyemids, such as the genus *Pseudicyema*, are parasitic in the kidneys of squids and octopuses. Orthonectids, such as *Rhopalura*, occur in a variety of marine invertebrates, *e.g.*, brittle stars, bivalve mollusks, and polychaete annelids. Recently some scientists have suggested that the two classes are not closely related and constitute two separate phyla.

In both the dicyemids and the orthonectids, the number and arrangement of cells is relatively constant for any given species. This definitive cell number is attained during embryonic development. Growth, therefore, consists of the enlargement and differentiation of existing cells. In both groups, chromatin (the material that comprises chromosomes) elimination occurs during early cleavage divisions from the cell line that will give rise to somatic cells.



Young dicyemid

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Both groups are very widely distributed wherever appropriate hosts occur in shallow-bottom environments of the sea. They are not found in hosts in open-sea environments, nor have they been found in hosts from tropical coral islands. In many regions, dicyemids infect entire populations of bottom-dwelling cephalopods, such as squids and octopuses. On the other hand, orthonectids infect only a small percentage of their hosts in a given region. In orthonectids, agametes (asexual reproductive cells), formed during the plasmodial stage, give rise to sexual adults that leave the host for a brief free-swimming period, during which the females are impregnated. The fertilized eggs develop into ciliated larvae that infect new hosts, giving rise to new plasmodia. While in the host, the plasmodia pass through a period of asexual reproduction, forming agametes before adults appear once more.

Dicyemids have a more complex life cycle. Two reproductive phases occur in the cephalopod host. During a phase called the nematogen phase, agametes give rise to wormlike larvae similar to their parents. These nematogens remain in the same host, thus increasing the parasite population. In the next phase, known as the rhombogen phase, a few axoblasts give rise to minute organisms known as infusorigens; these are reduced hermaphroditic individuals that remain in the axial cell of the rhombogen and form sperm and egg cells. The zygotes develop into ciliated infusoriforms, or swarm larvae, which escape from the parent rhombogen and from the cephalopod.

Mesozoic Era, the second of the Earth's three major geologic eras of Phanerozoic time and the interval during which the continental landmasses as known today were separated from the supercontinents Laurasia and Gondwana by continental drift.

A brief treatment of the Mesozoic Era follows. For full treatment, *see* MACROPAEDIA: Geochronology.

The Mesozoic Era saw the evolution of widely diversified and advanced flora and fauna, quite different from those that had developed earlier during the Paleozoic Era and would develop later during the Cenozoic Era. It lasted from about 245 to 66.4 million years ago and included the Triassic Period, the Jurassic Period, and the Cretaceous Period (*qq.v.*).

By mid-Mesozoic time, Laurasia, which included most of North America and Eurasia, was completely separated from Gondwana in the Southern Hemisphere by the Tethys Sea. Mesozoic rocks became widespread on every continent, and marine deposits were laid down by marine transgressions, which resulted in shallow epicontinental seas during periods of high sea level. Marine deposits were also laid down in geosynclines (large linear troughs) along the coasts of eastern North America and the Gulf of Mexico, on the margins of Eurasia and Gondwana, and around the rim of the present-day Pacific Ocean basin.

Reptiles were the dominant terrestrial form of life during the Mesozoic Era. In the Triassic Period there were the labyrinthodonts, large, clumsy amphibians living mostly in water, but they died out suddenly, leaving the toads and frogs, which eventually flourished. The cotylosaurs, or "stem reptiles," which had originated in the Late Carboniferous Epoch (320 to 286 million years ago), differentiated into the major reptile lines, leading to turtles, the major marine groups, the mammallike therapsid forms, and the thecodonts.

It was from the thecodonts that the best-known reptiles of the Mesozoic Era evolved—namely, the dinosaurs. During the Jurassic Period, the dinosaurs developed into huge and impressive forms. These included the herbivorous *Apatosaurus* and *Diplodocus,* the armoured *Stegosaurus,* and the carnivorous, bipedal *Allosaurus.* Cretaceous dinosaurs were even more abundant and diversified than those of the Jurassic. They included large herbivores like *Iguanodon,* the armoured *Ankylosaurus,* and the horned *Triceratops,* together with the duckbill hadrosaurs and small, lightly built, bipedal forms such as *Ornithomimus.* The best-known carnivore of the Cretaceous was the formidable *Tyrannosaurus.* The dinosaurs flourished throughout the Cretaceous Period until, in one of the great mysteries of paleontology, they suddenly became extinct at the end of the period.

The pterosaur, a creature with batlike wings, was the forerunner of the true fliers, the birds, and was one of the most unusually adapted reptile forms. Aerodynamically inefficient with their large, spreading, membranous wings, pterosaurs were little more than gliders that launched themselves from high places.

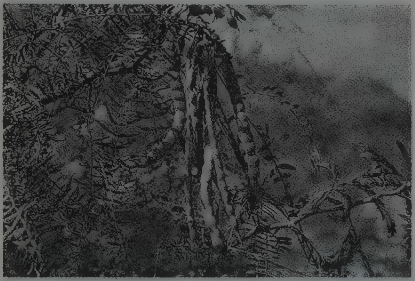
That birds did, in fact, evolve from reptile forms is evidenced by one of the most spectacular fossils ever found, that of the *Archaeopteryx,* the earliest known bird, which clearly possesses not only reptilian features but also, in extraordinary definition, the feathers that birds developed from reptilian scales.

The aquatic reptiles of the Mesozoic Era were widely diversified and thoroughly adapted to their marine environment. Among the most notable large-sized forms were the nothosaurs, placodonts, ichthyosaurs, plesiosaurs, and mosasaurs. Some forerunners of modern fish evolved during the Mesozoic. The most primitive form of the bony fishes was the Chondrosteiformes, which became extinct. They are represented in modern times by the sturgeon. The holost fishes replaced the chondrosts, but they, too, declined in numbers, and only a few modern forms, such as the Mississippi garpike, survive them. The teleosts, or bony fishes, were the most successful marine vertebrates; they became dominant in the Late Cretaceous Epoch and are well represented today. Probably the best-known survivors are the modern shark varieties that emerged during the Mesozoic. Some of the forms are little changed from their Jurassic and Cretaceous ancestors.

Among marine invertebrates the most important were the ammonoids, Mesozoic relatives of the pearly nautilus, which flourished in great diversity. Their straight or coiled, many-chambered forms are a valuable index to Mesozoic rocks, since they often serve to identify widely separated but contemporaneous stratigraphic forms. The ammonoids were almost as much a Mesozoic phenomenon as the dinosaurs, and they, too, died out suddenly at the end of the Cretaceous Period.

Mesquite, city, Dallas county, northeastern Texas, U.S., adjacent to the city of Dallas (west). It was established in 1873 when the Texas and Pacific Railway acquired land for the townsite (named for the mesquite shrubs that once covered the area), built a depot, and offered lots for sale. The city developed as a residential and industrial centre with many of its residents employed in Dallas, and it experienced rapid expansion after 1950. Tourist attractions include a (seasonal) weekend rodeo and an annual balloon festival. Mesquite is the seat of Eastfield College (1970). Pop. (1994 est.) 113,631.

mesquite, any of the spiny, deep-rooted shrubs or small trees constituting the genus *Prosopis* of the pea family (Fabaceae). They form extensive thickets in areas from South America into the southwestern United States. Two races occur, one low—called running mesquite—and the other often growing into trees 15 m (50 feet) tall. The plants' roots penetrate depths of as much as 20 m (70 feet) in search of water. Their trunks may be 45 cm (18 inches) in diameter but more commonly are smaller or shrublike. In warmer parts of the United States the mesquite is considered a pest and is eradicated.



Mesquite (*Prosopis*)
Leonard Lee Rue III

The compound leaves consist of many narrow olive-green to white hairy leaflets. The flowers occur in dense, cream-coloured catkins about 8 cm (3 inches) long and are followed by clusters of long, narrow, pale yellow beans 15–20 cm long. The beans, which contain a sweet pulp, are eaten by cattle. The wood of the mesquite, formerly used in railroad ties, is without economic value other than for unusual furniture and trinkets and for aromatic firewood.

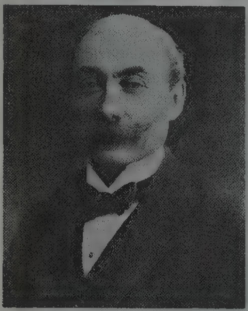
Mesrop Mashtots, SAINT, Mesrop also spelled MESROB, (b. *c.* 360, Hatsik, Armenia [modern Muş, Tur.]—d. Feb. 17, 440; Western feast day, Thursday following 4th Sunday after Pentecost, and Monday following 3rd Sunday after the Assumption; Armenian feast day, February 19), monk, theologian, and linguist who, according to tradition, invented the Armenian script and helped establish Armenia's golden age of Christian literature.

After studying classical languages with the patriarch Nerses I, Mesrop Mashtots began a monastic existence about 395. He was ordained a priest, maintained a lifelong esteem for the ascetic life, and founded several monasteries. He spread the Gospel in remote areas of Armenia and suppressed Mazdaism, a religion descended from Zoroastrianism. Later, he served as chancellor to King Vramshapuh, who supported him in systematizing or inventing the definitive 36-character Armenian alphabet, following a Greek model. (Two letters were added later.) This alphabet was initially used to translate from the Greek the first popular Armenian Bible, the "Mesropian" Bible (*c.* 410). Mesrop Mashtots himself was responsible for translating the New Testament and the Old Testament book of Proverbs. He subsequently revised the entire text.

Mesrop Mashtots dispatched his circle of scholars to Constantinople (modern Istanbul), Alexandria, and Rome in search of biblical and literary manuscripts. A collection of biblical commentaries, translations of patristic works, and liturgical prayers and hymns constructed on an eight-tone scale is credited to him, corroborating his reputation for having laid the foundation of a national Armenian liturgy.

Messager, André, in full ANDRÉ-CHARLES-PROSPER MESSAGER (b. Dec. 30, 1853, Montluçon, France—d. Feb. 24, 1929, Paris), French conductor and composer whose operettas achieved popularity in France and England.

Messager established his reputation with his operetta *La Béarnaise* (performed Paris, 1885; London, 1886). Between 1890 and 1926 he produced 14 operettas, including *Madame Chrysanthème* (1893; on a plot similar to Puccini's *Madama Butterfly*), *Mirette* (1894), and *Monsieur Beaucaire* (1919). Of his three ballets *Les Deux Pigeons* (1886) was especially well known. He wrote in a light, elegant style that was characteristically Parisian. He became director of the Opéra-Comique in Paris in 1898, then artistic director of the Royal Opera, Covent Garden (1901–06), and later associate director of the Paris Opéra. He conducted the first performance (1902) of Claude Debussy's *Pelléas et Mélisande*. His wife was the Irish composer Hope Temple (Dotie Davies; 1859–1938).



André Messager
J.P. Ziolo

Messager, Charles: *see* Vildrac, Charles.

Messali Hadj, Ahmed (b. 1898, Tlemcen, Alg.—d. June 3, 1974, Paris, France), revolutionary Algerian nationalist leader.

Messali emerged in 1927 as the head of an Algerian workers' association in Paris and spent most of the rest of his life forming pro-independence organizations, agitating both in France and Algeria, suffering imprisonment, and taking part in underground activities. Messali's first group, the Étoile Nord-Africaine (North African Star), was dissolved by the French in 1929 after he called for revolt against their colonial rule. In the mid-1930s he founded the Parti Populaire Algérien (PPA; Algerian Popular Party), which was suppressed only to reemerge in 1946 as the Mouvement pour le Triomphe des Libertés Démocratiques (MTLD; Movement for the Triumph of Democratic Liberties). His influence, however, declined dramatically in the postwar period. In 1954 he formed the Mouvement National Algérian (Algerian National Movement), but this organization was unable to compete with the Front de Liberation Nationale (National Liberation Front), a rival party, which came to lead the Algerian struggle for independence. He became politically isolated and spent his final years in Paris.

Messalina Valeria, Messalina also spelled MESSALLINA (b. *c.* AD 22—d. 48), third wife of the Roman emperor Claudius, notorious for licentious behaviour and instigating murderous court intrigues. Born into a patrician family, she was married to Claudius before he became emperor. They had two children, Octavia (later Nero's wife) and Britannicus. Early sources maintain that Messalina allied herself

Messalina, marble bust; in the Uffizi, Florence
Alinari—Art Resource

with Claudius' freedmen secretaries to dominate the Emperor and to gratify her avarice and lust. In 42, Messalina caused Claudius to condemn to death a senator, Appius Silanus, who had slighted her advances. This heightened tension between Emperor and Senate and prepared the way for a reign of terror in which many senators were executed after they had been denounced by Messalina. When she caused the death of Claudius' freedman secretary, Polybius, however, the other freedmen turned against her. The correspondence secretary, Narcissus, managed to have her put to death by convincing Claudius that she and her lover, Gaius Silius, had secretly married and were plotting to seize power.

Messalla Corvinus, Marcus Valerius (b. *c.* 64 BC—d. AD 13), Roman aristocrat and patron of literature.

Messalla was proscribed by the Second Triumvirate in 43, but he escaped to the camp of Brutus and Cassius, and after their defeat at Philippi (42) went over to Mark Antony. Later he joined Octavian and campaigned for him against Sextus Pompeius (36), the Illyrians (35–34), and the Alpine Salassi (34–33). Elected consul with Octavian, in place of Antony, for 31, he fought against Antony in the Battle of Actium (31). Messalla conquered Aquitania (in modern southwestern France) as proconsul and later held eastern commands. Becoming *curator aquarum* (superintendent of aqueducts) in 11, he restored the Via Latina between Tusculum and Alba and reconstructed several buildings.

As a literary patron Messalla included the poets Albius Tibullus and Sulpicia in his literary circle and was also a patron of Ovid. Messalla's own works are lost. His memoirs of the civil wars after the death of Caesar were used by Suetonius and Plutarch. He also wrote pastoral poems in Greek, translations of Greek speeches, occasional satirical and love poems, and essays on grammar. As an orator he followed Cicero instead of the Atticizing school, but his style was affected. Late in life he (or possibly his relative Messalla Rufus) wrote a work on the great Roman families.

Messana (Sicily): *see* Messina.

Messapic alphabet, also called MESSAPIAN ALPHABET, one of two Italian offshoots of the Tarentine–Ionic variety of the Greek alphabet. It was adopted *c.* 500 BC by the Messapii, who inhabited southeastern Italy in pre-Roman times.

Messapic language, also spelled MESSAPIAN, Indo-European language spoken by tribes (Messapii and Iapyges) living in the southeastern part of Italy in pre-Roman and early Roman times. Messapic inscriptions date from the 6th to the 1st century BC. The language is believed to be related to the extinct Illyrian languages that were spoken on the east side of the Adriatic.

Messapii, English MESSAPIANS, ancient pre-Roman people of the southeastern part of the Italian peninsula (Calabria and Apulia) who, with the closely related Iapyges, probably penetrated Italy from the other side of the Adriatic Sea *c.* 1000 BC. They spoke an Indo-European language, Messapic.

Messau (Nigeria): *see* Misau.

Messene, Modern Greek MESSÍNI, ancient city, southwestern Peloponnese, Greece, not to be confused with the modern township of the same name further south. It was probably founded in 369 BC after the defeat of Sparta by Athens and the Boeotian League in the Battle of Leuctra (371) for the decendants of exiled Messenians as a fortified city-state independent of Sparta. The site dominates the Messenian plain; with Megalopolis, Mantineia, and Argos, it formed a strategic barrier, conceived by the Theban Epaminondas, to contain Spartan ambition. The summit of Mt. Ithómi, 2,618 ft (798 m) in altitude, served as the acropolis, but apparently it had been fortified earlier as well.

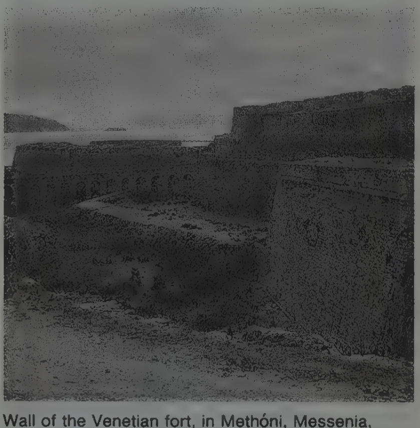
The earliest excavated part of the ancient agora, Messene, Greece
Starfoto—ZEFA

The classical city withstood several Macedonian and Spartan sieges. After the Battle of Chaeronea in 338 BC, it was absorbed into the domain of Philip II of Macedonia, and it remained important under the Romans. Pausanias, in the 2nd century BC, visited the city and claimed its fortifications excelled all others of the Greek world. Nothing is known of Messene in the Middle Ages.

Since 1957, the Hellenistic agora, theatre, stadium, and council chamber have been escavated. The foundations of the small Temple of Artemis Laphria sit on the shoulder of the acropolis, which is crowned by a small 16th-century monastery. The best preserved section of the ancient walls is on the northwest. The modern hamlet of Mavrommátion occupies a small part of the ancient site. Pop. (1981) 6,854.

Messenger (foaled 1780), racehorse who, though a Thoroughbred who sired many successful Thoroughbred (flat) racers, was most important as the foundation sire of the Standardbred (harness racehorse) breed. A son of Mambrino and grandson of Matchem, he was foaled in England but was taken to Philadelphia in 1788. His descendants became known for their trotting ability, and his great-grandson Hambletonian is the ancestor of most modern trotters.

Messenia, Modern Greek MESSINÍA, ancient district and modern *nomós* (department) of the southwestern Peloponnese, Greece, bounded on the east by the Taygetus Mountains (Taïyetos Óros), on the north by the Nédha Potamós (river) and the Arcadian mountains, and on the south and west by the Ionian Sea. Kalámai, at the head of the Messiniakós Kólpos (gulf), is the departmental capital. The heart of the province is the plain of Messenia, or Pámisos River Valley, historically one of the most fertile in Greece. It produces oranges, citrons, almonds, figs, grapes, and olives of the highest quality for export. It is bounded on the north by Tetrázion Óros and on the west and southwest by the foothills of the Kiparissías Óri. Off the southwest coast of the Akrítas peninsula lie the three Oinoúsai islands and the islet of Venétiko. The most notable of Messenia's Neolithic and Bronze Age settlements is the magnificent Mycenaean palace of Nestor north of Pylos (Pílos) on the Ionian Sea, discovered in 1939.


Wall of the Venetian fort, in Methóni, Messenia, Greece
Starfoto—ZEFA

According to Homeric legend, the southwestern Peloponnese was governed during Mycenaean times by the family of Neleides, originating in Iolcos, near modern Vólos, in Thessaly. The Dorians invaded Messenia after 1200 BC and intermingled with the inhabitants to form a single people. About 735 the aggressive Spartans invaded, annexing the central plain. Several more conflicts with Sparta occurred. In the 7th century BC the Messenians lost their remaining territory to Sparta, which enslaved those inhabitants who did not flee. Revolts in 490 and 465/464 were staged from the fortress citadel of Ithome, but *c.* 460 the defenders left the Peloponnese.

After the Battle of Leuctra in 371, the heavily fortified city of Messene was established. While the city flourished, the province remained depopulated; eventually it joined the Achaean League, which proved ineffective in protecting Messenia from Spartan onslaughts. In 146 the Messenians were brought under Roman rule as part of the province of Achaea.

In the Middle Ages Messenia shared the fortunes of the rest of the Peloponnese; it was overrun by Slavic hordes and was a battlefield for Byzantines, Franks, Venetians, and Turks, as the ruins of such medieval strongholds as Kalámai, Koróni, Methóni, and Pílos attest. Pop. (1981) 159,818.

Messenia, Gulf of, Modern Greek MESSINIAKÓS KÓLPOS, formerly GULF OF KORÓNI, or GULF OF KALAMÁTA, gulf of the Ionian Sea in the *nomós* (department) of Messenia, southwestern Peloponnese, Greece. It is enclosed by the Likódhimon Óros (mountain) and Ákra (cape) Akrítas on the west and the Mani peninsula on the east.

The non-navigable Pámisos Potamós (river), rising in the Mínthi Óros of Messenia, debouches at the head of the gulf just west of Kalámai, a manufacturing centre and the second port of the Peloponnese. On the east side of the Akrítas is the port of Koróni (ancient Asine), originally settled by Argives after the First Messenian War (*c.* 735–*c.* 715 BC). Reoccupied during the Middle Ages by refugees from the north who gave it the name of their former village, Koróni retains Byzantine, Venetian, and Turkish fortifications. In 1828 the French landed in this gulf during the War of Greek Independence to help clear the Peloponnese of Turks.

Messenian Wars (8th–7th century BC), contests between Sparta and Messenia in ancient Greece. Many modern historians believe that there were two early Messenian wars: the first (*c.* 735–*c.* 715) was the Spartan conquest of Messenia; the second (*c.* 660) was precipitated by a Messenian revolt over which the Spartans were ultimately successful. The complete conquest of Messenia by a land-hungry Sparta seems not to have ended until *c.* 600.

Messerschmitt, Willy (b. June 26, 1898, Frankfurt am Main—d. Sept. 17, 1978, Munich), German aircraft engineer and designer.

Messerschmitt was educated at the Munich Institute of Technology, where he received a degree in engineering in 1923. From 1926 he was employed as chief designer and engineer at the Bayerische Flugzeugwerke in Augsburg. His interest in gliders and sailplanes was carried into his early designs, which included the Bf 109 single-seat monoplane.

Messerschmitt, 1941
By courtesy of Bildarchive Preussischer Kulturbesitz BPK, Berlin

In 1938 the Augsburg company became the Messerschmitt-Aktien-Gesellschaft. The new company produced Messerschmitt's first military aircraft, the Me 109 (based on the Bf 109), which in 1939 set the world speed record at 481 miles (775 km) per hour. During World War II, about 35,000 Me 109s were produced for the German Luftwaffe. Other military designs produced during the war included the Me 110, a two-seater bomber and night fighter; the Me 163, the first operational rocket-propelled aircraft; and the Me 262, Germany's first operational jet-propelled aircraft.

After the war, Messerschmitt was detained by the U.S. occupation forces for two years; during the postwar ban on aircraft production, his firm produced prefabricated housing and sewing machines. In 1952 he served as an adviser to the Spanish government, and in 1958 he resumed aircraft production. In 1968–69 the Messerschmitt-Bölkow-Blohm company was formed with Messerschmitt as honorary chairman. The firm produced satellites, helicopters, missiles, and aircraft.

Messerschmitt 109 (German aircraft): *see* Me 109.

Messiaen, Olivier, in full OLIVIER-EUGÈNE-PROSPER-CHARLES MESSIAEN (b. Dec. 10, 1908, Avignon, France—d. April 27, 1992, Clichy, near Paris), influential French composer, organist, and teacher. As a composer he developed a highly personal style noted for its rhythmic complexity, rich tonal colour, and unique harmonic language.

Messiaen

Messiaen was the son of Pierre Messiaen, who was a scholar of English literature, and of the poet Cécile Sauvage. He grew up in Grenoble and Nantes, began composing at the age of seven, and taught himself to play the piano. At age 11 he entered the Paris Conservatoire, where his teachers included the organist Marcel Dupré and the composer Paul Dukas. During his later years at the Conservatoire he began an extensive private study of both Western and Eastern rhythm, birdsong, and microtonal music (which uses intervals smaller than a semitone). In 1931 he was appointed organist at the Church of the Trinité, Paris.

Messiaen became known as a composer with the performance of his *Offrandes oubliées* ("Forgotten Offertories") in 1931 and his *Nativité du Seigneur* (1938; *The Birth of the Lord*). In 1936, with the composers André Jolivet, Daniel Lesur, and Yves Baudrier, he founded the group La Jeune France ("Young France") to promote new French music. He taught at the Schola Cantorum and the École Normale de Musique from 1936 until the outbreak of World War II in 1939. As a French soldier he was taken prisoner and interned at Görlitz, where he wrote *Quatuor pour la fin du temps* (*Quartet for the End of Time*). Repatriated in 1942, he resumed his post at the Trinité and taught at the Paris Conservatoire. His students included Karlheinz Stockhausen and Pierre Boulez.

Much of Messiaen's music was inspired by Roman Catholic theology, interpreted in a quasi-mystical manner, notably in *Trois Petites Liturgies de la présence divine* (1944; *Three Short Liturgies of the Divine Presence*) for women's chorus and orchestra; *Vingt Regards sur l'Enfant Jésus* (1944; *Twenty Looks upon the Infant Jesus*) for piano; *Visions de l'amen* (1943; *Visions of Amen*) for two pianos; *Apparition de l'église éternelle* (1932; *Apparition of the Eternal Church*) and *Messe de la Pentecôte* (1950; *Mass for Pentecost*) for organ; and *La Transfiguration de Notre Seigneur Jésus-Christ* (1969; *The Transfiguration of Our Lord Jesus Christ*) for orchestra and choir. Among his most important orchestral works is the *Turangalîla-Symphonie* (1948) in 10 movements—containing a prominent solo piano part and using percussion instruments in the manner of the Indonesian gamelan orchestra, along with an Ondes Martenot (an electronic instrument). Also notable is *Chronochromie* (1960) for 18 solo strings, wind, and percussion. *Le Réveil des oiseaux* (1953; *The Awakening of the Birds*), *Oiseaux exotiques* (1956; *Exotic Birds*), and *Catalogue d'oiseaux* (1959; *Catalog of Birds*) incorporate meticulous notations of birdsong.

Messiaen's method of composition is set forth in his treatise *Technique de mon langage musical* (1944; "Technique of My Musical Language").

BIBLIOGRAPHY. Analyses of his style and his works include Carla Huston Bell, *Olivier Messiaen* (1984); Paul Griffiths, *Olivier Messiaen and the Music of Time* (1985); and Robert Sherlaw Johnson, *Messiaen*, new ed. (1989).

messiah (from Hebrew *mashiaḥ*, "anointed"), in Judaism, the expected king of the Davidic line who would deliver Israel from foreign bondage and restore the glories of its golden age. The Greek New Testament's translation of the term, *christos*, became the accepted Christian designation and title of Jesus of Nazareth, indicative of the principal character and function of his ministry. More loosely, the term messiah denotes any redeemer figure; and the adjective messianic is used in a broad sense to refer to beliefs or theories about an eschatological improvement of the state of humanity or the world.

The biblical Old Testament never speaks of an eschatological messiah, and even the "messianic" passages that contain prophecies of a future golden age under an ideal king never use the term messiah. Nevertheless, many modern scholars believe that Israelite messianism grew out of beliefs that were connected with their nation's kingship. When actual reality and the careers of particular historical Israelite kings proved more and more disappointing, the "messianic" kingship ideology was projected on the future.

After the Babylonian Exile, Jews' prophetic vision of a future national restoration and the universal establishment of God's kingdom became firmly associated with their return to Israel under a scion of David's house who would be "the Lord's anointed." In the period of Roman rule and oppression, the Jews' expectation of a personal messiah acquired increasing prominence and became the centre of other eschatological concepts held by various Jewish sects in different combinations and with varying emphases. In some sects, the "son of David" messianism, with its political implications, was overshadowed by apocalyptic notions of a more mystical character. Thus some believed that a heavenly being called the "Son of Man" (the term is derived from the Book of Daniel) would descend to save his people. The messianic ferment of this period, attested by contemporary Jewish-Hellenistic literature, is also vividly reflected in the New Testament. With the adoption of the Greek word Christ by the church of the Gentiles, the Jewish nationalist implications of the term messiah (implications that Jesus had explicitly rejected) vanished altogether, and the "Son of David" and "Son of Man" motifs could merge in a politically neutral and religiously highly original messianic conception that is central to Christianity.

The Roman destruction of Jerusalem's Second Temple and the Jews' subsequent exile, persecution, and suffering, however, only intensified their messianism, which continued to develop theologically and to express itself in messianic movements. Almost every generation had its messianic precursors and pretenders—the best-known case being that of the 17th-century pseudo-messiah Shabbetai Tzevi. Belief in and fervent expectation of the messiah became firmly established tenets of Judaism and are included among Maimonides' 13 Articles of Faith. Modernist movements in Judaism have attempted to maintain the traditional faith in an ultimately redeemed world and a messianic future without insisting on a personal messiah figure.

Islām, too, though it has no room for a saviour-messiah, developed the idea of an eschatological restorer of the faith, usually called the Mahdi (Arabic: "Rightly Guided One"). The doctrine of the Mahdi is an essential part of the Shīʿite creed.

Eschatological figures of a messianic character are known also in religions that are uninfluenced by biblical traditions. Even as unmessianic a religion as Buddhism has produced a belief, among Mahāyāna groups, in the future Buddha Maitreya, who would descend from his heavenly abode and bring the faithful to paradise. In Zoroastrianism, with its thoroughly eschatological orientation, a posthumous son of Zoroaster is expected to effect the final rehabilitation of the world and the resurrection of the dead.

Many modern movements of a millenarian character, particularly among primitive peoples (*e.g.,* the cargo cults of Melanesia), have been called messianic; but as the expectation of a personal saviour sent or "anointed" by a god is not always central to them, other designations (millenarian, prophetic, nativistic, etc.) may be more appropriate.

Messier, Charles (b. June 26, 1730, Badonviller, France—d. April 12, 1817, Paris), French astronomer who was the first to compile a systematic catalog of nebulae and star clusters. In Messier's time a nebula was a term used to denote any blurry celestial light source.

In 1751 Messier became a draftsman and recorder of astronomical observations for the noted French astronomer Joseph-Nicolas Delisle. Messier was the first in France to observe the anticipated return of Halley's Comet in 1758–59, and from that time he became an ardent searcher for new comets. Called the comet ferret by King Louis XV, Messier independently discovered 13 of them and observed many more.

In 1760 he began compiling a list of nebulae so that he could distinguish better between nebulae and comets, which look alike when viewed with a small telescope such as was available to Messier. Many of these nebulae, including some of the most prominent, are still known by his catalog numbers. Messier was elected a foreign member of the Royal Society of London in 1764 and obtained a seat in the Paris Academy of Sciences in 1770.

Messier catalog (M), in astronomy, list of approximately 109 star clusters, nebulae, and galaxies compiled by Charles Messier, who discovered many of them. The catalog is still a valuable guide to amateur astronomers, although it has been superceded by the New General Catalogue (NGC); both NGC numbers and Messier numbers remain in common use. The Messier catalog includes such diverse items as the Crab Nebula (M1), the Pleiades (M45), and the great spiral galaxy in Andromeda (M31). Messier's purpose was to make comet hunting easier by tabulating permanent deep-sky objects that could be mistaken for comets. He published a preliminary list of 45 such objects in 1771 and compiled the bulk of his catalog 10 years later. By 1784 he had listed 103 objects; in 1786 Pierre Mechain added 6 more. The existence of five Messier objects (M40, M47, M48, M91, and M102) is now considered doubtful.

Messina, Greek ZANKLE, Latin MESSANA, capital of Messina *provincia,* extreme northeastern Sicily, Italy. It lies on the lower slopes of the Peloritani Mountains, on the Strait of Messina opposite Reggio di Calabria. It was an ancient Siculan colony, first mentioned about 730 BC, founded by settlers from Chalcis, who called it Zankle ("Sickle"), from the shape of the harbour.

In the early 5th century BC it was occupied by Greek fugitives from Persian-occupied Miletus and Samos. The fugitives were assisted by Anaxilas, tyrant of Rhegium (Reggio di Calabria), who then ruled over Rhegium and Zankle, the name of which he changed to Messene in honour of his native region of Messenia in the Peloponnese. After regaining its independence, the city was destroyed by the Carthaginian Himilco in 396 BC. It was reconquered and rebuilt by the Syracusan tyrant Dionysius and was later involved in the war between the Carthaginians and the Syracusan tyrant Agathocles. It fell in 289 BC to the Mamertini, Campanian mercenaries in the service of Agathocles, who made it the centre for their domination of Sicily. Pressed by Syracuse and the Carthaginians, the Mamertini allied themselves with the Romans in 264 BC, and Roman intervention led to the First Punic War, at the end of which Messene was a free city and an ally of Rome.

When the western Roman Empire fell, Messana was taken successively by the Goths, the Byzantines (AD 535), and the Arabs (842). In the Byzantine attempts to reconquer the city, it suffered severe damage. Liberated in 1061 by the Norman leader Robert Guiscard (later Count Roger I of Sicily), the city prospered under the Normans as a commercial and cultural centre. The Swabian Holy Roman emperor Henry VI died there in 1197. When the Swabian dynasty ended with the death of Manfred in 1266, Messina passed to the Angevins (house of Anjou) of France and later, with the rest of Sicily, to the Aragonese and then to the Spanish Bourbons. It participated in the Risorgimento (movement for Italian political unity) risings in 1821, 1847, and 1848 and was liberated with the rest of the Kingdom of the Two Sicilies in 1860.

Severely damaged by an earthquake in 1783 and almost totally destroyed by an earthquake in 1908, Messina was rebuilt in modern style with wide streets and low, reinforced-concrete buildings. Notable surviving or restored landmarks include the cathedral and the Church of Annunciata dei Catalani, possibly of Byzantine origin, both rebuilt by the Normans in the 12th century. The National Museum houses works of art saved from the earthquake. Among numerous noteworthy modern buildings is the campanile adjacent to the cathedral. Messina has a university founded in 1548, a marine biological institute, and botanical gardens.

The city is an important port, and in 1943 it was the principal point for Axis reinforcement of troops and supplies to counter the Allied invasion of Sicily. It is connected with the Italian mainland by ferry service (including train ferry and hydrofoil boats) across the strait to Reggio di Calabria and Villa San Giovanni; Messina also has rail service to Palermo and Syracuse. The city's principal occupations are trade, citrus fruit industries, the manufacture of chemicals, pharmaceutical products, foodstuffs and preserves, and the operation of the port and dockyards. Its exports include fruit, wine, olive oil, chemical and pharmaceutical products, medicinal articles, and building materials. Pop. (1999 est.) mun., 259,156.

Messina, town, Northern province, South Africa. It lies near the Limpopo River, 10 miles (16 km) south of Zimbabwe. Messina is the northernmost town in South Africa.

Founded in 1904, Messina officially became a town in 1968. It is now the site of a large copper mine and contains smelting works. There is some cultivation along the river valley, and cattle breeding is important. The baobab trees characteristic of the area have been designated a national monument. The population is predominantly black. Pop. (1991) 11,006.

Messina, Strait of, Italian STRETTO DI MESSINA, ancient (Latin) FRETUM SICULUM, channel in the Mediterranean Sea separating Sicily (west) and Italy (east) and linking the Tyrrhenian and Ionian seas. The strait is 20 miles (32 km) long, 2 miles (3 km) wide in the north (between Faro Point and the Rock of Scylla), and 10 miles (16 km) wide in the south (between capes Alì and Pellaro); it is 300 feet (90 m) deep at the northern end.

The strait was greatly feared by sailors in antiquity, mainly because of the rocks and whirlpools known as Scylla and Charybdis (*q.v.*), which were personified as female monsters in Greek mythology. The strait's currents do, in fact, present considerable difficulties. The main current runs from south to north, but a subsidiary current flows in the reverse direction. These usually alternate every six hours, and the water falls 6 to 8 inches (150 to 200 mm) during the main current; especially strong currents tear seaweed from the bottom and sometimes throw up fish with atrophied or abnormal eyes and with organs for the production of phosphorescence. The frequent sighting of a mirage, called Fata Morgana (*see* Morgan le Fay), consisting of an apparent vertical elongation of an object on the shore, helped maintain the legends of the strait.

The major ports along the strait's scenic banks are Messina and Reggio di Calabria. The coastal regions are noted for archaeological remains and resorts, and the strait is rich in fish and plankton.

Messíni (Greece): *see* Messene.

Messinía (Greece): *see* Messenia.

Messner, Reinhold (b. Sept. 17, 1944, Bressanone, Italy), mountain climber who in 1980 made the first solo ascent of Mount Everest (29,035 feet [8,850 m]), the world's highest peak, without the use of contained oxygen for breathing. It was Messner's second ascent of Everest; his first climb in 1978 with Peter Habeler of Austria was the first ascent ever accomplished without additional oxygen.

Messner was introduced to mountaineering by his father, and from the age of 13 he made numerous difficult climbs in the Eastern Alps. In 1970 he scaled Nānga Parbati I (26,660 feet [8,126 m]) in the Himalayas by way of its Rupal (south) face; his younger brother Günther died during the descent. In 1975 Messner and Habeler made the first ascent of the northwestern face of Gasherbrum I (Hidden Peak; 26,470 feet [8,068 m]) in the Karakoram Range, without oxygen or support climbers. In 1978 he again climbed Nānga Parbat I, reaching the summit alone by a new route, and in 1979 he led a team of six to the top of the world's second highest mountain, K2 (28,251 feet [8,611 m]). In 1983 he led a party on a notable ascent of Cho Oyu (26,906 feet [8,201 m]) using a new route, the southwest face. Messner was the first man ever to climb all 14 of the world's mountains exceeding a height of 8,000 m (26,250 feet), and he was also the first to cross Antarctica without either dogs or machines. He also operated a successful Alpine-climbing school and wrote several books, including *Die Herausforderung* (1976; *The Challenge*) and *Everest* (1978).

Messys, Quentin (Flemish artist): *see* Massys, Quentin.

Mesta River (Greece): *see* Néstos River.

Mestghanem (Algeria): *see* Mostaganem.

mestizo, plural MESTIZOS, feminine MESTIZA, any person of mixed blood. In Central and South America it denotes a person of combined Indian and European extraction. In some countries—*e.g.,* Ecuador—it has acquired social and cultural connotations; a pure-blooded Indian who has adopted European dress and customs is called a mestizo (or cholo). In Mexico the description has been found so variable in meaning that it has been abandoned in census reports. In the Philippines "mestizo" denotes a person of mixed foreign (*e.g.,* Chinese) and native ancestry.

Mestre, northwestern suburb of Venice, in Venezia *provincia,* Veneto *regione,* northern Italy. Mestre lies on the mainland shore of the Venice Lagoon. It existed in Roman times and was the site of an important fortress in the 12th century. It came under Venetian domination in 1337 and was incorporated into the commune of Venice in 1926. Included in Mestre are the industrial districts of Marghera and Porto Marghera. The latter was built in 1919–28 and is one of the most important industrial and commercial ports in Italy. There are chemical, metallurgical, iron, and glass industries, coal processing, oil refining, engineering, and naval dockyards. The port exports regional products and imports coal, oil, ores, and cereals. Pop. (1991) 181,900.

Meštrović, Ivan (b. Aug. 15, 1883, Vrpolje, Slavonia, Austria-Hungary [now in Croatia]—d. Jan. 16, 1962, South Bend, Ind., U.S.), sculptor whose works are characterized by bold cutting and great powers of design.

The son of Croatian peasants, Meštrović was apprenticed to a marble cutter at the age of 13, and three years later he entered the Vienna Academy, where he studied until 1904. He exhibited at the Vienna Sezession exhibitions, at the Austrian exhibition at Earl's Court in London in 1906, and at Munich, Venice, and Paris, where he attracted the notice of Auguste

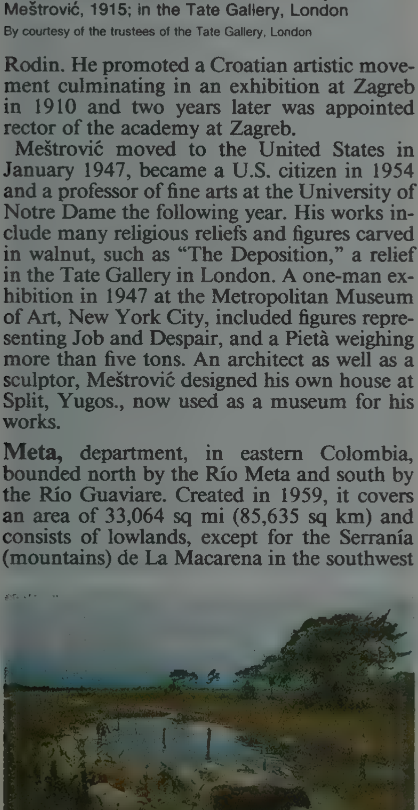
"Portrait of the Artist," plaster sculpture by Ivan Meštrović, 1915; in the Tate Gallery, London

By courtesy of the trustees of the Tate Gallery, London

Rodin. He promoted a Croatian artistic movement culminating in an exhibition at Zagreb in 1910 and two years later was appointed rector of the academy at Zagreb.

Meštrović moved to the United States in January 1947, became a U.S. citizen in 1954 and a professor of fine arts at the University of Notre Dame the following year. His works include many religious reliefs and figures carved in walnut, such as "The Deposition," a relief in the Tate Gallery in London. A one-man exhibition in 1947 at the Metropolitan Museum of Art, New York City, included figures representing Job and Despair, and a Pietà weighing more than five tons. An architect as well as a sculptor, Meštrović designed his own house at Split, Yugos., now used as a museum for his works.

Meta, department, in eastern Colombia, bounded north by the Río Meta and south by the Río Guaviare. Created in 1959, it covers an area of 33,064 sq mi (85,635 sq km) and consists of lowlands, except for the Serranía (mountains) de La Macarena in the southwest and the Andean Cordillera (mountains) Oriental in the east. Agriculture is concentrated on the lower mountain slopes, where grains, oilseeds, coffee, and other crops are cultivated. The cattle industry is well developed, and mineral deposits include coal and salt.



Cattle herding in Meta department, Colombia

Carl Frank

Industrial and commercial activity is centred on Villavicencio (*q.v.*), the departmental capital, whose chief industries are a brewery, a distillery, saddleries, soap factories, and coffee-roasting plants. A highway descends from Bogotá to Villavicencio; one branch then leads east-northeast along the Río Meta, and another runs southeast through the department. Air and river travel predominate in eastern Meta. Pop. (1981 est.) 388,917.

Meta River, major tributary of the Orinoco in eastern Colombia and western Venezuela. Formed in Meta department, Colombia, by the junction of the Upía and Guayuriba rivers, which descend from the eastern slopes of the Cordillera Oriental of the Andes, the Meta meanders east-northeastward across the Llanos (plains) of northern South America. At Nueva Antioquia, Colom., the river turns generally eastward, forming the border between Colombia and Venezuela. It empties into the Orinoco between Puerto Carreño, Colom., and Puerto Páez, Venezuela. Much of its 650-mi (1,046-km) length is navigable, but it is not a major transportation artery since the area it drains is sparsely populated.

metabolism, the sum of all the chemical reactions that take place within every single cell of a living organism, providing energy for vital processes and synthesizing new organic material.

A brief treatment of metabolism follows. For full treatment, *see* MACROPAEDIA: Metabolism.

Metabolic reactions are of two sorts. Some are anabolic reactions, which use energy to build complex molecules from simple molecules. The others are catabolic reactions, which make chemical energy available in the course of breaking down complex molecules into simpler molecules.

In order to carry on its life processes, every organism takes from its environment "free," or "useful," energy, *i.e.*, energy that is capable of performing work in the conditions of uniform temperature and pressure which characterize the interior of a cell. The organism eventually returns to its environment an equivalent amount of energy, much of it in the biologically unusable form of heat. All the energy used by living organisms derives ultimately from the Sun. Photosynthetic plants use solar energy directly to synthesize organic compounds from inorganic constituents, *e.g.*, carbon dioxide, water, and ammonia. By digesting photosynthetic organisms (or organisms that have digested photosynthetic organisms), nonphotosynthetic organisms obtain nutrients—mostly proteins, carbohydrates, and lipids—that serve them both as indirect sources of solar energy and as materials from which to synthesize their organic constituents.

In all organisms, the cellular reactions involved in metabolism make use of a particular energy-transferring compound—adenosine triphosphate (ATP). ATP releases energy when it is reduced; *i.e.*, when it drops its phosphate groups to become first adenosine diphosphate (ADP) and then adenosine monophosphate (AMP). As ATP is reconstructed from these intermediate compounds, energy is stored. During anabolic reactions, which require energy, ATP is reduced; during catabolic reactions, which yield energy, ATP is synthesized.

Every cellular chemical reaction is mediated by a specific enzyme (a protein that initiates and provides a site for a reaction between substances, without itself being chemically changed in the reaction). By their availability or unavailability as catalysts for chemical reactions, these enzymes regulate anabolism and catabolism.

The first phase of the liberation of chemical energy from food occurs mainly in the digestive tract in animals and is mostly a preliminary to catabolism; large food molecules are broken down into a number of relatively smaller molecules. Thus, proteins are broken down into the 20 or so amino acids of which they are composed, carbohydrates are broken down into simple sugars, and lipids into fatty acids and glycerols. The products of the first phase enter into the cells, where they are incompletely oxidized (by removal of hydrogen atoms or electrons). This incomplete oxidation constitutes the second phase of energy liberation, the key products of which are three carbon compounds—acetyl coenzyme A, oxaloacetate, and α-oxoglutarate. The details of the third and final phase of energy release from food were first elucidated by Sir Hans Krebs in 1937; in it, the products of the second phase combine and pass through a sequence of reactions (called the Krebs cycle, or tricarboxylic acid [TCA] cycle) that results ultimately in the re-formation of oxaloacetate and the production of two molecules of carbon dioxide (terminal respiration). Hydrogen atoms removed from intermediate products of this cycle are passed along a chain of carriers, eventually combining with oxygen to form water. Energy is released as the hydrogen atoms pass down the carrier chain; this energy is used to synthesize many molecules of ATP. This method of ATP synthesis, which requires oxygen, is called oxidative phosphorylation. Yeasts and certain other microorganisms do not produce ATP by oxidative phosphorylation; instead, they use intermediate products of the second phase of energy liberation as hydrogen acceptors. The end products of this process, which is called fermentation, are ethyl alcohol or lactic acid. Fermentation does not require oxygen, but it results in the synthesis of substantially less ATP than is achieved via oxidative phosphorylation. Fermentation also occurs in animal muscle cells when energy needs outstrip the cell's supply of oxygen.

The catabolic process begins with proteins, carbohydrates, and lipids and has as its rather indefinite end products the interconvertible intermediary compounds of the Krebs cycle. Anabolism begins with intermediate compounds and has as its end products the proteins, carbohydrates, lipids, and other large molecules that make up the tissues of the organism. Although certain chemical reactions and intermediary products (*e.g.*, acetyl coenzyme A) occur in both processes, the catabolism and anabolism of a specific compound are not achieved through reversals of the same chemical pathway.

Control over the rate of metabolic processes results from the greater or lesser production of the enzymes involved. Fine control results from the property of some of these enzymes (called pacemaker enzymes) whereby interaction with certain molecules other than their substrates (the substances they catalyze) causes them to modify their catalytic activity. The molecules that cause these modulations interact with the pacemaker enzymes at sites other than their active sites (those where they react with their substrates). These interfering molecules may be ATP or other products of the metabolic process to which the enzyme contributes, or they may be substances involved in another metabolic process. In any case, their availability to interact with the enzyme is an indication of the degree to which the reaction catalyzed by the enzyme may at a given moment be necessary to or superfluous in maintaining the metabolic balance of the organism.

Information about metabolic pathways is obtained in various ways. Organisms whose metabolisms are unbalanced (through either stress or disease) may accumulate abnormal quantities of particular metabolites (chemical substances involved in metabolism), a situation that will often be indicative of metabolic processes within the organism. Information as to metabolic pathways may also be obtained by feeding an organism nutrient compounds containing isotopes and then monitoring the isotopic atoms as they pass through and out of the organism. It is through the use of isotopes that rates of degeneration and reconstruction of the various tissues in the human body are known (*e.g.*, proteins in liver cells are replaced every five days, though the liver cells themselves last several months; proteins in muscle and brain tissue last much longer than do liver proteins). Important information linking enzyme–substrate pairs has been gained by the use of laboratory-bred mutants; these animals, genetically unable to synthesize particular metabolic enzymes, accumulate the substrate of that enzyme in their cells.

Metabolic diseases arise from nutritional deficiencies, especially of vitamins or proteins; in connection with diseases of the endocrine system, the liver, or the kidneys; or as a result of genetic defects.

Articles are alphabetized word by word, not letter by letter

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metacarpal, any of several tubular bones between the wrist (carpal) bones and each of the forelimb digits in land vertebrates, corresponding to the metatarsal bones of the foot. Originally numbering five, metacarpals in many mammals have undergone much change and reduction during evolution. The lower leg of the horse, for example, includes only one strengthened metacarpal; the two splint bones behind and above the hoof are reduced metacarpals, and the remaining two original metacarpals have been lost. In humans the five metacarpals are flat at the back of the hand and bowed on the palmar side; they form a longitudinal arch that accommodates the muscles, tendons, and nerves of the palm. The metacarpals also form a transverse arch that allows the fingertips and thumb to be brought together for manipulation.

metacentre, also spelled METACENTER, in fluid mechanics, the theoretical point at which an imaginary vertical line through the centre of buoyancy intersects another imaginary vertical line through a new centre of buoyancy created when the body is displaced, or tipped, in the water, however little.

The centre of buoyancy of a floating body is the point about which all the body parts exactly buoy each other, in other words, the effective centre of the displaced water. The metacentre remains directly above the centre of buoyancy regardless of the tilt of a floating body, such as a ship. When at rest on even keel, the vessel's centre of buoyancy is directly below the centre of gravity as well as below the metacentre. (The centre of gravity is the point in a body about which all parts of the body balance each other.) When a vessel tilts, one side displaces more water than does the other, and the centre of buoyancy moves and is no longer directly under the centre of gravity; but regardless of the amount of the tilt, the centre of buoyancy remains directly below the metacentre. If the metacentre is above the centre of gravity, buoyancy restores stability when the ship tilts. The stability increases with the distance between metacentre and centre of gravity, called the metacentric height. If the metacentre is below the centre of gravity, the boat is unstable, and a tilt results in capsizing.

metachromatic leukodystrophy, rare inherited metabolic disease in which the lack of a key enzyme causes loss of the protective myelin sheath from the white matter of the brain, resulting in psychological disturbances, mental deterioration, and sensory and motor defects. The absence of the enzyme cerebroside sulfatase (arylsulfatase A) allows certain specialized lipids (sphingolipids) to accumulate in nerve tissues instead of being broken down. At least two types of the disorder, infantile and adult, have been identified; a third, intermediate juvenile variety is sometimes recognized as well. In the more common infantile disease, the child develops normally for up to two years; the progressive onset of behavioral problems, mental deterioration, and blindness ends, after several years, in death. The adult disease is characterized mainly by psychological disturbances, including dementia. The juvenile form resembles infantile disease but is distinguished by later onset and a more protracted course.

metacinnabar, a mercury sulfide mineral that has the same chemical composition as cinnabar (HgS). Typical specimens have been obtained from Italy, Romania, and California. A member of the sphalerite group of sulfide minerals having isometric crystal symmetry, metacinnabar is transformed to cinnabar, a more stable form, upon heating to 400°–550° C (750°–1,020° F). For detailed physical properties, *see* sulfide mineral (table).

Metacom, also called METACOMET, KING PHILIP, or PHILIP OF POKANOKET (b. *c.* 1638, Massachusetts—d. Aug. 12, 1676, Rhode Island), sachem (chief of a confederation of Algonkin tribes) of the Wampanoag Indians who led the most severe Indian war in New England history, known as King Philip's War (1675–76).

Metacom was the second son of Massasoit, Wampanoag chief who had managed to keep peace with the Massachusetts and Rhode Island settlers for many decades. Upon Massasoit's death (1661) and that of his eldest son Wamsutta (English name Alexander) the following year, Metacom became chief of the tribe. He found it increasingly difficult to keep his pledge of continuing peace, however, primarily because of the ever-widening sale of Indian land to the English in exchange for guns, ammunition, liquor, and blankets. He was further embittered by the humiliations to which he and his people were continually subjected by the whites. He was, for example, summoned to Taunton in 1671 and required to sign a new peace agreement that included the surrender of Indian guns.

Metacom's dignity and unbending spirit both impressed and frightened the settlers, and he came to symbolize the Indian menace that could not be controlled. For 13 years he kept the surrounding towns and villages on edge with the fear of an Indian uprising. Finally, in June 1675, violence erupted when three Wampanoag warriors were executed by Plymouth authorities for the murder of John Sassamon, a tribal informer. Aided by a coalition of the Narragansett, Abnaki, Nipmuck, and Mohawk tribes, the Wampanoag were at first victorious. After a year of savage fighting, however, during which considerable loss of life and property was sustained by both sides, the Indian alliance began to disintegrate, and food became scarce. Seeing that defeat was imminent, Metacom returned to his ancestral home at Mount Hope, where he was betrayed by an informer and killed in a final battle. He was beheaded and quartered and his head displayed on a pole for 25 years at Plymouth.

metaethics, the subdiscipline of ethics concerned with determining the nature of moral concepts and judgments largely through the analysis of the logical and semantic aspects of moral language.

A brief treatment of metaethics follows. For a full treatment, *see* the MACROPAEDIA: Ethics.

Analytic philosophers, also known as philosophers of language, distinguish between the first-order language, in which all humans communicate with one another, and the second-order language, in which philosophers attempt to understand, analyze, and clarify the nature and meaning of first-order discourse. Hence, metaethics, as a term in the second-order enterprise, identifies a fundamental task of the moral philosopher, the logical analysis (1) of the meanings of such moral terms as right and wrong, obligatory and forbidden, good and evil; (2) of the function of the statements in which such terms occur; and (3) of the nature of the justifications, or moral reasoning, used in the support of these statements. Metaethics (or analytic, or critical, ethics) is thus to be contrasted with practical, normative, or speculative ethics, which explores such first-order questions as: "What actions are right and what are wrong?"; "How should one live and what things should one value?"; and "Is life worth living?"

Analytic philosophers agree that the fundamental questions in ethical theory are metaethical; and some even assert that they are the only questions appropriate for a moral philosopher and that normative questions can be dealt with by all people in their capacity as moralists. The position of the moral philosopher is thus analogous to that of the philosopher of science, who considers only the logic of scientific statements and remains neutral on the question of which are true and which false. The possibility that metaethics might succeed in such neutral analyses of moral language has been questioned, however, even by Analytic philosophers themselves, who argue that there are presuppositions about moral language that are themselves normative, which may well underlie the analytic enterprise and condition its theoretical results.

Major metaethical theories include naturalism, nonnaturalism (or intuitionism), emotivism, and prescriptivism. Naturalists, such as Ralph Barton Perry, Stephen Coburn Pepper, W.T. Stace, Richard B. Brandt, and Geoffrey James Warnock, and nonnaturalists, such as G.E. Moore, H.A. Prichard, W.D. Ross, and A.C. Ewing, agree that moral language is cognitive—*i.e.,* that moral claims can be known to be true or false. They disagree, however, on how this knowing is to be done. Naturalists hold either that these claims can be adequately justified by reasoning from statements employing only nonmoral terms or that moral terms themselves can be defined in nonmoral (natural or factlike) terms. Intuitionists deny both of these positions and hold that moral terms are *sui generis,* that moral statements are autonomous in their logical status. Emotivists, notably Alfred Jules Ayer and Charles Stevenson deny that moral utterances are cognitive, holding that they consist in emotional expressions of approval or disapproval and that the nature of moral reasoning and justification must be reinterpreted to take this essential characteristic of moral utterances into account. R.M. Hare and other exponents of prescriptivism take a somewhat similar approach, arguing that moral judgments are prescriptions or prohibitions of action, rather than statements of fact about the world.

metagenesis: *see* alternation of generations.

metal, any of a class of substances characterized by high electrical and thermal conductivity as well as by malleability, ductility, and high reflectivity of light.

A brief treatment of metals follows. For full treatment, *see* MACROPAEDIA: Matter: Its Properties, States, Varieties, and Behaviour.

Approximately three-quarters of all known chemical elements are metals. The most abundant varieties in the Earth's crust are aluminum, iron, calcium, sodium, potassium, and magnesium. The vast majority of metals are found in ores (mineral-bearing substances), but a few such as copper, gold, platinum, and silver frequently occur in the free state because they do not readily react with other elements.

Metals are usually crystalline solids. In most cases, they have a relatively simple crystal structure distinguished by a close packing of atoms and a high degree of symmetry. Typically, the atoms of metals contain less than half the full complement of electrons in their outermost shell. Because of this characteristic, metals tend not to form compounds with each other. They do, however, combine more readily with nonmetals (*e.g.,* oxygen and sulfur), which generally have more than half the maximum number of valence electrons. Metals differ widely in their chemical reactivity. The most reactive include lithium, potassium, and radium, whereas those of low reactivity are gold, silver, palladium, and platinum.

The high electrical and thermal conductivities of the simple metals (*i.e.,* the non-transition metals of the periodic table) are best explained by reference to the free-electron theory. According to this concept, the individual atoms in such metals have lost their valence electrons to the entire solid, and these free electrons that give rise to conductivity move as a group throughout the solid. In the case of the more complex metals (*i.e.,* the transition elements), conductivities are better explained by the band theory (*q.v.*), which takes into account not only the presence of free electrons but also their interaction with so-called *d* electrons.

The mechanical properties of metals, such as hardness, ability to resist repeated stressing (fatigue strength), ductility, and malleability, are often attributed to defects or imperfections in their crystal structure. The absence of a layer of atoms in its densely packed structure, for example, enables a metal to deform plastically, and prevents it from being brittle.

metal carbonyl, any coordination or complex compound consisting of a heavy metal such as nickel, cobalt, or iron surrounded by carbonyl (CO) groups. Some common metal carbonyls include: tetracarbonylnickel $Ni(CO)_4$, pentacarbonyliron $Fe(CO)_5$, and octacarbonyldicobalt $Co_2(CO)_8$. In general, the metal carbonyls are produced by direct action of carbon monoxide on the finely divided metal. They are used in the preparation of metals of exceptionally high purity and as catalysts in organic syntheses.

The electronic structures of most metal carbonyls containing one metal atom per molecule (mononuclear carbonyls) bear striking resemblances to those of the noble-gas elements. For example, tetracarbonylnickel has 36 electrons (28 from the nickel atom and 8 electrons from the 4 carbonyl groups) surrounding the nickel nucleus. This number, called the effective atomic number (EAN), is also the total number of electrons in the noble-gas element krypton.

metal cut, an engraving on metal, usually lead or type metal, or a print made from such plates. The earliest example of metal cut is the 15th-century technique called dotted manner, or *manière criblée,* from its characteristic use of dots to form the design.

The English poet and artist William Blake (1757–1827) experimented with metal cuts, but the technique's greatest exponent was the Mexican engraver José Guadalupe Posada (1852–1913). As metal-cut prints are often indistinguishable from wood engravings, many wood engravers turned to work with type metal instead of wood.

"Calavera Huertista," relief etching on zinc by José Guadalupe Posada, 1913

By courtesy of the Art Institute of Chicago

metal fatigue, weakened condition induced in metal parts of machines, vehicles, or structures by repeated stresses or loadings, ultimately resulting in fracture under a stress much weaker than that necessary to cause fracture in a single application.

Though the term dates back to the 19th century and though considerable observation of the phenomenon was made then and in the first half of the 20th century, only with the spectacular failure of pressure cabins in British Comet jetliners in 1954 did it receive widespread engineering attention. In the 1970s much remained to be learned about metal fatigue, but empirical methods had proved effective in overcoming it. Fatigue-resistant metals had been developed and their performance enhanced by surface treatment, while fatigue stresses were significantly lessened in aircraft and other applications by designing to avoid stress concentrations. Large-scale prototype testing and new testing methods, including the metallurgical microscope, were also employed.

metal point, descendant of the stylus of classical times and ancestor of the modern pencil, a small, sharpened metal rod used for drawing precise compositions on paper or parchment. The metal could be lead, silver, copper, or gold, but silverpoint was the most common choice because it is the most suited to permanent drawing, its stroke adhering unerasably. The silverpoint was of great value in producing the hard, clearly defined line required, for instance, by miniaturists; modelling, emphases, and light phenomena, however, had to be rendered either by means of repetitions, dense hatching, or blanks or else supplemented by other mediums.

"Study of Hands," silverpoint heightened with white on pink grounded paper by Leonardo da Vinci; in Windsor Castle, Berkshire, Eng.

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Silverpoint achieved great popularity with such 15th-century Flemish artists as Jan and Hubert van Eyck, Rogier van der Weyden, and Hans Memling, to whose styles it was perfectly attuned. The German artist Albrecht Dürer, too, used it with great effect, notably in the "Self-Portrait" (1484; Albertina, Vienna). The silverpoint lost favour in the 17th century but was revived by 18th-century miniaturists and is still occasionally used by modern artists.

metalanguage, in semantics and philosophy, language used for the analysis of object language (language that is used to talk about objects in the world). Thus, a metalanguage may be thought of as a language about another language. Such philosophers as the German-born Logical Positivist Rudolf Carnap and Alfred Tarski, Polish-born mathematician, argued that philosophical problems and philosophical statements can be resolved only when seen in terms of a syntactical framework. The logic of semantics is what determines the truth of a statement, rather than the statement's nonformal, or actual, meaning. Carnap felt that by making use of symbolic notation in a metalanguage and by adhering to rules of logic it was possible to avoid metaphysical judgments, which, in his system, were by definition invalid.

metalation, any chemical process by which a metal atom is introduced into an organic molecule to form an organometallic compound, but more commonly the process involving a hydrogen–metal exchange. An example is the metalation of benzene (C_6H_6) by reaction with ethylsodium (C_2H_5Na), forming phenylsodium (C_6H_5Na) and ethane (C_2H_6). Metalation by means of hydrogen–metal exchange is a very powerful method of removing a hydrogen atom (in the form of its cation, H^+) from a chemical compound; the reaction, therefore, is useful in studying the relative acidities of such extremely weak acids as the hydrocarbons.

Metallgesellschaft AG, major German industrial company engaged in mining, metal refining, fabrication, and trade; the design and production of industrial plants and equipment; the manufacture of chemicals; financial services and insurance; and transportation. The firm's headquarters are in Frankfurt am Main.

Established in 1881 by Wilhelm Merton (1848–1916), the company originally confined its activities to metal trading. In 1928 it merged with Metallbank und Metallurgische Gesellschaft (established in 1910) and through this and other mergers, acquisitions, and expansions became one of the largest industrial enterprises in Germany and in Europe.

The company is a major processor of zinc and copper. It operates metal and chemical subsidiaries in the U.S. and a financial subsidiary in Curaçao, Netherlands Antilles, and has a minority interest in firms in Italy, Canada, Austria, France, and Switzerland. Large stakes of Metallgesellschaft are held by outside interests.

metallic bond, force that holds atoms together in a metallic substance. Such a solid consists of closely packed atoms. In most cases, the outermost electron shell of each of the metal atoms overlaps with a large number of neighbouring atoms. As a consequence, the valence electrons continually move from one atom to another and are not associated with any specific pair of atoms. In short, the valence electrons in metals, unlike those in covalently bonded substances, are nonlocalized, capable of wandering relatively freely throughout the entire crystal. The atoms that the electrons leave behind become positive ions, and the interaction between such ions and valence electrons gives rise to the cohesive or binding force that holds the metallic crystal together.

Many of the characteristic properties of metals are attributable to the non-localized or free-electron character of the valence electrons. This condition, for example, is responsible for the high electrical conductivity of metals. The valence electrons are able to move away when an electrical field is applied without any thermal activity—*i.e.,* without its having to be heated into a conduction band, as in covalent crystals. The presence of the mobile valence electrons, as well as the nondirectionality of the binding force between metal ions, account for the malleability and ductility of most metals. When a metal is shaped or drawn, it does not fracture, because the ions in the planes of its crystal structure are quite easily displaced with respect to one another. Moreover, the nonlocalized valence electrons act as a buffer between the ions of like charge and thereby prevent them from coming together and generating strong repulsive forces that can cause the crystal to fracture.

metallic fibre, in textiles, synthetic fibre, known generically as metallic, including manufactured fibres composed of metal, metal-coated plastic, or of a core covered by metal (usually aluminum). Trademarked names include Chromeflex, Lurex, and Melora. Foil types are made with a metal foil that is coated with a plain or coloured plastic film and then cut into strips. Metallized types employ such films as Mylar, a polyester treated with vaporized metal that is bonded between layers of clear film. Colour pigment may be added with the film.

Metallic fibres are light in weight and do not tarnish. Those using polyester films are the strongest, can be stretched to a considerable extent, and are elastic and resilient. Metallic fibres are usually washable, requiring low temperatures when ironed, and can be dry-cleaned with most of the common cleaning solvents. They are resistant to attack by insects and microorganisms.

Metallic fibres are usually combined with others for decorative effect. Such combinations are used for knitting yarns, trimmings, and ribbons; in such apparel as knitwear, evening gowns, swimsuits, and neckties; and in such home furnishings as curtains, upholstery, and tablecloths. Industrial applications include automotive upholstery, theatre curtains, and grilles for radio and television sets.

metallic wood-boring beetle, also called JEWEL BEETLE, any member of the family Buprestidae (order Coleoptera), among the most brilliantly coloured insects. Most of the approximately 15,000 species are widely distributed in tropical regions. These beetles are long, narrow, and flat, with a tapering abdomen. The wing covers (elytra) of some species are metallic blue, copper green, or black in colour and are sometimes used in jewelry. The brightly coloured body of other species is hidden by the dull dark wing covers and is exposed only during flight or from a ventral (bottom) view. A predator chasing a metallic-coloured flying beetle may not recognize it as prey when it stops flying and becomes a dull, dark-coloured lump on a branch.

Metallic wood-boring beetle (*Agrilus*)
William E. Ferguson

Many metallic wood-boring beetle larvae carve out ribbon-shaped tunnels in wood. *Chrysobothris* attacks trees and shrubs and often seriously damages fruit trees. Some (*e.g., Agrilus*) cause the formation of a gall in which the larvae live. The small, flat *Brachys* tunnels through leaves.

The white, legless larvae, which resemble tadpoles, are called flatheaded borers because of their shape. The head region is flattened and expanded sideways; the rest of the body is cylindrical and narrow.

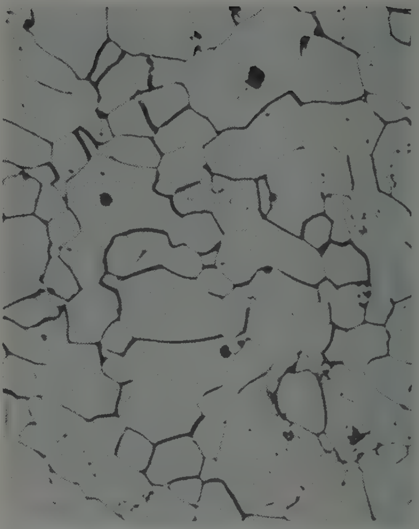
metallogenic province, geographic region in which predominantly one kind of ore deposit, or a grouping of ore deposits, occurs in relative abundance. Its cause is unknown, but it is postulated that the magmas (molten rocks) underlying such areas may have been richer in those ore minerals than the magmas elsewhere.

Among the examples of metallogenic provinces in North America are the gold province on the Canadian Shield that extends for 3,200 kilometres (2,000 miles) and includes all the major Canadian gold camps; the lead–zinc province of the Mississippi Valley, which is the world's largest producer of those metals; the copper province of the southwestern United States and adjacent parts of Mexico, which at one time produced about one-third of the world's copper; and a large silver–lead province in north central Mexico, which contains widespread, lead–zinc ores very rich in silver. In South America, the copper province extending northward from Chile into Peru provides a considerable portion of the world's copper. Europe has smaller and less well-defined provinces than North or South America; the German lead provinces, the English tin province, and the Scandinavian nickel province are good examples. Several outstanding provinces occur in Africa: the Witwatersrand and Orange Free State gold provinces; the Zambia and Shaba (formerly Katanga) copper provinces. Asia's metallogenic provinces include the Siberian Shield gold province, the platinum province in the Urals, the Georgian manganese province, the Malayan tin province, and the Chinese tungsten province. The mineral deposits of Australia do not occur in distinctive metallogenic provinces for the most part; exceptions include the very large gold provinces of Victoria and New South Wales and the silver–lead–zinc province of Broken Hill, New South Wales.

metallography, study of the structure of metals and alloys, particularly using microscopic (optical and electron) and X-ray diffraction techniques.

Metal surfaces and fractures examined with the unaided eye or with a magnifying glass or metallurgical or binocular microscope at magnifications less than 10 diameters can reveal valuable information as to the crystalline, chemical, and mechanical heterogeneity. Crystalline heterogeneity is known metallographically as grain. Chemical heterogeneity arises from impurities, segregation of chemical elements, and nonmetallic inclusions. Mechanical heterogeneity consists of local deformations of structure, elongation or distortion of nonmetallic inclusions, and regions of chemical segregation, resulting from cold fabrication processes.

Microscopic examination of polished or etched surfaces at magnifications ranging from about 100 to 1,500 diameters can reveal such information as size and shape of grains, distribution of structural phases and nonmetallic inclusions, microsegregation, and other structural conditions. Metallographic etching—that is, subjecting the polished surface to the action of a corrosive reagent—can reveal the structure by a selective and controlled solution or can unbuild the metal inwardly from the surface. This successive destruction occurs because of the different rates of dissolution of the structural components under the attack of the etching agent. Polarized light is useful to reveal grain structure, detect preferred orientation, examine oxide surface films, and identify phases of different composition.



Metallographic appearance of nominally pure iron (magnified 100 ×)
From George L. Kehl, *Principles of Metallographic Laboratory Practice* (1949); reproduced by permission of McGraw-Hill Book Company

In electron microscopes a beam of electrons instead of a beam of light is directed onto the specimen; because only a highly energetic electron beam will pass through metal films thicker than about 0.05 micron (1 micron equals 0.001 millimetre), a microscope specimen replica of the surface is ordinarily made. To do this a plastic solution is poured over the etched surface; the hardened solution contains on one side a reverse impression of the surface contours of the specimen. The development of transmission electron microscopes, in which the electrons are accelerated to 100 kiloelectron volts or more, has made it possible to examine internal details of thin foils of metals.

X-ray diffraction techniques involve the impingement of a beam of X-rays on the metal specimen and the subsequent diffraction of the beam from regularly spaced planes of atoms; usually, the diffracted rays are recorded on photographic film. The technique is used to study phenomena related to the grouping of the atoms themselves. By measuring the lines or spots on the diffraction pattern and by analysis of the intensity of the deflected rays, information can be obtained about the positions of the atoms of the specimen and hence the crystallography of the phases, the presence of internal strains, and the presence of solute atoms in solid solutions.

metalloid, a chemical element with properties intermediate between those of typical metals and nonmetals. Usually considered under this classification are the chemical elements boron, silicon, germanium, arsenic, antimony, and tellurium. The rare elements polonium and astatine are also sometimes included. Most of these elements are important industrial materials, being used to make transistors and other semiconductor devices, ceramics, solar batteries, and certain polymers.

Metalloids are usually brittle, somewhat shiny solids that behave as electrical insulators at room temperature but become comparable to metals as electrical conductors when heated or when small quantities of certain elements are introduced into the lattices of their crystalline structures.

Metalloids have electronic structures intermediate between the nearly empty outer electron shells of the typical metals and the nearly filled electron shells of the nonmetals. Thus, they have enough empty electron orbitals (pathways within the shells) into which electrons can be moved to conduct electric current. Their chemical properties are intermediate between the behaviour of electropositive and electronegative atoms.

metallophone, any percussion instrument consisting of a series of struck metal bars (compare xylophone, with struck wooden bars). Examples include the *saron* and *gender* of the Indonesian gamelan orchestra and the Western glockenspiel, vibraphone, and (with a keyboard) celesta.

Javanese *saron*, metallophone, in the Musée Instrumental du Conservatoire Royal, Brussels

By courtesy of the Musée Instrumental, Brussels; photograph © A.C.L., Brussels

China had such instruments by the 7th century. Metallophones had reached northern Europe from Indonesia by about the second half of the 17th century. There they were originally used as practice instruments but were accepted as performance instruments in the 18th century.

metallurgy, the art and science of extracting metals from their ores and modifying the metals for use. Customarily, metallurgy refers to commercial as opposed to laboratory methods. It also concerns the chemical, physical, and atomic properties and structures of metals and the principles whereby metals are combined to form alloys.

A brief treatment of metallurgy follows. For full treatment, *see* MACROPAEDIA: Industries, Extraction and Processing.

Metallurgic practices date from approximately 4000 BC. Copper is believed to have been the first metal extracted from ore. Copper mines have been found in several places in the Middle East, and the mined metal was probably used for weapons and other utilitarian objects.

Bronze was probably developed between 4000 and 1400 BC, when it was discovered that an alloy made of copper and tin formed a metal that was less brittle than copper alone. The use of iron, noted as early as 3000 BC in the Middle East, became common there and in southwestern Europe about 1200 BC, and its use gradually spread to Asia. Brass, an alloy of copper and zinc, was developed from 1600 to 600 BC. It was used by the Romans for jewelry, armour, and as currency. Silver was successfully mined starting around 500 BC, and lead was ultimately recovered from the silver ore. Gold, one of the first metals mined, was used in an alloy with silver to form electrum. The first important steel production was started in India some time between 500 BC and 500 AD.

Although the Romans made few metallurgical innovations themselves, they contributed to existing techniques of mining and casting and devised a variety of new uses for the metals.

Metallurgical principles were first widely disseminated in the 16th century when Vannoccio Biringuccio and Georgius Agricola composed books cataloging most of the available metallurgical knowledge.

Extracting metals from crude ore is performed in two phases, mineral dressing and process metallurgy. In the first phase, the ore must be gradually broken down to isolate the desired metallic elements from the crude ore. The most common means of liberating minerals from the ore is by a process of crushing and grinding, after which the ore is sorted, either by hand (for which the ore must have at least one visually distinctive characteristic) or by more advanced methods which may involve gravity concentration, separation by flotation, electrostatic or magnetic separation, or other specialized processes.

Process metallurgy, the second phase, is the procedure or series of procedures whereby the minerals which have been separated from ore are reduced to metal, alloyed, and made available for specialization. The three processes commonly applied are pyrometallurgy, electrometallurgy, and hydrometallurgy. The product may be further refined by adapting additional metallurgical techniques, such as distillation. In pyrometallurgy the ore is heated to extreme temperatures, usually in a furnace. In most cases, the fire has a chemical as well as a physical function. The fire burns away certain components of the ore, or it deoxidizes, and thereby reduces, the ore. In electrometallurgy the ore is subjected to an electrolytic process in the extraction and refinement of metals. Hydrometallurgy refers to processes in which the metal is extracted from the ore by an aqueous acid or salt solution. From this solution the metal is precipitated by some suitable reagent.

Few methods of metal extraction yield a pure product. What is obtained, as a rule, is a more or less impure metal which must then be further refined to become fit for commercial, industrial, or research purposes.

There are six principal methods of metal processing: mechanical working (both cold and hot), foundry processes, surface treatments, powder metallurgy, nuclear metallurgy, and heat treatment. In cold working the metal is hardened and undergoes structural rather than chemical change. In hot working, the metal is softened by heat. This process alters the crystallinity of the metal so that it may then be refined. The metal may be forged or shaped by the rolling or drawing process. Foundries cast metals in molds so that each object is a uniform size and shape. Iron, steel, and nonferrous metals are cast in molds. Surface treatment methods involve the application of an exterior layer to metals by such means as hot dipping, electroplating, and cementation. The purpose of this process is to produce a layer to protect the base substance, or to otherwise alter the surface character of the metal. Powder metallurgy consists of processing metal powder into a die to produce a compressed shape which then, under the process of sintering (diffusion bonding by heating), becomes consolidated and strengthened. Metal powder may be manufactured mechanically or chemically. Nuclear metallurgy involves the production of highly specialized metals for nuclear engineering, specifically, it involves the isolation of fissionable materials. In heat treatment, metals are subjected to heat to produce or improve certain desired qualities—*e.g.*, hardness, ductility, etc.

Of great importance to metallurgy is metallography, the science and study of the compositions and structures of metals, particularly by microscopes and X-ray devices.

metalmark, any small butterfly of the principally South American family Riodinidae (order Lepidoptera), named for characteristic metallic wing markings. Metalmarks are difficult to recognize because many species mimic other lepidopterans and have evolved almost every combination of colour and wing shape.

Most males possess reduced front legs; females have functional ones. Most of the broad, flat, and usually hairy larvae feed on ragwort and thistles.

metalogic, the study and analysis of formal languages and formal systems with regard to their semantics (the relations between expressions and meanings) and syntax (the relations among expressions). The discipline thus includes the study of both mathematics and logic insofar as these are treated formally and in abstraction from their practical applications.

A brief treatment of metalogic follows. For full treatment, *see* MACROPAEDIA: Logic, The History and Kinds of: *Metalogic.*

The chief early impetus to the development of metalogic was the discovery, in the 19th century, of different geometries and the consequent desire to separate abstract mathematics from spatial intuition. David Hilbert, in his *Grundlagen der Geometrie* (1899; *The Foundations of Geometry*), organized Euclid's geometry into a more rigorous axiomatic system that uncovered many hidden axioms and opened the way for related attempts to axiomatize other areas of mathematics and logic. As a consequence of this desire for transparency and complete specification, greater attention came to be paid to the formal syntactic features of the languages and systems used rather than merely to their intuitive meanings. The use of predicate calculus in the determination of relationships further advanced the convergence of axiomatic mathematics, semiotics, and logic toward metalogic.

Certain aspects of metalogic made possible an attempt to develop a metalogical formalization of the physical and behavioral sciences. Building on Ludwig Wittgenstein's early work, Rudolf Carnap and other exponents of Logical Positivism sought to analyze these sciences into formal languages consisting of logically valid sentences with universal logical ranges (sentences that are true in all possible worlds) and factually true sentences of a more restricted range. One product of this attempt was to be a formal solution to the problem of meaning. The collapse of these expectations led to a narrowing of the scope of metalogic. A great deal of work of a mathematical nature has been done in the areas of axiomatic set theory, model theory, and recursion theory.

Currently the central questions of metalogic are those of the completeness and consistency of a formal system based on axioms. Two fundamental contributions to the understanding of these questions were made by Kurt Gödel. In 1931 he established that for any formal system that is sufficiently complex to generate an elementary arithmetic, it is impossible for that system to prove its own consistency, *i.e.*, there exists no consistency proof of such a system that can be formalized in the system itself. Then in 1934 he introduced the concept of recursive functions (functions mechanically computable by a finite series of purely combinatorial steps); this idea, further elaborated by the work of Alonzo Church, Alan M. Turing, and Emil L. Post, resulted in the development of recursion theory. By means of this theory it was possible to prove that certain classes of problems are either mechanically solvable or unsolvable, and it became possible for logicians to arrive finally at a sharply defined concept of a formal axiomatic system and at sharply defined concepts of decidability.

Church extended Gödel's findings in 1936 to show that interesting formal systems are undecidable both with regard to theorems and with regard to true sentences. The incompleteness theorem shows that truth in a system to which the theorem applies is undecidable, for if they were decidable then all true sentences would form a recursive set and could be taken as the axioms of a formal system that would be complete. Or alternatively, since truth in the language of a system is itself not representable (definable) in the system, it cannot, if all recursive or computable functions and relations are representable in the system, be recursive (*i.e.*, decidable) itself. From this it follows that a consistent system is undecidable with respect to theorems as well.

Despite the proof that interesting formal systems are incomplete and undecidable, it has been shown by M. Presburger and Thoralf Skolem (both in 1930) that arithmetic is decidable with regard to addition or multiplication alone. Alfred Tarski also developed (in 1951) a decision procedure for elementary geometry and elementary algebra. With regard to consistency proofs the work of Gerhard Gentzen (1936) opened up an area of extensive work in classical number theory. Gödel (in 1958) extended his interpretation from classical number theory to intuitionistic theory and obtained constructive interpretations for sentences of classical number theory in terms of primitive recursive functionals. Recent work in consistency proofs has extended the work of both these men and has tried to make constructive notations for the second number class of Georg Cantor. Consistency proofs have sparked much discussion about their implications for epistemology.

The metalogic concern with completeness and consistency has produced important results with regard to formal logic. It can be shown that propositional calculus is complete because every valid sentence in it is a theorem. Its consistency follows from the validity claim of its axioms, that they are true in all possible worlds, and because the rules of inference carry from valid sentences to valid sentences. Since all and only valid sentences are theorems, the calculus is decidable. With regard to first order predicate calculus, it can be proved that it is consistent and that all its theorems are valid. More importantly it has been proved that the calculus is complete but undecidable. The former was proved by Gödel in 1930 and the latter by Church and Turing in 1936 using very different methods.

Another important field of metalogic has been model theory, in which the interpretation of theories formalized in the framework of formal logic are studied. Model theory has yielded, for example, proof that no theory with an infinite model can be categorical or such that any two models of the theory are isomorphic, whether the model be constructed of infinite cardinal numbers or of any uncountable cardinality. Model theory also enabled Per Linström in 1969 to establish roughly that within a broad class of possible logics, elementary logic is the only one that satisfies the requirements of axiomatizability of the Löwenheim–Skolem theorem. Model theory has branched out to develop models of second order logic and infinitary logics, and with its concepts of ultrafilters, ultraproducts, and ultrapowers it has been used to develop an exact foundation for the classical differential calculus using infinitesimals.

metalwork, useful and decorative objects fashioned of various metals, including copper, iron, silver, bronze, lead, gold, and brass. The earliest man-made objects were of stone, wood, and bone, which were found naturally on the surface of the earth. It was only later in evolution that man learned to extract metals from the earth and to hammer those metals into utensils, jewelry, weapons, and ritualistic objects.

A brief treatment of metalwork follows. For full treatment, *see* MACROPAEDIA: Decorative Arts and Furnishings.

Metal is made into objects by various techniques, some used to form the object itself and others used for decoration only. Forming techniques are primarily hammering and casting. Hammering is the oldest technique. Plates of metal were hammered into shape and individual components either riveted together or pinned to a solid core before the invention of soldering or welding. After about 2500 BC both hammering and casting were used. To cast an object, molten metal is poured into a mold and allowed to cool. There are various techniques of casting that vary according to the type of mold used. In the technique known as the lost-wax, or *cire perdue,* process a wax model is encased in a refractory mold and is replaced by the hot metal, which melts the wax. After the metal hardens, the mold is broken to release the object. It can therefore be used only once. Other techniques using wooden or plaster molds allow several castings. Decorating techniques include hammering; embossing, or repoussé, in which ornament is raised in relief from the reverse side of the sheet metal; chasing; engraving; inlaying; enamelling; and gilding. Niello is a type of decoration in which molten silver sulfide is inlaid into another, hard metal, the surface of which has first been engraved with ornamental designs. Each decorative process has its own special technique and requires distinct skills on the part of the craftsman.

Silver and gold have been worked since ancient times, especially for items of personal ornamentation such as jewelry. Utilitarian objects of silver were common in antiquity and have remained important in modern times. Important centres included Greece, Persia, and Rome. Precious objects of gold and silver were made for the Christian church from Byzantine times onward. Many were lavishly decorated with inlaid jewels, gilding, and enamelling. Goldsmiths and silversmiths formed themselves into guilds in the 12th century; such was the patronage of royalty, nobility, and the wealthy merchant classes. By the end of the Middle Ages hallmarking was enforced in England to control the purity of silver objects. Fine goldsmith's work was made in the 16th century, especially in Flanders and in Germany. Much of the silver tableware made in England from the 17th century has survived and is still admired for its grace and simplicity of form. Goldwork and silverwork from pre-Columbian America was of the highest quality. Hollow ornaments were cast using the lost-wax process in what are now Colombia, Central America, and Mexico. Sheet gold and silver were hammered and decorated to make brilliant and delicate ritualistic objects. In the southwestern United States the silverwork of the American Indians, particularly the Zuni and the Navajo, introduced by Mexican craftsmen, is distinctive.

Copper was the first nonprecious metal to be wrought by man. Various copper alloys with tin and zinc were soon developed, making copper harder wearing and easier to work with. Copper is worked in a manner similar to silver or gold, being malleable and relatively soft, and it is often decorated with enamel. Many copper objects, such as mirrors and jugs, were made in ancient Egypt. The metal was widely used for domestic utensils in Europe in the 17th and 18th centuries and was used from the mid-18th century as the basis for Sheffield plate, a silver plate made by bonding silver to copper.

The alloy of copper and tin is called bronze, and the copper and zinc alloy is known as brass. Both bronze and brass were used for a wide range of objects, bronze exclusively being formed by casting. Fine bronze vases and statues were made in ancient Greece, and bronze became the most important medium for Greek large-scale sculpture. Smaller objects such as armour and vases were beautifully decorated with hammer ornament. Much important bronze ware—notably bells, candlesticks, and chandeliers—was cast from the Middle Ages onward for ecclesiastical purposes. Among the most important Renaissance works in bronze were Lorenzo Ghiberti's 15th-century doors for the Baptistery of the cathedral of Florence.

In England monumental brasses to mark tombs were made from the 13th to the 16th century, and many are still in place in churches and cathedrals. French 17th- and 18th-century furniture makers used gilded bronze mounts. Bronzes have been made in China for about 3,700 years, mostly originally as ritual vessels. Some of them are of such high quality as to be considered works of sculpture.

Pewter is an alloy of tin, which in its pure form is too brittle to cast and difficult to melt, and either copper or lead. Pewter objects are cast in molds and are usually simple and utilitarian in form and decoration, since the alloy is unsuitable for either stamping or chasing. A group of flagons, considered some of the finest of all pewter objects, was made in Silesia in about 1500. Pewter remained popular for plates and tankards throughout the 17th and 18th centuries, though it was gradually superseded by cheaper earthenware and porcelain from the mid-18th century.

Iron, either wrought or cast, has been used for a long time for decorative architectural components. Wrought iron particularly, which can be twisted and hammered, was used for gates and railings from the 16th century on. In medieval and Tudor times in England decorative ironwork hinges were common for church doors, and window openings were frequently protected by wrought iron bars.

Lead, because of its resistance to water, has traditionally been used for roof coverings. It was used from antiquity as a substitute for bronze and precious metals for the casting of metal sculpture. Lead garden figures, weather resistant and soft and silvery in colour, became popular in the late 17th century when some outstanding vases and statues were cast.

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metameric segmentation, also called METAMERISM: *see* segmentation.

metamorphic rock, any of a class of rocks that result from the alteration of preexisting rocks in response to changing environmental conditions, such as variations in temperature, pressure, and mechanical stress, and the addition or subtraction of chemical components. The preexisting rocks may be igneous, sedimentary, or other metamorphic rocks.

A brief treatment of metamorphic rocks follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

The relative influence of the above-mentioned physical conditions defines the type of metamorphism involved. There are four basic kinds of metamorphic processes: (1) cataclastic, stress with low pressure; (2) contact, high temperature with low pressure; (3) regional, low to high temperature generally correlated with pressure; (4) metasomatic, wide range of temperatures and pressures in the presence of solutions.

The structure and mineralogy of any given metamorphic rock are reflective of the particular type of metamorphism that produced the rock. Its texture is determined by changes in the interrelationship between grains resulting from growth in the solid state, as opposed to liquid crystallization. The shape of the new crystals may be irregular or regular with crystal faces depending on the mineral type and the presence or absence of stress. Granoblastic texture describes a rock with grains having no preferred shape or relative orientation. Preferred orientation is exhibited by some rocks because of the growth of minerals with platy or elongate habit. This particular texture is manifested by micas in a rock called schist; the parallel alignment of most mica imparts a layered or foliated texture. Relic textures refer to those inherited from the preexisting rocks. Common relic textures include a preexisting mineral shielded from reaction by a new stable mineral overgrowth, or mineral layering that represents sedimentary layering. Folds or other deformation structures can be used to ascertain the direction of stress.

Metamorphic rocks formed by contact metamorphism are limited in extent and closely associated with an igneous intrusion. Pressure gradients are absent and fluid effects are dependent on the type of intrusion. A typical resultant rock has a hornfels texture with fine-grained, equidimensional grains. In common sedimentary rocks a sequence of minerals forms in response primarily to temperature changes. Such minerals include andalusite, cordierite, anorthite, diopside, grossularite, and wollastonite.

Because of the large areas affected, the most common metamorphic rocks are those produced by regional metamorphism. Typical rocks of this kind include schists and gneisses, coarse-grained rocks rich in feldspar with equidimensional grains. The coarse-grain size and regional extent both suggest long-term metamorphism characteristic of geosynclinal subsidence. Sedimentary sequences can frequently be traced for considerable distances and the change of mineralogy in response to metamorphism recognized for any restricted compositional range. For each composition, as represented by a particular type of sedimentary or igneous rock, the changes in mineralogy can be shown on a temperature/pressure graph as areas in which a certain mineral assemblage is stable. An examination of a sequence of metamorphic rocks reveals that there is also a general pattern in the structures or textures of the rocks in addition to mineralogic changes. In the case of common sedimentary shale low-grade metamorphism produces a slate, which is a micaceous, fine-grained rock. In turn, the slate becomes phyllite or a coarser-grained, laminated slate, and then schist. Further metamorphism results in a loss of volatile materials and metasomatic changes that produce a gneiss and subsequently a granulite (laminated rock without micas but with pyroxene-feldspar-garnet mineralogy), and finally migmatite, in which evidence of partial melting is present. Other rock compositions show parallel sequences: quartz sandstones become quartzites; limestones become marbles with a sequence of silicate minerals changing with pressure and temperature; and basic igneous rocks become greenschist, amphibolites, and ultimately eclogites. The appearance of characteristic minerals provides a mappable feature indicative of metamorphic intensity: the first occurrence of biotite, garnet, staurolite, kyanite, or sillimanite is represented by an isograd, which is an indicator of constant metamorphic conditions.

metamorphism, mineralogical and structural adjustments of solid rocks to physical and chemical conditions differing from those under which the rocks originally formed. Changes produced by surface conditions such as compaction and very high temperature processes such as partial melting are usually excluded. The most important agents of metamorphism include temperature, pressure, and stress. Equally as significant are changes in chemical environment that result in two metamorphic processes: (1) mechanical dislocation where a rock is deformed, especially as a consequence of differential stress; and (2) chemical recrystallization where a mineral assemblage becomes out of equilibrium due to temperature and pressure changes and a new mineral assemblage forms.

Three types of metamorphism may occur depending on the relative effect of mechanical and chemical changes. Dynamic metamorphism, or cataclasis, results mainly from mechanical deformation with little long-term temperature change. Textures produced by such adjustments range from breccias composed of angular, shattered rock fragments to very fine-grained, granulated or powdered rocks with obvious foliation and lineation. Large, pre-existing mineral grains may be deformed as a result of stress. Contact metamorphism occurs primarily as a conequence of increases in temperature when differential stress is minor. A common phenomenon is the effect produced adjacent to igneous intrusions where several metamorphic zones represented by changing mineral assemblages reflect the temperature gradient from the high-temperature intrusion to the low-temperature host rocks; these zones are concentric to the intrusion. Because the volume affected is small, the pressure is near constant. Resulting rocks have equidimensional grains because of a lack of stress and are usually fine-grained due to the short duration of metamorphism. Regional metamorphism results from the general increase, usually correlated, of temperature and pressure over a large area. Grades or intensities of metamorphism are represented by different mineral assemblages that either give relative values of temperature or absolute values when calibrated against laboratory experiments. Regional metamorphism can be subdivided into different pressure-temperature conditions based on observed sequences of mineral assemblages.

Other types of metamorphism can occur. They are retrograde metamorphism, the response of mineral assemblages to decreasing temperature and pressure; metasomatism, the metamorphism that includes the addition or subtraction of components from the original assemblage; poly-metamorphism, the effect of more than one metamorphic event; and hydrothermal metamorphism, the changes that occur in the presence of water at high temperature and pressure which affect the resulting mineralogy and rate of reaction.

metamorphosis, in biology, striking change of form or structure in an individual after hatching or birth. Hormones called molting and juvenile hormones, which are not species specific, apparently regulate the changes. These physical changes as well as those involving growth and differentiation are accompanied by alterations of the organism's physiology, biochemistry, and behaviour.

The immature forms, or larvae, are adapted to environments and modes of life that differ from those of the adult forms. These differences may be of significance in assuring that larvae and adults of the same species do not engage in direct competition for food or living space. Examples of metamorphosis include the tadpole, an aquatic larval stage that transforms into the land-dwelling frog (class Amphibia). Starfishes and other echinoderms undergo a metamorphosis that includes a change from the bilateral symmetry of the larva to the radial symmetry of the adult. Metamorphic patterns are well-known in crabs, lobsters, and other crustaceans and also in snails, clams, and other mollusks. The larval form of the urochordate (*e.g.,* the tunicate, or sea squirt) is tadpole-like and free swimming; the adult is sessile and somewhat degenerate.

Among the most dramatic and thoroughly studied examples of metamorphosis are the insects. Because development is not the same in all insects, it is convenient to group them into major categories according to the pattern of structural changes: ametabolous, hemimetabolous, and holometabolous. In ametabolous development there is simply a gradual increase in the size of young until adult dimensions are attained. This kind of development occurs in the silverfish, springtail, and other primitive insects. In more advanced insects (*e.g.,* grasshoppers, termites, true bugs) a phenomenon known as gradual, or hemimetabolous, metamorphosis occurs. The hemimetabolous life cycle consists of egg, nymph, and adult. The nymph, or immature insect, resembles the adult in form and eating habits, differing in size, body proportions, and colour pattern. Rudimentary wings are visible and develop externally. Development is gradual through a series of molts (periodic shedding of the outer skeleton), the adult emerging from the final molt.

Complete, or holometabolous, metamorphosis is characteristic of beetles, butterflies and moths, flies, and wasps. Their life cycle includes four stages: egg, larva (*q.v.*), pupa (*q.v.*), and adult. The larva differs greatly from the adult. It is wingless, and its form and habits are suited for growth and development rather than reproduction. The change to the adult occurs during the inactive, nonfeeding pupal stage. At this time the larva undergoes a transformation in which the wings appear externally, larval organs and tissues are broken down, and adult structures are developed. Hypermetamorphosis, a form of complete metamorphosis, occurs in some beetles, flies, and other insects and is characterized by a series of larval stages.

metanephros, permanent kidney in reptiles, birds, and mammals, developing by the 10th week in human embryos from the lower part of the Wolffian duct, and replacing the embryonic structure called the mesonephros. It consists of a compact, paired organ containing many nephrons; a ureter separate from the Wolffian duct leads from the metanephros to the bladder.

Metaphen (disinfectant): *see* nitromersol.

metaphor, figure of speech that implies comparison between two unlike entities, as distinguished from simile, an explicit comparison signalled by the words "like" or "as."

The distinction is not simple. The metaphor makes a qualitative leap from a reasonable, perhaps prosaic comparison, to an identification or fusion of two objects, to make one new entity partaking of the characteristics of both. Many critics regard the making of metaphors as a system of thought antedating or bypassing logic.

Metaphor is the fundamental language of poetry, although it is common on all levels and in all kinds of language. Many words were originally vivid images, although they exist now as dead metaphors whose original aptness has been lost—for example, "daisy" (day's eye). Other words, such as "nightfall," are dormant images. In addition to single words, everyday language abounds in phrases and expressions that once were metaphors. "Time flies" is an ancient metaphorical expression. When a poet says "The Bird of Time has but a little way / To flutter—and the Bird is on the Wing" (*The Rubáiyát of Omar Khayyam*), he is constructing a new metaphor on the foundations of an older, stock metaphor. When Tennessee Williams entitles his play *Sweet Bird of Youth,* he, too, is referring to that Bird of Time that flies. Thus, metaphorical language develops continuously in complexity just as ordinary language does.

In poetry a metaphor may perform varied functions from the mere noting of a likeness to the evocation of a swarm of associations; it may exist as a minor beauty or it may be the central concept and controlling image of the poem. The familiar metaphor "Iron Horse," for train, for example, becomes the elaborate central concept of one of Emily Dickinson's poems, which begins

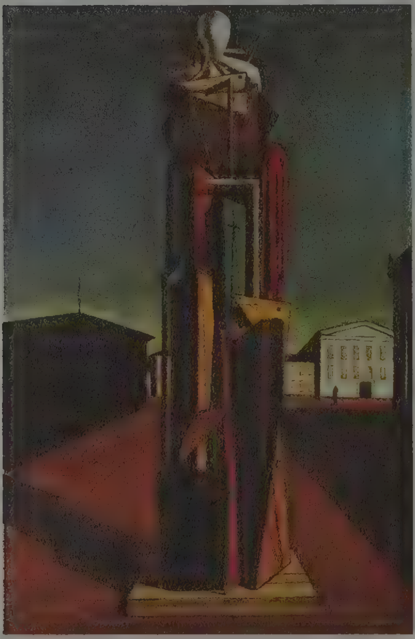
> I like to see it lap the Miles,
> And lick the Valleys up,
> And stop to feed itself at Tanks;
> And then prodigious step . . .

A mixed metaphor is the linking of two or more disparate elements, which often results in an unintentionally comic effect produced by the writer's insensitivity to the literal meaning of words or by the falseness of the comparison. A mixed metaphor may also be used with great effectiveness, however, as in Hamlet's

> Whether 'tis nobler in the mind to suffer
> The slings and arrows of outrageous fortune
> Or to take arms against a sea of troubles . . .

in which "sea" should be replaced by "host" for the strictly correct completion of the metaphor.

Metaphysical painting, style of painting that flourished mainly between 1911 and 1920 in the works of the Italian artists Giorgio De Chirico, Carlo Carrà, and Giorgio Morandi. These painters' representational but bizarre and incongruous imagery produces strange, disquieting effects on the viewer. Juxtaposing disparate objects set into deep perspectives, these works strongly influenced the Surrealists in the 1920s.



"The Great Metaphysician," Metaphysical painting by Giorgio De Chirico, oil on canvas, 1917; in the Museum of Modern Art, New York City

Collection, The Museum of Modern Art, New York City, the Philip L. Goodwin Collection

Metaphysical painting originated with De Chirico. In Munich, where he spent his youthful formative years, De Chirico was attracted to 19th-century German Romantic painting and to the works of the philosophers Arthur Schopenhauer and Friedrich Nietzsche. The latter's search for hidden meanings beyond surface appearances and his descriptions of empty squares surrounded by arcaded buildings in the Italian city of Turin made a particularly deep impression on De Chirico; his 1915 painting "Turin Melancholy" (Carlo Frua de Angeli Collection, Milan), for example, illustrates just such a square, with unnaturally sharp contrasts of light and shadow that lend an aura of poignant but vaguely threatening mystery to the scene. The arcades in this painting, as well as the deep perspectival space and dark-toned sky, are pictorial devices found in many of De Chirico's strange, evocative works. The enigmatic titles of his paintings contribute to their dreamlike effect: "The Nostalgia of the Infinite" (Museum of Modern Art, New York City), "The Philosopher's Conquest" (Art Institute of Chicago), and "The Soothsayer's Recompense" (Philadelphia Museum of Art).

Many of De Chirico's paintings depict mannequins, as do the works done around 1917–21 by the former Futurist Carlo Carrà, who came under his influence. The two artists met in 1917, in Ferrara where, together with De Chirico's younger brother—a poet, musician, and painter known as Alberto Savinio—they formulated the rather obscure principles of the *scuola metafisica* (Metaphysical school). De Chirico, however, had already arrived at his Metaphysical style several years before the movement came into existence and, by 1911, had shown paintings of this nature in Paris. Other adherents to Metaphysical painting were Filippo de Pisis and Mario Sironi. The Metaphysical school proved short-lived, however, and came to an end around 1920 because of dissension between De Chirico and Carrà over who had founded the group. De Chirico's work done after 1919 lost much of its mysterious power and eventually sank into a degraded and eccentric classicism.

Metaphysical poet, any of the poets in 17th-century England who inclined to the personal and intellectual complexity and concentration that is displayed in the poetry of John Donne, the chief of the Metaphysicals. Others include George Herbert, Henry Vaughan, Richard Crashaw, Andrew Marvell, John Cleveland, and Abraham Cowley.

Their work is a blend of emotion and intellectual ingenuity, characterized by conceit (*q.v.*) or "wit"—that is, by the sometimes violent yoking together of apparently unconnected ideas and things so that the reader is startled out of his complacency and forced to think through the argument of the poem. Metaphysical poetry is less concerned with expressing feeling than with analyzing it, with the poet exploring the recesses of his consciousness. The boldness of the literary devices used—especially obliquity, irony, and paradox—are always reinforced by a dramatic directness of language, whose rhythm is derived from that of living speech.

Esteem for Metaphysical poetry never stood higher than in the 1930s and '40s, largely because of T.S. Eliot's influential essay "The Metaphysical Poets" (1921). In this essay Eliot pointed out that the works of these men embody a fusion of thought and feeling that later poets were unable to achieve because of a "dissociation of sensibility," which resulted in works that were either intellectual or emotional but not both at once. In their own time, however, the epithet "metaphysical" was used pejoratively: in 1630 the Scottish poet William Drummond of Hawthornden objected to those of his contemporaries who attempted to "abstract poetry to metaphysical ideas and scholastic quiddities." At the end of the century, John Dryden censured Donne for affecting "the metaphysics" and for perplexing "the minds of the fair sex with nice speculations of philosophy when he should engage their hearts . . . with the softnesses of love." Samuel Johnson, in referring to the learning that their poetry displays, also dubbed them "the metaphysical poets," and the term has continued in use ever since. For an attempt to establish the justice of this term in relation to their work, Sir Herbert Grierson's *Metaphysical Poems and Lyrics of the 17th Century* (1921) and James Smith's essay "On Metaphysical Poetry" in *Determinations* (ed. F.R. Leavis, 1934) are of interest.

metaphysics, branch of philosophy concerned with critically examining basic philosophical assumptions and identifying what exists insofar as it exists. Metaphysics interacts with such other philosophical studies as logic, epistemology, aesthetics, and ethics.

A brief treatment of metaphysics follows. For full treatment, *see* MACROPAEDIA: Metaphysics.

Metaphysics has by tradition concerned itself with issues of broad philosophical interest. One of the most basic issues, first addressed by ancient Greek philosophers, is the existence and nature of forms, *i.e.,* abstract realities which are objects of the mind. Since the classical Greek philosophers distinguished between objects of the real world—sensible things—and objects of the mind—ideas—metaphysical philosophers have concerned themselves with the relationship between abstractions and substances, trying to determine whether both are real or whether one is somehow more real than the other. Metaphysicians have interpreted the natural world, the significance of time and space, and the existence and nature of God, all in an attempt to understand the relationship between form and idea.

Metaphysical argument is by and large an a priori process. A priori arguments start with basic, mutually consistent assumptions and develop them through to their logical conclusions. If absurdities arise during this deductive process, the original principles must be rejected or reevaluated. Since metaphysical conclusions are by nature extremely general, all-encompassing assertions that are paradigms of thought rather than statements of empirical fact, refuting them with counterexamples is ineffective criticism. Moreover, unlike in the empirical sciences, where new knowledge supersedes old beliefs, numerous conflicting metaphysical theories have all stood the test of time, affirming the notion that there is no single metaphysical truth.

The first metaphysicians, Parmenides and Plato, recognized a basic distinction between appearance and reality. Plato rejected the changeable, deceptive reality of the sensible world in favour of the unchanging and therefore truthful world of ideas. Aristotle began with Plato's distinction between form and matter and then integrated the two using a biological model. Aristotle assumed that matter was always moving toward its potential ideal form. In this way the material world is seen as a continuum of organic change.

With the development of Christianity, philosophers became concerned with finding an a priori proof of God's existence. Thomism, based on the metaphysics of St. Thomas of Aquinas, combined Aristotelian and Christian thought. According to St. Thomas, the contemplation of the everyday (which was the basis of Aristotle's examination of the relationship between form and matter) inevitably leads to the understanding that God exists and is the prime and sustaining cause of the material world. By examining the finite, ever-changing material world, one is inevitably led to the source of change, *i.e.,* God.

René Descartes caused another major shift in metaphysical thought. His dualistic philosophy defined the material and mental spheres as separate, independent realms. Rejecting the notion of God proposed by the Christian philosophers, Descartes postulated that the material world was set up by a prime agent, but thereafter, like a great mechanism, it ran free of divine interaction. Immanual Kant accepted dualism but rejected Descartes's explanation and revolutionized metaphysics by demonstrating the importance of perception. According to Kant, objective reality must be perceived through the human constructs of time and space. Thus the human view of the material world would always be influenced by the perceiving mechanism. What earlier metaphysicians had considered objective reality, Kant rejected as such, subordinating all observation to the mechanism of observation.

Materialism and Idealism tried to synthesize the concepts of mind and matter within a single theory. The Idealists merged the two spheres by subordinating matter to mind. Materialists assumed the antithetical position, subordinating mind to matter and asserting that all that existed was matter and that the mind was dependent on objective circumstances.

Several philosophers have questioned the validity of metaphysical methodology and conclusions. David Hume asserted that all knowledge comes through the senses. Since all basic concepts are derived from sense experience, Hume concluded that there is no pure thought. Logical Positivism, a 20th-century school of philosophy, asserted that any statement's meaning depends on how it can be verified. Since metaphysical statements cannot be verified, Logical Positivists concluded that metaphysical assertions have no meaning.

Ludwig Wittgenstein's criticism viewed metaphysical experience as something beyond the realm of language. Wittgenstein argued that there were things that could be said and things that could only be shown. Metaphysical theorizing is unsuccessful because it tries to talk about a realm that exists outside of the realm that language can illuminate.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

metaplasia, in zoology, the conversion of one type of living cell or group of cells into another as a means of regeneration. For example, the damaged or removed lens of a salamander eye is replaced through the transformation of nearby pigmented iris cells into lens cells. The regeneration of brain tissue from epidermis in annelid worms is another well-documented example of metaplasia. The term metaplasia also refers to the abnormal replacement of cells of one type by those of another type.

Metapontum, Greek METAPONTION, ancient Greek city in Italy on the Gulf of Tarentum, near the mouth of the Bradanus (Bradano) River. It was founded by an Achaean colony from Sybaris and Croton about 700 BC. Pythagoras died at Metapontum *c.* 500. The city declined after 207 when its inhabitants, who had supported Hannibal in the years following his victory at the Battle of Cannae (216), followed the defeated Carthaginian general in his retreat.

Tavole Paladine, Metapontum, 570–480 BC
G. Tomisch—Photo Researchers

At Metapontum are the remains of two temples, both dating from 570 to 480 BC. Of the first, probably dedicated to Apollo Lyceius, only the foundations remain; 15 columns still stand of the second temple, Tavole Paladine, which lies outside the area of the ancient city.

Metasequoia (tree): *see* dawn redwood.

metasilicate (mineralogy): *see* inosilicate.

metasomatic replacement, the process of simultaneous solution and deposition whereby one mineral replaces another. It is an important process in the formation of epigenetic mineral deposits (those formed after the formation of the host rock), in the formation of high- and intermediate-temperature hydrothermal ore deposits, and in supergene sulfide enrichment (enriched by generally downward movement). Metasomatic replacement is the method whereby wood petrifies (silica replaces the wood fibres), one mineral forms a pseudomorph of another, or an ore body takes the place of an equal volume of rock.

Replacement occurs when a mineralizing solution encounters minerals unstable in its presence. The original mineral is dissolved and almost simultaneously exchanged for another. The exchange does not occur molecule for molecule, but volume for volume; hence, fewer molecules of a less dense mineral will replace those of a more dense mineral. Replacement takes place first along major channels in a host rock through which the hydrothermal solutions flow. Smaller openings, even those of capillary size, eventually are altered, the smallest by diffusion at the very front of the exchange where solutions cannot flow.

Early-formed replacement minerals are themselves replaced, and definite mineral successions have been established. The usual sequence among the commoner hypogene (deposited by generally ascending solutions) metallic sulfide minerals is pyrite, enargite, tetrahedrite, sphalerite, chalcopyrite, bornite, galena, and pyrargyrite.

Although replacement can occur at any temperature or pressure, it is most effective at elevated temperatures, at which chemical activity is enhanced. Replacement by cold circulating waters mostly is confined to soluble rocks, such as limestone. These may be replaced by iron oxides, manganese oxides, or calcium phosphates; vast surface deposits of copper and zinc carbonates have also formed where limestones were replaced, and valuable deposits have occurred where supergene sulfide enrichment (*q.v.*) occurs. With higher temperatures, replacement increases until, at high temperatures, hardly any rock may resist. Solutions at intermediate temperatures form simple sulfides and sulfosalts for the most part, and those at higher temperatures form sulfides and oxides. Replacement deposits are the largest and most valuable of all metallic ore deposits except those of iron.

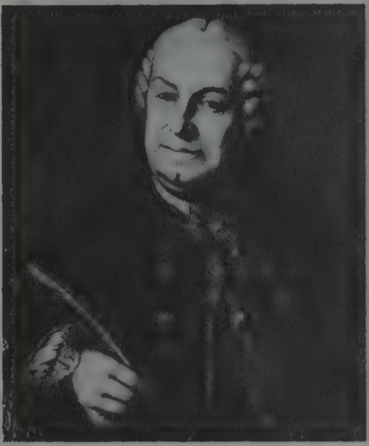
metastable state, in physics and chemistry, particular excited state of an atom, nucleus, or other system that has a longer lifetime than the ordinary excited states and that generally has a shorter lifetime than the lowest, often stable, energy state, called the ground state. A metastable state may thus be considered a kind of temporary energy trap or a somewhat stable intermediate stage of a system the energy of which may be lost in discrete amounts. In quantum mechanical terms, transitions from metastable states are "forbidden" and are much less probable than the "allowed" transitions from other excited states.

There are many examples of metastable states in atomic and nuclear systems. Analysis of atomic spectra often reveals metastable states as relatively final energy levels to which electrons have cascaded from higher energy levels in the act of generating light. Light energy trapped for a time in metastable mercury atoms accounts for the many photochemical reactions of this element. Metastable states of atomic nuclei give rise to nuclear isomers that differ—in energy content and mode of radioactive decay—from other nuclei of the same element.

Metastable atoms often lose their stored energy by collision with other atoms before they can radiate it, but in the rarefied upper atmosphere of Earth, in which atoms travel a longer time before collision, radiation from metastable oxygen atoms seems to account for the characteristic green colour of the aurora borealis and aurora australis. Metastable nuclei lose their energy by radioactive decay, usually by gamma radiation.

Metastasio, Pietro, original name PIETRO ARMANDO DOMINICO TRAPASSI (b. Jan. 3, 1698, Rome—d. April 12, 1782, Vienna), Italian poet and the most celebrated librettist in Europe writing during the 18th century for the opera seria (*q.v.*). In 1708 his astonishing skill in verse improvisation attracted the attention of Gian Vincenzo Gravina, a man of letters who made him his heir adoptive and Hellenized his name into "Metastasio."

In 1712, after receiving a good education from Gravina, Metastasio was taken to Scalea in Calabria, where he studied for some months with Gregorio Caloprese, the Cartesian philosopher. At the age of 14 he wrote *Giustino*, a tragedy in the Senecan style; and in 1717 he published a book of verses. In 1718 Metastasio entered the Accademia dell'Arcadia, and in 1719 he went to Naples where he was employed in a law office and gained acceptance in aristocratic circles through his voluptuous wedding poems.



Metastasio, detail of an oil painting by an unknown artist; in the Biblioteca Angelica, Rome
By courtesy of the Biblioteca Angelica, Rome; photograph, Aldo Marcucci

In honour of the birthday of the Empress of Austria, Metastasio composed *Gli orti esperidi* (1721), a serenata in which the principal role was taken by the prima donna Marianna Benti-Bulgarelli, called La Romanina, who became enamoured of the poet. In her salon Metastasio formed his lifelong friendship with the castrato male soprano Carlo Farinelli and came to know such composers as Nicola Porpora (from whom he took music lessons), Domenico Sarro, and Leonardo Vinci, who were later to set his works to music.

In this environment Metastasio's success was assured. At the request of La Romanina he gave up the law and composed his first *melodramma*, a lyric tragedy in three acts on the conflict of love and duty, called *Didone abbandonata* (1723, first performance 1724; *Dido Forsaken,* 1952). *Didone* was followed, between 1726 and 1730, by *Siroe, Catone in Utica, Ezio, Semiramide riconosciuta, Alessandro nell'Indie*, and *Artaserse*. On the recommendation of his friend and patroness Marianna Pignatelli, countess of Althann, Metastasio received an invitation (1729) from the emperor of Austria. In March 1730 he went to Vienna, where he lived the rest of his life as poet laureate to the imperial court.

During the reign of Charles VI Metastasio wrote cantatas, oratorios, and 11 *melodrammi*, some of the best of which—*Demetrio, Olimpiade, Demofoonte, La clemenza di Tito*, and *Attilio Regolo*—were performed as plays in their own right as well as being set to music by virtually every composer from Pergolesi to Mozart. After 1740, with the accession of Maria Theresa, Metastasio was not so well placed. He continued to be extremely productive until 1771, and his work was always honoured. But the Empress did not permit the same lavish expenditure on operatic spectacles as her predecessor, and Metastasio's talents gradually went into decline.

Metastasio's other writings include a rich *Epistolario* and five *canzonette*, of which *La libertà* (1733) and *La partenza* (1746) are outstanding examples of Italian verse in the Arcadian tradition. He also wrote works of criticism, the most interesting being the *Estratto della Poetica d'Aristotele* (1782), an exposition of his dramatic theories. Metastasio's works ran into innumerable editions. During the 18th century his verses were translated into many European languages.

metatarsal, any of several tubular bones between the ankle (tarsal) bones and each of the hindlimb digits, in land vertebrates corresponding to the metacarpal bones of the hand (forepaw). In humans the five metatarsal bones help form longitudinal arches along the inner and outer sides of the foot and a transverse arch at the ball of the foot. The first metatarsal (which adjoins the phalanges of the big toe) is enlarged and strengthened for its weight-bearing function in standing and walking on two feet.

metatarsalgia, disorder in which the weight of the body, when standing, rests on the centre of the anterior arch of the foot (on the heads of the central metatarsal bones) instead of on the inside and outside of the foot. Pain when walking may be severe, callosities develop on the area of stress, and there is a tendency to fracture of the metatarsals. The cause of metatarsalgia may be developmental or may occur secondary to another disease. Treatment consists in placing sponge-rubber pads in the shoes in such a position as to maintain normal formation of the anterior arch. A special form of metatarsalgia, Morton's toe, occurs in the middle-aged and is caused by enlargement of the digital nerve as it passes between the metatarsal heads to the toes. Constant severe pain is the main symptom, and treatment is by excision of the enlarged nerve.

metatexis, the process in which the magma-like portion of migmatites (mixed rocks that have granitic layers or veinlike bodies) is emplaced within a host rock of different composition. Migmatites may form by the injection of granitic magma (the metatect) into the host or by the partial fusion of the host itself; they form under the most extreme temperatures and pressures reached during regional metamorphism and are generally associated with rocks of the granulite facies. Such rocks, considered to represent the deeper parts of folded mountain belts, are often associated with large granitic bodies. The origin of these granites is closely tied to the migmatites because the metamorphic or igneous origin of the latter may be extrapolated to interpret the origin of the granitic body.

metatheory, a theory the subject matter of which is another theory. A finding proved in the former that deals with the latter is known as a metatheorem.

The most notable example of a metatheory was provided by David Hilbert, a German mathematician, who in 1905 set out to construct an elementary proof of the consistency of mathematics. For this purpose he needed a theory that studies mathematics and has mathematical proofs as the objects to be investigated. Although theorems proved in 1931 by Kurt Gödel, a Moravian-U.S. mathematical logician, made it unlikely that Hilbert's program could succeed, his metamathematics became the forerunner of much fruitful research. From the late 1920s Rudolf Carnap, a leading philosopher of science and of language, extended this inquiry, under the headings metalogic and logical syntax, to the study of formalized languages in general.

In discussing a formalized language it is usually necessary to employ a second, more powerful language. The former is then known as the object language, whereas the second is its metalanguage.

Metatron, greatest of angels in Jewish myths and legends, variously identified as the Prince (or Angel) of the Presence, as Michael the archangel, or as Enoch after his ascent into heaven. He is likewise described as a celestial scribe recording the sins and merits of men, as a guardian of heavenly secrets, as God's mediator with men, as the "lesser Yahweh," as the archetype of man, and as one "whose name is like that of his master." The latter appellation is based on Hebrew numerology; *i.e.,* when the consonants that comprise the names Metatron and Shaddai (Almighty) are analyzed according to preassigned numerical values, each name totals 314. Elisha ben Abuyah (flourished *c.* AD 100) is said to have apostasized after having had a vision of Metatron.

Metauro River, Italian FIUME METAURO, also called METRO, Latin METAURUS, river, Marche region, central Italy, rising in the Etruscan Apennines (Appennino Tosco-Emiliano) and flowing for 68 mi (109 km) east-northeast into the Adriatic Sea just south of Fano. The lower valley of the river (the ancient Metaurus) was the scene of a great Roman victory over the Carthaginians in 207 BC, when the consuls Marcus Livius Salinator and Claudius Nero defeated and slew Hasdrubal, the brother of the Carthaginian leader Hannibal. The battle was a decisive turning point in the Second Punic War.

Metaxas, Ioannis (b. April 12, 1871, Ithaca, Greece—d. Jan. 29, 1941, Athens), general and statesman, dictator of Greece from 1936 to 1941.

After active service in the Greco-Turkish war (1897), Metaxas completed his military training in Germany. He distinguished himself on the Greek general staff during the Balkan Wars (1912–13) and was appointed chief of staff in 1913 and promoted to general in 1916. During World War I he unsuccessfully fought to maintain Greek neutrality and opposed the plans of premier Eleuthérios Venizélos for the conquest of western Anatolia, accurately predicting the military catastrophe that ultimately overtook the Greek offensive in Anatolia in 1921–22. Strongly monarchist in his politics, he left the country after the deposition of King Constantine (1917), but returned after the King's restoration in 1920. With the fall of the monarchy in 1923, Metaxas again temporarily left Greece, but later held ministerial office under the republic (1928).

During the following years Metaxas provided doughty opposition to the government at the head of a small ultraroyalist party; shortly after the monarchy's restoration in 1935 King George II appointed him premier (April 13, 1936). Finally, on Aug. 4, 1936, he inaugurated a dictatorship under royal authorization. His Fourth of August Regime vigorously suppressed political opposition and succeeded in carrying out some beneficial economic and social reforms. When Italy invaded Greece in 1940, Metaxas brought a united country into the Western alliance. He remained in power until his death.

métayage (French), Italian MEZZADRIA, type of land tenure whereby the cultivator (metayer) uses land without owning it and pays rent in kind to the owner. Pure métayage is a form of share tenancy involving payment of approximately half the annual output; the métayer's family permanently occupies the land that it works. The term describes what was probably the dominant type of land tenure in 18th-century France, certainly in southern France, and in parts of Italy.

The typical French métayer's holding was small, consisting of either a single compact unit or scattered plots. The landowner usually furnished the chief capital items, possibly including livestock. Custom, rather than written contracts, prevailed. With the increasing use of money contracts that accompanied the growth of a market economy after 1800, métayage yielded largely to simple peasant tenure.

The economic and social conditions from which métayage emerged in late medieval France, including great population pressure on a limited land supply, have at various times also existed in India, Japan, eastern Europe, and the southern United States and have produced similar sharecropping systems.

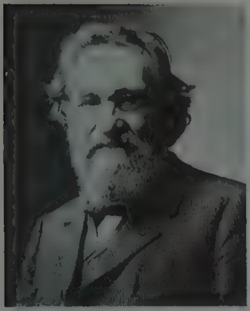
Metcalfe (of Fern Hill), Charles T(heophilus) Metcalfe, Baron, 2ND BARONET (b. Jan. 30, 1785, Calcutta—d. Sept. 5, 1846, Malshanger, Hampshire, Eng.), British overseas administrator who, as acting governor general of India, instituted in that country important reforms, particularly freedom of the press and the establishment of English as the official language. He later served as crown-appointed governor of Jamaica and governor general of Canada.

The second son of Maj. Thomas Metcalfe, who became a director of the East India Company and was made a baronet in 1802, Charles Metcalfe was educated at Eton College, Buckinghamshire. Returning to Calcutta (1801), he became a writer in the company's service. In 1803 he became personal secretary to the governor general, Lord Wellesley. He served as political assistant to Gen. Gerard Lake in the Third Marāthā War (fought between the British and the Marāthās of southwestern India). In 1808 he was sent as envoy to Lahore to secure Sikh support against the Napoleonic threat to India, afterward securing the Sikhs' agreement to British protection of all Sikh states east of the Sutlej River. He then served as resident in Gwalior (1810), in Delhi (1811–19), and in Hyderābād (1820–22), succeeding to the baronetcy in 1822.

Metcalfe became a member of the all-India governing supreme council in 1827 and, on Lord William Bentinck's departure in March 1835, acting governor general. The British government, refusing to retain an East India Company official as governor general, appointed Lord Auckland to the post. Metcalfe was made lieutenant governor of the northwest provinces the following year, but, denied governorship of Madras, he resigned in 1838 and returned to England. The following year he was appointed governor of Jamaica, where he eased the transition to the emancipation of blacks and updated judicial practices. Suffering from cancer, he resigned in 1842 and returned to England, but the following year he accepted the governor generalship of Canada, where he grappled with party politics. His health failing, he returned to England in 1845, soon after being raised to the peerage.

Metchnikoff, Élie, Russian ILYA ILICH MECHNIKOV (b. May 15, 1845, near Kharkov, Ukraine—d. July 16, 1916, Paris), Russian zoologist and microbiologist, who received (with Paul Ehrlich) the 1908 Nobel Prize for Physiology or Medicine for discovery in animals of amoeba-like cells that engulf foreign bodies such as bacteria—a phenomenon known as phagocytosis and a fundamental tenet of the science of immunology.

A graduate of the Kharkov A.M. Gorky State University (1864), he was professor of zoology and comparative anatomy at the University of Odessa (1870–82). In Messina, Italy (1882–86), while studying the origin of digestive organs in starfish larvae, he observed



Metchnikoff

H. Roger-Viollet

that certain cells unconnected with digestion surrounded and engulfed carmine dye particles and splinters that he had introduced into the bodies of the larvae. He called these cells phagocytes (from Greek words meaning "devouring cells").

Working at the Bacteriological Institute, Odessa (1886–87), and at the Pasteur Institute, Paris (1888–1916), which he directed (1895–1916), Metchnikoff established that the phagocyte is the first line of defense against acute infection in most animals, including man, whose phagocytes are known as leukocytes, or white blood cells. With the French bacteriologist Émile Roux, Metchnikoff succeeded in transmitting syphilis to apes (1903). He devoted the last decade of his life to the study of lactic acid-producing bacteria as a means of increasing human longevity. He wrote *The Comparative Pathology of Inflammation* (1892), *L'Immunité dans les maladies infectieuses* (1901; *Immunity in Infectious Diseases*), and *Études sur la nature humaine* (1903; *The Nature of Man*).

Metel, François Le: *see* Boisrobert, François Le Metel, seigneur de.

Metellus, Lucius Caecilius (d. 221 BC), Roman general during the First Punic War (264–241 BC).

As consul in 251, Metellus decisively defeated the Carthaginian general Hasdrubal at Panormus (now Palermo, Sicily) by panicking the enemy's elephants. Thereafter the image of an elephant frequently appeared on coins issued by the Metelli family. Metellus held a second consulship in 247. He is said to have been blinded in 241 while rescuing the statue of Minerva from a fire in the temple of Vesta.

Metellus Celer, Quintus Caecilius (d. 59 BC), Roman politician, a leading supporter of the Optimates (conservative senatorial aristocracy) and opponent of Pompey the Great.

Metellus was legate under Pompey in Asia in 66. As praetor in 63, he was sent to northern Italy to cut off the retreat of the rebel Catiline. During his consulship (60) Metellus turned against Pompey, who had divorced his sister. He persuaded the Senate to reject the proposed agrarian law that was to provide land grants for veterans discharged from Pompey's legions.

Metellus Creticus, Quintus Caecilius (fl. 1st half of the 1st century BC), Roman general.

Consul in 69 BC, Metellus was appointed to the command of the war against Crete, the headquarters of the pirates of the Mediterranean. Two years later the Senate passed the Lex Gabinia, giving Pompey absolute control of all operations against the pirates. The Cretans offered to surrender to Pompey, who instructed Metellus to cease operations. Metellus refused and completed the conquest of the island, which was annexed to Cyrene and became a Roman province. Pompey's partisans prevented Metellus from celebrating a triumph at Rome until 62, and in retaliation Metellus led the senatorial opposition that temporarily blocked ratification of Pompey's Asiatic settlement.

Metellus Macedonicus, Quintus Caecilius (d. 115 BC), Roman general and statesman.

While praetor in 148 Metellus deposed Andriscus, usurper of the throne of Macedonia, with the result that Macedonia became a Roman province. During his consulship of 143, he vanquished the Celtiberians in northern Spain. As censor in 131, he delivered a famous address proposing that all citizens be compelled to marry in order to increase the birth rate. Metellus opposed the agrarian reforms of the Gracchi (the brothers Tiberius Sempronius and Gaius Sempronius Gracchus) and participated in the attack in which Gaius Gracchus was killed (121). He erected a splendid colonnade in the Campus Martius and two temples dedicated to Jupiter Stator and Juno.

Metellus Numidicus, Quintus Caecilius (d. *c.* 91 BC), Roman general during the Jugurthine War (111–105) and a leader of the Optimates (conservative senatorial aristocracy).

As consul in 109 Metellus defeated the Numidian leader Jugurtha by the River Muthul in North Africa. Despite further military successes against Jugurtha, he lost his command to his subordinate Gaius Marius, who was elected consul for 108 despite Metellus' opposition. As censor in 102, Metellus unsuccessfully attempted to remove the reformers Lucius Appuleius Saturninus and Gaius Servilius Glaucia from the Senate, and in 100 he went into exile to escape having to swear support for Saturninus' agrarian law. Metellus returned to Rome in 99, the year after Saturninus was killed, but thenceforth took no part in politics.

Metellus Pius, Quintus Caecilius (d. *c.* 63 BC), one of the commanders of the Social War (90–89), who later defeated Quintus Pompaedius Silo, the Marsian leader (88). He earned his surname Pius (signifying filial devotion) by his attempts to obtain the recall from exile of his father, Quintus Caecilius Metellus Numidicus.

Metellus was praetor in 89 and was given proconsular command over southern Italy when Sulla left Rome to campaign in the East (86). He was unable to defend the city from the Marians (supporters of Sulla's rival, Gaius Marius). He retired to Africa but rejoined Sulla in Italy in 83. In the brief ensuing civil war against the Marians, Metellus overwhelmingly defeated Gaius Norbanus at Faventia (now Faenza) in 82. Consul with Sulla in 80, he was sent to Spain to fight the rebel Quintus Sertorius, who pressed him hard until the arrival of Pompey in 76. In the decisive battle of the war Sertorius' lieutenant, Lucius Hirtuleius, was routed at Segovia (75). In 71 Metellus returned to Rome and celebrated a triumph. He was *pontifex maximus* ("high priest") from *c.* 81.

Metellus Pius Scipio, Quintus Caecilius (d. 46 BC), Roman politician, a leading supporter of his son-in-law Pompey the Great in the power struggle between Pompey and Julius Caesar.

The son of Publius Cornelius Scipio Nasica, Metellus was adopted by Quintus Caecilius Metellus Pius. In 60 the renowned orator Cicero defended him in court against a charge of bribery. Metellus became consul in 52 through the influence of Pompey, who had married his daughter Cornelia. In January 49 Metellus proposed before the Senate that Caesar be declared an enemy of the state if he refused to disband his army. During the ensuing Civil War (Caesar against Pompey and the Optimates, 49–45) Metellus was assigned to govern Syria. He commanded the centre at the battle of Pharsalus in Thessaly (48), where Pompey's army was crushed. Metellus then took charge of the senatorial forces in Africa, but in 46 Caesar decisively defeated him in the bloody battle of Thapsus. Captured while attempting to flee to Spain, he committed suicide.

metempsychosis: *see* reincarnation.

meteor, also called SHOOTING STAR, or FALLING STAR, streak of light in the sky that results when a particle or small chunk of stony or metallic matter enters the Earth's atmosphere and vaporizes. The term is sometimes applied to the falling object itself, but the latter is properly called a meteoroid (*q.v.*). The vast majority of meteoroids burn up in the upper atmosphere, but occasionally one of relatively large mass survives its fiery plunge and reaches the surface as a solid body. Such an object is known as a meteorite (*q.v.*).

A brief treatment of meteors follows. For full treatment, *see* MACROPAEDIA: Solar System.

The speed at which a meteoroid enters the upper atmosphere is dependent primarily on two motions—that of the meteoroid in its elongated orbit and that of the Earth in its path around the Sun. Also, the Earth's gravitational pull on the meteoroid increases its velocity by 3 km (1.9 miles) per second or more. Observations have shown that meteoroids penetrate the atmosphere at velocities ranging from 11 to 72 km (7 to 45 miles) per second.

When a meteoroid plunges toward the Earth at high speed, its surface collides with the atoms and molecules of the atmosphere. These collisions dislodge material from the meteoroid's surface and break up atoms and molecules of both the meteoroid and atmosphere into charged particles. The ionized atoms are excited to produce visible light. Much of this light is generated near the moving solid body, but in the case of very fast, bright meteors a residual luminosity called the train may be left behind the meteor head. As the meteoroid plunges closer to the ground, an extremely dense, hot gas cap develops in front of it. A shock wave also may be produced in the air ahead of the meteoroid. Such atmospheric shock waves may propagate to the Earth's surface because meteoroids travel through the air at five times the speed of sound or higher. A meteoroid weighing about 1 kg (2.2 pounds) penetrating to an altitude of roughly 40 km (25 miles) can produce sounds on the ground resembling thunder or sonic booms.

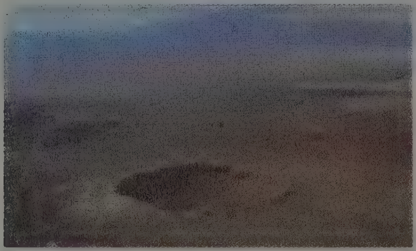
Most meteoroids crumble and disintegrate completely before they reach an altitude of 80 km (50 miles). It has been speculated that meteoroids that readily fragment originated with comets, whereas the denser objects that penetrate to the surface are remnants of asteroids that broke apart hundreds of millions of years ago.

When the Earth encounters swarms of meteoroids moving together, meteor showers become visible. Photographic data indicate that many such phenomena are associated with the orbits of observed comets. For example, the meteor shower known as Eta Aquarid, which can be seen each year in early May, has been identified with Halley's Comet. The meteoroids in the swarm producing this shower are thought to be debris ejected from the comet along its orbit.

Much accurate observational data on meteors has been obtained in recent years by means of special high-speed, wide-angle cameras and electronic image intensifiers. Radar also has been widely used in studying meteors, since radio waves can be bounced off the ionized gases yielded by the vaporizing constituent matter. It is very useful in determining the speed, direction, and height of meteors, particularly in daylight and under weather conditions unfavourable for visual observations.

Meteor Crater, also called BARRINGER CRATER, COON BUTTE, ARIZONA METEOR CRATER, or CANYON DIABLO, rimmed, bowl-shaped pit produced by a large meteorite in the rolling plain of the Canyon Diablo region, 19 miles (30 km) west of Winslow, Ariz., U.S. It is 4,000 feet (1,200 m) in diameter and about 600 feet (180 m) deep inside its rim, which rises nearly 200 feet (60 m) above the plain. Drillings reveal undisturbed rock beneath 700–800 feet of fill. The strata forming the rim of the crater are upturned and covered with the debris of the same bedrock, which shows an inverted stratigraphy.

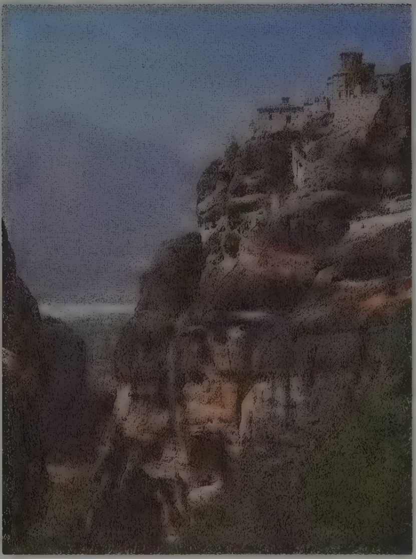
Discovered in 1891, its age has been variously estimated at between 5,000 and 50,000 years. Large numbers of nickel–iron fragments from gravel size to 1,400 pounds (640 kg) have been found in a 100-square-mile (260-square-kilometre) area. The distribution and composition of several thousand tons of sand-grain size nickel–iron droplets indicate that they condensed from a cloud of metallic vapours. Surveys show only fragments within the pit, but the 1960 discovery there of coesite and stishovite, which are high-pressure modifications of silica, helped to confirm the crater's meteoritic origin.


Meteor Crater in Arizona
D.J. Roddy, U.S. Geological Survey

meteor shower, entry into the Earth's atmosphere of a number of meteoroids at approximately the same place and time, traveling in parallel paths and apparently having a common origin. Many meteor showers are associated with comets. Some showers return annually, others at greater intervals, irregularly or not at all, depending on the relative positions of the shower orbits and Earth's orbit.

A meteor shower's name is derived usually from that of the constellation (or of a star therein) in which is situated the shower's radiant—*i.e.,* the point in the sky at which perspective makes the parallel meteor orbits seem to originate. Some showers (*e.g.,* the Bielids, now called Andromedids) are named for an associated comet. The Cyrillid shower of 1913 had no radiant (it seemed to enter the atmosphere from a circular orbit around the Earth) and was named for St. Cyril of Alexandria, on whose feast day (February 9) it was observed. The great Leonid meteor shower of Nov. 12, 1833, in which hundreds of thousands of meteors were observed in one night, was seen all over North America and initiated the first serious study of meteor showers. It was later established that the Leonid shower recurred at 33-year intervals, and occasional records of its appearances were traced as far back as AD 902. Since about 1945, radar observations have revealed meteor showers regularly occurring in the daylight sky, where they are optically invisible.

Metéora, group of monasteries on the summits of rock pinnacles in the *nomós* (department) of Trikala, Thessaly, Greece, just north of the small town of Kalabáka (medieval Stagoi). From the Cambunian Mountains two rock masses, eroded into isolated crags, pinnacles, and mounds of various heights, girths, and shapes, project southward into the valley of the Piniós River. The pinnacles average 1,000 feet (300 m) in height, but several reach 1,800 feet (550 m).


Monastery of St. Varlaám at Metéora, Thessaly, Greece
Robert Harding Picture Library, London

The earliest monastic settlement, a community of anchorites, was the Panayía Dhoúpiani, atop a rock called the pillar of Dhoúpiani. At the base of the pillar is the chapel of the Holy Virgin, dating possibly from the 12th century. About 1350 Athanasios Koinovitis, a monk from the monastic communities on Mount Athos, ascended the *plathy lithos* ("broad rock") and built the first structures of the Great Meteoron, whose regulations forbade access to women. In 1367 the hermit Neilos erected four churches on various rocks, one of which survives. In 1388 Athanasios' pupil, the hermit Ioasaf (son of the King of Serbia), enlarged the Metereon, making it the wealthiest and most prominent. Several more monasteries were erected in the 15th and 16th centuries after the Turkish occupation of Thessaly. Despite their cramped sites, each monastery contained monks' cells, cisterns, a church or two, and refectory; some also had a library. In the 16th century there were 16 monasteries, accessible only by rope and net. Today most are uninhabited, but monastic communities remain at the four largest: Great Meteoron (1356–72); Varlaám, or All Saints (Áyioi Pándes; *c.* 1530); St. Stephen (Áyios Stéfanos; 1312); and Holy Trinity (Áyia Triás; 1458). All can be reached by bridge or rock-cut steps. The monasteries suffered much during World War II and the subsequent civil war. Restoration in 1960 ensured preservation of the manuscripts and 16th-century frescoes; however, the construction of a highway in the early 1960s, which made the monasteries accessible to mass tourism, discouraged new monks from joining, while many of the older ones moved to Mount Athos in search of solitude and privacy.

meteorite, any interplanetary particle or chunk of stony or metallic matter known as a meteoroid (*q.v.*) that survives its passage through the Earth's atmosphere and strikes the ground. The term is often applied to similar objects that reach the surfaces of other planets or satellites.

A brief treatment of meteorites follows. For full treatment, *see* MACROPAEDIA: Solar System.

Meteoroids enter the Earth's atmosphere at a velocity of at least 11 km (7 miles) per second. Interaction with the atmosphere heats them to high temperatures, causing them to become incandescent, vaporize, and heat the surrounding air. This process produces a streak of light, which is referred to as a meteor (*q.v.*).

As meteoroids penetrate into the dense lower atmosphere, they usually fragment and disintegrate. Although several thousand enter the atmosphere each year, only a few hundred actually reach the ground. Occasionally, the remnant of a very large meteoroid weighing several tons or more may collide with the surface, exploding upon impact to create a so-called meteorite crater (*q.v.*).

Meteorites may be classified into two broad groups: undifferentiated and differentiated. Undifferentiated meteorites are those that do not appear to have experienced chemical differentiation associated with igneous melting. They consist of the chondrites, which constitute the most abundant type of meteorite. The chondrites are so called because they contain chondrules, spherules of millimetre size composed primarily of the silicate minerals olivine and pyroxene. The chondrites are commonly divided into three major subclasses—ordinary, enstatite, and carbonaceous—on the basis of chemical differences. The enstatite chondrites are, for example, more chemically reduced than the ordinary variety, so that nearly all their constituent iron is in metallic form. The carbonaceous chondrites, for their part, contain more carbon than either the ordinary or enstatite chondrites.

Differentiated meteorites evince the kind of chemical fractionation that is thought to occur on a planetary body that underwent core formation and magmatic differentiation comparable to that observed in volcanic rocks of the Earth and the Moon. Meteorites of this group are generally classified into three categories: iron, stony, and stony iron. The iron meteorites consist chiefly of nickel–iron metal and iron sulfides. The stony type are rich in silicates (*e.g.,* olivine, orthopyroxene, and plagioclase) but are poor in metal and sulfides. The principal subclass of the stony meteorites are the achondrites, which characteristically have no chondrules. The stony-iron meteorites contain mixtures of large masses of nickel–iron metal and differentiated silicate rock.

Meteorites are of considerable scientific interest because their chemical characteristics and their texture and internal structure carry clues to the early history of the solar system. It is widely held that nearly all meteorites originate from meteoroids produced by collisions between asteroids, which aggregated from fragmentary material about the same time as the Earth, some 4.5 billion years ago. There also are indications that a few meteorites, the CI carbonaceous chondrites, are derived from the nuclei of comets, which are considered by many researchers as the most pristine remnants of the dust and gas that formed the solar system.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

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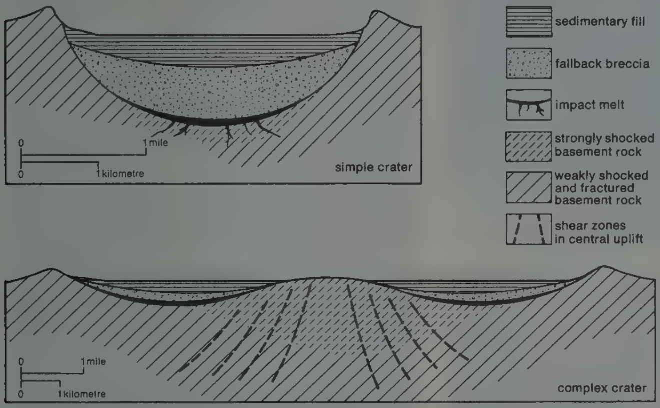
meteorite crater, depression that results from the impact of a meteorite with any planetary body. Data collected by Ranger, Orbiter, Surveyor, and Apollo spacecraft indicate that roughly 3,000,000,000,000 craters with diameters greater than one metre (about three feet) exist on the Moon's surface. The space probe observations also allow lunar craters to be classified by size and morphological characteristics and, at least inferentially, by modes of origin. Thus, most lunar scientists now recognize primary and secondary impact craters, volcanic calderas, maars, summit craters, and drainage or collapse craters as probable genetic types on the lunar surface.

Impact craters have been discovered on the surface of Mars as well as on various other planets and satellites. It is reasonable to assume that impacts occur frequently on all unprotected planetary surfaces in the solar system and, by extrapolation, on any similar bodies elsewhere in the universe. In general, the number of craters per unit of surface area correlates closely with the nature and density of the planetary atmosphere and its capability for erosion, as well as with the flux of bombarding particles (meteorites) over time in a planet's neighbourhood.

Impact craters are much less common on the Earth than on the Moon. This is partly because friction from the Earth's atmosphere effectively burns up most of the smaller bodies entering it from outer space. Thus, any craters formed on the Earth's surface will tend to be larger than the average size of all entering meteorites. Over the last eon (1×10^9 years) meteorites large enough to survive the plunge through the air and then excavate big craters appear to have been too few to produce the expected population of impact structures on the continents. The combined effects of the hydrosphere and the atmosphere in eroding the land surface evidently have erased most meteorite craters between 10 m (33 feet) and about 1 to 2 km ($^2/_3$ to $1^1/_4$ miles) in diameter. If such craters were more abundant in the first $2–3 \times 10^9$ years of terrestrial history, owing to a greater meteorite flux in the early solar system, their traces have long since been removed by erosion, deposition, and metamorphism.



Major types of impact craters; those larger than about six kilometres tend to be complex

Adapted from M.R. Dence in B.M. French and N.M. Short (eds.), *Shock Metamorphism of Natural Materials*

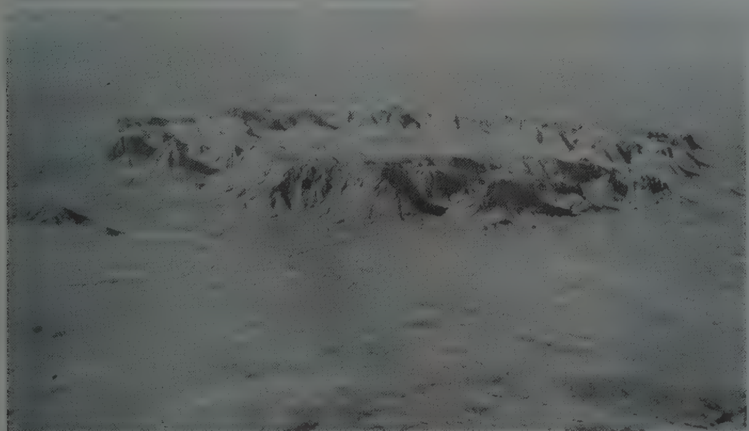
Since 1955, the list of definite and probable impact structures on the Earth's surface has grown significantly from the 20 to 27 proposed by investigators up until then. (*See* the Table.) The chief reasons for the sharp increase in the numbers of identified craters have been formulation of the astrobleme concept, more intensive searching, and development of new criteria for recognizing impact structures.

The astrobleme concept provided a better understanding of what to look for in relation to meteorite craters. An astrobleme is simply the scar of an impact crater—*i.e.,* any part of the structure that has survived erosion. Older impact structures may completely lack discernible crater rims, but they still retain some degree of circularity, have distinctive internal deformation features, or contain remnants of the original rock fragments (breccia) shocked in the impact. Thus, in the broader sense, a meteorite crater can be defined as any structure now at or near the surface containing evidence of a shock-producing impact in which the disturbance by deformation and fragmentation of rock or soil is generally circular in outline (plan) and dies out rapidly upon reaching diameter-to-depth ratios of 3 to 1 or greater.

The impact-cratering process. A noteworthy advance in meteoritics results from theoretical and experimental investigations of the cratering process. This includes field studies of nuclear and chemical explosions and of rocket-missile impacts, laboratory simulations of impacts using gun-impelled high-velocity projectiles, and the development of physical models of the sequence of crater formation using sophisticated computer programs.

A widely accepted model for impact-cratering mechanics postulates the following sequence of events:

Immediately after a meteorite strikes the ground, shock waves are imparted both to the rocks of the planetary surface and the meteorite itself. The ground-traversing shock front outruns the penetrating meteorite and forms an expanding cavity. The rocks behind the front are strongly compressed and generally are set in radial motion outward from the region of penetration. Varying fractions of the rock material will be vaporized, melted, crushed, fragmented, or fractured; ultimately, different sections of the volume of rock that are excavated will be dispersed and mixed together. The shock generated in the meteorite at the interface with the ground moves back into it as a compression that, upon reaching boundary surfaces along the sides and rear, transforms to a rarefaction that reflects into the meteorite. Thus, some of the meteorite is vaporized, whereas other parts are melted or intensely heated and mechanically damaged as the entire body breaks up. A fraction of this meteorite is smeared along with the outward-moving rock mass; much of the meteorite, however, ejects as fragments that escape the eventual crater.



Meteorite crater at Gosse Bluff, Northern Territory

By courtesy of the Earth Physics Branch, Department of Energy, Mines and Resources, Ottawa, Ont.

The initially intense shock wave attenuates as it diverges outward. The net effect is that the degree of shock damage attributable to compression diminishes with increasing radial distance from the line of penetration. Only a small proportion of the total volume excavated undergoes strong to intense shock pressures; in contrast, the bulk of the rock experiences little or no permanent damage.

The actual excavation process occurs as the advancing shock waves encounter free rock units at the ground–air interface or meet discontinuities such as stratigraphic bedding surfaces, joints (rock fractures), or units with varying physical properties because of varying rock types. The rarefactions effectively place the rock medium under tension, resulting in a general disruption of the units. Because these now-fragmented pieces were already in motion, they retain momentum sufficient to carry many of them forward and out of the developing crater as ejecta that follow trajectories established by their initial movements. Most such fragments move from the crater at low angles, and these are termed throwout deposits; at high angles the fragments fall back as crater-filling breccia deposits. Some, however, fall downward without leaving the crater, to form fragmental debris that concentrates along the crater base. This base is defined by its boundary with the rupture zone, which consists of broken and displaced but not fragmented and ejected rock, that underlies the breccia fill. This boundary also represents the surface below which the compression and rarefaction waves become too weak to efficiently excavate material.

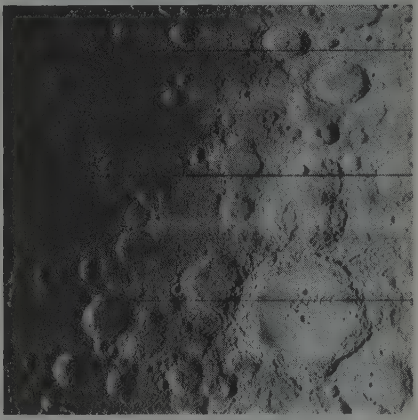
Within the rupture zone below the true crater floor and walls, the rocks can be folded, faulted, and intricately displaced. Especially in the rim, which marks the outer limit of surface excavation, layered units may be folded over completely to form structures that rival in complexity some of the great nappes (rock masses translated by thrust faulting) of the Alps. The overturning results when adjacent units below the uplifting free surface are peeled back as they go into motion in close succession. Massive rocks do not fold back but tend to uplift along joints, so that any preexisting foliation is distorted. However, all crater-related deformation decreases abruptly away from the breccia-rupture zone contact, so that drilling beyond this contact would rapidly pass out of shocked or disturbed rock into ordinary, unmodified country rock.

For small craters the entire formational process requires no more than a few seconds to completion. Craters that are tens of kilometres wide probably form in one to five minutes at most. The excavation caused by shock action occurs more rapidly than the later infilling process from fallback and slumping.

Experimental studies have added several details to the conceptual model. In the initial compression stage, materials behind the shock front experience pressures so high (many hundreds of kilobars) that their dynamic compressive strengths are greatly exceeded. Rocks behave under these conditions much like fluids. The first rarefactions develop along the target–projectile interface and later the projectile itself. Decompression leads to the ejection of fluidized rock as a hot jet that, according to some workers, accounts for the glassy objects called tektites. As the spherical shock front advances outward, the compressed shell of material behind it mixes with the projectile (meteorite) and ejects steadily increasing amounts to begin the excavation stage. Ejection and crater growth is a continuous, orderly process involving a steady flow of materials along shear lines. Cratering ceases when stresses become too weak to break up materials or when momentum is insufficient to carry fragments beyond the excavation limits.

Criteria of impact origin. Impact craters can differ from one another in both size and shape. They can vary from small, simple cup-shaped depressions that originally had raised rims, through cavities with a central hill (or peak), to those with more complicated central peaks and basins, and finally to multiringed basins that measure up to several hundred kilometres in diameter. Shape is thus one of the criteria used for identifying impact structures. A simple crater is characterized by a well-defined lip, a bowl-shaped cross section, and extensive fallback deposits that thicken toward the centre. The crater's initial diameter-to-depth ratio is about 5 to 1. When the crater diameter begins to exceed 4 to 5 km (2.5 to 3 miles), the rupture zone beneath the central base tends to uplift along shear lines. Large, complex craters have broad, domelike uplifts, which sometimes have topographic expression as central peaks. Rocks within this uplifted portion may be strongly shocked and intricately contorted. It has been proposed that large craters with diameter-to-depth ratios of about 10 to 1 and with central uplifts result from the impact of a comet rather than that of a meteorite. When a low-density cometary projectile strikes the ground, the dominant energy release remains near the surface; this causes lateral excavation to be more effective than is true of penetrating iron meteorites.

Some structures of nonimpact origin share many features with meteorite craters. The only truly definitive criteria so far advanced reside in the rocks themselves. Thus, rocks of any type are subject to remarkable changes during impact that, collectively, are described as shock metamorphism. The passage of transient pressure waves through rocks and their constituent minerals induces distinctive effects of very high pressures and temperatures and rapid strain rates that alter their composition and properties. These changes are produced in microseconds to milliseconds by pressures of up to 500–750 kilobars (comparable to pressures at depths of 1,400–1,800 km [about 870 to 1,120 miles] within the Earth), temperatures that rise above 2,000° C (3,600° F), and strain rates millions of times faster than those operating during mountain building.



Meteorite craters on the surface of the Moon, photographed by Lunar Orbiter IV

By courtesy of National Aeronautics and Space Administration

Significant known and probable impact craters

name and/or *location*	†morphology	diameter (km)	age (millions of years)
Acraman, Lake, *S.Aus., Australia*	Cr	160	600
Aouelloul*, *Mauritania*	S	0.37	3.1 (±0.3)
Bee Bluff (Uvalde), *Texas, United States*	S	2.4	40 or less
Beyenchime-Salata, *Yakutiya, Russia*	C	8	65 or less
Bosumtwi, Lake, *Ghana*	C	10.5	1.3
Brent*, *Ont., Canada*	S	3.8	450 (±30)
Clearwater Lake (East)*, *Que., Canada*	C	22	290 (±20)
Clearwater Lake (West), *Que., Canada*	Cr	32	290 (±20)
Deep Bay, *Sask., Canada*	C	12	100 (±50)
El'gygytgyn, *Russia*	C	22	3.5 (±0.5)
Flynn Creek, *Tenn., United States*	C	3.8	360 (±20)
Goat Paddock, *W.Aus., Australia*	C	5	50 or less
Haughton, *N.W.Terr., Canada*	C	20	15
Kara*, *Russia*	C	50	57
Liverpool, *N.Terr., Australia*	S	1.6	150 (±70)
Lonār, *Maharashtra, India*	S	1.8	0.05
Manicouagan, Lake, *Que., Canada*	Cr	70	210
Manson, *Iowa, United States*	C	35	70 or less
Meteor Crater*, *Ariz., United States*	S	1.2	0.1 or less
New Quebec Crater, *Que., Canada*	S	3.2	5
Ouarkziz, *Algeria*	C?	3.5	70 or less
Patom, *Russia*	S	0.09	0.003
Popigay*, *Russia*	Cr	100	39 (±9)
Red Wing Creek, *N.D., United States*	C	9	200
Ries*, *Germany*	Cr	24	15
Shunak, *Kyrgyzstan*	S	2.5	12
Steen River, *Alta., Canada*	C	25	95 (±7)
Steinheim, *Germany*	C	3.4	15
Sudbury, *Ont., Canada*	C	140	1,840 (±150)
Taban Khara Obo*, *Mongolia*	S	1.3	30 or less
Talemzane, *Algeria*	S	1.7	3 or less
Tenoûmer, *Mauritania*	S	1.9	2.5 (±0.5)
Vredefort, *South Africa*	C	140	1,970 (±100)
West Hawk Lake, *Man., Canada*	S	2.7	100 (±50)
Zhamanshin*, *Kazakhstan*	C	10	4.5

An asterisk (*) denotes impact structures with meteorites, identifiable meteoritic component, or enrichment in meteoritic-signature elements. †Morphology: S denotes a simple crater; C a complex crater with central uplift; Cr a complex crater with ring form.

meteoritics, scientific discipline concerned with meteors and meteorites. The awe-inspiring noise and lights accompanying some meteoric falls convinced early humans that meteorites came from the gods; accordingly these objects were widely regarded with awe and veneration. This association of meteorites with the miraculous and religious made 18th-century scientists suspicious of their reality. Members of the French Academy, which was then considered the highest scientific authority, were convinced that the fall of stones from heaven was impossible. Keepers of European museums discarded genuine meteorites as shameful relics of a superstitious past. Against this background, the German physicist Ernst Florens Friedrich Chladni began the science of meteoritics in 1794, when he defended the trustworthiness of accounts of falls (*see also* Hraschina meteorite). A shower of stones that fell in 1803 at L'Aigle, Fr., finally convinced the scientific world of the reality of meteorites. Interest was intensified by the great meteor shower of Nov. 12, 1833, which was visible in North America. Most natural-history museums now have meteorite collections.

For many years the only method of observing meteors was with the naked eye. The observer would plot the path of a meteor among the stars on a chart and note its apparent magnitude, the time, and other information. A similar plot of the same meteor made about 60 km (40 miles) away permitted rough estimates to be made of its altitude and the true angle of its path. This data can now be obtained more accurately with photographic or radar techniques, but visual observation continues to provide information on the magnitudes of meteors and serves as a check of instrumental methods. Binoculars and telescopes extend the range of visual observations from the 5th or 6th magnitude, the limit of the unaided eye, to the 12th or 13th. Direct photographs of a meteor's trail (the column of ionized gases formed by the passage of a meteoric body through the upper atmosphere) taken at two points on the Earth's surface several kilometres apart yield the most accurate data for tracing the path of a meteor. Specially designed wide-angle, high-speed cameras are employed. A rapidly rotating shutter in front of the open lens makes it possible to photograph the meteor trail in short segments, from which the velocity and deceleration of a meteor can be computed.

Radar is also widely used for meteor detection and observation. Radar pulses (short bursts of radio-frequency energy) emitted from a ground-based transmitter are reflected by a meteor's trail. The distance to the meteor can be determined by measuring the time lapse between the transmitted and reflected radar signals. Its motion toward (or away from) the radar facility can be derived from the rate at which the distance changes, which in turn yields the velocity of the object in the line of sight.

meteoroid, any interplanetary body of relatively small size that enters the Earth's atmosphere. In colliding with atmospheric atoms and molecules at high velocity, the object begins to burn up and heats the air around it. The resultant luminous phenomenon is called a meteor (*q.v.*). If the object survives its plunge through the atmosphere and lands on the ground, it is termed a meteorite (*q.v.*).

A brief treatment of meteoroids follows. For full treatment, *see* MACROPAEDIA: Solar System.

Meteoroids range in size from dust particles measuring less than 1 micrometre across to bodies several kilometres in diameter. Most meteoroids consist either of rocky material (largely silicate minerals) or of nickel-iron alloy, though some are made up of silicates intermixed with nickel–iron alloy.

Observational and theoretical studies of the orbits of meteoroidal bodies, as well as laboratory investigations of recovered meteorites, strongly suggest that the majority of meteoroids are fragments of asteroids produced by collisions between such objects in the asteroid belt lying between the orbits of Mars and Jupiter. There also is evidence that some meteoroids, particularly the smaller ones, are of cometary origin. The nucleus of a comet (*q.v.*) is composed of a mixture of ice and less-volatile material, chiefly in the form of grains of rock dust. When a comet approaches the Sun, the ice begins to evaporate and the dust particles embedded within it are swept away from the nucleus. Particles of millimetre-to-centimetre size may enter the Earth's atmosphere to become meteoroids.

meteorology, scientific discipline concerned with atmospheric phenomena, particularly of the troposphere and lower stratosphere.

A brief treatment of meteorology follows. For full treatment, *see* MACROPAEDIA: Earth Sciences.

Meteorology entails a systematic study of short-term—that is, day-to-day—variations in temperature, humidity, air pressure, wind, cloud cover, and precipitation, along with their causes. It provides the basis for weather forecasting. Meteorology is closely related to, but distinct from, climatology (*q.v.*), which deals with weather conditions in a given area over an extended period of time (from a month to many millions of years).

Meteorology is divided into two major branches, dynamic and synoptic. Dynamic meteorology deals primarily with the motions of the atmosphere and the physical processes involved in air flow. Research in the field involves the extensive use of computer models of general global circulation and of small-scale motion systems such as tornadoes and hurricanes. These mathematical models contribute much to the understanding of the physics and structure of the lower atmosphere.

Synoptic meteorology concentrates on atmospheric phenomena that are directly associated with weather. It derives its name from the synoptic method, in which simultaneous observations of atmospheric conditions for a specific time are plotted on a map for a broad area whereby a general view of the weather in that area is attained. The observations are routinely collected from a worldwide network of facilities, including ground-based radars and remote-sensing systems—*e.g.,* balloon-borne radiosondes and Earth-orbiting meteorological satellites. Synoptic meteorologists use data from these facilities to make short-range forecasts of local weather. Such forecasts project atmospheric conditions for time periods of a few hours to 12 hours in advance.

meter: *see* metre.

metes and bounds, limits or boundaries of a tract of land as identified by natural landmarks, such as rivers, or by man-made structures, such as roads, or by stakes or other markers. A principal legal type of land description in the United States, metes-and-bounds descriptions are commonly used wherever survey areas are irregular in size and shape. The land boundaries are run out by courses and distances, and monuments, natural or artificial, are fixed at the corners, or angles. A course is the direction of a line, usually with respect to a meridian but sometimes with respect to the magnetic north. Distance is the length of a course measured in some well-known unit, such as feet or chains.

Metge, Bernat, also called BERNARDO METGE (b. 1350, Barcelona, Catalonia [now in Spain]—d. 1413, Barcelona), poet and prose writer whose masterpiece, *Lo Somni* (1398; "The Dream"), initiated a classical trend in Catalan literature.

Educated in medicine, Metge entered (1376) the royal household of Peter IV of Aragon and Catalonia to serve as secretary-mentor to Prince John (later King John I). He was arrested for obscure reasons in 1381, and while in prison he translated *Valter y Griselda,* Boccaccio's story of Griselda, from Petrarch's Latin version and wrote *Libre de Fortuna y Prudencia* (1381; "The Book of Fortune and Prudence"), which is more a philosophical treatise than a poetic work.

When John I became king (1387), Metge returned to royal service, as secretary-procurator for John and his wife, Violante (by whom Metge had an illegitimate son). The victim of court intrigues, the poet was again imprisoned in 1388 and 1396. On the latter occasion he composed *Lo Somni,* a series of four prose dialogues in which he reflects on human frailties and ill-fated love. Part of *Lo Somni* takes place in a dreamlike setting inhabited by John I, the legendary poet and musician Orpheus, and the blind Theban seer Tiresias. Combining scholastic enquiry with poetic imagination, Metge in *Lo Somni* ponders the immortality of the soul versus natural death and discusses the ethical conduct of women. In this work Metge achieved a stylistic masterpiece of Catalan prose that was emulated by Catalan writers for centuries.

Although restored to royal favour in 1403 as secretary to King Martin of Aragon, Metge faded from the public view after 1410.

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methadone, potent synthetic narcotic drug that is the most effective form of treatment for addiction to heroin and other narcotics. Methadone first became available at the end of World War II. Similar to morphine in its analgesic effect, it was originally used in medicine to alleviate severe pain. Methadone is used in the form of its hydrochloride salt, which is a white, crystalline powder with a bitter taste. It is soluble in water, in alcohol, and in chloroform.

Methadone's usefulness in treating heroin addiction was discovered in the 1960s. It is now routinely used on a daily, long-term (maintenance) basis as a substitute drug given to persons who were formerly or who would otherwise be addicted to heroin. It is given orally once a day. Methadone's usefulness as a heroin substitute stems from several important effects the drug has. First and foremost, when taken daily it prevents a former heroin addict from feeling withdrawal symptoms and it suppresses his drug hunger for heroin. Second, methadone itself causes no euphoric effects whatsoever, unlike heroin, so the person feels no disruptive psychological craving for it. Third, the human body does not develop a tolerance for methadone, unlike heroin, so methadone doses of the same (rather than increasing) size can be taken for long periods of time. Fourth, when used on a maintenance basis, methadone actually blocks the euphoric effects, or "high," produced by heroin, thus robbing this drug of its psychological attractiveness to the former addict. Finally, methadone's lack of euphoric effects and its 24-hour period of action enable persons maintained on it to lead relatively normal lives involving work, schooling, and normal family and social relations.

Methadone is an addictive drug, but one can more easily cease using it than heroin. Because of this, methadone is sometimes used to detoxify heroin addicts; the addict switches from heroin to a high daily dose of methadone, which is then gradually reduced over several weeks until the patient is drug-free. In this way the severe withdrawal symptoms encountered in abruptly quitting heroin are avoided.

Methadone-maintenance therapy is markedly successful in keeping addicts off the use of heroin or whatever other narcotic they were using, but there is considerably less success in enabling such people to stop using methadone as well and be drug-free.

methamphetamine, also called *d*-DESOXYEPHEDRINE, byname SPEED, potent and addictive synthetic stimulant drug that affects the central nervous system. It was used widely for legal medical purposes throughout much of the 20th century. In the United States it was marketed under the brand names Methedrine and Desoxyn, and it was widely administered to industrial workers in Japan in the 1940s and '50s to increase their productivity.

Methamphetamine, which increases physical activity and suppresses the appetite, is of limited usefulness in the treatment of attention deficit disorder, narcolepsy, and obesity. However, heavy or prolonged use may produce powerful side effects, including aggression and paranoia, kidney and lung disorders, brain and liver damage, chronic depression, immune deficiency disorders, convulsions, and schizophrenia. It is normally taken in pill form or, as a crystalline powder ("crystal meth"), sniffed through a hollow tube; it may also be taken intravenously.

Methamphetamine was regarded with deep suspicion and hostility in the United States by the 1960s, not just by law enforcement officials, politicians, the media, and medical professionals but also by large sections of the drug subculture. After the Controlled Substances Act (1970) severely restricted its availability, a large illicit manufacturing industry, relying on hundreds of clandestine "meth labs," arose in the southwest and west and spread to parts of the Midwest in the 1990s. Despite periodic police crackdowns, large quantities of the drug continue to be produced in these labs.

Methamphetamine use has been particularly widespread in Pacific Rim nations, where it has become a serious social problem. Partly because of its association with energy and aggression, its growing use was often correlated with rapid modernization and industrialization. In the United States, a 1996 survey estimated that nearly 5 million people had tried methamphetamine, representing an increase of approximately 240 percent from 1990. (J.P.J.)

methanal: *see* formaldehyde.

methane, also called MARSH GAS, colourless, odourless gas that occurs abundantly in nature as the chief constituent of natural gas, as a component of firedamp in coal mines, and as a product of the anaerobic bacterial decomposition of vegetable matter under water (hence its alternate name, marsh gas). Methane also is produced industrially by the destructive distillation of bituminous coal in the manufacture of coal gas and coke-oven gas. The activated-sludge process of sewage disposal also produces a gas rich in methane.

Methane is the simplest member of the paraffin series of hydrocarbons. Its chemical formula is CH_4. It is lighter than air, having a specific gravity of 0.554. It is only slightly soluble in water. It burns readily in air, forming carbon dioxide and water vapour; the flame is pale, slightly luminous, and very hot. The boiling point of methane is −164.0° C (−263.2° F) and the melting point is −182.5° C (−296.5° F). Methane in general is very stable, but mixtures of methane and air, with the methane content between 5 and 14 percent by volume, are explosive. Explosions of such mixtures have been frequent in coal mines and collieries and have been the cause of many mine disasters.

The chief source of methane is natural gas, which contains from 50 to 90 percent methane, depending on the source. Methane produced by the destructive distillation of bituminous coal and by coal carbonization is important in locations where natural gas is not plentiful.

Since commercial natural gas is composed largely of methane, their uses may for all practical purposes be considered identical. Because of its abundance, low cost, ease of handling, and cleanliness, such gas is widely used as a fuel in homes, commercial establishments, and factories.

Methane is an important source of hydrogen and some organic chemicals. Methane reacts with steam at high temperatures to yield carbon monoxide and hydrogen; the latter is used in the manufacture of ammonia for fertilizers and explosives. Other valuable chemicals derived from methane include methanol, chloroform, carbon tetrachloride, and nitromethane. The incomplete combustion of methane yields carbon black, which is widely used as a reinforcing agent in rubber used for automobile tires.

methanol, also called METHYL ALCOHOL, WOOD ALCOHOL, or WOOD SPIRIT, the simplest of a long series of organic compounds called alcohols; its molecular formula is CH_3OH. Methanol was formerly produced by the destructive distillation of wood. The modern method of preparing methanol is based on the direct combination of carbon monoxide gas and hydrogen in the presence of a catalyst. Most methanol is produced from the methane (*q.v.*) found in natural gas.

Pure methanol is an important material in chemical synthesis. Its derivatives are used in great quantities for building up a vast number of compounds, among them many important synthetic dyestuffs, resins, drugs, and perfumes. Large quantities are converted to dimethylaniline for dyestuffs and to formaldehyde for synthetic resins. It is also used in automotive antifreezes, in rocket fuels, and as a general solvent. Methanol is also a high-octane, clean-burning fuel that is [illegible] potentially important substitute for gasoline in automotive vehicles. The methanol derived from wood is used chiefly for rendering ethyl alcohol unfit to drink.

Methanol is a colourless liquid that boils at 64.96° C (148.93° F) and solidifies at −93.9° C (−137° F). It forms explosive mixtures with air and burns with a nonluminous flame. It is a violent poison; many cases of blindness or death have been caused by drinking mixtures containing it.

methemoglobinemia, inherited or acquired decrease in the oxygen-carrying capacity of the red blood cells. The hemoglobin of the red blood cells must be in the reduced (deoxidized) state to bind with oxygen; methemoglobin, the oxidized form of hemoglobin, is useless for oxygen transport. Normally, various organic catalysts or enzymes are active in keeping hemoglobin in the reduced form. Hereditary methemoglobinemia occurs when there is an inborn defect in this enzyme system or when the hemoglobin molecule is abnormally structured (hemoglobin M) and is thereby more susceptible to oxidation. Acquired methemoglobinemia may arise as a result of contact with certain drugs and chemicals that produce oxidant compounds in the circulation, causing the oxidation of hemoglobin faster than the enzyme system can keep it in the reduced state. The severity of the symptoms is related to the quantity of methemoglobin present in the circulation, and range from a bluish discoloration of the skin and mucous membrane to weakness, difficulty in breathing, and dizziness in the more severe cases. Treatment of hereditary methemoglobinemia usually includes the administration of reduction compounds such as vitamin C or methylene blue. Acquired methemoglobinemia usually disappears spontaneously when the cause is removed.

methionine, sulfur-containing amino acid obtained by the hydrolysis of most common proteins. First isolated from casein (1922), methionine accounts for about 5 percent of the weight of egg albumin; other proteins contain much smaller amounts of methionine. It is one of several so-called essential amino acids for mammals and fowl; *i.e.,* they cannot synthesize it. In microorganisms it is synthesized from the amino acids cysteine and aspartic acid.

Methionine is important in methylation (the process by which methyl, or $-CH_3$, groups are added to compounds) and is also a precursor of two other amino acids, cystine and cysteine.

method, the (acting): *see* Stanislavsky method.

method of exhaustion (mathematics): *see* exhaustion, method of.

methodic doubt, in Cartesian philosophy, a way of searching for certainty by systematically though tentatively doubting everything. First, all statements are classified according to type and source of knowledge—*e.g.,* knowledge from tradition, empirical knowledge, and mathematical knowledge. Then, examples from each class are examined. If a way can be found to doubt the truth of any statement, then all other statements of that type are also set aside as dubitable. The doubt is methodic because it assures systematic completeness, but also because no claim is made that all—or even that any—statements in a dubitable class are really false or that one must or can distrust them in an ordinary sense. The method is to set aside as conceivably false all statements and types of knowledge that are not indubitably true. The hope is that, by eliminating all statements and types of knowledge the truth of which can be doubted in any way, one will find some indubitable certainties.

In the first half of the 17th century, the French Rationalist René Descartes used methodic doubt to reach certain knowledge of self-existence in the act of thinking, expressed in the indubitable proposition *cogito, ergo sum* ("I think, therefore I am"). He found knowledge from tradition to be dubitable because authorities disagree; empirical knowledge dubitable because of illusions, hallucinations, and dreams; and mathematical knowledge dubitable because people make errors in calculating. He proposed an all-powerful, deceiving demon as a way of invoking universal doubt. Although the demon could deceive men regarding which sensations and ideas are truly of the world, or could give them sensations and ideas none of which are of the true world, or could even make them think that there is an external world when there is none, the demon could not make men think that they exist when they do not.

Methodism, movement founded by John Wesley in the 18th century, purportedly to revitalize the Church of England. The movement survives in the form of the modern Methodist churches worldwide.

A brief treatment of Methodism follows. For full treatment, *see* MACROPAEDIA: Protestantism: *Methodist churches.*

In 1738 Wesley, an Anglican clergyman, attended a religious meeting where, as he relates in his *Journal,* he felt his "heart strangely warmed" and experienced an assurance of personal salvation he had not known before. Soon he was cooperating with George Whitefield in open-air preaching among the outcasts of society—those who felt themselves neglected by the Church of England. Although Wesley later separated from Whitefield on doctrinal grounds, he was joined by many lay recruits and a few ordained clergy, most notably his brother Charles, whose hymns expressed the message of the Methodist Revival.

The Methodists formed a "society" within the Church of England. Wesley never wished them to leave the church, but after years of strained relations, the formal break with the Church of England came in 1795, four years after Wesley's death. The Methodists' tightly knit system of church government, which combined a strong central authority with effective local organization and the employment of lay preachers, enabled the movement to expand rapidly throughout the 19th century. Methodism was especially successful in the expanding industrial areas, where it helped the working people to overcome economic depression by spiritual means and often, by encouraging thrift and simple living, to raise their economic status as well.

In America the Methodist Episcopal Church was constituted as an autonomous body in 1784 under the guidance of Francis Asbury and Thomas Coke, who organized the American church according to Wesley's principles but adapted them to the needs of both the settled communities and the frontier. Although the first Methodist itinerants did not arrive in America until shortly before the Revolution, by the middle of the 19th century the Methodists had more members than any other American denomination. This remarkable advance occurred especially on the American frontier, where Methodist circuit riders preached to the frontier folk in simple terms.

It was the unique Methodist institutions, however, that made Methodism so dynamic an element in American Protestantism. Methodists were organized locally into "classes" which enforced discipline, while a hierarchical structure with a strong central authority efficiently organized and supervised the itinerant preachers. The Methodist advance was temporarily halted in 1844 by the church's division into Northern and Southern branches over the issue of slavery. After the Civil War, both branches continued their rapid increase in numbers and in material resources. As Methodism gradually became assimilated to the general pattern of middle-class American Protestantism, a "holiness" movement emerged out of Methodism and then separated from it in the late 19th century. The Northern and Southern branches reunited in 1939, and further mergers took place later in the 20th century, but the independent holiness and pentecostal denominations that grew out of the holiness movement still exist. The black Methodist churches, which had been merged into a new central jurisdiction in 1939 (forming a separate but equal jurisdiction within the United Methodist Church), gradually became integrated after 1968. By 1974 all districts based on race had been abolished.

Because of the enthusiasm for missionary activity among both British and American Methodists, the movement has become worldwide. The churches derived from American Methodism are more widespread and more numerous, but the movement toward autonomy has proceeded more smoothly among those in the British sphere of influence. Despite a series of schisms in both British and American Methodism in the 19th century, Methodists have gradually but consistently moved toward reunification in the 20th century, and Methodists from all countries have played a full part in worldwide ecumenical activities.

Despite wide variations in belief, practice, and status, Methodists share a warm acceptance of the doctrines of historic Christianity, without a stringent insistence on the need for doctrinal conformity or a great interest in theological speculation. They share an emphasis on those doctrines that indicate the power of the Holy Spirit to confirm the faith of the believer and to transform one's personal life (especially the teaching about assurance and

Christian perfection that is associated with John Wesley); an insistence that the heart of religion lies in one's personal relationship with God; a simplicity of worship and a partnership of ordained ministers and laity in the worship and administration of the church; a concern for the underprivileged and the betterment of social conditions; the formation of small groups for mutual encouragement and edification; a connectional system of government (by which all ministers are "in connection" with the central authority of the church, and the agencies of the church are centrally administered); and an allegiance to John Wesley.

Methodius, SAINT: *see* Cyril and Methodius, Saints.

Methodius I, SAINT (b. 788/800, Syracuse, Sicily—d. June 14, 847, Constantinople [now Istanbul]; feast day June 14), patriarch of Constantinople from 843 to 847.

As a monk, Methodius embraced the position of the Iconodules, who supported the veneration of images, as opposed to the Iconoclasts, who denounced the veneration of images. The Iconoclastic movement arose in the 8th century as a reaction against pagan tendencies in Christianity. During the reign of the iconoclast emperor Theophilus (829–842), Methodius was respected as a learned man and was allowed to live in the palace in Constantinople despite his Iconodule beliefs. He found an ally in the wife of Theophilus, Theodora, who venerated icons and kept them in her room. After the death of Theophilus, Theodora became regent for their son Michael III. In 843 she named Methodius patriarch and with his help restored the legitimacy of venerating icons to the Byzantine Empire.

methotrexate, cytotoxic drug used to slow the growth of certain cancers, especially a highly malignant but rather rare form in women called choriocarcinoma. It has also been used in the treatment of psoriasis, a skin disease in which abnormally rapid proliferation of epidermal cells occurs, and as an inhibitor of some types of immune reactions. Methotrexate is an antimetabolite of the vitamin folic acid. It prevents the synthesis of nucleic acids and thus inhibits cell reproduction.

methoxychlor, also called 1,1,1-TRICHLORO-2,2-BIS(*p*-METHOXYPHENYL)ETHANE, a colourless, crystalline organic halogen compound used as an insecticide. Methoxychlor is very similar to DDT but acts more rapidly, is less persistent, and does not accumulate in the fatty tissues of animals as does DDT.

Methoxychlor is prepared by the reaction of chloral with anisole (methyl phenyl ether) in the presence of sulfuric acid; the commercial product usually is about 88 percent pure.

Methuen (of Corsham), Paul Sanford Methuen, 3rd Baron (b. Sept. 1, 1845, Corsham Court, Wiltshire, Eng.—d. Oct. 30, 1932, Corsham Court), British military commander who was defeated by the Boers (Dec. 11, 1899) in the Battle of Magersfontein during the South African War.

After serving in the Gold Coast (now Ghana; 1873–74) and in Bechuanaland (now Botswana; 1884–85), Methuen was made a lieutenant general in 1898. In 1899, as commander of the British 1st Division in South Africa, he directed part of a three-pronged operation aimed at relieving the Boer siege of Kimberley and was defeated in the Magersfontein Hills by the Boer generals J.H. De la Rey and P.A. Cronje. In March 1902 he was captured by De la Rey at Tweebosch. Methuen was later commander in chief in South Africa (1907–12) and governor of Malta (1915–19). He was made a field marshal in 1911.

Methuselah, also spelled METHUSHAEL, Old Testament patriarch whose life span as recorded in Genesis (5:27) was 969 years; he has survived in legend and tradition as the longest-lived human. Genesis tells nothing about Methuselah beyond sparse genealogical details: he was the great-great-great-great-grandson of Seth, the child of Adam and Eve begotten more than a century after Cain. He was the father of Lamech and the grandfather of Noah. By the Biblical account he came of hardy stock: all his forebears lived for between 895 and 962 years except for his father, Enoch, who lived to be 365.

The enumeration of Methuselah in Genesis is his only appearance in the Old Testament save for a mention in I Chronicles 1:3, where he is cited in the lineage of Saul. In the New Testament he is mentioned once in the Gospel of Luke. There, at 3:23–28, the lineage of Joseph, whom people supposed to be the father of Jesus, is traced back 75 generations, through David and Saul, and Abraham, Isaac, and Jacob, to Methuselah and thence to Seth and Adam.

methyl alcohol: *see* methanol.

methyl bromide, also called BROMOMETHANE, a colourless, nonflammable, highly toxic gas (readily liquefied) belonging to the family of organic halogen compounds. It is used as a fumigant against insects and rodents in food, tobacco, and nursery stock; smaller amounts are used in the preparation of other organic compounds.

Methyl bromide is manufactured by the reaction of methanol with hydrobromic acid; it is slightly soluble in water but miscible with many organic solvents. For use as a fumigant, methyl bromide often is mixed with chloropicrin, which serves as a warning agent because of its intense odour.

methyl chloride, also called CHLOROMETHANE, a colourless, flammable, toxic gas belonging to the family of organic halogen compounds. It is used in the manufacture of silicone polymers, tetramethyllead (an antiknock agent for gasoline), and methylcellulose (a textile-sizing agent) and as a solvent in the production of butyl rubber. It has also been used as a refrigerant, but less toxic and less flammable compounds have largely replaced it.

Methyl chloride was first prepared about 1835 from methanol, sulfuric acid, and common salt. The oldest commercial process was the thermal decomposition of betaine, a waste product of the beet-sugar industry; later methods depend on the reaction of methanol with hydrogen chloride or of methane with chlorine. The compound is ordinarily stored and shipped as the liquid, which boils at −24° C (−11° F) at atmospheric pressure.

methyl group, one of the commonest structural units of organic compounds, consisting of three hydrogen atoms bonded to a carbon atom, which is linked to the remainder of the molecule. The methyl radical (CH_3), the methyl cation (CH_3^+), and the methyl anion $(CH_3^-)_4^3$ are transient intermediates in many chemical reactions.

methylene (chemistry): *see* carbene.

methylene blue, a bright greenish blue organic dye belonging to the phenothiazine family. It is mainly used on bast (soft vegetable fibres such as jute, flax, and hemp) and to a lesser extent on paper, leather, and mordanted cotton. It dyes silk and wool but has very poor lightfastness on these fibres. It is also employed as a biological stain, in testing milk for tubercular infection, and as a chemical oxidation–reduction indicator.

Methylene blue was discovered in 1876 and is manufactured by a process, introduced about 1886, using dimethylaniline as the principal starting material.

methylene chloride, also called DICHLOROMETHANE, a colourless, volatile, practically nonflammable liquid belonging to the family of organic halogen compounds. It is extensively used as a solvent, especially in paint-stripping formulations.

Methylene chloride is commercially produced along with methyl chloride, chloroform, and carbon tetrachloride by the chlorination of methane. It boils at 40° C (104° F) at atmospheric pressure; it is denser than water and very slightly soluble in it. It is an effective solvent for fats, oils, greases, and many polymeric substances; its use is favoured by low toxicity, low flammability, high stability, and ease of recovery for reuse.

methylmorphine: *see* codeine.

metic, Greek METOIKOS, in ancient Greece, any of the resident aliens, including freed slaves. Metics were found in most states except Sparta. In Athens, where they were most numerous, they occupied an intermediate position between visiting foreigners and citizens, having both privileges and duties. They were a recognized part of the community and specially protected by law, although subject to restrictions on marriage and property ownership. A significant source of manpower and skilled labour, they constituted a large part of the population of Athens by the 5th century BC. Cephalus, father of Lysias and a metic, was a character in Plato's *Republic;* Pasion, a metic and former slave, became a great Athenian banker of the 4th century BC.

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métis, plural MÉTIS, in Canadian history, a person of mixed Indian and French or Scottish ancestry. The first métis were the offspring of local Indian women and European fur traders in the Red River area of what is now the province of Manitoba. They resisted the Canadian takeover of the Northwest in 1869. In the course of half a century they had developed a distinctive way of life and thought of themselves as a nation with rights in the northwest. Fearing the oncoming wave of settlers from Ontario, they established a provisional government under the leadership of Louis Riel, an educated métis. In 1870 their government negotiated a union with Canada that resulted in the establishment of the province of Manitoba.

Metochites, Theodore (b. *c.* 1260, Nicaea, Empire of Nicaea [now İznik, Turkey]—d. March 13, 1332, Constantinople [now Istanbul]), Byzantine prime minister and negotiator for Emperor Andronicus II Palaeologus, one of the principal literary and philosophical scholars of the 14th century.

The son of George Metochites, a prominent Eastern Orthodox cleric under Emperor Michael VIII Palaeologus and a leading advocate of union with the Latin Church, Theodore became a favourite of Emperor Andronicus II and undertook various diplomatic missions to enlist help against the encroaching Ottoman Turks. In a vain attempt to reverse Byzantium's military and political decline through an alliance with Serbia, Metochites, in 1298, led an embassy to the Serbian court at Skoplje and arranged the marriage of Emperor Andronicus' five-year-old daughter, Simonis, to Tsar Milutin. As a result Serbia, although militarily stronger than Byzantium, and acknowledged as ruler of formerly Byzantine Macedonia, admitted the universal sovereignty of the Eastern emperor. In his *Presbeutikos* ("Embassy Papers"), Metochites left a valuable historical account of these negotiations as well as a concrete description of Byzantine influence on Slavic royalty.

Promoted to *megas logothetēs* ("grand logothete," or "chancellor"), Metochites married Irene Palaeologus and, as a relative of the ruling dynasty, directed Byzantine political affairs from 1321 to 1328, when Andronicus fell from power. Because of his fidelity to Andronicus II, he was deprived of his wealth and exiled by Andronicus III. In 1331 he retired to Chora Monastery (now Kariye Camii), in Constantinople, to continue his scholarly pursuits. He directed the material and artistic restoration of the monastery, the mosaic work of which, particularly the extant piece showing him offering the church of Chora to an enthroned Christ, represents the acme of 14th-century Byzantine mosaic art.

Metochites' voluminous writings range from scientific to theological matters. His best-known work, *Hypomnēmatismoi kai sēmeiōseis gnōmikai* ("Personal Comments and Annotations"), commonly designated the "Philosophical and Historical Miscellany," is an encyclopaedic collection of tracts and essays on classical thought, history, and literature, comprising more than 70 Greek authors. Other treatises on physics, astronomy, physiology, and Aristotelian psychology survive only in Latin translations. His commentaries on the *Dialogues* of Plato were an important influence on the 15th-century Platonic renaissance.

Metonic cycle, in chronology, a period of 19 years in which there are 235 lunations, or synodic months, after which the Moon's phases recur on the same days of the solar year, or year of the seasons. The cycle was discovered by Meton (fl. 432 BC), an Athenian astronomer. Computation from modern data shows that 235 lunations are 6,939 days, 16.5 hours; and 19 solar years, 6,939 days, 14.5 hours. *See also* golden number.

metonymy (Greek: "change of name," or "misnomer"), figure of speech in which the name of an object or concept is replaced with a word closely related to or suggested by the original, as "crown" for "king" ("The power of the crown was mortally weakened") or an author for his works ("I'm studying Shakespeare"). A familiar Shakespearean example is Mark Antony's speech in *Julius Caesar* in which he asks of his audience: "Lend me your ears." Metonymy is closely related to synecdoche, the naming of a part for the whole or a whole for the part, and is a common poetic device. Metonymy has the effect of creating concrete and vivid images in place of generalities, as in the substitution of a specific "grave" for the abstraction "death." Metonymy is standard journalistic and headline practice as in the use of "city hall" for "municipal government," the "White House" for the "President of the United States," or "Kremlin" for the government of the Soviet Union.

Métraux, Alfred (b. Nov. 5, 1902, Lausanne, Switz.—d. April 12, 1963, Paris, Fr.), Swiss anthropologist noted for his pioneering contributions to South American ethnohistory and the examination of African culture in Haiti.

Métraux studied with several prominent European anthropologists. He was director of the ethnological institute at the University of Tucumán, Arg. (1928–34), and wrote two classic works (1928) on the ethnohistory of the extinct Tupinambá Indians of Brazil. Following an expedition to Easter Island (1934–35), Métraux joined the Bishop Museum, Honolulu, and engaged in a major field effort in Argentina and Bolivia. In two works, *Ethnology of Easter Island* (1940) and *L'Île de Pâques* (1935; *Easter Island*), he argued that Easter Island's indigenous population is Polynesian, both culturally and physically, and that the island's well-known monolithic sculptures are native creations rather than Asian or American Indian ones.

As a member of the Bureau of American Ethnology of the Smithsonian Institution, Washington, D.C. (1941–45), Métraux contributed extensive, exemplary historical reconstructions to the bureau's *Handbook of South American Indians* (7 vol., 1946–59). From 1946 to 1962 Métraux held posts with the United Nations and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). For the latter he engaged in studies in the Amazon (1947–48) and Haiti (1949–50). *Le Vaudon haïtien* (1958; *Voodoo in Haiti*), one of his two books on that island's culture, presented voodoo as a structured, complex religious system, examined its African origins, and showed its relation to Roman Catholicism in Haiti.

metre, also spelled METER, in measurement, fundamental unit of length in the metric and International systems of measurement. It is equal to approximately 39.37 inches in U.S. Customary measure. The metre was historically defined by the French Academy of Sciences in 1791 as 1/10,000,000 of the quadrant of the Earth's circumference running from the North Pole through Paris to the equator. The International Bureau of Weights and Measures in 1889 established the international prototype metre as the distance between two lines on a standard bar of 90 percent platinum and 10 percent iridium. By 1960 advances in the techniques of measuring light waves had made it possible to establish a more accurate and easily reproducible standard not dependent on any artifact. In 1960 the metre was thus defined in the International System (*q.v.*) as equal to 1,650,763.73 wavelengths in vacuum of the orange-red line in the spectrum of the krypton-86 atom.

By the 1980s, advances in laser measurement techniques had yielded values for the speed of light of an unprecedented accuracy, and it was decided in 1983 by the General Conference on Weights and Measures that the accepted value for this constant would be exactly 299,792,458 metres per second. The metre is now thus defined as the distance traveled by light in a vacuum in 1/299,792,458 second.

metre, also spelled METER, in poetry, the rhythmic pattern of a poetic line. Various principles, based on the natural rhythms of language, have been devised to organize poetic lines into rhythmic units. These have produced distinct kinds of versification, among which the most common are quantitative, syllabic, accentual, and accentual-syllabic.

1. Quantitative verse, the metre of classical Greek and Latin poetry, measures quantity, or the length of time required to pronounce syllables regardless of their stress. Various combinations of long and short syllables (the long syllables being roughly equivalent to twice the duration of the short syllables) constitute the basic rhythmic units. Quantitative verse has been adapted to modern languages but with limited success.

2. Syllabic verse, most common in languages that are not strongly accented, such as the Romance languages and Japanese. It is based on a fixed number of syllables within a line, although the number of accents or stresses may be varied. Thus, the classic metre of French poetry is the alexandrine, a line of 12 syllables with a medial caesura (a pause occurring after the 6th syllable). The Japanese haiku is a poem of 17 syllables, composed in lines of 5/7/5 syllables each.

3. Accentual verse, occurring in strongly stressed languages such as the Germanic. It counts only the number of stresses or accented syllables within a line and allows a variable number of unaccented syllables. Old Norse and Old English poetry is based on lines having a fixed number of strongly stressed syllables reinforced by alliteration. Accentual metres are evident in much popular English verse and in nursery rhymes; *i.e.*, "$\overset{\prime}{\text{One}}$, $\overset{\prime}{\text{two}}$, $\overset{\prime}{\text{Buck}}|\overset{\smile}{\text{le}}$ $\overset{\smile}{\text{my}}$ $\overset{\prime}{\text{shoe}}$." In the late 19th century, the English poet Gerard Manley Hopkins used it as the basis for his poetic innovation "sprung rhythm" (*q.v.*).

4. Accentual-syllabic verse, the usual form of English poetry. It combines Romance syllable counting and Germanic stress counting to produce lines of fixed numbers of alternating stressed and unstressed syllables. Thus, the most common English metre, iambic pentameter, is a line of ten syllables or five iambic feet. Each iambic foot is composed of an unstressed syllable followed by a stressed syllable.

Variations within any of these regular metres are not only permissible but inevitable and desirable. The words $\overset{\smile}{\text{a}}|\overset{\prime}{\text{gain}}$ and $\overset{\smile}{\text{for}}|\overset{\prime}{\text{lorn}}$, for instance, may each constitute an iambic foot, but they are vastly different in quality. Even in the most formal metrical designs, the quality, pitch, and force of certain sounds, along with the interplay of other poetic devices such as assonance, consonance, alliteration, or rhyme may act to reinforce or obscure the basic metrical pattern.

The function of regular metre in poetry is complex. In its most primitive aspects, as in nursery rhymes or folk ballads, it creates the physical pleasure that any simple rhythmic acts such as rocking, swaying, trotting, or foot tapping provide. Used mimetically, it may be lulling, galloping, staccato, heavy and slow, or quick and light to match the content and emotional tone of the poem. In more sophisticated poetry, regular metre is a subtle and flexible device, organically integrated into the total poem through its sensitive interaction with the natural rhythms of speech and the meaning of words. Although the late 19th century and early 20th century witnessed a widespread rebellion against the restrictions of metrically regular poetry, the challenge of condensing an imaginative impulse into a formal framework still appeals to poets. *See also* foot; scansion.

metre, also spelled METER, in music, rhythmic pattern constituted by the grouping of basic temporal units, called beats, into regular measures, or bars; in Western notation, each measure is set off from those adjoining it by bar lines. A time (or metre) signature, found at the beginning of a piece of music, indicates the number of beats in a measure and the value of the basic beat. For example, $\frac{3}{4}$ metre has three quarter-note beats per measure. The time signature implies that an accent regularly occurs on the first beat of each measure. Simple metres are duple (*e.g.*, $\frac{2}{2}$, $\frac{2}{4}$), triple ($\frac{3}{4}$, $\frac{3}{8}$), or quadruple ($\frac{4}{4}$, $\frac{4}{8}$). Compound metres are also duple ($\frac{6}{8}$, $\frac{6}{16}$), triple ($\frac{9}{8}$), or quadruple ($\frac{12}{8}$) but have time signatures that indicate the number of beats to be a multiple of three. Thus, in $\frac{6}{8}$, for example, both beats of the basic duple division are divisible into three subunits, yielding a total of six. Some metres that occur less frequently are neither duple nor triple ($\frac{5}{4}$, $\frac{7}{4}$) but may be considered a combination of duple and triple—such as $\frac{2}{4}+\frac{3}{4}$ or $\frac{3}{4}+\frac{2}{4}+\frac{2}{4}$.

The concept of regular rhythmic groups is traceable to the ancient beginnings of dance and poetry, which music primarily served to undergird. Specifications of metre first appeared in written music as early as about 1200, when short rhythmic formulas called rhythmic modes (*see* rhythmic mode) came into use, implying repetition of simple triple patterns. From 1300 to 1600 both duple and triple metres were recognized in music theory, but, in practice, rhythm was often complex and involved combinations of metres. From the 17th to the 20th century, regular metres as used today became the standard. In the course of the 18th century, metre changes from movement to movement gained aesthetic significance equal to that of key and tempo distinctions in multimovement works. Such 20th-century composers as Igor Stravinsky and Béla Bartók accorded their extensive metrical manipulations a structural prominence previously reserved for melody and harmony.

metric space, in mathematics, a set together with a rule, called a distance function, for relating a number to every pair of objects from the set such that the correspondence has properties similar to those of distance in Euclidean space. That is, the distance function (dist) is always positive and satisfies the triangle inequality (that is, the length of any side of a triangle is less than the sum of the other two sides) for any three points.

Any metric space can be made into a topological space by choosing the open subsets of the topology to be the analogues of circles in the Euclidean plane; that is, for each point p and each positive real number r the corresponding open set consists of all points x such that dist(p, x) is less than r. One important characteristic of metric spaces is that they have the Hausdorff property, meaning that sequences can have only one limit point.

Metrization is a process for making a suitable Hausdorff topological space into a metric space in such a way that the open sets resulting from the use of the distance function, as in the preceding paragraph, are the same as the open sets of the original topology. The determination of exactly which types of topological spaces are metrizable is one of the important problems in general topology.

metric system, international decimal system of weights and measures, based on the metre for length and the kilogram for mass, that was adopted in France in 1795 and, by the late 20th century, was used in almost all nations.

The French Revolution of 1789 provided the opportunity to pursue the frequently discussed idea of replacing the confusing welter of traditional but illogical units of measure with a rational system based on multiples of 10. In 1791 the French National Assembly directed the French Academy of Sciences to address the chaotic state of French weights and measures. It was decided that the new system would be based on a natural physical unit to ensure immutability. The academy settled on the length of 1/10,000,000 of a quadrant of a great circle of the Earth, measured around the poles of the meridian passing through Paris. An arduous six-year survey to determine the arc of the meridian from Barcelona, Spain, to Dunkirk, Fr., eventually yielded a value of 39.37008 inches for the new unit to be called the metre, from Greek *metron,* meaning "measure."

All other metric units were derived from the metre, including the gram for weight (one cubic centimetre of water at its maximum density) and the litre for capacity (one-thousandth of a cubic metre). Greek prefixes were established for multiples of 10, ranging from pico- (one-trillionth) to tera- (one trillion) and including the more familiar micro- (one-millionth), milli- (one-thousandth), centi- (one-hundredth), and kilo- (one thousand). Thus, a kilogram equals 1,000 grams, a millimetre 1/1,000 of a metre. In 1799 the Metre and Kilogram of the Archives, platinum embodiments of the new units, were declared the legal standards for all measurements in France, but the motto of the metric system expressed the hope that the new units would be "for all people, for all time."

Not until 1875 did an international conference meet in Paris to establish an International Bureau of Weights and Measures. The Treaty of the Metre signed there provided for a permanent laboratory in Sèvres, near Paris, where international standards are kept, national standard copies inspected, and metrological research conducted. The General Conference of Weights and Measures, with diplomatic representatives of some 40 countries, meets every six years to consider reform. The conference selects 18 scientists who form the International Committee of Weights and Measures that governs the Bureau.

For a time, the international prototype metre and kilogram were based, for convenience, upon the archive standards rather than directly upon actual measurement of the Earth. Definition by natural constants was readopted in 1960, when the metre was redefined as 1,650,763.73 wavelengths of the orange-red line in the krypton-86 spectrum, and again in 1983, when it was redefined as the distance traveled by light in a vacuum in 1/299,792,458 second. The kilogram is still defined as the mass of the international prototype at Sèvres.

In the 20th century the metric system generated derived systems needed in science and technology to express physical properties more complicated than simple length, weight, and volume. The centimetre-gram-second (CGS) and the metre-kilogram-second (MKS) systems were the chief systems so used until the establishment of the International System of Units (*q.v.*).

Metric system

base unit*

quantity	*name of unit*	*symbol*
length	metre	m
area	square metre	square m, *or* m^2
	are (100 square metres)	a
volume	cubic metre	cubic m, *or* m^3
	stere (1 cubic metre)	s
weight	kilogram	kg
	metric ton (1,000,000 grams)	t
capacity	litre	l
temperature	Celsius	°C

prefixes designating multiples and submultiples

prefix	*symbol*	*factor by which unit is multiplied*	*examples*
exa-	E	10^{18} = 1,000,000,000,000,000,000	
peta-	P	10^{15} = 1,000,000,000,000,000	
tera-	T	10^{12} = 1,000,000,000,000	
giga-	G	10^{9} = 1,000,000,000	
mega-	M	10^{6} = 1,000,000	megaton (Mt)
kilo-	k	10^{3} = 1,000	kilometre (km)
hecto-, hect-	h	10^{2} = 100	hectare (ha)
deca-, dec-	da	10 = 10	decastere (das)
		1	
deci-	d	10^{-1} = 0.1	decigram (dg)
centi-, cent-	c	10^{-2} = 0.01	centimetre (cm)
milli-	m	10^{-3} = 0.001	millilitre (ml)
micro-, micr-	μ	10^{-6} = 0.000001	microgram (μg)
nano-	h	10^{-9} = 0.000000001	
pico-	p	10^{-12} = 0.000000000001	
femto-	f	10^{-15} = 0.000000000000001	
atto-	a	10^{-18} = 0.000000000000000001	

*The metric system of bases and prefixes has been applied to many other units, such as decibel (0.1 bel), kilowatt (1,000 watts), megahertz (1,000,000 hertz), and microhm (one-millionth of an ohm).

Metro-Goldwyn-Mayer, Inc. (MGM), American corporation that, during its peak in the 1930s and '40s, was the world's largest and most profitable motion-picture studio.

The corporation was formed when Marcus Loew, a film exhibitor and distributor, bought into Metro Pictures in 1920. Four years later the company merged with the Goldwyn production company (whose studios in Culver City, near Hollywood, eventually became the MGM studio headquarters). In 1925 Louis B. Mayer Pictures joined the group, and Mayer himself was head of the studio for 25 years. Also prominent during MGM's early years was producer Irving Thalberg, the "boy genius" of Hollywood who was granted authority to reedit any film. Among the studio's major releases during the late silent era were *The Big Parade* (1925), *Ben-Hur* (1926), and *Flesh and the Devil* (1927), and its top stars included Greta Garbo, John Gilbert, and Lon Chaney.

Mayer successfully honed an elegant image for the studio during the 1930s and '40s, its most prosperous years. *Grand Hotel* (1932), *David Copperfield* (1935), *The Wizard of Oz* (1939), *Gone with the Wind* (1939), *The Philadelphia Story* (1940), *Mrs. Miniver* (1942), and *Gaslight* (1944) were among the major productions that helped make MGM the "Tiffany of studios," as it was regarded at the time. Boasting that it had "more stars than there are in the heavens," the studio had a roster of talent that included Clark Gable, Spencer Tracy, Joan Crawford, Jean Harlow, William Powell, Myrna Loy, Katharine Hepburn, Judy Garland, Mickey Rooney, Elizabeth Taylor, and Gene Kelly.

Beginning with *Meet Me in St. Louis* (1944), MGM launched a series of lavish Technicolor musicals, a style of film with which the studio would be permanently associated thereafter. The best of these included *On the Town* (1949), *An American in Paris* (1951), *Singin' in the Rain* (1952), and *The Band Wagon* (1953). Such films were expensive to produce, however, and they reaped only modest profits. MGM's gradual decline in the 1950s led to a series of management changes the following decade, when the studio's output was limited to a few high-profile, large-budget films such as *Doctor Zhivago* (1965) and *2001: A Space Odyssey* (1968). In the 1970s the studio sold many of its assets and concentrated on several nonfilm ventures such as hotels and casinos. By the end of the decade, MGM Grand Hotels in Las Vegas and Reno, Nev., earned the company more money than any of its films.

MGM purchased United Artists films in 1981 and became known as the MGM/UA Communications Company when it incorporated in 1986. Also in that year, the company bought back many of the assets it had sold the previous decade and again became a major producer of motion pictures. *Moonstruck* (1987), *Get Shorty* (1995), *The Birdcage* (1996), *Legally Blonde* (2001), and, especially, the ongoing series of James Bond films have been among the studio's most successful subsequent productions.

MGM/UA has since been divided, sold, and resold several times. Although its main product continues to be motion pictures, it has diversified into such ventures as international television networks, video and computer games, and touring ice shows.

Metro Toronto Zoo, zoological park in West Hill, Ontario, Can., which ranks as one of the largest zoos in the world. This 287-hectare

(710-acre) park was opened in 1974 by the municipality of Toronto and the Metropolitan Toronto Zoological Society. It replaced the overcrowded and outdated municipal Toronto Zoo at Riverdale.

The Metro Toronto Zoo has a fine collection comprising a few thousand specimens representing nearly 280 species. Its exhibits are arranged zoogeographically so that all the animals native to a particular continent are grouped together. Each area has a pavilion for displaying the smaller specimens and for housing those that cannot tolerate the cold Canadian climate. Plants indigenous to the areas represented are used in the pavilions to create the appropriate natural setting. Half of the African pavilion, for example, is designed to simulate a jungle habitat and houses gorillas and bongo antelope, while the other half holds swamplands for such animals as pygmy hippopotamuses and sitatunga antelope. Outdoors, the 20-hectare (50-acre) reproduction of the savannah is home for a mixed group of zebras, white rhinoceroses, and various other species of large mammals and birds. The "Canadian Animal Domain" is another of the larger exhibits, covering 166 hectares (410 acres). Visitors may ride a train through this section of the zoo to observe the large mammals displayed there.

metrology, the science of measurement. From three fundamental quantities, length, mass, and time, all other mechanical quantities—*e.g.,* area, volume, acceleration, and power—can be derived. A comprehensive system of practical measurement should include at least three other bases, taking in the measurement of electromagnetic quantities, of temperature, and of intensity of radiation—*e.g.,* light.

Accordingly, the 11th General Conference of Weights and Measures in 1960 adopted six quantities and units as the bases on which was established the International System of Units (*q.v.*). Since 1887 many national standards laboratories have been founded to set up and maintain standards of measurement, both for the six basic quantities and for their systematic derivatives. They also do attendant test and verification work for science and industry. Examples are the National Bureau of Standards (NBS) in the United States, the National Physical Laboratory (NPL) in the United Kingdom, and similar bodies in many other countries. The international metric organization created by the Metric Convention of 1875 (amended in 1921) also has a central laboratory, the International Bureau of Weights and Measures, at Sèvres (near Paris). It has duties analogous to those of the national laboratories but is concerned especially with the international coordination of all scientific work relating to the maintenance and improvement of the metric system of units and standards. This organization acts under the authority of the General Conference of Weights and Measures with the aid of an elected executive body, the International Committee of Weights and Measures, which meets every year.

Measuring a quantity means ascertaining its ratio to some other fixed quantity of the same kind, known as the unit of that kind of quantity. A unit is an abstract conception, defined either by reference to some arbitrary material standard or to natural phenomena. For example, the standard of length in the metric system was defined (1889–1960) by the separation of two lines on a particular metal bar, but it is now defined as equal to a certain number of wavelengths of light produced by a particular kind of atom under given conditions.

metronome, instrument for marking musical tempo, erroneously ascribed to the German Johann Nepomuk Maelzel (1772–1838) but actually invented by a Dutch competitor, Dietrich Nikolaus Winkel (*c.* 1776–1826). It consists of a pendulum swung on a pivot and actuated by a hand-wound clockwork whose escapement (a motion-controlling device) makes a ticking sound as the wheel passes a pallet. Below the pivot there is a fixed weight; above it, a sliding weight. A scale of numbers indicates how many oscillations per minute occur when the sliding weight is moved to a given point on the pendulum. Thus, the notation "M.M. (Maelzel's metronome) 𝅗𝅥 = 60" indicates that at 60 oscillations per minute the half note will receive one beat. The conventional metronome is housed in a pyramidal case. Pocket and electric metronomes are also made. Metronomes have occasionally been used as musical instruments, *e.g.,* by the Hungarian György Ligeti (*Poème symphonique,* 1962, for 100 metronomes).

Metrophanes Kritopoulos (b. 1589, Beroea, Macedonia, Ottoman Empire—d. May 30, 1639, Walachia, Ottoman Empire), Greek Orthodox patriarch of Alexandria, Egypt, and theologian whose discussions with European Protestants concluded with his writing an exposition of Eastern Orthodox doctrine in an attempt at Christian unity.

After becoming a monk at Mt. Athos, Greece, Kritopoulos in 1617 was sent on a tour of leading Anglican and Protestant university centres by the patriarch of Constantinople (now Istanbul), Cyril Lucaris, who sought to integrate Orthodox and Calvinist teaching. After study and exchanges with Anglicans at Oxford (1617–23) and with continental reformers in Germany, Switzerland, and Italy until *c.* 1630, he returned to the East and was made an Egyptian bishop in 1631; by 1636 he had been consecrated patriarch of Alexandria. He subscribed to the decisions of the 1638 Council of Constantinople that condemned Cyril for his Protestant leanings.

While at Helmstedt, Ger. (1624–25), Kritopoulos wrote in Greek "Confession of the Catholic and Apostolic Eastern Church," a treatise on the traditional Orthodox creed. The confession reverts to the doctrinal expressions of the early Greek Church Fathers as a basis for mutual understanding among the contending Christian communions. Thus, he emphasizes the biblical and devotional simplicity of primitive Christianity, with its emphasis on the divine Trinity and the reconciliation of fallen man with God through a mystical, sacramental relationship to Christ's divinity and sacrifice. Critical of aspects both in Protestant and Roman Catholic teaching, Kritopoulos maintained an ambiguous position in mediating the contrary theologies.

metropolitan, in the Roman Catholic, Eastern Orthodox, and Anglican churches, the head of an ecclesiastical province. Originally, a metropolitan was a bishop of the Christian Church who resided in the chief city, or metropolis, of a civil province of the Roman Empire and, for ecclesiastical purposes, administered a territorial area coextensive with a civil province. The first known use of the title in church conciliar documents was at the Council of Nicaea in 325, which definitely established the metropolitan in the organization of the church.

Following the general pattern of civil government, the expanding church created ecclesiastical provinces, each headed by a metropolitan, who was assisted by his suffragan bishops, each of whom headed a diocese within the province. This system has continued substantially unchanged. The metropolitan convokes and presides at provincial synods, and he takes the chief part, assisted by his suffragans, in the consecration of bishops.

In Slavic-speaking Orthodox churches the title metropolitan is used to designate heads of autocephalous churches and a few important episcopal sees; in Greek-speaking Orthodox churches it is given to all diocesan bishops, as distinct from their auxiliaries. In Western medieval Roman Catholicism, especially since the 9th century, the rights of the metropolitans gradually disappeared in the framework of papal centralization. The title archbishop, conferred by popes on metropolitans of particular note, took on connotations of spiritual authority, and the title metropolitan came to be regarded as being particularly associated with temporal authority. The distinction still remains in the Roman Catholic Church, but in the Church of England the titles are synonymous. *See also* archbishop.

metropolitan area, also called METROPOLIS, a major city together with its suburbs and nearby cities, towns, and environs over which the major city exercises a commanding economic and social influence. Literally construed, *metropolis* from the Greek means "mother city," and by implication there are progeny or dependents scattered about the core area. Sometimes there may be two or more major cities, as in the Tokyo–Yokohama Metropolitan Area (Japan) or an agglomeration of metropolitan boroughs as in Greater London (England). The U.S. Census employs a unit called a metropolitan statistical area (MSA) which includes either (1) a city with a population of at least 50,000 or (2) an urbanized area of at least 50,000 population with a total metropolitan population of at least 100,000 (75,000 in New England). An urbanized area is defined as having a population of at least 50,000, and a population density of at least 1,000 per square mile.

Metropolitan Museum of Art, largest and most comprehensive art museum in New York City and one of the foremost in the world. The museum was incorporated in 1870 and opened two years later. The complex of buildings at its present location in Central Park opened in 1880. The main building facing Fifth Avenue, designed by William Morris Hunt, was completed in 1902. McKim, Mead and White designed certain later additions. The American section, added in 1924, included the 1823 marble facade saved from the demolished U.S. Branch Bank on Wall Street. The American Wing, a four-acre addition, was wrapped around the old section in 1980 by architects Kevin Roche, John Dinkeloo, and associates, who had also designed the Lehman Wing in 1975, the Michael C. Rockefeller and Sackler wings in 1978, and a projected European wing.

The Saint-Guilhem arcade and garden court at The Cloisters, a branch of the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, The Cloisters Collection

The Metropolitan Museum has important collections of Egyptian, Babylonian, Assyrian, Far and Near Eastern, Greek and Roman, European, Pre-Columbian, New Guinean, and American art including architecture, sculpture, painting, drawings, prints, glass, ceramics, textiles, metalwork, furniture, period rooms, arms and armour, and musical instruments. It has a Costume Institute and a Junior Museum. The Thomas J. Watson Library, built in 1964, has one of the most complete art and archaeology reference collections in the world.

European art of the Middle Ages is found on display in both the Central Park complex and The Cloisters, the Metropolitan's museum of medieval art in Fort Tryon Park. The building, which opened in 1938, is made up of parts of medieval monasteries and churches.

Metropolitan Opera Association, New York City, leading U.S. opera company, distinguished for the outstanding singers it has attracted since its opening performance (Gounod's *Faust*) on Oct. 22, 1883. After its first season under Henry E. Abbey had ended in a $600,000 deficit, its management passed to the conductor Leopold Damrosch and later to his son, conductor and composer Walter Damrosch. In 1892, under Abbey, Walter Schoeffel, and Maurice Grau, the programming was a balance of German, French, and Italian. Grau, as manager during the Metropolitan's "Golden Age" (1898–1903), drew many excellent artists from all over the world.

Heinrich Conried, manager from 1903 to 1908, arranged performances of Richard Wagner's *Parsifal* (first performance outside Bayreuth, Ger.) and Richard Strauss's *Salome,* which so shocked its audience that it was withdrawn. During Giulio Gatti-Casazza's 25 years as general manager, weekly radio broadcasts were inaugurated.

Under Edward Johnson (general manager 1934–50), U.S. composers and artists were encouraged. His successor, Rudolf Bing, made innovations in staging and brought the first black singers to the Metropolitan. He also arranged the Metropolitan's first televised performance and organized its touring company. In 1966 the Metropolitan moved to the Lincoln Center for the Performing Arts, New York City. In 1972, Bing resigned and was succeeded by Göeran Gentele, former head of the Stockholm opera; Gentele was killed in an automobile accident later that year and was succeeded by Schuyler G. Chapin in 1973 and Anthony Bliss in 1975.

Metsähine (Finnish god): *see* Tapio.

Metsu, Gabriel, Metsu also spelled METZU (b. January 1629, Leiden, Neth.—buried Oct. 24, 1667, Amsterdam), Dutch painter of scenes of everyday life.

The son of a painter of Leiden, he studied and worked there until about 1650, when he settled in Amsterdam. He began with religious subjects, but sacred art was unsuited to his temperament: he turned to the life of the marketplace and of the drawing room, which he painted with equal facility. Among his better-known works are "The Music Lesson" and "The Artist and His Wife" (Metropolitan Museum of Art, New York City), and "The Duet" (National Gallery, London).

Metsys, Quentin (Flemish artist): *see* Massys, Quentin.

mettā (Pāli), in Buddhism, the perfect virtue of sympathy. *See* brahmavihāra.

Metternich, Klemens, Fürst von (prince of), in full KLEMENS WENZEL NEPOMUK LOTHAR, FÜRST VON METTERNICH-WINNEBURG-BEILSTEIN (b. May 15, 1773, Coblenz, Archbishopric of Trier—d. June 11, 1859, Vienna), Austrian statesman, minister of foreign affairs (1809–48), and a champion of conservatism, who helped form the victorious alliance against Napoleon I and who restored Austria as a leading European power, hosting the Congress of Vienna in 1814–15.

Metternich, black and white chalk drawing by Anton Graff, c. 1803–05; in the Kupferstichkabinett, Dresden, Ger.

By courtesy of the Staatliche Kunstsammlungen, Dresden, Ger.

Early life. Metternich, the descendant of an old Rhenish noble family, was the son of Franz Georg Karl, Graf von Metternich-Winneburg and Countess Beatrix Kagenegg. His father was then the Austrian envoy to the Rhenish principalities of the empire, and Metternich spent his youth in the Rhine–Moselle region, for which he retained a lifelong affection.

In 1788 he entered the University of Strasbourg, where he studied diplomacy; but the spread of the French Revolution prompted him to leave Strasbourg in 1790 and enter the University of Mainz. Before the French revolutionary troops entered Mainz, he went to Brussels in the Austrian Netherlands, where his father was then chief minister. In 1794 he undertook a diplomatic mission to England, where he published a pamphlet calling for a general arming of the German people; but in October he rejoined his father, who had in the meantime fled to Vienna as the French invaded the Netherlands. In Vienna he occupied himself with natural, scientific, and medical studies, in which he always kept a lively interest and which he later did much to encourage.

In September 1795 Metternich married the countess Eleonore Kaunitz, heiress and granddaughter of the former Austrian state chancellor Wenzel Anton, Graf von Kaunitz. This marriage gave him the link with the high nobility of Austria and the access to high office he had long desired. After having represented the Roman Catholic Westphalian counts of the empire at the end of the Congress of Rastatt (1797–99), which ratified compensation for the German princes ousted by the French from their possessions on the left bank of the Rhine, he was in 1801 appointed Austrian minister to the Saxon court at Dresden, and there he formed his friendship with Friedrich von Gentz, the German publicist and diplomat. Serving as Austrian minister in Berlin after 1803, Metternich failed to persuade Frederick William III of Prussia to join Austria in the war of 1805 against France but gained a profound insight into the internal brittleness of the Prussian state, whose speedy ruin he predicted.

Ministry during the Napoleonic Wars. In 1806 Metternich served as Austrian minister to France. In contact with Napoleon's sister Caroline Murat and other ladies of Parisian society, he won a reputation for licentiousness; nevertheless, from those ladies and from his relations with the foreign minister Talleyrand and with the Russian envoy, he obtained excellent reports on the state of affairs in France. Although Metternich's successes in the negotiations leading up to the Franco-Austrian Treaty of Fontainebleau were insignificant, he used his time to acquire a deep insight into the emperor Napoleon I's character. Yet he overestimated the impact of the Spanish rising of 1808 on the Napoleonic system, and his optimistic reports did much to induce Austria to undertake the disastrous war of 1809 against France. After the Battle of Wagram, he tried to obtain favourable terms in the peace negotiations but was rebuffed by Napoleon.

On Oct. 8, 1809, the emperor Francis (at that time Francis I of Austria but no longer Holy Roman emperor) appointed Metternich minister of foreign affairs. Six days later the oppressive Treaty of Schönbrunn was signed with France. Austria was now in urgent need of a respite, which Metternich obtained by forming the project of a marriage between the archduchess Marie-Louise, a daughter of Francis I, and Napoleon, whose vanity Metternich cleverly exploited. It is not clear how far he expected that this marriage would restrain Napoleon from further campaigns of conquest, but at least he achieved a relationship between France and Austria loose enough to preserve Austria's freedom of action: Austria neither joined the Confederation of the Rhine, a league of German princes under Napoleon's protection, nor became one of the client states of the Napoleonic system. Utterly exhausted and debt-ridden, Austria could hardly have resisted any further demands of Napoleon, but it was then no longer the main object of Napoleon's hostility.

As early as 1811, in order to promote Austria's internal development, Metternich wanted the state to be reorganized on federal lines instead of continuing under the centralized system that the emperor Joseph II had imposed. Yet Metternich could never overcome the objections of his strictly absolutist emperor. At the same time the enthusiasm for arming the nation and for a German national rising against Napoleon, which he had felt as late as 1809, began to be superseded by a firm dislike for all popular movements. Agreeing with the Emperor on this, he now came to regard these manifestations as a menace to the multinational Habsburg state. He became the strictest exponent of the doctrine of the balance of power in Europe—a doctrine instilled into him originally by Koch, latterly by his diplomat friend Gentz.

When Napoleon launched his invasion of Russia in 1812, Metternich obtained the status of an independent contingent for the Austrian forces under Prince Karl Schwarzenberg that accompanied the French Army. The disaster that befell Napoleon's army came as a surprise to Metternich. On Jan. 30, 1813, Schwarzenberg concluded an indefinite armistice with the Russians. But in view of the inadequacy of Austria's armaments, Metternich could not make up his mind to change over to war on Russia's side against Napoleon. Resisting all ill-considered projects, in particular those of the archduke John (who was put under house arrest for planning a premature anti-French rising in the Alps), Metternich firmly adhered to neutrality while Austria secretly rearmed. He even drew Saxony into the neutral camp for a time. When, later in 1813, Saxony's return to the French side and Napoleon's victory over the Russians and Prussians at Bautzen shook Metternich's will to make war and stiffened Napoleon's attitude, Metternich mediated an armistice between France, Russia, and Prussia. Even so, in the subsequent Treaty of Reichenbach, June 24, 1813, between Austria, Prussia, and Russia, Metternich undertook to bring Austria into the war against France if Napoleon rejected the peace terms that he was offering.

By dominating the negotiations with the French during the summer of 1813, Metternich gained more time for rearming. At this point he was not interested in the annihilation of Napoleon's power, which the emperor Francis likewise, out of consideration for his daughter Marie-Louise, was unwilling to destroy altogether. Metternich also distrusted the Russian emperor Alexander I and feared that after the collapse of France, Europe would be at Russia's mercy. Napoleon's obstinacy frustrated the attempt at a settlement; but when in August Austria finally declared war on France, Metternich, by his superior conduct of negotiations, had won for his country the leadership both in the political and in the military field. In October 1813 the hereditary title of prince was bestowed on him by the Austrian emperor.

In opposition to the plans of the Prussian minister Karl, Freiherr vom Stein, and of the Russian emperor, Metternich promised the South German states of the Confederation of the Rhine that if they went over to the allies they would not forfeit the position they had achieved on Napoleon's side. This promise alone showed that, while he was striving for a solution compatible with the interests of all parties, he also wanted to gain the South German states as allies against the Prussian–Russian designs of aggrandizement. After Napoleon's defeat at Waterloo and abdication, Metternich rejected as unrealistic the proposals of Baron Stein and others for the resuscitation of the Holy Roman Empire. The first Treaty of Paris (May 30, 1814) stipulated nothing more for Germany than a loose confederation of states.

Leadership of the Congress of Vienna. The Congress of Vienna (September 1814–June 1815) was the climax of Metternich's work of reconstruction. The very fact that it was held in Vienna was in itself a great success for him. He had precise ideas about the basis for a new order in Europe but knew from the start that he would have to modify them substantially if he was to salvage even a small part of his plans against the opposition of self-interested princes. He wanted to secure Austria's predominance by forming two confederations, one German and the other Italian, with Austria as the leading power in both. Within Germany, he proposed the creation of a hereditary German imperial title, and he thought that Austria and Prussia should share the task of protecting Germany's western frontier. Friendship with Prussia on the one hand and with Bavaria on the other thus seemed to him to be the prerequisite of success. Supported by the British foreign secretary, Lord Castlereagh, Metternich sought to prevent the elimination of France, which he saw as a necessary counterweight against Russia. Likewise, he resisted the territorial aggrandizement of Russia and Prussia and objected in particular to Prussia's designs for annexing all of Saxony.

The congress became a splendid social event. By an unbroken chain of festivities Metternich kept the visiting monarchs in a mood that made them disinclined to interfere very persistently in the real work of the statesmen. Facile and not averse to amorous adventures, Metternich brilliantly mastered his dual role of social representation and political leadership.

Yet Metternich only partly succeeded in his plans: the German imperial project came to nothing because Francis steadfastly refused to support it; the Italian confederation did not materialize; and the German confederation, when it at last did come into being in June 1815, was based only on a brief and noncommittal federal act derived from a Bavarian compromise proposal. In European affairs, however, Metternich was more successful: he achieved equality of status for France; he obtained a reduction of the Prussian demands on Saxony; and, in particular, he blocked the farther reaching demands of Russia. Both Russia and Prussia, in fact, were held in check by the common front of Austria, England, and France that Metternich had created.

Metternich's moderation produced a long-lasting European order. This, however, must be ascribed to his diplomatic capability rather than to his political foresight. Austria's status in the German confederation had been strengthened; but the Emperor's refusal of the German crown meant that Prussia, with equal status in the confederation, would be able to counterbalance Austria.

Role in the German confederation. Not even within the Austrian Empire was Metternich able to prevail with the idea (already at the root of his plans of 1811) of overcoming the spirit of national revolution by revitalizing the old historical regions and the privileges they enjoyed in preabsolutist times. His attempt to organize the newly acquired Italian provinces according to historical principles was frustrated by the emperor Francis, who, though accepting Metternich's ideas, united two incompatible regions in a completely unhistorical "Lombardo-Venetian kingdom" and so destroyed Metternich's hopes of counteracting pan-Italian nationalism. Moreover, as Metternich had feared, the initially strong pro-Austrian mood turned into its opposite.

The reconstruction of Austria took shape entirely in the spirit of the emperor Joseph II, on centralist and absolutist lines, without regard to national differences and without the establishment of departmental ministries, which Metternich had demanded. After many futile remonstrances Metternich eventually yielded to the obstructionism of the Emperor, who detested innovation and stood jealously on his dignity. The reestablishment of the ancient diets of the estates of Tirol and Galicia complied to some extent with Metternich's idea of resurrecting the provincial diets in order to create a counterweight against the growing forces of liberal and nationalist opinion that was demanding a central parliament. He condemned, however, the repressive measures by which the police minister tried to achieve these aims.

The domestic affairs of Austria created difficulties for Metternich at the Frankfurt am Main Bundestag (federal assembly), which opened in 1816. He had originally intended to use this assembly to oppose revolutionary thought all over Germany. Pointing to the examples of Tirol and Galicia, he attempted in 1817–18 to encourage the German states to introduce constitutions resurrecting the historical provinces and to set up their own diets instead of a central parliament. In summer 1818, however, Bavaria and Baden promulgated constitutions that reflected not Metternich's ideas but those of limited monarchy similar to that outlined by the French charter of June 1814; and in 1819, when revolutionary activity culminated in the murder of the dramatist August von Kotzebue and when the opening sessions of the Bavarian and Baden assemblies proved stormy, Metternich decided to stifle these unmanageable liberal currents.

He managed to convince the Prussian chancellor Prince Karl August von Hardenberg that his prescription for provincial diets was right. Then, assured that Prussia would not follow the South German example, he could quietly watch how parliaments created against his advice fulfilled his predictions and discouraged the liberal inclinations of German princes. Consequently, at the ministerial conferences of Carlsbad and Vienna in 1819–20, Metternich, to the surprise of the South German states, did not attempt to undo the new constitutions but simply curtailed the activity of the federal assembly, which had become an inconvenience to him. Reorienting his German policy, he began to rely not on the assembly but on the common interest of the princes whom he led to share his point of view by personal contact. Henceforth it was no longer the privileges of Austria as granted by the federal act, but Metternich's personality that guaranteed Austria's predominance in the German confederation.

Years of decline. Metternich had hoped that a system of congresses, at which the great powers would concert their actions, would maintain order and peace in Europe. At the congresses of Aix-la-Chapelle (1818), of Troppau (1820), of Laibach (1821), and of Verona (1822) his international reputation was at its zenith, but the disruption of the forum of great powers became evident when Great Britain abandoned the policy of intervention against revolutions in other countries: Viscount Castlereagh prepared the way for this change at Troppau, and George Canning, his successor as British foreign secretary, brought Metternich's influence on western Europe to an end by insisting on the right of national self-determination for the South American colonists in revolt against Spain and for the Greek insurgents against Turkey. With Alexander I's death (1825) it seemed likely that Metternich's influence on Russia would likewise come to an end; and Prussia's jealousy of Austria's dominance was causing further difficulties, when in 1830 the July Revolution in France, followed by insurrections in Belgium, Poland, and Germany, appeared to justify again Metternich's dismal prognoses and served to convince the eastern powers, Austria, Prussia, and Russia, that they should stand together by his principles.

Metternich had been appointed Austrian state chancellor on May 25, 1821, but his influence in Austria was decisively restricted by the appointment of Franz Anton, Graf von Kolowrat, as minister of state and head of the Cabinet conferences (1826). Kolowrat opposed an orderly governmental organization and won great ascendancy over the emperor Francis. Metternich, as his influence dwindled, yielded to an increasingly irritating vanity and to a passion for theorizing that caused his utterances to become increasingly prolix and, at times, to verge on the ridiculous. For the sake of legitimacy and despite general apprehensions, he gave Francis the disastrous advice to recognize his feebleminded eldest son, the archduke Ferdinand, as heir to the throne. In 1835, therefore, when Ferdinand succeeded his father, Metternich, at first together with the archduke Louis (Ludwig), took the chair at the "conference," or council of state that assumed the functions of a regency. In 1836 it seemed as if he would at last be able to carry out his idea of well-ordered government, but at the decisive moment Kolowrat managed to convert the archdukes John and Louis to his own theories. Thenceforth Metternich's authority was confined to external affairs. His vanity tempted him to disguise the waning of his influence by accepting responsibility for decrees that neither came from him nor accorded with his views. He thus became a hated symbol of repression and reaction and, eventually, on March 13, 1848, had to resign, as the first victim of the revolution. He made his way with difficulty into exile in England but returned to Vienna in 1851, where he died eight years later.

After his first wife's death in 1825, Metternich married Baroness Antoinette Leykam in 1827. After her death in 1829, he married Countess Melanie Zichy-Ferraris in 1831, who died in 1854. His son by his second marriage, Richard, Fürst von Metternich, was Austrian ambassador in Paris from 1859 to 1870 and one of the foremost diplomats of his time.

(K.O.v.A./Ed.)

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Metz, city, capital of the Moselle *département,* Lorraine *région,* northeastern France, at the confluence of the Moselle and Seille rivers, northwest of Strasbourg and south of the Luxembourg frontier. It was partly rebuilt and its suburbs considerably extended after World War II.

Metz derives its name from the Mediomatrici, a Gallic tribe who made it their capital. It was fortified by the Romans. In the 3rd century it was evangelized, and it became a bishopric in the 4th century. After being plundered by the Huns in the 5th century, the city passed under Frankish domination. In 843, at the partition of the Carolingian Empire, Metz became the capital of Lorraine. During the Middle Ages, the city was a free town within the Holy Roman Empire and grew prosperous. After the Reformation in the 16th century, when Metz became Protestant and was in danger of being subjected to persecution, Henry II of France (reigned 1547–59), though a Roman Catholic, offered to defend it, successfully withstanding a siege by Charles V, the Holy Roman emperor, in 1552. The French continued to occupy the town; and in 1648, at the Peace of Westphalia, it was ceded to France with Toul and Verdun.

Porte des Allemands (Gate of the Germans), Metz, France

P. Salou—Shostal

During the 1870–71 Franco-Prussian War the French troops retreated into Metz after an indecisive battle. The Germans besieged the town, and 54 days later the French were forced to capitulate. Metz was returned to France after World War I. During World War II it was occupied by the Germans and in 1944 was liberated only after a long battle.

Metz has pleasant promenades along the banks of the Moselle River, which divides into several arms as it flows through the city. The Gothic cathedral of Saint-Étienne was originally formed when two 12th-century churches were joined into a single edifice. The transept and the nave, one of the highest of French Gothic churches, have huge pointed windows. The two towers were begun in the 13th century. The cathedral has remarkable 13th- and 14th-century stained-glass windows, as well as contemporary ones by the painters Marc Chagall and Jacques Villon. The old city gate, the Porte des Allemands (Gate of the Germans), built in the 13th and 15th centuries, which was partly destroyed during World War II, has imposing crenellated towers. The museum has a collection of Gallo-Roman antiquities, which are exhibited in the vestiges of Roman baths discovered in 1935.

Metz, a railway junction on the Nancy-Luxembourg line, is also the centre of a complex road and motorway network and is located in a commanding position on the canalized Moselle. It is also near the Lorraine iron-mining basin and near the Moselle coal mines. The manufacture of automobile, electrical, and mechanical equipment and of food products (brewing, canned foods) and the processing of tobacco are among the main industries. The University of Metz was founded in 1971. Pop. (1990) 123,920.

Meudon, city, Hauts-de-Seine *département,* Paris *région,* France, southwestern suburb of Paris, standing on a hill on the south bank of the Seine River. Meudon is bordered to the south by woods and by the terrace of Meudon and has a fine panoramic view of Paris. The Observatoire de Meudon on the terrace is housed in the transformed early 18th-century royal Château-Neuf, severely damaged by fire in 1870.

During the 19th or early 20th century, the sculptor Auguste Rodin, the painters Édouard Manet and Pierre-Auguste Renoir, and the composer Richard Wagner all lived in Meudon. Rodin's estate is a museum housing his tomb and many of his works. There is an aeronautical museum outside the city. Industry, centred in the Bas Meudon quarter, is predominantly machinery fabrication. Pop. (1990) 46,173.

Meulen, Adam Frans van der (baptized Jan. 11, 1632, Brussels, Spanish Netherlands [now in Belgium]—d. Oct. 15, 1690, Paris, France), Flemish Baroque painter who specialized in battle scenes.

Meulen was a pupil of the painter of battle scenes Pieter Snayers, of the Flemish school, and was called to Paris about 1666 by the finance minister Jean Colbert, at the request of Charles Le Brun, to fill the post of battle painter to Louis XIV. His paintings of the campaigns in Flanders (1667) so delighted Louis that from that date van der Meulen was ordered to accompany him on all his campaigns. He also made many tapestry cartoons for the Gobelins factory depicting Louis's military career. In 1673 he was received into the French Academy.

Meunier, Constantin (Emile) (b. April 12, 1831, Etterbeek, Belg.—d. April 4, 1905, Ixelles), Belgian sculptor and painter, one of the principal social-realist artists of the late 19th century in Europe.

Meunier began his career as a sculptor, but during the years 1857–84 he pursued only painting. After visiting some mines and factories, Meunier demonstrated in his paintings a humanitarian interest in labourers, focusing particularly on the miners of the Borinage, dockworkers of Antwerp, metalworkers, and women labourers.

In 1882, under the sponsorship of the Belgian government, Meunier went to Spain, where he produced paintings primarily on religious subjects. After returning to Belgium, he began to explore in bronze sculpture the social themes that had dominated his earlier paintings. The empathy and respect with which he viewed his subjects (*e.g.,* "The Fire-Damp Explosion," 1887) renders Meunier's work universal rather than political. Notable works include "The Docker" (bronze; 1905) and a large sculptural group, "Monument to Labour," which was installed in the Place de Trooz, Brussels, in 1930.

Meurthe-et-Moselle, *département,* Lorraine *région,* northeastern France, created in 1871 from those parts of the *départements* of Meurthe and Moselle that remained in French possession after the Franco-Prussian War (1870–71). These *départements* originally had been constituted from a section of historical Lorraine (*q.v.*), and when the territories annexed by Germany in 1871 were restored to France following World War I, they were formed into the neighbouring *département* of Moselle.

Meurthe-et-Moselle extends from Vosges *département* in the south to the Belgian and Luxembourg frontiers in the north and has at its centre the Moselle River valley and Nancy (*q.v.*), the departmental capital. The country is forested and hilly, rising to about 1,200 feet (370 m) in the southwest, where the hills are cut by the Meuse River valley, and to more than 2,000 feet in the southeast in the Vosges mountains. The Meurthe and Moselle rivers approach each other south of Nancy. The Moselle loops around the ancient cathedral city of Toul and receives the Meurthe north of Nancy. It flows past metallurgical works and through Pont-à-Mousson before leaving the *département.* The wooded, hilly northern strip contains the greater part of the Briey iron-ore basin and embraces the heavily industrialized valleys of the Longwy iron-ore field, with its concentrations of blast furnaces and foundries. The area accounts for a sizable proportion of France's total iron and steel output. The prospect of the abandonment of iron mining weighs heavily on the local economy. Planners hope to substitute automobile-related industries. The Canal de la Marne au Rhin crosses the *département* west-east through Nancy and the middle of the Dombasle-sur-Meurthe rock-salt deposits, which are exploited for heavy chemical industries.

The climate in the *département* is predominantly continental, with severe winters (averaging 20 to 30 days of snow) and hot summers. Forestry is important, and cereals, beets, and potatoes are grown, but there is a trend toward cattle raising to provide local markets with meat and dairy produce. Traditional local industries include brewing at Nancy, glassworks at Baccarat, and iron pipes at Pont-à-Mousson. The *département* is divided into the *arrondissements* of Nancy, Briey, Toul, and Lunéville, which has a fine 18th-century palace inspired by Versailles. Nancy is the administrative centre for education. Area 2,024 square miles (5,241 square km). Pop. (1992 est.) 709,700.

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Meuse, *département,* Lorraine *région,* northeastern France, created from parts of historical Lorraine (*q.v.*) province and a fragment of Champagne.

Bounded in the northeast for 8 miles (13 km) by the Belgian frontier, Meuse occupies an oblong area of 2,400 square miles (6,216 square km), which the Meuse River traverses from south-southeast to north-northwest for over 100 miles (160 km). The Meuse flows in a deeply entrenched valley past Commercy and through the ancient fortress city of Verdun (*q.v.*), the largest centre, in the middle of the *département.* The Ornain River, a tributary of the Marne, crosses the southwest, passing through Bar-le-Duc (*q.v.*), the administrative capital. The Canal de la Marne au Rhin passes through the Ornain valley. The Aisne River gathers its headwaters north of Bar-le-Duc in the rugged, forested highlands of Argonne (750–900 feet [225–275 m]) that extend along the western border. The Aire, a tributary of the Aisne, flows below the eastern escarpment of the Argonne range and is separated from the Meuse by a stretch of hilly, forested country. The Meuse Heights, which rise to more than 1,300 feet [about 400 m] and were the scene of heavy fighting during World War I, follow the east bank of the Meuse.

Because of its higher elevation, Meuse has a more severe climate than most other parts of northern France. Forests cover the heights. The economy has traditionally been largely agricultural, featuring cattle raising, cereals, and forage. Many of the vines that once grew on sheltered slopes have been replaced by plum and apricot trees. Industry, now the largest employment sector, was formerly confined to metalworking and food processing at Bar-le-Duc, Commercy, and Verdun, the administrative centres of the three *arrondissements* and the only sizable towns. Industry is now more widespread but is small-scale and has not altered the rural character of the *département*. Meuse is in the educational division of Nancy. Pop. (1988 est.) 196,400.

Meuse-Argonne, battles of the (Sept. 26–Nov. 11, 1918), a series of final confrontations on the Western Front in World War I.

Following the German retreat from the Marne River in July, General Ferdinand Foch and the Allied high command designed a series of convergent and practically simultaneous offensives against the shaken German armies. One was a joint operation in the Meuse valley toward the Mézière and Sedan rail centre. The Americans proceeded west of the Meuse River, the French west of the Argonne Forest. The Americans faced the most difficult natural obstacle, the dense Argonne Forest. General John Pershing's opening surprise attack advanced 5 miles (8 km) along the Meuse River but only 2 miles (3 km) in the difficult Argonne Forest sector. Attack after attack edged deeper into the Germans' defensive position, and on the 11th day of the American offensive, the Germans recognized that they were outflanked and retreated to avoid capture. Meanwhile the French advanced steadily across the Aisne lowlands. By October 31 the American forces had advanced 10 miles (16 km), the French had advanced 20 miles (32 km), and the Argonne had been cleared of German troops.

Hard fighting continued in the Meuse-Argonne sector during October. More than 1,000,000 Americans participated in the battles. On November 10 the Allies reached Sedan and cut the rail line there. The Armistice was declared (November 11) before a final offensive against Germany itself could begin.

Meuse River, Latin MOSA, Flemish MAES, Dutch MAAS, river, rising at Pouilly on the Langres Plateau in France and flowing generally northward for 590 miles (950 km) through Belgium and The Netherlands to the North Sea. In the French part, the river has cut a steep-sided, sometimes deep valley between Saint-Mihiel and Verdun, and beyond Charleville-Mézières it meanders through the Ardennes region in a narrow valley. Entering Belgium at Givet, it continues northward to Namur, where it is joined on the left (west) bank by the Sambre River and then turns eastward to Liège. The Meuse there forms a natural routeway for river transport and is the centre of industrial development. At Liège it is deep and narrow and lies about 450 feet (137 m) below the plateau tops. The river turns north and from Maastricht (The Netherlands) to Maaseik (Belgium) forms the frontier between The Netherlands and Belgium. From Venlo (The Netherlands) it curves gradually west, reaches sea level and divides, one branch flowing into the Hollandsch Canal (an outlet of the North Sea), while another joins the Waal River (a channel of the Rhine) near Gorinchem to become the Merwede. Near Dordrecht the Merwede divides into the Noord to the north, which joins with the Lek River to become the Nieuwe Maas, and the Oude Maas to the south. The Nieuwe Maas and Oude Maas come together at the Nieuwe Waterweg (New Waterway), which leads to the North Sea.

The Meuse River is navigable for most of its length and is one of the more important waterways of western Europe. In the vicinity of Maastricht, the Albert Canal extends northwestward from the Meuse to reach Antwerp, while the Juliana Canal parallels the Meuse's course northward into the southern part of The Netherlands. The Meuse and its canals are heavily traveled by small cargo ships and barges.

The valley of the Meuse River is a natural barrier that has historically formed part of the defenses on the approach to the heart of the Paris basin from the east. Its line has given great strategic importance to the fortress of Verdun and was the scene of heavy fighting in World War I. During World War II, the crossing of the Meuse River capped the successful German breakthrough into France in May 1940.

Mevleviyah (Islām): *see* Mawlawīyah.

Mewār painting, one of the most important schools of Indian miniature painting of the 17th and 18th centuries. It is a school in the Rājasthanī style and was developed in the Hindu principality of Mewār (in Rājasthān state). The works of the school are characterized by simple bright colour and direct emotional appeal. The comparatively large number of paintings to which dates and places of origin can be ascribed make possible a more comprehensive picture of the development of painting in Mewār than in any other Rājasthanī school. The earliest-dated examples come from a *rāgamālā* (musical modes) series painted in 1605 at Chawand, an early capital of the state. This expressive and vigorous style continued with some variations through 1680, after which time Mughal influence became more apparent. One of the outstanding painters of the early phase was the artist Sāhibdīn.

Krishna lifting Mount Govardhana, Mewār miniature painting, early 18th century; in a private collection

P. Chandra

The Mewār school continued through the 18th century and into the 19th, the production being fairly prolific. An increasing number of paintings were concerned with portraiture and the life of the ruler, though religious themes continued to be popular.

Mewati (people): *see* Mina.

Mexia, Ynes Enriquetta Julietta (b. May 24, 1870, Georgetown, Washington, D.C., U.S.—d. July 12, 1938, Berkeley, Calif.), American botanical collector and explorer whose discoveries helped to clarify and complete botanical records.

The descendant of Mexican-Americans living in Texas, she lived in Texas, Philadelphia, and Mexico City before moving to San Francisco in 1908, having recently been widowed. Mexia was a social worker before entering the University of California as a special student at the age of 51. There she developed an enthusiasm for botany, and in 1925 she began a series of journeys to remote locations in South and Central America and Alaska. On those travels she collected some 150,000 botanical specimens, finding one new genus of Compositae (*Mexianthus mexicanus*) and more than 500 new species of plants, many of which were named in her honour.

Mexicali, city, capital of Baja California Norte state, northwestern Mexico. It lies in the Mexicali Valley, an extension of the Imperial Valley of the United States, in the extreme northeastern portion of Baja California. The city lies across the Mexico-U.S. border from Calexico, Calif. Its name, formed from the first two syllables of Mexico and California, was chosen as a gesture of international friendship. Improved irrigation of the Mexicali Valley, land redistribution (1937), and a duty-free zone franchise (1937–67) brought capital, immigration, and better transport facilities to the city. Its economy, which is no longer entirely dependent upon tourism, is based chiefly on the processing and distribution of long-staple cotton and varieties of fruits, vegetables, and cereals. The Autonomous University of Baja California was established in the city in 1957. It is easily accessible by highway, railroad, and air from the southwestern United States and from many points in Mexico. Mexicali has experienced phenomenal growth in the 20th century. Pop. (2000 prelim.) 550,000.

Mexican hairless, breed of toy dog that is probably descended from hairless Chinese dogs which were taken to Mexico in the late 16th century. A rather long-legged dog, the Mexican hairless generally weighs 10 pounds (4.5 kg) or less. It is hairless except for a topknot and some fuzz on its long tail; its soft skin is pink, slate, or gray in colour. The breed, which is known as the Chinese dog in Mexico, is not formally recognized by the American Kennel Club.

Mexican hat dance, a popular Mexican folk dance, a form of jarabe (*q.v.*).

Mexican jumping bean, the seed of certain Mexican shrubs, especially those of the genus *Sebastiania,* of the spurge family (Euphorbiaceae), that contain larvae of a small olethreutid moth (*Laspeyresia saltitans*). The movements of the larvae feeding on the pulp within the seed, which are intensified by warmth, give the seed the familiar jumping movement.

Mexican lion: *see* puma.

Mexican process (silver production): *see* patio process.

Mexican Revolution (1910–20), a long and bloody struggle among several factions in constantly shifting alliances which resulted ultimately in the end of the 30-year dictatorship in Mexico and the establishment of a constitutional republic. The revolution began against a background of widespread dissatisfaction with the elitist and oligarchical policies of Porfirio Díaz, which favoured wealthy landowners and industrialists. When Díaz in

1908 said that he welcomed the democratization of Mexican political life and appeared ambivalent about running for his seventh reelection as president in 1910, Francisco Madero emerged as the leader of the Antireeleccionistas and announced his candidacy. Díaz had him arrested and declared himself winner after a mock election in June, but Madero, released from prison, published his *Plan de San Luis Potosí* from San Antonio, Texas, calling for a revolt on November 20. The revolt was a failure, but it kindled revolutionary hope in many quarters. In the north, Pascual Orozco and Pancho Villa mobilized their ragged armies and began raiding government garrisons. In the south, Emiliano Zapata waged a bloody campaign against the local caciques (rural political bosses). In the spring of 1911 the revolutionary forces took Ciudad Juárez, forced Díaz to resign, and declared Madero president.

Madero's regime faltered from the start. Zapata turned against him, angered at his failure to effect the immediate restoration of land to dispossessed Indians. Orozco, initially a supporter of Madero, was also dissatisfied with the slow pace of reform under the new government and led a revolutionary movement in the north. The U.S. government then turned against Madero as well, fearing that the new president was too conciliatory to the rebel groups and concerned about the threat that civil war in Mexico was posing to American business interests there. Tensions reached a peak when yet another faction of rebel forces, led by Félix Díaz (the former dictator's nephew), clashed with federal troops in Mexico City under the command of Victoriano Huerta. On Feb. 18, 1913, after the ninth day of that melee (known as *La Decena Trágica,* or "The Ten Tragic Days"), Huerta and Díaz met in the office of U.S. Ambassador Henry Lane Wilson and signed the so-called "Pact of the Embassy," in which they agreed to conspire against Madero and to install Huerta as president. Huerta assumed the presidency the following day, after arresting Madero, who was assassinated a few days later.

Opposition to Huerta's drunken and despotic rule grew in the north, and an uneasy alliance was formed between Pancho Villa, Álvaro Obregón, and Venustiano Carranza, whose *Plan de Guadalupe* called for Huerta's resignation. In the spring and summer of 1914, the rebel forces converged on Mexico City, forcing Huerta into exile. Carranza declared himself president on August 20, over Villa's objections. A state of anarchy and bloodshed ensued until Villa, Obregón, and Zapata held a convention at which it was agreed that the rivalry between Villa and Carranza made order impossible, and they elected Eulalio Gutiérrez interim president. Villa retained the support of Zapata and backed Gutiérrez. Obregón, however, re-allied himself with Carranza and routed Villa in a bloody battle in April 1915 at Celaya. Thereafter, both Zapata and Villa lost ground, and Villa, blaming his defeat on U.S. President Woodrow Wilson's support of Carranza, launched a vendetta against Americans in Mexico and in U.S. border towns. His raid on Columbus, N.M., which claimed the lives of 18 Americans, prompted President Wilson to order General John J. Pershing into the Mexican hills in futile pursuit.

Carranza, president again, presided over the writing of the Constitution of 1917, which conferred dictatorial powers on the president but gave the government the right to confiscate land from wealthy landowners, guaranteed workers' rights, and limited the rights of the Roman Catholic church. Carranza remained in power by eliminating those who opposed him (Zapata was assassinated in 1919), but in 1920 opposition reached a climax when he tried to break up a railroad strike in Sonora. Deserted by virtually all his supporters, including Obregón, he was killed attempting to flee the capital on May 21. Adolfo de la Huerta became interim president until Obregón was elected in November.

Many historians regard 1920 as the end of the revolution, but sporadic violence and clashes between federal troops and various rebel forces continued until the reformist president, Lázaro Cárdenas, took office in 1934 and "institutionalized" the reforms that were fought for during the revolution and were legitimized in the Constitution of 1917.

Mexican Revolutionary Party, Spanish PARTIDO REVOLUTIONARIO MEXICANO, former name (1938–46) of Mexico's major political party, the Institutional Revolutionary Party (*q.v.*).

Mexican tulip poppy: *see* golden cup.

Mexican War, also called MEXICAN-AMERICAN WAR, Spanish GUERRA DE 1847, or GUERRA DE ESTADOS UNIDOS A MEXICO ("War of the United States Against Mexico"), war between the United States and Mexico (April 1846–February 1848) stemming from Mexican anger at the United States' annexation of Texas in 1845 and from a dispute over whether Texas ended at the Nueces River (Mexican claim) or the Rio Grande (U.S. claim). The war—in which U.S. forces were consistently victorious—resulted in the United States' acquisition of more than 500,000 square miles (1,300,000 square km) of Mexican territory extending westward from the Rio Grande to the Pacific Ocean.

Mexico severed relations with the United States in March 1845, shortly after the U.S. annexation of Texas. In September President James K. Polk sent John Slidell on a secret mission to Mexico City to negotiate the disputed Texas border, settle U.S. claims against Mexico, and purchase New Mexico and California for up to $30,000,000. Mexican officials, aware in advance of Slidell's intention of dismembering their country, refused to receive him. When Polk learned of the snub, he ordered troops under General Zachary Taylor to occupy the disputed area between the Nueces and the Rio Grande (January 1846).

On May 9, 1846, Polk began to prepare a war message to Congress, justifying hostilities on the grounds of Mexican refusal to pay American claims and its refusal to negotiate with Slidell. That evening he received word that Mexican troops had crossed the Rio Grande on April 25 and attacked Taylor's troops, killing or injuring 16 of them. In his quickly revised war message—delivered to Congress on May 11—Polk claimed that Mexico had "invaded our territory and shed American blood on American soil."

Congress overwhelmingly approved a declaration of war on May 13, but the United States entered the war divided. Democrats, especially those in the Southwest, strongly favoured the conflict. Most Whigs viewed Polk's motives as conscienceless land grabbing. And Abolitionists saw the war as an attempt by the slave states to extend slavery and enhance their power when additional slave states were created out of the soon-to-be-acquired Mexican lands.

Following its original plan for the war, the United States sent its army on the Rio Grande, under Taylor, to invade the heart of Mexico while a second force, under Colonel Stephen Kearny, was to occupy New Mexico and California. Kearny's campaign into New Mexico and California encountered little resistance, and the residents of both provinces appeared to accept American occupation with a minimum of resentment. Meanwhile, Taylor's army fought several battles south of the Rio Grande, captured the important city of Monterrey, and defeated a major Mexican force at the Battle of Buena Vista (*q.v.*) in February 1847. But Taylor showed no enthusiasm for a major invasion of Mexico, and on several occasions he failed to pursue the Mexicans vigorously after defeating them. In disgust, Polk revised his war strategy. He ordered General Winfield Scott to take an army by sea to Veracruz, capture that key seaport, and march inland to Mexico City. Scott took Veracruz in March after a siege of three weeks and began the march to Mexico City. Despite some Mexican resistance, Scott's campaign was marked by an unbroken series of victories, and he entered Mexico City on Sept. 14, 1847. The fall of the Mexican capital ended the military phase of the conflict.

Polk had assigned Nicholas Trist, chief clerk in the State Department, to accompany Scott's forces and to negotiate a peace treaty. But after a long delay in the formation of a new Mexican government capable of negotiations, Polk grew impatient and recalled Trist. Trist, however, disobeyed his instructions and on Feb. 2, 1848, signed the Treaty of Guadalupe Hidalgo. Under the terms of this treaty, Mexico ceded to the United States nearly all the territory now included in the states of New Mexico, Utah, Nevada, Arizona, California, Texas, and western Colorado for $15,000,000 and U.S. assumption of its citizens' claims against Mexico.

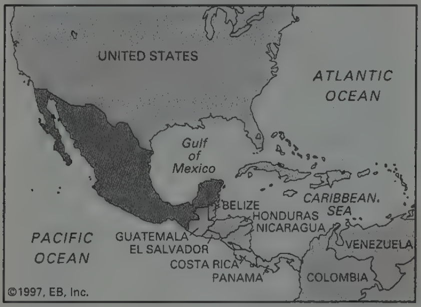
Zachary Taylor emerged a national hero and succeeded Polk as president in 1849. The war reopened the slavery-extension issue, which had been largely dormant since the Missouri Compromise. On Aug. 8, 1846, Representative David Wilmot of Pennsylvania attempted to add an amendment to a treaty appropriations bill. The Wilmot Proviso—banning slavery from any territory acquired from Mexico—was never passed, but it led to acrimonious debate and contributed greatly to the rising sectional antagonism. The status of slavery in the newly acquired lands was eventually settled by the Compromise of 1850, but only after the nation had come perilously close to civil war.

Mexicana Airlines, Spanish in full CIA. MEXICANA DE AVIACIÓN, SA (CMA), oldest airline in North America, founded in 1924 in Tampico, Mex., and now headquartered in Mexico City.

The company began as a cargo carrier, carrying payrolls to the oil fields out of Tampico. The first scheduled service began in 1928, linking Mexico City, Tuxpan, and Tampico, followed in the same year by service between Mexico City, Veracruz, and Mérida. The Mexico City–Tampico–Brownsville route opened in 1929, piloted by Charles A. Lindbergh.

In the course of succeeding decades, the routes and services expanded, and the ownership of the airline by Pan American Airways rose and then fell (to accord with new Mexican laws limiting foreign ownership). In 1967 Pan American yielded its remaining stock in the airline. The Mexican government was the majority shareholder in the company from 1982 to 1990, when it sold the airline to private investors. By the late 20th century Mexicana was providing service to more than 30 cities in Mexico and various cities in the United States, the Caribbean, Central America, and Europe.

Mexico, officially UNITED MEXICAN STATES, Spanish MÉXICO, or ESTADOS UNIDOS MEXICANOS, also spelled MÉJICO, northernmost and the third largest country of Latin America. Situated in the southwestern part of mainland North America and roughly triangular in shape, Mexico stretches more than 1,850 miles (3,000 km) from northwest to southeast. Its width varies from more than 1,200 miles (1,900 km) in the north to less than 135 miles (215 km) at the Isthmus of Tehuantepec in the south. Mexico is bordered by the United States to the north, Belize and Guatemala to the southeast, the Gulf of Mexico and the Caribbean Sea to the east, and the Pacific Ocean to the south and west. The capital, Mexico City, is one of the largest cities in the world. Area 756,066 square miles (1,958,201 square km). Pop. (1995 est.) 91,145,000.



Mexico

A brief treatment of Mexico follows. For full treatment, *see* MACROPAEDIA: Mexico.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Mexico is a country of extraordinary physical variety: the core of the country is a high plateau rimmed by mountains on the east, west, and south; coastal plains separate the mountains from the sea on the east and west. There are two major peninsulas—Yucatán in the southeast (200 miles [320 km] wide) and Baja California in the northwest (25 to 150 miles wide). Also part of Mexican territory are the volcanic Revillagigedo Islands in the Pacific Ocean, about 300 miles (480 km) south of the tip of Baja California and 450 miles (725 km) west of the coastal port of Manzanillo.

Most of Mexico is occupied by the central Mexican Plateau. This plateau is enclosed by two high cordilleras—the Sierra Madre Occidental on the west and the Sierra Madre Oriental on the east—and by the Cordillera Neo-Volcánica on the south. The Mexican Plateau averages 4,000 feet (1,200 m) in elevation in the north and 7,000 to 9,000 feet (2,000 to 2,700 m) in the central part of the country. The Cordillera Neo-Volcánica to the south has the nation's highest peaks, Citlaltépetl (also called Orizaba; 18,701 feet [5,700 m]) and Popocatépetl (17,883 feet [5,452 m]). Farther south, the Sierra Madre del Sur range extends along the southern Pacific Coast to the Isthmus of Tehuantepec, where it joins the complex mountain ranges of the Sierra de Soconusco and the Chiapas Highlands.

The Gulf Coastal Plain extends some 900 miles (1,450 km) along the Gulf of Mexico from the Texas border to the Yucatán Peninsula. It is fringed by beaches, sandbars, swamps, and lagoons. The narrow and discontinuous Pacific Coastal Plain (more than 800 miles [1,300 km] long and 60 to 100 miles [100 to 160 km] wide) contains good natural harbours, such as those of Acapulco and Manzanillo. The coastal lowlands of the Yucatán Peninsula have a limestone karst topography with sinkholes and caverns. Mexico's rivers are short and swift-flowing, except for the Rio Grande (called in Mexico the Río Bravo del Norte) on the Texas border and the Papaloapan, which enters the Gulf of Mexico south of Veracruz.

Southern Mexico is subject to volcanic activity and frequent earthquakes, such as the disastrous earthquakes that struck Mexico City in 1985 and the Pacific coastal states in 1995. El Chichón volcano, 400 miles (650 km) southeast of Mexico City, erupted in 1982, causing hundreds of deaths and major damage to crops and livestock.

Mexico's physical diversity is also expressed in its climate. Lowlands and hills below 3,000 feet (900 m) are classed as *tierra caliente* ("hot land") and have a mean annual temperature of about 77° F (25° C). The tropical highlands lying at 3,000 to 6,000 feet (1,800 m) are classed as *tierra templada* ("temperate land") and have a mean temperature of 66° F (19° C); the central plateau and the Chiapas Highlands, 6,000 to 7,000 feet (2,100 m), are classed as *tierra fría* ("cold land") and have a mean temperature of 63° F (17° C). The highest peaks, above about 14,000 feet (4,300 m), are classed as *tierra helada* ("frozen land"). Half of Mexico is predominantly arid and receives less than 24 inches (600 mm) of precipitation annually; two-fifths of its area is semiarid, and less than one-tenth is humid. Rainfall ranges from less than 10 inches (250 mm) in the arid north-northwest, to 40 to 115 inches (1,000 to 2,900 mm) in the coastal plains, and to more than 200 inches (5,000 mm) in the Chiapas Highlands.

Plant and animal life vary greatly with climate and topography. Cactus, agaves, and yucca predominate in the arid northern, northwestern, and central regions. In the south and east, in Yucatán, and on the western coasts, rain forests and savannah are prominent. The south-central mountains and the ranges of the Sierra Madre (at elevations below 13,000 feet [4,000 m]) support coniferous and mixed forests. On the southern coasts, large mangrove swamps are common. Birds, reptiles, insects, and a variety of mammals (such as monkeys, jaguars, tapirs, and anteaters in the tropical south and armadillos, deer, pumas, and coyotes in the arid north) are plentiful.

The people. About three-fifths of Mexico's total population is mestizo (mixed European and Indian stock), nearly one-third is American Indian, and almost all of the rest are of European ancestry. Roman Catholics comprise about nine-tenths of the population, and Protestants account for most of the remainder. Spanish is the official language. A small percentage of the total population speaks only an Indian language; nonetheless, more than 50 Indian languages are spoken.

One of the most important characteristics of Mexico's population since 1940 has been its rapid rate of growth, which is considered undesirable by the government because it puts intense pressure on the country's developing economy. Despite governmental programs begun in the early 1970s to educate the populace about family planning, and despite a slowing of the rate of natural increase during the 1980s, the birth rate remains unacceptably high. Abortion is legally restricted but widely practiced. Emigration (mostly to the United States, and much of it illegal) for economic reasons has been widespread.

Although the life expectancy of 67 years for males and 73 years for females is relatively high for a developing country, infant mortality also is still high. More than one-third of the population is younger than 15 years of age. Although the overall population density is relatively high, the geographic distribution of the population is uneven. Nearly three-fourths of the population is urban. The country's largest cities are Mexico City, Guadalajara, Ciudad Nezahualcóyotl, and Monterrey.

The economy. Mexico has a mixed economy based largely on wholesale and retail trade, manufacturing, agriculture, and petroleum extraction. The gross national product (GNP) is not growing as rapidly as the population; the GNP per capita, however, is consistently one of the highest in Latin America.

The primary sector (agriculture, forestry, and fishing) accounts for less than one-tenth of the gross domestic product (GDP) and employs about one-fourth of the workforce. Agricultural output has been kept low by the prevalence of small farming plots. Arable land represents about one-eighth of the total land area. Irrigation is inadequate. The government has promoted the development of collective farms in an effort to increase agricultural output, but Mexico is not agriculturally self-sufficient, and the country has been a net importer of grains since 1980; malnutrition affects a sizable portion of the population, especially young children.

Corn (maize), wheat, rice, and beans are the leading staples. Sugarcane, sorghum, bananas, tomatoes, oranges, and potatoes are also major crops. Coffee, cotton, and fruits and vegetables are exported. Cattle and pigs are the major livestock. Mexico is also one of the world's largest producers of natural honey. Forests cover more than one-fourth of the total land area and mainly produce coniferous roundwood. Fishing is an important industry, and frozen prawns are an export item.

Mexico has a wide variety of natural resources and an enormous power potential in its petroleum reserves and hydroelectric capacity. Its proven crude-oil reserves rank seventh in the world, and natural-gas reserves also are substantial. The production of petroleum contributes one-fourth of the government's revenue. Coal reserves in northeastern Coahuila state are of exceptionally high quality. About three-fourths of Mexico's electricity is generated from petroleum and other fossil fuels; waterpower provides nearly all the remainder.

Mexico is the world's largest producer of silver, bismuth, and celestite and is also a leading producer of arsenic, fluorspar, antimony, cadmium, lead, mercury, zinc, sulfur, and gypsum. There are reserves of gold, graphite, mercury, iron ore, and copper. Although mining is highly developed, it accounts for only a small fraction of the GDP. In the late 20th century the government privatized numerous mining enterprises.

Manufacturing accounts for almost one-fourth of the GDP and employs about one-seventh of the workforce. The petrochemical industry has grown rapidly as a result of expanding petroleum production. Leading manufactures include processed foods, chemical products, transport vehicles, electrical machinery, printing and paper products, textiles, metal products, and iron and steel products. Tourism is a major industry and source of foreign exchange.

Union activity is legal, and most unions are affiliated with the Congress of Labour (Congreso del Trabajo; CT), which was founded in 1966. The CT, in turn, is closely associated with the dominant political party, the Institutional Revolutionary Party (Partido Revolucionario Institucional; PRI).

Expenditures by the federal government based on expanding petroleum revenues increased by about one-third in 1979 and by almost two-thirds in 1980. Declining international prices for petroleum sharply reduced the government's revenue in the early 1980s, however, and resulted in both large deficits and extensive cuts in federal spending. A drastic cut in imports together with scaled-down wage increases, the elimination of consumer subsidies, and lower exchange rates resulted in a positive balance of payments beginning in the early 1980s. Mexico's external public debt was still one of the largest in the world in the mid-1990s, however, and the sluggish economy was hampered by high rates of inflation. In the 1980s and '90s the government relaxed some of the legal restrictions that had curtailed foreign investment.

Government and social conditions. Mexico is a federal republic. The Constitution of 1917 provides for the separation of powers among the executive, legislative, and judicial branches. The executive head is the president, who is directly elected to a six-year term and may serve only once. The president has broad powers of appointment and can legislate in certain economic and financial matters. Legislative power is vested in a bicameral legislature, consisting of a 500-member Chamber of Deputies and a 128-member Senate. Deputies serve for three years and senators for six, and election to two consecutive terms is prohibited. The candidates of the dominant PRI won every presidential election, as well as nearly all gubernatorial, legislative, and local elections, from 1929 to 2000. The judicial power rests in federal courts, headed by the Supreme Court of Justice, and a tier of state jurisdictions.

Presidents of Mexico from 1917

name	term
Venustiano Carranza*	1917–20
Adolfo de la Huerta	1920
Álvaro Obregón	1920–24
Plutarco Elías Calles	1924–28
Emilio Portes Gil	1928–30
Pascual Ortíz Rubio	1930–32
Abelardo L. Rodríguez	1932–34
Lázaro Cárdenas	1934–40
Manuel Ávila Camacho	1940–46
Miguel Alemán	1946–52
Adolfo Ruiz Cortines	1952–58
Adolfo López Mateos	1958–64
Gustavo Díaz Ordaz	1964–70
Luis Echeverría Álvarez	1970–76
José López Portillo	1976–82
Miguel de la Madrid	1982–88
Carlos Salinas de Gortari	1988–94
Ernesto Zedillo Ponce de León	1994–2000
Vicente Fox Quesada	2000–

*Claimed the presidency as early as 1914.

Mexico's standard of living is close to subsistence among most of the rural population and the urban poor. There is a shortage of medical personnel and equipment in rural areas. Life expectancy is about 75 years for women and 69 for men. The leading causes of death are heart diseases, cancers, and accidents.

Mexico's literacy rate is about 85 percent. Six-year primary education is compulsory and free, yet more than one-third of the population over 15 has had little or no primary schooling, and another third lacks a complete secondary education. The largest institutions of higher education are the National Autonomous University of Mexico, the University of Guadalajara, and the National Polytechnic Institute.

Almost all newspapers are published in Spanish and are mainly privately owned but operate under government regulation. The most influential dailies include *Excélsior, Novedades,* and *El Universal,* all published in Mexico City. Radio and television broadcasts are received throughout Mexico, and Internet use is expanding rapidly.

Cultural life. Folk arts in Mexico have remained vigorous and widely practiced. Particularly notable among handicrafts are the clay pottery made in the valley of Oaxaca and the bird and animal figures made in the village of Tomala. Colourfully embroidered cotton garments, cotton or wool rebozos (shawls) and serapes (outer garments), and colourful baskets and rugs are seen everywhere. Folk music has been one of the major art forms throughout Mexico's history. Accompanied by guitar and trumpets, singers dressed as *charros* (cowboys) perform at festivals and on special occasions.

Mexican painting achieved international renown during the 20th century. The painters Diego Rivera, José Clemente Orozco, and David Alfaro Siqueiros became famous for their wall-sized public murals depicting the history and culture of their native land in crowded and vigorous figurative compositions. Mexican literature in the early 20th century dealt largely with the Mexican Revolution. There was in the late 20th century a more universal literature with characters and themes that have made the best writers, including such authors as Juan José Arreola, Carlos Fuentes, and the poet Octavio Paz, accessible to an international audience. Among other important figures are the composer Carlos Chávez and the dramatist Rodolfo Usigli. The National Institute of Fine Arts and the Symphony Orchestra of Mexico have been given notable government support, as have various ballet groups.

History. Hunter-gatherer peoples are thought to have inhabited Mexico more than 20,000 years ago. The beginnings of village farming are evident between 1500 and 900 BC More complex cultures began to form between 900 and 300 BC, and from AD 100 to 900 some of these crystallized into great civilizations, such as the Olmec, Toltec, Mayan, and Aztec. At the time of the Spanish conquest, the Aztec, who rose to prominence about 1200, were the rulers of much of Mexico.

Diego de Velázquez de Cuéllar, the conqueror of Cuba, laid the foundation for the Spanish conquest of Mexico by sending Francisco Hernández de Córdoba to explore the Yucatán coast and Hernán Cortés to explore Mexico. In a campaign lasting two years Cortés conquered the Aztecs, capturing their capital city, Tenochtitlán, in 1521. Cortés established Mexico City on the site of the Aztec capital. In 1526 Francisco de Montejo conquered the remnants of the Maya civilization.

From the time of Spanish conquest until independence was declared in 1821, Mexico was part of the viceroyalty of New Spain. Following the War of the Spanish Succession (1701–13), Mexico's colonial status changed as a new ruling family, the Bourbons, instituted several French-based administrative reforms aimed at increasing Spain's economic return from its colonies. Despite authoritarian rule and heavy taxes, there was little resistance to Spanish rule prior to the 19th century. Two insurrections, one led by Miguel Hidalgo y Costilla (1810–11) and the other by José María Morelos y Pavón (1814–15), were crushed. The independence movement then became a guerrilla war led by Vicente Guerrero.

In 1821 Guerrero and Agustín de Iturbide, the commander of royalist troops, negotiated a status quo independence from Spain, and a congress was elected. A military rebellion forced Iturbide to leave the country in 1823, and the congress declared Mexico a republic. A federal constitution was adopted in 1824, and Manuel Félix Fernández, better known as Guadalupe Victoria, was elected the first president. A liberal revolt placed Antonio López de Santa Anna in power in 1833; he subsequently was several times president of Mexico.

In 1845 the U.S. government voted to annex Texas, and in the ensuing Mexican War, Santa Anna's armies were defeated and Mexico City was captured by the United States. The Treaty of Guadalupe Hidalgo (1848) ceded nearly all the territory now included in Arizona, western Colorado, Nevada, Utah, Texas, California, and New Mexico to the United States.

In 1857 a new constitution was promulgated as the basis for *La Reforma* ("The Reform"), led by Benito Juárez, in an effort to abolish the remnants of colonialism. In the civil war (1858–61) between conservatives, who opposed the constitution of 1857, and liberals led by Juárez, the latter were victorious despite the attempts of the French to establish a monarchy in Mexico; Juárez then became the president of Mexico.

In 1876 Porfirio Díaz led a rebellion that placed him in the presidency until he was unseated in 1911, although there was a period (1880–84) during which a comrade assumed the office. Díaz established order and a workable government by means of his autocratic rule; however, his later years in power were marred by an increasingly inequitable distribution of wealth in the country and by mounting hardships for Mexico's small farmers and agricultural labourers.

In 1911 Francisco I. Madero, another revolutionary, succeeded to the presidency; but the revolution that had begun with his rise to power did not stop, as peasant and labour groups demanded more reform. A succession of rebellions and coups continued until the Partido Nacional Revolucionario (PNR; National Revolutionary Party), dominated by revolutionary and reformist politicians from northern Mexico, was established in 1929; it continued to control Mexico without interruption until 2000. In 1938 the PNR was renamed the Partido Revolucionario Méxicano (PRM; Party of the Mexican Revolution) and in 1946 the Partido Revolucionario Institucional (PRI).

From the 1920s to the '40s the PRI and its political forebears instituted a wide range of social and economic reforms under the leadership of a series of able and determined Mexican presidents. In the late 1930s, for example, President Lázaro Cárdenas carried out sweeping land reforms and formed the Confederación de Trabajadores de México, a labour confederation made up of smaller labour unions. Following World War II, the government placed heavy emphasis on economic growth. During the mid-1970s, Mexico emerged as one of the major petroleum-producing countries. By the end of Portillo's term, however, Mexico had accumulated a huge external debt because of the government's unrestrained borrowing on the strength of its petroleum revenues. With the subsequent decline in world oil prices during the mid-1980s, Mexico faced the prospect of a severe financial crisis. Efforts to ameliorate the government's financial situation and to encourage broad-based economic growth were carried out by subsequent presidents. Notable among such efforts was the liberalization of the economy in the 1980s and '90s, including the privatization of several state-owned companies.

From the mid-1990s President Ernesto Zedillo faced an economic crisis, public demonstrations in Mexico City, and ongoing civil unrest in the southern state of Chiapas. He also oversaw political and electoral reforms that loosened the PRI's hold on power. The party subsequently lost key electoral races, including the presidential election of 2000, which was won by Vicente Fox of the opposition National Action Party, thus ending 71 years of uninterrupted rule by the PRI.

The country has continued to grapple with such issues as economic control and development (notably the petroleum sector and the evolution of trade relations with the United States), the spectre of further civil unrest, corruption and violence stemming from the drug trade, and a partly reshaped political scene.

México, also spelled MÉJICO, state, on the Central Plateau, Mexico, almost completely surrounding the Federal District (which comprises Mexico City). The general elevation of the state's area of 8,245 square miles (21,355 square km)—more than 10,000 feet (3,000 m) above sea level—ensures a cool, healthful climate, which, with fertile soils and plentiful rainfall, has resulted in a dense population. The state contains many preconquest ruins, among them Tenayuca, Malinalco, and the great centre of San Juan Teotihuacán, covering 8 square miles (21 square km), about 30 miles (50 km) northeast of central Mexico City. The state capital is Toluca (*q.v.*).

Much of the northern part of the state lies in the Valley of Mexico, or Anáhuac, a circular lacustrine plain and intermontane basin from which most of the lakes have disappeared, leaving only swamps, sodden meadows, and lagoons. Chief among these bodies are Zumpango, San Cristóbal, Xaltocan, Xochimilco, and Texcoco, the latter three lying partly in the Federal District. The stream flow into and out of the basin was altered greatly by the opening in 1900 of the Tequixquiac tunnel, conducting water eventually to the Gulf of

Mexico, and by the system of tunnels and tubes completed in 1951, which provided the state and the Federal District with drinking water and hydroelectric power.

Services, agriculture (cereals, especially corn [maize]; maguey [agave, source of pulque]; coffee; sugarcane; and fruits), mining, and manufacturing (including assembly plants, aluminum processing, and ironworks and steelworks) are the principal mainstays of the economy. Rail and highway systems are well developed. Pop. (2000 prelim.) 13,083,359.

Mexico, city, seat of Audrain county, central Missouri, U.S. It is situated on the South Fork of the Salt River. Founded (1836) by the Reverend Robert C. Mansfield and James H. Smith, it was named for a tavern sign reading "Mexico that-a-way." Its commercial development was stimulated by the arrival (1858) of the railroad. Ulysses S. Grant was appointed a brigadier general of the Union Army there in 1861. With the establishment of the Western Stove Lining Works (1887), the fireclay industry became the city's economic mainstay. Agriculture, light manufacturing, and the breeding of saddle horses on the surrounding bluegrass pastures, are important. The Audrain County Historical Society Museum displays materials on the American Saddlebred horse. The Missouri Military Academy was established in Mexico in 1889. Inc. 1857. Pop. (1999 est.) 11,355.

Mexico, Gulf of, Spanish GOLFO DE MÉXICO, body of water on the southeastern coast of North America, connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatán Channel. It is bounded on the northwest, north, and northeast by the United States, on the west, south, and southeast by Mexico, and on the east by Cuba.

A brief treatment of the Gulf of Mexico follows. For full treatment, *see* MACROPAEDIA: Atlantic Ocean.

Oval in shape, the gulf covers an area of some 600,000 square miles (1,550,000 square km). The deepest point is in the Mexico Basin (Sigsbee Deep), which lies 17,070 feet (5,203 m) below sea level. The Gulf Stream, a riverlike current of warm water, enters from the Caribbean Sea through the Yucatán Channel and flows out to the Atlantic Ocean via the Straits of Florida; it is the principal current moving oceanic waters into and out of the gulf. The Mississippi and the Rio Grande are the major rivers draining into the gulf. The Gulf of Mexico's salinity varies from about 36 parts per 1,000 in open waters to as few as 14 to 20 per 1,000 in the north near the outflow of the Mississippi. In winter, surface-water temperatures range from 64° F (18° C) in the north to 76° F (24° C) in the south off the Yucatán coast; in summer the temperatures can reach 90° F (32° C). From June through October hurricanes can develop in the gulf from tropical storms spawned in the South Atlantic.

The gulf serves as a major source of food, energy, and raw minerals; its coastal waters are also much used for recreation and for disposing of wastes. Red snapper, flounder, shrimp, mullet, oyster, and crab provide the basis for commercial fishing in the gulf; tarpon and king mackerel are caught for sport. Oil and natural-gas reserves on the continental shelf alone are enormous. The major ports on the gulf are Veracruz in Mexico and Galveston, New Orleans, Pensacola, and Tampa in the United States.

Mexico, National Autonomous University of, Spanish UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO, byname UNAM, government-financed coeducational institution of higher education in Mexico City founded in 1551. The original university building, dating from 1584, was demolished in 1910, and the university was moved to a new campus in Mexico City in 1954.

The National University was founded as the Royal Pontifical University by Antonio de Mendoza, the first viceroy of New Spain. From 1553 to 1867, when it was closed by the government of Benito Juárez, the university was controlled by the Roman Catholic church. After 1867 a number of independent professional schools—law, medicine, engineering, and architecture—were established by the government. In 1910 under the government of Porfirio Díaz, these separate schools were coordinated into the National University of Mexico. In the 1920s all Mexican universities were placed under government control, but the National University was given administrative autonomy in 1929. Between July and December of 1968, the university was one of the centres of student demonstrations to protest government policies, and in September of that year the campus was occupied by the military. Although there are still accusations of government interference in university affairs, the university officially maintains its administrative independence. Students still occasionally carry out major demonstrations and strikes at UNAM, such as those sparked in 1999 by the university's proposal to charge tuition and fees; a limited number of students forced the university to remain closed until February 2000.

The National University has faculties of accounting and business administration, architecture, chemistry, dentistry, economics, engineering, law, medicine, philosophy and letters, political and social sciences, professional studies, psychology, sciences, and veterinary medicine and zoology. It also has national schools of music, nursing and obstetrics, plastic arts, and social work. The university enrolls more than 425,000 undergraduate and graduate students.

Mexico Basin, triangular-shaped ocean area covering a large portion of the floor of the Gulf of Mexico. The basin lies northwest of the Campeche Bank, approximately between 22° and 26° N and 89° and 95° W. Depths range beyond 11,000 feet (3,400 m) in much of the area, with Sigsbee Deep (17,070 feet [5,203 m]) being the deepest point. In the middle of the basin, the Sigsbee Knolls form a series of hills that are believed to be reflections of underlying salt domes rising above the generally flat basin floor.

Mexico City, Spanish MÉXICO, or CIUDAD DE MÉXICO, ancient (Nahua, or Aztec) TENOCHTITLÁN, city, capital of the Federal District (*q.v.*) and of Mexico. The city, which is one of the oldest metropolises in the Western Hemisphere, is the political and economic centre of the country and has been a focus of Latin-American culture since the 16th century. It is one of the world's most populous cities and metropolitan areas.

A brief treatment of Mexico City follows. For full treatment, *see* MACROPAEDIA: Mexico City.

Located in the southern part of the Valley of Mexico, Mexico City occupies an ancient plain (once a lake) that is surrounded by mountains. The small islands in the lake were gradually unified through land reclamation to form one large island, a process that began after the Aztecs settled there. Constant flooding later necessitated filling and draining the lakes of the valley floor until the city merged with the mainland. This accounts for the soft silt subsoil that underlies the city and that has proved quite unstable during earthquakes such as the one in 1985, which killed 9,500 people.

Mexico City's expansion is limited by mountains on all sides. The mountains block the circulation of air past the city; the resultant trapping of automotive exhaust, industrial smoke, sulfur dioxide and other volcanic emissions from nearby Mount Popocatépetl (including major eruptions during the late 1990s), and airborne dust has made air pollution a serious health problem. The greater metropolitan area has spread beyond the original limits of the Federal District of Mexico into the neighbouring state of Mexico.

Although the area is overwhelmingly urban, some places in the south remain agricultural. Mexico City's tropical, high-elevation (7,350 feet [2,240 m]) climate lacks a winter season. The weather is cool and dry, except in the May–September rainy season; the annual median temperature is 64° F (18° C).

Mexico City dominates the national economy, generating about one-third of all industrial production. Major city industries include construction; the manufacture of chemicals, plastics, cement, and yarns and textiles; and tourism. Most major finance, mortgage, and insurance companies are based in the city, which is also headquarters for Mexico's stock exchange and banking establishments.

At the centre of the original Aztec city of Tenochtitlán, the Spaniards created a planned town, placing the main public buildings around the former ceremonial city centre, now called the Zócalo (officially, Plaza de la Constitución). The Zócalo remains the hub of Mexico City's life. The great Metropolitan Cathedral stands nearly on the spot of the former main Aztec temple, and the viceroy's palace (now the National Palace) was built over the ruins of the palace of Montezuma. Running southwestward and then westward from the old colonial city centre is the city's main thoroughfare, the Paseo de la Reforma, while the Avenida Insurgentes is the city's main north-south street.

Mexico City gradually expanded, but until 1930 its growth was haphazard; after that year a series of planning commissions reorganized the metropolis. Despite wholesale destruction of many parts of the old city, plazas such as that of Santo Domingo preserve their original atmosphere. The metropolitan area has grown markedly beyond the 16 *delegaciones* (administrative units) that make up the city and Federal District. The Mexican government relinquished direct control of the district in 1997 in an effort to improve urban planning, services, and accountability. That year Cuauhtémoc Cárdenas Solorzano was elected to a two-year term as the district's first mayor.

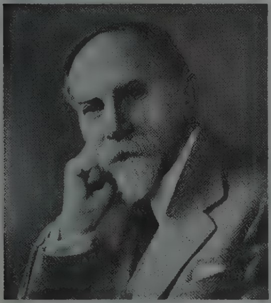
The predominant part of the population is mestizo (of mixed European and Indian descent). Many live in the poorer northern sections, in slum districts called *ciudades perdidas* ("lost cities"), or in *colonias* ("neighbourhoods") of the capital. Continued migration from rural areas has given the city a more Indian character, however. Most of the middle- and high-income groups, which are usually of European parentage, live in the western part of the city or in newly developed suburbs to the south. Mexico City's population continues to grow at a rapid rate.

The National Autonomous University of Mexico (founded 1551) and the National Polytechnic Institute (1936), the College of Mexico (1940), Metropolitan Autonomous University (1973), and Ibero-American University (1943) are the outstanding institutions of higher learning. Museums include the remarkable National Museum of Anthropology.

Mexico City is the hub of the nation's transportation network. An extensive railway network radiates from the capital, and major highways lead to the United States, the Guatemalan frontier, Atlantic ports, and the Pacific coast. The Benito Juárez International Airport lies in the eastern suburbs. Area city and Federal District, 571 square miles (1,479 square km); metropolitan area, 883 square miles (2,286 square km). Pop. (2000 prelim.) city, 8,591,309; (1996 est.) metropolitan area, 16,908,000.

Meyer, Adolf (b. Sept. 13, 1866, Niederweningen, Switz.—d. March 17, 1950, Baltimore), influential American psychiatrist from 1900 to 1940, much of whose teaching has been incorporated into psychiatric theory and practice in the United States, Britain, and other English-speaking nations.

When Meyer emigrated to the United States in 1892, he was already exceptionally well-trained in neuroanatomy and neurophysiology. In the United States he became acquainted with the thought of the psychologist William James, the philosopher-educator John Dewey, and others who were molding sociological and philosophical tradition in the United States. He fused these various influences into a concept of human behaviour that he called ergasiology, or psychobiology, which seeks a complete integration of the psychological and biological study of human beings.



Adolf Meyer

By courtesy of the Johns Hopkins University, Baltimore

As neuropathologist at the Eastern Hospital for the Insane, Kankakee, Ill. (1893–95), Meyer emphasized the importance of taking accurate case histories of patients. Before widespread recognition of the theories of Sigmund Freud, he began suggesting that childhood sexual feelings may precipitate serious mental problems. Gradually he decided that the disorder in mental illness results essentially from personality dysfunction rather than brain pathology. He was chief pathologist of the mental institution at Worcester, Mass. (1895–1902), and then became director of pathology for the Pathological Institute of the New York State Hospital Service, Ward's Island (1902–10), and professor of psychiatry at the Cornell University Medical College, Ithaca, N.Y. (1904–09). As he became more aware of the importance of social environment in the development of mental disorders, his wife (*née* Mary Potter Brooks) began visiting patients' families. Her interviews are considered the first effort in psychiatric social work.

In 1910 Meyer became professor of psychiatry at Johns Hopkins University (Baltimore) and later director of its Henry Phipps Psychiatric Clinic (1914). Until he retired in 1941, he impressed generations of students with the idea that, in the diagnosis and treatment of mental illness, account must be taken of the patient as a whole person. His work appears in his *Collected Papers*, 4 vol. (1950–52), and *Psychobiology* (1957).

Meyer, Conrad Ferdinand (b. Oct. 11, 1825, Zürich—d. Nov. 28, 1898, Kilchberg, Switz.), important Swiss writer noted for his historical tales and his poetry.

After completing his schooling, Meyer began to study law but suffered from depression, which compelled him to enter a mental home for a time. A long stay in French Switzerland, largely in Lausanne, gave him a thorough knowledge of French literature and culture; he also took up history, studying abroad in Paris and Italy. Rome, and especially the work of Michelangelo, was one of the decisive experiences in his life; Michelangelo's monumental style became an ideal that he attempted to realize in his own poetry. He passed the rest of his life in Zürich or nearby, where, with no settled profession and of independent means, he was able to devote himself to his writing. From 1877 he had a country house at Kilchberg, near Zürich. In 1892 depression once again forced him into a mental home for a year, and afterward he did no more creative work.

Conrad Ferdinand Meyer, etching by Karl Stauffer-Bern, 1887

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Meyer began to write rather late, and his total output was relatively slender. After two unimportant collections of poetry (*Zwanzig Balladen,* 1864; *Romanzen und Bilder,* 1870), he achieved his first success with a work of permanent importance, the powerful poem *Huttens Letzte Tage* (1871). The narrative poem *Engelberg* (1872) was followed by his 11 *Novellen,* or prose narratives, among which are *Das Amulett* (1873), *Der Heilige* (1880; *The Saint*), *Das Leiden eines Knaben* (1883), *Die Hochzeit des Mönchs* (1884; *The Monk's Wedding*), *Die Versuchung des Pescara* (1887), and *Angela Borgia* (1891). His *Gedichte* ("Poems") were first collected in 1882.

The material of Meyer's historical narratives is taken almost entirely from the periods of the Renaissance and the Reformation. From these eras he takes passionate men of action as his main characters, and through their struggles and tribulations Meyer examines such larger problems as the prevalence of injustice, the power of conscience, and the meaning of destiny. The stories are often lightly shot through with irony. *Der Heilige,* about the conflict between Thomas Becket and Henry II of England, is generally regarded as the best of the *Novellen.* In his poetry Meyer laid great stress on polished form. He dispensed entirely with the direct expression of feeling and in an almost brittle tone presents a terse figurative motif (generally provided by history or the mountains of his own country) to which he gives symbolic value. Meyer is considered by many to be the second most important Swiss writer after Gottfried Keller.

Meyer, Eugene (b. Oct. 31, 1875, Los Angeles—d. July 17, 1959, Mt. Kisco, N.Y., U.S.), influential leader in American political and social life and publisher of *The Washington Post* from 1933 to 1946.

Upon graduating from Yale University (1895), Meyer worked in various European cities for two years learning the banking business. Soon after his return he established his own prosperous investment-banking firm. He was an influential financier when President Woodrow Wilson in 1917 named him an adviser to the government on nonferrous metals. He later served as managing director of the War Finance Commission under Wilson and in various high-ranking positions under the next six presidents. For Herbert Hoover he drafted legislation creating the Reconstruction Finance Corporation (1932) and became its first chairman. He was the first president of the International Bank for Reconstruction and Development (the World Bank), founded in 1946.

In 1910 he had married Agnes Ernst. In 1933, when he bought *The Washington Post,* he installed her as vice president. She was by that time an influential author and journalist, noted for her work in the areas of health, education, and social conditions. Meyer served as publisher of the *Post* from 1933 until 1940 and as editor and publisher from 1940 to 1946. Under his direction the paper more than tripled its circulation and developed a strong editorial page and a tradition of responsible journalism. In 1947 Meyer turned over active management of the paper to his son-in-law Philip L. Graham, who had married the Meyers' daughter Katharine.

Meyer, Kuno (b. Dec. 20, 1858, Hamburg—d. Oct. 11, 1919, Leipzig), German scholar of the Celtic languages and editor whose translations made him the chief interpreter of early Irish literature for English and German readers.

In 1884 Meyer became a lecturer in German at University College, later the University of Liverpool, and published his English translation of *Aislinge Meic Conglinne* (English title, *The Vision of MacConglinne,* 1892), an irreverent medieval parody of the religious "vision," a popular genre of ancient Irish literature. About the time he became professor of Celtic studies, he began publishing, with Alfred Nutt, his translation of *Imram Brain* (English title, *The Voyage of Brân,* 2 vol., 1895–97), an early Irish narrative of a voyage to the Other World. In 1903 he established the School of Irish Learning, Dublin, and the following year founded its journal, *Ériu* ("Ireland"). He also established German reviews of Celtic studies and was a principal contributor to them. He became professor of Celtic studies at the Friedrich-Wilhelms-Universität, Berlin, in 1911, when the second edition of his *Selections from Ancient Irish Poetry* was published. He also published *Learning in Ireland in the Fifth Century* (1913).

Meyer, (Julius) Lothar (b. Aug. 19, 1830, Varel, Oldenburg [Germany]—d. April 11, 1895, Tübingen), German chemist who, independently of Dmitry Mendeleyev, developed a periodic classification of the chemical elements. Though originally educated as a physician, he was chiefly interested in chemistry and physics.

In 1859 Meyer began his career as a science educator, holding various appointments before serving as professor of chemistry at the University of Tübingen (1876–95). His book *Die modernen Theorien der Chemie* (1864; "Modern Chemical Theory"), a lucid treatise on the fundamental principles of chemical science, contained a preliminary scheme for the arrangement of elements by atomic weight and discussed the relation between the atomic weights and the properties of the elements. This influential work was often enlarged and went into many editions. In about 1868 Meyer prepared an expanded table, similar in many ways to Mendeleyev's table published in 1869. It was not until 1870, however, that Meyer published his own table, a graph relating atomic volume and atomic number and clearly showing the periodic relationships of the elements. He did not claim priority for his achievement, and he admitted that he had been reluctant to predict the existence of undiscovered elements as Mendeleyev had done.

Meyer worked in several areas of chemistry, but much of his activity grew out of his preoccupation with the classification of the elements. He worked on recalculating a number of atomic weights and made use of the periodic table for predicting and studying related elements' chemical properties.

Meyer, (Marie-)Paul(-Hyacinthe) (b. Jan. 17, 1840, Paris—d. Sept. 7, 1917, Paris), French language and literary scholar and one of the great authorities on the Medieval French and Provençal languages, also noted for his literary histories and critical editions of many medieval works.

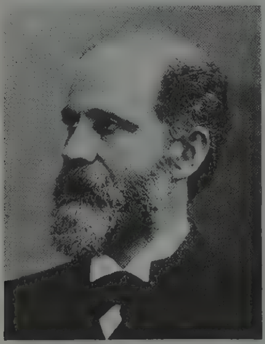
Attached to the manuscript department of the Bibliothèque National, Paris, from 1863, Meyer became professor of southern European languages and literatures at the Collège de France (1876) as well as director of the École des Chartes (school of paleography) in 1882. His initial studies related to Old Provençal literature, but he subsequently explored many areas of Romance literature. Among his works are *Les Derniers Troubadours de la Provence* (1872; "The Last Troubadours of Provence") and *La Chanson de la croisade contre les Albigeois,* 3 vol. (1875–79; "Song of the Crusade Against the Albigensians"). His critical editions include *Histoire,* 3 vol. (1882–1902; "History"), of Guillaume le Maréchal.

Meyer, Ray, byname of RAYMOND JOSEPH MEYER (b. Dec. 18, 1913, Chicago), U.S. collegiate basketball coach with the most team victories of active coaches in the early 1980s.

Meyer played basketball at St. Patrick's High School (Chicago) and at Notre Dame University (South Bend, Ind.; B.A. 1938), where he was forward (1936–38) and captain (1937–38). He then served as an assistant coach at Notre Dame (1940–42). He was head coach at De Paul University (Chicago) from 1942 until his retirement in 1984. In his career he won 724 games with a .671 winning percentage. Meyer was named coach of the year by the National Association of Basketball Coaches in 1979. He took 20 teams to the National Collegiate Athletic Association (NCAA) and National Invitational Tournament (NIT) championships, and won the NIT championship in 1945. Meyer was elected to the Basketball Hall of Fame in 1978.

Meyer, Viktor (b. Sept. 8, 1848, Berlin—d. Aug. 8, 1897, Heidelberg, Baden), German chemist who contributed greatly to knowledge of both organic and inorganic chemistry.

Meyer studied under the analytic chemist Robert Bunsen, the organic chemist Emil Erlenmeyer, and the physicist Gustav Kirchhoff at the University of Heidelberg, where he received his Ph.D. in 1867 and where he later succeeded Bunsen (1889–97). Meyer earlier had served as professor of chemistry at the Zürich Polytechnic Institute (1872–85) and the University of Göttingen (1885–89).


Viktor Meyer
Historia-Photo

Devising a method of determining the vapour densities of inorganic substances at high temperatures (1871), Meyer found that diatomic molecules of iodine and bromine dissociate into atoms upon heating. In 1872 he discovered the aliphatic nitro compounds. Originator of the term stereochemistry, the study of molecules identical in chemical structure but possessing different spatial configurations (stereoisomers), Meyer discovered (1878) the oximes (organic compounds all containing the $>\mathrm{C{=}NOH}$ group) and demonstrated their stereoisomerism. He also coined the term steric hindrance to signify the energy barrier to rotation of different parts of an organic molecule brought about by the presence in the molecule of bulky side groups.

A keen observer, he converted the failure of a lecture demonstration into his discovery (1882) of thiophene, a sulfur-containing organic compound resembling benzene in its chemical and physical properties.

Meyer-Lübke, Wilhelm (b. Jan. 30, 1861, Dübendorf, Switz.—d. Oct. 4, 1936, Bonn), Swiss-German linguist whose comparative studies of the Romance languages and the popular spoken Latin from which they developed revolutionized Romance linguistics. Adhering to the tenets of the Neogrammarian school of linguistics, he advocated rigorous research methodology.

After teaching at the University of Jena (1887–90), he joined the faculty of the University of Vienna, where he remained until his appointment at the University of Bonn (1915). An important early work was his historical-critical Italian grammar (1891). The work that established his reputation as a comparativist, however, was the *Grammatik der romanischen Sprachen,* 4 vol. (1890–1902; "Grammar of the Romance Languages"). Most successful in methodology, Meyer-Lübke reached his peak in the *Einführung in das Studium der romanischen Sprachwissenschaft* (1901; "Introduction to the Study of Romance Linguistics"). He also published a spate of manuals and monographs on Old Sardinian, Old Portuguese, Catalan, and Romanian. His wide influence has continued to the present. In the 1960s a number of his works were reissued, and a revision of his great *Romanisches etymologisches Wörterbuch* ("Romance Etymological Dictionary"), which was originally published between 1911 and 1920, appeared in 1968.

Meyerbeer, Giacomo, original name JAKOB LIEBMANN MEYER BEER (b. Sept. 5, 1791, Tasdorf, near Berlin—d. May 2, 1864, Paris), German opera composer who established in Paris a vogue for spectacular romantic opera.

Born of a wealthy Jewish family, Meyerbeer studied composition in Berlin and later at Darmstadt, where he formed a friendship with C.M. von Weber. His early German operas, produced at Munich, Stuttgart, and Vienna, were failures, and after a journey to Paris and London he settled in 1816 in Italy, where he produced five operas in the style of Rossini. The best of these was *Il crociato* (Venice, 1824), given the following year in London and Paris. His first French opera, written in association with Eugène Scribe, was *Robert le Diable* (Paris, 1831), produced on an extremely lavish scale and calculated to appeal to the current romantic taste for medievalism, the supernatural, and the macabre. Its success was immediate, establishing this work as the model of French grand opera. *Les Huguenots* was similarly successful in 1836. In 1842 Meyerbeer temporarily returned to Berlin, where he became music director to the King of Prussia and where he prompted the production of Wagner's *Der fliegende Holländer.* During this period he wrote a German opera, *Ein Feldlager in Schlesien* (1844), in which Jenny Lind took the principal part. His third romantic opera on a libretto of Scribe, *Le Prophète,* was given in Paris in 1849. He then turned to a lighter style and produced two works in the tradition of the opéra comique, *L'Etoile du nord* (1854) and *Le Pardon de Ploërmel* (1859). His last opera, *L'Africaine,* was in rehearsal at the time of his death.

Meyerbeer enjoyed an enormous vogue in his day, but his reputation, based on his four Paris operas, did not survive long. Yet he exercised a considerable influence on the development of opera by his conception of big character scenes, his dramatic style of vocal writing, and his original sense of orchestration—particularly his novel use of the bass clarinet, the saxophone, and the bassoon. Berlioz came under his influence, and operas such as Verdi's *Don Carlos* and Puccini's *Turandot* are traced to Meyerbeer not only for their spectacular elements but also for their effective manipulation of ensembles and arias. A number of his operas, most notably *L'Africaine,* were revived in the 20th century, and a ballet suite, *Les Patineurs,* based on *Le Prophète,* was arranged by Constant Lambert.

Meyerbeer, detail of a lithograph by Fritz Kriehuber, 1847
By courtesy of the Staatliche Museen Preussischer Kulturbesitz Kupferstichkabinett, West Berlin—Art Resource/EB Inc.

Meyerhof, Otto (b. April 12, 1884, Hanover, Ger.—d. Oct. 6, 1951, Philadelphia), German biochemist who shared with Archibald V. Hill the Nobel Prize for Physiology or Medicine in 1922 for research on the chemical reactions of metabolism in muscle. His work on the glycogen-lactic acid cycle remains a basic contribution to the understanding of muscular action, despite revisions resulting from the later research of others.

After receiving his M.D. from the University of Heidelberg (1909), Meyerhof held posts in physiology and physical chemistry at Kiel and other German universities. From 1929 to 1938 he headed the department of physiology at the Kaiser-Wilhelm-Institut für Medizinische Forschung at Heidelberg. After two years in Paris, he served as research professor at the University of Pennsylvania. He lectured widely in England and the U.S. and wrote *The Chemical Dynamics of Life Phenomena* (1924).

Meyerhold, Vsevolod Yemilyevich (b. Feb. 9 [Jan. 28, old style], 1874, Penza, Russia—d. Feb. 2, 1940, Moscow), Russian theatrical producer, director, and actor whose provocative experiments in nonrealistic theatre made him one of the seminal forces in modern theatre.

Meyerhold, 1933
Harlingue—H. Roger-Viollet

Meyerhold became a student in 1896 at the Moscow Philharmonic Dramatic School under the guidance of Vladimir Nemirovich-Danchenko, cofounder of the Moscow Art Theatre. Two years later, Meyerhold joined the Moscow Art Theatre and there began to formulate his avant-garde theories of symbolic, or "conditional," theatre. In 1906 he became chief producer at the theatre of Vera Komissarzhevskaya, a distinguished actress of the time, and staged a number of Symbolist plays that employed his radical ideas of nonrepresentational theatre. For his presentation of Henrik Ibsen's *Hedda Gabler* in 1906, Meyerhold rebelled against the stylized naturalism popularized by Konstantin Stanislavsky's art theatre and instead directed his actors to behave in puppetlike, mechanistic ways. This production marked the beginning of an innovative theatre in Russia that became known as biomechanics (*q.v.*). Meyerhold's unorthodox approach to the theatre led him to break with Komissarzhevskaya in 1908. Thereafter, drawing upon the conventions of commedia dell'arte and Oriental theatre, he went on to stage productions in Petrograd (St. Petersburg). During 1920–35 Meyerhold achieved his greatest artistic success as a director, beginning with Fernand Crommelynck's *Le Cocu magnifique* (1920; *The Magnificent Cuckold*) and ending with his controversial production in 1935 of Aleksandr Pushkin's story "Pikovaya Dama" ("The Queen of Spades").

Although he embraced the Russian Revolution of 1917, his fiercely individualistic temperament and artistic eccentricity brought reproach and condemnation from Soviet critics. He was accused of mysticism and neglect of Socialist Realism. Meyerhold refused to submit to the constraints of artistic uniformity and defended the artist's right to experiment. In 1939 he was arrested and imprisoned. Weeks later, his actress-wife, Zinaida Raikh, was found brutally murdered in their apartment. Nothing more was heard of him in the West until 1958, when his death in 1942 was announced in the *Great Soviet Encyclopaedia;* in a later edition the date was changed to 1940.

Meyers Enzyklopädisches Lexikon, in full MEYERS ENZYKLOPÄDISCHES LEXIKON IN 25 BÄNDEN, MIT 100 SIGNIERTEN SONDERGEITRÄGEN, German encyclopaedia published in 25 volumes in Mannheim, W.Ger., from 1971 to 1979. The encyclopaedia was first published in Leipzig as the *Meyers Grosses Konversations-Lexikon* in 46 volumes in 1840–52. Subsequent editions occupied fewer volumes, the 4th edition (1885–90), for example, appearing in 17 volumes. The 8th edition was strongly influenced by Nazi ideology and was incompletely published in 1936–42 in nine volumes.

The 9th edition, bearing the current title, marked a return to the quality and standards achieved by the earlier editions. Their scholarly, unbiased approach is once again evident in the modern set, which combines about 250,000 brief dictionary-like entries with lengthier articles accompanied by extensive bibliographies. *Meyers* is copiously illustrated with thousands of small high-quality photographs and other illustrations. Its geographic articles are detailed and have maps and charts. Biographies include those of living persons. The 100 special signed contributions mentioned in the full title are lengthy essays on major topics, whose authors are identified on the title page of each volume. An atlas appeared in 1974.

Meyerson, Émile (b. Feb. 12, 1859, Lublin, Pol., Russian Empire [now in Poland]—d. Dec. 4, 1933, Paris, France), Polish-born French chemist and philosopher of science whose concepts of rational understanding based on realism and causalism were popular among scientific theorists in the 1930s.

Educated in classical science and chemistry under Robert Wilhelm Bunsen in Germany, Meyerson emigrated to Paris (1882), where he became an industrial chemist, foreign editor for the Havas news agency, and, later, director of the Jewish Colonization Association for Europe and Asia Minor. Although he had no formal university connection, his erudite works—especially *Identité et réalité* (1908; *Identity and Reality*), *De l'explication dans les sciences,* 2 vol. (1921; "On Explanation in the Sciences"), and *Du cheminement de la pensée,* 3 vol. (1931; "On the Ways of Thought")—convinced scholars that scientific philosophy is understood only by analyzing the history of science. He extended his views to such other areas as quantum theory, philosophical and primitive thought, and relativity theory, as in *La Déduction relativiste* (1925; "Relativist Deduction").

Meymaneh, also spelled MAIMĀNA, town, northwestern Afghanistan. It lies at the northern foot of the Torkestān Mountain Range at an elevation of 2,850 feet (870 m). The town serves an agricultural area irrigated from the Qeyṣār River and also handles the trade in Karakul sheep with nomads. Meymaneh is linked with neighbouring towns by highways, but they are impassable in places during spring floods. Meymaneh was the capital of a semiautonomous Uzbek khanate until its subjection by the emir of Afghanistan in 1868. In 1885 a Russo-Afghan boundary commission formally allotted the khanate to Afghanistan. Pop. (1988 est.) 45,100.

Meynell, Alice, in full ALICE CHRISTIANA GERTRUDE MEYNELL, née THOMPSON (b. Sept. 22, 1847, Barnes, near London, Eng.—d. Nov. 27, 1922, London), English poet and essayist.

Much of Meynell's childhood was spent in Italy, and about 1872 she converted to Roman Catholicism, which was reflected in her writing. Encouraged by Alfred Tennyson and Coventry Patmore, she published her first volume of poems, *Preludes,* in 1875.

One sonnet, "My Heart Shall Be Thy Garden," brought her the friendship of Wilfrid Meynell (1852–1948), whom she married in 1877, bearing him eight children. She continued to pursue her literary activities, helping her husband, who edited the *Weekly Register,* and in 1883 they launched *Merry England* (1883–95), a monthly magazine for which she wrote many essays. Francis Thompson became known through their magazine, after they had aided and befriended the destitute poet.

Alice Meynell, detail of a drawing by John Singer Sargent, 1894; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Meynell's verse is marked by its simple vocabulary and religious sincerity, and it communicates a gentle mournfulness and a sense of the passing of time. Her poetry was so popular that she was mentioned as a possible poet laureate upon the death of Tennyson.

Meynell, Sir Francis, in full SIR FRANCIS MEREDITH WILFRID MEYNELL (b. May 12, 1891, London, Eng.—d. July 10, 1975, Lavenham, Suffolk), English book designer particularly associated with the fine editions of Nonesuch Press, publications that were notable for the use of modern mechanical means to achieve results that rivaled the printing of handpresses.

The son of Wilfrid and Alice Meynell, he was educated at Trinity College, Dublin. In 1914 he set up the Romney Street Press, a handpress that published two books; and from 1916 to 1923 he managed the Pelican Press, which set type for advertisements and printed political pamphlets. One of the works issued by Pelican was *Typography* (1923), which is significant as a type specimen book and as an essay on book production. In 1923 he founded the Nonesuch Press, about which he once said, "Our stock in trade has been the theory that mechanical means could be made to serve fine ends; that the machine in printing was a controllable tool." One of the outstanding achievements of the press was a seven-volume edition of Shakespeare, published in 1929–33.

From 1946 (the year in which he was knighted) to 1958, Meynell served as director general of the Cement and Concrete Association while also continuing to design fine books. His own works include *Seventeen Poems* (1945), *Poems and Pieces* (1961), and his autobiography, *My Lives* (1971).

Mezhdurechensk, also spelled MEŽDURE-ČENSK, city, Kemerovo *oblast* (province), central Russia. It is located where the Usa River flows into the Tom River, in the upper Tom valley. Developed as the coal-mining settlement of Olzheras in the Tom-Usinsky region of the Kuznetsk Basin in the 1950s, it was renamed and incorporated as a town in 1955. In appearance it is a typical heavy-industrial "new town," with coal mining as its main activity. Pop. (1994 est.) 107,400.

Mézières (France): *see* Charleville-Mézières.

Mézières, Philippe de, Mézières also spelled MAIZIÈRES (b. *c.* 1327, Mézières, France—d. May 29, 1405, Paris), French nobleman and author who championed the last of the Crusades.

Born of poor nobility, Mézières was at first a soldier of fortune in Italy, serving Lucchino Visconti, lord of Milan, and then Andrew of Hungary, in Naples. Joining the Crusade led by Humbert II, he was knighted after defending Smyrna (modern İzmir, Turkey) against Turkish assault in 1346. When Humbert's army disbanded, he made his way to Jerusalem, arriving in 1347. He conceived the idea of a new order of knighthood, Ordre de la Passion ("Order of the Passion"), whose members would be spiritually distant from worldly preoccupations and devoted to conquering the holy places. Although he later drew up a prospectus for this order, it never became a reality.

In 1347 Mézières went to Cyprus, where he found a kindred spirit in the son of the king of Cyprus, the future Peter I. He returned to France, again as a soldier of fortune. When Peter acceded to the throne of Cyprus in 1359, Mézières was made chancellor, and the two set off for Europe to win support for a new Crusade. The Crusade, finally launched against Egypt, culminated in the sack of Alexandria (October 1365). When Peter was assassinated in Cyprus in January 1369, Mézières was in Venice, where he remained until 1372. He then went to Avignon, where he worked to establish in western Europe the feast of the Presentation of the Virgin. He went to Paris and in 1373 was made a member of the royal council by Charles V and preceptor to his son, the future Charles VI. After the death of Charles V, he was compelled, with the other counselors of the late king, to retire. In 1380 he withdrew to the Celestine monastery in Paris, continuing to exert an influence on public affairs. Later he allied himself with Louis d'Orléans, brother of Charles VI.

Mézières's major writings are the *Vita Sancti Petri Thomasii* (1659), the life of the legate Peter Thomas; his prospectus on the Order of the Passion, *Nova religio passionis* (1367–68; revised and enlarged 1386 and 1396); and *Le Songe du vieil pèlerin* (1389; "The Old Pilgrim's Dream"), an elaborate allegory containing autobiographical elements and advocating peace with England in the interests of the Crusades.

mezuzah, also spelled MEZUZA (Hebrew: "doorpost"), plural MEZUZOTH, MEZUZOT, MEZUZAHS, or MEZUZAS, small folded or rolled parchment inscribed by a qualified calligraphist with scriptural verses (Deuteronomy 6:4–9, 11:13–21) to remind Jews of their obligations toward God. The parchment is placed in a metal, wooden, or glass case so that the word Shaddai ("Almighty") can usually be seen on the back of the parchment. After a special blessing is recited, the mezuzah is firmly fixed to the main doorpost of the home (to the right as one enters). It is a custom with some Jews to kiss the mezuzah as they pass it. The wearing of a mezuzah on a chain around the neck is a practice of relatively recent origin.

Mezuzah, German, *c.* 1810; in the Jewish Museum, New York City

Jewish Museum, New York City—Art Resource/EB Inc.

mezza majolica, majolica also spelled MAIOLICA, in pottery, an earthenware body dipped into clay slip and covered with a lead glaze, superficially resembling true majolica, or tin-glazed earthenware. In German it is sometimes known as *halb-fayence* ("half faience"). Both terms are misnomers; the ware is more correctly classified as sgraffito. That is, it is decorated by incision through the slip to reveal differently coloured clay beneath.

Mezza majolica dish with incised decoration and painted with coloured lead glazes, northern Italy, *c.* 1480; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

Mezza majolica was produced in Italy from the late 15th until the 18th century, the main centre being Bologna. Since the glaze used was lead rather than tin, as in true majolica, it had a tendency to run when fired, causing a blurring of the design that, though not always unpleasant aesthetically, was, at best, unpredictable. The method of decoration, sometimes used in conjunction with glazes coloured green and manganese, is technically related to certain Chinese and Korean objects. The technique was practiced by Byzantine potters in Constantinople and made its appearance in Italy about 1500.

mezzadria (land tenure): *see* métayage.

mezzo-soprano (Italian: "half-soprano"), in vocal music the range between the soprano (*q.v.*) and the alto, usually encompassing the A below middle C and the second F or G above middle C. The term is often abbreviated to "mezzo."

Mezzogiorno, economically underdeveloped region roughly coextensive with the former Kingdom of Naples (*see* Naples, Kingdom of); in current Italian administrative usage, it is a mainland subregion consisting of the modern southern Italian regions of Abruzzi, Molise, Campania, Puglia, Basilicata, and Calabria and an insular subregion composed of Sicily and Sardinia. Mezzogiorno is the Italian term for "midday" or "noon," and southern Italy is known as the Mezzogiorno because of the intensity of sunshine there at midday.

The Normans ruled southern Italy between 1130 and 1198 and were succeeded by the German Hohenstaufen. The French Angevins ousted the Hohenstaufen in 1266 and greatly expanded the power of the feudal nobility. Alfonso V of Aragon conquered southern Italy between 1420 and 1442 and established the Dogana della Mene delle Pecore ("Custom of the Sheep") to levy taxes on sheep and other livestock. The Dogana reduced the number of small farmers and agricultural labourers in southern Italy by favouring the conversion of cropland to pasture.

Southern Italy and Sicily were established as an independent kingdom under the Spanish Bourbons in 1734; only limited reforms were introduced, and most southern Italians were tied to some form of feudal obligation as late as 1786. Small-scale land reform was implemented near Manfredonia in Puglia in 1806 and was followed by a series of projects to reclaim marshland and improve drainage.

The Mezzogiorno continued to be dominated by the owners of large estates after the unification of Italy in 1861, and the social and economic backwardness of the south became the subject of the Letteratura Meridionalista ("Southern Literature") in the late 19th century. Large-scale land reform was not implemented in southern Italy until 1946, and many large estates remain intact. The Cassa per il Mezzogiorno, a development fund for the south, was established as a separate ministry of the Italian government in 1950 and receives funds from the parliament to invest in the social and economic development of southern Italy, Sicily, and Sardinia. Private investment in the industrial development of the south is channeled through the Association for the Development of Industry in the Mezzogiorno, which was created in 1946.

Southern Italy is dominated by the Apennine Range, and up to one-half of the land is too steep for any form of cultivation. Coastal plains are generally narrow and poorly drained and are limited to the environs of the cities of Naples and Salerno, Foggia, and Taranto. Malaria was prevalent in the marshy plains well into the 20th century and was not fully eradicated until after World War II. Limestone and other soft rocks susceptible to erosion predominate in the Apennines; centuries of overcutting and overgrazing forests and scrubland have stripped topsoil from the mountains and hills and have left behind a raw landscape of steep slopes and deeply eroded gullies. Annual precipitation rarely exceeds 20 inches (510 mm) and falls almost entirely in torrential winter downpours that further intensify soil erosion. Irrigation and hydroelectric development are limited because most rivers dry up during the summer.

Southern Italy's population is concentrated in the coastal towns, which have grown at the expense of villages in the Apennines. Rows of small new houses have been built throughout the lowlands reclaimed from marsh. The southern Italian population's rate of natural increase exceeds that of northern Italy but has been offset in large part by the immigration of workers to industrial centres in northern Italy, France, Switzerland, and Germany.

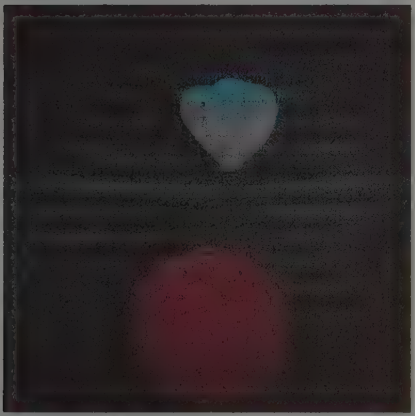
The per capita income of southern Italy lags behind that of northern Italy, and agriculture continues to employ a disproportionately high percentage of the southern work force. Land reform has favoured sharecroppers and labourers previously employed on large estates and has been accompanied by the creation of agricultural cooperatives and subsidiary rural roads throughout the Mezzogiorno; thousands of new farmhouses have also been built. Chief crops in this region include wheat, olives, grapes, peaches, apricots, pears, and various vegetables.

The Cassa has invested heavily in reforestation and the expansion and modernization of irrigation, roads, railways, and harbours. Four dozen industrial centres have been established with assistance from the Cassa; the European Investment Bank of the European Economic Community has also subsidized the industrialization of the Mezzogiorno. Economic planners have favoured the development of heavy industries in the south; such industries, however, employ relatively few workers, and they have been unable to attract ancillary industries. Iron, steel, machine tools, agricultural machinery, and petrochemicals are produced in the industrial triangle of Bari, Brindisi, and Taranto; industries around Naples are more diversified and produce textiles and various consumer goods, iron, steel, Olivetti office machinery, Pirelli cables, Alfa Romeo automobiles, and ships. Relatively few industries have been located in the Apennine Range. Tourist facilities are concentrated along the coast.

Illiteracy is fairly common in the Mezzogiorno and is highest in Calabria, where it is several times higher than the national average. The standard of living in southern Italy lags behind that in northern Italy, and thousands of households lack motor vehicles, telephone service, and other modern conveniences. Workers on large estates commonly live in a *corte,* or *cortile,* which is an agglomeration of crowded tenements around a rectangular courtyard; stables and barns are at ground level, and several stories of tenements rise above. Farmsteads are usually built of stone on a rectangular plan of two stories and are roofed at a slight angle with tile or slate. The traditional farmstead of Apulia is the conical *trullo* built of stone from a cylindrical base. Cave dwellings are common in Matera province.

Numerous towns in Calabria were settled by Albanians and host celebrations in honour of Skanderbeg, the national hero of Albania. The *Primavera albanese,* the Albanian springtime, is widely celebrated in Cosenza province. Calabrian dialects preserve a number of Greek words. Apulian cuisine shows Spanish influences and relies heavily on olive oil and fine wines.

mezzotint, also called BLACK MANNER, a method of engraving a metal plate by systematically and evenly pricking its entire surface with innumerable small holes that will hold ink and, when printed, produce large areas of tone. The pricking of the plate was originally done with a roulette (a small wheel covered with sharp points), but later an instrument called a cradle, or rocker, was used. It resembles a small spade with a toothed edge, and its cutting action throws up rough ridges of metal called burrs. The burrs are scraped away in places intended to be white in the finished print. In the 20th century, the plate is often roughened by working over it in several directions with a carborundum stone.


"Papillon," mezzotint by Yozo Hamaguchi, 1967; in the collection of the artist
By courtesy of Yozo Hamaguchi

The term mezzotint (from Italian *mezza tinta,* "halftone") derives from the capability of the process to produce soft, subtle gradations of tone. Used alone, however, mezzotint designs are often indistinct and, consequently, engraved or etched lines are introduced to give the design greater definition.

Although the process of mezzotint was invented in Holland by the German-born Ludwig von Siegen during the 17th century, it was soon practiced enthusiastically and almost exclusively in England. The technique is laborious and, consequently, unsuitable for original work. But its rich blacks, its subtle gradations of tone, and especially its adaptability to making colour prints made it ideal for the reproduction of paintings. During the 17th, 18th, and early 19th centuries, mezzotints were the only means most people had of becoming acquainted with the paintings of major artists. After the invention of photography in the 19th century, mezzotint was rarely used, although in the 20th century the French artist Georges Rouault and the English printmaker Stanley William Hayter each made several plates. Its most distinguished mid-20th-century advocate, Yozo Hamaguchi, a Japanese artist living in Paris, developed techniques for printing colour mezzotint, and other artists, such as Mario Avati of Great Britain and Merlyn Evans of France, have mastered it.

Mfecane, also spelled DIFAQANE ("The Crushing"), series of Zulu and other Nguni wars and forced migrations in the second and third decades of the 19th century that changed the demographic, social, and political configuration of southern and central Africa and parts of eastern Africa. It was set in motion by the rise of the Zulu military kingdom under Shaka (1787–1828), who revolutionized Nguni warfare. The rise of Shaka's kingdom, which took place during a time of drought and social unrest, was itself part of a wider process of state-formation in southeast Africa, which probably resulted from intensified competition over trade at Delagoa Bay. The pattern of the Mfecane, in which tribe was set against tribe over an ever-increasing radius, was highly successful in areas weakened by overpopulation and overgrazing.

In South Africa itself, the Mfecane caused immense suffering and devastated large areas as refugees scrambled to safety in mountain fastnesses, or were killed; this eased the way for white expansion into Natal and the Highveld. In the Cape Colony, it greatly increased pressures on the eastern frontier as refugees known as Mfengu crowded in on the peoples of the Transkei. At the same time, however, as a result of the Mfecane, some of the most formidable kingdoms to oppose white penetration were created—the Basuto, Swazi, and Ndebele and Gaza (of Mozambique).

The impact of the Mfecane was felt far beyond South Africa, as peoples fled from Shaka's armies as far as Tanzania and Malaŵi (the Ngoni) in the northeast, and Barotseland, in Zambia, to the northwest (the Kololo).

Mfengu, also called FINGO, people living in Eastern Cape province of South Africa and traditionally speaking a Xhosa language (one of the Bantu languages).

The Mfengu are descendants of refugees from the Mfecane in Natal, largely of Hlubi, Bhele, and Zizi origin, who made their way to the eastern Cape, where they were succoured by local chiefs. In the wars of 1835, 1846, and 1851–53, the Mfengu fought on the British side and were granted lands in the frontier districts of the Transkei and Ciskei, at Xhosa expense and in order to act as a buffer against further Xhosa invasions of the colony. With their tribal structures shattered during the Mfecane, the Mfengu were receptive from an early date to Christianity and Western education, and in the 19th century many became wealthy peasant-farmers, providing some of the first Western-type political leaders among Cape Africans. In the 20th century many Mfengu demanded their own Bantustan, or black state, in the lands granted them by the British in the 19th century, which were incorporated in the Cape Colony in 1879.

Some Mfengu still follow traditional ways of life, the men herding cattle and the women raising crops. Other Mfengu, however, are a part of the modern economy, employed as businessmen, civil servants, lawyers, and teachers in the large cities.

M'fumbiro Mountains (Africa): *see* Virunga Mountains.

MG42, German general-purpose machine gun, used as a standard weapon by many armies around the world.

The MG42 was designed in Germany in 1938, and it was placed in action on all fronts by mid-1942. Its original calibre was 7.92 mm, but when West Germany entered the North Atlantic Treaty Organization (NATO), the weapon's bore was modified to fire the NATO standard rifle and machine-gun cartridge of 7.62 mm. The MG42 was redesignated the MG1 by the West German army after its modification in calibre; guns that had been reworked from the old to the new calibre were then called MG2, and a further modification to facilitate antiaircraft use was styled MG3. The gun without a butt, for tripod mounting, is 109.7 cm (43.2 inches) long with a barrel 56.5 cm (22.25 inches) long. With a butt, for use with a bipod, the gun is 122.5 cm (48.25 inches) long. It weighs (without bipod) 10.5 kg (23.1 pounds). The MG42 is fed by a metal link belt at a cyclic rate of fire of 700–1,300 rounds per minute. It is air-cooled and has a quick-change barrel.

MGB, former Soviet intelligence and counterintelligence agency, one of the forerunners of the KGB (*q.v.*).

Mhow, city, western Madhya Pradesh state, central India. It lies on the southern Mālwa Plateau, the watershed of the Chambal and Narmada river basins. The city, formerly a large British cantonment, was founded in 1818. It remains an important cantonment and has an airport; dairy farming is a major industry. There is a government college affiliated with the University of Indore. Pop. (1991 prelim.) cantonment, 74,852; metropolitan area, 83,649.

MI-5, formally SECURITY SERVICE, intelligence agency charged with internal security and domestic counterintelligence activities of the United Kingdom. It is authorized to investigate any person or movement that might threaten the nation's security.

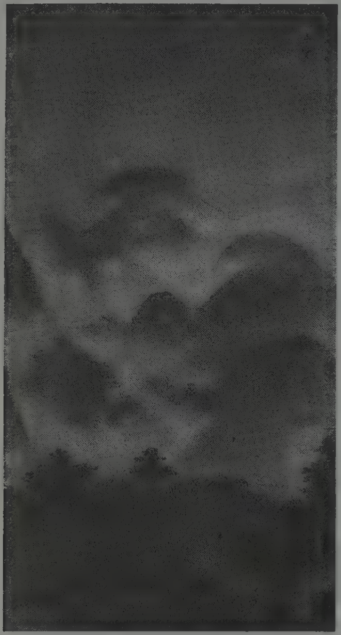
MI-5's earliest antecedent was a secret service formed in 1569 by Sir Francis Walsingham, who later became secretary of state to Elizabeth I. The need for centralized control of intelligence functions was first expressed early in the 20th century. MI-5 was formed in 1909 to identify and counter German spies then working in Britain, which it did with great effect. It was placed under the command of Vernon Kell, then a captain in the British army. Kell retired as a major general in 1924 and was later knighted, but remained in charge of the agency until 1940. (The "MI-5" label developed during this period because it was then "section five" of "military intelligence.") MI-5 is responsible for domestic counterespionage but has no powers of arrest, which devolve instead on Scotland Yard.

Articles are alphabetized word by word, not letter by letter

MI-6, formally SECRET INTELLIGENCE SERVICE, British government agency responsible for the collection, analysis, and appropriate dissemination of foreign intelligence. MI-6 is responsible for the conduct of espionage activities outside British territory. It has existed in various forms since the establishment of a secret service in 1569 by Sir Francis Walsingham, who became secretary of state to Queen Elizabeth I. It was constituted in its present form by Commander (later Sir) Mansfield Cumming in 1912 as World War I approached. In the 1930s and 1940s it was considered the most effective intelligence service in the world. During the rise of Nazi Germany, MI-6 conducted espionage operations in Europe, Latin America, and much of Asia. (The "MI-6" label developed during this period because it was then "section six" of "military intelligence.")

When the United States entered World War II, the British agency helped train personnel of the U.S. Office of Strategic Services and has since cooperated with the successor Central Intelligence Agency (CIA). The revelation in the mid-1950s that MI-6 had been penetrated by British double agents who had served the Soviet Union since the 1930s stirred wide public consternation. Details of MI-6 operations and relationships seldom appear in the British press. The agency has the power to censor such stories through the use of "D" notices under the Official Secrets Act. MI-6 reports to the Foreign Office.

Mi Fei, Pinyin MI FEI, original name (Wade-Giles romanization) MI FU, also called YÜAN-CHANG, HAI-YÜEH WAI-SHIH, or HSIANG-YANG MAN-SHIH (b. 1051—d. 1107, Huai-yang, Kiangsu province, China), scholar, poet, calligrapher, and painter, one of the dominant figures in Chinese art. He followed an official career but never rose high in the civil service and frequently changed posts. In 1103 he was made a doctor of philosophy, and in 1104 he became a professor of painting and calligraphy. Of his extensive writings—poetry, essays on the history of aesthetics, and criticism of painting—a considerable amount survives.



"Tower of the Rising Clouds," colour on silk by Mi Fei; in the Freer Gallery of Art, Washington, D.C.

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

Life. Mi Fei was born of a family that had held high office in the early years of the Sung dynasty (960–1279). Because his mother had been the wet nurse of the emperor Ying Tsung (reigned 1063/64–67/68), he was brought up within the Imperial precincts, mixing freely with the Imperial family. As a young boy, Mi Fei showed precocious talent, particularly in calligraphy. Although he expressed a distaste for the formal lessons prescribed for a future official, he displayed a lively intelligence by his quickness in understanding learned argument, an aptitude for excitingly original poetry, and an ability in painting and calligraphy.

In later life Mi Fei had a checkered official career, with frequent changes of post. He began as a reviser of books in the Imperial library and subsequently served in three posts outside the capital of K'ai-feng, in the Honan Province. In 1103 he was appointed a doctor of philosophy and was briefly military governor of Wu-wei in the province of Anhwei. He returned to the capital in 1104 to serve as a professor of painting and calligraphy, taking this opportunity to present to the Emperor a painting by his son, Mi Yu-jen. He then undertook the position of a secretary to the Board of Rites before setting out on his final appointment as military governor of Huai-yang, in Kiangsu Province, in which post he died at the age of 57. He was buried in Tan-t'u, in Kiangsu Province, under an epitaph written for him by Mi Yu-jen. Mi Fei was married and had five sons, of whom only the two eldest survived infancy, and eight daughters.

Works. Mi Fei's writings were extensive. A collection of his poetry, the *Shan-lin chi*, has been lost, but still existing are the *Pao-chang tai-fang lu* ("Critical Description of Calligraphics in Mi Fei's Collection"), and *Hua shih* ("Account of Painting"), containing records of his own and others' collections of paintings, essays on aesthetic history, and criticism of paintings. There also exist three posthumous collections of his writings, *Pao-chin yingkuang chi* ("Literary Works of Mi Fei"), *Hai-yüeh ming-yen* ("Remarks on Calligraphy"), and *Hai-yüeh t'i-pa* ("Inscriptions and Colophons by Mi Fei").

Throughout Mi Fei's life, the workings of a highly individualistic temperament were evident. This was manifested in his fastidious attention to cleanliness, his preference for the clothes of ancient Chinese dynasties, and his love for strange rocks and ink stones, which he collected. To this eccentricity of personality must also be attributed his comparative failure in his official career. Despite his undoubted ability, his friendship with the leaders of both principal political factions (the poet-statesman Wang An-shih and Su Tung-p'o), and his family connections, he never rose to any office higher than that of a second-class secretary to the Board of Rites. The reason, his epitaph states, was that "he could not endure to bow and scrape before the world." An example of this upstanding independence is his attitude toward art collectors; he divided them into two classes, busybodies and connoisseurs—utterly deriding the former as illiterate and intent simply on making a name for themselves.

As an artist, Mi Fei is best known for his calligraphy and landscape painting. His calligraphic style rejected what was inaccessibly unusual or flamboyant and was formed by patient and catholic study of the great Chinese calligraphers of the past. His theoretical writings in the *Shu shih* and *Hai-yüeh ming-yen,* which contain some of the most penetrating remarks written on the subject of calligraphy, indicate that Mi Fei believed in respect for historic styles suffused with the calligrapher's own creative talent. Most of all he valued spontaneity and self-expression, eschewing the contrived and saccharine.

Mi Fei's paintings, such as "Tower of the Rising Clouds" (Freer Gallery of Art, Washington, D.C.), represented a break with the past. Before the period of the Sung dynasty, landscape painting in China had depended essentially on line for its description of the world. Mi Fei, however, was concerned with depicting the misty rivers and hills of the lake district of Honan Province and introduced a technique of extremely moist washes and horizontal texture strokes. Later known as "Mi dots" (*Mi tien*), this technique rendered a vivid impression of that rainy and cloud-clad Chinese region. This technique of "splashed ink" (*p'o-mo*) was Mi Fei's own invention; it attracted enthusiastic contemporary attention and remained a compelling influence throughout the history of Chinese painting.

(C.S.-y.)

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Mi Hsi (in Chinese mythology): *see* Fu Hsi.

Mi-Sinai tune, in the music of the Ashkenazic (Yiddish-vernacular) Jews, any of a group of melodically fixed chants for the liturgy of the High Holy Days and other festivals. Developed in the Rhineland in the 12th–15th centuries, they were held in such high esteem that they became known as Mi-Sinai ("from Mount Sinai"). Their texts, written during a period of repression, are often mystical or express longing for the Messiah.

Musically, the Mi-Sinai tunes are among the finest achievements of Jewish music. They represent a thorough integration into traditional Jewish music of elements borrowed from European music. Thus, there can be discerned in the melodies rhythmically and tonally modified fragments from compositions of the 14th-century French composer Guillaume de Machaut, the 15th-century Burgundians, German secular minnesinger song, French and German folk song, and Gregorian chant; these borrowed elements, however, can be discovered only on painstaking examination. The melodies also draw on a number of commonly recurring melismas (melodic fragments with several notes on one vowel) that had gained nonmusical connotations through strong associations with specific Hebrew texts.

Miacis, genus of extinct carnivores found as fossils in deposits of early to late Eocene age in North America and of late Eocene age in Europe and Asia (the Eocene Epoch began 54,000,000 years ago and lasted 16,000,000 years). *Miacis* is representative of a group of early carnivores, the miacids, that were the ancestors of the modern carnivores. Miacids retain primitive characteristics present in the creodonts, an older group of mammalian carnivores, such as low skulls, long, slender bodies, long tails, and short legs. *Miacis* retained the primitive number of teeth, 44, although some reductions in this number were apparently in progress; some of the teeth are reduced in size. The hind limbs were longer than the forelimbs, and the pelvis was very doglike in form and structure. Some specialized traits are present in the vertebrae. *Miacis* and related forms had brains that were relatively larger than those of the more primitive creodonts; the increase in brain size as compared with body size probably reflects an increase in intelligence. *Miacis* was probably a forest dweller that preyed upon smaller animals; it was very weasel-like in form.

Miami, Algonkian-speaking Indians who lived in the area of what is now Green Bay, Wis., U.S., when first encountered by Europeans in the 17th century. They had also established settlements around the southern end of Lake Michigan in northeastern Illinois and northern Indiana and on the Kalamazoo River in Michigan; they continued to expand as far as Detroit and Ohio, but they later withdrew from their eastern territories and settled in Indiana.

The Miami social system was based on exogamous clans, with clan chiefs serving as members of the village council; one of their number was elected civil chief. A separate war chief was chosen on the basis of ability in leading raids. At the time of the first French contact, the Miami were divided into six bands, of which two, the Wea and the Piankashaw, later became separate tribes.

The staple of the Miami diet was a particular type of maize (corn) that was considered superior to that cultivated by their neighbours. During the summer they occupied permanent agricultural villages; they moved to the prairies in winter for communal bison hunts. In addition to mat-covered dwellings, each village had a large house in which councils and ceremonies were held. A major feature of Miami religion was the Midewiwin, or Grand Medicine Society, a secret religious organization whose members were believed to be able to secure supernatural aid for tribal welfare, as well as being able to cure the sick. Sacred medicine bundles of magical objects were important in many rites and ceremonies.

In the 19th century the Miami ceded most of their lands to the U.S., with one band remaining in Indiana and the rest removing to a reservation in Oklahoma in 1867.

Miami, city, transportation and business hub of southeastern Florida, U.S., and seat (1844) of Miami-Dade county. It is a leading resort and Atlantic Ocean port situated on Biscayne Bay at the mouth of the Miami River. The Everglades area is a short distance to the west. Greater Miami, the state's largest urban concentration, comprises all of the county, which includes Miami Beach (across the bay), Coral Gables, Hialeah, North Miami, and many smaller municipalities; together these make up the southern section of Florida's "Gold Coast."

History. Spaniards in the 16th century found a village of Tequesta Indians on the site. The name Mayaimi, probably meaning "big water" or "sweet water," may have referred to Lake Okeechobee or to local Native Americans who took their name from the lake. In 1567 the Spanish established a mission there as part of a futile attempt to subdue the Tequesta. After the United States acquired Florida from Spain (1821), Fort Dallas was built (1836) as a base during the Seminole Wars. Settlers—among them Julia D. Tuttle, known as the "mother of Miami"—gradually moved into the area.

In 1896 Henry M. Flagler extended his Florida East Coast Railway to the site. Flagler had been convinced to extend the railroad after a freeze during the winter of 1894–95 destroyed most of Florida's citrus crop; Tuttle reportedly sent him a fresh orange blossom to prove that the freeze had not reached Miami. Flagler dredged the harbour, started constructing the Royal Palm Hotel, and promoted tourism. Miami was incorporated the same year.

During the Florida land boom in the early and mid-1920s, the city's population more than tripled, but the collapse of this speculation, compounded by a devastating hurricane in 1926, dampened Miami's fortunes for more than a decade. Miami Beach underwent a brief construction boom in the mid-1930s, but this came to an end when, during World War II, soldiers replaced tourists at the oceanfront hotels, and long stretched of beach were converted to rifle ranges. After the war, many soldiers returned to the Miami area to live, and in the 1950s and '60s Latin American immigrants, particularly those from Cuba, began to arrive in large numbers. During the 1980s Miami gained a reputation as a centre of the illegal drug trade, and several acts of violence were directed against foreign tourists in the early 1990s; however, by the end of the 20th century tourism was rebounding. In 1992 Hurricane Andrew caused some 50 deaths and considerable property damage to areas of the county just south of Miami, although the city itself was spared.

The modern city. The downtown skyline of Miami now features a collection of gleaming, glass-walled skyscrapers accented with neon lighting at night. The city's close relationship to Latin America is especially well represented in its ethnic neighbourhoods. Several hundred thousand Cuban refugees have settled in the area since 1959, particularly in the Little Havana district, just west of downtown. Its annual Calle Ocho festival (March) draws large crowds of visitors. Little Haiti, to the north of downtown, developed after Haitian refugees began arriving in the 1990s.

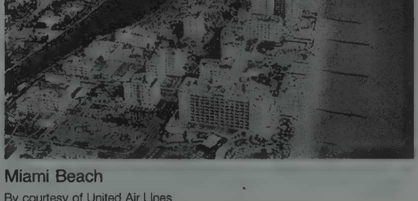
A subtropical climate helps to make Miami one of America's great winter resorts, and tourism is a major part of the city's economy. The miles of beaches are lined with glittering skyscraper hotels and are dotted with marinas, yacht clubs, and golf courses. The city is also a centre of international banking and finance, business services, manufacturing (including apparel, medical equipment, pharmaceuticals, printing, and metal products) and international commerce. The Port of Miami handles international shipping and is a world leader in cruise ship operations. Miami International Airport also handles international cargo going mostly to Latin America and the Caribbean.

The Miami Seaquarium, Vizcaya Museum and Gardens (1916; estate of industrialist James Deering), and Parrot Jungle and Gardens are among the area's many attractions. There are museums of history, art, and science, as well as several theatre, music, and dance organizations. Scuba diving, boat tours in the Everglades, and sport fishing are among the many popular outdoor activities, as are sailing regattas and fishing tournaments. The city is home to several professional sports teams, including the Florida Marlins (baseball), Miami Dolphins (American football), and Miami Heat (basketball), and the annual Orange Bowl Festival (January) features a parade and college football game. Biscayne and Everglades national parks are nearby.

Metropolitan Miami has many institutions of higher education, including the University of Miami (1925) in Coral Gables, Barry University (1940) in Miami Shores, St. Thomas University (1961), Florida Memorial College (1879), International Fine Arts College (1965), Miami-Dade Community College (1960), and Florida International University (1972), site of the National Hurricane Center. The city also is a world leader in marine study. Located there are the famed University of Miami-affiliated Rosenstiel School of Marine and Atmospheric Science and federal oceanographic laboratories. Pop. (2000) city, 362,470; Miami PMSA, 2,253,362; Miami–Fort Lauderdale CMSA, 3,876,380.

Miami, city, seat (1907) of Ottawa county, northeastern Oklahoma, U.S., in the Ozark foothills on Neosho River near Grand Lake (Lake O' the Cherokees; impounded by Grand River Dam). Originally a trading post called Jimtown and renamed in 1890 for the Miami Indian tribe whose reservation was close by, it was laid out in 1891. The community, which is in a cattle-raising and dairying region, developed rapidly as a commercial centre when lead and zinc were discovered nearby in 1905. Miami is the seat of Northeastern Oklahoma Agricultural and Mechanical College (1919). Inc. 1910. Pop. (2000) 13,704.

Miami Beach, city, Miami-Dade county, southeastern Florida, U.S. It lies on a barrier island between Biscayne Bay and the Atlantic Ocean, just east of Miami. The area was originally inhabited by Tequesta and later by Seminole Indians. Until 1912 the site was a mangrove swamp. John S. Collins, Carl Fisher, and others pioneered real estate development there, and a bridge was built across the bay (followed by a causeway in 1920). Dredging subsequently added land area to the island. The city was incorporated in 1915 as Ocean Beach and renamed Miami Beach the following year.


Miami Beach
By courtesy of United Air Lines

Growth was hindered by the collapse of the Florida land boom, a hurricane in 1926, and the onset of the Great Depression. By the mid-1930s, however, the city's fortunes had reversed, fueled by the construction of numerous Art Deco-style buildings. Growth boomed after World War II, and the region developed as a retirement area and tourist destination.

Miami Beach is now a year-round luxury resort, with no industries and no transportation facilities other than its road links to Miami. It has museums of art and of Jewish culture. South Beach, one of Miami Beach's most popular spots, has a large district of restored Art Deco buildings. Biscayne National Park is just south. Pop. (2000) 87,933.

Miami Herald, The, morning daily newspaper published in Miami, generally considered the dominant paper in South Florida and one of the most respected in the United States, unrivaled in its coverage of Latin America.

The *Herald* was established in 1910 and was known in its early years as a "reporter's paper" because of the freedom of expression it gave many of its writers. The paper also gained a reputation for its hard-hitting exposés and its thorough coverage of Miami's large Spanish-speaking community.

John S. Knight acquired the *Herald* in 1937 while building what would become one of the largest U.S. newspaper chains, the Knight–Ridder group. In 1946 he started an English-language international edition with circulation in more than 20 Latin-American countries.

The *Herald* has long crusaded against organized crime and other community problems, and it is widely noted for its outstanding local reporting. Its editorial stance is often conservative in tone, but it is progressive in social terms and vigorously independent politically.

Miami River, also called GREAT MIAMI RIVER, river issuing from Indian Lake, Logan county, west central Ohio, U.S., and flowing south-southwest past Dayton, Middletown, and Hamilton to enter the Ohio River west of Cincinnati after a course of 170 miles (274 km). Its chief tributaries are the Stillwater, Mad, and Whitewater rivers. After severe flooding in 1913, the Miami Conservancy District was established (1915) and an extensive system of levees and basins was built.

Miami Seaquarium, marine park, on Virginia Key, in Miami, Fla., U.S., that has one of the world's largest collections of marine animals, composed of some 10,000 specimens. Opened in 1955, the 38-acre (15-hectare) park provides marine life exhibits as well as animal shows featuring killer whales, dolphins, and sea lions. Manatee and shark exhibits include presentations on the animals. The park has a 750,000-gallon (2,840,000-litre) main aquarium tank filled with reef fishes, sea turtles, and eels; 26 smaller aquarium tanks showcase other marine life. There are also exhibits on rainforest and mangrove habitats. The Seaquarium provides conservation, research, and educational programs. Rescue and rehabilitation efforts help whales, dolphins, sea turtles, and especially manatees that have been injured in the wild. A feature of the park allows visitors to interact individually with dolphins in the water.

Miāni, Battle of (Feb. 17, 1843), engagement between a British force of about 2,800 troops under Sir Charles Napier and a host of more than 20,000 followers of the *amīrs* of

Sindh ending in a British victory and the annexation of most of Sindh. Complaints had been made against the *amīrs*' attitude toward the British during the First Anglo-Afghan War (1839–42). Instead of leaving settlement to the British resident, the British gave full civil and military powers to Napier in September 1842. Napier forced on the *amīrs* an onerous new treaty and provocatively seized and razed the desert fortress of Imamgarh. A popular upsurge then led to open war. At Miāni the British prevailed. The army of the *amīrs* was scattered, and Sindh, except for the state of Khairpur, was annexed.

Miānwāli, city and district, Sargodha division, Punjab Province, Pakistan. The city, the district headquarters, lies just east of the Indus River; it is connected by road and rail with Multān and Rāwalpindi. Founded in 1868, it was constituted a municipality in 1903–04. Institutions include a hospital and government colleges affiliated with the University of the Punjab.

Miānwāli district (area 5,403 sq mi [13,994 sq km]), constituted in 1901, comprises the greater portion of the Sind Sāgar Doāb (the country lying between the Indus and Jhelum rivers) and the Īsa Khel subdistrict on the west bank of the Indus. It consists of a fertile tract along the Indus River and the vast barren upland (Thal) that forms the greater part of the district. Cotton, wheat, barley, and sorghums are the chief crops; sheep and camel breeding is widespread. Pop. (1998 prov.) city, 79,996; (1981) district, 1,377,000.

Mianyang (China): *see* Mien-yang.

Miao, also spelled MEO, self-designation HMONG, HMUNG, or HMU, mountain-dwelling people of China elsewhere known usually as Hmong. Most of the Miao of China and the related peoples of northern Vietnam, Laos, and Thailand speak a Hmong-Mien (Miao-Yao) language that is traditionally classified as a member of the Sino-Tibetan language family. (This relationship is still supported by Chinese scholars, although it is not widely shared by linguists outside of China.)

The Miao consist of 70 or 80 different groups, who are distinguished by differences in dialect, dress, and culture. They live chiefly in the provinces of Kweichow (Guizhou), Hunan, Szechwan (Sichuan), and Yunnan, and in Kwangsi Chuang Autonomous Region (Guangxi Zhuangzu Zizhiqu). Ethnic Miao in China—not counted by language—numbered more than 8,000,000 at the turn of the 21st century. Smaller numbers are found in Southeast Asia, and tens of thousands have immigrated to the United States, France, French Guiana, and Australia.

The related Hmong of Southeast Asia are concentrated in the northern areas of Vietnam and Laos. Those in Vietnam are sometimes divided into groups distinguished by the costumes of the women (*e.g.,* White Hmong, Blue Hmong, Black Hmong, Red Hmong, Flowery Hmong). The Hmong (H'moong) of Thailand live mainly in the northern provinces. As elsewhere, they are often distinguished by the colour of their dress, the majority being Blue or White.

Most Miao live in single-story houses built directly on the ground. Agriculture is the chief means of subsistence for all of the groups, who grow corn (maize) and rice on burned-over forest land in the hills. Opium, which is sold in the markets, remains a significant cash crop.

There is little indigenous political organization above the village level. In religion most Hmong and Miao venerate spirits, demons, and ancestral ghosts. Their shamans exorcise malevolent spirits, and priests perform ceremonial functions. Animal sacrifice is widespread.

Miao-li, *shih* (town) and seat of Miao-li *hsien* (county), northwestern Taiwan, 19 mi (31 km) southwest of Hsin-chu city, in the northern part of the island's western coastal plain. Situated on the west bank of the Hou-lung Hsi (river), the town is a market centre for watermelons, sugarcane, and citrus fruits produced in the surrounding agricultural region. Miao-li is the site of a large liquid ammonia plant and is also the operations centre of the nearby Miao-li oil field. It is connected by the Chungshan freeway and the West Line railway to Taipei, Taiwan's capital, in the northeast and to the port of Kao-hsiung in the south. Pop. (1998 est.) 90,041.

Miao-Yao languages, also called HMONG-MIEN LANGUAGES, family of languages spoken chiefly in southern China, northern Vietnam, Laos, and Thailand. Although some linguists have proposed higher level genetic relationships to several language families—including Sino-Tibetan, Tai-Kadai, Austronesian, and Austroasiatic—no genetic relationships between Hmong-Mien and other language families have been conclusively demonstrated.

Most Miao-Yao speakers belong to the Miao and Yao nationalities, two minority ethnic groups in China (although not all Miao or Yao people speak a Miao-Yao language). Under pressure from the dominant Han Chinese population, waves of Miao and Yao speakers migrated to Southeast Asia during the 19th and early 20th centuries. Another wave of migration followed the end of the Vietnam War in the 1970s, when tens of thousands of Southeast Asian Hmong and Mien emigrated to the United States, France, French Guiana, and Australia. At the turn of the 21st century, the total number of Miao-Yao speakers worldwide was believed to be more than 12,000,000.

Miaoulis, Andreas Vokos (b. 1769, Negropont, Euboea, Greece—d. June 24, 1835, Athens), patriot who successfully commanded the Greek revolutionary naval forces during the Greek War of Independence (1821–30).

Miaoulis amassed a fortune from his wheat-shipping business during the Napoleonic Wars and devoted it to the Greek independence struggle against the Turks. In 1822 he was given command of the principal Greek naval forces and between May 1825 and January 1826 defeated the Turks in engagements off Modon, Cape Matapan, Suda, and Cape Papas. After the war he led a faction of the influential pro-English party; later his opposition to the pro-Russian president of Greece, Ioánnis Kapodístrias, and support for the antigovernment rebels of the isle of Hydra moved him to seize the government naval arsenal at Poros (July 27, 1831) and burn the government fleet (Aug. 13, 1831). He later served on the commission that offered the Greek crown to Otto (later called Otho) of Bavaria and was made vice admiral shortly before his death.

Miass, city, Chelyabinsk *oblast* (province), west central Russia, on the Miass River. Miass was founded in 1773 as a copper- (and later iron-) smelting centre. The modern city is important for the production of commercial vehicles and for gold mining in the vicinity. On the northern outskirts is the Ilmen Mineralogical Nature Reserve, established in 1920. Pop. (1997 est.) 167,000.

mica, any of a group of hydrous potassium, aluminum silicate minerals. It is a type of phyllosilicate, exhibiting a two-dimensional sheet or layer structure. Among the principal rock-forming minerals, micas are common in all three major rock varieties—igneous, sedimentary, and metamorphic.

A brief treatment of micas follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

Micas may contain various metals besides potassium and aluminum in significant amounts. Such metals include magnesium, lithium, manganese, titanium, and ferrous and ferric iron. Structurally, each mica layer consists of one octahedral and two tetrahedral units. The tetrahedral unit is a network of silicon-bearing tetrahedrons, each sharing three oxygen atoms with other tetrahedrons. The shared oxygen atoms are near-planar, as are the silicon and unshared apex oxygen atoms. The net silicon-to-oxygen ratio of this tetrahedral unit is $(Si_2O_5)^{-2}$; aluminum may substitute for silicon. The other structural unit of the mica layer is a two-dimensional array of aluminum- or magnesium-containing octahedrons with the composition $(Al_2O_4(OH)_2)^{-4}$ or $(Mg_3O_4(OH)_2)^{-4}$. This octahedral unit lies between and shares apical oxygen atoms with two tetrahedral units. Fluorine may substitute for hydroxide (OH). With trivalent ions (*e.g.,* aluminum) only two-thirds of the available octahedral sites are filled, whereas for divalent ions (*e.g.,* magnesium) all octahedral sites are filled; these two mica types are called di-octahedral and tri-octahedral micas, respectively. Individual mica layers are weakly bonded to adjacent layers by potassium, sodium, or calcium atoms which are 12-coordinated to oxygen; electrical charges are balanced by the substitution of aluminum for silicon in tetrahedral sites. Mica layers can be stacked in several relative orientations with or without a regular repetitive sequence, the former resulting in a larger unit cell than for the ideal structure. The weak bonding between mica layers accounts for the perfect cleavage.

The composition of mica minerals can first be based on di- or tri-octahedral layer and then on octahedral species as well as interlayer species. Thus the general formula can be written as $X_2Y^{4-6}Z_8O_{20}(OH,F)_4$. Here X is the interlayer cation (calcium, sodium, potassium); Y the octahedral cation (aluminum, ferric iron, lithium, magnesium, ferrous iron); and Z the tetrahedral cation (silicon, aluminum).

The micas are widespread minerals easily recognized by their cleavage, which gives rise to a relatively soft mineral. Muscovite, the most abundant variety of mica, is common in acid igneous rocks such as granites; it also frequently forms very large "books" in pegmatites. In metamorphic rocks muscovite commonly occurs at lower grades but reacts to form alkali feldspar and sillimanite at higher grades. Two other principal types of mica are biotite and phlogopite. Unlike the latter, biotite contains more iron than magnesium, resulting in its characteristic brown to black colour. It is very common in granites and intermediate igneous rocks such as gabbros and norites and often forms mica-rich biotite schists during the metamorphism of sediments containing large amounts of iron. Phlogopite is found in ultrabasic rocks, which reflects its high magnesium content. Samples of phlogopite have been discovered in kimberlites, suggesting that it may be a store for volatiles in deep-seated rocks. One other major variety of mica, lepidolite, occors in granitic pegmatites in which lithium is enriched. Fine-grained micas intermixed with clays occur in sediments both as detrital minerals and as the result of diagenesis of clays. Typically these micas are muscovite and glauconite.

Micas have various industrial uses. Those varieties containing little iron are employed as thermal or electrical insulators in appliances and certain electrical devices such as capacitors. In ground form, micas are used in the manufacture of wallpaper, roofing paper, and paint. Ground micas also serve as fillers, lubricants, absorbents, and packing material.

Micah, Book of, the sixth of 12 Old Testament books that bear the names of the Minor Prophets, grouped together as The Twelve in the Jewish canon. According to the superscription, this Judaean prophet was active during the last half of the 8th century BC.

The book is a compilation of materials some of which come from a period considerably later than Micah's time. The threats in chapters 1–3 and 6–7:7 are usually attributed to Micah, but the promises in chapters 4–5 and 7:8–20 are generally dated several centuries later. Some of the promises seem to presuppose the fall of Jerusalem and the subsequent Babylonian Exile (6th century BC), but it is possible that some promises date from before the exile or from Micah himself. The exalted view of Zion in 4:1-4 and the messianic character of 5:2–4 reflect the ideology of the Zion cult in Jerusalem before the exile.

Micah's threats are directed against idolaters, those who oppress the little man, priests and prophets who use their profession for financial gain, and leaders who pervert equity and abhor justice. The promises emphasize the importance of Zion, where Yahweh or his royal regent reigns over a kingdom of peace, and of the return from exile for Israel as well as for Judah.

micelle, in physical chemistry, a loosely bound aggregation of several tens or hundreds of atoms, ions (electrically charged atoms), or molecules, forming a colloidal particle—*i.e.*, one of a number of ultramicroscopic particles dispersed through some continuous medium. Micelles are important in the chemistry of surfaces—*e.g.*, the power of soap solutions to disperse organic compounds insoluble or only slightly soluble in water is explained as a property of micelles.

Michael, Hebrew MIKHAʾEL, Arabic MĪKHĀʾIL, in the Bible and the Qurʾān, one of the archangels. He is repeatedly depicted as the "great captain," the leader of the heavenly hosts, the warrior helping the children of Israel; and early in the history of the Christian church he came to be regarded as helper of the church's armies against the heathen. He holds the secret of the mighty "word" by the utterance of which God created heaven and earth and was "the angel who spoke to [Moses] on Mount Sinai" (Acts 7:38). The numerous representations of Michael in art reflect his character as a warrior: he is shown with a sword, in combat with or triumph over a dragon, from the story in the Book of Revelation (Apocalypse).

The feast of St. Michael, which originated in Phrygia, is kept in both East and West on September 29. In the Roman Catholic Church the feast of the Appearing (or Apparition) of St. Michael the Archangel is kept on May 8. According to legend, this appearance took place on Mt. Gargano, in Apulia, *c.* 492, and the mountain became an important medieval pilgrimage site.

Michael, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Greek	Michael
Polish	Michał
Portuguese	Miguel
Romanian	Mihai
Russian	Mikhail
Serbo-Croatian	Mihailo, or Mihajlo

BYZANTINE EMPIRE

• Michael I RHANGABE (d. *c.* 843), Byzantine emperor from 811 to 813.

The son-in-law of the emperor Nicephorus I, Michael was proclaimed emperor by a coup d'etat, despite the claims of Nicephorus' son Stauracius, who had been mortally wounded in Bulgaria. Under the influence of the abbot and theologian Theodore Studites, Michael supported the proponents of the use of religious images, or icons. He recognized Charlemagne's title of emperor (Western, Holy Roman) in return for the cession to Byzantium of Venice and other cities on the Adriatic.

When in 812 Krum, the Bulgarian khan, captured the Byzantine city of Develtus and transported its inhabitants to Bulgaria, Michael was unable to deal with the Bulgarians immediately because of an Iconoclast revolt that aimed to replace him with a son of the former emperor Constantine V. After Michael had suppressed the insurrection, however, Krum offered to conclude peace, but the terms offered seemed unacceptable to Theodore Studites, and on his advice Michael declined the proposal. Krum then renewed hostilities, capturing the city of Mesembria in November 812.

The following year Michael defeated the Bulgarians in several engagements, but on June 22, 813, he lost the Battle of Versinikia near Adrianople, as a result of the desertion of the troops of one of his generals, Leo the Armenian. Leo then deposed Michael and himself ascended the throne as Leo V. Michael retired to a monastery on one of the Princes Islands.

• Michael II (b. Amorium, Diocese of Asia—d. October 829), Byzantine emperor and

Micas

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	cleavage	refractive indices	crystal system	remarks
biotite $K_2(Fe^{+2},Mg)_{6-4}(Fe^{+3},Al,Ti)_{0-2}[Si_{6-5}Al_{2-3}O_{20}]O_{0-2}(OH,F)_{4-2}$	black to deep brown, reddish brown, or green	vitreous	2½–3	2.8–3.2	tabular or short pseudorhombohedral prisms	1 perfect, platy	$\alpha = 1.565–1.625$ $\beta = 1.605–1.696$ $\gamma = 1.605–1.696$	monoclinic	continuous variation between biotite and phlogopite
chloritoid $(Fe^{+2},Mg,Mn)_2(Al,Fe^{+3})Al_3O_2(SiO_4)_2(OH)_4$	dark green	pearly	6½	3.5–3.8	commonly in coarsely foliated masses; also sheaf-like aggregates; tabular crystals	1 perfect, platy	$\alpha = 1.713–1.730$ $\beta = 1.719–1.734$ $\gamma = 1.723–1.740$	monoclinic, triclinic	
clintonite $Ca_2(Mg_{4.6}Al_{1.4})[Si_{2.5}Al_{5.5}O_{20}](OH)_4$	colourless, yellow, green, reddish brown	pearly submetallic	3½ or 6 depending on crystal face	3.0–3.1	pseudorhombohedral crystals	1 perfect, platy	$\alpha = 1.643–1.648$ $\beta = 1.655–1.662$ $\gamma = 1.655–1.663$	monoclinic	xanthophyllite is the same as clintonite except for optical orientation
glauconite $(K,Na,Ca)_{1.2-2.0}(Fe^{+3},Al,Fe^{+2},Mg)_{4.0}[Si_{7-7.6}Al_{1-0.4}O_{20}](OH)_4 \cdot nH_2O$	green, yellowish or bluish green		2	2.4–3.0	fine-grained, rounded aggregates of small, badly formed sheets	1 perfect	$\alpha = 1.546–1.63$ $\beta = 1.57–1.66$	monoclinic	
illite $K_{1-1.5}Al_4[Si_{7-6.5}Al_{1-1.5}O_{20}](OH)_4$	white; various pale colours	earthy	1–2	2.7 (less with absorbed water)	aggregates of small flakes	1 perfect	$\alpha = 1.545–1.66$ $\gamma = 1.57–1.66$	monoclinic	forms a solid solution series with both muscovite and montmorillonite
lepidolite $K_2(Li,Al)_{5-6}[Si_{6-7}Al_{2-1}O_{20}](OH,F)_4$	purple and pink to colourless	pearly	2½–4	2.8–2.9	aggregates of short prisms or small flakes; large tabular crystals	1 perfect, platy	$\alpha = 1.525–1.548$ $\beta = 1.551–1.585$ $\gamma = 1.554–1.587$	monoclinic	forms a solid solution series with muscovite
margarite $Ca_2Al_4[Si_4Al_4O_{20}](OH)_4$	grayish pink; pale yellow, pale green	pearly or vitreous	3½–4½	3.0–3.1	translucent aggregates of thin plates	1 perfect, platy	$\alpha = 1.630–1.638$ $\beta = 1.642–1.648$ $\gamma = 1.644–1.650$	monoclinic	
muscovite $K_2Al_4[Si_{6-7}Al_{2-1}O_{20}](OH,F)_4$	light shades of brown, green, or red to colourless	vitreous to silky or pearly	2–2½	2.8–3.0	large tabular blocks (called books); pseudo-hexagonal crystals; fine-grained aggregates	1 perfect, platy	$\alpha = 1.552–1.574$ $\beta = 1.582–1.610$ $\gamma = 1.587–1.616$	monoclinic	doubly refractive; highly resistant to acids; forms solid solution series with both lepidolite and illite
paragonite $Na_2Al_4[Si_6Al_2O_{20}](OH)_4$	colourless; pale yellow	vitreous	2½	2.9	fine-grained, massive, scaly aggregates	1 perfect, platy	$\alpha = 1.564–1.580$ $\beta = 1.594–1.609$ $\gamma = 1.600–1.609$	monoclinic	
phlogopite $K_2(Mg,Fe)_6[Si_6Al_2O_{20}](OH,F)_4$	yellow to brown or reddish brown	pearly	2–2½	2.8–2.9	scales or plates	1 perfect, platy	$\alpha = 1.530–1.590$ $\beta = 1.557–1.637$ $\gamma = 1.558–1.637$	monoclinic	thin plates show asterism; continuous variation between phlogopite and biotite

founder of the Amorian, or Phrygian, dynasty who attempted to moderate the Iconoclastic controversy that divided 9th-century Byzantium.

Rising from humble origins, Michael became a military commander. He was a comrade-in-arms of Leo the Armenian, who later became Emperor Leo V (813). When, in 803, Bardanes Turcus and Nicephorus I were fighting over the imperial throne, Leo and Michael at first supported Bardanes but later deserted him and joined the cause of Nicephorus. Years later, after Leo had ascended the throne, Michael incurred the suspicion of his former friend and was imprisoned on a charge of treason. On Dec. 24, 820, he was sentenced to death and ordered to be thrown into a furnace, but on the following day, his partisans assassinated Leo and proclaimed Michael emperor.

Shortly before Michael ascended the throne, however, a soldier named Thomas the Slavonian raised a rebellion, and it was not until the end of 823 that Michael succeeded in suppressing this revolt, which so weakened the resources of the empire that it was unable to resist later Arab onslaughts. The Arabs conquered Crete (826 or 827) and parts of Sicily (827–829).

Michael II, coin, 9th century; in the British Museum
Peter Clayton

Although Michael was an Iconoclast (a member of the party opposed to the use of religious images, or icons), in practice he followed a policy of toleration. He even freed prisoners who had been jailed for their devotion to icons and recalled former patriarch Nicephorus, Theodore Studites, and other theologians who had been exiled for that reason.

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• **Michael III,** byname MICHAEL THE AMORIAN, or THE DRUNKARD (b. 838, Constantinople—d. Sept. 23, 867, Constantinople), Byzantine emperor—last of the Amorian, or Phrygian, dynasty—whose reign was marked by the restoration of the use of icons in the Byzantine Church, and by successful campaigns against the Arabs and Slavs.

Michael became a child emperor (Jan. 20, 842) upon the death of his father, Theophilus. A council of regency was set up, in which the dowager empress, Theodora, and her chief minister, Theoctistus, were the leading figures. The following year the use of icons was restored but with a conciliatory ecclesiastical policy toward the Iconoclasts. Also beginning in 843, campaigns undertaken against the Slavs in Greece and against the Arabs in Asia Minor, the Aegean, and the Nile Delta met with some success.

Michael III, coin, 9th century; in the British Museum
Peter Clayton

After a quarrel with his mother, Michael connived at the murder of Theoctistus by his maternal uncle Bardas (November 855) and in March 856, with the help of Bardas, took over direct control of the government. When Theodora attempted to resume power, she and her daughters were relegated to a convent.

Bardas became the moving spirit in the new regime. A university was organized in Constantinople. Patriarch Ignatius, who had supported Theodora, was pressured into resigning (858); his followers, however, appealed to the Pope, who ordered his reinstatement (863). Because Michael refused to depose the new patriarch, Photius, a schism with Rome resulted.

Byzantine forces continued to win victories over the Arabs, and in the campaign of 859, which reached at least as far as the Euphrates River, Michael himself led the troops. On another campaign in 860, Michael was forced to return to Constantinople, which had come under Russian siege. The invaders, however, probably withdrew before the Emperor returned with his army. About this time Michael fell increasingly under the influence of his chamberlain, Basil the Macedonian, who poisoned the Emperor's mind against Bardas. Thus, Michael acquiesced in the murder (April 865) of Bardas by Basil. In May 866 he made Basil co-emperor. In the following year Basil had Michael assassinated and became emperor.

Although Michael was unstable and extremely cruel, many modern historians believe he was not so incompetent or so dissolute as the epithet "the Drunkard" would imply. This more modern view is supported to some extent by his record of victories over the Arabs. His faults were probably exaggerated by Byzantine historians who sought to find extenuating circumstances for the murder of Michael by Basil and his supporters.

• **Michael IV,** byname MICHAEL THE PAPHLAGONIAN (d. Dec. 10, 1041, Constantinople), Byzantine emperor during whose seven-year reign an important treaty was signed with the Fāṭimid Caliphate of Egypt, temporary gains were made in Sicily, and a revolt in Bulgaria was suppressed.

A man of humble origin, Michael owed his elevation to his brother John the Orphanotrophus, an influential and capable eunuch, who brought him to court where the old Macedonian empress Zoe fell in love with him and married him on the death of her husband, Romanus III, in April 1034.

A 30 years' peace was signed with the Fāṭimid Caliphate (*c.* 1037), thus ending a period of hostilities. Byzantium and Egypt each agreed not to aid the enemies of the other. The Byzantine emperor received permission to renovate the Church of the Holy Sepulchre in Jerusalem at his own expense, and he might also have received the right to appoint the patriarch of Jerusalem. In return, Michael released 5,000 Muslim prisoners.

During Michael's reign, Byzantine conquests were made in Sicily, including the capture of Messina (1037) and Syracuse (1040); but these were only temporary. In the Balkans, Michael failed to subdue the ruler of Zeta, but he quelled a rebellion in the Bulgarian provinces.

When Michael ascended the throne, he was suffering from epilepsy, a condition that continually worsened. When he returned from the Bulgarian campaign, he was mortally ill, and he retired to the monastery of SS. Cosmas and Damian.

• **Michael V** CALAPHATES (Greek: Caulker) (d. after 1042), Byzantine emperor (1041–42). The nephew of Michael IV, Michael Calaphates was adopted by his uncle's elderly wife, Empress Zoe. Several months after his accession to the throne (Dec. 10, 1041), he exiled Zoe to a convent. An uprising erupted, however, and to stem it Michael hurriedly recalled her. Nevertheless, his political opponents had him deposed, blinded, and sent to a monastery.

• **Michael VI** STRATIOTICUS (fl. mid-11th century), Byzantine emperor who in his one-year reign (1056–57) failed to control the military aristocracy, which deposed him.

The empress Theodora, the last ruler of the Macedonian dynasty, had chosen Michael, an elderly official, as her successor. On her death (Aug. 21, 1056), Michael became emperor. His policies, however, antagonized the military leaders in Asia Minor, who proclaimed Isaac Comnenus emperor on June 8, 1057. Comnenus marched on Constantinople and defeated Michael's supporters on August 20, and Michael abdicated 11 days later.

Michael VI Stratioticus, coin, 11th century; in the British Museum
Peter Clayton

• **Michael VII** DUCAS, also called MICHAEL VII PARAPINACES (b. 1059, Constantinople—d. 1078, Ephesus, Samos, Byzantine Empire), Byzantine emperor whose policies hastened the conquest of Asia Minor by the Turks.

The eldest son of Constantine X Ducas, Michael was a minor on his father's death (May 21, 1067), and his mother assumed the regency. Because of the dangerous military and political situation, she soon married the military commander Romanus Diogenes, who was crowned co-emperor as Romanus IV in January 1068. On the defeat of Romanus by the Seljuq Turks at Manzikert in 1071, Michael was proclaimed sole emperor (October 24).

When a Norman mercenary, Roussel de Bailleul, rebelled and attempted to set up a separate kingdom in Asia Minor, the Byzan-

Michael VII Ducas, coin, 11th century; in the British Museum

Peter Clayton

tines called on the Turks for assistance in subduing him, facilitating the Turkish conquest of Asia Minor and the establishment of the Sultanate of Rūm.

Michael increasingly fell under the influence of Nicephoritzes, an official who attempted to create a state monopoly in grain. His policy not only angered the great landowners but also led to higher prices and discontent among the people. When rioting broke out in Constantinople, two rival commanders, Nicephorus Bryennius and Nicephorus Botaneiates, marched on the capital to claim the throne. Michael abdicated (March 31, 1078) and became a monk.

• **Michael VIII** PALAEOLOGUS (b. 1224?, Nicaea—d. Dec. 11, 1282, Thrace), Nicaean emperor (1259–61) and then Byzantine emperor (1261–82), who in 1261 restored the Byzantine Empire to the Greeks after 57 years of Latin occupation and who founded the Palaeologan dynasty, the last and longest lived of the empire's ruling houses.

Early years. A scion of several former imperial families (Ducas, Angelus, Comnenus), Michael passed a rather uneventful boyhood, seemingly marked primarily by fantasies of himself recovering Constantinople from the Latins; he spent much of his youth living in the imperial palaces at Nicaea and Nicomedia.

Michael VIII Palaeologus, detail of a Greek manuscript, 14th century; in the Bavarian State Library, Munich (Codex Monacensis Graecus 442)

By courtesy of the Bayerisches Staatsbibliothek, Munich

His remarkable resourcefulness and talent for intrigue were revealed early. At the age of 21 he was charged by the emperor John III Vatatzes of Nicaea with treasonous conduct against the state, a charge from which he extricated himself by the force of his wit. Later, on the death of the emperor Theodore II Lascaris in 1258, Michael was chosen regent for Theodore's six-year-old son, John Lascaris. Gradually usurping more and more authority, Michael seized the throne and early in 1259 was crowned emperor after shunting aside and blinding the rightful heir, his charge, John. Faced with rebellion by Lascarid supporters in Asia Minor, Michael succeeded, in the eyes of many Greeks, in legitimating his rule by retaking Constantinople from the Latins. Whether as the result of Michael's carefully planned ruse or of accident, or both, the great city fell to his general in July 1261. Although the Greeks generally were exultant, a few realized that the centre of gravity had shifted from Asia Minor to Europe. In the long run this concern with Europe was to prove fateful, for it led to the neglect of the frontiers in the East and with that neglect eventually to the conquest and settlement of all of Asia Minor by the Turks.

Defense against Latin rivals. From the first, Michael's hold on the throne was precarious, surrounded as it was on all sides by Latins desirous of restoring Latin rule. Especially active was Baldwin II of Courtenay, the last Latin emperor of Constantinople. In his manoeuvres to recover his throne from Michael, Baldwin finally entered into a diplomatic and matrimonial alliance with a man who was the West's ablest diplomat—in his machinations almost the equal of Michael himself—Charles of Anjou, brother of St. Louis of France. At papal invitation, Charles had advanced into southern Italy, expelled the last representatives of the imperial House of Hohenstaufen, Manfred and Conradin, and then from Palermo and Naples almost at once fixed his gaze across the Balkans onto Constantinople. To quote a chronicler, "he aspired to the monarchy of the world, hoping thereby to recreate the great empire of Julius Caesar by joining East and West."

Threatened by this grand design was not only Michael but the papacy as well; should Charles succeed in the conquest of Constantinople, the pope would become a mere puppet of Charles in Italy. Hence development of an alliance between Michael and the papacy was logical, and it took shape in two decades of intricate negotiations for religious union between Rome and Constantinople. In exchange for the papal promise to restrain Charles from attacking Constantinople, Michael promised to bring about religious union of the Greek Church with Rome. That promise provoked the violent opposition of most of Michael's own people, who opposed union on doctrinal grounds; specifically they objected to such parts of the Latin liturgy as the *Filioque* (procession of the Holy Spirit from the Son and the Father) and the use of the azyme (unleavened bread). Perhaps more important, most of them refused to accept papal ecclesiastical supremacy, which they felt, however obscurely, would lead to restoration of Latin political domination and possibly even cultural assimilation to the Latins.

Union of Eastern and Latin churches. Despite all the obstacles, union was nevertheless finally pronounced at the second Council of Lyons in 1274. Though the Orthodox East was coerced into accepting union, immediately after Michael's death (1282) the Greek Church declared the union invalid and a fraud. The Greeks had objected to the council on the grounds that not all the Eastern patriarchs or their representatives had been present, that no discussion on problems separating the two churches had taken place, and that no subsequent council had declared that of Lyons ecumenical. Nevertheless, for political reasons, Michael had struggled to maintain the union. But when Charles of Anjou finally managed to enthrone his own candidate, Martin IV, as pope in 1281, Martin at once excommunicated Michael and at the same time pronounced Charles's projected expedition against Byzantium a "Holy Crusade" against the "schismatic" Greeks. Included in the vast network of alliances erected by Charles to conquer the Greek East were not only Sicily, parts of Italy, Greek Lascarid dissidents, various Slavs of the Balkans, Baldwin, France, and Venice but also the papacy. Venice's aim in particular was to recover the broad trading privileges it had exercised in the days of the Latin Empire and to oust its arch foe, the Genoese, from the lucrative Greek markets.

The diplomatic duel between Charles and Michael was intensified, with Charles striving unceasingly to prepare his troops and navy. He even launched an attack across the Adriatic on Berat (in modern Albania) under the French general Sully but was repulsed by Michael. What Michael had on his side—the result of his consummate diplomatic ability—was (for a time) the papal alliance, a secret agreement with the Hohenstaufen supporters in Sicily, the support of Genoa, and finally, most important, a secret alliance with the son-in-law of Manfred, King Peter III of Aragon. The denouement to this remarkable contest was the outbreak on March 30/31, 1282, of the Sicilian Vespers, the massacre of the French signalling the revolt against Charles. Byzantium was saved from a second occupation by the Latins.

Assessment. At his death, which occurred soon afterward, Michael thus left an intact empire to his son Andronicus II. But it cannot be denied that his policy of using ecclesiastical union to stave off Charles's attack on his capital and the deep opposition that policy provoked among the Byzantine population established a fateful precedent for later Byzantine history. Moreover, by focussing his attention too exclusively on Europe, his policy helped to lead to Ottoman occupation of all of Asia Minor and ultimately to the capture of Constantinople itself. Nevertheless, Michael's positive accomplishments cannot be overlooked. He gave Byzantium two centuries more of life, rebuilt the capital, and reestablished the University of Constantinople. His sponsorship of a general revival of learning led to the important Byzantine "Renaissance" in the 14th and 15th centuries. (D.Ge.)

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• **Michael IX** PALAEOLOGUS (b. *c.* 1277—d. Oct. 12, 1320, Thessalonica, Byzantine Empire), Byzantine co-emperor with his father, Andronicus II, from 1295 who, despite his efforts in fighting the Turks and in resisting the encroachments of the Catalan mercenaries, was unable to reverse the decline of the empire.

In 1303, Byzantium employed as mercenaries the Catalan Company, led by Roger de Flor, which soon began attacking and robbing Byzantines and Turks alike. Hoping to get rid of them, Michael arranged the murder of Roger de Flor in the imperial palace in April 1305. The Catalans then rebelled and ravaged the countryside of Thrace for several years before moving on to Thessaly.

Michael died before his father and, thus, never reigned as sole emperor.

POLAND

• **Michael** WIŚNIOWIECKI, Polish in full MICHAŁ KORYBUT WIŚNIOWIECKI (b. July 31, 1640, Lwów, Pol.—d. Nov. 10, 1673, Lwów), king of Poland (1669–73), whose reign was marked by struggles between the pro-Habsburg and pro-French political factions.

A native Pole and descendant of Korybut, brother of King Władysław II Jagiełło, Michael was freely elected by the unanimous vote of the Polish nobility; but he was chosen chiefly for the merit of his father, Jérémi Wiśniowiecki, a great border magnate who had victoriously kept down the Cossacks, and he proved to be a passive tool in the hands of the Habsburgs. In view of this, the French party rallied round Jan Sobieski, a military commander of rising fame. The dissensions between the two camps cost Poland a new defeat at the hands of the united Turks and Cossacks. Sealed by the Treaty of Buczacz (Buchach; 1672), by which all Polish Ukraine came under Turkish suzerainty, this defeat was wiped out only by a brilliant victory of Sobieski's at Khotin (1673), which also, after King Michael's early death, carried him to the throne (as John III Sobieski) against an Austrian candidate.

PORTUGAL

• **Michael** (b. Oct. 26, 1802, Queluz, Port.—d. Nov. 14, 1866, Brombach, Baden), younger son of King John VI of Portugal, regent of Portugal from February 1828 and self-proclaimed king from July 1828 to 1834, though his royal title was not everywhere recognized.

Michael went with the rest of the royal family to Brazil in 1807, escaping from Napoleon's armies, but returned with them in 1821 to Portugal. He was then—and remained—much under the influence of his Spanish mother, Queen Carlota Joaquina. On his return, King John VI accepted the liberal constitution of 1821, but Queen Carlota refused to take the oath. When in 1823 the French overthrew the radical regime in Spain, Michael led a military rebellion that dissolved the discredited Cortes in Portugal. His father promised an amended constitution but appointed liberal ministers, and on April 30, 1824, Michael again led a military rebellion. When it faltered, his father reluctantly exiled him to Vienna (June 1824). When John VI died (March 10, 1826), his elder son, Peter, emperor of Brazil, became Peter IV of Portugal but constitutionally abdicated in favour of his daughter Maria, then seven years of age. She was to marry Michael, who was to accept Peter's constitutional Charter. Michael swore to accept the Charter, returned to Portugal, and assumed the regency (Feb. 22, 1828); however, he promptly fell under his mother's influence, settled old scores, and had himself proclaimed king (July 7, 1828). He was so recognized by the Holy See, Spain, the United States, and Russia but not by the liberal monarchies. In 1830 the Duke of Wellington's government in Britain was about to recognize him, but it fell. In 1831 Peter abdicated in Brazil, returned to Europe, and initiated a civil war. Michael lost Porto, but the struggle was protracted; he was finally forced by foreign intervention to leave Lisbon and surrendered at Évora-Monte on May 26, 1834. He renounced the throne, departed for Genoa (where he cancelled his renunciation), and settled in Italy and Germany.

ROMANIA

• **Michael** (b. Oct. 25, 1921, Sinaia, Rom.), king of Romania and, during World War II, a principal leader of the coup d'etat of August 1944, which severed Romania's connection with the Axis powers.

Michael
Camera Press

After his father—the future king Carol II—had been formally excluded from the royal succession by an act of state (January 1926), Michael was proclaimed king of Romania under a three-member regency on the death of his grandfather, King Ferdinand (July 20, 1927). But upon the return of Carol from exile (June 1930), the regency was dissolved, and Michael was reduced to the rank of crown prince. With Carol's abdication in September 1940, Michael again became king but was in effect a prisoner of the newly established military dictatorship of Gen. Ion Antonescu. Michael was strongly influenced by his mother, Queen Helen, who at this time was recalled from a 10-year exile. Becoming the focus of opposition against the Antonescu regime, he arrested the dictator on Aug. 23, 1944, signalling the overthrow of the military government. From the end of World War II in 1945, he strenuously opposed the Communists' accession to power in Romania but was ultimately forced to abdicate on Dec. 30, 1947, and go into exile, finally settling near Geneva (with his wife, Anne de Bourbon-Parma) and becoming an executive for a U.S. brokerage firm.

RUSSIA

• **Michael,** Russian in full MIKHAIL FYODOROVICH ROMANOV (b. July 22 [July 12, old style], 1596—d. July 23 [July 13, O.S.], 1645, Moscow), tsar of Russia from 1613 to 1645 and founder of the Romanov dynasty, which ruled Russia until 1917.

Son of Fyodor Nikitich Romanov (later the Orthodox patriarch Philaret), Michael was related to the last tsar of the Rurik dynasty, Fyodor I (reigned 1584–98) through his grandfather Nikita Romanov, who was Fyodor's maternal uncle. When the *zemsky sobor* (assembly of the land) met in 1613 to elect a new tsar after the Time of Troubles—a period of chaotic internal disorders, foreign invasions, and a rapid succession of rulers following the death of Fyodor I—it chose Michael Romanov as tsar (February 1613).

Michael, detail of a coloured lithograph by Peter Borel, mid-19th century, based on a 17th-century painting
Novosti Press Agency

Emissaries came from Moscow to the monastery near Kostroma where Michael was living with his mother—who had been compelled to become a nun during the reign of Boris Godunov (ruled 1598–1605)—and in March he accepted the offer of the throne with great reluctance.

Only 16 years old and poorly educated at the time of his coronation on July 21 (July 11, O.S.), 1613, Michael at first allowed his mother's relatives to gain control of governmental affairs. Although they promoted their personal interests, they also restored order to Russia, suppressed internal uprisings, and made peace both with Sweden (Treaty of Stolbovo, 1617) and with Poland (Truce of Deulino, 1618).

In 1619 Michael's father, who had been forced to become a monk under the name Philaret (Filaret) in 1601 and had later been taken to Poland, was released from captivity. Upon his return to Russia, he was installed as patriarch of the church and Michael's co-ruler. From then until his death in 1633, he dominated Michael's government, which increased diplomatic, commercial, and cultural contact with western Europe, made extensive use of the *zemski sobor* as a popular consultative body, employed a variety of means to solve Russia's continuing financial dilemmas, reformed the structure of local government to increase the authority of the central administration, and strengthened the institution of serfdom. When his father died, Michael's maternal relatives again played prominent roles in his government until he died and left his throne to his son Alexis.

SERBIA

• **Michael III,** Serbo-Croatian in full MIHAILO OBRENOVIĆ (b. Sept. 16 [Sept. 4, old style], 1823, Kragujevac, Serbia—d. June 10 [May 29, O.S.], 1868, Kosutnjak, near Belgrade), prince of Serbia (1839–42, 1860–68) and modern Serbia's most enlightened ruler, who instituted the rule of law and attempted to found a Balkan federation aimed against the Ottoman Empire.

The second son of Miloš Obrenović, Michael succeeded to the Serbian throne on the death of his elder brother, Milan, on July 8, 1839, but fled into exile after a revolt in 1842. Having travelled widely, he returned on his father's restoration to the throne (1858), served as commander in chief of the army, and became prince again on Miloš' death in 1860. An enlightened, though increasingly authoritarian, ruler, Michael gradually freed Serbia from Turkish controls until all Ottoman soldiers had left the country in 1867. Nevertheless his Balkan League, designed to unite all South Slavs against Turkey, collapsed soon after his death. In domestic affairs, Michael reformed the judicial system, revised the electoral laws, and instituted a regular conscript army (1861), for which Russia furnished supplies; he also established a state mortgage bank (1862), the Serbia Learned Society (1864), the first Serbian coinage since the Middle Ages (1868), and the national theatre. His reign was cut short by his assassination.

WALACHIA

• **Michael,** byname MICHAEL THE BRAVE, Romanian MIHAI VITEAZUL, original name MIHAI BASARAB (b. 1558—d. Aug. 19, 1601, Torda, Walachia), Romanian national hero, prince of Walachia, who briefly united much of the future national patrimony under his rule.

Acceding to the princely throne of Walachia in 1593, Michael submitted in May 1595 to the suzerainty of the prince of Transylvania, Sigismund Báthory, in order to secure support against Ottoman rule. He routed the Turks at Călugăreni (August 1595) and Giurgiu (October 1595). In 1598 he took an oath of fealty to the Habsburg emperor, Rudolf II, and also concluded a peace with the Turks. The following year he attacked his new Transylvanian suzerain, Andreas Báthory, and defeated him at Şelimbăr (October 1599). Having now proclaimed himself prince of Transylvania, Michael next conquered Moldavia (May 1600) and assumed the title of "prince of Ungro-Walachia, Transylvania, and Moldavia." In September of that year, however, the troops of Emperor Rudolf divested him of Transylvania, while Polish forces wrested Moldavia from his control the following month. Reconciled to the Emperor in 1601, he helped suppress a Magyar rebellion at Gorăslău (August 1601) but was put to death shortly thereafter on the order of the imperial general Giorgio Basta. During the 19th century Michael acquired the reputation among Romanian nationalists as the father of his people.

Michael CERULARIUS (b. *c.* 1000, Constantinople—d. Jan. 21, 1059, Madytus, near Constantinople), Greek Orthodox patriarch of Constantinople from March 1043 to November 1058 who figured prominently in the events leading to the Schism of 1054, the formal severing of Eastern Orthodoxy from Roman Catholicism.

Although Cerularius was educated for the civil service rather than for an ecclesiastical career, he was named patriarch in 1043 by the Byzantine emperor Constantine IX Monomachus. Cerularius' ambitious desires for political power, coupled with his inflexible belief in the autonomy of the Eastern Church, led him to thwart Constantine's attempts to ally the Byzantine and Roman empires in defense against the Normans. In 1052, partly in response to concessions that Constantine made to Pope Leo IX, Cerularius decided to force the Latin churches in his diocese to use the Greek language and liturgical practices; when they refused to do so, he ordered them closed.

In 1054, when Pope Leo sent three legates to Constantinople to negotiate an alliance with the Byzantine Empire, Cerularius again obstructed Constantine's and Leo's efforts by refusing to meet with the legates. In the midst of these negotiations, however, Pope Leo died, and one of his legates, the French cardinal Humbert of Silva Candida, took advantage of the papal vacancy to retaliate against Cerularius. On July 16, 1054, Humbert entered Constantinople's cathedral, Hagia Sophia, and excommunicated Cerularius and his clergy. In response, Cerularius convened a Holy Synod and excommunicated all the legates. Constantine's efforts to effect a reconciliation failed, and the schism between Rome and Constantinople was final.

Cerularius continued to flex his political muscles, ultimately constraining Constantine to support the schism. He had less control, however, over Constantine's successor, Emperor Isaac I Comnenus, who dethroned Cerularius in 1058 and drove him into exile. Cerularius died soon thereafter.

Michaelis, Georg (b. Sept. 8, 1857, Haynau, Prussia—d. July 24, 1936, Bad Saarow-Pieskow, Ger.), German politician and imperial chancellor during World War I, whose government was completely dependent on the military supreme command and lasted only 15 weeks.

A Prussian civil servant from 1879, Michaelis taught at the German school of law in Tokyo (1885–89), re-entered the Prussian civil service in 1892, and became undersecretary of state in the Finance Ministry in 1909. During World War I he headed the department for grain supply (from 1915), and in early 1917 was appointed Prussian state commissioner for food supply. After the fall of the government of Theobald von Bethmann Hollweg during the summer of 1917, the military supreme command, headed by Paul von Hindenburg and Erich Ludendorff, Germany's actual rulers, chose Michaelis to form a new government (July 14, 1917). Totally unqualified for the chancellorship, Michaelis could maintain himself only with the backing of the army. He was evasive on the Reichstag's (federal lower house) demand for acceptance of its peace resolution of July 19 (indicating that Germany wanted no annexations) and refused to make any concessions in the negotiations following Pope Benedict XV's peace proposals (Aug. 16, 1917). His downfall was engineered by the Reichstag majority parties after Michaelis blamed the Independent Social Democratic Party for the naval mutiny during the summer of 1917. Of no further use to the military and without parliamentary support, Michaelis was forced to resign on Oct. 31, 1917. Heading the administration of Pomerania from March 1918 to April 1919, Michaelis was later chiefly engaged in Protestant church organizations and projects for student welfare.

Michaelis, 1919

By courtesy of the Bildarchiv Preussischer Kulturbesitz BPK, Berlin

Michaelis-Menten hypothesis, a general explanation of the velocity and gross mechanism of enzyme-catalyzed reactions. First stated in 1913, the hypothesis assumes the rapid, reversible formation of a complex between an enzyme and its substrate (the substance upon which it acts to form a product). It also assumes that the rate of formation of the product, *P*, is proportional to the concentration of the complex. The velocity of such a reaction is greatest when all the sites at which catalytic activity can take place on the enzyme molecules (active sites) are filled with substrate; *i.e.,* when the substrate concentration is very high. These relationships provide the basis for all kinetic studies of enzymes and also have been applied to investigations of the effects of carriers upon the transport of substances through cell membranes.

Michaeliskirche (Hildesheim, Ger.): *see* Sankt Michael.

Michaelmas, Christian feast of St. Michael the Archangel, celebrated in the Western churches on September 29 and in the Eastern (Orthodox) Church on November 8. In the Roman Catholic Church, it is the Feast of SS. Michael, Gabriel, and Raphael, archangels; in the Anglican Church, its proper name is the Feast of St. Michael and All Angels.

The cult of St. Michael began in the Eastern Church in the 4th century and spread to Western Christianity by the 5th century; the date of May 8 commemorates the dedication of a sanctuary to St. Michael at Monte Gargano in Italy in the 6th century. Because of St. Michael's traditional position as leader of the heavenly armies, veneration of all angels was eventually incorporated into his cult.

During the Middle Ages, Michaelmas was a great religious feast and many popular traditions grew up around the day, which coincided with the harvest in much of western Europe. In England it was the custom to eat a goose on Michaelmas, which was supposed to protect against financial need for the next year. In Ireland, finding a ring hidden in a Michaelmas pie meant that one would soon be married.

Michajlovka (city, Russia): *see* Mikhaylovka.

Michał (Polish personal name): *see under* Michael.

Michaux, André (b. March 7, 1746, Satory, Fr.—d. Nov. 13, 1802, Tamatave, Madagascar), French botanist who spent 12 years studying the plants of North America.

From 1779 to 1781 Michaux travelled in England, Spain, and in the Auvergne region of south central France, studying the plants of these areas. In 1782 the French government sent him to Persia to collect plants and grains, which he brought back to France in 1785. He was then sent to North America to collect plants for the depleted forest of Rambouillet, southwest of Paris. He stocked the two nurseries with plants he collected from what are now the Southeastern and Midwestern states. Shipwrecked on his return trip to Paris in 1797, he lost most of the plants he had collected. In 1800 he went to Madagascar, where he contracted a fever from which he died.

Michaux, Henri (b. May 24, 1899, Namur, Belg.—d. Oct. 18, 1984, Paris), Belgian-born French lyric poet and painter whose domain was the inner world revealed by dreams, fantasies, or hallucinogenic drugs.

He travelled to Asia and South America as a sailor, living intermittently in Paris, where he eventually settled in 1922. There he became a teacher for a time and then was employed as secretary to the poet Jules Supervielle. Michaux attracted attention with his poems *Qui je fus* (1927; "Who I Was") and held his first painting show in 1937. In 1941 André Gide wrote a study that made his poetry very popular for a time. Michaux became a French citizen in 1955.

Michaux's view of the human condition was bleak; his poems emphasize the impossibility of making sense of life as it impinges on the individual. Against the futility of real life Michaux set the richness of his imagination, and the contradictions of his Surrealistic images serve as a foil to the absurdity of existence. Some of Michaux's poetry is cast in the form of deceptively flippant verse with playful rhymes. At other times Michaux presented his themes in prose poems. Michaux himself prepared three volumes of selections from his works, *L'Espace du dedans* (1944; "The Space Within"), *Ailleurs* (1948; "Elsewhere"), and *La Vie dans les plis* (1950; "Life Within the Folds"). English translations include *Selected Writings* (1968) by Richard Ellman and *Poems* (1967) by Ted Savory.

Miche, Jean-Claude (b. Bruyères-en-Vosges, Fr.—d. Dec. 1, 1873, Saigon), French Roman Catholic missionary who was instrumental in securing a French protectorate over Cambodia in 1863.

On arriving in Cochinchina (now part of southern Vietnam) in 1836, Father Miche was promptly condemned to death by the Vietnamese emperor, Minh Mang, who objected to Christian missionary activity in his realm. Miche was soon captured and remained imprisoned until his rescue on March 19, 1843.

In 1856, at the instigation of the French consul Louis-Charles de Montigny, Father Miche tried unsuccessfully to get the Cambodian king, Duong, to accept French help in ridding Cambodia of Siamese domination. By 1863–64 he had gained the confidence of Duong's successor, King Norodom, and he and a naval officer, Ernest Doudart de Lagrée, induced the King to allow the French to establish a protectorate over his domain in opposition to Siam.

Miche was named chief apostolic vicar of Cambodia in 1864 and spent the remaining years of his life in missionary activities. He compiled a Latin-Cambodian dictionary and also wrote a number of letters in *Annales de la propagation de la foi* (1863; "Annals of the Propagation of the Faith"), which give an account of events of the times.

Michel, Hartmut (b. July 18, 1948, Ludwigsburg, W.Ger.), German biochemist who, along with Johann Deisenhofer and Robert Huber, received the Nobel Prize for Chemistry in 1988 for their determination of the structure of certain proteins that are essential for photosynthesis.

Michel earned his doctorate from the University of Würzburg in 1977. In 1979 he joined the staff of the Max Planck Institute for Biochemistry in Martinsried, Ger., where he conducted his award-winning research. He became head of the Max Planck Institute for Biophysics in Frankfurt am Main in 1987.

It was Michel's preliminary work, done in the period from 1978 to 1982, that cleared the way for the three scientists' joint research. They wanted to determine the three-dimensional structure of a four-protein complex (called a photosynthetic reaction centre) that is crucial to the process of photosynthesis in certain bacteria. Michel performed the hitherto impossible feat of reducing the protein complex to a pure crystalline form, thus making it possible to determine the protein's structure atom-by-atom by means of X-ray diffraction techniques.

Michel, Louise, in full CLÉMENCE-LOUISE MICHEL (b. May 29, 1830, Vroncourt-la-Côte, France—d. Jan. 10, 1905, Marseille), French anarchist who fervently preached revolutionary socialist themes. Rejecting parliamentary reform, she believed in sensational acts of violence and advocated class war.

Louise Michel
J.E. Bulloz

Liberally educated and trained as a teacher, Michel developed her revolutionary ideas while teaching (1866–70) at Montmartre, in Paris. During the German siege of Paris (1870–71), she worked in the ambulance service and in 1871 fought zealously with the National Guard defending the Paris Commune against the Versailles troops. After the defeat of the Commune she was court-martialed and sentenced to prison.

Freed by the amnesty of 1880, Michel renewed her revolutionary campaign and lectured throughout France, but she was imprisoned for three years for inciting a riot. From 1886 to 1896 she lived in London, always keeping in touch with revolutionary developments on the Continent. In 1896 she returned to France and lectured on revolutionary themes until her death. Her writings reveal a strong sense of social consciousness. Besides her *Mémoires* (1886), she published both poetry and prose.

Michel-Lévy, Auguste (b. Aug. 7, 1844, Paris, France—d. Sept. 27, 1911, Paris), French mineralogist and petrologist, one of the pioneers of microscopic petrology.

Michel-Lévy was a brilliant student. His interest turned to geology, and in 1862 he matriculated at the Polytechnic School, then entered the School of Mines, from which he graduated at the head of his class in 1867. From 1870 he made his career with the government Geological Map Service, serving as its director from 1887 until his death. He was named to the Academy of Sciences in 1896.

Michel-Lévy proposed the use of birefringence to study minerals in thin section and measured this property for many minerals. He also developed statistical techniques to describe the chemical composition of feldspars; his methods have been applied to other minerals. He formulated the first classification of igneous rocks that considered mineralogy, chemical composition, and texture. With Ferdinand Fouqué, Michel-Lévy studied and experimented widely in the synthesis of igneous rocks. They showed that the same molten mixture yields rocks of different mineralogy, depending on the conditions of crystallization, and that the rate of cooling determines crystal size. Together they wrote *Minéralogie micrographique: roches éruptives françaises,* 2 vols. (1879; "Micrographic Mineralogy: French Igneous Rocks") and *Synthèse des minéraux et des roches* (1882; "Synthesis of Minerals and Rocks"). With Alfred Lacroix he wrote *Tableaux des minéraux des roches* (1889) and *Les Mineraux des roches* (1888).

Michelangeli, Arturo Benedetti (b. Jan. 5, 1920, Brescia, Italy—d. June 12, 1995, Lugano, Switz.), Italian pianist best known for his interpretations of Romantic music, particularly that of Claude Debussy.

Michelangeli began studying violin at the age of 3 and entered Milan Conservatory at the age of 10 as a piano student of Giuseppe Anfossi. After his graduation in 1933, he turned briefly to medical studies. In 1939 he won first prize at the Geneva International Piano Competition. He served in the Italian air force during World War II. His debuts in London (1946) and New York (1948) won critical acclaim, and he embarked upon an international career. He founded and directed the International Pianists Academy at Brescia from 1964 to 1969; among his students were Martha Argerich and Maurizio Pollini. In his playing Michelangeli displayed consummate technique marked by great clarity and control of tone colour and counterpoint.

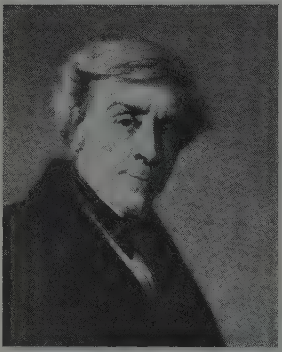
Michelangelo, in full MICHELANGELO DI LODOVICO BUONARROTI SIMONI (b. March 6, 1475, Caprese, Republic of Florence [Italy]—d. Feb. 18, 1564, Rome, Papal States), Italian Renaissance sculptor, painter, architect, and poet who exerted an unparalleled influence on the development of Western art.

A brief treatment of Michelangelo follows. For full treatment, *see* MACROPAEDIA: Michelangelo.

In 1488 Michelangelo was apprenticed to the painter Domenico Ghirlandajo, from whom he learned the technique of fresco and panel painting. In Rome (1496–1501) he sculpted a number of works; one of his most famous, the "Pietà," is now in St. Peter's Basilica, Vatican. On his return to Florence in 1501, Michelangelo started work on a gigantic marble "David" and completed it in 1504. Michelangelo's output in these years was prolific; he executed three tondi (circular representations) of the Madonna (two sculptures, one painting; *c.* 1503–05), the cartoon of the "Battle of Cascina" for the Hall of Five Hundred of the Palazzo Vecchio in Florence (1504), and, at Rome (1505–06), worked on the tomb of Pope Julius II, who commissioned him to paint the ceiling of the Sistine Chapel (1508–12). After Julius' death, he again worked on the pope's monument (completed 1545), of which his great statue "Moses" forms a part.

In 1514 he designed the front of a small chapel in Castel Sant'Angelo, Rome, and in 1520 the mortuary chapel of the Medici family in San Lorenzo in Florence. The statues of the Medici tomb rank beside the "Moses" as Michelangelo's greatest achievements in sculpture, although after 14 years' work (1520–34) he left it for pupils to complete. In Rome he painted "The Last Judgment," a powerful fresco in the Sistine Chapel (1534–41). Michelangelo's architectural works include his Mannerist masterpiece, the Laurentian Library (1523–59), Florence, and parts of the facade of the Palazzo Farnese (1547). As chief architect of St. Peter's, he designed that basilica's monumental dome. His writings, including many sonnets, constitute a compelling spiritual autobiography.

Michelet, Jules (b. Aug. 21, 1798, Paris, France—d. Feb. 9, 1874, Hyères), French nationalist historian best known for his monumental *Histoire de France* (1833–67). Michelet's method, an attempt to resurrect the past by immersing his own personality in his narrative, resulted in a historical synthesis of great dramatic power.



Michelet, detail of an oil painting by Thomas Couture; in the Carnavalet Museum, Paris
Giraudon—Art Resource

Michelet was the son of a modest printer who managed to give Jules an education. A brilliant student, Michelet at 29 was teaching history and philosophy at the École Normale Supérieure. He had already published textbooks and a translation (1827) of Giambattista Vico's *Scienza nuova* ("New Science"). The July Revolution (1830) confirmed Vico's influence on Michelet in stressing man's own part in the making of history, conceived as a continuous struggle of human freedom against fatality. This, the main theme of the *Introduction à l'histoire universelle* (1831), was to underlie Michelet's later writings.

After the *Histoire romaine,* 2 vol. (1831), Michelet devoted himself to medieval and modern history; his appointment as head of the historical section of the Record Office in the same year provided him with unique resources for carrying out his monumental life's work, the *Histoire de France.* The first six volumes (1833–43) stop at the end of the Middle Ages; they include the "Tableau de la France," in which the emergence of France as a nation is seen as a victory over racial and geographic determinism; they also include his treatment of Joan of Arc as the very soul of France and the living symbol of his own patriotic and democratic ideals.

Michelet deliberately threw his intimate self into his narrative, convinced that this was the way to achieve the historian's ultimate aim: the resurrection (or re-creation) of the past. Such a resurrection must be integral: all the elements of the past—artistic, religious, economic, as well as political—must be brought back, intertwined, as they once were, in a living synthesis. Arbitrary and overambitious as the undertaking seems, Michelet's compassionate genius and romantic imagination enabled him to conjure up an effective evocation, unsurpassed for poetic and dramatic power.

Toward the end of this period, which was marked by private crises reflected in his work (the death of his first wife, in 1839, and of his friend Mme Dumesnil, in 1842, cast shadows over whole periods of his *Histoire de France*), Michelet turned away from Christianity and began to profess a messianic belief in democratic progress. His increasing hostility to the church, expressed in his lectures at the Collège de France, eventually brought him into conflict with the Jesuits and caused his lectures to be suspended in January 1848.

A month later, the revolution that he had heralded in *Le Peuple* (1846) seemed to bring about the realization of his dreams. But they were soon shattered: in 1852 Michelet, having refused allegiance to the Second Empire, lost his posts. In 1847 he had interrupted the sequence of the *Histoire de France* to write the *Histoire de la révolution française,* 7 vol. (1847–53). He visualized the French Revolution as a climax, as the triumph of *la Justice* over *la Grâce* (by which he meant both Christian dogma and the arbitrary power of the monarchy). These volumes, written at a feverish pace, are a vivid, impassioned chronicle.

Michelet then resumed the *Histoire de France* from the Renaissance to the eve of the revolution (11 vol., 1855–67). Unfortunately, his hatred of priests and kings, his hasty or abusive treatment of documents, and his mania for symbolic interpretation continually distort these volumes into hallucinations or nightmares. Also thus distorted is *La Sorcière* (1862), an apology for witches considered as godforsaken souls, victims of the antinatural interdictions of the church.

A new and happier inspiration produced a series of books on nature: *L'Oiseau* (1856); *L'Insecte* (1858); *La Mer* (1861); *La Montagne* (1868). They reflect the influence of his second marriage to Athénaïs Mialaret, 30 years his junior, in 1849; written in a lyrical vein, they contain some of the most beautiful pages of a supreme prose writer. *L'Amour* (1858) and *La Femme* (1860), written under the same influence, are erotic and didactic.

The Franco-German War of 1870 shattered Michelet's idealism and his illusions about Germany. After his death, in 1874, his widow tampered with his diaries, and their publication as a whole was begun only in 1959 (*Journal,* vol. 1, 1959, vol. 2, 1962; *Écrits de jeunesse,* 1959). They record his travels through Europe, and, above all, they give a key to his personality and illuminate the relationship between his intimate experiences and his work. (J.J.Se.)

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Michelin, in full COMPAGNIE GÉNÉRALE DES ÉTABLISSEMENTS MICHELIN, leading French manufacturer of tires and other rubber products. Headquarters are at Clermont-Ferrand.

Founded in 1888 by the Michelin brothers, André (1853–1931) and Édouard (1859–1940), the company manufactured tires for bicycles and horse-drawn carriages before introducing pneumatic tires for automobiles in the 1890s. To show that demountable pneumatic tires could be used successfully on motor vehicles, the Michelins equipped a car with such tires held onto the rims by bolts and entered and drove it in the 1895 Paris–Bordeaux road race. Although they did not win the race, they created popular interest in pneumatic tires. Their company became a major producer of tires in Europe. In 1948 Michelin was the first to introduce steel-belted radial tires.

The company established its first foreign plant at Turin, Italy, in 1906 and today operates facilities in a number of countries. Michelin was reorganized as a holding company in 1951, with interests in tires, other rubber products, and synthetic rubber.

The company also publishes an international series of travel guides known as Michelin guides (French: Guide Michelin) and a series of road maps. The guides were initiated by André Michelin, whose aim was to promote tourism by car and thus to support his tire industry. The first Red Guide (1900), an aid to travel in France, was a pocket-size, alphabetical listing of French towns of interest that were large enough to contain hotels and garages. It included the prototypical rating symbols for which Michelin has become famous; this now-extensive list of symbols indicates such features of lodgings as comfort level (from luxurious to modest comfort) and the presence of such amenities as swimming pools, gardens, tennis courts, and air conditioning. The Red Guide also includes restaurant ratings, noting those that provide serviceable but inexpensive meals as well as a select few (indicated by the presence of three stars) that provide "cooking worth a special journey." In 1957 the company began publishing Red Guides to other western European countries, including guides to Spain and Portugal, Italy, Great Britain and Ireland, the Benelux countries (Belgium, Netherlands, and Luxembourg), and West Germany.

In addition to the Red Guides, the most popular of the Michelin guides, Michelin offers supplementary Green Guides, which can be of aid to the traveler in search of more information on the museums, natural wonders, and other points of interest in a region. Michelin also publishes a great number of highly detailed and informative maps.

Michell, John (b. 1724, Nottinghamshire, Eng.—d. April 21, 1793, Thornhill, Yorkshire), British geologist and astronomer who is considered the father of seismology, the science of earthquakes.

In 1760, the year in which he was elected a fellow of the Royal Society of London, Michell finished writing "Conjectures Concerning the Cause, and Observations upon the Phænomena of Earthquakes," in which he presented the conclusions from his study of the disastrous Lisbon earthquake of 1755. He showed that the focus of that earthquake was underneath the Atlantic Ocean, and he proposed that the cause of earthquakes was high-pressure steam, created when water comes into contact with subterranean fires. His contributions to astronomy included the first realistic estimate of the distance between the Earth and a star and the suggestion, later verified by the British astronomer John Herschel, that binary stars are physically close to and in orbit around one other.

Michell became Woodwardian professor of geology at the University of Cambridge in 1762 and rector of Thornhill in 1767. In 1750 he had published a major work on artificial magnets. He may have conceived the principle of the torsion balance independently of the French physicist C.-A. Coulomb. He hoped to use this instrument to determine the mean density of the Earth. Although he died before finishing his work, it was carried on by the British physicist Henry Cavendish in his determination of *G,* the gravitational constant (a measure of the strength of gravity).

Michelozzo, in full MICHELOZZO DI BARTOLOMMEO, Michelozzo also spelled MICHELOZZI (b. 1396, Florence—d. 1472, Florence), architect and sculptor, notable in the development of Florentine Renaissance architecture.

Michelozzo studied with the celebrated sculptor Lorenzo Ghiberti, in whose workshop he acquired the skills of a bronze founder. After 1420 they collaborated on the "St. Matthew" for the church of Or San Michele, Florence. In 1427 Michelozzo and the sculptor Donatello established a partnership, active until 1438, to build several architectural-sculptural tombs. They also collaborated on the pulpit (designed 1428) in Prato cathedral.

Throughout his career Michelozzo was closely associated with his principal patrons, the Medicis, and he followed Cosimo de' Medici into exile at Venice in 1433. Upon Cosimo's triumphant return to power in Florence in 1434, Michelozzo's architectural career began in earnest with several important commissions. In 1436 he began the complete rebuilding of the ruined monastery of San Marco at Florence. The elegant library he built for the monastery became the model for subsequent libraries throughout 15th-century Italy. In 1444–45 he directed the similar reconstruction of the large complex of church buildings at Santissima Annunziata, also in Florence. Michelozzo also temporarily succeeded Filippo Brunelleschi as architect for the cathedral of Florence upon the latter's death in 1446.

Michelozzo produced several innovations in the design of the Florentine palazzo, or palace. The basic plan called for a blocklike structure, usually three stories high, with a central open court. On the exterior the three stories were separated by horizontal string courses, and the rustication of the stonework was different in each story. The building was capped by a bold overhanging cornice. These features are outstanding in the palazzo that Michelozzo built in Florence for Cosimo de' Medici (1444–59; now called the Palazzo Medici-Riccardi), one of the finest examples of early Renaissance architecture.

In his later years Michelozzo restored several villas for the Medicis and worked as an engineer in Ragusa (now Dubrovnik, Croatia) and on the Greek island of Chios.

Michels, Robert (b. Jan. 9, 1876, Cologne—d. May 3, 1936, Rome), German-born Italian political sociologist and economist, noted for his formulation of the "iron law of oligarchy," which states that political parties and other membership organizations inevitably tend toward oligarchy, authoritarianism, and bureaucracy.

Born into a wealthy German bourgeois family, Michels became a socialist and spent most of his life teaching in Italy; he held academic positions at the universities of Turin, Basel, and Perugia. In his major work, *Zur Soziologie des Parteiwesens in der modernen Demokratie* (1911; *Political Parties: A Sociological Study of the Oligarchical Tendencies of Modern Democracy*), he set forth his ideas on the inevitable development of oligarchies, even in organizations committed to democratic ideals, because of such organizational needs as rapid decisionmaking and full-time activity. In his later writings Michels came to view this elitist rule as not only inevitable but also desirable, and he did not oppose the rise of Fascism in Italy. His *Corso di sociologia politica* and other writings were translated into English as *First Lectures in Political Sociology* (1949).

Michelsen, (Peter) Christian (Hersleb Kjerschow) (b. March 15, 1857, Bergen, Nor.—d. June 28, 1925, Fjøsanger, near Bergen), Norwegian statesman who, as prime minister, proclaimed his country's separation from Sweden in 1905.

Michelsen began his career as a lawyer; later he started his own shipping firm, which became one of the largest in Norway. A member of the Storting (parliament) from 1891, he adhered at first to the "Pure" Left Party but later broke with it and in 1903 was returned to the Storting as a member of the Coalition Party (conservatives and moderate liberals). In February 1905 he abandoned the coalition ministry of G.F. Hagerup in protest against Hagerup's extremely moderate policy in the growing conflict with Sweden. On March 11 Michelsen was appointed prime minister in a new coalition; thenceforth he was the unquestioned leader of the Norwegians in the conflict that led to the dissolution of the union with Sweden and the establishment of the new Kingdom of Norway under King Haakon VII. Michelsen remained in office until Oct. 28, 1907, when he retired because of illness.

Michelson, A(lbert) A(braham) (b. Dec. 19, 1852, Strelno, Prussia—d. May 9, 1931, Pasadena, Calif., U.S.), German-born U.S. physicist who established the speed of light as a fundamental constant and pursued other spectroscopic and meteorological investigations. He received the 1907 Nobel Prize for Physics.

Michelson
By courtesy of the University of Chicago

Michelson came to the United States with his parents when he was two years old. From New York, the family made its way to Virginia City, Nev., and San Francisco, where the elder Michelson prospered as a merchant.

At 17, Michelson entered the United States Naval Academy at Annapolis, Md., where he did well in science but was rather below average in seamanship. He was graduated in 1873, then served as science instructor at the academy from 1875 until 1879. In 1878 Michelson began work on what was to be the passion of his life, the accurate measurement of the speed of light. He was able to get useful values with homemade apparatus. Feeling the need to study optics before he could be qualified to make real progress, he travelled to Europe in 1880 and spent two years in Berlin, Heidelberg, and Paris, resigning from the navy in 1881. Upon his return to the United States, he determined the velocity of light to be 299,853 kilometres (186,329 miles) per second, a value that remained the best for a generation. When it was bettered, Michelson bettered it.

While in Europe, Michelson began constructing an interferometer, a device designed to split a beam of light in two, send the parts along perpendicular paths, then bring them back together. If the light waves had, in the interim, fallen out of step, interfererence fringes of alternating light and dark bands would be obtained. From the width and number of those fringes, unprecedently delicate measurements could be made, comparing the velocity of light rays travelling at right angles to each other.

It was Michelson's intention to use the interferometer to measure the Earth's velocity against the "ether" that was then thought to make up the basic substratum of the universe. If the Earth were travelling through the light-conducting ether, then the speed of the light travelling in the same direction would be expected to be equal to the velocity of light plus the velocity of the Earth, whereas the speed of light travelling at right angles to the Earth's path would be expected to travel only at the velocity of light. His earliest experiments in Berlin showed no interference fringes, however, which seemed to signify that there was no difference in the speed of the light rays, and, therefore, no Earth motion relative to the ether.

In 1883 he accepted a position as professor of physics at the Case School of Applied Science in Cleveland and there concentrated his efforts on improving the delicacy of his interferometer experiment. By 1887, with the help of his colleague, American chemist Edward Williams Morley, he was ready to announce the results of what has since come to be called the Michelson-Morley experiment. Those results were still negative; there were no interference fringes and apparently no motion of the Earth relative to the ether.

It was perhaps the most significant negative experiment in the history of science. In terms of classical Newtonian physics, the results were paradoxical. Evidently, the speed of light plus any other added velocity was still equal only to the speed of light. To explain the result of the Michelson-Morley experiment, physics had to be recast on a new and more refined foundation, something that resulted, eventually, in Albert Einstein's formulation of the theory of relativity in 1905.

In 1892 Michelson, after serving as professor of physics at Clark University at Worcester, Mass., from 1889, was appointed professor and the first head of the department of physics at the newly organized University of Chicago, a position he held until his retirement in 1929. From 1923 to 1927 he served as president of the National Academy of Sciences. In 1907 he became the first American ever to receive a Nobel Prize in the sciences, for his spectroscopic and meteorological investigations.

Michelson advocated using some particular wavelength of light as a standard of distance (a suggestion generally accepted in 1960) and, in 1893, measured the standard metre in terms of the red light emitted by heated cadmium. His interferometer made it possible for him to determine the width of heavenly objects by matching the light rays from the two sides and noting the interference fringes that resulted. In 1920, using a 6-metre (20-foot) interferometer attached to a 254-centimetre (100-inch) telescope, he succeeded in measuring the diameter of the star Betelgeuse (Alpha Orionis) as 386,160,000 km (300 times the diameter of the Sun). This was the first substantially accurate determination of the size of a star.

In 1923 Michelson returned to the problem of the accurate measurement of the velocity of light. In the California mountains he surveyed a 35-km pathway between two mountain peaks, determining the distance to an accuracy of less than 2.5 cm. He made use of a special eight-sided revolving mirror and obtained a value of 299,798 km/sec for the velocity of light. To refine matters further, he made use of a long, evacuated tube through which a light beam was reflected back and forth until it had travelled 16 km through a vacuum. Michelson died before the results of his final tests could be evaluated, but in 1933 the final figure was announced as 299,774 km/sec, a value less than 2 km/sec higher than the value accepted in the 1970s. (I.A.)

BIBLIOGRAPHY. Full-length studies of Michelson include Bernard Jaffe, *Michelson and the Speed of Light* (1960); and Dorothy Michelson Livingston, *The Master of Light* (1973), a well-written biography by Michelson's daughter that contains interesting anecdotal detail.

Michelson–Morley experiment, an attempt to detect the velocity of the Earth with respect to the hypothetical luminiferous ether, a medium in space proposed to carry light waves. First carried out in 1881 by physicists A.A. Michelson and E.W. Morley in the United States, the test was later refined by them and by many others.

The procedure depended on a Michelson interferometer, a sensitive optical device that compares the optical path lengths for light moving in two mutually perpendicular directions. It was reasoned that, if the speed of light were constant with respect to the proposed ether through which the Earth was moving, that motion could be detected by comparing the speed of light in the direction of the Earth's motion and the speed of light at right angles to the Earth's motion. No difference was found. This null result seriously discredited the ether theories and ultimately led to the proposal by Albert Einstein in 1905 that the speed of light is a universal constant.

Michener, James A(lbert) (b. Feb. 3, 1907?, New York, N.Y., U.S.—d. Oct. 16, 1997, Austin, Texas), U.S. novelist and short-story writer who, perhaps more than any other single author, made foreign environments accessible to Americans through fiction. Best known for his novels, he wrote epic and detailed works classified as fictional documentaries.

Michener was a foundling discovered in Doylestown, Pa. He was adopted by Mabel Michener and raised as a Quaker. In his teens he ran away from home and eventually became a teacher and editor. He served as a naval historian in the South Pacific from 1944 to 1946, and his early fiction is based on this area. He won a Pulitzer Prize in 1948 for the collection *Tales of the South Pacific* (1947), which presented the world of the South Pacific as exotic and foreign yet still part of the brotherhood of man.

Michener's novels were typically massive in scope, and he researched them extensively. A Michener novel such as *Hawaii* (1959) traditionally opens with the earliest history of an area—the geology, flora, and fauna—and ultimately encompasses the people who settle and rule there. He might spend years preparing a book, as he did in Spain for *Iberia: Spanish Travels and Reflections* (1968). His books were extremely popular, offering the reader a carefully and elaborately created world. In his later years, Michener turned his interest to American landscapes, in *Centennial* (1974) and *Chesapeake* (1978). *The Covenant* (1980) concerned South Africa and the background of apartheid. Another massive opus was *Space* (1982) in which he tried, with mixed results, to fictionally chronicle the U.S. space program. Not all of Michener's works were fictional. *The Fires of Spring* (1949) was autobiographical, as was his 1992 memoir, *The World Is My Home*. His last completed book was *A Century of Sonnets* (1997).

Michener in later life was a great philanthropist, contributing millions of dollars to universities and the Authors League Fund.

Michiel, Vitale II (d. 1172, Venice), doge of Venice who ruled during an important crisis in the Venetian Republic's relations with the Byzantine Empire and whose assassination led to a significant revision of the Venetian constitution.

Elected at the beginning of the Guelf–Ghibelline (papal–imperial) struggle, Vitale II maintained strict neutrality in spite of Venice's Guelf leanings. He relaxed this policy in 1160 during the siege of Milan by the emperor Frederick I Barbarossa, when he sent supplies to the Milanese.

Vitale's actions were an indication of the growing independence of Venice, which was nominally subject to the Byzantine Empire. In 1166 the Byzantine emperor Manuel I Comnenus sought to reimpose the old relationship by requesting a Venetian subsidy to help pay the costs of defense against Norman Sicily. But Venice's own relations with Sicily were good, and Vitale refused to pay the subsidy. Subsequently he ordered Venetian merchants to avoid Byzantine ports, for fear of reprisals, and then revoked the ban on Constantinople's assurances of his countrymen's safety. Suddenly on March 12, 1171, however, Comnenus ordered all Venetians in his empire arrested and their ships and goods seized.

Vitale was reluctant to go to war, but public sentiment forced his hand, and he led a fleet against Comnenus. Plague decimated the crews, and half of the ships had to be burned to keep them from the enemy. When the rest of the fleet returned to Venice, it spread plague among the populace. Holding the Doge responsible for the disasters, a mob assassinated him. The turmoil ended with changes in the constitution of the Venetian Republic limiting the power of the doge and people and increasing that of the wealthy oligarchic families.

Michigan, constituent state of the United States of America, lying in the Middle West, in the north-central United States, surrounded almost entirely by the Great Lakes. It is bounded on the north by Lake Superior, across from which is the Canadian province of Ontario; on the east by Lakes Huron and Erie and the southern tip of Ontario province; on the south by Ohio and Indiana; and on the west by Lake Michigan and Wisconsin. The capital is Lansing.

A brief treatment of Michigan follows. For full treatment, *see* MACROPAEDIA: United States of America: *Michigan.*

Michigan's original inhabitants were mainly Algonquian-speaking Indians. The French settled parts of the area in the 17th century, founding Sault Ste. Marie in 1668 and Detroit in 1701; fur trading was their primary activity. The English gained control of Michigan in 1763, the Americans in 1783, though the English maintained a presence until 1796 and actually recaptured Detroit in the early years of the War of 1812. After that war, settlement accelerated, and Michigan became the 26th state in 1837.

Michigan is divided into two large land segments: the Upper and Lower peninsulas. The western region of the Upper Peninsula is part of the Superior Upland, a rugged, mineral-rich area where elevations reach more than 1,900 feet (579 m). The remainder of the state is part of the Central Lowland, a mildly rolling area comprising largely denuded white-pine forests and sandy soil, though a fertile clay soil abounds in the south. The climate, which is tempered by the Great Lakes, is mild. Though the Upper Peninsula is cooler, the difference in temperature range between far northern and far southern cities is not excessive. In July, the average temperature in Sault Ste. Marie is 64° F (18° C); in Detroit, 73° F (23° C). The corresponding January averages are 14° to 16° F (−10° to −8.9° C) and 26° F (−3° C). Southern Michigan is the wettest part of the state; the average annual precipitation for the entire state is 31 inches (787 mm). The coastal strip along Lake Michigan receives an unusually large snowfall from westerly storms moving across the lake.

From its French period, Michigan had a sizable Roman Catholic population that was augmented by later waves of immigrants from Poland and Italy. The Upper Peninsula attracted a number of Finns and Cornishmen, and western Michigan was settled extensively by Dutch who brought their Reformed religious tradition with them. Germans settled throughout the state, but the Irish population remained largely urban. The migration of blacks to Michigan has been significant. In 1980 the state was nearly 13 percent black, but the city of Detroit was more than 63 percent black. Hispanic, Arab, and Asian immigrants constituted increasingly significant elements of the urban population in the 1980s. Michigan's rate of growth from 1970 to 1980 exceeded that of the other heavily industrial states in the Middle West but was still well below the national average. The city of Detroit continued to lose population—20 percent between 1970 and 1980—but the Detroit metropolitan area still represented almost half of the state's total population.

Agriculture is important but has not been as important as manufacturing during the 20th century. Grains are grown in the south, potatoes in the north. Fruit is grown along the coastal strip of Lake Michigan. The Upper Peninsula is rich in copper and iron ores, and mining is a mainstay of its economy.

Tourism has become a major industry, but manufacturing remains the basis of Michigan's economic strength. The automobile industry has long been synonymous with Detroit. Machinery, fabricated metals, food products, and chemicals are other major manufactures.

Water transportation is still important; exports are shipped from Detroit harbour, and metal ores (especially iron) travel by way of the Great Lakes. Railways date from 1836. The state is well served by roads and highways.

Detroit is the cultural centre of Michigan, with a symphony orchestra and the Institute of Arts. There are some 90 colleges and universities in the state, including the University of Michigan, opened in 1837. The Gerald R. Ford Museum in Grand Rapids and the Gerald R. Ford Library in Ann Arbor are relatively recent additions to the state's cultural resources. Local ethnic festivals include Holland's Tulip Time Festival and Frankenmuth's Bavarian Festival. Area 58,527 square miles (151,586 square km). Pop. (2000) 9,938,444.

Michigan, Lake, third largest of the five Great Lakes of North America and the only one lying wholly within the United States. Bordered by the states of Michigan (east and north), Wisconsin (west), Illinois (southwest), and Indiana (southeast), it connects with Lake Huron through the Straits of Mackinac in the north. The lake is 321 miles (517 km) long (north to south); it has a maximum width of 118 miles (190 km) and a drainage basin of about 45,500 square miles (118,000 square km), exclusive of its surface area, which is 22,300 square miles (57,757 square km). With a mean surface elevation of 579 feet (176 m) above sea level, the lake has a maximum depth of 923 feet (281 m). Currents are slight, with a generally southward drift along the western side, a northward drift along the eastern side, and at times counterclockwise swirls in the southern basin and around the Beaver Island group in the north. Approximately 100 streams flow into the lake, only a few of which are of appreciable size. The Manistee, Pere Marquette, White, Muskegon, Grand, Kalamazoo, and St. Joseph rivers enter the lake from the east. The Fox and Menominee rivers flow into Green Bay, a northwestern arm of the lake. The Chicago River flowed into the southwestern end of the lake but was reversed in 1900 so that it now drains through the Chicago Sanitary and Ship Canal into the Des Plaines River at Joliet, Ill. The northern end of the lake contains all of the islands, the largest of which is Beaver Island, Michigan.

The land adjacent to Lake Michigan is low and gently rolling, but wave-cut bluffs of rock occur in many places. Sand dunes are common along the southeastern shore, notably at the Indiana Dunes National Lakeshore and State Park, where prevailing winds blow sand inland. The moderating influence of the lake accounts for the noted fruit-growing region along its eastern shore.

Lake Michigan is part of the Great Lakes–St. Lawrence Seaway and, thus, handles international commerce. Although ice in the harbours limits navigation from mid-December through mid-April, the open lake rarely freezes over, and railway-car ferry service across the lake is maintained between some ports throughout the year.

The southern end of the lake abuts a great industrial complex centred on Chicago, which consumes large quantities of waterborne raw materials, principally iron ore, coal, and limestone; these are handled at the ports of Calumet (South Chicago) Harbor in Illinois and at Indiana (East Chicago) Harbor and Gary in Indiana. Some of the iron ore is loaded at Escanaba, Mich., on the lake's northern shore; but most is brought from the Lake Superior region. Milwaukee and Green Bay, Wis., are centres of distribution of coal from Lake Erie ports. Grain is shipped from Milwaukee and Chicago. Other major lake ports include Michigan City (Ind.); Waukegan (Ill.); Kenosha, Racine, and Manitowoc (Wis.); and Manistee, Ludington, Muskegon, Grand Haven, and Benton Harbor (Mich.).

The restocking of lake trout and the introduction of coho salmon have rejuvenated recreational and commercial fishing on the lake while also greatly reducing the population of alewives (small saltwater fish that entered the Great Lakes via the St. Lawrence Seaway and created many problems when large numbers died off in springtime). Although pollution is threatening the ecological balance of the lake, popular summer-resort areas dot its shores.

In 1634 the French explorer Jean Nicolet became the first European to see Lake Michigan. The Jesuit Claude-Jean Allouez began missionary work among the Indians of Green Bay and the Fox River in 1668. The French explorer Louis Jolliet and the French missionary Jacques Marquette mapped the lake's western shore from Green Bay to Chicago in 1673. Robert Cavelier, sieur de La Salle, also of France, brought the first sailing ship to the lake in 1679, but it was lost in a storm on its return eastward with a cargo of furs. La Salle later established a trading post near St. Joseph, Mich. The name of the lake is from the Algonquian Indian term *michigami,* or *misschiganin,* meaning "big lake."

Michigan, University of, state university of Michigan. It originated as a preparatory school in Detroit in 1817 and moved to Ann Arbor in 1837. It began to offer postsecondary instruction in 1841 and is now one of the leading research universities of the world. Branch campuses were opened in 1956 (Flint) and 1959 (Dearborn).

Though not a land-grant university in the sense of being a product of the Morrill Act of 1862, the University of Michigan profited from federal grants of land in 1826 and 1836. Under the vigorous presidencies of Henry P. Tappan (1852–63), who consciously adopted European and especially German models and fostered teaching education, and James Burrill Angell (1871–1909), Michigan became a leader in broadening higher education. It established the first medical school west of the Alleghenies and offered the first course in American history in any college. It was among the first colleges to admit women (1870) and blacks (1868). Angell succeeded in reorganizing the university to include all the principal professional schools and a graduate school. He also broadened the curriculum to include electives.

The university consists of the College of Literature, Science, and the Arts and of professional schools in architecture, art, business administration, dentistry, education, engineering, law, library science, medicine, music, natural resources, nursing, pharmacy, public health, and social work.

Special facilities and programs include the Institute for Social Research, the Survey Research Center, the Gerald R. Ford Presidential Library, the Phoenix Laboratory (which houses a two-megawatt nuclear reactor), a hospital complex, a broadcasting station, the Aerospace Engineering Laboratory, a naval tank for ship design studies, Great Lakes research ships and research aircraft; museums; and solar research observatories in Michigan and Hawaii.

Michigan City, city, La Porte county, northern Indiana, U.S. The city is situated on the southern end of Lake Michigan, 25 mi (40 km) east-northeast of Gary. It was laid out in 1830 by Maj. Isaac Elston as the terminus of the Michigan Road (whence its name) from the Ohio River. Once a major lumber port, it is now one of the state's leading vacation spots, near the Indiana Dunes National Lakeshore (1966), as well as an industrial centre. Manufactures include Pullman cars (started in 1852 when the railroad arrived) and mining equipment. Steel mills constructed in the 1960s at nearby Burns Harbor are part of a growing industrial complex. The Old Lighthouse (1858), one of the first on the Great Lakes, is now a museum. The Indiana State Prison (1860) is in the city. Purdue University North Central Campus is at Westville, 5 mi south, and International Friendship Gardens, 1½ mi east, has plantings representative of many nations. Inc. 1836. Pop. (1990) 33,822.

Michinaga (Japanese regent): *see* Fujiwara Michinaga.

Michoacán, state, west central Mexico, bounded by the Pacific Ocean on the south-southwest; the states of Colima, Jalisco, and Guanajuato on the northwest and north; Méhoxico on the east; and Guerrero on the south. The state's territory of 23,138 sq mi (59,928 sq km) rises from a narrow coastal plain to the Sierra Madre Occidental. It lies in an area of great volcanic activity: Mt. Jorullo arose during an eruption in an agricultural region in 1759, and in 1943 Paricutín suddenly appeared near Uruapan, the eruption that formed it continuing into 1952. The most important rivers draining to the Pacific are the Lerma, on the northwestern frontier, and the Balsas–Tepalcatepec, on the southern frontier, both of which have large-scale irrigation projects. The fertile mountain valleys are cool and healthful, but the coastal plain is hot and unhealthful. The state has two large lakes: Chapala, bordering Jalisco state, and Pátzcuaro, in a popular resort area where fishermen use lightweight, gracefully framed nets called butterfly nets.

Butterfly-net fishing off Janitzio Island on Lake Pátzcuaro, Michoacán state, Mexico
Art Resource

In the 1530s the Dominican Vasco de Quiroga established the first successful missions among the Tarascan Indians around Lake Pátzcuaro, in which, influenced by Thomas More's *Utopia,* he sought to organize a cooperative commonwealth. Crafts taught then survive today, and Quiroga's name is still venerated in the region. Michoacán produces a wide range of forest products, tropical crops, grains, minerals, oil, and sulfur. It is well served by highway, air, and rail routes. Important cities of the state are Morelia (*q.v.*), the capital; Uruapan; Zamora; and Pátzcuaro. The population is chiefly mestizo and Tarascan Indian. Pop. (1990 prelim.) 3,534,042.

Michurin, Ivan Vladimirovich (b. Oct. 27 [Oct. 15, Old Style], 1855, Vershino estate, near Dolgoye, Russia—d. June 7, 1935, Michurinsk, Russian S.F.S.R.), Russian horticulturist who earned the praise of the Soviet government by developing more than 300 new types of fruit trees and berries in an attempt to prove the inheritance of acquired characteristics. When Mendelian genetics came under attack in the Soviet Union, Michurin's theories of hybridization, as elaborated by T.D. Lysenko, were adopted as the official science of genetics by the Soviet regime, despite the nearly universal rejection of this doctrine by scientists throughout the world.

Michurinsk, also spelled MIČURINSK, formerly (until 1932) KOZLOV, city, Tambov *oblast* (province), western Russia, on the Lesnoy Voronezh River. Founded in 1636 as a fortress named Kozlov, it was chartered in 1779. Locomotive repair works reflect its junction position, and there are vegetable- and fruit-processing industries. It is a horticulture centre, with an institute founded by the Soviet scientist I.V. Michurin, who lived there until 1935 and after whom the city is named. Pop. (1991 est.) 109,400.

Miciński, Tadeusz (b. Nov. 9, 1873, Łódź, Pol., Russian Empire—d. February 1918, near Chirikova, Russia), writer, poet, and playwright of the Neoromantic period of Polish literature, a forerunner of Expressionism and Surrealism.

Miciński studied philosophy at the University of Kraków, traveled in Germany and Spain, and was influenced by Polish messianism and by Friedrich Nietzsche and Fyodor Dostoyevsky. Miciński's passionate metaphysical concerns led him to an obsessive concentration on the problem of good and evil. His major works are strange and fantastic depictions of imaginary societies in which human embodiments of moral opposites engage in combat, using the weapons of mystical awareness and revolutionary political action. His novel *Nietota. Księga tajemna Tatr* (1910; "Nietota: The Secret Book of the Tatra Mountains") is an imaginary re-creation of Polish life at the beginning of the 20th century. In the apocalyptic visions of his novel *Xiądz Faust* (1913; "Father Faust"), Miciński predicted that Polish–Russian brotherhood would come about through revolution. At the end of World War I Miciński was assassinated in the chaos of the Russian Revolution while he was helping to organize the Polish armed forces.

Micius (Chinese philosopher): *see* Mo-tzu.

Mickey Mouse, one of the most popular and famous characters of Walt Disney's animated cartoons. He was introduced in *Steamboat Willie* (1928), the first animated cartoon with sound. Mickey Mouse was created by Walt Disney; he was customarily drawn by Ub Iwerks, but his voice was provided by Disney himself. Mickey was often portrayed with a girlfriend, named Minnie Mouse. Mickey was a cheerful and mischievous anthropomorphic rodent who went on to star in more than one hundred cartoon shorts and became a virtual cult figure. In 1932 Disney was given an Honorary Award by the Academy of Motion Picture Arts and Sciences for the creation of Mickey Mouse.

Mickiewicz, Adam (Bernard) (b. Dec. 24, 1798, Zaos'ye, near Novogrudek, Belorussia, Russian Empire—d. Nov. 26, 1855, Constantinople), one of the greatest poets of Poland and a lifelong apostle of Polish national freedom.

Mickiewicz, detail of an oil painting by Aleksander Kamiński, 1850
By courtesy of the Polska Akademia Nauk, Instytut Sztuki, Warsaw

Born into an impoverished noble family, Mickiewicz studied at the University of Vilnius between 1815 and 1819; in 1817 he joined a secret patriotic student organization, the Filomaci, later incorporated in the Filareci.

His first volume of poems, *Poezja I* (1822; "Poetry I"), included ballads, romances, and an important preface explaining his admiration for these western European forms and his desire to transplant them to Polish soil. *Poezja II* (1823) contained parts two and four of his *Dziady* ("Forefather's Eve"), in which he combined folklore and mystic patriotism to create a new kind of Romantic drama. With the other Filareci, Mickiewicz was arrested in 1823 and sentenced to deportation to Russia for spreading Polish nationalism; he worked in Moscow and was befriended by most of the leading Russian writers, including Pushkin. In 1825 he visited the Crimea and soon after published his erotic *Sonety Krymskie* (1826; "Sonnets from the Crimea"). *Konrad Wallenrod* (1828) is a poem describing the wars of the Teutonic Order with the Lithuanians but actually representing the age-old feud between Poland and Russia.

Mickiewicz was finally able to leave Russia on the grounds of ill health in 1829. He traveled throughout Germany but missed participating in the unsuccessful Polish insurrection of 1830. In the third part of *Dziady* (1833; *Dziady III*), which he completed in 1832, Mickiewicz views Poland as fulfilling a messianic role among the nations of western Europe by its national embodiment of the Christian themes of self-sacrifice and eventual redemption. In 1832 he settled in Paris and there wrote, in biblical prose, the *Księgi narodu polskiego i pielgrzymstwa polskiego* ("Books of the Polish Nation and its Pilgrimage"), a moral interpretation of the history of the Polish people. His masterpiece, the great poetic epic *Pan Tadeusz* (1834; *Master Thaddeus*), describes the life of the Polish gentry in the early 19th century through a fictional account of the feud between two families of Polish nobles. The poem conveys perfectly the ethos of an archaic society in which the ideals of chivalry are still alive and shows the effect of the Napoleonic myth on honest and simple minds, to whom the French emperor is an instrument of Providence.

He was appointed professor of Latin literature at the University of Lausanne (Switzerland) in 1839 but resigned a year later to teach Slavonic literature at the Collège de France. He remained there until 1844, when he was suspended for teaching the mystical doctrines of the mesmerist Andrzej Towiański. In early 1848 he went to Rome to persuade the new pope to support the cause of Polish national freedom. Between March and October 1849 he edited the radical newspaper *La Tribune des Peuples* ("People's Tribune"). Napoleon III relieved him of his post at the Collège de France in 1852 but appointed him librarian at the Arsenal. In September 1855 he was sent to Turkey by Prince Adam Czartoryski to mediate between factions of Poles preparing to fight on the side of the Allies in the Crimean War, but he did not survive the trip. In 1890 his remains were reburied in the vault of Wawel cathedral in Kraków, where many Polish kings are laid to rest.

Mickiewicz was the principal poet of Polish Romanticism. His love lyrics, succinct and charged with emotion and meaning, raised the image of woman to ideal heights previously unknown in Polish poetry. With his exalted patriotism, mystical feeling, and passionate appreciation of the positive aspects of Polish life, he came to epitomize the Polish spirit for succeeding generations of his nation's writers.

Micmac, the largest of the Indian tribes occupying Canada's eastern Maritime provinces (Nova Scotia, New Brunswick, and Prince Edward Island). Because their Algonkian dialect differs greatly from that of their neighbours, the speculation is that they were latecomers to the area in prehistoric times. Historically, they were probably the Indians whom John Cabot first encountered in 1497. Although early chroniclers described them as fierce and warlike, they were among the first Indians to accept Jesuit teachings and to intermarry with the settlers of New France. In the 17th and 18th centuries they were allies of the French against the English, frequently descending to raid the New England frontiers. In the late 20th century their descendants, mixed with whites, numbered some 10,000 and lived generally as poor labourers.

The Micmac formed a confederacy of several clans (Micmac: "Allies"), each clan having its own symbols and its own chief, though leadership was not strong. Generally, even their war leaders were simply those demonstrating exceptional prowess. There were apparently no hereditary social classes, and slavery did not exist (male war prisoners were usually tortured to death, and captured women and children were assimilated into the tribe).

The Micmac were seasonally nomadic. In winter they hunted caribou, moose, and small game; in summer they fished, gathered shellfish, and hunted seals on the coasts. Winter dwellings were conical wigwams covered with birch bark or skins; summer dwellings were varied, usually oblong wigwams, relatively open-air. Clothing was typical of the eastern woodlands: loincloths for men, sheaths for women, and robes for both, with notable use of fringe. They were expert canoeists.

Their ceremonies were reported to be elaborate, but little is known of the nature of their rituals and religious beliefs.

Micon, also spelled MIKON (fl. 5th century BC), Greek painter and sculptor, a contemporary and pupil of Polygnotus, who, with him, was among the first to develop the treatment of space in Greek painting.

As a painter Micon is known for the mural painting on the Stoa Poikile ("Painted Portico") on the Agora at Athens and for the paintings at the Theseum at Athens. Micon and his teacher Polygnotus worked on the Stoa Poikile together, beginning shortly after 460 BC. While Polygnotus executed the central composition for the Stoa Poikile, Micon executed the "Amazonomachy," or the "Battle of Theseus and the Amazons," placed to the right of Polygnotus' work. This work apparently marked an important advance in the rendering of space, perspective, and distance by means of the placement of figures within a composition. The painting procured Micon a considerable reputation among his contemporaries. Micon began to work on the Theseum soon after 475 BC. Among the subjects represented there were the "Battle of the Centaurs and Lapiths" and the "Death of Theseus." Micon's innovations helped initiate the decline of Greek vase (pottery) painting because the small, curving surfaces of pots would not permit the spatial elaboration that was possible on the flat, wall-sized pictorial surfaces used by muralists.

microbiology, scientific study of microorganisms, a diverse group of simple life forms including protozoans, algae, molds, bacteria, and viruses. Research in microbiology is concerned with the structure, function, and classification of such organisms and with ways of controlling and exploiting their activities.

A brief treatment of microbiology follows. For full treatment, *see* MACROPAEDIA: Biological Sciences.

The foundations of microbiology were established during the last half of the 19th century. The French biologist and chemist Louis Pasteur determined the role of bacteria in fermentation and disease, and the German physician Robert Koch discovered a procedure for proving that a specific organism causes a specific disease. Other investigators soon developed elaborate methods and laboratory equipment with which they revealed the ubiquity, diversity, and powerful effects of microorganisms.

Many major advances have occurred in microbiology since the mid-20th century. A multitude of disease-causing microorganisms have been identified and the means of controlling their harmful effects developed. Research has, moreover, uncovered effective means of channeling the activities of various microorganisms so as to benefit medicine, industry, and agriculture. Molds, for example, are employed to produce enzymes and antibiotics, most notably penicillin. Certain bacteria also are cultivated on a large scale because they are useful in the commercial production of lactic acid, the derivatives of which are used as solvents and as a means of treating anemia and calcium deficiency. The field of genetic engineering (*q.v.*) led to entirely new industrial applications of bacteria, since some of those organisms that had been genetically altered were capable of synthesizing insulin and other biochemicals of great medical value.

microburst, pattern of intense winds that descends from rain clouds, hits the ground, and fans out horizontally. Microbursts are short-lived, usually lasting from about 5 to 15 minutes, and they are relatively contained, usually affecting an area of 0.6 to 1.9 miles (1 to 3 km) in diameter. They are often but not always associated with thunderstorms or strong rains. By causing a sudden divergence in wind direction or speed—a condition known as wind shear—microbursts create a particular hazard for airplanes at takeoff and landing because the pilot is confronted with a rapid and unexpected shift from headwind to tailwind.

In arid places the rain that is often associated with microbursts has evaporated before the downdraft reaches the ground; dry microbursts thus afford virtually no visible clue to their presence. Wet microbursts, typical of more humid areas, generally produce a visible rain shaft. The mechanics of the microburst phenomenon are not yet completely understood. Their existence was first observed in 1974 by Tetsuya Theodore Fujita, a Japanese-American meteorologist working at the University of Chicago.

microcephaly, condition of abnormal smallness of the head. Microcephalic individuals are usually severely retarded both mentally and developmentally. Primary microcephaly results when the brain itself is abnormally small (microencephaly), so that there is no stimulus for the vault to grow. It also occurs when all the cranial sutures fuse prematurely, precluding brain growth. Irradiation of the abdomen in pregnant women or maternal (and via the placenta, fetal) infection with German measles or toxoplasmosis during the first three months of pregnancy may sometimes produce a microcephalic child. Microcephaly of greater or lesser degree also accompanies various genetic syndromes such as Hurler's syndrome and some chromosomal disorders.

microclimate, any climatic condition in a relatively small area, within a few metres or less above and below the Earth's surface and within canopies of vegetation.

The strongest gradients and cyclical patterns of temperature and humidity occur just above and below the terrestrial surface. Complexities of microclimate are necessary for the existence of a variety of life forms because, although any single species may tolerate only a limited range of bioclimate, strongly contrasting microclimates in close proximity provide a total environment in which many species of flora and fauna can coexist and interact.

Microclimatic conditions depend on such factors as temperature, humidity, wind and turbulence, dew, frost, heat balance, and evaporation. The effect of soil type on microclimates is considerable. Sandy soils and other coarse, loose, and dry soils, for example, are subject to high maximum and low minimum surface temperatures. The surface reflection characteristics of soils are also important; soils of lighter colour reflect more and respond less to daily heating. Also strongly influencing the microclimate is the ability of the soil to absorb and retain moisture, which depends on the composition of the soil and its use. Vegetation, too, can insulate the soil below and reduce temperature variability. Sites of exposed soil then exhibit the greatest temperature variability.

Topography can affect the vertical path of air in a locale and, therefore, the relative humidity and air circulation. For example, air ascending a mountain undergoes a decrease in pressure and often releases moisture in the form of rain or snow. As the air proceeds down the leeward side of the mountain, it is compressed and heated, thus promoting drier, hotter conditions there. An undulating landscape can also produce microclimatic variety through the air motions produced by differences in density.

The microclimates of a region are strongly bound to the average moisture, temperature, and winds of the climate in general and to latitude, elevation, and season. Weather and climate are sometimes, in turn, influenced by microclimatic conditions, especially by variations in surface characteristics. Wet ground, for example, promotes evaporation and increases atmospheric humidity. The drying of bare soil, on the other hand, creates a surface crust that inhibits ground moisture from diffusing upward, which promotes the persistence of the dry atmosphere. Microclimates control evaporation from surfaces and influence precipitation, and so are important to the hydrologic cycle—*i.e.,* the processes involved in the circulation of the Earth's waters.

The initial fragmentation of rocks in the process of rock weathering and the subsequent soil formation are largely dependent on the prevailing microclimate, for the fracturing of rocks is accomplished by the frequent freezing of water trapped in their porous parts. The final weathering of rocks into the clay and mineral constituents of soils is largely a chemical process; however, such microclimatic conditions as relative warmth and moisture influence the rate and degree of weathering.

microcline, a common feldspar mineral, one form of potassium aluminosilicate ($KAlSi_3O_8$) that occurs in volcanic rock. Green specimens are called amazonstone, which is sometimes used as a gem. Microcline forms multiple-twinned crystals and two sets of fine, tapering lamellae at right angles to each other; this tartan twinning distinguishes it from other feldspars. Microcline is found at Baveno, Italy; Kragerø, Nor.; Madagascar; and, as amazonstone, in the Urals, Russia, and Florissant, Colo., U.S. For detailed physical properties, *see* feldspar (table).

Microcline is the form of potassium feldspar that is stable at the lowest temperatures. Its structure differs from that of orthoclase because of a different distribution of silicon and aluminum atoms in its aluminosilicate crystal framework. Microcline exhibits a variation in symmetry. Individual specimens range from those that are triclinic (three unequal axes inclined obliquely to one another) to those that are barely distinguishable from monoclinic (three unequal axes, only one of which is inclined obliquely).

Microcline forms a series of mixtures with the plagioclase albite, the sodium atoms of which replace the potassium atoms in the microcline structure. The intermediate members of the series are called microcline–microperthites and exhibit unmixing (separation) of the sodium and potassium phases into minute intergrowths of distinct crystals of the pure compounds. It has been suggested that this chemical variation might also influence the symmetry.

Micrococcus, genus of spherical bacteria in the family Micrococcaceae that is widely disseminated in nature. Micrococci are microbiologically characterized as gram-positive cocci, 0.5 to 3.5μm (micrometres; 1μm$=10^{-6}$ metre) in diameter.

Micrococci are usually not considered pathogenic. They are normal inhabitants of the human body and may even be essential in keeping the balance among the various microbial flora of the skin. Some species are found in the dust of the air (*M. roseus*), in soil (*M. denitrificans*), in marine waters (*M. colpogenes*), and on the skin or in skin glands or skin-gland secretions of vertebrates (*M. flavus*). Those species found in milk, such as *M. luteus, M. varians,* and *M. freudenreichii,* are sometimes referred to as milk micrococci and can result in spoilage of milk products.

microcomputer, any of a class of small digital computers whose central processing unit (CPU) is contained on a single integrated semiconductor chip. A microcomputer uses a single microprocessor (*q.v.*) for its CPU, which performs all logic and arithmetic operations. The system also contains a number of associated semiconductor chips that serve as the main memory for storing program instructions and data and as interfaces for exchanging data of this sort with peripheral equipment—namely, input/output devices (*e.g.,* keyboard, video display, and printer) and auxilliary storage units. Smaller microcomputers first marketed in the 1970s contain a single chip on which all CPU, memory, and interface circuits are integrated.

As large-scale integration and then very-large-scale integration have progressively increased the number of transistors that can be placed on one semiconductor chip, so the processing capacity of microcomputers using such single chips has grown commensurately. During the 1980s microcomputers came to be used widely in other applications besides video games and other relatively simple computer-based recreations. Increasingly powerful microcomputers began to be used in personal computer systems and workstations, for instance. High-performance microcomputer systems are used widely in business, in engineering, in "smart" or intelligent machines employed in the factory and office, and in military electronics systems.

In the early 1990s, small computers that fit in a pocket yet provide the power of a desktop personal computer were introduced. These pocket, or palm-sized, computers are distinguished by their high portability, enhanced performance, and low cost. *See also* digital computer.

microcopy: *see* microform.

microcosm (from Greek *mikros kosmos,* "little world"), a Western philosophical term designating man as being a "little world" in which the macrocosm, or universe, is reflected. The ancient Greek idea of a world soul (*e.g.,* in Plato) animating the universe had as a corollary the idea of the human body as a miniature universe animated by its own soul. The notion of the microcosm dates, in Western philosophy, from Socratic times (Democritus specifically referred to it)—*i.e.,* from the 5th century BC. Propagated especially by the Neoplatonists, the idea passed to the Gnostics, to the Christian scholastics, to the Jewish Kabbalists, and to such Renaissance philosophers as Paracelsus. The supposed analogy between the whole and its parts served not only to develop a cosmology in which the reality of the individual received due attention but was also fundamental to astrology and other fields in which belief in a metaphysical relationship between man and the rest of nature is postulated. In later philosophy the monadology of G.W. Leibniz presented a comparable view of man and the universe; and, in the 19th century, Rudolf Lotze chose *Mikrokosmus* as the title of his major work on the theory of knowledge and reality.

microcredit, also called MICROBANKING, a means of extending credit, usually in the form of small loans with no collateral, to nontraditional borrowers such as the poor in rural or undeveloped areas.

This approach was institutionalized in 1976 by Muhammad Yunus, an American-educated Bangladeshi economist who had found that a significant percentage of the world's population lacked the means to borrow money, build their trades, and rise out of poverty. Yunus set out to solve this problem by founding the Grameen Bank (*q.v.*) in Bangladesh. The Grameen approach is unique because the small loans are guaranteed by members of the borrower's community; pressure within the group encourages borrowers to pay back the loans in a timely manner. Grameen's clients are among the poorest of the poor, many of whom had relied on a barter economy to meet their daily needs.

The success of microloans in Bangladesh led to similar programs in other developing nations, including Bolivia and Indonesia. An alternative approach to Grameen-style lending is stepped lending, in which a borrower begins with a very small loan, repays it, and qualifies for successive loans at higher values.

microcrystalline wax, any petroleum-derived plastic material that differs from paraffin waxes in having much finer and less-distinct crystals and higher melting point and viscosity. Microcrystalline waxes are used chiefly in laminated-paper products, in coatings and linings, and in adhesives, sealing compositions, and various types of polishes.

In contrast to paraffins, microcrystalline waxes may vary widely in character depending on the crude-oil source and the method and degree of refinement. Some are ductile, like beeswax; others are hard and brittle; and still others crumble easily during handling. The melting-point range is higher than that of paraffin wax, with commercial grades ranging from 63° to 93° C (145° to 200° F). The colour of microcrystalline waxes ranges from creamy white to dark brown. Decolorization is difficult, and these waxes' odour and taste may be undesirable in some applications.

Microcrystalline waxes may be made from the residue of crude petroleum by refining; or they may be made from petroleum jelly by removing the oil with a solvent. Their physical properties may be controlled by the temperature of the solvents. Methods of separation include solvent dilution, chilling, centrifuging, filtering, and various combinations of these.

Chemically, microcrystalline waxes consist of saturated aliphatic hydrocarbons.

Microcycas, a genus of palmlike cycads (plants of the family Cycadaceae), native to Cuba. The only species, corcho (*M. calocoma*), is columnar in habit and occasionally branched; it reaches heights of 9 m (30 feet) or more and is often mistaken for a palm.

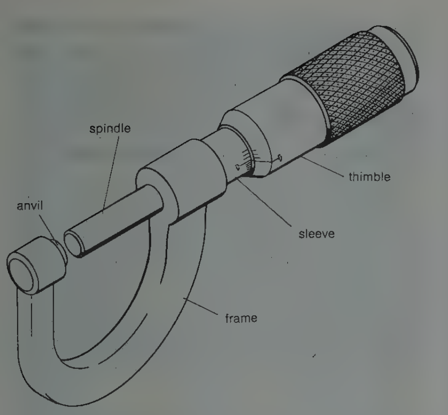
microeconomics, study of the economic behaviour of individual consumers, firms, and industries and the distribution of total production and income among them. It considers individuals both as suppliers of labour and capital and as the ultimate consumers of the final product, and it analyzes firms both as suppliers of products and as consumers of labour and capital. Microeconomics seeks to analyze the market or other type of mechanism that establishes relative prices among goods and services and allocates society's resources among their many alternative uses. *Compare* macroeconomics.

microfauna, small, often microscopic animals, especially those inhabiting the soil, an organ, or other localized habitat. Single-celled protozoans, small nematodes, small unsegmented worms, and tardigrades (eight-legged arthropods) are the most common components of microfauna. Many inhabit water films or pore spaces in leaf litter and in the soil, feeding on smaller microorganisms that decompose organic material.

microform, also called MICROCOPY, or MICRORECORD, any process, photographic or electronic, for reproducing printed matter or other graphic material in a much-reduced size, which can then be re-enlarged by an optical apparatus for reading or reproduction. Microform systems provide durable, extremely compact, and easily accessible file records.

The science of microphotography burgeoned in the late 20th century, with scores of processes and a variety of miniaturizations being introduced. Generally speaking, a microform may be in the form of continuous media, such as roll or cartridge microfilm, or in that of individual and physically separate records, such as film chips (microfilm containing coded microimages, to be used in automatic retrieval systems) or microfiche (a sheet of microfilm displaying at the top a title or code readable with the naked eye). Use of the microform permits considerable space saving. The microform usually utilizes photographic techniques; however, other methods such as video magnetic tape recording have been used. Most microform techniques also permit the document file to be duplicated easily for dissemination or filing in different places.

micrometer, in full MICROMETER CALIPER, instrument for making precise linear measurements of dimensions such as diameters, thicknesses, and lengths of solid bodies; it consists of a C-shaped frame with a movable jaw operated by an integral screw. The fineness of the measurement that can be made depends on the lead of the screw—*i.e.,* the amount the spindle moves toward or away from the anvil



Micrometer

in one revolution and the means provided for indicating fractional parts of a revolution. The accuracy of the measurements depends on the accuracy of the screw-nut combination.

micrometre, also called MICRON, metric unit of measure for length equal to 0.001 mm, or about 0.000039 inch. Its symbol is μm. The micrometre is commonly employed to measure the thickness or diameter of microscopic objects, such as microorganisms and colloidal particles. Minute distances, as, for example, the wavelengths of infrared radiation, are also given in micrometres.

Micronesia, ethnogeographic grouping of Pacific Islands encompassing the generally small islands and island groups of Kiribati (formerly the Gilbert Islands), Guam, Nauru, the Commonwealth of the Northern Marianas, the Federated States of Micronesia (Yap, Pohnpei [Ponape], Chuuk [Truk], and Kosrae of the Caroline Islands), the Republic of the Marshall Islands, and the Republic of Palau (Belau). Located, for the most part, northward from the Equator, Micronesia (from Greek *mikros,* "small," and *nēsoi,* "islands") includes the westernmost of the Pacific Islands.

A brief treatment of Micronesia follows. For information about regional aspects of Micronesia, *see* MACROPAEDIA: Pacific Islands.

The island arcs of Micronesia rise abruptly from the deep ocean and comprise volcanic mountain ranges built up from lava from the fractured ocean floor. When the mountain mass rises above the ocean surface, the resulting islands have topography that is generally rugged, with sharp peaks, ridges, cliffs, and (on those with streams) canyons and waterfalls. Termed "high islands" because of their high elevations, these islands are often fringed with coral reefs. By contrast, "low islands" are composed exclusively of coral formations, which result in either single coral islands or, more commonly, coral atolls. Kwajalein Atoll in the Marshalls is the world's largest coral atoll.

Mangrove and tropical forests and scrubland constitute most of the ground cover on the islands. Native species of animals include snakes, lizards, and numerous species of birds. A greater variety of both flora and fauna is found on the high islands. The reefs and lagoons abound in lobsters, shrimps, clams, oysters, octopuses, turtles, and innumerable species of fish.

Western Micronesia (comprising Palau and the Mariana Islands) was probably settled by peoples from Indonesia or the Philippines some 3,500 years ago, and eastern Micronesia was possibly settled from eastern Melanesia at about the same time.

Among the high-island cultures of Micronesia there are seven major cultures: the Chamorros, most of whom live on the four southernmost of the Marianas; the Palauans; the Yapese; the Chuukese, of the dozen or so islands in the Chuuk Lagoon; the Pohnpeians; the Kosraeans; and some of the Nauruans. The two distinctive low-island cultures are those of the Marshall Islands and the Gilberts (composing Kiribati).

Settlement patterns of the Micronesians were typified by the dispersed, extended-family homestead. Those who inhabited the larger atolls generally lived along the lagoon side. Most Micronesian communities had meeting-houses and canoe houses (for storage). At the time of European contact, Micronesian extended families lived in thatched, one-room houses. Communities were small and were located near a stream, a lagoon, or the sea.

Except for the Yapese, Micronesians generally followed a system of matrilineage. They commonly channeled their social, economic, and political activities along lines of mutual aid and obligation among local groups related by blood or marriage. Male heads of various kin groups acted as leaders within the community.

Early Micronesians lived by subsistence horticulture and fishing; horticulture was a more likely enterprise on the high islands and fishing among the atoll inhabitants. Fish, breadfruit, bananas, pandanus, taro, tropical yams, and coconut were widely distributed and served as the main foods.

Land was the most important property among the Micronesians. On the larger high islands, some of the interior land was communally owned. Feasts were an important aspect of island life, providing one of many types of exchange common in Micronesia.

The Micronesians were polytheists, believing in several high gods, a large number of spirits attached to specific localities or credited with performing specific functions, and a number of ancestors and deceased neighbours who could sometimes make contact with their living descendants and friends.

Much of Micronesian art was ephemeral, consisting of singing, dancing, storytelling, and body painting. Few permanent artifacts remain. Contact with European culture had a great effect on Micronesian arts. Traditional sports, dance, and music are performed more often at the instigation of curious outsiders than for members of the local communities.

The Austronesian languages of the varied populations of Micronesia are mutually unintelligible. Polynesian languages are spoken by the inhabitants of the Ellice Islands and some isolated atolls. English is also widely spoken.

In recent times substantial movements of indigenous population have occurred within Micronesia, generally from the low islands to the nearest high island.

The economies of most Micronesian islands still are based largely on subsistence farming and fishing. The principal cash crop on most islands is coconuts (which are dried for copra). Guam and some other large islands rear some cattle and water buffalo, but pigs and chickens predominate on all the islands. Milk and dairy products must be imported by most of the islands.

There are no sizable mineral deposits in Micronesia except phosphates, which have been mined only on Nauru. Many islands use coral limestone for cement and other construction materials. In general, local industries are limited to processing agricultural commodities such as copra, coconut oil, and fish and to producing furniture, small boats, bottled soft drinks, and handicrafts.

Construction is concentrated on projects sponsored by the military on islands associated with the United States and on roads, housing, and basic infrastructure elsewhere. The periodic devastation wrought by typhoons requires that all Micronesian islands have facilities for repair and maintenance.

Tourism is of growing importance as air transport is extended. Touring by boat is especially popular throughout Micronesia.

The first European colonies in Micronesia were established by Spain in 1668. After the loss of its Pacific colonies, Spain sold the islands to Germany between 1885 and 1899. Japan occupied the islands in 1914 and was granted a mandate in 1920 by the League of Nations to govern them. The islands were heavily fortified by the Japanese before World War II and were occupied by the United States after bitter fighting in 1944. The United Nations granted a trusteeship mandate to the United States in 1947.

A three-branch government patterned on the U.S. federal government was created in 1968. In 1973–74 the Congress of Micronesia adopted guidelines for a constitutional convention that would lead to independence. Regional differences led to a division of the islands into four constituencies when the proposed constitution was voted on in 1978. The Kosrae, Pohnpei, Chuuk, and Yap districts approved it and formed the Federated States of Micronesia. Of the districts that rejected the constitution, the Northern Marianas chose commonwealth status with the United States in 1978. The Marshall Islands voted for an independent constitution in 1979. By 1991 the status of Palau alone remained uncertain.

Micronesia, officially FEDERATED STATES OF MICRONESIA, republic of the western Pacific Ocean, comprising the island states (from west to east) of Yap, Chuuk (Truk), Pohnpei (Ponape), and Kosrae, all in the Caroline Islands. The capital is Palikir on the island of Pohnpei. Area 271 square miles (701 square km). Pop. (1991 est.) 111,000.

A brief treatment of Micronesia follows. For full treatment, *see* MACROPAEDIA: Pacific Islands.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The more than 600 islands and islets may be divided into two groups: to the east (in Chuuk, Pohnpei, and Kosrae states) are islands formed of coral caps on mountains of volcanic origin rising from the ocean floor; and to the west (in Yap state) are continental islands formed by folds in the Earth's crust that rise above the surface of the ocean. Yap island and six islands in the Chuuk group rise to more than 500 feet (150 m), and Kosrae and Pohnpei islands have peaks above 2,000 feet (600 m). The remaining formations in the Federated States consist mostly of low-lying atolls having sand islands on top of a coral reef, the whole enclosing a lagoon. There are also a few isolated coral islands. Pohnpei is the largest of the republic's islands, with an area of 129 square miles (334 square km). The islands and atolls extend about 1,750 miles (2,800 km) east-west and about 600 miles (965 km) north-south.

The climate is tropical, with a mean annual temperature of 81° F (27° C). Rainfall gradually decreases from east to west, from 200 inches (5,000 mm) on Pohnpei to about 120 inches (3,000 mm) on Yap. Numerous typhoons originate in the area each year. On the high islands of Kosrae, Pohnpei, and the Chuuk group, vegetation consists of mangrove swamps on the shore and of grassland, forest, or scrub ascending to the rain forests of the central mountain areas. On the coral atoll islands and Yap, the predominant vegetation is coconut and pandanus palms and breadfruit trees.

The people. The indigenous people of the Federated States are Micronesian and exhibit great diversity in physical types, cultures, and languages. The people of Kapingamarangi and Nukoro atolls, situated southwest of Pohnpei, have a Polynesian culture. Approximately one-half of the country's population lives on Pohnpei, Weno (Moen) in the Chuuk group, and Yap. Pohnpei alone has about 27 percent of the total population, and the islands in the Chuuk group (including Weno) have approximately 50 percent; Kosrae also has a relatively large population. The majority of the people live in traditional villages and are predominantly Christian. Malayo-Polynesian languages and English are widely spoken in the islands.

The economy. Subsistence farming and fishing are the principal economic activities. The staple crops are breadfruit, taro, coconuts, and bananas; yams, cassava, and sweet potatoes are grown on some of the high islands. The main source of revenue is U.S. government grants, which account for an estimated 70 percent of the gross national product (GNP). Copra exports and income from the sale of fishing rights, both mostly to Japan, are additional sources of revenue. Black pepper is grown on Pohnpei for export, and there is some tourism. Imports include rice and other foodstuffs and manufactured goods.

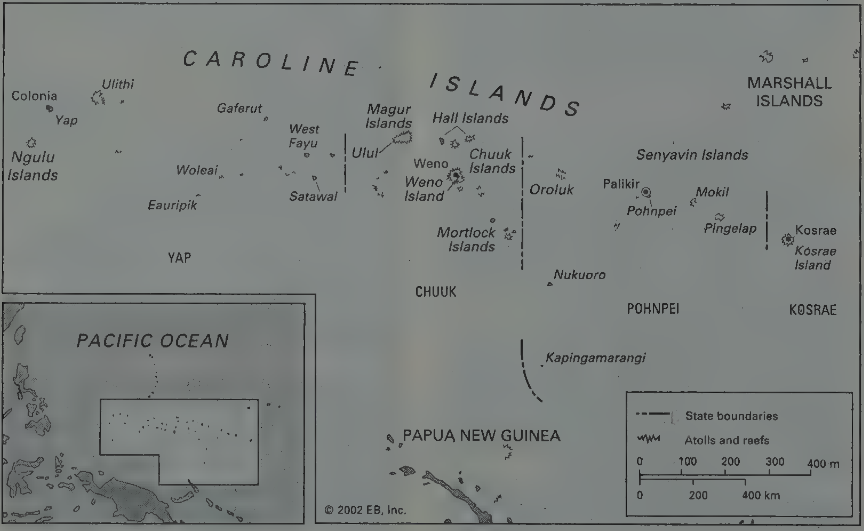
Transportation among the islands and atolls is by boat or air. The major commercial ports are at Takatik near Pohnpei, Kosrae, Colonia on Yap, and Weno. International airports and television stations are located on Yap, Pohnpei, and Weno.

Government and social conditions. The government of the Federated States of Micronesia consists of a president and vice president elected by the unicameral National Congress, which is made up of one at-large senator from each state, with four-year terms, and single-district senators, with two-year terms, elected on the basis of population. Each of the four local state governments has a popularly elected governor and a unicameral legislature.

Under the terms of the Compact of Free Association with the United States, which was signed by the Federated States of Micronesia in 1982, the United States is responsible for internal security and defense and provides financial assistance to the republic. The compact's articles also allow for the islands to become fully independent or to alter their status with the United States at any time, based on approval through a plebiscite.

There are hospitals on Yap, Weno, Pohnpei, and Kosrae and dispensaries on the inhabited islands. Each inhabited atoll and large island has at least one primary school. Yap, Ulithi, Weno, Weipat (Chuuk group), Pohnpei, and Kosrae have secondary schools. The Community College of Micronesia (established 1970; formerly the Micronesian Teacher Education Center) is on Pohnpei.

History. The islands that make up the Federated States were probably settled by people from eastern Melanesia some 3,500 years ago. The islands were colonized by Spain in the 17th century and eventually came under Japanese rule after World War I. They were taken by American forces during World War II. In 1947 the area encompassed by the four states, then divided into three districts, became part of the United Nations Trust Territory of the Pacific Islands, administered by the United States. Under the constitution of the Federated States of Micronesia, the country became an internally self-governing federation in 1979. The Federated States, in 1982, signed a Compact of Free Association with the United States, which was endorsed by referendum in 1983 and by U.S. law in 1985. Micronesia was admitted as a member of the United Nations in 1991.



Federated States of Micronesia

Micronesian languages, group of mutually unintelligible languages belonging to the Eastern, or Oceanic, branch of the Austronesian (Malayo-Polynesian) language family and most closely related to the Melanesian and Polynesian languages. The seven languages in the Micronesian group, all closely related, are the Nuclear Micronesian languages, including Marshallese, Gilbertese, Chuukese, Pohnpeian, Kosraean, Carolinean, and Ulithian. Two more languages of Micronesia that belong to the Polynesian group are Nukuoro and Kapingamarangi. Two languages spoken in Micronesia appear to be most closely related to the Western, or Indonesian, branch of the Austronesian languages—Chamorro, closely similar to the languages of the Philippines, and Palauan, the affinities of which are less certain but clearly Indonesian.

In addition, two Micronesian languages, Yapese and Nauruan, are of uncertain relation to the Nuclear Micronesian group. Nuclear Micronesian languages are similar in phonology and close enough in structure to show their close interrelationship, but vocabulary items generally show few similarities, with less than 25 percent of the total vocabulary similar within closely related languages.

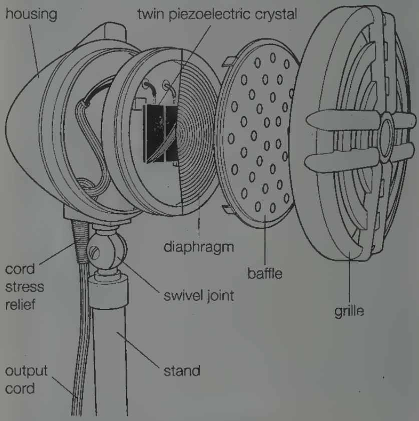
micronutrient: *see* trace element.

micropegmatite, quartz and alkali feldspar intergrowth so fine that it can be resolved only under the microscope; it is otherwise indistinguishable from the coarser intergrowths known as graphic granite. The quartz-feldspar interfaces are planar, and the quartz areas tend to be triangular in cross section. These patches of quartz are in parallel optical orientation, and it was long supposed that they were actually continuous, either above or below the plane of observation; a detailed study of the coarser intergrowths common in many pegmatites indicated, however, that the various quartz patches usually are separate individuals. Both the angular (runic, or letterlike) character of the quartz areas and their optical parallelism are evidently crystallographic responses to growth conditions.

Micropegmatite often occurs in granite and diabase and composes all or a large part of granophyre. Where the intergrowth is coarse enough and sufficiently abundant to permit chemical analysis, the bulk composition averages about 25 percent quartz and 75 percent feldspar. This composition often is that of granites and rhyolites. In diabase, micropegmatite may be interstitial, forming pods (roughly cylindrical cigar-shaped aggregates), seams, or veins.

microphone, device for converting acoustic power into electric power that has essentially similar wave characteristics. While those on telephone transmitters comprise the largest class of microphones, the term in modern usage is applied mostly to other varieties.

Apart from telephone transmitters, microphones are most widely applied in hearing aids, sound-recording systems (principally magnetic and digital tape recorders), dictating machines, and public-address systems. Microphones are extensively used in communications systems, radio or wire, to provide better response quality than with conventional telephone transmitters, or for hands-free operation.



Cross section of a crystal microphone
EB Inc.

In a microphone, sound waves (sound-pressure variations in the air) are converted into corresponding variations in electric current in two operations that take place almost simultaneously. In the first, the sound wave impinges on a slightly flexible surface (diaphragm), causing it to move to and fro in a manner corresponding to the movement of the air particles. In the second, the diaphragm by its motion causes a corresponding change in some property of an electric circuit. Depending on the type of microphone, displacement of the diaphragm may cause variations in the resistance of a carbon contact (carbon microphone), in electrostatic capacitance (condenser microphone), in the motion of a coil (dynamic microphone) or conductor (ribbon microphone) in a magnetic field, or in the twisting or bending of a piezoelectric crystal (crystal microphone; *see* Figure). In each case, motion of the diaphragm produces a variation in the electric output. By proper design, a microphone may be given directional characteristics so that it will pick up sound primarily from a single direction (unidirectional), from two directions (bidirectional), or more or less uniformly from all directions (omnidirectional).

microprocessor, any of a type of miniature electronic device that contains the arithmetic, logic, and control circuitry necessary to perform the functions of a digital computer's central processing unit (*q.v.*). In effect, this kind of integrated circuit can interpret and execute program instructions as well as handle arithmetic operations.

The microprocessor was developed in the late 1970s as a result of large-scale integration (LSI), which made it possible to pack thousands of transistors, diodes, and resistors onto a silicon chip less than 0.2 inch (5 mm) square. During the early 1980s very-large-scale integration (VLSI) vastly increased the circuit density of microprocessors. A single VLSI circuit holds hundreds of thousands of electronic components on a chip identical in size to the LSI circuit.

The production of inexpensive microprocessors enabled computer engineers to develop microcomputers. Such computer systems are smaller than portable television sets but have enough computing power to perform many business, industrial, and scientific tasks. The microprocessor also permitted the development of so-called intelligent terminals, such as automatic teller machines and point-of-sale terminals employed in retail stores. The microprocessor also provides automatic control of industrial robots, surveying instruments, and various kinds of hospital equipment. It has brought about the computerization of a wide array of consumer products, including programmable microwave ovens, self-tuning television sets, and electronic games. In addition, some automobiles feature microprocessor-controlled ignition and fuel systems designed to improve performance and fuel economy.

microrecord: *see* microform.

microscope, instrument for producing enlarged images of extremely small objects. With the aid of a scanning tunneling microscope, objects as small as atoms may be seen and studied. Microscopes are indispensable in many scientific fields.

A brief treatment of microscopes follows. For full treatment, *see* MACROPAEDIA: Microscopes.

The simplest microscope comprises a single lens. Such magnifiers were in use by the mid-15th century, and by 1674 the Dutch naturalist Antonie van Leeuwenhoek had produced lenses powerful enough to enable him to observe bacteria 2–3 micrometres in diameter.

In the compound microscope an additional lens is employed to enlarge the image produced by a primary lens. This instrument was invented in the Netherlands between 1590 and 1609, but it did not come into universal use until after 1830, when the English microscopist Joseph Lister established the theoretical principles that made possible the construction of lenses free of chromatic and spherical aberration. By the end of the 19th century there were available microscopes that achieved resolution equal to the theoretical limit set by numerical aperture and the wavelengths of visible light and ultraviolet radiation.

In 1924 the French physicist Louis de Broglie showed that a beam of electrons may be considered as a form of wave motion having a much shorter wavelength than that of light. Based on that idea, the electron microscope, in which specimens are illuminated by an electron beam that is focused by an electrostatic or electromagnetic field, was developed in the 1930s. Modern electron microscopes provide detailed images at magnifications of more than 250,000. The field lenses of electron microscopes, however, suffer the same defects as do the glass lenses of optical microscopes, including chromatic and spherical aberrations. High-frequency sound waves (above the range of human hearing) have wavelengths comparable to those of visible light. This understanding led to use of sound rather than optical waves in microscopy. Although the idea dates to the 1940s, the first working acoustic microscopes were not developed until the 1970s. Because sound waves can penetrate opaque materials, acoustic microscopes are capable of providing images of the internal structures, as well as the surfaces, of many objects that cannot be viewed with an optical microscope.

The scanning tunneling microscope, introduced in the early 1980s, measures variations in an electric current that is generated between the microscope probe and the surface of a specimen. The image of the surface that is produced is of such high resolution that individual atoms can be seen.

microscopic reversibility, principle of, principle formulated about 1924 by the American scientist Richard C. Tolman that provides a dynamic description of an equilibrium condition. Equilibrium is a state in which no net change in some given property of a physical system is observable; *e.g.,* in a chemical reaction, no change takes place in the concentrations of reactants and products, although the Dutch chemist J.H. van't Hoff had already recognized that this condition results from the equality of the forward and backward rates of a reversible reaction. According to the principle of microscopic reversibility, at equilibrium there is continuous activity on a microscopic (*i.e.,* atomic or molecular) level, although on a macroscopic (observable) scale the system may be considered as standing still. There is no net change favouring any one direction, because whatever is being done is being undone at the same rate. Thus, for a chemical reaction at equilibrium, the amount of reactants being converted to products per unit time is exactly matched by the amount being converted to reactants (from products) per unit time. The principle of microscopic reversibility, when applied to a chemical reaction that proceeds in several steps, is known as the principle of detailed balancing. Basically, it states that at equilibrium each individual reaction occurs in such a way that the forward and reverse rates are equal.

Microsoft Corporation, leading developer of personal-computer software systems and applications. The company also publishes books and multimedia titles, and offers electronic mail services. It has sales offices throughout the world but does virtually all of its research and development at its corporate headquarters in Redmond, Wash., U.S.

In 1975 William H. Gates and Paul G. Allen, two boyhood friends from Seattle, converted BASIC, a popular mainframe programming language, for use on an early personal computer (PC), the Altair. Shortly afterward Gates and Allen founded Microsoft, deriving the name from the words "microcomputer" and "software." During the next few years they refined BASIC and developed other programming languages. In 1980 International Business Machines (IBM) asked Microsoft to produce the essential software, or operating system for its first personal computer, the IBM PC. Microsoft purchased an operating system from another company, modified it, and renamed it MS-DOS (Microsoft Disk Operating System). MS-DOS was released with the IBM PC in 1981. Thereafter, most manufacturers of personal computers licensed MS-DOS as their operating system, generating vast revenues for Microsoft; by the early 1990s it had sold more than 100 million copies of the program and defeated rival operating systems such as CP/M, which it displaced in the early 1980s, and later OS/2. Microsoft deepened its position in operating systems with its Windows graphical command program, whose third version, released in 1990, gained a wide following. By 1993, Windows 3.0 and its subsequent versions were selling at a rate of one million copies per month, and nearly 90 percent of the world's PCs ran on a Microsoft operating system. In 1995, the company released Windows 95, which for the first time fully integrated MS-DOS with Windows and effectively matched in ease of use Apple Computer's Macintosh OS. It also became the leader in productivity software such as word-processing and spreadsheet programs, outdistancing long-time rivals Lotus and WordPerfect in the process

Microsoft dramatically expanded its electronic publishing division, created in 1985 and already notable for the success of its multimedia encyclopaedia, *Encarta.* It also entered the information services and entertainment industries with a wide range of products and services, most notably the Microsoft Network and MSNBC (a joint venture with the National Broadcasting Company, a major American television network).

As a result, by the mid-1990s Microsoft, which became a publicly owned corporation in 1986, had become one of the most powerful and profitable companies in American history. It consistently earned profits of 25 cents on every sales dollar, an astonishing record; net income topped $2.1 billion in the company's fiscal year ending June 30, 1996. However, its rapid growth in a fiercely competitive and fast-changing industry spawned resentment and jealousy among rivals, some of whom complained that the company's practices violated U.S. laws against unfair competition. Microsoft and its defenders countered that, far from stifling competition and technical innovation, its rise had encouraged both and that its software had consistently become less expensive and more useful. A U.S. Justice Department investigation concluded in 1994 with a settlement in which Microsoft changed some sales practices that the government contended enabled the company to unfairly discourage OS customers from trying alternative programs. The following year, the Justice Department successfully challenged Microsoft's proposed purchase of Intuit, the leading maker of financial software for the PC.

Partly because of its stunning success in PC software, Microsoft was slow to realize the commercial possibilities of network systems and the Internet. In 1993 it released Windows NT, a landmark program that tied disparate PCs together and offered improved reliability and network security. Sales were initially disappointing, but by 1996 Windows NT was hailed as the likely standard for PC networking, challenging Novell's NetWare. Microsoft did not move into Internet software until a new venture, Netscape, Inc., had introduced Navigator, a Web "browser" program that simplified the once-arcane process of navigating the World Wide Web. In a violent change of course, Microsoft quickly developed its own browser, Internet Explorer, made it free, and moved aggressively to persuade computer makers and Internet service providers to exclusively distribute it. By 1996 Microsoft was bundling Explorer with Windows OS and had begun the process of integrating Explorer directly into Windows. In response, Netscape accused Microsoft of violating its 1995 consent decree and sued; these efforts helped to persuade the U.S. Department of Justice to reopen a broad investigation of Microsoft.

In 1999, following a trial that lasted 30 months, a judge found Microsoft in violation of the Sherman Antitrust Act and ordered the breakup of the company. In 2001 an appeals court overturned the breakup order but still found the company guilty of illegally trying to maintain a monopoly.

microsporidian, any parasitic protozoan of the phylum Microsporidia (Microspora), found mainly in cells of the gut epithelium of insects and the skin and muscles of fish. They also occur in annelids and some other invertebrates. Infection is characterized by enlargement of the affected tissue.

Microsporidians have minute spores (2 to 20 micrometres, or 0.00008 to 0.0008 inch) that contain a single polar filament and the infective parasite (sporoplasm). When spores are ingested by a new host, the organisms enter the gut epithelium and reach specific tissues through the bloodstream or the body cavity. In the host cells they grow and repeatedly divide asexually. The mature parasites (trophozoites) eventually give rise to sexually produced zygotes that produce new spores. The species *Nosema bombycis* causes the disease pébrine in silkworms (*see* Nosema).

microsurgery, also called MICROMANIPULATION, or MICRURGY, the specialized surgical technique of observing through a compound microscope when operating on minute structures of the human body. Microsurgery has made possible significant advances in surgery on humans, especially in delicate operations on the inner ear, eye, brain, and nerve fibres and small blood vessels in general. The technique also has applications in research on cells, cell constituents, and embryos and is used in various other biomedical areas of study.

In microsurgery, the surgeon observes the body structure he is operating on through a microscope rather than by gazing directly at it. Some operating microscopes are equipped with television cameras so the progress of the operation can be observed on a television monitor. An entire repertoire of tiny precision instruments has been developed for use in microsurgery.

Micromanipulative techniques were first applied to surgery in the 1920s for use on the delicate bones of the inner ear. The techniques had been expanded by the 1950s to include surgery on tiny blood vessels and nerve strands. Microsurgery has made possible operations that otherwise simply could not be performed. Most dramatically, severed limbs or digits can be reattached to the body through the microsurgically guided reconnection of severed muscles, tendons, blood vessels, and nerve fibres. Repairs of the eye's retina, the removal of previously inaccessible tumours from the brain and spinal cord, and a host of other feats can also be performed.

microtonal music, music using tones that are not an exact number of semitones (half steps) apart. The smallest interval between two keys on a piano (*e.g.,* between B and C, F and F♯, A♭ and A) is the semitone, an interval also measured as 100 "cents." There are thus 12 equal semitones, or 1,200 cents, to the octave.

Much of the world's music, however, of both past and present times, uses intervals greater or smaller than 100 cents. In music not derived from the western European artistic traditions of the past 300 years or so, microtonal intervals often result from the use of tones that, in intonation, are close to the tones of the natural harmonic series (a sequence of overtones faintly audible above a fundamental note), an intonation not found in the tones of the piano. The Hindu scale divides the octave into 22 intervals, and most East Asian music has a tonal vocabulary of 12 tones generated in a cycle of fifths.

Some Western composers and music theorists have assumed as a starting point the octave as divided into 12 equal semitones of 100 cents each and have suggested the use of microtonal intervals derived from it—*e.g.,* intervals of a quarter tone (50 cents), sixth tone (33.3 cents), 12th tone (16.7 cents), and 16th tone (12.5 cents). In this last case, the octave would consist of 96 equal divisions, and the modern semitone would equal eight of them in sequence; *e.g.,* between B and C would lie eight equal 16th-tone intervals.

Even in Western music, microtonal intervals of one sort or another appear to have been used at least from the time of the ancient Greeks onward; many theorists of the past have written about microtonal music in either observing musical practices of their time or making speculative suggestions for composers to take up. Among the better-known modern composers of microtonal music are Charles Ives, Harry Partch, Julián Carrillo, Alois Hába, and Krzysztof Penderecki.

microtubule, fine, membrane-bounded tubular structure of indefinite length, found within animal and plant cells. Microtubules have several functions. They help give shape to many cells and are major components of cilia and flagella (cellular locomotory projections). They participate in the formation of spindle fibres during cell division (mitosis). They also assist the flow of materials from the cell bodies of nerve cells toward the ends of those cells' axons.

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microwave, electromagnetic radiation having a frequency within the range of 1 gigahertz to 1 terahertz (10^9–10^{12} cycles per second) and a wavelength between 1 mm and 1 m.

microwave oven, also called ELECTRONIC OVEN, appliance that cooks food by means of high-frequency electromagnetic waves called microwaves. A microwave oven is a relatively small, boxlike oven that raises the temperature of food by subjecting it to a high-frequency electromagnetic field. The microwaves are absorbed by water, fats, sugars, and certain other molecules, whose consequent vibrations produce heat. The heating thus occurs inside the food, without warming the surrounding air; this greatly reduces cooking time, and baking and other cooking tasks that require hours in a conventional oven can be completed in minutes in a microwave oven. Microwave ovens generate radiation at a frequency of about 2,450 megahertz by means of a magnetron, which is a kind of electron tube.

Since the heating occurs by an absorption process, microwave ovens tend to cook certain foods unevenly or at different rates. For example, moist foods cook faster than less moist ones, and moist outer layers tend to absorb most of the radiation before it can reach inner sections, which remain uncooked. Microwave ovens also cannot brown or crisp foods on the outside. Most types of glass, Styrofoam (trademark), polyethylene, paper, and similar materials do not absorb the microwaves and hence do not heat up. Foods cannot be cooked in metal vessels in a microwave oven, however, because the metal blocks out the microwaves. Microwave ovens are subject to safety standards that ensure minimal levels of radiation leakage from them, and no significant health hazards are associated with such leakages.

Mictlantecuhtli, stone figure of Totonac origin from the Remojadas region, Mexico, *c.* AD 900; in the Museum of Anthropology, Jalapa, Mexico

By courtesy of the Museo Nacional de Antropologia, Mexico City

Mictlantecuhtli, Aztec god of the dead, usually portrayed with a skull face. With his wife, Mictecacíhuatl, he ruled Mictlan, the underworld. The souls of those whose manner of death failed to call them to various paradises (*i.e.,* for those dead by war, sacrifice, childbirth, drowning, lightning, and certain diseases) made a four-year journey, fraught with trials, through the nine hells of Mictlan. In the last, where Mictlantecuhtli dwelt, they disappeared or found rest.

Mičurinsk (Russia): *see* Michurinsk.

Mid-Atlantic Ridge, submarine ridge lying along the north-south axis of the Atlantic Ocean; it occupies the central part of the basin between a series of flat abyssal plains that continue to the margins of the continental coasts. The Mid-Atlantic Ridge is in effect an immensely long mountain chain extending for about 10,000 miles (16,000 km) in a curving path from the Arctic Ocean to near the southern tip of Africa. The ridge is equidistant between the continents on either side of it. The mountains forming the ridge reach a width of 1,000 miles. These mountains sometimes reach above sea level, thus forming the islands or island groups of the Azores, Ascension, St. Helena, and Tristan da Cunha, among others.

Running along the crest of the Mid-Atlantic Ridge is a long valley about 50 to 75 miles (80 to 120 km) wide. This rift contains the zone of seafloor spreading, in which molten magma from beneath the Earth's crust continuously wells up, cools, and is progressively pushed away from the ridge's flanks. This phenomenon is evinced by the fact that the crustal material on either side of the Mid-Atlantic Ridge is notably younger than that farther away from the ridge. Because of seafloor spreading, the movement of the ocean floor and of the continents outward from the ridge is resulting in an increasing widening of the Atlantic Basin at about 1 to 10 cm (0.5 to 4 inches) a year. Apart from seafloor spreading, the Mid-Atlantic Ridge is also the site of volcanic activity and earthquakes along part of its length.

Mid Bedfordshire, district, administrative county of Bedfordshire, south-central England. The district lies almost entirely within the historic county of Bedfordshire, but a small area north of Sandy belongs to the historic county of Cambridgeshire. Predominantly rural, Mid Bedfordshire extends across a broad valley within the River Ouse catchment basin and is crossed by a low ridge oriented northeast to southwest. The eastern half of the district is a principal market gardening area for Greater London. The sandy soils in the eastern part of Mid Bedfordshire are intensively cultivated with brussels sprouts, potatoes, and peas around the market parishes of Biggleswade, Sandy, Potton, and Maulden. Wheat and barley are also grown, and dairy cattle are raised in the district. Brick making constitutes an important economic activity in the northwest, where there are heavy clay beds. Woburn Abbey in the southwest is an 18th-century mansion that was built on the former site of a Cistercian abbey. Biggleswade and Ampthill are the administrative centres of the district. Area 195 square miles (504 square km). Pop. (1998 est.) 123,000.

Mid Devon, district, administrative and historic county of Devon, southwestern England, located between the bleak moorlands of Exmoor and Dartmoor. Mid Devon is a heavily dissected interior plateau 400 to 800 feet (120 to 245 m) in elevation. It has variable soil types suited for grassland cultivation, except in the south-central area where the merging Exe, Culm, and Yeo river valleys are cultivated with cereals, potatoes, fodder crops, and early-season vegetables. Large numbers of sheep and dairy and beef cattle are grazed throughout the district. Tiverton, the district seat on the River Exe, was one of the first settlements established by the Anglo-Saxons after their 7th-century conquest of southwestern England. Tiverton became a major centre of the woolen trade (both kerseys and worsteds) between the mid-14th and early 19th century. The contemporary town continues to be a textile centre, manufacturing elastic nets and woven nylon as well as lace. Area 353 square miles (915 square km). Pop. (1998 est.) 67,400.

Mid Glamorgan, former county (1974–96) of South Wales. The region is now incorporated into the unitary council areas of Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Rhondda Cynon Taff, and Vale of Glamorgan.

Mid-Indian Ridge, submarine ridge of the Indian Ocean that is connected to the Mid-Atlantic Ridge; both are segments of the worldwide mid-oceanic ridge system. Entering the Indian Ocean from the South Atlantic, the Mid-Indian Ridge extends north to a point near Rodrigues Island, where it divides into two parts: one segment continues northward toward the Gulf of Aden, where it connects with the East African Rift System; the second branch extends southeast toward the Macquarie Islands. Between the Gulf of Aden and Rodrigues Island, the Mid-Indian Ridge bears the name Carlsberg Ridge. The ridge is associated with a belt of earthquake epicentres and, hence, is seismically active. This fact is further observed in its rough relief and thin sediment cover.

Mid Suffolk, district, administrative and historic county of Suffolk, southeastern England. It occupies the central part of the county and is mainly an agricultural area of low, rolling hills. Cereals, sugar beets, cattle, and pigs are intensively raised. The district contains many small villages and medieval churches. Stowmarket, Mid Suffolk's principal market town, lies 12 miles (19 km) northwest of Ipswich; it also has a light industrial base. The small community of Needham Market is the administrative centre. Area 336 square miles (871 square km). Pop. (1998 est.) 81,900.

Mid Sussex, district, administrative county of West Sussex, historic county of Sussex, southeastern England. It occupies an area in central Sussex. Mid Sussex extends from The Weald, a sandstone area of hilly grasslands and woodlands in the north, across undulating grasslands of the Ouse and Adur river valleys in the centre, to the steep chalk scarps of the north-facing South Downs in the extreme south, inland from the English Channel. Haywards Heath, the district seat, and Burgess Hill, both commuter stops on the Brighton-to-London railway, are residential centres with a light-industrial base. The town (parish) of East Grinstead in The Weald is an older market centre and suburban community that also has a light-industrial base. Mixed farming occurs throughout the district. Area 129 square miles (333 square km). Pop. (1998 est.) 127,100.

Midas, in Greek and Roman legend, king known for his foolishness and greed. The stories of Midas, part of the Dionysiac cycle of legends, were first elaborated in the gay burlesques of the Athenian satyr plays. The tales are familiar to modern readers through the late classical versions, such as those in Ovid's *Metamorphoses.*

According to the myth, Midas captured Silenus, the satyr and companion of the god Dionysus. For his kind treatment of Silenus Midas was rewarded by Dionysus with a wish. The king wished that all he touched might turn to gold, but when his food became gold and he nearly starved, he realized his error. Dionysus then granted him release by having him bathe in the Pactolus River (in modern Turkey), an action to which the presence of alluvial gold in that stream is attributed.

In another story the king was asked to judge a musical contest between Apollo and the satyr Marsyas. When Midas decided against Apollo, the god changed his ears into those of an ass. Midas concealed them under a turban and made his barber swear to tell no living soul. The barber, bursting with his secret, whispered it into a hole in the ground. He filled in the hole, but reeds grew from the spot and broadcast the sibilant secret—"Midas has ass's ears"—when the wind blew through them.

Midas (fl. 700 BC?), king of Phrygia (an ancient district in west-central Anatolia), first mentioned in extant Greek literature by Herodotus as having dedicated a throne at Delphi, before Gyges—*i.e.,* before or little after 700 BC. Later reports that he married a daughter of Agamemnon, king of Aeolic Cyme, and that Midas, or Midacritus, traded with a western Tin Island, suggest the picture of a real king with commercial interests. The name Midas appears on the facade of one of the great rock-cut monuments of the upper Sangarius (Sakarya) region (in present-day northwestern Turkey); and before 700 BC Assyrian troops fought in the Taurus region (in southern Turkey) with the troops of "Mita of Mushki," probably the same Midas, known there as king of a more easterly people, the Moschi (the biblical Meshech).

The name Midas was probably dynastic, alternating in Phrygia with Gordieus. Both names are perpetuated in those of towns near the upper Sangarius, "Midas city" (Midaeion, or Midaeum) being about 60 miles (97 km) west of the more famous Gordium.

Middelburg, *gemeente* (commune) and capital, Zeeland *provincie,* southwestern Netherlands, on the former Walcheren Island. Named for its central position on the island, Middelburg was a flourishing medieval town that traded in wine and cloth and that later prospered through the activities of the Dutch East India Company. It was one of the first towns captured by the Sea Beggars (Dutch insurgents against Spain) in 1574. It was inundated during World War II, but most of the damage has been repaired. Tourism and metal and textile industries are the main sources of income. Landmarks (all restored since 1945) include the town hall (about 1512); the Abbey of St. Nicholas (founded 1150), now the seat of the provincial government; and the 16th-century New Church. Pop. (1999) 44,481.

middle age, period of human adulthood that immediately precedes the onset of old age. Though the age period that defines middle age is somewhat arbitrary, differing greatly from person to person, it is generally defined as being between the ages of 40 and 60. The physiological and psychological changes experienced by a middle-aged person centre on the gradual decline of physical abilities and the awareness of mortality. In middle age, the relative potencies of past, present, and future are altered as the individual increasingly directs effort to the process of reminiscence and recollection of the past, rather than anticipation of the future. If approached constructively, middle age can prepare an individual for a satisfying and productive old age. *See also* psychological development.

Middle Ages, the period in European history from the collapse of Roman civilization in the 5th century AD to the period of the Renaissance (variously interpreted as beginning in the 13th, 14th, or 15th century, depending on the region of Europe and on other factors). The term and its conventional meaning were introduced by Italian humanists, who were engaged in a revival of classical learning and culture, and the notion of a thousand-year period of darkness and ignorance separating them from the ancient Greek and Roman world served to highlight the humanists' own work and ideals. In a sense, the humanists invented the Middle Ages in order to distinguish themselves from it. The Middle Ages nonetheless provided the foundation for the transformations of the humanists' own Renaissance.

A brief treatment of the Middle Ages follows. For full treatment, *see* MACROPAEDIA: European History and Culture.

The sack of Rome by Alaric the Visigoth in AD 410 had enormous impact on the political structure and social climate of the Western world, for the Roman Empire had provided the basis of social cohesion for most of Europe. Although the Germanic tribes that forcibly migrated into southern and western Europe in the 5th century were ultimately converted to Christianity, they retained many of their customs and ways of life; the changes in forms of social organization they introduced rendered centralized government and cultural unity impossible. Many of the improvements in the quality of life introduced by the Romans, such as a relatively efficient agriculture, extensive road networks, water-supply systems, and shipping routes, decayed substantially, as did artistic and scholarly endeavours. This decline persisted throughout the period of time sometimes called the Dark Ages (also called Late Antiquity, or the Early Middle Ages), from the fall of Rome to about AD 1000, with a brief hiatus during the flowering of the Carolingian court established by Charlemagne. Apart from that interlude, no large kingdom arose in Europe to provide stability. The only force capable of providing a basis for social unity was the Roman Catholic church. The Middle Ages therefore present the confusing and often contradictory picture of a society trying to structure itself politically on a spiritual basis. This attempt came to an end with the rise of artistic, commercial, and other activities anchored in the secular world in the period just preceding the Renaissance.

After the dissolution of the Roman Empire, the idea arose of Europe as one large church-state, called Christendom. Christendom was thought to consist of two distinct groups of functionaries, the sacerdotium, or ecclesiastical hierarchy, and the imperium, or secular leaders. In theory these two groups complemented each other, attending to people's spiritual and temporal needs, respectively. Supreme authority was wielded by the pope in the first of these areas and by the emperor in the second. In practice the two institutions were constantly sparring, disagreeing, or openly warring with each other. The emperors often tried to regulate church activities by claiming the right to appoint church officials and to intervene in doctrinal matters. The church, in turn, not only owned cities and armies but often attempted to regulate affairs of state.

During the 12th century a cultural and economic revival took place; many historians trace the origins of the Renaissance to this time. The balance of economic power slowly began to shift from the region of the eastern Mediterranean to western Europe. The Gothic style developed in art and architecture. Towns began to flourish, travel and communication became faster, safer, and easier, and merchant classes began to develop. Agricultural developments were one reason for these developments; during the 12th century the cultivation of beans made a balanced diet available to all social classes for the first time in history. The population therefore rapidly expanded, a factor that eventually led to the breakup of the old feudal structures.

The 13th century was the apex of medieval civilization. The classic formulations of Gothic architecture and sculpture were achieved. Many different kinds of social units proliferated, including guilds, associations, civic councils, and monastic chapters, each eager to obtain some measure of autonomy. The crucial legal concept of representation developed, resulting in the political assembly whose members had *plena potestas*—full power—to make decisions binding upon the communities that had selected them. Intellectual life, dominated by the Roman Catholic church, culminated in the philosophical method of Scholasticism, whose preeminent exponent, St. Thomas Aquinas, achieved in his writings on Aristotle and the Church Fathers one of the greatest syntheses in Western intellectual history.

The breakup of feudal structures, the strengthening of city-states in Italy, and the emergence of national monarchies in Spain, France, and England, as well as such cultural developments as the rise of secular education, culminated in the birth of a self-consciously new age with a new spirit, one that looked all the way back to classical learning for its inspiration and that came to be known as the Renaissance.

Middle America, the isthmian tract between the southern Rocky Mountains and the northern tip of the Andes (or, generally, from the southern border of the United States to the northern border of Colombia), marking the territory transitional from North America to South America. The difference between this designation and "Central America" is that Middle America includes Mexico and the Caribbean islands.

Middle America Trench, submarine depression in the Pacific Ocean off the western coast of Central America. Extending northwest-southeast for more than 1,700 miles (2,750 km) from central Mexico to Costa Rica, the trench reaches a maximum depth of 21,880 feet (6,669 m) and covers a total area of 37,000 square miles (96,000 square km). The shallower northern section of the trench tends to curve along the coast of Mexico, paralleling the break in the continental shelf, while the deeper southern section follows a more linear course. The southern section of the trench is usually associated with active volcanism on land, as, for example, the eruption in 1982 of El Chichón volcano in southern Mexico; the trench floor in this area is relatively irregular.

Middle Anglia, a province of Anglo-Saxon England lying between East Anglia and Mercia. It certainly comprised the basins of the Nene, Welland, and Great Ouse, with the districts west of the fens and probably extended into present Oxfordshire. Parts of the area were settled early, but nothing is known of its political history until 653, when it was subject to Mercia, under the rule of Penda's son, Peada. St. Guthlac, who was born there, belonged to the Mercian royal family. Peada introduced Christianity, but no permanent see was created until 737, when one was established at Leicester. St. Wilfrid administered the province in his exile of 691–705.

The province contained the religious foundations of Peterborough, Ely, Oundle, and Crowland.

Middle Atlas (mountains, Morocco): *see* Moyen Atlas.

Middle Comedy, style of drama that prevailed in Athens from about 400 BC to about 320 BC. Preoccupied with social themes, Middle Comedy represents a transition from Old Comedy, which presented literary, political, and philosophical commentary interspersed with scurrilous personal invective, to New Comedy, with its gently satiric observation of contemporary domestic life. Aristophanes' last play, the *Plutus,* is an extant work that reflects this transition. Antiphanes and Alexis were preeminent Middle Comedy dramatists, but none of their plays has survived.

middle-distance running, in athletics (track and field), races that range in distance from 800 m (roughly one-half mile) to 3,000 m (almost 2 miles). In international competitions, middle-distance races include the 800 m, the 1,500 m (the metric mile), and the 3,000 m (a steeplechase event for men, but a regular run for women). In English-speaking countries, until the second half of the 20th century, the 880 yards (half mile) and the mile were run as the equivalents of the 800 m and the 1,500 m.

Middle-distance races are set apart from the sprint (dash) races of 200 m (about 650 feet) or less by the pacing required; dashes are run at top speed the entire length of the race, whereas middle-distance races require that the athletes maintain a plateau pace that allows for a final spurt of speed, or kick.

An early favourite among middle-distance races was the mile, which in the first half of the 20th century was run in times exceeding four minutes. Breaking the "four-minute barrier" was considered unlikely. On May 6, 1954, however, the 25-year-old Roger Bannister of Great Britain set a record of 3 min 59.4 s in a dual meet at Oxford. With increasingly controlled climatic and surface conditions and increasingly accurate timing devices, however, the record was lowered many times thereafter. *See* Sporting Record: *Athletics. See also* Olympic Games.

Middle East, the lands around the southern and eastern shores of the Mediterranean Sea, extending from Morocco to the Arabian Peninsula and Iran and sometimes beyond. The central part of this general area was formerly called the Near East, a name given to it by some of the first modern Western geographers and historians, who tended to divide the Orient into three regions. Near East applied to the region nearest Europe, extending from the Mediterranean Sea to the Persian Gulf; Middle East, from the Gulf to Southeast Asia; and Far East, those regions facing the Pacific Ocean.

The change in usage began to evolve prior to World War II and tended to be confirmed during that war, when the term Middle East was given to the British military command in Egypt. Thus defined, the Middle East consisted of the states or territories of Turkey, Cyprus, Syria, Lebanon, Iraq, Iran, Palestine (now Israel), Jordan, Egypt, The Sudan, Libya, and the various states of Arabia proper (Saudi Arabia, Kuwait, Yemen, Oman, Bahrain, Qatar, and the Trucial States, or Trucial Oman [now United Arab Emirates]. Subsequent events have tended, in loose usage, to enlarge the number of lands included in the definition. The three North African countries of Tunisia, Algeria, and Morocco are closely connected in sentiment and foreign policy with the Arab states. In addition, geographic factors often require statesmen and others to take account of Afghanistan and Pakistan in connection with the affairs of the Middle East.

Occasionally Greece is included in the compass of the Middle East because the Middle Eastern (then Near Eastern) question in its modern form first became apparent when the Greeks rose in rebellion to assert their independence of the Ottoman Empire in 1821 (*see* Eastern Question). Turkey and Greece, together with the predominantly Arabic-speaking lands around the eastern end of the Mediterranean, were also formerly known as the Levant (*q.v.*).

Use of the term Middle East, nonetheless, remains unsettled, and some agencies (notably the United States State Department and certain bodies of the United Nations) still employ the term Near East.

Middle English language, the vernacular spoken and written in England from about 1100 to about 1500, the descendant of the Old English language and the ancestor of Modern English.

The history of Middle English is often divided into three periods: (1) Early Middle English, from about 1100 to about 1250, during which the Old English system of writing was still in use; (2) the Central Middle English period from about 1250 to about 1400, which was marked by the gradual formation of literary dialects, the use of an orthography greatly influenced by the Anglo-Norman writing system, the loss of pronunciation of final unaccented *-e,* and the borrowing of large numbers of Anglo-Norman words; the period was especially marked by the rise of the London dialect, in the hands of such writers as John Gower and Geoffrey Chaucer; and (3) Late Middle English, from about 1400 to about 1500, which was marked by the spread of the London literary dialect and the gradual cleavage between the Scottish dialect and the other northern dialects. During this period the basic lines of inflection as they appear in Modern English were first established. Among the chief characteristic differences between Old and Middle English were the substitution of natural gender in Middle English for grammatical gender and the loss of the old system of declensions in the noun and adjective and, largely, in the pronoun.

The dialects of Middle English are usually divided into three large groups: (1) Southern (subdivided into Southeastern, or Kentish, and Southwestern), chiefly in the counties south of the River Thames; (2) Midland (corresponding roughly to the Mercian dialect area of Old English times) in the area from the Thames to southern South Yorkshire and northern Lancashire; and (3) Northern, in the Scottish Lowlands, Northumberland, Cumbria, Durham, northern Lancashire, and most of Humberside and West and North Yorkshire.

Middle Himalayas (Asia): *see* Lesser Himalayas.

Middle Passage, in the days of the African slave trade to the New World, the middle part of the slave's journey—*i.e.,* the crossing of the Atlantic Ocean. From about 1518 to the mid-19th century, millions of African men, women, and children made the 21–90-day voyage aboard grossly overcrowded sailing ships manned by crews mostly from Great Britain, the Netherlands, Portugal, and France. Slaver captains anchored chiefly off the Guinea Coast for a month to a year to gather their cargoes of from 150 to 600 persons. Then began a long period of continuous danger, with raids at port by hostile tribes, threats of slave mutiny, epidemics, attack by pirates or enemy ships, and bad weather. During the Middle Passage, male slaves were kept constantly shackled to each other or to the deck to prevent mutiny, of which 55 detailed accounts were recorded between 1699 and 1845.

So that the largest possible cargo might be carried, the captives were wedged horizontally, spoon fashion, with 6 feet by 16 inches (183 by 41 cm) being the average space allotted per person. Unable to stand erect or turn over, many slaves died in this position. If bad weather or equatorial calms prolonged the journey, the twice-daily ration of water plus either boiled rice, millet, cornmeal, or stewed yams was greatly reduced, resulting in near starvation and attendant illnesses. In the daytime, weather permitting, captives were brought on deck for exercise or for "dancing the slaves" (forced jumping up and down). At this time, conscientious captains insisted that the sleeping quarters be scraped and swabbed by the crew; but in bad weather the oppressive heat and noxious fumes in the unventilated and unsanitary holds caused fevers and dysentery, with a high mortality rate. Deaths during the Middle Passage, caused by epidemics, suicide, "fixed melancholy," and mutiny, have been estimated at 13 percent. So many bodies of dead or dying Africans were jettisoned into the ocean that sharks regularly followed the slave ships on their westward journey.

The Middle Passage supplied the New World with its major work force and brought enormous profits to international slave traders. At the same time, it exacted a terrible price in physical and emotional anguish on the part of the uprooted Africans; it was distinguished by the callousness to human suffering it developed among the traders.

Middle Rhine Highlands, also called RHENISH SLATE MOUNTAINS, German RHEINISCHES SCHIEFERGEBIRGE, mountainous highlands lying mainly in northwestern Germany but also extending westward as the Ardennes through southeastern Belgium and northern Luxembourg, with an overlap into eastern France beyond the Meuse River. The Highlands form a greatly varied plateau with areas of rugged relief, as in the Eifel and the Rothaargebirge in the region of Sauerland, though these nowhere exceed 3,000 feet (900 m). Other highlands include the Taunus, the Hunsrück south of the Mosel River, and the Westerwald.

Although slates and sandstones are the main rocks, there are volcanic outcrops and considerable areas of limestone where the relief is smoother, the soils more fertile, and the land more densely settled. The plateau is dissected by the gorge of the Rhine River and the deep meanders of its tributaries (notably, the Mosel), and in the western portion the Meuse River flows from south to north. *See also* Ardennes (plateau).

Middle Stone Age: *see* Mesolithic period.

Middle Way, Sanskrit MADHYAMA-PRATIPADĀ, Pāli MAJJHIMA-PATIPADĀ, in Buddhism, complement of general and specific ethical practices and philosophical views that are said to facilitate enlightenment by avoiding the extremes of self-gratification on one hand and self-mortification on the other. *See* Eightfold Path.

Middle West, also called MIDWEST, or NORTH CENTRAL STATES, region, northern and central United States, lying midway between the Appalachian and Rocky mountains and north of the Ohio River and the 37th parallel. The Middle West, as defined by the federal government, comprises the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. Actually composed of two regions, the Northwest Territory, or the Old Northwest, and the Great Plains, the Middle West has become more an idea than a region: an area of immense diversity but somehow consciously representative of a national average.

The Northwest Territory entered the United States in 1783 at the conclusion of the American Revolution and was organized under a series of ordinances that set the precedent for the admission of future territories into the Union. The Great Plains entered the United States in 1803 as part of the Louisiana Purchase. The Plains were to develop primarily agriculturally, but the Northwest Territory, blessed with both fertile soil and valuable natural resources (coal, oil, iron ore, and limestone), would develop both industrially and agriculturally.

Emerging transportation arteries, first canals and then railroads, linked the Middle West with Eastern markets and firmly established it as part of the industrially expanding North, thus concluding a process begun in 1787 when slavery was outlawed in the Northwest Territory. The region was not without its Southern sympathizers, however, as a number of its settlers, particularly in the Ohio River valley, had migrated from the South; but the Middle West was to give to the brewing sectional crisis not only a new political party (the Republicans) that was devoted to the nonextension of slavery but also two of the Union's staunchest defenders: Abraham Lincoln and Stephen A. Douglas.

After the American Civil War, the growth experienced by the Middle West was dramatic. Transportation, immigration, and industrialization all played a part. By 1890 Chicago, not even 60 years old, had become the second largest city in the country, and the Middle West accounted for 29 percent of the country's manufacturing employment and nearly one-third of its value added by manufacture. The Great Plains, however, developed more slowly. Westward migration tended to skip the Plains for the West Coast, and it was not until the late 1800s, when most American Indians had been subjugated, barbed-wire fencing had been introduced, and railroads had penetrated the interior, that the Plains experienced rapid settlement by farmers, ranchers, and tradesmen.

The influence of the Middle West on national life has been significant. In the 1870s, it was the main area of activity of the Granger movement and a hotbed of labour agitation. It provided some of the most prominent figures of the Progressive movement and was home for many of America's most famous industrial giants. It was an innovator in architecture and retailing, a potent force in the settlement-house movement, a centre of temperance activity, and an inspiration to a new school of naturalistic writers.

Unique in American life, the Middle West has fused the raw and expansive muscle of an urban industrial establishment with the sturdy conservatism of a rural hinterland. But like its neighbours to the northeast, the Middle West's growth rate has lagged behind that of the country as a whole.

Despite regional economic shifts adverse to the Middle West, the region has continued to be the most important economic region in the country, leading all other sections in value added by manufacture and in total value of farm marketings.

Middlebury, town ("township"), seat of Addison county, west-central Vermont, U.S. The area was granted in 1761, together with Salisbury and New Haven, and named for its location midway between the other two. Settled in 1773 by Benjamin Smalley, the settlement was temporarily abandoned (1778–83) because of Tory and Indian attacks. Middlebury College (noted for its summer Writers' Conference) was chartered in 1800, and the Congregational Church in the town was built in 1806–09. Vermont's marble-quarrying industry began there in 1803, but only light manufacturing has succeeded it; recent business growth has centred on ski and summer resort development. The famous Morgan horses are bred at a nearby farm, managed by the University of Vermont. Pop. (1990) 8,034.

Middlesboro, officially MIDDLESBOROUGH, city, Bell county, southeastern Kentucky, U.S. It lies in a valley at the western end of the Cumberland Gap near where the borders of Kentucky, Tennessee, and Virginia meet. Despite its location on the old Wilderness Road through a natural pass in the mountains, the site was not settled until 1889. It was developed by English investors as an iron and steel centre and named after Middlesbrough (now Teesside), Yorkshire, Eng. Their company went bankrupt, however, when the London bank Baring Brothers and Company failed in 1893. The city eventually recovered as a centre for the important eastern Kentucky coalfields. Middlesboro is also a trade centre for tobacco and cattle. Industries include tanning, food processing, and the manufacture of plastic pipe, elastic webbing, and mobile homes. It is a tourist gateway to the Cumberland Gap National Historic Park to the east. Kentucky Ridge State Forest is north, and Fern Lake, with a wild-game sanctuary, is south. Inc. 1890. Pop. (1990) 11,328.

Middlesbrough, district (borough), county of Cleveland, England, with an area of 21 square miles (54 square km). It is situated on the south bank of the River Tees, at the head of its estuary, 7 miles (11 km) from the North Sea.

When the Stockton and Darlington Railway was extended east of Stockton in 1830 to the site where Joseph Pease had acquired land to develop a new coal-exporting port, Middlesbrough came into being; it was the first town in England to owe its existence to a railway. The new town was laid out on a regular grid on a site of 32 acres (13 hectares) alongside the new port. The impetus given by the coal trade was reinforced in spectacular fashion after 1850 by the discovery of ironstone on nearby Eston Beacon, and blast furnaces and ironworks crowded into Middlesbrough and adjacent sites alongside the Redcar Railway (1846).

Primary metallurgy has left Middlesbrough for spacious estuary sites farther east, but Middlesbrough retains important heavy engineering works. Its dock (1843) still handles general cargo, and some new lighter industries, including telephone equipment, have diversified its industrial employment.

As the industrial conurbation has extended, Middlesbrough has become the focus of its organization. Additional roads and bridges have been built across the river at Middlesbrough (one in 1976), and the town has emerged as the commercial and cultural capital of Cleveland. The shopping centre lies south of the old town of 1830, and Riverside Park occupies industrial sites in the former Ironmasters' District. Pop. (1986 est.) 144,300.

Middlesex, ancient county of England, most of which, for local government purposes, became part of Greater London in 1965.

The River Thames was the key to the history of Middlesex. From about 8000 BC, traders and settlers used the Thames as their waterway. Earliest settlements established are of the Iron Age (*c.* 500 BC) at sites at Brentford and Heathrow. In the 1st century BC, Belgic tribes had established themselves in southeastern England, and Middlesex formed part of the Catuvellauni territory. The Romans established stations at what became Staines and Brentford. In the early 5th century the Saxons began to colonize the area. Positioned as it was between the East and West Saxons, the region soon obtained its modern name (meaning "middle Saxons"); the earliest written record of it is in the form *Middelseaxan,* in a charter of 704.

From early times, Middlesex was dominated by the City of London, which in the 12th century obtained the right of appointing the sheriff of the county. It was for centuries the county retreat of royalty and wealthy London merchants. The most outstanding building is the royal palace of Hampton Court; other mansions include Osterley, Syon, and Swakeleys.

In 1888, Middlesex lost 50 sq mi (130 sq km) and 2,500,000 inhabitants to the county of London; and the administrative county of Middlesex was set up. Middlesex acquired its own sheriff, and the site of the Guildhall in Parliament Square, Westminster, was deemed still in the county of Middlesex for the purpose of holding sessions of the peace.

Nine of the 32 London boroughs established (April 1, 1965) under the 1963 London Government Act were created wholly or in part from former Middlesex authorities, namely, Hounslow, Hillingdon, Ealing, Brent, Harrow, Haringey, Enfield, Richmond upon Thames, and Barnet. The urban districts of Staines and Sunbury-on-Thames were transferred to Surrey, and Potters Bar to Hertfordshire. Under the Administration of Justice Act (1964) the Middlesex area of Greater London is deemed a county for purposes of law. The name Middlesex continues to be used for postal districts and in the names of many county institutions and organizations.

Middlesex, Lionel Cranfield, 1st earl of (b. 1575—d. 1645), lord treasurer of England under King James I (ruled 1603–25). Although most historians regard him as James's most competent finance minister, he fell from power because his efforts at economy offended all factions in the government.

Middlesex, detail of a painting by Daniel Mytens; in the collection of Lord Sackville

By courtesy of Lord Sackville; photograph, Courtauld Institute Galleries, London

Cranfield spent his early career as a London merchant and financier. In 1612 he became acquainted with the lord privy seal, Henry Howard, earl of Northampton, and through Northampton's patronage, he was made surveyor general of the customs (1613).

After Northampton's death in 1614, Cranfield attached himself to the royal favourite, George Villiers, who eventually became the powerful duke of Buckingham. By 1620 Buckingham had found Cranfield a position on the privy council, where he quickly acquired a reputation as a financial reformer, though he was unsuccessful in his warnings to James I about the dangers of monopolies. Cranfield became lord treasurer in 1621 and a year later was created earl of Middlesex.

As minister in charge of finances, Middlesex was somewhat successful in increasing the King's revenues, but he soon alienated both James and Buckingham by his attempts to reduce royal expenditures. He opposed war with Spain on financial grounds, and, as a consequence, a prowar Parliament led by Buckingham and Prince Charles (later King Charles I) impeached him in 1624. Cranfield warned Buckingham of the dangers of such a precedent and told the Prince that he would one day "have his belly full of Parliaments." Found guilty of maladministration and corruption, Middlesex was fined and temporarily imprisoned. He spent the rest of his life in retirement, receiving a full pardon from King Charles I in 1626. See R.H. Tawney, *Business and Politics Under James I: Lionel Cranfield As Merchant and Minister* (1958), and Menna Prestwich, *Cranfield* (1966).

Middleton, Arthur (b. June 26, 1742, near Charleston, S.C.—d. Jan. 1, 1787, Goose Creek, S.C., U.S.), British American planter, legislator, signer of the Declaration of Independence, and one of the leaders in the controversies leading up to the American Revolution (1775–83).

Arthur Middleton, detail of an engraving by J.B. Longacre after a portrait by B. West

By courtesy of the Library of Congress, Washington, D.C.

After completing his education in England, Middleton returned to South Carolina in 1763 and was elected to the colonial legislature. In 1775–76 he was a member of the Council of Safety, a committee that directed leadership for the colony's preparations for revolution. He served on the legislative committee that drafted the South Carolina state constitution and was a delegate to the Continental Congress (1776–78).

At the siege of Charleston (1780) he served in the militia, was taken prisoner when the city fell to the British, and was sent to St. Augustine, Fla., as a prisoner of war. After being exchanged in July 1781, he was a member of the Continental Congress (1781–83), the South Carolina legislature (1785–86), and on the original board of trustees of the College of Charleston.

Middleton, Charles Middleton, 2nd earl of (b. *c.* 1640—d. 1719), Jacobite supporter of James II of England and of James Edward, the Old Pretender.

Eldest son of the 1st Earl, he held several offices under Charles II and James II, being envoy extraordinary at Vienna and afterwards joint secretary for Scotland. In 1684 he became an English secretary of state, and with Richard Graham, Viscount Preston, he had the difficult task of managing the House of Commons for James II. He was loyal to James after the King fled to France, although he remained in England, where, as the leader of the moderate Jacobites, he sought to bring about a restoration by peaceful means.

In 1693 the Earl joined the exiled King at Saint-Germain, where he became his secretary of state; afterwards he held the same office at the court of James Edward, the Old Pretender, in Flanders and in Lorraine. He was partly responsible for the unsuccessful expedition of the Jacobites to Scotland in 1707, and he resigned his office as secretary in 1713. Middleton had been created earl of Monmouth by the Pretender, for his titles in Britain had been declared forfeited in 1695. The Earl had been a Protestant, although a lukewarm one, until 1701, when he yielded to the dying wish of James II and joined the Roman Catholic Church.

Middleton, Sir Hugh (Welsh merchant and politician): *see* Myddelton, Sir Hugh.

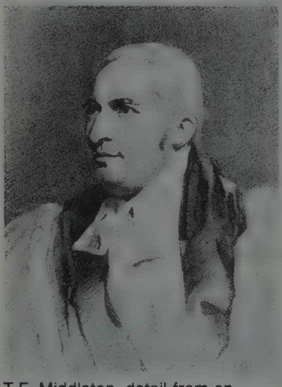
Middleton, John Middleton, 1st earl of (b. *c.* 1619—d. June 1674, Tangier), Scottish Royalist during the reigns of Charles I and Charles II.

In early life he served as a soldier in France. Later, although he fought against Charles I in both England and Scotland, being especially prominent at the Battle of Philiphaugh and in other operations against the great Montrose, he held a high command in the Scottish army that marched to rescue Charles I in 1648, and he was taken prisoner after the Battle of Preston. He joined Charles II when that monarch reached Scotland in 1650, but he was soon at variance with the party that at that time was dominant in church and state and was restored to favour only after doing a public penance at Dundee. He was a captive for the second time after the Battle of Worcester, where he commanded the Royalist cavalry, but he escaped from the Tower of London to Paris.

In 1653 Middleton was chosen by Charles II to head the projected rising in Scotland. He reached that country in February 1654, but the insurrection was a complete failure. Its leader, who cannot be held responsible for this result, remained in Scotland until 1655, when he rejoined Charles II, who made him an earl in 1656. He returned to England with the King in 1660 and was appointed commander in chief of the troops in Scotland and lord high commissioner to the Scottish Parliament, which he opened in January 1661. He was an ardent advocate of the restoration of episcopacy, this being one reason that led to serious dissensions between the Earl of Lauderdale and himself, and in 1663 he was deprived of his offices. He was afterwards (from 1667) governor of Tangier, where he died.

Middleton, T(homas) F(anshaw) (b. Jan. 28, 1769, Kedleston, Derbyshire, Eng.—d. July 8, 1822, Calcutta), noted Anglican missionary who was the first bishop of Calcutta and founder of Bishop's College there.

Middleton served various parishes in England from his ordination as a priest in 1792 to 1812, when he became archdeacon of Huntingdon. Widely recognized as a biblical scholar after publication of his study *The Doctrine of the Greek Article Applied to the Criticism and Illustration of the New Testament* (1808), Middleton was consecrated in 1814 as bishop of Calcutta. In that position he was responsible for overseeing Anglican missionary work in both Australia and all of India. Despite his strict Anglicanism, he readily licensed the Society for Promoting Christian Knowledge, a German Lutheran group, to perform missionary work in his see. In 1820 he established Bishop's College at Calcutta to train mission-



T.F. Middleton, detail from an engraving by H. Meyer, after a drawing by J. Jackson

BBC Hulton Picture Library

aries and teachers for the growing Anglican Church in India. Middleton's *Sermons* were published posthumously in 1824.

Middleton, Thomas (b. April 1570?, London—d. July 4, 1627, Newington Butts, Surrey, Eng.), late-Elizabethan dramatist who drew men as he saw them, with comic gusto or searching irony.

By 1600 Middleton had spent two years at Oxford and had published three books of verse. He learned to write plays by collaborating with Thomas Dekker, John Webster, and others for the producer Philip Henslowe.

Thomas Middleton, detail of a woodcut from "Two New Plays" by Middleton, 1657

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

A popular playwright, he was often commissioned to write and produce lord mayor's pageants and other civic entertainments, and in 1620 he was appointed city chronologer. His chief stage success was *A Game at Chaess* (1625), in which the Black King and his men, representing Spain and the Jesuits, are checkmated by the White Knight, Prince Charles. This political satire drew crowds to the Globe until the Spanish ambassador protested and James I suppressed the play.

His masterpieces are two tragedies, *Women beware Women* (1621?, published 1657) and *The Changeling* (1622, with William Rowley; published 1653).

Middleton's comedies picture a society dazzled by money in which most men grasp for all they can get, by any means. *Michaelmas Terme* (1605?, published 1607) is one of the richest in irony. In *A Tricke to Catch the Old-one* (1606?, published 1608) two rival usurers are so eager to score over each other that both are taken in by a clever nephew. In *A Mad World, My Masters* (1604?, published 1608) a delightful old country gentleman prides himself on his generosity to all except his grandson and heir.

A Chast Mayd In Cheape-side (1613?, published 1630), an exuberant comedy, makes fun of naive or complacent London citizens. In *The Roaring Girle* (1604–10?, with Dekker; published 1611)—who prefers her freedom to marriage—Middleton depicts the notorious criminal Moll Frith, who dressed as a man.

The tragicomedies are farfetched in plot but strong in dramatic situations. In *A Faire Quarrell* (1616?, with Rowley, published 1617), Captain Ager, with his conflicts of conscience, is one of Middleton's few heroes.

Most of Middleton's other plays are comedies. He collaborated with Dekker in *The Honest Whore* (1604), and with Rowley and Massinger in *The Old Law* (1618?, published 1656).

Middletown, city, coextensive with the town (township) of Middletown, Middlesex county, central Connecticut, U.S., on the Connecticut River. Settled in 1650 and incorporated as a town in 1651, it occupies the site of the Indian village of Mattabesec (Mattabesett) and was named for its position between the upstream towns and the river mouth. The city, chartered in 1784, consolidated with the town in 1923. Middletown was a seaport and shipbuilding centre in the 18th and 19th centuries, a base of the "triangular trade" (in rum, slaves, and molasses) with Africa and the West Indies and, later, of the China clipper trade. The first official pistol-maker to the U.S. government, Simeon North, had his factory here in 1799. With the coming of the steamship, Middletown declined as a port. Its diversified economy includes agriculture and the manufacture of textiles, machinery, and chemicals. In 1955 the Atomic Energy Commission erected an experimental laboratory in Middletown. It is the seat of Middlesex Community College (1966) and Wesleyan University (1831). The Submarine Library and Museum housing submarine memorabilia is located in town. The Powder Ridge Ski area is nearby as is the 900-ac (364-ha) Hubbard Park. Pop. (1990) city, 42,762; Middletown PMSA, 90,320.

Middletown, city, Orange county, southeastern New York, U.S., on the Wallkill River, 60 mi (97 km) northwest of New York City. Settled in 1756, it was organized around the local Congregational Church in 1785 and named for its midway location between the Hudson and Delaware rivers. Until 1798 it was in Ulster County. It became headquarters for several turnpike companies, and, after 1843, the terminal of the Erie Railroad (later Erie Lackawanna Railway, now part of Conrail [Consolidated Rail]). Located in a dairy and fruit-growing region, it serves as a gateway to a mountain and lake resort area and has light industries, including the manufacture of clothing, leather goods, and machinery. Middletown is the home of the Orange County Community College (1950). Inc. village, 1848; city, 1888. Pop. (1990) 24,160.

Middletown, city, Butler county, southwestern Ohio, U.S., on the Miami River (bridged). With nearby Hamilton, it forms a standard metropolitan statistical area. Founded in 1802, it was named for its location midway between Dayton (35 mi [56 km] north) and Cincinnati. It soon became a lively agricultural trading community, with its products (wheat, corn, tobacco, livestock, fruits, and vegetables) transported to Cincinnati and New Orleans via freight wagons, river flatboats, and the Miami and Erie Canal boats. Four railroads—the Baltimore and Ohio, the Big Four, the Erie, and the Pennsylvania—arrived later. Early industrial development centred on tobacco, paper, and steel. George M. Verity built a mill (1900) that produced sheet steel by the continuous rolling process. The tobacco factories declined, but paper and steel industries have continued to flourish. Airplane and missile parts and machinery are also manufactured. A branch campus (1966) of Miami University (Oxford, Ohio) is in Middletown. Inc. city, 1883. Pop. (1990) city, 46,022; Hamilton-Middletown PMSA, 291,479.

Middletown, town (township), Newport county, Rhode Island, U.S., on Rhode (Aquidneck) Island, Narragansett Bay. It was named for its location between the other two towns on the island, Newport and Portsmouth. Closely related to Newport, from which it was set off and incorporated in 1743, Middletown has developed as a residential suburb of that city. The surrounding area is predominantly agricultural (dairy and potato farms and nurseries). Middletown is the home of St. George's School for boys (1896) and the site of historic Whitehall, built (1729) by Bishop George Berkeley, an Irish philosopher who lived there from 1729 to 1731. The Norman Bird Sanctuary and Museum is nearby. Pop. (1990) 19,460.

middot (Hebrew: "measure," or "norms"), in Jewish hermeneutics or biblical interpretation, methods or principles used to explicate the meaning of biblical words or passages to meet the exigencies of new situations. Though the rules, or norms, were probably developing in early Hellenistic Judaism, the first known *middot* were compiled by Rabbi Hillel in the 1st century BC. Following the 7 norms compiled by Hillel were the 13 rules of Rabbi Ishmael ben Elisha (*c.* AD 100) and the 32 rules of Rabbi Eliezer ben Yose the Galilaean (*c.* AD 150). These *middot* remained normative for more than 1,000 years in Judaism.

Among the more prominent *middot* are the *kol wa-ḥomer* ("how much more"), in which the interpreter proceeds from a minor to a major premise, and the *gezera shawa* (comparison of similar expressions, or laws), in which an inference is made by analogy. The *kol wa-ḥomer* rule is limited by the principle of *dayyo* ("it is sufficient") so that the interpreter will not go beyond the conclusion warranted by the premise. In the New Testament, Jesus applied this rule in the Sermon on the Mount (Matthew 5–7): "If you then, who are evil, know how to give good gifts to your children, how much more [*kol wa-ḥomer*] will your Father who is in heaven give good things to those who ask him!" (Matt. 7:11).

In addition to the rules of rabbis Hillel, Ishmael, and Eliezer, other rules were developed and found acceptance. Some of the rules, such as *noṭariqon* ("shorthand"), allowed for arbitrary interpretations. According to *noṭariqon,* each letter of a word may be regarded as the initial letter of another word, so that a word in a text might be read as an entire sentence. Another principle, *al tiqre . . . ella*ʾ ("do not read . . . but"), allows the interpreter to exchange one vowel or consonant for another. *Gematria* (*q.v.*), in which each letter of a word stands for a number that, when added to the others, yields a meaningful sum total, was used not only by rabbis but also by early Christian theologians, such as Origen of Alexandria in the 3rd century AD.

Mide (Ireland): *see* Meath.

Midfaʿi, Jamil al- (b. 1890, Baghdad—d. 1959), statesman, several times prime minister of Iraq.

Midfaʿi attended the engineering college in Istanbul and became an artillery officer in the Turkish Army, from which he deserted in 1916 to join the Arab forces that had risen in revolt in Arabia under the direction of Sharīf Ḥusayn. Later, from a base in Syria, Midfaʿi launched raids into Iraq, where there was considerable opposition to the British rule that had been imposed there at the end of World War I. When in 1921 an independent government was formed in Iraq, he returned and subsequently occupied important provincial governorships in which he showed honesty, moderation, and ability. He represented an important group of army officers that had served in the Arab revolt and that later became the backbone of the newly founded Iraqi kingdom.

Midfaʿi became minister of the interior and later president of the chamber (1930). He was twice briefly prime minister in 1933 and 1934, then minister of defense, and again prime minister in 1937 for a period of barely maintained order and acute financial difficulty. During these years he became allied with a group of politicians who supported Great Britain and opposed the growing influence of Nazi Germany. In 1941 this group forced the regent, ʿAbd al-Ilāh, into exile, and Midfaʿi chose to accompany him. The monarchy, however, was soon restored, and he returned to become prime minister once more. In the postwar years he was largely eclipsed by the power of the Iraqi statesman Nuri as-Said and was in retirement in 1958 when a military coup overthrew the monarchy.

Midgard, also spelled MIDGARDR (Old Norse: Middle Abode), also called MANNA-HEIM

("Home of Man"), in Norse mythology, the Middle Earth, the abode of mankind, made from the body of the first created being, the giant Aurgelmir (Ymir). According to legend, the gods killed Aurgelmir, rolled his body into the central void of the universe, and began fashioning the Midgard. Aurgelmir's flesh became the land, his blood the oceans, his bones the mountains, his teeth the cliffs, his hair the trees, and his brains (blown over the earth) became the clouds. Aurgelmir's skull was held up by four dwarfs, Nordri, Sudri, Austri, and Vestri (the four points of the compass), and became the dome of the heavens. The sun, moon, and stars were made of scattered sparks that were caught in the skull.

Midgard is situated halfway between Niflheim on the north, the land of ice, and Muspelheim to the south, the region of fire. Midgard is joined with Asgard, the abode of the deities, by Bifrost, the rainbow bridge.

midge, also called CHIRONOMID, NONBITING MIDGE, or GNAT (family Chironomidae), any of a group of tiny two-winged flies (order Diptera). Although they resemble mosquitoes, midges are harmless and do not have scales on wings or body; in addition, the pattern of wing veins differs from that of mosquitoes, and the small mouthparts are not elongated into a sucking tube. The male antennae are feathery. Midges are usually found around ponds or streams in late afternoon and evening in swarms that produce a humming sound. Midges may breed in water or manure or under tree bark.

Midge (Chironomidae)

N.A. Callow

The wormlike aquatic larvae, soft-bodied and often bloodred, are commonly known as bloodworms. They are important food for aquatic animals, especially trout and young salmon. The nonbiting midge is related to the biting midge (*q.v.*). For the family Cecidomyiidae (Itonididae), *see* gall midge.

midget, in human anatomy, a person of very small stature whose bodily proportions, intelligence, and sexual development are within the normal range. Diminutive stature occurs sporadically in families the rest of whose members are of ordinary size. The children of midgets are usually of ordinary height and proportions. *See also* dwarfism; pygmy.

midget-car racing, form of automobile racing, popular in the United States, in which miniature front-engine racing cars compete on ¼- or ½-mile dirt or paved tracks. Races are short, usually no more than 25 miles (40 km). Cars are of limited engine displacement, varying according to engine type—*e.g.,* 114 cubic inches (1,870 cubic cm) for an overhead cam model, 76 cubic inches (1,245 cubic cm) if supercharged. The sport originated in the 1930s among racing enthusiasts who could not afford to race and maintain full-size cars. Racing is under the direction of a division of the United States Auto Club. *See also* karting; automobile racing.

midget moth, any member of the approximately 300 species in the cosmopolitan family Nepticulidae (sometimes called Stigmellidae), containing some of the smallest members of the order Lepidoptera. Most have long and pointed wings generally covered with scales and spinelike hairs; the wingspan is from 3 to 6 mm (⅛ to ⅖ inch).

Most nepticulid larvae are leaf miners, although some species produce galls on plants. Pupation occurs either inside larval galleries or within thick, silken cocoons constructed in rubbish piles or in loose soil.

Midgley, Thomas, Jr. (b. May 18, 1889, Beaver Falls, Pa., U.S.—d. Nov. 2, 1944, Worthington, Ohio), American engineer and chemist who discovered the effectiveness of tetraethyl lead as an antiknock additive for gasoline.

The son of an immigrant inventor from London, Midgley grew up in Pennsylvania and Ohio and graduated from Cornell University (1911). He held various jobs before joining the research staff of the Dayton (Ohio) Engineering Laboratories Company (Delco) in 1916. He served as vice president of the Ethyl Gasoline Corporation from 1923, vice president of Kinetic Chemicals, Inc., from 1930, and director of the Ethyl-Dow Chemical Company from 1933. From 1940 to 1944 he was a director and vice president of the Ohio State University Research Foundation. He also served as head of one branch of the National Defense Research Committee during World War II.

Midgley's research on the problem of engine knock made him a pioneer in the study of internal combustion, and in 1921 he discovered tetraethyl lead. His investigation of problems arising from the use of lead additives led him to the demonstration that bromine could be extracted from seawater.

During World War I Midgley also developed the control systems for the aerial torpedo, a propeller-driven device somewhat like the buzz bomb of World War II. His search for a nontoxic, nonflammable refrigerant culminated within three days in his discovery of dichlorodifluoromethane, which was commercially introduced under the trade name Freon-12. Freon-12 and several related compounds came into universal use as refrigerants and later found wide application as aerosol propellants.

Midgley conducted extensive research on the composition of natural and synthetic rubbers and discovered one of the first catalysts for "cracking" (breaking down) hydrocarbons.

Midhat Paşa (b. October 1822, Constantinople, Ottoman Empire [now Istanbul, Tur.]—d. May 8, 1883, Aṭ-Ṭāʾif, Arabia [now in Saudi Arabia]), twice Ottoman grand vizier who was known for his honest ability, his administrative reforms, and his initiation of the first constitution of the Ottoman Empire (1876).

Son of a *qāḍī* (judge), Midhat was trained for an administrative career. He joined the office of the grand vizier, eventually becoming the second secretary to the Grand Council. His enemies arranged for him to be given (1854) the nearly impossible task of halting the revolt and brigandage rampant in Rumelia, in the Balkans, where he achieved startling success. After restoring order to Bulgaria (1857), he spent six months' study leave in Europe.

In 1861 Midhat was made a vizier and entrusted with the government of Niš, where his reforms were so successful that Sultan Abdülaziz charged him to help prepare a scheme for their adoption in other parts of the empire. After reorganizing the Council of State, he was made governor of Baghdad (1869), where his success was as impressive as at Niš. Midhat took a bold step in 1872. In an interview with the absolutist sultan, he expressed opposition to the grand vizier Mahmud Nedim's antireform policies. The sultan thereupon appointed him grand vizier in place of Mahmud Nedim. Too independent for the court, however, Midhat remained in power only three months. He was later made minister of justice and then president of the Council of State.

Deteriorating conditions in the empire in 1876 led to a coalition of Midhat, the grand vizier, and the minister of war that deposed Sultan Abdülaziz on May 30 and placed his nephew Murad V on the throne; Murad's insanity led to his deposition in August, and he was replaced by his brother Abdülhamid II. Midhat again became grand vizier, and, mainly at his urging, the empire's first constitution was promulgated on December 23, guaranteeing a broad range of democratic freedoms. In the following February, however, he was dismissed and ordered to leave the country. He was recalled again the next year and appointed governor of Smyrna. In May 1881 the sultan again ordered his arrest, and, although he escaped and appealed to the European powers to intervene for him, he gave himself up shortly afterward. At his trial he was found guilty of having caused the death of the deposed Sultan Abdülaziz and sentenced to death. On British intercession the sentence was commuted to life banishment. Midhat spent the last days of his life in Aṭ-Ṭāʾif, where he was probably murdered.

Midi, cultural region encompassing the southern French regions of Aquitaine, Languedoc, and Provence. The Midi is bounded by Spain and the Pyrenees to the south and by Italy and the Alps to the northeast. The southern flank of the Massif Central extends into Languedoc. Lowlands include the Aquitaine Basin and the plains of Languedoc and the Rhône Basin. A Mediterranean climate prevails throughout most of the Midi. The northern boundaries of the Midi roughly coincide with the limit of the cultivation of olive trees.

The Midi was not politically united during the European Middle Ages and was not fully incorporated into France until 1860, when the house of Savoy relinquished the county of Nice. Catalan culture entered the Midi through Roussillon, and Italian influences penetrated by way of Nice.

Midi Canal, also called LANGUEDOC CANAL, French CANAL DU MIDI, or CANAL DU LANGUEDOC, major link in the inland waterway system from the Bay of Biscay to the Mediterranean. A landmark engineering work carried out in France in the 17th century, the Midi Canal connects Toulouse with the Mediterranean and provides a waterway to the Atlantic via the Aude and the Garonne. Rising 206 feet (63 m), via 26 locks, in its 32-mile (51.5-kilometre) journey to the summit of its route, it runs 3 miles (5 km) along the summit, then descends 114 miles (183.5 km) with a difference in elevation of 620 feet (189 m) taken up by 74 locks. The engineer, Pierre-Paul Riquet, overcame a rocky rise near Béziers by a daring innovation, employing black powder to blast a 515-foot (157-metre) tunnel, 22 feet (6.7 m) wide and 27 feet (8 m) high, the first canal tunnel ever so built, and the first use of explosives in underground construction. The canal was built between 1665 and 1681, with its final completion in 1692.

Midi-Pyrénées, *région,* southwestern France, encompassing the *départements* of Lot, Aveyron, Tarn, Tarn-et-Garonne, Gers, Hautes-Pyrénées, Haute-Garonne, and Ariège. The capital is Toulouse. The region has an area of 17,509 square miles (45,349 square km) and is bounded by the *départements* of Pyrénées-Atlantiques and Landes to the west, Lot-et-Garonne and Dordogne to the northwest, Corrèze and Cantal to the north, and Lozère, Gard, Hérault, Aude, and Pyrénées-Orientales to the east. Spain lies to the south. The Pyrenees rise in the south and cover much of Hautes-Pyrénées, Haute-Garonne, and Ariège. An oceanic climate prevails.

The region is sparsely populated. The population declined by more than 31 percent between 1851 and 1946, as in most of rural France outside the Paris region, and has subsequently increased at a rate well below the national average. Repatriated émigrés from northern Africa have accounted for much of the post-World War II increase. The population remains predominantly rural outside the urban areas of Toulouse, Tarbes, Albi, Castres, and Montauban.

Immigrants from Morocco and Tunisia have helped to expand the cultivation of wheat in the Aquitaine basin. Viticulture is largely limited to Condom and Eauze in Gers, Gaillac in Tarn, and Fronton in Haute-Garonne. Animal husbandry and forestry predominate in the Pyrenees.

The region's industries are underdeveloped. Electrometallurgy is concentrated in the valleys of the Pyrenees. Hydroelectric power is generated from the Neste and Ariège rivers in the Pyrenees and from the Truyère River and Lake Pareloup in the Massif Central. Pop. (1999) 2,551,687.

Midianite, also called ISHMAELITE, in the Old Testament, member of a group of nomadic tribes related to the Israelites and most likely living east of the Gulf of Aqaba in the northwestern regions of the Arabian Desert. They engaged in pastoral pursuits, caravan trading, and banditry, and their main contacts with the Israelites were from the period of the Exodus (13th century BC) through the period of the judges (12th–11th century BC). According to the Book of Judges, the Israelite chieftain Gideon drove the Midianites into western Palestine, after which they largely disappear from the biblical narrative.

According to the Book of Genesis, the Midianites were descended from Midian, who was the son of the Hebrew patriarch Abraham by the latter's second wife, Keturah. Jethro, priest-leader of the Midianite subtribe known as the Kenites, and his daughter Zipporah (a wife of Moses), influenced early Hebrew thought: it was Yahweh, the lord of the Midianites, who was revealed to Moses as the God of the Hebrews.

Midland, town, Simcoe county, south-central Ontario, Canada. It is located on Midland Bay, an arm of Georgian Bay on Lake Huron. It was surveyed in 1872 and became a village in 1878 and a town in 1887. Midland has large harbour installations and grain elevators and is a customs port and a steamship terminal for the Georgian Bay resorts.

Just east on the Wye River is the reconstructed Fort-Sainte-Marie, which from 1639 to 1649 was the Jesuit mission headquarters for the Huron region. It was one of the first European settlements in inland Canada and had Ontario's first hospital, school, and farm. Nearby are Little Lake Park, with a replica of a Huron Indian village and a museum, and the Wye Marsh Wildlife Centre. Pop. (2001) 16,214.

Midland, city, seat (1850) of Midland county, east-central Michigan, U.S. It lies along the Tittabawassee River, just west of Bay City. It originated in the 1830s as a lumbering settlement and was named for the county (located in the middle of the Lower Peninsula). Brine deposits formed the basis of the city's chemical industry, which was the world's largest producer of bromine by 1888. In 1890 Herbert H. Dow formed a company in Midland based on his own method of bromine extraction, and the city expanded with its growth. Dow Chemical Company formed the basis of the city's economy, producing a wide range of industrial, agricultural, and consumer chemicals. The city is noted for its modern architecture, including many buildings designed by Alden B. Dow, Herbert's son and a student of Frank Lloyd Wright. Attractions include the Midland Center for the Arts and Dow Gardens. Inc. village, 1869; city, 1887. Pop. (2000) city, 41,685; Saginaw–Bay City–Midland MSA, 403,070.

Midland, city, seat (1885) of Midland county, western Texas, U.S. It lies on the southern edge of the High Plains, just northeast of Odessa. Founded in 1884 as a depot on the Texas and Pacific Railway, it was named for its position midway between El Paso and Fort Worth (300 miles [480 km] east).

Midland is the hub of a 12-county ranching region noted for Hereford cattle. It is also the financial and trade centre for the vast Permian Basin, which contains large quantities of oil, natural gas, anhydrite, salt, and potassium. Oil was discovered in 1923, and three years later the oil industry began moving into Midland. With tens of thousands of producing wells in the basin and hundreds of oil-company offices in the city, it became one of the nation's most important oil centres. Oil distribution, petrochemical industries, and livestock dominate the economy. Midland's Permian Basin Petroleum Museum traces the history and development of the basin, which was once an ancient sea. Midland College was founded in 1969. Inc. 1906. Pop. (2000) 94,996; Odessa-Midland MSA, 241,600.

Midland Bank PLC, formerly one of the leading commercial banks in the United Kingdom, acquired by HSBC Group (formerly the Hongkong and Shanghai Banking Corporation) in July 1992.

The bank was established as the Birmingham and Midland Bank in Birmingham in 1836. After absorbing several banks in the Midlands, it merged with the Central Bank of London in 1891 to form the London and Midland Bank. It attained national coverage by expansion and amalgamation; between 1891 and 1924 it made acquisitions throughout England, Wales, Ireland, and Scotland. The name Midland Bank Ltd. was adopted in 1923. By 1934 it was the world's largest deposit bank.

Midland's expansion slowed during and after World War II. In the 1960s and '70s it began to establish a presence in important financial centres overseas. In 1981 Midland acquired the California-based Crocker National Bank; it proved to be a disastrous investment. The Midland name was retained until 1999, when the bank was renamed HSBC Bank PLC. HSBC is based in London.

Midlands, region of central England, commonly subdivided into the East and the West Midlands. The East Midlands includes the historic and geographic counties of Lincolnshire, Northamptonshire, Derbyshire, Nottinghamshire, Leicestershire, and Rutland. The West Midlands comprises Staffordshire, Warwickshire, Shropshire, Herefordshire, and Worcestershire. Parts of the historic counties of Warwickshire, Worcestershire, and Staffordshire make up the metropolitan county of West Midlands. The West Midlands contains a concentration of large industrial cities, including Birmingham, Coventry, Leicester, Derby, Nottingham, Stoke-on-Trent, and Wolverhampton. Pop. (2001) 9,439,516.

Midlothian, council area and historic county in southeastern Scotland, south of the Firth of Forth. The historic county and council area cover somewhat different territories. The council area encompasses a suburban and rural area south and southeast of Edinburgh. The northern part of the council area occupies the low coastal plain bordering the Firth of Forth. The rest is gently rolling country that gradually slopes upward to the Moorfoot Hills in the south. The River Esk flows northward through the area to drain into the Firth of Forth. The council area lies entirely within the historic county, which also encompasses the southeastern portion of West Lothian council area, a hilly region south of the Moorfoot Hills surrounding the upper valley of Gala Water in the Scottish Borders council area, the town of Musselburgh in East Lothian council area, and most of the council area of the city of Edinburgh, including the city's historic core.

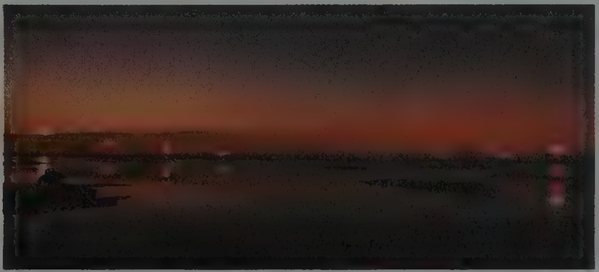
There are remains of prehistoric forts on several hilltops, and Roman settlements at Inveresk and Cramond probably lay along the main Roman road. Along with the rest of the Lothian region, Midlothian was held by the Angles of Northumbria, but in the 11th century AD King Malcolm II of Scotland (reigned 1005–34) conquered the area. Edinburgh became the capital of Scotland in the 15th century. Midlothian's history from that time is essentially that of Edinburgh, and until the 20th century the county was known as Edinburghshire.

Aside from the architectural riches of Edinburgh, Midlothian has the remains of many ecclesiastical buildings, including the great Cistercian abbey at Newbattle and a church of the Knights Templar at Temple. Numerous castles and country mansions built after 1400 survive, particularly near Edinburgh. Famous battle sites are at Pinkie (1547), Carberry Hill (1567), and Rullion Green (1666).

Crops raised in Midlothian include oats, barley, potatoes, turnips, and wheat, and dairy cattle and sheep are kept. The leading industrial sector is electronics manufacturing, concentrated in the suburban towns outside Edinburgh. Dalkeith is the administrative centre. Other large towns include Bonnyrigg, Loanhead, and Penicuik. Area council area, 137 square miles (355 square km). Pop. (2001) council area, 80,941.

Midnapore, also spelled MIDNAPUR, or MEDINIPUR, city, south-central West Bengal state, northeastern India. The city lies just north of the Kāsai River and is an agricultural-trade centre on the Grand Trunk Road from Calcutta to Amritsar. Kharagpur (*q.v.*), across the river, provides major rail connections. Rice milling and the manufacture of chemicals and silk cloth are the chief industries. Constituted a municipality in 1865, Midnapore is an educational centre, with numerous colleges affiliated with the University of Calcutta. Rice, corn (maize), legumes, and oilseeds are the chief crops grown in the surrounding area. Pop. (2001 prelim.) 153,349.

midnight Sun, the Sun, as seen in the Arctic or Antarctic, where the tilt of the Earth's axis,



Midnight Sun at Point Barrow, Alaska, at latitude 71° 23′ N; exposures made in August at half-hour intervals

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relative to the plane of its orbit, produces at least one 24-hour period of daylight, and one of night, in every year. At the poles, both day and night are theoretically six months long, though the actual periods of light and dark are modified by the twilight periods. The effect of the tilt of the axis is seen in lower latitudes as a lengthening of daylight hours in the summer and their shortening in the winter.

Midrash (Hebrew: "Exposition," or "Investigation"), in Judaism, the method of biblical investigation in which oral tradition interprets and elaborates on the scriptural text. The term Midrash also denotes the large collections of Halakhic (legal) and Haggadic (nonlegal) materials deduced from the Hebrew Bible by this exegetical method.

A brief treatment of the Midrash follows. For full treatment, *see* MACROPAEDIA: Judaism.

The term *Midrash* is derived from the Hebrew root *darash,* which means "to search," or "to investigate," and indicates intensive study, or searching, of the spirit of a biblical passage, as opposed to its literal interpretation. Such "searching" became necessary because the Written Law, in the Pentateuch (the first five books of the Old Testament), required reinterpretation in the light of later historical conditions, and because of the disagreement between the Pharisees and Sadducees over the status of the Oral Law (*see* Pharisee).

Midrash thus began as a philological method of interpreting the literal meaning of biblical texts, but it developed into a complex interpretive system used to reconcile biblical contradictions, establish the scriptural bases for new laws, and bring new meaning to the scriptural text. Midrashic activity reached its height in the 2nd century CE (Common Era) with the schools of Rabbi Ishmael ben Elisha and Rabbi Akiba ben Joseph. The Talmud (scholarly interpretations of the Jewish Oral Law) quotes from all Midrashic collections (Midrashim) and uses all Midrashic rules of interpretation.

The Midrashim may be divided into two broad groups: (1) Halakha Midrash, which may be defined as the scholastic deduction of the Oral Law (*halakha*) from the Written Law; and (2) Haggada Midrash, which consists of homiletic works whose purpose is edification rather than legislation. Both seek to reveal the inner meaning of the Bible. Haggadic Midrash was highly esteemed, but it was not so authoritative as Halakhic. Halakhic Midrashim are often dull, legalistic, and sober; whereas Haggadic Midrashim are rarely dull, are often highly imaginative and edifying, and do not insist on sobriety.

Midway, Battle of (June 3–6, 1942), World War II naval battle, fought almost entirely with aircraft, in which the United States destroyed Japan's first-line carrier strength and most of its best trained naval pilots and ended the threat of further Japanese invasion in the Pacific.

Despite a setback in May 1942 in the indecisive Battle of the Coral Sea, the Japanese had continued with plans to seize Midway Island and bases in the Aleutians. Seeking a naval showdown with the numerically inferior U.S. Pacific Fleet, Adm. Yamamoto Isoroku sent out the bulk of the Japanese fleet, including four heavy and three light aircraft carriers, with orders to engage and destroy the American fleet and invade Midway. U.S. intelligence had divined Japanese intentions after breaking the Japanese naval code, however, and the Americans were ready: three heavy aircraft carriers of the U.S. Pacific Fleet were mustered. These ships were stationed 350 mi northeast of Midway and awaited the westward advance of Yamamoto's armada. Whereas the Japanese had no land-based air support, the Americans from Midway and from Hawaii could commit about 115 land-based planes.

The battle began on June 3, 1942, when U.S. bombers struck ineffectually at the Japanese carrier strike force about 220 mi southwest of the U.S. fleet. Early the next morning Japanese planes from the strike force attacked and bombed Midway heavily, while the Japanese carriers again escaped damage from U.S. land-based planes. But as the morning progressed the Japanese carriers were soon overwhelmed by the logistics of almost simultaneously sending a second wave of bombers to finish off the Midway runways, zigzagging to avoid the bombs of attacking U.S. aircraft, and trying to launch more planes to sink the now-sighted U.S. naval forces. A wave of U.S. torpedo bombers was almost completely destroyed during their attack on the Japanese carriers at 9:20 AM, but at around 10:30 AM 36 carrier-launched U.S. dive-bombers caught the Japanese carriers while their decks were cluttered with armed aircraft and fuel. The U.S. planes quickly sank three of the heavy Japanese carriers and one heavy cruiser. In the late afternoon U.S. planes sank the fourth heavy carrier, but Japanese aircraft badly damaged the U.S. carrier *Yorktown.* On June 6, a Japanese submarine fatally torpedoed the *Yorktown* and an escorting American destroyer. The Japanese, however, appalled by the loss of their carriers, had already begun a general retirement on the night of June 4–5 without attempting to land on Midway.

The Battle of Midway brought the Pacific naval forces of Japan and the United States to approximate parity and marked the turning point of the military struggle between the two nations.

Midway Islands, unincorporated territory of the United States in the central Pacific Ocean, 1,300 mi (2,100 km) northwest of Honolulu. The islands, near the western end of the Hawaiian archipelago, comprise a coral atoll with a circumference of 15 mi, enclosing two islands, Eastern (Green) and Sand. The land area is 2 sq mi (5 sq km). The climate is subtropical.

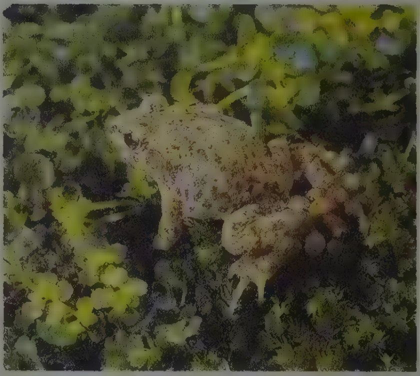
Reported and claimed for the United States in 1859 by Capt. N.C. Brooks, the atoll was first called Middlebrooks and then Brooks; the name Midway dates from the islands' formal annexation by the United States in 1867. In 1903 Pres. Theodore Roosevelt placed the islands under the control of the U.S. Navy, and Sand Island became a station of the Hawaii–Luzon submarine cable (1905). Transpacific aviation gave Midway new importance in 1936, when it was made a regular stop on the San Francisco–Manila mail run. In 1940 the U.S. Navy began work on an air and submarine base there. In World War II, the Battle of Midway (June 3–6, 1942), characterized mainly by the actions of carrier-based planes, marked the turning point of the Pacific war. After the war, Midway's importance as a commercial air base was reduced, and regular stops there were eliminated in 1950. That year also saw the reduction of Midway to a naval station and air facility. The islands comprise a National Wildlife Reserve, established to protect their abundant bird life. Pop. (2000) none.

Midwest (region, U.S): *see* Middle West.

Midwest City, Oklahoma county, central Oklahoma, U.S., an eastern residential suburb of Oklahoma City. It was founded in 1942 after activation of the Midwest Air Depot, now Tinker Air Force Base, headquarters for the Oklahoma City Air Logistics Center, adjoining the city to the south. The community was planned as a model city, with curvilinear street design and spacious parks, by builder and developer W.P. Atkinson with the approval of Air Force officials. Inc. 1943. Pop. (2000) 54,088.

Midwestern Regionalism, American literary movement of the late 19th century that centred on the realistic depiction of Middle Western small town and rural life. The movement was an early stage in the development of American Realistic writing. E.W. Howe's *Story of a Country Town* (1883) and Joseph Kirkland's *Zury* (1887) and *The McVeys* (1888) foreshadowed the stories and novels of Hamlin Garland, the foremost representative of Midwestern Regionalism. Garland wrote *Main-Travelled Roads* (1891) and *A Son of the Middle Border* (1917), examples of works that deal with the poverty and hardship of Middle Western rural life and that explode the myth of the pioneer idyll. Chicago was the focal point of Midwestern Realist activity; Garland lived in the city for a time, as did such others as Theodore Dreiser, Edgar Lee Masters, and Sherwood Anderson. These latter figures were writers from small towns in the Middle West who were deeply influenced by the regional movement of the 1890s and became the leading exponents of 20th-century Realism and Naturalism.

midwife toad (*Alytes obstetricans*), slow-moving, terrestrial amphibian (family Discoglossidae) found in western Europe and noted for the breeding behaviour of the species. The midwife toad is about five centimetres (two inches) long and plump, with warty, dull-gray skin. It mates on land and breeds throughout the spring and summer.



Male midwife toad (*Alytes obstetricans*) carrying eggs on back legs

Heather Angel

The midwife toad is nocturnal and thoroughly terrestrial. Toward evening the males reveal their presence by a clear whistling note. Mating takes place on land; the male seizes the female around the waist and stimulates her cloacal region with his toes until the eggs are forcibly expelled. The eggs are large and yellow, and produced in two rosarylike strands of gelatinous capsules. While the eggs are being extruded, the male positions himself and discharges milt (sperm-containing fluid) over them to effect fertilization. This having been accomplished, the male twists the egg strings around his legs and returns to his usual retreat, resorting to a short immersion in the water during exceptionally dry nights. When the time for hatching has come, after about three weeks, the male enters the water; the larvae, measuring slightly over a half inch, bite their way through their tough envelope, which is not abandoned by the father until all the young are liberated.

midwifery, the art and practice of attending upon women in childbirth. The profession of midwife must be one of the oldest, being clearly recognized in the earliest books of the Old Testament and an accepted element in the social structure in ancient Greece and Rome. But the old obstetrical learning, meagre as it was, disappeared in the Middle Ages, and the little that survived became adulterated by superstition. Childbirth in those days was associated with an appalling infant mortality and with grave danger to any mother who was unable to deliver herself expeditiously and unaided.

In Europe in the 17th century a slow and hesitant movement for the training of midwives began. In the 18th century, maternity hospitals appeared in the larger cities and became training centres for midwives. It was not until the 19th century that the training and control of midwives' practice were put on a statutory basis. The Netherlands, Scandinavia, Germany, and France all made early progress in this regard. In Great Britain, the first Midwives Act (1902) set up a Central Midwives Board to prescribe the training of student-midwives in hospitals, examine and license candidates, and regulate the practice of all such certified midwives. This was a great advance, for at that time the great majority of births in Great Britain were home births attended by midwives. The Midwives Act resulted in a steady rise in the professional skill of British midwives, most of whom were trained as state registered nurses (S.R.N.) before becoming state certified midwives (S.C.M.).

In the late 19th and early 20th century, advances in obstetrics and gynecology caused a great shift in childbearing from the home to the hospital in most Western nations. In the 1960s, however, a variety of economic and social factors spurred a renewed interest in the concerned, personal care provided by midwives and gave rise, in the United States, to the profession of nurse-midwife. A certified nurse-midwife (C.N.M.) is a registered nurse who has received professional training in midwifery and been certified by the American College of Nurse-Midwives. C.N.M.'s accept only those patients who can be expected to have a normal delivery. They do not perform operative deliveries, and if a delivery does prove difficult, a physician is usually called. C.N.M.'s deliver babies in hospitals, clinics, birthing centres, or, more rarely, at home. They provide prenatal and postnatal care, advise women about their reproductive health before and after pregnancy, and offer family-planning services and counseling.

Lay midwives, by contrast, usually have no professional training in midwifery, are unlicensed, and deliver babies at home. In developed nations, they have traditionally worked in isolated rural areas, but in developing countries they are much more common. Midwives of all sorts deliver about three-fourths of all the infants born throughout the world each year.

Mie, *ken* (prefecture), central Honshu, Japan, occupying part of the Kii Peninsula. It faces Ise Bay to the east and the Pacific Ocean to the south. The deeply indented Pacific coast, fringed with islands, and the ancient town of Ise form the central attractions of Ise-shima National Park in the prefecture. Sheltered inlets produce cultured pearls, lobster, and shrimp. The port of Toba is a tourist centre; offshore are the "Wedded Rocks," which are likened to Shintō deities and are joined by a large straw rope. Heavy industries in the prefecture produce chemicals, petroleum, iron, and steel. Traditional industries produce textiles, porcelain, lumber, cement, and glass. Tsu, on the west shore of Ise Bay, is the prefectural capital. Mie University, founded in 1949, is located there. Area 2,231 square miles (5,778 square km). Pop. (1994 est.) 1,827,000.

Ama (fisherwomen) who dive for pearl oysters, abalone, and edible seaweed, off the coast of Mie prefecture, Japan

Bob and Ira Spring

Mielziner, Jo (b. March 19, 1901, Paris, France—d. March 15, 1976, New York, N.Y., U.S.), American stage designer who, in more than 360 Broadway productions from 1924, introduced several devices that became standard in 20th-century theatrical staging. One of his innovations was the transparent skeletal framework setting of *Death of a Salesman* (1949), which allowed separate times and places to be shown simultaneously. Mielziner's success with works as diverse as *Hamlet* and the musical comedy *Annie Get Your Gun* was due both to his unusual technical ingenuity and to his grasp of the organic function of the total stage environment.

Mielziner studied at the National Academy of Design and the Art Students League of New York and at the Pennsylvania Academy of the Fine Arts in Philadelphia. He also attended school in Paris and Vienna, then returned to the United States to study under the stage craftsmen Robert Edmond Jones and Lee Simonson, then with the Theatre Guild. He was a collaborating designer of the Lincoln Center Repertory Theatre in New York City and the Los Angeles Music Center. He designed the setting in which Michelangelo's "Pietà" was exhibited in the Vatican Pavilion at the New York World's Fair (1964–65). After 1968 he served as chairman of the American Theater Planning Board and acted as a consultant on theatrical design.

Mien-yang, Pinyin MIANYANG, city in north-central Szechwan *sheng* (province), China. It is located on the Fou River, about 70 miles (110 km) northeast of Ch'eng-tu, at a point where the ancient route to Pao-chi and to Sian (Hsi-an) in Shensi province emerges into the northeast of the Ch'eng-tu Plain in Szechwan. This route is now followed by a railway line and highways connecting Mien-yang with Ch'eng-tu, Nan-ch'ung, and Chungking to the south.

The surrounding area, for which Mien-yang acts as the central market, is fertile, densely populated, and known for its silk production. Mien-yang has a large modern factory producing raw silk and shops for production of silk and cotton textiles on a minor scale. The area to the north was also a traditional centre of local ironworking. After the building of the now electrified Ch'eng-tu–Pao-chi railway, Mien-yang's steel industry was developed, using coal from Kuang-yüan in the northeast. Mien-yang is the chief supplier of food and other goods for the new industrial centre of Chiang-yu to the north, which also produces steel and cement. Pop. (1990 est.) 262,947.

Miercurea-Ciuc, Hungarian CSÍKSZEREDA, town, capital of Harghita *judeţ* (county), Romania. The town lies along the Olt River in the Ciuc Depression. It was an Iron Age settlement, and later Dacian and Szekler villages developed there; its history is presented in the county museum. Miercurea-Ciuc has become an important road focus and industrial town, producing timber products, tractors, clothing, and foodstuffs. The area has a tourist industry based on several small village spas in the Eastern Carpathian Mountains (particularly Tuşnad), hiking paths in the nearby Harghita Mountains, and the neighbouring pilgrimage centre of Şimleu. Magyars form a large majority of the population. Pop. (1992 prelim.) 46,029.

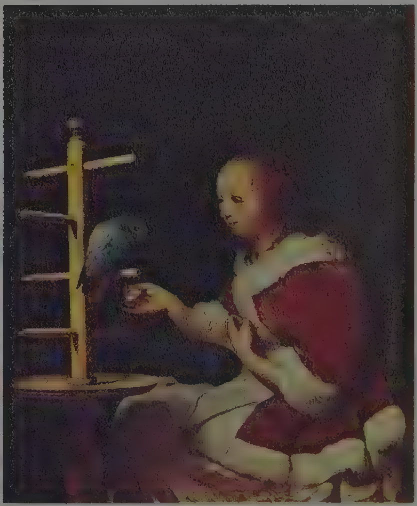
Mieres, town, Asturias *provincia* and *comunidad autónoma* ("autonomous community"), northwestern Spain. Mieres lies south-southeast of Oviedo city. Until 1836 it was governed by the municipal corporation of Lena, but since that time it has been an independent administrative entity. The town is a mining and industrial centre with iron, sulfur, hard and soft coal, and mercury mines nearby. It also has blast furnaces, steel furnaces, zinc smelters, and factories specializing in the manufacture and repair of motors and machinery for mining and for general industry. The parish church of San Juan, originally established by a grant of King Ordoño I of Asturias in AD 857, has Romanesque columns and capitals. Mieres is situated on the railway lines between Madrid and Gijón. Pop. (1991 prelim.) 53,379.

Mierevelt, Michiel Janszoon van, Mierevelt also spelled MIEREVELD, or MIERVELDT (b. May 1, 1567, Delft, Neth.—d. June 27, 1641, Delft), Dutch portrait painter patronized by the royalty of many European countries.

Mierevelt was the son of a goldsmith, who apprenticed him to the copperplate engraver J. Wierix. Anthonie van Blocklandt (called Montfoort), who had seen and admired two of Mierevelt's early engravings, invited him to enter his school at Utrecht. Mierevelt remained at Utrecht until the death of Montfoort (1583) and then settled at Delft. Devoting himself at first to still life, Mierevelt eventually took up portraiture. His portraits, usually small in size, are sincere in characterization and restrained in composition; his drawing is severe and the colour harmonious. The many commissions entrusted to him necessitated the employment of numerous assistants, by whom hundreds of portraits were turned out. Comparatively few of the 2,000 or more portraits (a contemporary attributes 10,000) that bear his name are wholly his handiwork.

Mieris, Frans van, THE ELDER (b. April 16, 1635, Leiden, Neth.—d. March 12, 1681, Leiden), Dutch painter, son of Jan van Mieris and chief member of a family of Leiden painters.

Mieris took service with Abraham Toorenvliet, a glazier who kept a school of design. He then studied with Gerrit Dou and Abraham van den Tempel and acquired a manner



"Woman with Parrot," painting on copper by Frans van Mieris the Elder; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, A.C. Cooper that had more of the finish of the exquisites of the Leiden *fijnischilders* ("fine painters") school than of the breadth of the disciples of Rembrandt. He seldom chose panels larger than 12–15 inches (30–38 cm) square. Characteristic of his art in its minute proportions is a shiny brightness and metallic polish. The subjects he treated best are those in which he illustrated the habits or actions of the wealthier classes, but he sometimes succeeded in homely incidents and in portraiture, and he occasionally ventured into allegory. His son Willem van Mieris (1662–1747) and his grandson Frans van Mieris the Younger (1689–1763) were also accomplished genre painters.

mierkat, also spelled MEERKAT, common name for certain carnivores of the civet family (Viverridae): the suricate (*q.v.*) and various mongoose (*q.v.*) species.

Mies van der Rohe, Ludwig, original name MARIA LUDWIG MICHAEL MIES (b. March 27, 1886, Aachen, Ger.—d. Aug. 17, 1969, Chicago, Ill., U.S.), German-born American architect whose rectilinear forms, crafted in elegant simplicity, epitomized the International Style (*q.v.*) of architecture.

Mies van der Rohe

Artemis Verlag und Verlag fur Architektur, Zurich

Early training and influence. Ludwig Mies (he added his mother's surname, van der Rohe, when he had established himself as an architect) was the son of a master mason who owned a small stonecutter's shop. Mies helped his father on various construction sites but never received any formal architectural training. At age 15 he was apprenticed to several Aachen architects for whom he sketched outlines of architectural ornaments, which the plasterers would then form into stucco building decorations. This task developed his skill for linear drawings, which he would use to produce some of the finest architectural renderings of his time.

In 1905, at the age of 19, Mies went to work for an architect in Berlin, but he soon left his job to become an apprentice with Bruno Paul, a leading furniture designer who worked in the Art Nouveau style of the period. Two years later he received his first commission, a traditional suburban house. Its perfect execution so impressed Peter Behrens, then Germany's most progressive architect, that he offered the 21-year-old Mies a job in his office, where, at about the same time, Walter Gropius and Le Corbusier were also just starting out.

Behrens was a leading member of the Deutscher Werkbund, and through him Mies established ties with this association of artists and craftsmen, which advocated "a marriage between art and technology." The Werkbund's members envisioned a new design tradition that would give form and meaning to machine-made things, including machine-made buildings. This new and "functional" design for the industrial age would then give birth to a *Gesamtkultur,* that is, a new universal culture in a totally reformed man-made environment. These ideas motivated the "modern" movement in architecture that would soon culminate in the so-called International Style of modern architecture.

In Berlin Mies was influenced by Behrens' emulation of the pure, bold and simple Neoclassic forms of the early 19th-century German architect Karl Friedrich Schinkel. It was Schinkel who became the decisive influence on Mies's search for an architecture of *Gesamtkultur.* Throughout his life, the elegant clarity of Schinkel's buildings seemed to Mies to embody most perfectly the form of the 20th-century urban environment. Another decisive influence was Hendrik Petrus Berlage, a pioneer of modern Dutch architecture, whom Mies met in 1911. Berlage's work inspired Mies's own love for brick, and the Dutch master's philosophy inspired Mies's credo of "architectural integrity" and "structural honesty." With regard to structural honesty, Mies would eventually go further than anyone else to make the actual rather than apparent or dramatized supports of his buildings their dominant architectural features.

Work after World War I. During World War I Mies served as an enlisted man, building bridges and roads in the Balkans. When he returned to Berlin in 1918, the fall of the German monarchy and the birth of the democratic Weimar Republic helped inspire a prodigious burst of new creativity among modernist artists and architects. Architecture, painting, and sculpture, according to the manifesto of the Bauhaus—the avant-garde school of the arts just established in Weimar—were not only moving toward new forms of expression but were becoming internationalized in scope. Mies joined in several modernist architectural groups at this time and organized many exhibitions, but there was virtually nothing for him to build. His foremost building of this period—an Expressionist memorial to the murdered communist leaders Karl Liebknecht and Rosa Luxemburg, dedicated in 1926—was demolished by the Nazis.

Mies's most important work of these years remained on paper. In fact, these theoretical projects, rendered in a series of drawings and sketches that are now in the New York Museum of Modern Art, foreshadowed the entire range of his later work. The Friedrichstrasse Office Building (1919) was one of the first proposals for an all steel-and-glass building and established the Miesian principle of "skin and bones construction." The "Glass Skyscraper" (1921) applied this idea to a glass skyscraper whose transparent facade reveals the building's underlying steel structure. Both of these building designs were uncompromising in their utter simplicity. Other theoretical studies explored the potentials of concrete and brick construction, and of de Stijl form and Frank Lloyd Wright concepts. Few unbuilt buildings surpassed them in the variety of ideas and in their influence on the development of the architecture of the time.

This influence was apparent at the first postwar Werkbund exposition at Weissenhof near Stuttgart in 1927. The exhibition consisted of a housing demonstration project planned by Mies, who had by then become the Werkbund's vice president. Europe's 16 leading modernist architects, including Le Corbusier and Mies himself, designed various houses and apartment buildings, 33 units in all. Weissenhof demonstrated, above all, that the various architectural factions of the early postwar years had now merged into a single movement—the International Style was born. Though not a popular success, the exposition was a critical one, and Europe's elite suddenly began to commission modern villas, such as Mies's Tugendhat House (1930) at Brno, Czech.

Perhaps Mies's most famous executed project of the interwar period in Europe was the German Pavilion (also known as the Barcelona Pavilion), which was commissioned by the German government for the 1929 International Exposition at Barcelona. It exhibited a sequence of marvelous spaces on a 175- by 56-foot (53.6- by 17-metre) travertine platform, partly under a thin roof, and partly outdoors, supported by chromed steel columns. The spaces were defined by walls of honey-coloured onyx, green Tinian marble, and frosted glass and contained nothing but a pool, in which stood a sculptural nude, and a few of the chairs Mies had designed for the pavilion. These cantilevered steel chairs, which are known as Barcelona chairs, became an instant classic of 20th-century furniture design.

In 1930 Mies was appointed director of the Bauhaus, which had moved from Weimar to Dessau in 1925. Between Nazi attacks from outside and left-wing student revolts from within, the school was in a state of perpetual turmoil. Though not cut out to be an administrator, Mies soon won respect as a stern but superb teacher. When the Nazis closed the school in 1933, Mies tried for a few months to continue it in Berlin. But modern design was as hopeless a cause in Hitler's totalitarian state as was political freedom. Mies announced the end of the Bauhaus in Berlin late in 1933 before the Nazis could close it.

Mies in America. Four years later, in 1937—again after working mainly on projects that were never built—Mies moved to the United States. Soon after he arrived in the country, he gained an appointment as director of the School of Architecture at Chicago's Armour Institute (later the Illinois Institute of Technology). Mies served as the school's director for the next 20 years, and, by the time he retired in 1958, the school had become world-renowned for its disciplined teaching methods as well as for its campus, which Mies had designed in 1939–41. A cubic simplicity marked the campus buildings, which could easily be adapted to the diversified demands of the school. Exposed structural steel, large areas of glass reflecting the grounds of the

The Lake Shore Drive Apartments, Chicago, designed by Mies van der Rohe; photographed in 1955

Ezra Stoller © Esto

campus, and a yellow-brown brick were the basic materials used.

The many commissions that his architectural office received after World War II gave Mies unique opportunities to realize large-scale projects, among them several high-rise buildings that are conceived as steel skeletons sheathed in glass curtain-wall facades. Among these major commissions are the Promontory Apartments in Chicago (1949), the Lake Shore Drive Apartments (1949–51) in that city, and the Seagram Building (1956–58) in New York City, a skyscraper office building with a glass, bronze, and marble exterior that Mies designed with Philip Johnson. These buildings exemplify Mies's famous principle that "less is more" and demonstrate, despite their austere and forthright use of the most modern materials, his exceptional sense of proportion and his extreme concern for detail. The International Style, with Mies its acknowledged leading master, reached its zenith at this time. The United States in the 1950s had a faith in material and technical progress that seemed similar to the earlier German notion of *Gesamtkultur.* Miesian-influenced steel-and-glass office buildings appeared all over the United States and indeed all over the world.

Late work. In the 1960s Mies continued to create beautiful buildings, among them the Bacardi Building in Mexico City (1961); One Charles Center office building in Baltimore (1963); the Federal Center in Chicago (1964); the Public Library in Washington, D.C. (1967); and, most Miesian of all, the Gallery of the Twentieth Century (later called the New National Gallery) in Berlin, dedicated in 1968. A heavy man, plagued by arthritis, Mies continued to live near Lake Michigan in Chicago until his death in 1969.

Although Mies attracted a great number of disciples, his indirect influence was perhaps of even greater importance. He is the only modern architect who formulated a genuinely contemporary and universally applicable architectural canon, and office buildings all over the world echo his concepts. His work eventually came under criticism in the 1970s for rigidity, coldness, and anonymity, but it was Mies's declared choice to accept the nature of 20th-century industrial society and express it in his architecture. (W.V.E./Ed.)

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Mieszko, name of rulers of Poland, grouped below chronologically and indicated by the symbol •.

•Mieszko I (b. *c.* 930—d. May 25, 992), Piast prince or duke of Poland (from *c.* 963), who brought Poland into Christendom and expanded the state to the Baltic Sea.

Mieszko accepted Christianity directly from Rome in 966 in order to resist forced conversion by the Germans and the incorporation of Poland into the Holy Roman Empire—the fate of Bohemia. Mieszko expanded the Polish state southward into Galicia at the expense of Bohemia and northward to the Baltic Sea through the incorporation of Pomerania.

•Mieszko II Lambert (b. 990—d. May 10, 1034), king of Poland from 1025 to 1034, grandson of Mieszko I. Somewhat deranged, he was dominated by his wife, the German Ryxa, and let the achievements of his father, Bolesław I, crumble. Much territory was lost to Bohemia and to the Holy Roman Empire. At his death, Poland fell into anarchy.

•Mieszko III, byname MIESZKO THE OLD, Polish MIESZKO STARY (b. 1126/27—d. March 13, 1202), prince of Great Poland from 1173 to 1177 and, during a period of civil war, in 1190/91 and 1194. The brother and successor of Bolesław IV, he was so brutal and despotic that he provoked a revolt of the magnates, who drove him out and tried, with mixed success, to replace him with his brother Casimir II.

mifepristone, drug used for inducing abortion in the first several weeks of pregnancy. Formerly called RU-486 (a name derived from French manufacturer Roussel-Uclaf and a serial number), mifepristone has been available in France for the termination of early pregnancy since 1988. In spite of demonstrated effectiveness and safety, the drug was not approved for use in the United States until 2000 due to protest from anti-abortion groups.

Mifepristone, administered in pill form, blocks the receptors for progesterone, a hormone necessary for the maintenance of pregnancy, and therefore results in the breakdown of the uterine lining. Two days later, the woman is given another drug, usually misoprostol, that induces uterine contractions, causing the uterine lining, along with the embryo, to be shed through the vagina. Along with the necessary effects of abdominal cramping and uterine bleeding, mifepristone may cause gastrointestinal disturbances, headache, and fatigue.

Mifraz̠ Shelomo (Egypt): *see* Ra's Naṣrānī.

Mifune Toshirō (b. April 1, 1920, Tsingtao, Shantung province, China—d. Dec. 24, 1997, Mitaka, near Tokyo, Japan), leading actor in the post-World War II Japanese cinema, known internationally for his flamboyant portrayals of samurai characters, especially in films directed by Kurosawa Akira.

During World War II, Mifune served in the Japanese army. In 1946 he had a small part in *Shin baka jidai* (1947; "These Foolish Times"), and in 1947 he achieved critical recognition and box-office success as the gangster in Kurosawa's *Yoidore tenshi* (1948; *Drunken Angel*). Mifune achieved international recognition for his portrayal of a bandit in the period film *Rashomon* (1950). He is best known for his popular portrayals of samurai in other period films, including *Shichinin no samurai* (1954; *Seven Samurai*), *Musashi Miyamoto* (1956), *Kakushitoride no san akunin* (1958; *The Hidden Fortress*), *Yojimbo* (1961), and *Sanjuro* (1962). He was a highly versatile actor and starred in pictures as diverse as a Japanese adaptation of William Shakespeare's *Macbeth,* titled *Kumonosu Djo* (1957; *Throne of Blood*); *Donzoko* (1957; *The Lower Depths*), based on the play by Maksim Gorky; *Tengoku to jigoku* (1957; *High and Low*), a detective thriller; and *Akahige* (1965; *Red Beard*), his last appearance in a film by Kurosawa.

Mifune Toshirō

Toho Movie Co., Japan

Among international productions Mifune appeared in are *Hell in the Pacific* (1969), *Tora! Tora! Tora!* (1969), *Soleil rouge* (1971; *Red Sun*), *Paper Tiger* (1975), and *Midway* (1976). He also performed in the American television production *Shogun* (1980).

MiG, officially ANPK IMENI A.I. MIKOYANA, formerly OKB-155, Russian aerospace design bureau that is the country's major producer of jet fighters. The design bureau is part of the state-owned multifirm aerospace complex VPK MAPO (Military-Industrial Complex–Moscow Aircraft Production). Headquarters are in Moscow.

The company originated in 1939 as a department within the Moscow-based design bureau of the aviation designer Nikolay N. Polikarpov. Put in charge was the engineer Artem I. Mikoyan, who made as his deputy a close colleague, Mikhail I. Gurevich; the two men remained associated throughout most of their careers. Their first design, a single-engine interceptor, first flew in 1940 and eventually bore the name MiG-1 ("MiG" being derived from the first letters of Mikoyan and Gurevich plus *i,* the Russian word for "and"). In 1942 the department was made an independent design bureau and given the name OKB-155.

After World War II the organization grew rapidly in size and influence. Using captured German technology, Mikoyan and Gurevich produced the first Soviet jet fighter, the MiG-9 (first flown 1946). During the Cold War, OKB-155 developed some of the U.S.S.R.'s most notable high-speed jet fighters, including the MiG-15 (1947), which shocked Western forces in the Korean War with its speed and agility; the MiG-17 (1950), which reached supersonic speeds in tests; the MiG-19 (1953), the first mass-produced Soviet supersonic fighter; and the MiG-21 (entered service 1958), capable of about twice the speed of sound. The design bureau produced more than 9,000 MiG-21s in as many as 32 versions for the Soviet Union and more than 40 other countries, and it licensed a version for production in China. The last major fighters designed under Mikoyan's leadership included the MiG-23 interceptor (entered service 1972), the first Soviet operational variable-wing jet fighter, and the MiG-25 interceptor (introduced 1970), capable of three times the speed of sound.

After Mikoyan died in 1970, the organization produced several new fighters, among them the MiG-29 attack light interceptor and the all-weather MiG-31 fighter-interceptor, both first flown in the 1970s. In the late 1980s its formal name became ANPK imeni A.I. Mikoyana (Aviation Scientific and Production Complex named after A.I. Mikoyan), but it remained commonly known as MiG.

Following the dissolution of the Soviet Union in 1991, MiG restructured its operations. In 1995 it combined with a number of aircraft production plants and the following year became incorporated into the giant VPK MAPO, which consolidated 12 major aerospace firms into a single entity focused on research and development, manufacturing, and marketing of aerospace products. To survive in a strained post-Communist economy, MiG turned to export sales of modernized versions of the MiG-29 and diversified modestly into the civilian passenger plane market. It continued to develop advanced fighter concepts, including the 1.42 (1.44I) multifunctional fifth-generation fighter (first flown 2000).

migmatite, in geology, rock composed of a metamorphic (altered) host material that is streaked or veined with granite rock; the name means "mixed rock." Such rocks are usually gneissic (banded) and acidic rather than basic in composition; they may occur on a regional scale in areas of high-grade metamorphism.

Many migmatites probably represent the partial fusion of the metamorphic host during extreme metamorphism; the components of the rock with the lower melting temperatures are fused and gather to produce the streaks of granite. The migmatites of some Precambrian metamorphic terrains may be the result of this process. Migmatite also can form near large intrusions of granite when some of the magma is injected into the neighbouring metamorphic rocks.

Mignard, Pierre, byname MIGNARD LE ROMAIN (b. Nov. 17, 1610, Troyes, France—d. May 13, 1695, Paris), painter in the classical French Baroque manner, known primarily for his court portraits.

In 1630 Mignard left the studio of Simon Vouet for Italy, where he spent 22 years and made a reputation that brought him a summons to Paris in 1657. Successful with his portrait of Louis XIV and in favour with the court, Mignard pitted himself against Charles Le Brun; he declined to enter the French Royal Academy, of which Le Brun was the head, and he organized the opposition to its authority. In spite of the deserved success of his decorations of the cupola of the Church of Val-de-Grâce (1664), Mignard was excluded from any great share in work for public projects, such assignments being under the control of the new academy. Mignard accordingly was chiefly active in portraiture; many of the beauties and celebrities of his day sat for him, including Molière, the Viscount de Turenne, Jacques Bossuet, the Marquise de Maintenon, the Marquise de Sévigné, and the Marquise de Montespan. His skill and graceful arrangements atoned for his want of originality and lack of character perception.

With the death of Le Brun (1690), Mignard deserted his allies and succeeded to all the posts held by his opponent. These late honours he did not long enjoy. He died while about to commence work on the cupola of the Hôtel des Invalides. His brother Nicolas Mignard (1606–68) and his nephew Paul Mignard (*c.* 1638–91) were also accomplished painters.

Migne, Jacques-Paul (b. Oct. 25, 1800, Saint-Flour, France—d. Oct. 24, 1875, Paris), French Roman Catholic priest who became one of the foremost 19th-century publishers of theological literature.

Migne studied theology at Orléans, France, where he was ordained priest in 1824. He was then assigned to the French parish of Puiseaux. In 1833 he went to Paris and started a newspaper, *L'Univers Religieux* ("The Religious World"). At Petit-Montrouge, near Paris, he opened (1836) a publishing house that produced vast collections of religious works at popular prices. The original establishment was destroyed by fire in 1868, but Migne subsequently founded a new house in Paris.

Migne, engraving by É. Tailland

Giraudon—Art Resource

Migne published, among other works, the *Collection intégrale et universelle des orateurs sacrés,* 99 vol. (1844–66; "Complete and Universal Collection of Sacred Orators"), and the *Encyclopédie Théologique,* 168 vol. (1845–66; "Theological Encyclopedia"). His most celebrated publication, however, is considered to be the *Patrologiae cursus completus* ("Complete Course of the Teachings of the Church Fathers"). This enormous series consists of *Patrologia Latina,* 217 vol. (1844–55; "Collection of the Latin Fathers"), the available works of Latin ecclesiastical writers up to the time of Pope Innocent III; and *Patrologia Graeca,* 162 vol. ("Collection of the Greek Fathers"; Greek text and Latin translation, 1857–66), the writings of Christian Greeks to 1439. The *Patrologiae* is invaluable because its vast scope contains many works nonexistent in other editions.

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Mignet, François, in full FRANÇOIS-AUGUSTE-MARIE MIGNET (b. May 8, 1796, Aix-en-Provence, France—d. March 24, 1884, Paris), historian and archivist whose clarity of exposition influenced French historical studies in the 19th century.

Educated at Avignon, Mignet became professor there in 1815; he returned to Aix for his law studies and was called to the bar in 1818. His first work, the *Essai sur les institutions de Saint Louis,* was acclaimed by the Academy of Inscriptions and Belles-Lettres in 1821, but Mignet left academic life to enter political journalism in Paris. He was joined there by his friend Adolphe Thiers, the future president of France's Third Republic. He worked first on the staff of the *Courrier Français,* a journal that opposed the restoration of the monarchy, and then, with Thiers and Armand Carrel, he founded *Le National* in 1830. This newspaper was instrumental in precipitating the July Revolution, which resulted in the accession of Louis-Philippe as French king. Mignet gave up politics and journalism for historical work, and he was appointed keeper of the archives at the Foreign Ministry, holding this post until his resignation in 1848. Mignet was also elected to the Academy of Moral and Political Sciences in 1832, became its permanent secretary in 1837, and in 1836 was elected to the French Academy.

Mignet's writings include *Histoire de la révolution française,* 2 vol. (1824; "History of the French Revolution"); *Antonio Perez et Philippe II* (1845); *Histoire de Marie Stuart,* 2 vol. (1851; "History of Mary Stuart"), which made use of important unpublished documents; and the *Histoire de la rivalité de François I et Charles-Quint* (1875; "History of the Rivalry Between Francis I and Charles V"). A collection of diplomatic documents, *Négociations relatives à la succession d'Espagne sous Louis XIV,* 4 vol. (1835–42; "Negotiations Relating to the Spanish Succession under Louis XIV"), remains unfinished, but it contains an important introductory essay, reprinted in *Mémoires historiques* (1843; "Historical Memoirs").

Mignon, Abraham (b. June 21, 1640, Frankfurt am Main [Germany]—d. 1679, Wetzlar or Frankfurt am Main), German Baroque still-life painter.

Mignon studied with the still-life painter Jacob Marrel, who took him to Holland about 1660. Mignon then worked with Jan de Heem at Utrecht, where he joined the Guild of St. Luke in 1669. His flower pieces are marked by close observation, careful finish, and delicate handling. His favourite scheme was to introduce roses against a dark background. He also did detailed studies of the forest floor.

mignonette, any of about 60 species of herbs and shrubs making up the genus *Reseda* (family Resedaceae). They are native to Europe, North Africa, and parts of Asia but have been widely introduced elsewhere. Several species have become popular garden flowers.

Mignonette (*Reseda odorata*)

Bernard Alfieri

Mignonettes are annual or perennial plants that reach heights of 30 to 75 cm (1 to 2 feet) and are found in field margins and open grasslands. Their leaves are typically simple in shape and pinnately lobed. Mignonettes bear long spikes—technically racemes—of small white or yellowish green flowers that have orange anthers (pollen sacs). The popular garden mignonette (*R. odorata*) assumes the form of a low dense mass of soft green foliage studded freely with the racemes of flowers. This species is widely grown for its flowers' delicate, musky fragrance and for an essential oil that is used in perfumery. Other species include wild mignonette (*R. lutea*) and white mignonette (*R. alba*).

migraine, a condition marked by painful recurring headaches, sometimes with nausea and vomiting. *See* headache.

migrant labour, casual and unskilled workers who move about systematically from one region to another offering their services on a temporary, usually seasonal, basis. In North America, migrant labour is usually employed in agriculture; it generally involves harvesting activities and is manual, repetitive, easily learned, and demanding of almost no skill. The demand for migrant labour in agriculture stems from the seasonal nature of its worker requirements. In Europe and the Middle East, migrant labour has usually been recruited for urban rather than agricultural employment and involves longer periods of residence. Migrant labour in various forms is found in South Africa, the Middle East, western Europe, the United States, and India.

The economic conditions that favour the demand for migrant labour include those where rapid increases in agricultural production have taken place or where there has been a rapid decrease in the number of farm labourers owing to high urban wages. The supply of migrant labour, on the other hand, is influenced by unfavourable economic and social conditions existing in the home base of such labourers.

The labour market for migrant workers in agriculture is notably disorderly, partly because such workers' employment relationships are so ephemeral. Most migrant labourers have no reemployment rights, are usually not organized in unions, and have little systematic access to job seeking. Middlemen, job brokers, labour contractors, and crew leaders arise out of this fundamental disorganization of this labour market. Labour contractors, in addition to bringing the workers together, transporting them, supervising them, and dispensing their pay, also search out the employers and negotiate wages and working conditions.

The wages, working conditions, and standard of life of migrant workers tend to be lower than those of other groups of workers. Migrants often must work long hours under exacting requirements. In some countries, particularly India, child labour is widespread among migrant labourers, and even in the United States those children who do not work often do not go to school, because in most localities the schools are open only to local residents. Migrant labourers' housing often amounts to little more than a roof over one's head. Literacy levels, social cohesion, and rates of political participation are exceptionally low among migrant workers.

Contributing to these ills is the fact that the migrants, whether national or foreign-born, are fundamentally alien to the community in which they work. The local population, if eager to see them come, is even more eager to see them go. Migrant workers have difficulty gaining access to local health and social services, are often deprived of their rights, do not enjoy easy recourse to the courts, and are abused by exploitative employers.

The fact that the migrant worker is "here today and gone tomorrow" makes the regulation of his working and living conditions difficult. Union- and government-established labour standards available to regular industrial and agricultural workers generally do not exist for migrant labour. Government authorities on all levels generally acknowledge the existence of serious social problems associated with migrant labour, yet claim that they are unable to deal with them effectively. Where social legislation has been passed and improvements have been achieved in the lives of migrants, the major effect has been to force employers to provide more housing and sanitary facilities and to regularize the activities of the labour contractors.

In the Northern Hemisphere migrant labour moves seasonally from south to north following the harvest (in the Southern Hemisphere the pattern is reversed). Within this broad direction most migrant workers move in well-established patterns. In the United States, for example, workers may winter in Florida to help pick citrus crops and then, joined by others from Texas and Puerto Rico, move northward into New England as far as Maine, harvesting tomatoes, potatoes, apples, and other farm produce. Another large stream of workers from Texas sets out in the spring for the north-central, mountain, and Pacific states, harvesting fruits, vegetables, sugar beets, and cotton. A third stream of migrants works on harvesting vegetables, moving from southern California northward through the Pacific Coast states.

In the United States, owing chiefly to the increased use of mechanization in farming, less than 500,000 persons are still occupied in migrant labour; in the 1940s there were more than 1,000,000, and in the 1920s there were twice that number. Some of the migrant workers employed are American citizens of Mexican descent, while many others are illegal immigrants from south of the border. Most are younger than 30, males predominate, and a majority of these have less than eight years of schooling. In common with those of other countries, many migrant workers in the United States suffer from underemployment, inadequate housing, and exclusion from normal community life. They usually work for low wages and have average annual incomes that amount to only a fraction of those of most American workers. The lot of migrant workers in the United States has nevertheless improved since the 1960s, when labour unions began to try to organize the migrants, and some states and localities established special committees to implement and expand social legislation benefiting them.

Patterns of migrant labour on other continents have differed substantially from those in North America, with urban (rather than agricultural) employment accounting for a much greater share of such work. Migrant labour was used on a massive scale in South Africa, where black workers were drawn from rural areas to work in cities in which they lacked residence rights. This racially determined migrancy was a cornerstone of the apartheid system in the second half of the 20th century and forced millions of black workers to shuttle between their impoverished black "homelands" and the cities, where they enjoyed only the minimal rights common to most migrant workers.

More benign forms of migrancy flourished in Europe and the Middle East in the second half of the 20th century. In West Germany, for instance, where rapid industrial growth in the decades after World War II produced a severe labour shortage, several million workers were drawn from Turkey, Greece, Italy, and Yugoslavia to jobs there. The same phenomenon drew many workers to France from North Africa, Spain, and Italy, while Britain took workers from its former colonies in South Asia, Africa, and the West Indies. After western Europe's economic growth tapered off in the 1970s, the presence of so many foreign workers became a source of social tension in some of their host countries. An even more dramatic example of migratory employment occurred in the oil-rich countries of the Persian Gulf in the 1970s and '80s; millions of workers from Egypt, Yemen, Jordan, Pakistan, and other Muslim countries migrated to work in the rapidly expanding economies of Saudia Arabia, United Arab Emirates, Libya, Iraq, and Kuwait.

India still probably has more migrant workers in agriculture than any other Asian country; these are involved mainly in the harvesting of tea, cotton, and rice. In Australia and the southernmost nations of Latin America, migrants work on ranches more often than on farms and are engaged in wool shearing and meat processing.

migration, in ethology, the regular, usually seasonal, movement of all or part of an animal population to and from a given area. Familiar migrants include many birds; hoofed animals, especially in East Africa and in the Arctic tundra; bats; whales and porpoises; seals; and fishes, such as the salmon.

A brief treatment of migration follows. For full treatment, *see* MACROPAEDIA: Behaviour, Animal.

Most migration is horizontal, but the patterns of migration vary widely among animal groups. Marine invertebrates such as plankton are simply carried by ocean currents; certain species travel only during certain seasons, while others combine the two modes. Crustaceans, including those that normally live on land, migrate to reproduce in seawater. Insects migrate to breed, feed, or hibernate. Migratory fish may be classified according to whether they live and migrate entirely in the sea (*e.g.,* herring), live in the sea and migrate to freshwater to spawn (salmon), or live in freshwater and breed in the sea (certain eels). Most reptiles and amphibians are unable to travel great distances and thus do not migrate; many species of frogs and toads, however, make annual migration-like movements to breeding ponds and lakes, and sea turtles make prodigious migrations to reach their breeding grounds.

Migration is most highly developed among birds, many species of which migrate annually between their breeding grounds in higher latitudes and wintering grounds in lower latitudes. Northern Hemisphere birds tend to go south for the winter, and tropical birds migrate according to the cycle of wet and dry seasons. Pelagic, or open-sea, birds travel much greater distances than coastal birds, which stick close to land though they may change altitude. During migration, even the most individualistic birds become gregarious; some, like ducks and cranes that fly in the well-known V-shape pattern, are extremely cohesive.

It is not fully understood how migrating animals find their way over long and complex routes. A compass sense has been demonstrated in birds, which navigate by the position of the Sun, stars, and the Earth's magnetic field, similar mechanisms are used by some insects, crustaceans, and fish. Migrating land animals, on the other hand, may depend on scented trails and landmarks over short distances. Migration is part of the life cycle of an animal. It is controlled by the pituitary gland in a cyclical pattern related to seasonal changes in daylight, but it may be modified by environmental conditions, such as sudden cold weather, which will stimulate early departure. Migration has great ecological significance; it results in the optimal use of food surpluses and enables fast-moving animals to live for a time in otherwise unsuitable regions.

migration, human: *see* human migration.

Miguel (Portuguese personal name): *see under* Michael.

Mihai (Romanian personal name): *see under* Michael.

Mihailo, also spelled MIHAJLO (Serbo-Croatian personal name): *see under* Michael.

Mihailovgrad, also spelled MIHAJLOVGRAD (Bulgaria): *see* Montana.

Mihailović, Dragoljub, Mihailović also spelled MIHAJLOVIĆ, byname DRAŽA (b. March 27, 1893, Ivanjica, Serbia—d. July 17, 1946, Belgrade, Yugos.), army officer and head of the royalist Yugoslav underground army, known as the Chetniks (*q.v.*), during World War II.

Having fought in the Balkan Wars (1912–13) and World War I, Mihailović, a colonel at the time of Germany's invasion of Yugoslavia (April 1941), refused to acquiesce in the capitulation of the Yugoslav army. He organized the royalist Chetniks, who operated mainly in Serbia. He was appointed general in 1941 and minister of war that same year by King Peter's Yugoslavian government-in-exile.

Both the Chetniks under Mihailović and the communist-dominated Partisans, who were led by Josip Broz Tito, resisted the occupying German forces, but political differences led to distrust and eventual armed conflict between them. Reports of Chetnik resistance in the early stages of occupation buoyed the Allies and made of Mihailović a heroic figure. Fearful, however, of brutal reprisals against Serbians, Mihailović came to favour a restrained policy of resistance until the Allies could provide more assistance; the Partisans supported a more aggressive policy against the Germans. Favouring the latter policy and confronted with reports of Chetnik collaboration (particularly in Italian-held areas) directed against the Partisans, the Allies switched their support from Mihailović to Tito in 1944. After the war Mihailović went into hiding. He was captured by the Partisans on March 13, 1946, and charged by the Yugoslav government with treason and collaboration with the Germans. Although a U.S. commission of inquiry cleared Mihailović and those under his immediate command of the charge of collaboration, the issue is still disputed by some historians. Mihailović was sentenced to death and was executed in Belgrade in 1946.

Mihalache, Ion (b. March 3, 1882, Topoloveni, Rom.—d. 1953?, Galați), Romanian statesman and popular political leader and founder of the Peasant Party.

In 1918 Mihalache formed the Peasant Party of the old Regat (Moldavia-Walachia, within the territories acquired from Austria-Hungary, Russia, and Turkey); the party had much success in the elections of November 1919. While he was minister of agriculture in the Peasant-Transylvanian National coalition government (1919–20), his proposed land reforms disquieted King Ferdinand and the conservative interests and led to the so-called royal coup d'état of March 1920, in which the rightist general Alexandru Averescu was installed as premier. In October 1926 Mihalache became vice president of the National Peasant Party, formed by the fusion of his Peasant Party with the Transylvanian Nationals. In 1928–30, in the first cabinet of Iuliu Maniu, he served again as minister of agriculture, and between 1930 and 1933 he served as interior minister under three governments. He refused to participate in the corporatist dictatorship of King Carol II and during World War II joined the underground liberation movement against General Ion Antonescu's military dictatorship.

After the installation of a communist regime in 1945, he planned with Maniu a Romanian government-in-exile but was arrested and imprisoned in November 1947. He died in Sighet prison, probably in 1953.

Mihara, city, Hiroshima *ken* (prefecture), Honshu, Japan. It is located on the mouth of the Nuta River, at the Bingo Channel of the Inland Sea. The city grew around Mihara Castle (1582), and in the 17th century large tracts of land in the locality were brought under cultivation. Mihara has long been an important Inland Sea port; the construction of a wharf at Itozakichō (1864) and a major railway (1894) contributed to its prosperity. By the early 20th century, numerous factories were established, producing fibres, cement, and rolling stock. Chemical factories began operation in the early 1970s. Pop. (1990) 85,518.

Mihira: *see* Varāhamihira.

miḥnah, any of the Islāmic courts of inquiry established about AD 833 by the ʿAbbāsid caliph al-Maʾmūn (reigned 813–833) to impose the Muʿtazilite doctrine of a created Qurʾān (Islāmic sacred scripture) on his subjects.

The Muʿtazilites, a Muslim theological sect influenced by the rationalist methods of Hellenistic philosophy, taught that God was an absolute unity admitting of no parts. This rationale was brought to bear on the problem of God's Word, the Qurʾān: because the Word is God and not a part of Him, the Qurʾān, as a verbal expression and thus a material thing removed from God, had to be created by God in order to be accessible to man. In contrast, the traditionalist view held that the Qurʾān was uncreated and external, essentially, that it had existed along with God since the beginning of time.

Al-Maʾmūn adopted the Muʿtazilite view and demanded that all judges and legal scholars in the empire submit to questioning to determine the soundness of their positions. Most acquiesced, utilizing the principle of taqiya (concealment of one's beliefs under duress) to avoid imprisonment. When al-Maʾmūn died, the new caliph, al-Muʿtaṣim (reigned 833–842), continued the policies of his brother. The caliph al-Wāthiq (reigned 842–847) also vigorously enforced the *miḥnah,* in one case trying himself to execute a man he considered a heretic. The inquisition continued until about 848, when al-Mutawakkil (reigned 847–861) made the profession of the Muʿtazilite view of a created Qurʾān punishable by death. *See also* Muʿtazilah.

mihrab, Arabic MIḤRĀB, prayer niche in the qibla wall (that facing Mecca) of a mosque; mihrabs vary in size but are usually ornately decorated. The mihrab originated in the reign of the Umayyad prince al-Walīd I (705–715), during which time the famous mosques at Medina, Jerusalem, and Damascus were built. The structure was adapted from the prayer niches common to the oratories of Coptic Christian monks. *See also* mosque.

Mijikenda (people): *see* Nyika.

Mikael SEHUL (b. *c.* 1692—d. 1784, Adowa, Eth.), nobleman who ruled Ethiopia for a period of 25 years as regent of a series of weak emperors. He brought to an end the ancient Solomonid dynasty of Ethiopia, which had ruled for 27 centuries, and began a long period of political unrest.

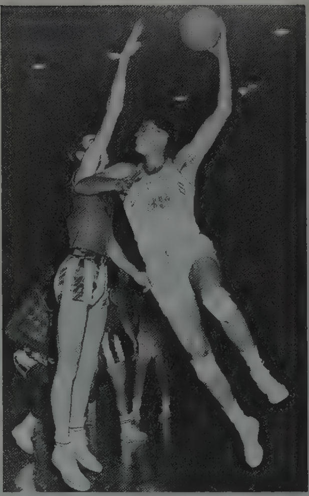
In the reign of Iyoas (1755–69), son of the last Solomonid emperor, Mikael was called to aid the emperor in resisting a takeover of power by the Oromo (Galla) peoples of the south, who were traditionally Islāmic and enemies of the Christian north. Mikael took this opportunity to occupy the capital with his own troops and had himself proclaimed regent. When Iyoas attempted to have Mikael assassinated, Mikael had Iyoas tried and hanged (1769) and selected the next three emperors, Yohannes II, Tekle Haimanot II, and Tekle Giorgis, whom he controlled until his fall. In 1784 a coalition, initiated by Oromo nobles, defeated him in battle. He was allowed to return to his native Tigray province as governor, where he died.

Mīkāl, also spelled MĪKĀʾĪL, in Islām, the archangel who was so shocked at the sight of hell when it was created that he never laughed again. In biblical literature Michael is the counterpart of Mīkāl. In Muslim legend, Mīkāl and Jibrīl were the first angels to obey God's order to worship Adam. The two are further credited with purifying Muḥammad's heart before his night journey (*isrāʾ*) from Mecca to Jerusalem and subsequent ascension (*miʿrāj*) to heaven. He also is remembered as aiding the Muslims to their first significant military victory in Arabia in 624.

The single allusion to Mīkāl in the Qurʾān (2:98) states: "Whoever is an enemy of God or his angels or his apostles or Jibrīl or Mīkāl, verily God is an enemy of the unbelievers." This has generated several explanatory legends that revolve around the Jews, who hold Michael in particular esteem as "the lord of Israel." In one story Muḥammad is questioned by Jews about his prophetic mission and answers them quite satisfactorily. But when he says that Jibrīl is the bearer of his revelations, the Jews attack the archangel as the spirit of destruction and the foe of Michael, the angel of fertility. On another occasion the caliph ʿUmar is reported to have asked the Jews of the synagogue of Medina how Mīkāl and Jibrīl were regarded by God. The Jews replied that Michael sat at God's left and Gabriel at his right but that the two were enemies. Whereupon ʿUmar revealed the falseness of their position and said that an enemy of either angel was immediately an enemy of God.

Mikan, George, in full GEORGE LAWRENCE MIKAN (b. June 18, 1924, Joliet, Ill., U.S.), American professional basketball player and executive who was selected in an Associated Press poll in 1950 as the greatest basketball player of the first half of the 20th century. Standing about 6 feet, 10 inches, he was the first of the outstanding big men in the post-World War II professional game.

Mikan received his undergraduate and legal education at De Paul University, Chicago. After a brief period with the Chicago American Gears of the professional National Basketball League (NBL), he joined the Minneapolis Lakers, a team that was successively in the NBL, the Basketball Association of America (BAA), and, from 1949, the National Basketball Association (NBA). In nine seasons he scored 11,764 points in 520 regular games for an average of 22.6 points a game, and 2,141 points in 91 championship games for a 23.5-point average. With Mikan at centre, the Lakers won six championships from 1947–48 through 1953–54 (1950–51 season excepted). Having retired as a player in 1956, he coached the Lakers for part of the 1957–58 season.


Mikan (with ball), 1949
AP/Wide World Photos

When the professional American Basketball Association (ABA) was founded on Feb. 2, 1967, Mikan was named its commissioner (chief executive). He resigned on July 14, 1969, because the ABA office was to be moved to New York City from Minneapolis, where he was a successful lawyer and businessman.

Mikawachi porcelain, Japanese porcelain of the Tokugawa period (1603–1867) from the kilns at Mikawachi on the island of Hirado, Hizen province, now in Nagasaki prefecture. Although the kilns were established by Korean potters in the 17th century, it was not until 1751, when they came under the patronage of the prince of Hirado, that they began to make the all-white and the blue-and-white wares for which they are famous. The body of Mikawachi ware is of fine-grained, extremely white porcelain that is usually decorated with miniature-style paintings of landscapes, trees and flowers, or figures in a delicate underglaze blue. The figure paintings are the most characteristic, especially those of Chinese boys at play (*karo-ko*). Relief decoration and colour glazes, particularly dark brown, were also used. Water droppers, small incense burners, brush sets, ink palettes, and modeled animal figures were among the many objects produced. The period of patronage lasted until 1843, at which time the quality of Mikawachi porcelain declined.

Mike Fink (folklore hero): *see* Fink, Mike.

Mikhail (Russian personal name): *see under* Michael.

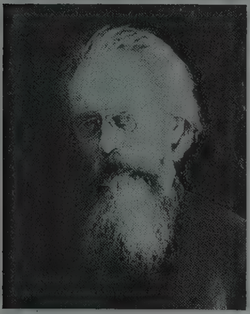
Mikhailovka (Russia): *see* Mikhaylovka.

Mikhailovskii, Nikolai Konstantinovich: *see* Mikhaylovsky, Nikolay Konstantinovich.

Mikhaylovgrad (Bulgaria): *see* Montana.

Mikhaylovka, also spelled MICHAJLOVKA, or MIKHAILOVKA, city, Volgograd *oblast* (province), western Russia, on the Medveditsa River and the main highway between Voronezh and Volgograd. Its main industries are flour milling, canning, and meatpacking. Limestone quarries located near the city are the basis for a number of cement factories. Pop. (1991 est.) 58,700.

Mikhaylovsky, Nikolay Konstantinovich, Mikhaylovsky also spelled MIKHAILOVSKII (b. Nov. 27 [Nov. 15, Old Style], 1842, Meshchovsk, Russia [now in Russian S.F.S.R.]—d. Feb. 10 [Jan. 28], 1904, St. Petersburg), Russian literary critic and publicist whose views provided much of the theoretical basis for the Populist (Narodnik) movement.



Mikhaylovsky, detail of a portrait by N.A. Yaroshenko, 1893; in the State Literature Museum, Moscow

Novosti Press Agency

Born into a noble family and trained as a mining engineer, Mikhaylovsky began writing for the press in 1860. From 1868 to 1884 he was associated with the widely read St. Petersburg literary journal *Otechestvennye Zapiski* ("Native Notes"). Building upon the critical traditions established by N.G. Chernyshevsky and N.A. Dobrolyubov, he viewed the writer as the moral judge of society and viewed literature as an expression of conscience, in which the writer analyzed reality from the standpoint of a particular subjective ideal. His most celebrated pieces were "The Left and Right Hand of Count Leo Tolstoy" (1873), which accurately predicted Tolstoy's later social doctrines, and "A Cruel Talent" (1882), a criticism of Fyodor Dostoyevsky's *The Possessed.*

Although he took no personal part in revolutionary or illegal activities, his provocative pieces and well-known sympathies were highly influential. Opposed to the social implications of evolutionary theory, Mikhaylovsky held that history followed no predetermined pattern; his faith in individualism and rationalism gave a liberal cast to the Populist (Narodnik) ideology of his followers. Mikhaylovsky championed the obligations of the nobility toward the people; he also set himself at variance with Marxism in his call for the Russian intelligentsia to draw upon the strength, values, and institutions of the peasantry in the struggle for progress and social change.

Mikhaylovsky was temporarily banished from St. Petersburg (1882 and 1891) for his ties to revolutionary organizations, but in 1892 he became the editor of the liberal populist journal *Russkoye bogatstvo* ("Russian Wealth"), a post he held until his death.

Miki, city, Hyōgo *ken* (prefecture), western Honshu, Japan. The town developed around a castle built by Bessho Naganori in 1468 and captured by the Hideyoshi clan in 1580. Subsequently, the economy centred on hardware manufacture, and, during the Meiji period (1868–1912), the city was a major supplier of hardware in Japan. After World War II the industry declined, and Miki was restructured as a satellite city of metropolitan Kōbe. Pop. (1990) 76,509.

Miki Kiyoshi (b. Jan. 5, 1897, Hyōgo prefecture, Japan—d. Sept. 26, 1945, Tokyo), Marxist philosopher who helped establish the theoretical basis for the noncommunist democratic-socialist movement popular among workers and intellectuals in Japan after World War II.

After graduating from Kyōto Imperial University, Miki studied in Germany and then returned to Japan, where in 1927 he became a professor of philosophy at Hosei University in Tokyo. In 1928 he launched the influential review *Shinkō kagaku no hata no moto ni* ("Under the Flag of the Rising Science") to promote Marxist socialism, and over the next several years he wrote a series of books, all designed to show Marxism as the inevitably prevailing philosophy. He also began to gain a tremendous following.

Miki's liberal attempts at synthesizing democracy and socialism, however, brought his expulsion (1930) from the communist circle of the Proletariat Science Institute. Ironically, the same year, he was arrested by the government as a communist supporter and held for six months. Returning to the university, he opposed the increasing power of the military, but in 1942 he was drafted by the army press to work in the Philippines for a year. By the end of his tour of duty, his opposition to the government had grown more muted; nevertheless, this did not prevent his being arrested again in 1945 for having sheltered a communist. He died in Toyotama Prison 40 days after the war ended.

Miki Takeo (b. March 17, 1907, Donari, Japan—d. Nov. 13, 1988, Tokyo), politician, prime minister of Japan from December 1974 to December 1976.

The son of a Shikoku landowner, Miki attended Meiji University in Tokyo, as well as American universities, earned a law degree in 1937, and was elected to the Diet a few months later. He publicly opposed the war against the United States, and thus his political career, unlike those of many others, was not interrupted or destroyed by the postwar American occupation. At various times of his life he occupied 10 Cabinet posts, including the Ministry of International Trade and Industry and the Foreign Ministry (1966–68).

In the general election of July 1974 the Liberal-Democratic Party (LDP), which had governed Japan since 1955, suffered a severe setback, losing many seats in the Diet (though retaining their majority). Miki, then deputy prime minister, resigned from the Cabinet in protest at the heavily financed electoral campaign directed by Prime Minister Tanaka Kakuei and at rumours about Tanaka's alleged financial irregularities. In retrospect this was seen as the first of a chain of events that led to the resignation of Tanaka in the following December. The Liberal-Democrats, ridden by financial scandal and deeply divided, elected the irreproachable Miki as a compromise candidate to succeed Tanaka in the LDP presidency and the prime ministry.

As prime minister Miki planned to reform the LDP, and he pushed the government inquiry into the developing scandal over Tanaka's acceptance of large bribes paid to him by high executives of the Lockheed Aircraft Corporation. But despite these efforts, Tanaka's indictment in August 1976 deeply hurt the LDP at the polls; in the general election of December 1976, the Liberal-Democrats won only 249 of the 511 seats in the Diet. Miki, accepting responsibility for the decline in the party's power, resigned.

Mikimoto Kōkichi (b. January 1858, Mie prefecture, Japan—d. Sept. 21, 1954, near Nagoya), Japanese pearl farmer and merchant who introduced the commercial production of cultured pearls.

In 1892, by inserting semiglobular mother-of-pearl beads into pearl oysters, he succeeded in inducing the oysters to form half pearls around the irritating foreign substance. Tokichi Nishikawa, his son-in-law, perfected the technique of producing wholly spherical cultured pearls. Mikimoto strictly maintained the high quality of his pearls, exhibited them at international expositions, and established sales offices abroad. Although his monopoly in the cultured pearl business was gradually broken, until his death he continued research to improve the quality of Mikimoto pearls.

Mikkeli, Swedish SANKT MICHEL, *lääni* (province), southeastern Finland, encompassing the major part of the Savo forest region. It has a land area of 6,310 square miles (16,342 square km); approximately one-third of the province is occupied by the Saimaa and Päijänne lake systems. Principal towns are Mikkeli, the administrative capital; Savonlinna, a lake port, rail junction, and tourist centre; and Heinola, a rail terminus and resort centre. Local industry includes forestry and the manufacture of wood products; metalworking, food processing, and the quarrying of limestone, granite, and graphite are also important. Pop. (1991 est.) 208,345.

Mikkeli, Swedish SANKT MICHEL, town, capital of Mikkeli *lääni* (province), southeastern Finland, northeast of Helsinki. Mikkeli received its town charter in 1838 and became the administrative capital of the province in 1843. It was the site of the Battle of the Porrassalmi Canal (1789), in which the Finns defeated a much larger Russian force. The town is the seat of a Lutheran bishopric and has a regional museum. Local industry includes plywood milling and granite quarrying. Tourist activities centre on skiing. Pop. (1991 est.) mun., 31,904.

Mikkelsen, Ejnar (b. Dec. 23, 1880, Vester-Brønderslev, Den.—d. May 3, 1971, Copenhagen), Danish polar explorer and author.

Mikkelsen went to sea at the age of 14. He was inspired by dreams of polar exploration, and at age 16 he walked the 320 miles (515 km) from Stockholm to Göteborg in an unsuccessful attempt to persuade S.A. Andrée to take him on the latter's Arctic balloon flight. In 1900, however, G.C. Amdrup took him on the Danish expedition to east Greenland. In 1901–02 Mikkelsen was a member of the Baldwin-Ziegler expedition to Franz Josef Land. He served as chief officer of the international hydrographic expedition to the North Atlantic in 1903–04. He then led the Anglo-American polar expedition (1906–08); his sledge journey of several hundred miles over the ice of the Beaufort Sea established that, contrary to previous reports, there was no land north of Alaska. He described this expedition in *Conquering the Arctic Ice* (1909).

Mikkelsen's most notable exploit belongs to the expedition that he led to northeast Greenland in 1909–12 to look for the maps and diaries left there by the explorer Ludwig Mylius-Erichsen in 1907. Mikkelsen found these, but, when he and his only companion, I.P. Iversen, returned to their base on the coast, they found their ship crushed by ice and no sign of the remaining members of the expedition, who had in fact returned home on a sealing vessel. The two men survived a further two winters in Greenland, suffering great hardships, and were rescued by a Norwegian sealer after nearly all hope for them had been abandoned. Mikkelsen recounted this adventure in *Lost in the Arctic* (1913).

After further years at sea and after practicing as a journalist, Mikkelsen led an expedition in 1924 to establish an Eskimo settlement at Scoresby Sound in east Greenland, and in 1932 he led a scientific expedition to southeast Greenland. He later served as inspector general for east Greenland (1934–50). He took an active role in the resettlement of Eskimos along Greenland's east coast. Among his other books were *Frozen Justice* (1922) and *Two Against the Ice* (1957).

Miklas, Wilhelm (b. Oct. 15, 1872, Krems, Austria—d. March 20, 1956, Vienna), statesman who served as president of the first Austrian republic (1928–38).

A member of the Christian Social Party, Miklas sat in the Reichsrat (parliament) during the late years of empire (1907–14), and, after 1919, in the Nationalrat (lower house) of the new Austrian republic. He was president of the Nationalrat when he was elected to the federal presidency. Despite the increased powers granted the president by the constitutional revision of 1929, he remained little more than a figurehead, drifting unprotestingly with the rightward, anti-constitutional current of Austrian politics after 1930. When Austria was united with Nazi Germany, in 1938, he was forced to resign from office, and thereafter he retired from public life.

Mikołajczyk, Stanisław (b. July 18, 1901, Holsterhausen, near Gelsenkirchen, Ger.—d. Dec. 13, 1966, Washington, D.C.), Polish statesman, who tried to establish a democratic, non-Soviet regime in Poland after World War II.

Coorganizer and leader of the Peasant Party (1931–39) and a member of the Sejm (Diet), Mikołajczyk fled to London after the German invasion of Poland in 1939. He served as minister of the interior of the Polish government in exile and then became prime minister (1943–44).

On June 27, 1945, Mikołajczyk returned to Poland and joined the Communist-dominated provisional government as second deputy premier and minister of agriculture and land reform. At the Potsdam Conference, he tried to press the interests of a free Poland, a condition that was agreed upon but ignored. Mikołajczyk's Peasant Party members, as the only organized non-Communist opposition, suffered from repeated intimidation and arrests. When the manipulated election of 1947 foreshadowed a Stalinist takeover, Mikołajczyk fled to England and then to the United States. He was the author of *The Pattern of Soviet Domination* (1948).

Mikon (Greek painter): *see* Micon.

Míkonos, also spelled MYKONOS (Greek: White Island), island, one of the smaller of the eastern Cyclades (*q.v.*) group of Greek islands in the Aegean Sea. According to legend it is the piece of rock thrown by Heracles to destroy the Giants. It is a rugged granite mass, about 33 sq mi (85 sq km) in area, lying next to Dhílos (Delos) and between Tínos to the northwest and Naxos and Páros to the south. Míkonos has several beaches and on the north coast the Gulf of Pánormos forms a deep indentation. The Ionians, who worshipped Dionysus, were the first to settle on the island; in 426 BC the Athenians transferred the remains of the dead buried at the shrine on Delos to Rheneía, near Míkonos. During the Frankish period around AD 1253 the island passed to the dukes of Naxos, and later it was attached to Venice. During the Greek War of Independence at the beginning of the 19th century, the people of the island, led by Manto Maroghenious, repulsed a Turkish attack. The Rococo church of Paraportiani, near the seashore, is the main church on the island. It consists of four chapels with curved vaults and coloured cupolas. There are also about 360 churches built by sailors and their families, honouring vows made during Aegean storms. Architectural attractions of the island include the Tria Pighadia (Square of the Three Wells); Venetia, a line of old houses with wooden balconies; and the hill of windmills. Míkonos has poor soil and is ill-supplied with water; it thus has little agriculture, the major crops being barley, grapes, and figs. Manganese is mined, but tourism is the chief economic activity. The island is the point of departure for the shrines of the sacred island of Delos, and so has air service from Athens, as well as boat connections to other islands of the Cyclades. Local specialties known throughout Greece include almond cookies called *amygdalato*, and colourful hand-woven garments, napkins, and rugs. A branch of the school of Fine Arts at Athens is located at Míkonos and enrolls students from around the world. The folkloric emblem of Míkonos is the pelican, nicknamed Petros. Pop. (1981) 5,503.

Mikoyan, Anastas Ivanovich (b. Nov. 25 [Nov. 13, old style], 1895, Sanain, Armenia—d. Oct. 21, 1978, Moscow), Old Bolshevik and highly influential Soviet statesman who dominated the supervision of foreign and domestic trade during the administrations of Joseph Stalin and Nikita S. Khrushchev.

Mikoyan abandoned the priesthood to join the Bolshevik Party in 1915 and to become one of the chiefs of the revolutionary movement in the Caucasus. In 1918 he was arrested by British troops that had intervened in the Russian Civil War. After his release, he went to work in the Communist Party organization.

Mikoyan, 1962
Keystone

Mikoyan's support of Stalin in the power struggle of the early 1920s earned him a post in the Central Committee of the party in 1923. He was appointed people's commissar for external and internal trade in 1926, and thereafter consistently held posts relating to that field. In 1935 he was elected a member of the Politburo, serving as its specialist on trade matters. Appointed to the State Defense Committee (February 1942), which ruled the Soviet Union during World War II, Mikoyan supervised the procurement and transport of supplies to the armed forces. In 1946 he became deputy premier (*i.e.,* vice chairman of the Council of Ministers), with responsibility for directing the country's trade.

Although Mikoyan was apparently in danger of losing Stalin's favour, Stalin died (March 1953) before he could purge him, and Mikoyan was able to become minister of trade and deputy premier in the post-Stalin government and to retain his membership in the party's Presidium (formerly the Politburo). He subsequently supported Khrushchev in his rise to power, and ultimately became Khrushchev's close adviser and a first deputy premier of the Soviet Union.

After Khrushchev was removed, Mikoyan held the largely ceremonial position of chairman of the Presidium of the Supreme Soviet from 1964 to December 1965. Although he was excluded from the party's Presidium in April 1966, he remained a member of the Central Committee and continued to be honoured as a high official at public ceremonies. After his death in 1978, Mikoyan was not accorded interment in the Kremlin wall, the traditional resting place for the most honoured Soviet leaders: he was buried in the Novodevichy Cemetery, Moscow, site of the graves of second-rank public figures, including that of Khrushchev.

Miksa (Hungarian personal name): *see under* Maximilian.

Mikszáth, Kálmán (b. Jan. 16, 1847, Szklabonya, Hung.—d. May 28, 1910, Budapest), novelist, regarded by contemporaries and succeeding generations alike as the outstanding Hungarian writer at the turn of the century. He studied law but soon took up journalism. In 1887, already famous, he was elected to the National Assembly.

Mikszáth scored his first success with two volumes of short stories entitled *A tót atyafiak* (1881; "The Slovak Kinsfolk"), and *A jó palócok* (1882; "The Good Palócs"). In 1894 he published his first novel, *Beszterce ostroma* ("The Siege of Beszterce"), the story of an eccentric Hungarian aristocrat. Mikszáth's early art is romantic. Toward the end of the century he became more realistic as the writer of everyday life, which he described with understanding and sympathy, though he did not hesitate to pillory the shortcomings of society with sharp-witted satire.

Only toward the end of his life did Mikszáth succeed in creating such full-sized novels as his two principal works *Különös házasság* (1900; "A Strange Marriage") and *A Noszty fiu esete Tóth Marival* (1908; "The Noszty Boy and Mary Tóth"). The first of these works is set in early 19th-century Hungary and deals with the fight of two lovers against the oppressive forces of society. The second tells the story of a frivolous young noble who tries to make a fortune by seducing a rich middle-class girl. Mikszáth's last work, *A fekete város* (1910; "The Black City"), is the finest of his historical novels.

Mikulicz-Radecki, Johannes von (b. May 16, 1850, Czernowitz, Rom.—d. June 4, 1905, Breslau, Ger.), Polish surgeon whose innovations in operative technique for a wide variety of diseases helped develop modern surgery. At the University of Vienna (M.D., 1875) he assisted the German founder of abdominal surgery, Theodor Billroth (1875–82), and did much to popularize Joseph Lister's antiseptic methods.

Professor of surgery at the universities of Kraków (1882–87), Königsberg (1887–90), and Breslau (1890–1905), Mikulicz contributed prodigiously to cancer surgery, especially on organs of the digestive system. He was first to suture a perforated gastric ulcer (1885), surgically restore part of the esophagus (1886), remove a malignant portion of the colon (1903), and describe what is now known as Mikulicz' disease, a symmetrical swelling of the lacrimal (tear) and salivary glands caused by an overgrowth of lymph tissue. He also developed (1881) improved models of the esophagoscope and gastroscope, instruments introduced into the alimentary canal to view the esophagus and stomach, respectively.

mikvah, also spelled MIKVEH, or MIQWE ("collection [of water]"), in Judaism, a pool of natural water in which one bathes for the restoration of ritual purity. The Mishna (Jewish code of law) describes in elaborate detail the requirements for ritually proper water and for the quantity of water required for ritual cleansing. In former times, a *mikvah* was so essential to each community of Jews that, if necessary, a synagogue could be sold to finance its construction.

With the destruction of the Second Temple of Jerusalem in AD 70, many laws of ritual purity lost their relevance. Consequently, ritual bathing in modern times is much restricted. Traditionally observant Jews, however, still use the *mikvah*, and converts are required by Halakha (legal tradition) to undergo a ritual bath. Males bathe each Friday and before major festivals, while women use the *mikvah* (as the law prescribes) before their wedding, after childbirth, and following menstruation.

mīlād (Islām): *see* mawlid.

Milan, Italian MILANO, city, capital of Milan province and of Lombardy region (Lombardia), northern Italy. Milan is the leading financial centre of Italy and its most prosperous manufacturing and commercial city. Milanese assert that it is the ideological, if not the actual, capital of Italy. Settled by the Gauls in about 600 BC, the site has had a long and often turbulent history.

A brief treatment of Milan follows. For full treatment, *see* MACROPAEDIA: Milan.

Milan is situated north of the Po River in the heart of the Po Basin, halfway across the plain spreading between the Ticino and the Adda rivers. To the north lies the great sweep of the southern flank of the Alps. Milan's winters are chilly and damp and its summers hot and humid.

Milan owes its economic supremacy largely to its geographical position at the centre of the transportation routes of the Val Padana (Po Valley). Italy's principal commercial and financial centre, Milan has the country's largest stock market. It also is an internationally renowned centre of fashion and design. Major industries include the manufacture of vehicles, electric appliances, textiles and clothing, and chemicals and related items. Papermaking and publishing, food processing, production of rubber goods, telecommunications, and tourism are also important.

The course of walled fortifications can still be traced in contemporary streets. The 15th-century Castello Sforzesco and the 14th-century Duomo (cathedral), the great Piazza del Duomo (1489), and the commercial Piazza Cordusio dominate the modern city centre. Most industrial growth has been concentrated in peripheral areas; entire industrial districts have developed, mainly in the north and northeast and in the south and southwest. Many old streets and buildings have been demolished to make way for massive new city blocks and high rises. Though central Milan's transportation is encumbered by narrow streets, the newer suburban areas are linked to the core of the city by major arterial highways.

Milan's most striking architectural achievement is the medieval Duomo, the third largest church of Europe. The most notable of the city's many palaces is the Palazzo di Brera, the construction of which began in 1651. The Pinacoteca di Brera contains an excellent collection of northern Italian painting as well as the Biblioteca Nazionale Braidense. San Simpliciano, located on the Corso Garibaldi, is an ancient church that was founded in the first centuries of the Christian Era; the fresco "Coronation of the Virgin" ornaments its apse. Leonardo da Vinci's "Last Supper," one of the most famous paintings of the Renaissance, is in the former refectory of the convent of Sta. Maria delle Grazie.

Milan is rich in galleries, museums, libraries, and theatres; La Scala (1776–78) is one of the great opera houses of the world. Milan is the seat of three universities. Other institutes of higher education include the Polytechnic Institute of Milan and the Giuseppe Verdi Conservatory of Music.

An extensive network of roads and rail lines spreading toward outlying areas, and particularly toward the north, gives Milan an economic advantage over other Italian cities. Trans-Alpine tunnels and other connections link the city with all parts of Europe. Milan is the starting point of the famous scenic route known as the Autostrada del Sole, which stretches down the spine of the Italian peninsula. Two international airports serve Milan, the Aeroporto di Linate, which is 6 mi (10 km) east of the city, and the Aeroporto della Malpensa, 29 mi to the northwest. Area city, 70 sq mi (182 sq km). Pop. (1998 est.) 1,302,808.

Milan, village, Erie and Huron counties, northern Ohio, U.S., on the Huron River, just southeast of Sandusky. In 1804 Moravian missionaries established an Indian village called Pequotting on the site. Settlers from Connecticut arrived a few years later, and the village was laid out in 1816 by Ebenezer Merry and named for Milan, Italy. A canal was dug (1832–39) to Lake Huron, 3 mi (5 km) away, and the community became a busy wheat-shipping centre. The village's refusal, however, to allow the Lake Shore and Michigan Railroad a right-of-way marked its decline as a commercial centre. Milan, now a quiet, rustic community, is the birthplace of the inventor Thomas Alva Edison (1847); the red-brick house on Edison Drive, where he spent the first seven years of his life, is preserved as a museum. The home of Lehman Galpin, the Edison family doctor, is now a local historical museum. Pop. (2000) 1,445.

Milan III (or I), in full MILAN OBRENOVIĆ (b. Oct. 21, 1819, Kragujevac, Serbia—d. July 8, 1839, Belgrade), prince of Serbia in 1839.

On June 13, 1839, at age 19, Milan succeeded to the Serbian throne on the abdication of his father, Prince Miloš. Severely ill with tuberculosis, he took no part in government, which was managed by a three-man regency. After Milan died 25 days later, the regency continued to administer the country for nine months until his brother and successor, Michael III, arrived in Belgrade in March 1840.

Milan IV (or II), in full MILAN OBRENOVIĆ (b. Aug. 22 [Aug. 10, Old Style], 1854, Mărăşeşti, Moldavia—d. Feb. 11 [Jan. 29], 1901, Vienna), prince (1868–82) and then king (1882–89) of Serbia.

Succeeding his cousin Prince Michael III of Serbia on July 2, 1868, Milan was dominated during the first years of his reign by a regency that adopted a seemingly liberal constitution in 1869, tried to develop close relations with Austria, and made Milan generally unpopular. When Milan assumed personal control of the government (August 1872), however, he further alienated public opinion by his frivolous extravagance; by his unfaithfulness to his wife, the Russian-born Natalie Petrovna Keshko, whom he married in 1875; and by his refusal to accommodate the pan-Slavist sentiments of his subjects or support the rebels of Bosnia-Hercegovina, who rose against their Ottoman Turkish rulers in 1875. Only when threatened with a revolution did he abandon his policy of neutrality and declare war on the Turks (June 30, 1876). Although the Serbs were quickly defeated, their situation was saved by the subsequent Russian victory over the Turks (Russo-Turkish War of 1877–78). Ultimately, the Treaty of Berlin not only enlarged Serbia's territory but also recognized it as a completely independent state (1878).

In order to acquire such concessions at the peace conference, Milan's representatives had been obliged to rely on Austria, which demanded in return that Serbia link its railroads, as well as its economy, with Austria's. Although many Serb political figures preferred to develop close relations with Russia rather than with Austria, Milan favoured the pro-Austrian policy: he appointed pro-Austrian ministers, concluded trade and tariff agreements that made Serbia's economy dependent on Austria's, and secretly pledged to conclude no treaties with other governments without Austria's approval (1881).

Subsequently, Austria supported Milan when he proclaimed himself king and declared the principality of Serbia a kingdom (1882). In 1883, with his army, he quelled a large peasant uprising led by radicals in eastern Serbia.

After Milan declared war on Bulgaria in 1885 and suffered another major military defeat, Austria extended diplomatic aid and arranged for peace to be concluded on the basis of status quo ante bellum. Milan's dependence upon Austria aggravated domestic discontent, which he tried to assuage by granting a more liberal constitution in January 1889. In March, however, Milan was compelled to abdicate in favour of his son Alexander.

Having divorced Natalie in October 1888, Milan renounced his Serb nationality in 1892 and settled in Paris as the Count of Takovo. In 1897 he returned to Serbia to serve as his son's commander in chief. Although he instituted beneficial reforms in the army, he remained unpopular; and when Alexander married against the advice of his father and his chief ministers, Milan went permanently into exile (1900).

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Milan, Edict of, a proclamation that permanently established religious toleration for Christianity within the Roman Empire. It was the outcome of a political agreement concluded in Milan between the Roman emperors Constantine I and Licinius in February 313. The proclamation, made for the East by Licinius in June 313, granted all persons freedom to worship whatever deity they pleased, assured Christians of legal rights (including the right to organize churches), and directed the prompt return to Christians of confiscated property. Previous edicts of toleration had been as short-lived as the regimes that sanctioned them, but this time the edict effectively established religious toleration.

Milán, Luis (b. *c.* 1500, Valencia, Aragon—d. after 1561, Valencia, Spain), composer, courtier, and player of the vihuela, the Spanish variety of the lute. In Valencia he lived at the brilliant and cultivated court of the vicereine Germaine de Foix, which he described in a manual of courtly behaviour (1561). His most noted work is *El Maestro* ("The Teacher"), a collection of vihuela pieces and solo songs with vihuela accompaniment. This was the first of a series of vihuela books that became one of Spain's most distinguished contributions to 16th-century music. The pieces in Milán's book are arranged in order of difficulty. The songs—Spanish and Portuguese villancicos and romances and Italian sonnets—are often of great beauty, and the instrumental writing is varied and resourceful.

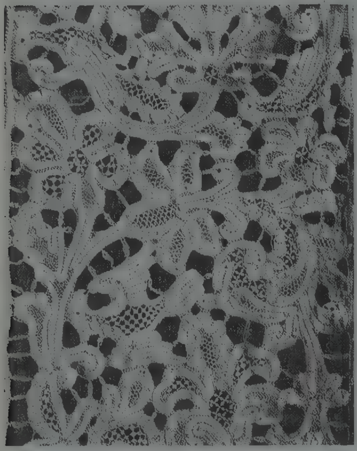
Milan, University of, Italian UNIVERSITÀ DEGLI STUDI DI MILANO, coeducational state institution of higher learning in Milan founded in 1924 by Luigi Mangiagalli as the Royal University of Milan. Two existing scientific institutions, the Royal Scientific and Literary Academy (founded under the Casati Law of 1859) and the Clinical Institutes (1906), formed the foundation of the new university. By 1934, 60 different scientific institutes, clinics, and schools of advanced study had been established within the university, including a school whose graduates were sent to practice in rural districts. Brought under state control by the Fascists, the university remains under government jurisdiction but enjoys administrative autonomy. In the decade following 1969, when admission requirements to Italian universities were relaxed, student enrollment at Milan rose from about 11,000 to more than 60,000. A *laurea,* or degree, is offered in 19 disciplines requiring four to six years of study.

Milan faience, tin-glazed earthenware (usually called maiolica in Italy) produced by several factories in Milan during the 18th century. The earliest known specimens are from the factory of Felice Clerici, opened *c.* 1745. The wares were copies of, or inspired by, porcelain models from China and Japan. The Japanese prototype, Imari ware, was characterized by profuse decoration and a nonnaturalistic use of colours. In 1759 the factory of Pasquale Rubati began to produce maiolica decorated in an imitation of porcelain.

Milan faience tureen, *c.* 1750; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

Milanese lace, lace made at Milan in the 17th and 18th centuries. It is a bobbin-made lace, with a design consisting of bold, conventionalized leaf, scroll, and ribbon ornament interspersed with arms, human and animal figures, and the like. The design is formed of continuous tape or braid, worked on a pillow (a padded oval or round board), the background (thread bars or net) being worked around it afterward.



Milanese lace from Italy, late 17th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Milano (Italy): *see* Milan.

Milazzo, Latin MYLAE, town, Messina province, northern Sicily, Italy, on the low isthmus of a peninsula 3 miles (5 km) long, on the west side of the Golfo (gulf) di Milazzo, west of Messina. The town was founded in 716 BC by colonists from Zankle (Messina). It was taken by the Athenians in 426 BC and by the Syracusan tyrant Agathocles in 315 BC. The consul Gaius Duilius won the first Roman naval victory over the Carthaginians in the bay in 260 BC, and in 1860 the Italian nationalist Giuseppe Garibaldi defeated the Bourbon forces of the Kingdom of the Two Sicilies outside Milazzo. The town suffered from Allied bombing in World War II. The old town on a hill above is partly surrounded by Spanish walls from the 16th century and contains a 13th-century Norman castle.

The transit port for the Eolie Islands, Milazzo is a tourist centre and exports early fruit, wine, and olive oil. It has a growing chemical industry and an oil refinery. Pop. (1984 est.) mun., 31,497.

Milbank, city, seat of Grant county, northeastern South Dakota, U.S., in the Whetstone Valley, 28 miles (45 km) northeast of Watertown. Settlers arrived after 1880, when it was made a railroad division point. It was named for Jeremiah Milbank, director of the Chicago, Milwaukee, and St. Paul Railroad. The city is the birthplace of American Legion Junior League Baseball (1925). Milbank's economy depends on agriculture, granite quarrying, and food processing. Inc. town, 1881; city, 1894. Pop. (1990) 3,879.

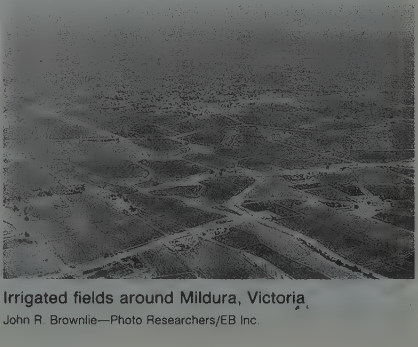
Mildenhall, parish, Forest Heath district, county of Suffolk, England, on the River Lark. The town retains its hexagonal market, cross dating from the reign of Henry V and now scheduled as an ancient monument. The Church of St. Mary is of the 13th to the 15th century with a tower 112 feet (34 m) high. It is distinguished for the open-timber hammer-beam roof of the nave. Mildenhall lies amid a farming area for which it acts as the main service centre.

The so-called Mildenhall Treasure is a hoard of Roman silver tableware acquired by the British Museum in 1946, having apparently been discovered four years before in the plowing of a field at West Row, 2 miles (3.2 km) northwest of Mildenhall, near remains of a 4th-century Roman building. The majority of the pieces, 34 in all, seem to be of 4th-century workmanship, and some are products of Mediterranean factories. Possibly the owners buried their family plate in the troubled days of the Anglo-Saxon invasions. Pop. (1981) 11,971.

mildew, a conspicuous mass of threadlike hyphae and fruiting structures produced by various fungi (division Mycota). It is associated with cloth, fibres, leather goods, and plant diseases (downy mildew and powdery mildew [*qq.v.*]). The fungi use these substances as sources of food for growth and reproduction.

Mildner glass, late 18th-century glassware decorated by Johann Josef Mildner (1763–1808) in the *Zwischengoldgläser* (*q.v.*) technique of bonding gold-leaf engravings or etchings between two layers of glass, one of which fits precisely into the other. Mildner, who worked at the Gutenbrunn glasshouse in Austria, is best known for his gift tumblers featuring a medallion etched in gold or silver leaf, usually against a red ground. His motifs consisted of portraits, monograms, or coats of arms and, less often, of allegories or representations of saints. Occasionally, he scratched a poem onto the back of the medallion. Works signed between 1787 and 1808 are extant.

Mildura, city, Victoria, Australia, on the Murray River near its junction with the Darling. In the 1840s sheep runs were established in the district, which became known as Mildura, a name derived from an Aboriginal term for "red earth." Settlement began with irrigated agriculture, introduced there in 1886 by George and William Chaffey, Canadians from California who received a 250,000-acre (100,000-hectare) grant from the colonial government to develop the semiarid countryside, called the Mallee (*q.v.*). After initial setbacks in the 1890s, irrigation succeeded and the settlement grew. Proclaimed a borough (1920) and a town (1922), Mildura became a city in 1934. The area, also known as Sunraysia, produces most of the state's dried fruits and supplies fresh fruits and vegetables to Melbourne, 290 miles (467 km) to the southeast by rail and highway. Industries include fruit processing and packing, flour milling, wine making, and brick, plaster, and pipe works. Pop. (1985 est.) 17,840.



Irrigated fields around Mildura, Victoria

John R. Brownlie—Photo Researchers/EB Inc.

mile, any of various units of distance, such as the statute mile of 5,280 feet. It originated from the Roman *mille passus,* or "thousand paces," which measured 5,000 Roman feet, or 4,840 English feet.

About the year 1500 the "old London" mile was defined as eight furlongs. At the time, the furlong, measured by a larger northern (German) foot, was 625 feet, and thus the mile equaled 5,000 feet. During the reign of Queen Elizabeth I, the mile gained an additional 280 feet—to 5,280—under a statute of 1593 that confirmed the use of a shorter foot that made the length of the furlong 660 feet.

Elsewhere in the British Isles, longer miles were used, including the Irish mile of 6,721 feet and a Scottish mile of 5,951 feet.

A nautical mile is the length on the Earth's surface of one minute of arc, or, by international definition, 1,852 m (6,076.12 feet; 1.1508 statute miles). The measure remains in universal use in both marine and air transportation. The knot is one nautical mile per hour.

Miles City, city, seat of Custer county, eastern Montana, U.S., at the junction of the Yellowstone and Tongue rivers. It was founded in 1877 and was named for a U.S. army officer who had campaigned in the area, General Nelson A. Miles. After the arrival of the Northern Pacific Railway (1881), it became a market for cattle, sheep, wool, and farm crops. Saddles are made, and roundups and rodeos are annual events. The city is the seat of Miles Community College (1939) and of the State Industrial School for Boys. The Range Riders Museum, a bird refuge, and fish hatchery are nearby. Inc. 1887. Pop. (1990) 8,461.

Miles Gloriosus, also called BRAGGART WARRIOR, stock figure in theatrical comedies from Roman times to the present whose name derives from a comedy written *c.* 205 BC by the Roman playwright Plautus. Plautus' play, based on one or more Greek plays of unknown authorship, is a complicated farce in which a vain, lustful, and stupid soldier, Pyrgopolynices, is duped by his clever slave and a courtesan. The work was highly popular, and Pyrgopolynices became the prototype for many swaggering cowards of later comedy. One of the most popular stock figures of the commedia dell'arte of mid-16th-century Italy was the strutting Capitano. Created from the same pattern are Shakespeare's Falstaff and Pistol and the characters of many other Elizabethan playwrights, including Ben Jonson and Beaumont and Fletcher. The influence of Plautus' *Miles Gloriosus* can be seen in the works of many other dramatists, from Corneille to George Bernard Shaw and Bertolt Brecht.

Milescu, Nicolae (b. 1636, Vaslui, Moldavia [now in Romania]—d. 1708, Moscow), Moldavian writer, scholar, and traveler.

After studies at the Greek patriarchate college in Constantinople, he returned in 1653 to Iaşi (Jassy), Moldavia, and was appointed secretary to Prince Gheorghe Ştefan. Hoping to be appointed prince of Moldavia, he intrigued against Prince Ilias Alexandru, who in 1668 punished him by cutting his nose. So disgraced, Milescu left his native country, never to return. He revisited Constantinople, where his friend Dositheos, patriarch of Jerusalem, gave him a letter to Tsar Alexis (Aleksey Mikhaylovich). He traveled to Moscow, where he arrived in 1671 and was appointed translator to the *posolski prikaz* (foreign office) as Nikolay Gavrilovich Spafari. He gained the confidence of two boyars (aristocrats) who had great influence with the tsar and in 1675 was sent as ambassador to Peking, returning in January 1678. In the meantime, Alexis had been succeeded by his son Fedor III, and Spafari-Milescu lost his official position.

A highly educated man who could write in Greek, Latin, Romanian, and Russian, Milescu left many manuscripts. He translated the Bible from Greek into Romanian; and the Bible printed in 1688 by the Walachian prince Şerban Cantacuzino was based on his translation. Among his writings the most valuable is the *Puteshestviye cherez Sibir . . . do Kitaya* ("Journey Across Siberia . . . to China"). It was printed in 1882 (Eng. trans. in J. Baddeley's *Russia, Mongolia, China,* vol. 2, 1919).

Milesian tale, Latin MILESIA FABULA, in the literature of ancient Greece and Rome, a brief erotic or picaresque tale of romantic adventure. This type of tale was first written or collected by Aristides of Miletus (*c.* 2nd century BC). In the 1st century BC, Aristides' collection was translated into Latin by Lucius Cornelius Sisenna as *Milesiae fabulae;* this volume served as a model for episodes in Petronius' *Satyricon* (1st century AD), a narrative dealing with the escapades of a trio of disreputable heroes, and for *The Golden Ass* (2nd century AD) by Lucius Apuleius, an account of the ribald adventures of a hero who is changed into an ass. The Greek and Latin Milesian tales provided prototypes for many tales included in Boccaccio's *Decameron* (1348–53) and the *Heptaméron* (1558–59) of Margaret of Angoulême.

Miletus, Byzantine PALATION, Turkish BALAT, ancient Greek city of western Anatolia, some 20 miles (30 km) south of the present city of Söke, Turkey. It lies near the mouth of the Büyükmenderes (Menderes) River.

Before 500 BC, Miletus was the greatest Greek city in the east. It was the natural outlet for products from the interior of Anatolia and had a considerable wool trade with Sybaris, in southern Italy. Miletus was important in the founding of the Greek colony of Naukratis in Egypt and founded more than 60 colonies on the shores of the Black Sea, including Abydos, Cyzicus, Sinope (now Sinop), Olbia, and Panticapaeum. In addition to its commerce and colonization, the city was distinguished for its literary and scientific-philosophical figures, among them Thales, Anaximander, Anaximenes, and Hecataeus. Together with the people of the other two Ionian cities of Caria, Myus and Priene, the Milesians spoke a distinctive Ionian dialect. Little is known about Milesian government before 500 BC. At the beginning and end of the 6th century BC, however, the city was ruled by the tyrants Thrasybulus and Histiaeus, respectively.

In the 7th century BC Miletus came into conflict with the neighbouring state of Lydia, and it probably acknowledged Lydian overlordship in the mid-6th century. In the latter part of the 6th century, it came under Persian rule, along with the other Greek cities of Anatolia. About 499 BC the Milesians led the Ionian revolt that marked the beginning of the Greco-Persian Wars (*q.v.*). The city was stormed and sacked by the Persians in 494. After the Persian defeat by the Greeks (479), Miletus joined the Athenian-dominated Delian League. By the mid-5th century the city had been weakened and impoverished by internal divisions, and in 442 it was defeated in war by neighbouring Samos.

Its fortunes soon revived, however, and the Milesians set about rebuilding their city on a new grid plan of the type invented in this period by Hippodamus of Miletus. In 412 the city sided with Sparta against Athens; before 350 Mausolus of Caria ruled it, and it fell to Alexander in 334 after a siege. Hellenistic rulers who competed for influence at Miletus included the Seleucid Antiochus IV Epiphanes and Eumenes II of Pergamum, both about 170 BC. Miletus retained its commercial importance and received special attention from the Roman emperors Augustus and Trajan. By the 6th century AD, however, its two harbours had silted up, and it was eventually abandoned.

The ruins occupy the former peninsula crowned by the hill of Kalabak Tepe. The total area of the archaic city is unknown, but Hellenistic town walls and foundations have been uncovered. There also are extensive remains of the classical city from the 5th century BC to Roman imperial times. The Greco-Roman theatre and its adjoining Byzantine castle are the most visible of the site's ruins.

Milford, city, coextensive with the town (township) of Milford, New Haven county, southwestern Connecticut, U.S. It lies on Long Island Sound, near the mouth of the Housatonic River. Settled in 1639 on land bought from the Paugusset Indians, it was probably named (1640) for Milford Haven, Wales, or for Milford, Eng. In 1643 it became a part of New Haven Colony, which in turn united with Connecticut Colony in 1664. During the Revolution, Milford militia drove off a small British landing force. Oysters and clams have always been important commercially, and they provide the basis of the economy along with agriculture, some light industry, and summer tourism. Simon Lake invented his even-keel submarine torpedo boat there in 1894. Milford was chartered as a city in 1959, the year of town-city consolidation. Pop. (1994 est.) 49,092.

Milford Haven, Welsh ABERDAUGLEDDYF, port, Preseli Pembrokeshire district, Dyfed county, Wales, on the north shore of a deep natural harbour. The inlet, also named Milford Haven, for many centuries was used as a landing and embarkation point on the route from southwestern Wales to Ireland, but the town was founded only in 1793.

Milford Haven has had a checkered maritime history, suffering a rapid decline of its whaling industry and losing to other ports on the Haven its naval dockyard and Irish packet service, all before 1860. It had gained importance as a fishing port by 1900, though, and since 1960 it has become one of Europe's leading oil ports, one of the few places in western Europe able to accommodate the largest tankers. Major refineries have been built, and both oil and petroleum products arrive at the port via pipeline. An oil-fired power station has been built nearby. Pop. (1991) 13,398.

Milford Haven, Louis Alexander Mountbatten, 1st marquess of, also called (until 1917) LOUIS ALEXANDER, PRINCE OF BATTENBERG (b. May 24, 1854, Graz, Austria—d. Sept. 11, 1921, London, Eng.), British admiral of the fleet and first sea lord, who was responsible, with Winston Churchill, for the total mobilization of the fleet prior to World War I.

The eldest son of Prince Alexander of Hesse, he was naturalized as a British subject in 1868, when he entered the Royal Navy. He took part in the British invasion of Egypt in 1882, including the bombardment of Alexandria (July 11). After serving as director of naval intelligence, he was promoted to the rank of rear admiral in 1904 and vice admiral in 1908. He commanded the Atlantic Fleet from 1908 to 1910 and became first sea lord in 1912. As such he was charged with readying the fleet for war. After a test mobilization in July 1914, he ordered (with instructions from Churchill, first lord of the Admiralty) the reserve ships to remain in full commission; thus, the fleet was wholly mobilized on Aug. 3, 1914, the day before Great Britain entered World War I.

Despite this and other services, he was forced to resign as first sea lord (Oct. 29, 1914) because of his German birth. In 1917, at the request of King George V, he relinquished his German titles, assumed the surname of Mountbatten, and on July 17 of that year was created marquess of Milford Haven.

In 1884 he had married Princess Victoria of Hesse-Darmstadt, a granddaughter of Queen Victoria. They had two daughters and two sons, George (1892–1938), 2nd marquess, and Louis, afterward Earl Mountbatten of Burma. A grandson (through his daughter Princess Alice) is Prince Philip, duke of Edinburgh, husband of Queen Elizabeth II.

Milford Sound, inlet of the Tasman Sea, southwestern South Island, New Zealand. The sound is a fjord, created when the sea flooded a glacial valley. About 2 miles (3 km) wide, it extends inland for 12 miles (19 km). From the heights of Mitre Peak (5,560 feet [1,695 m]) and Pembroke Peak (6,710 feet), the valley walls plunge steeply beneath the water, reaching a depth of 1,680 feet (512 m) near the fjord's head. The sound is entered by the Arthur and Cleddau rivers from the main valley and by the Bowen, Sinbad, Harrison, and Stirling rivers from side valleys.

Named by a whaler in the 1820s because of its resemblance to Milford Haven in Wales, the sound was surveyed by Captain John Lort Stokes of the Royal Navy in 1851. The sound is the northernmost fjord in Fiordland National Park and the terminus of the Milford walking track. It is also the site of a town, Milford Sound, one of the region's few permanently inhabited places.

Milhaud, Darius (b. Sept. 4, 1892, Aix-en-Provence, France—d. June 22, 1974, Geneva, Switz.), a principal French composer of the 20th century known especially for his development of polytonality (simultaneous use of different keys).

Born of a Provençal Jewish family, Milhaud studied under Paul Dukas and Vincent d'Indy at the Paris Conservatory. He was grouped by the critic Henri Collet with the young composers whom Collet called "Les Six" (*see* Six, Les). In 1940 he became professor at Mills College, Oakland, Calif. After 1947 he taught at the Paris Conservatory. In his later years he suffered from crippling arthritis, but he continued to compose and conduct.

Milhaud's bold, individual, dissonant style is especially exemplified in the ballets *L'Homme et son désir* (1918; *Man and His Desire;* scenario, Paul Claudel), *Le Boeuf sur le toit* (1919; *The Nothing-Doing Bar;* scenario, Jean Cocteau), and *La Création du monde* (1923; *The Creation of the World;* scenario, Blaise Cendrars). He composed the incidental music for Claudel's *Protée* (1920) and for Claudel's translations of the Aeschylean tragedies *Agamemnon* (1913), *Choéphores* (1915), and *Les Euménides* (1917–22). Whips and hammers are introduced into the orchestration of this trilogy, a work of great dramatic force, in which the chorus is required to groan, whistle, and shriek. His other operas include *Christophe Colomb* (1930; text by Claudel); *Le Pauvre Matelot* (1926; *The Poor Sailor;* text by Cocteau), *David* (1954), and *Médée* (1939).

From about 1913, Milhaud's music is characterized by his use of bitonality and polychords. He was the first to analyze (though not the first to use) polytonality and to develop that technique consistently. An example of his use of polytonality is the "Saudades do Brasil" (1921). His style became simplified in later years, but its harmonic basis remained mostly polytonal. The effect of his polytonality is that of simultaneous movement of different planes of sound. Although dissonant, his music retains a lyrical quality.

A prolific composer, Milhaud wrote more than 400 works, including radio and motion-picture scores, a setting of the Jewish *Sabbath Morning Service,* symphonies (eight for large orchestra, five for small orchestra), choral works, and the two-piano suite "Scaramouche" (1936; later arranged for saxophone or clarinet and orchestra). His chamber music includes a suite for violin, clarinet, and piano, and 18 string quartets. Among his songs are settings of poems by Claudel, Christina Rossetti, and Stéphane Mallarmé.

miliaria, an inflammatory disorder of human skin, characterized by multiple small lesions at the site of sweat pores, brought about by the blockage of sweat ducts and the resulting escape of sweat into various levels of the skin. Most cases of miliaria occur in extremely hot weather; the lesions tend to disappear with cooler weather and the resultant decrease in sweating. There are four varieties of miliaria.

In miliaria crystallina, the sweat escapes into the superficial region of the epidermis, the outermost horny layer of the skin, where it collects in tiny, clear, noninflammatory, dewdrop vesicles (blisters); these are most commonly seen in patients with fever or after a sunburn.

Miliaria rubra, or prickly heat, the most common form of sweat retention, results from the escape of sweat into the epidermis, where it produces discrete, densely packed, pinhead vesicles or red papules (solid, usually conical elevations); these lesions occur chiefly on the trunk and extremities, where they cause itching and burning. The incidence of prickly heat is highest in tropical climates, where it most commonly affects infants.

In miliaria pustulosa, there are pustules, or small elevations of the skin filled with pus, at the site of sweat retention.

Miliaria profunda is a deep type of sweat retention, the sweat escaping into the dermis, the vascular layer of the skin located below the epidermis. The lesions, in this form of miliaria, are firm papules.

Milíč (of Kroměříž), John, Czech JAN MILÍČ Z KROMĚŘÍŽE (b. *c.* 1305, Kroměříž, Bohemia [now in Czech Republic]—d. June 29, 1374, Avignon, France), theologian, orator, and reformer, considered to be the founder of the national Bohemian religious-reform movement.

Milíč was educated at Prague and ordained about 1350, entering the imperial chancery of Charles IV in 1358. Later, he received a clerical benefice from Pope Innocent VI and was made a minor prelate and treasurer of St. Vitus' Cathedral in Prague. Inspired by the spirit of reform and repelled by clerical corruption, Milíč resigned his office in 1363 and went into seclusion.

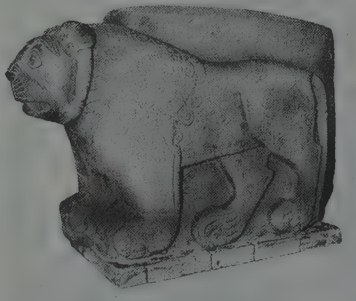
When he emerged, he devoted himself to preaching the tenets of church reform, asceticism, and ecclesiastic and secular poverty. He attacked the secularization of the Roman Catholic church and emphasized the Scriptures as a rule for life, preaching in Czech and German rather than the traditional Latin. His use of the vernacular and his reforming zeal soon gained him wide popularity among the laity.

Convinced that the degenerate state of the church and society portended an imminent end of the world and the coming of the Antichrist, Milíč traveled to Rome in the spring of 1367 and preached penance and moral conversion before the papal court. For his efforts, he was imprisoned by the Inquisition on suspicion of heresy but was released by Pope Urban V when the latter returned from Avignon in October. Late in 1367 he presented Urban with his pamphlet *Libellus de Antichristo* ("Booklet on Antichrist"), in which he urged the pope to convene a general council to reform the church.

Milíč then returned to Prague, where he began preaching daily sermons at the cathedral, in Latin for the clergy and in Czech for the people. His sermons were widely distributed throughout central Europe and spurred demands for Christian reform. At several centres he established at Prague, Milíč introduced the *devotio moderna,* a reform of prayer developed in Holland that emphasized a method of devotion centred on Christ (Christocentric) and intended to involve the emotions—as opposed to the academic and abstract forms of medieval scholastic theology.

When new charges of heresy were drawn up against him, Milíč, supported by the Holy Roman emperor and by Archbishop John of Jenstein, submitted his case to Pope Gregory XI at Avignon in 1373. Absolved of all charges, he was invited by the pope to preach to the College of Cardinals. He became ill and died the following year before he could return to Prague. Although Milíč remained within the Roman Catholic church, he is considered the forerunner of the Bohemian Reformation because of his attempted clerical reforms, his support for a vernacular Bible and vernacular preaching, and his doctrinal influence on Jan Hus.

Milid, modern ARSLANTEPE (Turkish: "Lion Mound"), ancient city near the upper Euphrates River in east-central Turkey, 4 miles (6.5 km) northeast of the town of Malatya. The site was first inhabited in the 4th millennium BC and later became an important city of the Hittites until the dissolution of their empire early in the 12th century BC. It survived as an independent city-state, sometimes linked with the "neo-Hittite" federation (a postimperial Syrian-Hittite culture) and sometimes subject to Assyria. Removed to a new site in Roman times, it became the capital of Lesser Armenia. Later, it was successively occupied by Sāsānid Persians and Arabs and finally became an important centre of the Christian Jacobite sect. In the 12th century AD it fell to the Seljuq sultanate of Rūm.



Lion from Milid, Neo-Hittite period (10th or 8th century BC); in the Archaeological Museum, Ankara

By courtesy of the Archaeological Museum, Ankara

Milid was excavated from 1932 onward by French archaeologists, and the bas-reliefs found there are among the best surviving examples of Hittite art.

Milinda-pañha (Pāli: "Questions of Milinda"), lively dialogue on Buddhist doctrine with questions and dilemmas posed by King Milinda—*i.e.,* Menander, Greek ruler of a large Indo-Greek empire in the late 2nd century BC—and answered by Nāgasena, a senior monk. Composed in northern India in perhaps the 1st or 2nd century AD (and possibly originally in Sanskrit) by an unknown author, the *Milinda-pañha* is the one noncanonical work whose authority was accepted implicitly by such commentators as Buddhaghosa, who quoted it frequently. It is also one of the few postcanonical works of the Theravāda school that was not produced in Ceylon, though its authority there remains unquestioned.

The problems discussed are common themes in the Pāli canon, beginning with the nonexistence of a soul, and the doctrine is orthodox Theravāda. Of the seven books into which the work is divided, the second and third and sections of the first are masterpieces of ancient Indian prose. They deal with basic questions of interest to laypersons and make excellent use of parables. The remainder is a later addition of a more scholastic nature.

military, naval, and air academies, schools for the education and training of officers for the armed forces. Their origins date from the late 17th century, when European countries began developing permanent national armies and navies and needed trained officers for them—though the founding of academies themselves did not begin until the mid-18th century and later. Until the 20th century, training emphasized the handling of weapons, the drilling and management of men, tactics and strategy, and ceremonial; for naval cadets, navigation was included. In the 20th century, separate air force academies were founded in some countries. To accommodate the increasing part played by science, technology, and organization in modern warfare, the content of the instruction has broadened to include more scientific, technical, and general subjects. At the same time, cadets began to be drawn from much wider social strata than hitherto.

Perhaps the first country to develop a comprehensive and modernly efficient scheme of military education was Prussia, which had such early brilliant reformers as Gerhard von Scharnhorst, August von Gneisenau, and Carl von Clausewitz and whose complex of military institutions in the 19th century would elicit the respect (and often the imitation) of other military powers. At the base of the officer-training system were eventually 8 cadet schools, more or less for the upper class or elite, and 10 war schools for the less select—both training men for commissions. At the apex of the system was the venerable War Academy, or Kriegs Akademie, at Berlin, founded in 1810 and offering the highest advanced education for commissioned officers. A great complex of technical and auxiliary schools, such as for cavalry and engineering, filled in the system. After World War I the entire complex was disrupted, though the military tradition persisted.

Among the countries that closely imitated the Prussian system were Austria-Hungary, tsarist Russia, and Japan. The first real military academies in Russia were established in the mid-19th century. Immediately after the Bolshevik Revolution in October 1917, a new centralized Soviet military academy was founded in Moscow, followed by the founding of naval, air, engineering, and military political academies. In Japan, the principal schools for the training of officers were the Army Academy (founded 1868) and the Naval Academy (founded 1869), both of which were disbanded after World War II. Perhaps the most famous military academy in East Asia, however, was the Whampoa Academy, an army academy set up by the Chinese Kuomintang (Nationalist) leader Sun Yat-sen near Canton in 1924 with Chiang Kai-shek as its first commandant.

In France the system developed in simpler form, with two traditional channels for men seeking commissions. Military engineers, artillerymen, and other technical officers were trained at the École Polytechnique (*q.v.*), an engineering school that was founded in 1794. Staff and other officers for the infantry and cavalry were trained at the École Spéciale Militaire de Saint-Cyr, founded by Napoleon in 1803. (*See* Saint-Cyr.) Advanced training for selected colonels is also offered at the École Supérieure de Guerre. The École Navale at Brest trains officers for the navy, and the École de l'Air at Salon-de-Provence is the air force academy.

Until 1939 potential officers for the British army were trained at either the Royal Military Academy at Woolwich (founded 1741), offering training in artillery, engineering, and communications, or the Royal Military College at Sandhurst (founded 1802), offering cavalry and infantry training. From 1940 the functions of these schools were combined at Sandhurst (*q.v.*), which in 1947 was officially designated the Royal Military Academy, Sandhurst. British naval cadets are enrolled at the Royal Naval College, Dartmouth; and air force cadets train at the Royal Air Force College, Cranwell (founded 1920). Selected commissioned officers are educated in higher strategy and policy at the Imperial Defence College.

The United States has four major academies: the United States Military Academy (*q.v.*) at West Point, N.Y. (founded 1802); the United States Naval Academy (*q.v.*) at Annapolis, Md. (founded 1845); the United States Air Force Academy (*q.v.*) at Colorado Springs, Colo. (founded 1954); and the United States Coast Guard Academy (*q.v.*) at New London, Conn. (founded 1876). There is also the United States Merchant Marine Academy (*q.v.*) at Kings Point, N.Y. (founded 1943), whose graduates may apply for commissions in the naval reserve. At the apex of the system, for training commissioned officers of the three basic services in higher strategy and policy, are the National War College and the Industrial College of the Armed Forces, the latter for study of economic aspects of mobilization. Advanced training is also offered at the several academies and at nonmilitary universities.

military and naval affairs, issues having to do with the organization, training, equipment, and employment of the armed forces of a nation.

Military and naval affairs are treated in a number of articles in the MACROPAEDIA. For discussion of military sciences such as strategy and tactics, as well as related disciplines such as the law of war, *see* War, Theory and Conduct of. For weapons and weapons systems, *see* War, Technology of. For related topics, *see* Cryptology; Intelligence and Counterintelligence; Mapping and Surveying; Navigation. For histories of major wars and campaigns, *see* Crusades; World Wars. Other wars and campaigns are covered in the history sections of articles on various nations, empires, and continents.

For a description of the place of military and naval affairs in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Five, Division IV; Part Seven, Division III.

Military Appeals, United States Court of: *see* United States Court of Military Appeals.

military bridge, temporary bridge that must usually be constructed in haste by military engineers, from available materials, frequently under fire. The earliest types historically were pontoon bridges—*i.e.,* floating bridges that rest on stationary boats. Pontoon bridges were constructed in ancient times by Persians, Greeks, Romans, and Mongols, the most famous being Xerxes' 2-mile (3-kilometre) span over the Hellespont (Dardanelles). The Romans, however, frequently built more durable military bridges, notably Julius Caesar's timber crossing of the Rhine River and Trajan's timber-arch span of the Danube. By the 17th century, bridging equipment was part of the train of European and Turkish armies, with pontoons fashioned not only of timber but also of leather, copper, and tin. Pneumatic pontoons with steel roadways made their appearance during World War II.

Military trestles were built in considerable numbers in the wars of the 19th century, notably the American Civil War. Abraham Lincoln, inspecting a 400-foot (120-metre) railroad bridge over Potomac Creek, built in nine days, expressed his astonishment: "Loaded trains are running every hour, and upon my word it consists of nothing but beanpoles and cornstalks."

Military pontoon bridges are usually built either by successively extending outward from the shore or by constructing whole sections as rafts and floating them into position. Truss bridges, for use where riverbanks are steep or navigation must be kept open, are made up in panels readily bolted together. Military truss bridges were pioneered in World War II by the highly successful British-invented Bailey bridge, which played an especially important role in the Allied campaign in Italy. Also during World War II, the scissors assault bridge was introduced; a folding bridge, consisting of a pair of solid-girder-supported deck sections, hinged at their juncture, was carried to the riverbank by a tank; opening out in an inverted V, it flattened into a level crossing. Modern refinements of basic types of military bridges have included increased use of aluminum, more efficient and stronger scissors types, and greatly increased use of mechanical erecting equipment. *See also* pontoon bridge.

military engineering, the art and practice of designing and building military works and of building and maintaining lines of military transport and communications. Military engineering is the oldest of the engineering skills and was the precursor of the profession of civil engineering.

Modern military engineering can be divided into three main tasks: (1) combat engineering, or tactical engineer support on the battlefield, (2) strategic support by the execution of works and services needed in the communications zones, such as the construction of airfields and depots, the improvement of ports and road and rail communications, and the storage and distribution of fuels, and (3) ancillary support, such as the provision and distribution of maps and the disposal of unexploded bombs, mines, and other warheads. Construction, fortification, camouflage, demolition, surveying, and mapping are the province of military engineers. They build bases, airfields, depots, roads, bridges, port facilities, and hospitals. In peacetime military engineers also carry out a wide variety of civil-works programs.

Classical and medieval eras. Evidence of the work of the earliest military engineers can be found in the hill forts constructed in Europe during the late Iron Age, and later in the massive fortresses built by the Persians. One epic feat of ancient military engineering was the pontoon bridge built by the engineers of the Persian king Xerxes across the Hellespont (modern Dardanelles), which, according to Herodotus, was accomplished by a mile-long chain of boats, 676 in all, arranged in two parallel rows. The greatest ancient defensive work ever built is the Great Wall of China, which was begun in the 3rd century BC to defend China's northern frontier from its barbarian neighbours. Counting its tributary branches, the Great Wall is about 6,400 km (4,000 miles) long and dwarfs any other set of fortifications ever built.

The Romans were the preeminent military engineers of the ancient Western world, and examples of their works can still be seen throughout Europe and the Middle East. The Romans' *castra,* or military garrison towns, were protected by ramparts and ditches and interconnected by straight military roads along which their legions could speedily march. Like the Chinese, the Romans also built walls to protect their empire, the most famous of these being Hadrian's Wall in Britain, which is 73 miles (117 km) long and was built to protect the northern frontier from Picts and Scots. The troops and engineers of the legions built many of the greatest works of the Roman Empire, including its extensive network of roads; the watchtowers, forts, and garrison towns manned by its troops; the aqueducts that brought water to cities and towns; and various bridges, harbours, naval bases, and lighthouses. The Romans were also masters of siegecraft who used such devices as battering rams, catapults, and ballistae (giant crossbows) to take enemy fortifications.

The Byzantine Empire, India, and China continued to fortify their cities with walls and towers, while in Europe urban civilization collapsed with the fall of the Roman Empire and the ensuing Middle Ages. One sign of its revival was the motte-and-bailey forts that sprang up on the continent in the 10th and 11th centuries AD. These basically consisted of a high mound of earth (motte) encircled by wooden palisades, ditches and embankments (the bailey), with a wooden tower occupying the central mound. They were replaced from the 11th century by stone-built castles that served as both military strongholds and centres of administration. (*See* castle.) Medieval engineers became proficient at mining operations, by which tunnels were driven under the walls of castles and their timbering set afire, causing the masonry overhead to collapse.

The Renaissance and after. The development of powerful cannons in the 15th century brought about a reappraisal of fortification design and siege warfare in Europe and parts of Asia. In China and India the response to the new siege guns was basically to build fortifications with thicker walls. Sixteenth-century Europe's response was the sunken profile, which protected walls from artillery bombardment, and the bastioned trace, a series of projections from the main fortress wall to allow both direct and flanking fields of fire against attackers. This system was brought to a peak of sophistication in the 17th century by Sébastien Le Prestre de Vauban of France, whose fortifications and siege-warfare techniques were copied by succeeding generations of military engineers. The system perfected by him did not change until the second half of the 19th century, when breech-loading artillery and the use of high-explosive shells called for drastic alterations in the design and construction of defenses.

The 19th century. Technological advances changed the nature of military engineering in the century following the Napoleonic Wars. British and French military engineers first used the electric telegraph in the Crimean War (1853–56). With the spread of railways, military engineers became responsible in theatres of war for the construction and maintenance of railway systems and the control of the rail movement of troops and military matériel. Military engineering schools offered the finest technical training in Europe well into the 19th century, and their graduates were among the technical elite of industrialized nations. As European countries colonized vast portions of Africa, Asia, and Australia, military engineers were often given responsibility for the exploration and mapping of these regions and for the construction of public buildings and utilities, roads, bridges, railways, telegraph networks, irrigation projects, harbours, and maritime defenses. In the United States, the Army Corps of Engineers led the way in developing the West; they explored, surveyed, and mapped the land, built forts and roads, and later assisted in building the transcontinental railway. The corps later specialized in improving harbours and inland waterways and constructing dams and levees.

The 20th century. The protracted trench warfare of World War I called upon all of the traditional siegecraft skills of the military engineers. Trench tramways and light railways were built for the maintenance of forward troops. Large camouflage projects were carried out to screen gun positions, storage dumps, and troop movements from enemy observation. Mining and countermining were carried out on a scale never before attempted. The greatest achievement was the firing in June 1917 by British sappers of more than 1,000,000 pounds (450,000 kg) of explosive, placed in 16 chambers 100 feet (30 m) deep, which completely obliterated Messines Ridge in Belgium and inflicted 20,000 German casualties.

The scope of military signaling increased enormously and reached such a size and complexity that, when World War I ended, military telecommunication engineers became a separate corps in all armies. New techniques were developed for fixing enemy gun positions. Mapmaking by the use of aerial photographs (photogrammetry) developed. Field printing presses were set up to provide vast quantities of maps of the fighting areas, and a grid system was introduced for maps covering the whole theatre of operations.

In the 1930s French military engineers designed and constructed the Maginot Line, a supposedly impregnable defensive system protecting France's common frontier with Germany and Luxembourg. The military engineers of World War II faced and solved problems on a scale and of a character not previously experienced. Because of the importance of air power, hundreds of airfields and airstrips had to be built, often in great haste and while under fire. Amphibious operations, involving the landing of troops on a hostile shore, involved a host of engineering problems, from the underwater demolition of obstacles to the rapid construction of open-beach dock facilities, such as the prefabricated Mulberry Harbour used to maintain the Normandy landings in 1944. Special equipment, including armoured engineering vehicles that had to be capable of wading ashore from landing craft, was developed for the Allies' amphibious operations. Inland, new and stronger types of temporary bridges were developed to support the passage of tanks and other heavy armoured vehicles.

Minelaying is a subspecialty of military engineering that acquired increased importance in the 20th century. Floating submarine mines were first used to destroy ships in the 19th century and came into wide use in World War I during the Battle of the Atlantic. Antitank mines came into wide use in World War II and became the principal obstacle to the movement of armoured forces. Special techniques and equipment were developed for minelaying, mine location, and the breaching and clearing of minefields.

One of the most extraordinary feats of military engineering during the war was the building in 1944 by Allied forces of a supply road from Ledo, India, to the Burma Road at a point where the road was still in Chinese hands. This Stilwell (originally Ledo) Road opened in January 1945, was 478 miles (770 km) long, and twisted through mountains, swamps, and jungles. The most important fortifications of the war were those built by Germany along the coast of northern France in 1942–44 to resist an Allied invasion across the English Channel. The largest task carried out by military engineers in World War II, however, was the Manhattan Project, which produced the atomic bombs dropped on Hiroshima and Nagasaki. Civilian scientists as well as engineers were recruited in large numbers for this mammoth project, whose success made it a model for later large-scale government efforts involving many scientists and engineers from different disciplines.

In the latter part of the 20th century military engineers were responsible for the construction of command and control facilities such as the granite-delved complex at Cheyenne Mountain, Colorado Springs, Col., U.S., which houses the operations centre for the North American Aerospace Defense Command (better known as NORAD) and other aerospace units.

military government, administration of occupied territory by an occupying power, including the exercise of executive, legislative, and judicial authority. In international law, territory is considered occupied when it is actually under the authority of hostile armed forces. The necessity for military government arises from the failure or inability of the legitimate government to exercise its functions. It is immaterial whether or not the government over an enemy's territory consists of a military or civil or mixed administration.

Because it is in connection with belligerent occupation that the general concept of military government evolved, the definition does not cover cases in which military forces have been stationed in neutral or friendly territory and share with local civil authorities the responsibilities of administration. Also, military government must be distinguished from military law and martial law. Military law is the code that regulates the conduct of members of the armed forces but does not apply to civilians. Martial law is the temporary government of the civil population through the military forces without the authority of written law, as necessity may require; it is invoked only in domestic territory.

military law, the body of law concerned with the maintenance of discipline in the armed forces. Military law in no way relieves military personnel of their obligations to their country's civil code or to the codes of international law, as recognized in various conventions.

A brief treatment of military law follows. For full treatment, *see* MACROPAEDIA: War, The Theory and Conduct of.

In any armed force a disciplinary code is necessary to ensure that the will of the commander is obeyed. In Rome, military law was formalized in the 5th century AD in the Digest and Codex of the emperor Justinian. Until then, Roman military law varied according to the individual commander. In the European Middle Ages, military law was defined by ordinances or articles of war issued by the sovereign or by a commander designated by him at the outset of each new campaign. The articles of war of Maurice of Nassau, prince of Orange, and Gustav II Adolf formed the basis of military law throughout Europe, which, revised, reformed, and amended, continues to this day.

The jurisdiction of military law extends, in different countries and in different degrees, to any offense committed by a member of the armed forces. It also extends to any offense injurious to military discipline, whether committed by a soldier or by a civilian. Soldiers who fail to respond to military conscription in some countries are subject to military law for such offenses as desertion or self-mutilation. Reservists in some countries are subject to military law for such offenses as treason, revelation of state secrets, or communication with foreign countries. Ordinary civilians in some countries may be prosecuted in military courts on charges of treason, rebellion, fraud, or impeding military operations. In other countries, civilians may not be prosecuted in military courts unless accused of crimes committed in a war zone or during a state of siege. Some countries recognize no military offenses by civilians.

Prisoners of war fall under military jurisdiction as well, and their rights have been established by the Geneva Prisoner of War Convention of 1949.

Mutiny, insubordination, desertion, and misconduct in action constitute violations of military law, but military law usually extends further to all actions committed by soldiers in foreign territory that would constitute offenses against the civil code of their home countries. A soldier may be prosecuted in a civil court for severe crimes against his civil code.

Continental European countries tend to distinguish between military crimes subject to judicial punishment and breaches of discipline subject to administrative action. Members of the Commonwealth and those countries whose military law derives from the Anglo-Saxon model do not make such a distinction, instead regarding all military offenses as subject to judicial punishment.

In most countries, summary penalties such as loss of privileges, cancellation of liberty, and fines can be imposed by officers not lower than the rank of captain; the commanding officer of the unit is the principal source of discipline. A soldier may appeal against summary punishment, either to a higher military authority or to a tribunal. In most countries, offenses beyond a commanding officer's jurisdiction are tried in a service court, or court-martial. Prior to trial by court-martial, a military magistrate conducts a formal investigation of the charges. A court-martial is generally tried by between three and seven judges selected from the officer corps.

In times of war, military offenders are almost always tried in military courts, regardless of whether the country has civilian jurisdiction over military personnel.

The degree to which a soldier is responsible for unlawful conduct committed on orders from a superior officer is a question that is widely debated by the architects of modern military law and by scholars of war crime.

military police, disciplinary force, composed of soldiers, that exercises police and related functions in armies. Generally, their principal duty is to maintain law and order, prevent and investigate crime within the army, and operate confinement facilities. They also engage in combat as infantry when required.

In the United States, military police constitute a separate branch of the army known as the Military Police Corps. Although it had a long, irregular history dating back to 1776, the corps as a unified, centrally directed organization developed only with the rapid expansion of the army during and after World War II. Its responsibilities extend wherever U.S. troops are stationed. The head of the corps, the provost marshal general, is the chief law-enforcement authority on the staff of the Department of the Army.

In the United Kingdom the military police are organized as a combat corps in the army and have been known since 1946 as the Corps of the Royal Military Police. At the head of the corps is the provost marshal, one of the most ancient appointments in the army. In addition to the usual functions performed by all military police, the corps' duties include the preservation of discipline outside unit bases, road patrols and traffic control, and escorts and antivice duties. In war, in addition to controlling prisoners of war and stragglers, the corps manned information posts, cared for refugees, and prevented looting.

Most other countries of the world, except those of continental Europe, have formed their military police on the United States and British models.

military unit, also called UNIT, a group having a prescribed size and a specific combat or support role within a larger military organization. The chief military units in the ancient classical world were the phalanx (*q.v.*) of the Greeks and the legion (*q.v.*) of the Romans. The units used in modern armies have their origins in the 16th–18th centuries, when professional armies reemerged in Europe after the end of the Middle Ages. The basic units of the company, battalion, brigade, and division have been retained since then.

Armies, navies, and air forces are organized hierarchically into progressively smaller units commanded by officers of progressively lower rank. The prototypical units are those of the army. The smallest unit in an army is the squad, which contains 7 to 14 soldiers and is led by a sergeant. (A slightly larger unit is a section, which consists of 10 to 40 soldiers but is usually used only within headquarters or support organizations.) Three or four squads make up a platoon (*q.v.*), which has 20 to 50 soldiers and is commanded by a lieutenant. Two or more platoons make up a company (*q.v.*), which has 100 to 250 soldiers and is commanded by a captain or a major. The function of administration is introduced at this level, in the form of a headquarters platoon administered by a sergeant and containing supply, maintenance, or other sections.

Two or more companies make up a battalion (*q.v.*), which has 400 to 1,200 troops and is commanded by a lieutenant colonel. The battalion is the smallest unit to have a staff of officers (in charge of personnel, operations, intelligence, and logistics) to assist the commander. Several battalions form a brigade, which has 2,000 to 8,000 troops and is commanded by a brigadier general or a colonel. (The term regiment [*q.v.*] can signify either a battalion or a brigade in different countries' armies.) A brigade is the smallest unit to integrate different types of combat and support units into a functional organization. A combat brigade, for example, usually has infantry, armour, artillery, and reconnaissance units.

Two or more brigades, along with various specialized battalions, make up a division (*q.v.*), which has 7,000 to 22,000 troops and is commanded by a major general. A division contains all the arms and services needed for the independent conduct of military operations. Two to seven divisions and various support units make up an army corps, or a corps, which has 50,000 to 300,000 troops and is commanded by a lieutenant general. The army corps is the largest regular army formation, though in wartime two or more corps may be combined to form a field army (commanded by a general), and field armies in turn may be combined to form an army group.

militia, military organization of citizens with limited military training, which is available for emergency service, usually for local defense. In many countries the militia are of ancient origin; Macedonia under Philip II (d. 336 BC), for example, had a militia of clansmen in border regions who could be called to arms to repel invaders. Among the Anglo-Saxon peoples of early medieval Europe, the militia was institutionalized in the fyrd, in which every able-bodied free male was required to give military service. Similar arrangements evolved in other countries. In general, however, the emergence in the Middle Ages of a quasi-professional military aristocracy, which performed military service in return for the right to control land and servile labour, tended to cause the militia to decay, particularly as political power became increasingly centralized and life became more secure. The institution persisted nevertheless and, with the rise of national monarchies, served in some measure to provide a manpower pool for the expanding standing armies. In France in the 18th century, one-eighteenth of the militia was required to enter the regular army each year.

In colonial America the militia, based on the tradition of the fyrd, was the only defense against hostile Indians during the long periods when regular British forces were not available. During the American Revolution, the militia, called minutemen, provided the bulk of the American forces as well as a pool for recruiting or drafting of regulars. The militia played a similar role in the War of 1812 and the American Civil War. After that conflict, however, the militia fell into disuse. State-controlled volunteer units of well-to-do men (those who could afford to buy their own uniforms) were formed in most states and came to serve a quasi-social function; many of these volunteers were veterans of the Civil War. In the 1870s and '80s such units, which came to be referred to as the National Guard, were called upon by state governors to break strikes. At that time these state units constituted the nation's only trained reserve. In the 20th century, despite the parallel growth of designated reserve forces, the National Guard was called into federal service in both world wars and continued to be used in emergencies by both the state and the federal government.

In Great Britain the Territorial Force, a militia-like reserve organization for home defense, was created in 1908. It became the Territorial Army in 1921, and overseas service was required. During World War II the militia principle was followed in the establishment of the Home Guard. Militia forces—conscripts who undergo periodic military training until retired to an inactive reserve in middle age—constitute today the bulk of the armed forces available for emergency service in Switzerland, Israel, Sweden, and several other countries. China and various other countries that maintain large standing forces and conscript reserves also support huge militia forces as territorial reserves for local defense.

Miliukov, Pavel Nikolayevich (Russian statesman): *see* Milyukov, Pavel Nikolayevich.

milk, liquid secreted by the mammary glands of female mammals to nourish their young for a period beginning immediately after birth. The milk of domesticated animals is also an important food source for humans, either as a fresh fluid or processed into a number of dairy products such as butter and cheese.

A brief treatment of milk follows. For full treatment, *see* MACROPAEDIA: Food Processing.

Almost all the milk now consumed in Western countries is from the cow, and milk and milk products have become important articles of commerce. Other important sources of milk are the sheep and goat, which are especially important in southern Europe and the Mediterranean area; the water buffalo, which is widely domesticated in Asia; and the camel, which is important in the Middle East and North Africa.

Milk is essentially an emulsion of fat and protein in water, along with dissolved sugar (carbohydrate), minerals, and vitamins. These constituents are present in the milk of all mammals, though their proportions differ from one species to another and within species. (*See* Table.) The milk of each species seems to be a complete food for its own young for a considerable time after birth. In the stomachs of the young, milk is converted to a soft curd that encloses globules of fat, enabling digestion to proceed smoothly without the disturbance often caused by fatty food. Lactose, or milk sugar, is broken down into simpler digestible sugars by the enzyme lactase, which is produced in the intestine of infants. Infants who do not produce lactase develop lactose intolerance, a condition in which a variety of gastrointestinal problems arise. Lactose intolerance also commonly develops after weaning or with advancing age, when many individuals cease producing lactase.

Milk protein is of high nutritional value because it contains all the essential amino acids—*i.e.,* those which infants cannot synthesize in the necessary quantities. Milk's mineral content includes calcium and phosphorus in quantities sufficient for normal skeletal development, but little iron. Milk contains B vitamins as well as small amounts of vitamins C and D. Commercial cow's milk is commonly enriched with vitamins D and A before sale.

Microorganisms contained in raw (unheated) milk or picked up from the environment will quickly sour and curdle the milk. Cooling to slightly above its freezing point keeps milk palatable for a longer time by reducing the multiplication of spoilage bacteria and the chemical changes that they induce.

Many countries have laws requiring that milk be pasteurized as a protection against pathogenic (disease-causing) organisms. Pasteurization is a partial sterilization accomplished by raising the milk to a temperature high enough to destroy pathogenic bacteria and a large proportion of those causing spoilage. Pasteurized milk that is kept refrigerated in closed containers will remain consumable for approximately 14 days.

Milk fat, being less dense than other milk components, can be efficiently removed in a cream separator by centrifugation, yielding low-fat milk and skim milk. Low-fat milk contains 1–2 percent fat, while skim milk contains less than 0.5 percent fat.

Much of the milk sold as a beverage has undergone homogenization, a process in which the milk is forced under high pressure through small openings to distribute the fat evenly throughout the milk.

milk fever, also called PARTURIENT PARESIS, in cattle, a disorder characterized by abnormally low levels of calcium in the blood (hypocalcemia). It occurs in cows most commonly within three days after they have calved, at a time when the cow's production of milk has put a severe strain on its calcium stores. The early symptoms include loss of appetite and depression or restlessness, followed by muscle weakness and spasms of the hindlegs. In acute cases the hindlegs become paralyzed and the cow collapses into coma, followed by death. The death rate in untreated animals may run as high as 90 percent. Fever is not a symptom in this disorder. The most effective treatment is the intravenous injection of calcium gluconate, upon which the animal makes a speedy recovery. There is no effective means of preventing milk fever, but modern treatment methods have made deaths from it a rarity in the developed nations.

milk glass, opaque white glass (as opposed to white, or clear, glass) that was originally made in Venice before 1500 and in Florence between 1575 and 1587, where it was intended to simulate porcelain. In northern Europe it was made only to a very limited extent, with rare 17th-century examples coming from

Nutrient composition of the whole milk of humans and select domesticated animals (per 100 g)

source	energy (kcal)	fat (g)	cholesterol (mg)	protein (g)	calcium (mg)	phosphorus (mg)	carbohydrate (g)
human	70	4.38	14	1.03	32	14	6.89
cow	61	3.34	14	3.29	119	93	4.66
goat	69	4.14	11	3.56	134	111	4.45
sheep	108	7.00	—	5.98	193	158	5.36
water buffalo	97	6.89	19	3.75	169	117	5.18

Source: *Composition of Foods,* Agriculture Handbook no. 8–1, U.S. Department of Agriculture

Germany or Bohemia. In the 18th century, milk glass became a substitute for the Chinese porcelain that was admired in Europe but that had proved difficult to reproduce. This milk glass was produced in England, Germany, and especially in Venice.

Milk glass pokal, German, 17th century; in the Kunstgewerbemuseum, Cologne

By courtesy of Kunstgewerbemuseum, Cologne

milk leg, also called ILIOFEMORAL THROMBOPHLEBITIS, or PHLEGMASIA ALBA DOLENS, inflammation of the femoral vein, the principal vein of the thigh, with formation of a clot that blocks the channel of the vein. The condition may occur shortly after childbirth, or it may result from the use of oral contraceptives. Other predisposing factors are aging, malignancy, and chronic infection. The leg becomes swollen and is pale and painful (hence the name phlegmasia alba dolens—"white, painful inflammation"). If the blockage persists, ulcers may develop. The affected person is kept in bed, with the swollen leg elevated and motionless; anticoagulants are used to prevent further clotting while the body's plasmin (also called fibrinolysin) dissolves the blockage, and antibiotics are used to combat any infection. The leg is bandaged to prevent collection of fluid in the tissues (edema). Severe occlusion may require surgical treatment. If the clot detaches there is danger of pulmonary artery blockage.

Milk River, river rising in two headstreams in the Blackfeet Indian Reservation in the Rocky Mountain foothills, northwestern Montana, U.S. Both streams flow northeastward into Alberta, Can., where they unite as the Milk River, which, after flowing east for about 100 miles (160 km), bends southeastward to reenter Montana. The river then flows in an easterly direction across the state to enter the Missouri River below Nashua, a few miles northeast of the Fort Peck Dam and Reservoir (1940), after a course of 625 miles (1,006 km). Near Havre, Mont., much of the river's water, stored in a lake created by Fresno Dam (1939), is used for irrigation.

Milken, Michael R. (b. July 4, 1946, Encino, Calif., U.S.), American financier whose junk-bond operations fueled many of the corporate takeovers of the 1980s.

Milken studied business at the University of California, Berkeley, graduating in 1968. In 1969, while studying at the University of Pennsylvania's Wharton School of Finance, he began working at the Drexel Firestone banking firm, which soon afterward merged with Burnham & Company to form what became Drexel Burnham Lambert Inc., a major investment banking company. In 1971 Milken became head of Drexel Burnham's bond-trading department. He saw great potential in the neglected area of "junk bonds"—*i.e.*, non-investment-grade bonds that were typically issued by smaller, newer companies or by established firms whose fortunes had soured. Though junk bonds earned substantially higher rates of return than did investment-grade bonds, they were also regarded as more liable to default and hence were considered too risky by the large institutional investors—savings and loan associations, pension funds, insurance companies, and mutual funds—that provided American corporations with much of their investment capital. Milken's studies showed that junk bonds had acceptable default rates for their higher yield, and he began persuading a growing number of institutions to buy them.

By 1984 Drexel Burnham was able to raise large amounts of capital by floating new issues of junk bonds, which Milken used to provide financing for a new class of entrepreneurs and "corporate raiders" to expand their businesses or acquire other companies. Milken's vast and increasingly powerful junk-bond network fostered the "merger mania" of the 1980s, in which his clients, partners, and allies, among others, engaged in a wave of corporate mergers, acquisitions, hostile takeovers, and leveraged buyouts. By the end of the 1980s, the junk-bond market had grown to $150 billion in size, and Drexel Burnham had become one of the leading financial firms in the United States. Milken's own operations accounted for at least half of the firm's profits, and his own salary jumped from $25,000 in 1970 to $550 million in 1987—the highest annual compensation to that time.

In 1986, however, one of Drexel's clients, Ivan Boesky, was convicted of insider trading, and he implicated Milken and Drexel Burnham Lambert in his illegal financial dealings. In 1988 both Milken and Drexel Burnham were charged with securities fraud. Drexel reached a settlement with the government later that year, agreeing to pay $650 million in fines, and Milken left the firm in 1989. Without Milken's controlling hand, his network of junk-bond issuers and buyers fell apart, and soon afterward the junk-bond market collapsed, leading to Drexel Burnham's bankruptcy in 1990. Milken pled guilty to six counts of securities fraud that same year; he was sentenced to 10 years in prison, ordered to pay fines totaling $600 million, and permanently barred from engaging in the securities business.

milkfat: *see* butterfat.

milkfish, also called BANDENG, or BANGOS (*Chanos chanos*), silvery marine food fish that is the only living member of the family Chanidae (order Gonorhynchiformes). The milkfish is often collected when young and raised for food in brackish or freshwater tropical ponds. It is a toothless herbivore 1 to 1.5 m (3 to 5 feet) or more in length with a deeply forked tail. It is found throughout warmer regions of the Pacific and Indian oceans and can withstand very shallow, warm (88° F [31° C]) lagoon water. From March to May, it lays up to several million eggs in shallow, brackish water.

milkweed, any of several species of flowering plants belonging to the family Asclepiadaceae (*q.v.*).

milkweed butterfly, any of a group of butterflies considered by some authorities as the family Danaidae (order Lepidoptera) and by others as the subfamily Danainae of the brush-footed butterfly (*q.v.*) family Nymphalidae. The best known are species such as the monarch butterfly (*q.v.*) and queen butterfly. Although the majority of species are found in the tropics of both the Old World and the New, some well-known members live in temperate regions. The large, colourful adults have long, usually brownish wings marked by black-and-white patterns. The first pair of legs is small and not used for walking. They fly slowly and deliberately, and some, such as the monarch butterfly, migrate great distances.

The larvae are often brightly banded or striped, with two to four pairs of fleshy projections protruding from the body. They feed chiefly on milkweed and sometimes on nightshade; these plants contain acrid, milky juices that probably make the larva and its subsequent stages distasteful to predators. This, combined with a conspicuous coloration, protects them. Many other butterflies benefit from this protection through mimicry.

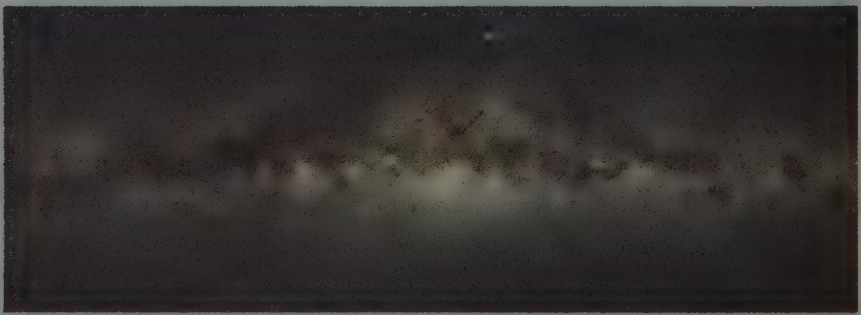
milkweed floss, seed fibre of *Asclepias syriaca,* or common milkweed, and *A. incarnata,* or butterfly weed, both of which are plants of the Asclepiadaceae family and grow in North America. The soft, buoyant, lustrous floss is yellowish white in colour and is made up of individual fibres that are about 1 to 3 cm (0.375 to 1.12 inches) in length and 20 to 50 microns (0.0008 to 0.002 inch) in diameter. The seedpods containing the floss are mechanically processed, or ginned, separating the seeds from their attached fibres. The fibres contain oily material and lignin, a woody plant substance, which makes them too brittle for spinning.

Milkweed floss is used in such water-safety equipment as life jackets and belts and will float in water while supporting as much as 30 times its own weight. It is also used as upholstery padding and insulation material. Like similar seed flosses, it is sometimes known as vegetable silk.

Milky Way Galaxy, large disk-shaped system of stars and interstellar matter of which the Sun is a component. It includes the multitude of stars whose light produces the Milky Way, the highly irregular luminous band that encircles the sky. This band of starlight lies roughly in the plane of the galactic disk.

A brief treatment of the Milky Way Galaxy follows. For full treatment, *see* MACROPAEDIA: Galaxies.

The Milky Way system is one of billions of galaxies that make up the universe. It contains several billion stars and large amounts of interstellar gas and dust. The system is a typical example of a class of galaxies known as barred spirals. It has a nucleus surrounded by a large central bulge with spiral arms coiled around



Milky Way Galaxy as seen from Earth

Dirk Hoppe

it. These curving arms, which resemble those of a huge pinwheel, are embedded in the galactic disk, which constitutes the main part of the system and measures roughly 70,000 light-years in diameter.

The galactic nucleus is obscured by interstellar dust particles, which absorb both the visible and the ultraviolet light radiated by its components. Investigators, however, have been able to record and study emissions from the region at radio, infrared, X-ray, and gamma-ray wavelengths. The strong emissions of infrared radiation and X rays in particular seem to indicate the presence of rapidly moving clouds of ionized gas. These gas clouds are thought to be circling a supermassive object, in all likelihood a black hole with a mass approximately 4,000,000 times that of the Sun. Investigators have determined that the central bulge contains mostly Population II objects (*i.e.,* old stars and star clusters) such as RR Lyrae variable stars and globular clusters. The components of the spiral arms are quite different. The arms are occupied by objects belonging to the extreme Population I variety (*i.e.,* very young, bright stars and open clusters). In addition, this region of the Galaxy contains the highest concentrations of interstellar gas and dust particles and therefore constitutes the most favourable site for new star formation. The Sun is located near the inner edge of one of these arms—the Orion arm—about two-thirds of the way from the centre of the Galaxy. The galactic nucleus lies in the direction of the constellation Sagittarius at a distance of about 27,000 light-years from the Sun.

Above and below the galactic disk is a spherical region (referred to as simply the spherical component) that is occupied by globular clusters and other very old Population II objects—*e.g.,* dwarf stars deficient in the heavy elements. Exterior to the whole visible portion of the Galaxy is the giant massive halo. Its constituents, shape, and extent are still not known.

The entire Milky Way system rotates around the galactic centre, but the various constituent objects do not rotate at the same velocity. Stars distant from the centre travel at lower speeds than do those closer to it. The Sun, which is located relatively far from the nucleus, moves at an estimated speed of about 225 km per second (140 miles per second) in a nearly circular orbit. Because of its relatively low velocity, the Sun's period of revolution about the galactic centre is approximately 200,000,000 years.

Mill (board game): *see* Nine Men's Morris.

Mill, James (b. April 6, 1773, Northwater Bridge, Forfarshire, Scot.—d. June 23, 1836, London, Eng.), Scottish philosopher, historian, and economist. He was prominent as a representative of philosophical radicalism, a school of thought also known as Utilitarianism, which emphasized the need for a scientific basis for philosophy as well as a humanist approach to politics and economics. His eldest son was the celebrated Utilitarian thinker John Stuart Mill.

After distinguishing himself as a Greek scholar at the University of Edinburgh, James Mill was licensed a Presbyterian preacher in 1798. He soon turned to teaching, however, and embarked on historical and philosophical studies. In 1802 he went to London to devote himself to a career in journalism. In 1804 he wrote a pamphlet on the corn trade, arguing against a bounty on the exportation of grain, and in 1806 he began his *History of British India,* 3 vol. (1817).

Mill became acquainted with Jeremy Bentham, who founded Utilitarianism, in 1808. As Bentham's chief companion and ally for many years, he adopted Bentham's principles in their entirety and did more to propagate them and to oppose the beginnings of Romanticism than anyone else. He was a regular contributor (1806–18) to the *Anti-Jacobin Review,* the *British Review,* the *Eclectic Review,* and the *Edinburgh Review* (1808–13). In 1811 he helped edit the periodical *Philanthropist* with the English writer William Allen, contributing his opinions on education, freedom of the press, and prison discipline. He also participated in the discussions that led to the founding of London University in 1825. In 1814 Mill undertook to write various articles on politics, law, and education for the six-volume Supplement to the 4th, 5th, and 6th editions of the *Encyclopædia Britannica.* As reprints they enjoyed a wide circulation in his time. One of the articles, "Government," had considerable influence on public opinion in the 1820s. In it, Mill concluded that a representative democracy based on wide suffrage is a necessary element of good government. "Government," which was possibly the most succinct statement of the political theory of the philosophical radicals, helped prepare the ground for passage of the first Reform Bill by Parliament in 1832.

James Mill

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

In 1819, two years after Mill's *History of British India* appeared, he was appointed an official in India House, despite his drastic criticisms in the *History* of British rule in India. He rose gradually through the ranks until he was appointed head of the examiner's office in 1830. The *History,* his major literary achievement, was the first full historical treatment of the British conquest of India. Mill harshly criticized the British administration of India, and during his 17 years with the India House he helped completely reform the system of government in the colony. However, the *History*'s severe Utilitarian analysis of Indian civilization also popularized among European readers an image of the subcontinent as perpetually backward and undeveloped. Mill never actually visited India.

Mill was also influential in English politics. His writings and his personal connections with radical politicians helped determine the change of view from theories of the rights of man and the absolute equality of men, as promulgated by the French Revolution, to the claiming of securities for good government through wide extension of the franchise. His *Elements of Political Economy* (1821), an especially precise and lucid work, summarizes the views of the philosophical radicals, based primarily on the work of the economist David Ricardo. In this work Mill maintained: (1) that the chief problem of political reformers is to limit the increase of population, on the assumption that capital does not naturally increase at the same rate as population; (2) that the value of a thing depends entirely on the quantity of labour put into it; and (3) that what is now known as the "unearned increment" of land is a proper object for taxation. The enunciation of the second of these propositions is important in view of the use made of it by Karl Marx. Mill developed Bentham's doctrines by his explanation of the association of ideas. This theory, presented in Mill's *Analysis of the Phenomena of the Human Mind,* 2 vol. (1829), centres on the interrelatedness of mental concepts.

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Mill, John Stuart (b. May 20, 1806, London, Eng.—d. May 8, 1873, Avignon, France), English philosopher, economist, and exponent of Utilitarianism, which he tended to humanize and infuse with an element of Idealism.

A brief treatment of John Stuart Mill follows. For full treatment, *see* MACROPAEDIA: Mill, John Stuart.

Mill was educated under his father's rigorous discipline both at home and in France. He joined the examiner's office of India House in 1823, becoming its chief in 1856. After writing essays for various periodicals, he was asked to edit *The London Review* in 1835. His early writings, later published in the first two volumes of *Dissertations and Discussions* (1859), added a new dimension to English radicalism. Mill's major publications, however, were *A System of Logic* (1843) and *Principles of Political Economy* (1848). He showed interest in woman suffrage (*Subjection of Women* [1869]) and wrote on ethics and politics (*On Liberty* [1859]; *Considerations on Representative Government* [1861]).

Mill's successive friendships with John Sterling, Thomas Carlyle, and Mrs. Taylor (Harriet Hardy), whom he married in 1851, influenced his thinking over the years and sustained his interest and enthusiasm. He had a brief parliamentary career and was also elected rector of St. Andrews University in 1867, but he retired in the following year and moved to France. His *Autobiography* (1873) and *Three Essays on Religion* (1874) were published posthumously.

Millais, Sir John Everett, 1ST BARONET (b. June 8, 1829, Southampton, Hampshire,

"The Blind Girl," oil painting by Sir John Everett Millais, 1856; in the Birmingham City Museum and Art Gallery, Birmingham, Eng.

By courtesy of the Birmingham Museums and Art Gallery

Eng.—d. Aug. 13, 1896, London), English painter and illustrator, and a founding member of the artistic movement known as the Pre-Raphaelite Brotherhood.

In 1838 Millais went to London and at the age of 11 entered the Royal Academy schools. Extremely precocious, he won all the academy prizes. In 1848 Millais joined with two other artists, William Holman Hunt and Dante Gabriel Rossetti, to form the Pre-Raphaelite Brotherhood. The Brotherhood was founded in opposition to contemporary academic painting, which the group believed was the result of the example set by Raphael and which had dominated the schools and academies since his time. At the next year's academy, the novelist Charles Dickens led a violent attack on Millais's "Christ in the House of His Parents" (1850; Tate Gallery, London), which many considered blasphemous because of its lack of idealization and seeming irreverence in the use of the mundane.

Millais's period of greatest artistic achievement came in the 1850s. "The Return of the Dove to the Ark" (1851; Ashmolean Museum, Oxford) was admired by both the English essayist and critic John Ruskin and the French author Théophile Gautier; and "The Order of Release" (1853; Tate Gallery), which included a portrait of his future wife Effie Gray (then unhappily married to Ruskin, whose portrait Millais also painted), was praised by Eugène Delacroix in 1855 and earned for its artist his associateship to the Royal Academy in 1853. In 1856 Millais painted one of his greatest public successes, "The Blind Girl" (Birmingham City Museum and Art Gallery)—a tour de force of Victorian sentiment and technical facility.

In 1863 Millais became full academician, and by this time his style had broadened and his content altered toward a more deliberately popular, less didactic approach. He executed illustrations for George Dalziel's *Parables* (1864) and E. Moxon's edition of Tennyson's poems and contributed to *Once a Week*, *Good Words* and other periodicals. Millais's later work is undoubtedly of poorer overall quality—a deterioration of which he was fully aware. In 1870 appeared the first of his pure landscapes, "Chill October." Many of these landscapes are of Perthshire, where Millais shot and fished in the autumn. Many portraits belong to this late period, including those of William Gladstone, of Alfred, Lord Tennyson, and of Cardinal Newman. Millais was created a baronet in 1885 and was elected president of the Royal Academy in 1896.

Millardet, Pierre-Marie-Alexis (b. Dec. 13, 1838, Monmerey-la-Ville, France—d. Dec. 15, 1902, Bordeaux), French botanist who developed the Bordeaux mixture, the first successful fungicide. He also saved the vineyards of France from destruction by *Phylloxera,* a genus of plant lice.

Millardet studied at the universities of Heidelberg and Freiburg in Germany, then returned to France to take doctorates in both medicine and science. He became assistant professor of botany at the University of Strasbourg in 1869, moved to Nancy three years later, and in 1876 became professor of botany at the University of Bordeaux, remaining there until his retirement in 1899.

Between 1858 and 1863 the greenish yellow grape phylloxera, an aphidlike plant pest, was introduced into Europe on vines imported from the United States for grafting. The insect spread swiftly, causing extensive destruction. Millardet brought this plague under control by introducing resistant American vines as stocks for grafting with European varieties.

Along with phylloxera came *Plasmopara viticola,* a downy mildew fungus that damaged fruits and vegetables, particularly grapes. Farmers for centuries in the Médoc area of France had sprinkled their vines with a thick mixture of copper sulfate, lime, and water, whose unappetizing appearance discouraged thieves from stealing the grapes. In October 1882 Millardet noticed that this mixture also controlled the downy mildew, suggested its application as a fungicide, and, after three years of experimentation and testing, published his favourable results in the *Journal d'Agriculture Pratique.* This combination of chemicals, which became known as the Bordeaux mixture, was the first fungicide to receive large-scale use the world over and can be said to have started a new era in the technology of agriculture.

Millau, town, Aveyron *département,* Midi-Pyrénées *région,* southern France. It lies in the Grands-Causses plateau region, at the confluence of the Tarn and Dourbie rivers, southeast of Rodez on the northwestern edge of the Causses du Larzac. In pre-Roman times it was Condatomag, a Celtic community. The Romans renamed it Aemilianum and developed it as a pottery centre. Chartered in 1183, it was ruled by the Aragonese and the English in the Middle Ages. During the Reformation, it became a Huguenot stronghold and rebelled against Louis XIII in 1620. Millau is noted for gloves and Roquefort cheese. Pop. (1990) 22,458.

Millau, Fr., on the Grands-Causses Plateau
Club Iris

Millay, Edna St. Vincent (b. Feb. 22, 1892, Rockland, Maine, U.S.—d. Oct. 19, 1950, Austerlitz, N.Y.), American poet and dramatist who came to personify romantic rebellion and bravado in the 1920s.

Millay's earliest poems were published in the children's magazine *St. Nicholas*. Until she left home for college, she lived with her mother and sisters in Camden, Maine, and her work is filled with the imagery of coast and countryside.

Her first acclaim came when "Renascence" was included in *The Lyric Year* in 1912; the poem brought Millay to the attention of a benefactor who made it possible for her to attend Vassar College. She graduated in 1917. For a time she supported herself in New York City by writing short stories under the pseudonym Nancy Boyd and as an actress and playwright with the Provincetown Players. In 1923 she married the businessman Eugen Boissevain and lived thereafter on a farm in the Berkshires.

"Renascence" gave its title in 1917 to her first book, *Renascence and Other Poems*, which was full of the romantic and independent temper of youth. The line "My candle burns at both ends," from a poem in *A Few Figs from Thistles* (1920) was taken up as the watchword of the "flaming youth" of that era and brought her a renown that she came to despise. *Second April* (1921) marked a return to the earlier mood and craftsmanship. In 1921 she also published three verse plays: *Two Slatterns and a King*, *The Lamp and the Bell*, and *Aria da Capo*. "The Harp Weaver," a work thought to have been inspired by her devotion to her mother, was published in 1923 in *The Harp Weaver and Other Poems*. She was commissioned to write the libretto for Deems Taylor's opera *The King's Henchman*, first presented at the Metropolitan Opera in New York City in 1927 and a greater success than any previous American opera. Her major later works include: *The Buck in the Snow* (1928), introducing a more sombre tone to her poetry; *Fatal Interview* (1931), a highly acclaimed sonnet sequence; and *Wine from These Grapes* (1934). Her letters were edited by A.R. Macdougall in 1952.

Edna St. Vincent Millay
Harper & Row, Publishers, Inc.

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Millburn, urban township, Essex county, northeastern New Jersey, U.S., just west of Newark on the Rahway and Passaic rivers. It is primarily a residential community that abuts the fashionable Short Hills district. About 1664, colonists from New York purchased land from the Lenni Lenape Indians and founded Elizabethtown, which was divided in 1793 when the Township of Springfield was formed. In 1857 the northern part of Springfield seceded and was incorporated as the Township of Millburn, the name originating from Samuel Campbell's first "mill-on-the-burn," built about 1790. This so-called Diamond Paper Mill has been transformed into the Paper Mill Playhouse (the State Theatre of New Jersey). Earlier, the township had many names, including Rum Brook, Riverhead, Vauxhall, Milltown, and Millville. During the Revolutionary War, the Battle of Springfield (June 23, 1780) took place in the vicinity, with fighting around the present town hall. Pop. (1993 est.) 18,934.

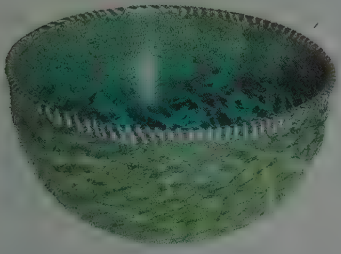
Mille, Cecil B. de: *see* DeMille, Cecil B.

Mille Miglia (Italian: "Thousand Miles"), the most famous of the Italian road races for automobiles. Although the course was changed 13 times in the 23 years the race was run, it often started and ended in Rome, winding through the mountains and smaller towns of Italy. The first Mille Miglia was run March 26–27, 1927, starting in Brescia, with the winner returning just over 20 hours later and averaging 48 mph for the race. The race was banned by Mussolini in 1939 after several spectators were killed in a crash in the 1938 race. It was reinstated in 1947 but was discontinued after the 1957 race when a crash killed 2 drivers and 11 spectators.

Milledgeville, city, seat (1809) of Baldwin county, central Georgia, U.S., on the Oconee River (dammed immediately north of the city to form Lake Sinclair). It was founded in 1803 and named for John Milledge, then governor of Georgia. It was the capital of Georgia from 1807 to 1867. Relatively little damage was done to it during the Civil War by Gen.

William Tecumseh Sherman on his march to Savannah, and many fine antebellum homes remain. The old statehouse is now part of Georgia Military College (founded 1879). The Old Governor's Mansion (1838) is on the campus of Georgia College (1889). Inc. town, 1806; city, 1835. Pop. (1999 est.) 18,034.

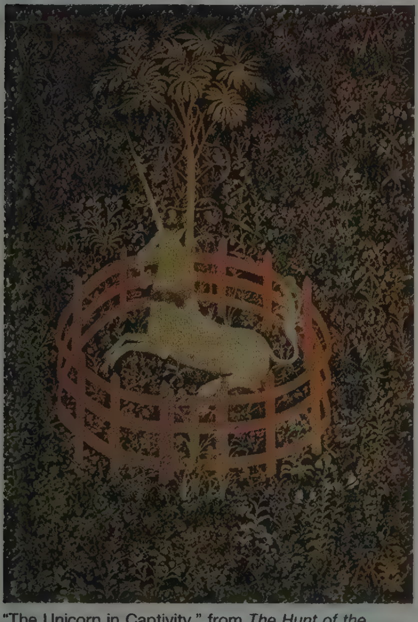
millefiori glass (Italian: "thousand flowers"), type of mosaic glassware characterized by a flowerlike pattern. It is produced by first heating a bundle of thin glass rods of different colours until the rods fuse together. The bundle is pulled thin, cooled, and sliced cross-sectionally to produce small disks with flowerlike designs. These disks are applied to hot blown glassware such as a vase or bowl, which is then reheated and blown a second time. The resulting glassware is brilliantly coloured with an intricate, fade-resistant design. The technique of millefiori glassmaking was developed by the Romans in the 1st century BC and revived and refined by Venetian glassmakers in the 15th century. Since the mid-19th century, the technique has been used to make paperweights and gaming marbles.



Millefiori glass bowl, Roman, *c.* 100 BC–100 AD; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, A.C. Cooper Ltd.

millefleur tapestry (French: "thousand flowers"), also called MENUES VERDURES, kind of tapestry characterized by its background motif of many small flowers. Millefleur tapestries, which often show secular scenes or allegories, are thought to have originated in the Loire district in France in the mid-15th century. They became popular and were produced in many parts of France and the Low Countries until the end of the 16th century.



"The Unicorn in Captivity," from *The Hunt of the Unicorn*, French or Flemish millefleur tapestry, late 15th–early 16th century, from the Château de Verteuil; in the Cloisters, the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, the Cloisters Collection, gift of John D. Rockefeller, Jr., 1937

Millenary Petition, request for changes within the Church of England, presented to King James I of England in April 1603 by Puritan ministers. Its authors claimed that it had been signed by 1,000 (Latin *millenarius*, "of a thousand") ministers. Some practices objected to included the priest's making the sign of the cross during Baptism, use of the ring for marriage, and ministers' wearing of surplices. In response the king called the Hampton Court Conference (*q.v.*), where most of the requests were rejected.

millennium, a period of 1,000 years. The Gregorian calendar (*q.v.*), put forth in 1582 and subsequently adopted by most countries, did not include a year 0 in the transition from BC (years before Christ) to AD (those since his birth). Thus, the 1st millennium is defined as spanning years 1–1000 and the 2nd 1001–2000. Although numerous popular celebrations marked the start of the year 2000, the 21st century and 3rd millennium AD began on Jan. 1, 2001.

millennium, in Christian theology, the 1,000-year period when Jesus Christ will return and establish his kingdom on Earth. Among early Christians the idea of millennialism, or millenarianism, derived chiefly from Jewish eschatological expectations and usually implied the nearness of the triumph of Christians over the world.

A brief treatment follows. For a full treatment, *see* MACROPAEDIA: Doctrines and Dogmas, Religious.

The doctrine of the millennium is clearly present in the New Testament only in Rev. 20. According to that account, Satan was bound and thrown into a pit for 1,000 years. Martyrs were resurrected and reigned with Christ for the millennium. At the end of the period, Satan was loosed to deceive the nations, but he was soon defeated. All the dead were then gathered for the final judgment.

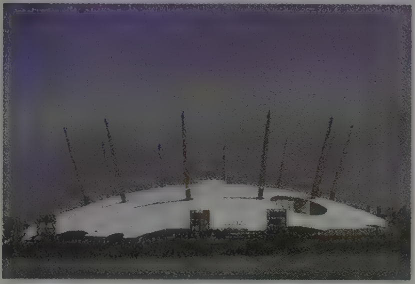
Many different interpretations of the millennium have been given. Those Christians who believe that the Second Coming of Christ will begin the 1,000-year period of righteousness in the world have been called premillennialists. Others, known as postmillennialists, believe that eventually Christianity will be accepted throughout the world, and a 1,000-year period of Christian righteousness will be climaxed by the return of Christ, the resurrection of the dead, and the final judgment.

The more general use of the term to include expectations of material benefits to be enjoyed on earth in the near future means that a number of early Christian writers, especially those close to Jewish Christianity, can be called millenarians. Many Christians first became aware of the dangers of this kind of doctrine only with the rise of the movement known as Montanism. The Montanists believed that the heavenly Jerusalem would soon be manifested in Phrygia. At the same time, more orthodox teachers continued to share a similar hope; Hippolytus tells of bishops in Syria and Pontus who led their flocks out into the desert to await Christ's coming.

By the time of the triumph of the church in the reign of Constantine such hopes were on the wane. The great Western theologian Augustine was a millenarian early in his career, but he later changed his views. At the Council of Ephesus (431) millenarian views were not condemned; but they were mentioned only to be ignored. In later times they were used sporadically against the authority of the church; thus they flourished among spiritual enthusiasts during the Middle Ages and particularly at the time of the Reformation, especially among the various groups loosely denominated Anabaptist. The more conservative Reformers shared the Catholic view of the coming of Christ as primarily past rather than future, thus at least partly identifying the Kingdom of God on earth with the church.

Throughout later Western history, the appeal of millennialism has tended to resurge in times of great social change or crisis. Sects arising out of the industrialization of the West include the Seventh-day Adventists, Jehovah's Witnesses, and the Latter-day Saints (Mormons).

Millennium Dome, complex in Greenwich, London, England. Its central structure is the largest dome in the world, with nearly twice the area of the former record holder, the Georgia Dome (in Atlanta, Ga., U.S.).



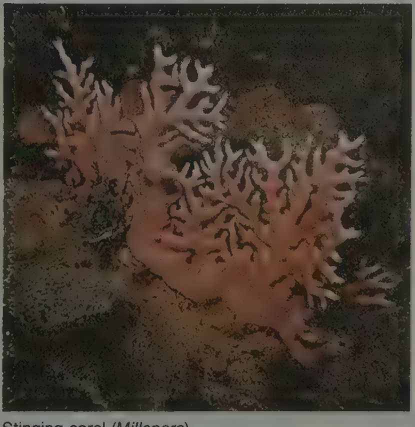
The Millennium Dome under construction, July 1999

© Reuters New Media Inc./Corbis

The dome's foundation, main supports, and Teflon-coated roof, which were completed in mid-1998, create an interior floor area of more than 861,000 square feet (80,000 square m). The roof measures 1,050 feet (320 m) in diameter and reaches a height of some 165 feet (50 m). The roof assembly is supported by a web of 2,600 cables suspended from a circle of 12 steel masts that rise nearly 330 feet (100 m). The unusual design of the dome resembles a partly flattened mushroom punctured by a circle of 12 pins.

The dome's creation stirred controversy owing to its enormous cost and uncertainties regarding the value and popularity of its exhibits. The Millennium Dome exhibition took place from Dec. 31, 1999, until Dec. 31, 2000; however, visitor receipts failed to cover expenses.

millepore, also called STINGING CORAL, or PEPPER CORAL (Millepora), any of a genus of invertebrate marine animals comprising the order Milleporina (phylum Cnidaria). Millepores are common in shallow tropical seas to depths of 30 metres (about 100 feet). Unlike the true corals, which belong to the class Anthozoa, millepores are closely related to the hydras (*q.v.*). Both hydras and the millepores belong to the class Hydrozoa. Some species form branching treelike growths up to 50 cen-



Stinging coral (*Millepora*)

Douglas Faulkner

timetres (about 20 inches) high. Others form massive and shapeless or leaflike growths. Most are whitish, yellowish, or beige in colour. They bear powerful stinging structures called nematocysts.

miller (moth): *see* owlet moth.

Miller, Arthur (b. Oct. 17, 1915, New York City), U.S. playwright who combined social awareness with a searching concern for his characters' inner lives. He is best known for *Death of a Salesman* (1949).

Miller was shaped by the Depression, which spelled financial ruin for his father, a small manufacturer, and demonstrated to the young Miller the insecurity of modern existence. After graduation from high school he worked in a warehouse. With the money he earned he attended the University of Michigan, where he began to write plays. His first public success was with *Focus* (1945), a novel about anti-Semitism. *All My Sons* (1947), a drama about a manufacturer of faulty war materials that strongly reflects the influence of Ibsen, was his first important play. *Death of a Salesman* became one of the most famous American plays of its period. It is the tragedy of a small man destroyed by false values that are in large part the values of his society.

Arthur Miller, photograph by Inge Morath

Magnum

The Crucible (1953) was based on the witchcraft trials in Salem, Mass., in 1692, a period Miller considered relevant to the 1950s, when investigation of subversive activities was widespread. In 1956, when Miller was called before the House Un-American Activities Committee, he refused to name people he had seen 10 years earlier at an alleged Communist writers' meeting. He was convicted of contempt but appealed and won.

A Memory of Two Mondays and another short play, *A View from the Bridge* (a story of an Italian-American longshoreman whose passion for his niece destroys him), were staged on the same bill in 1955. *After the Fall* (1964) is concerned with failure in human relationships and its consequences. *The Price* (1968) continued Miller's exploration of the theme of guilt and responsibility to oneself and to others by examining the strained relationship between two brothers. He directed the London production of the play in 1969.

The Archbishop's Ceiling, produced in Washington, D.C., in 1977, dealt with the Soviet treatment of dissident writers. *The American Clock,* a series of dramatic vignettes based on Studs Terkel's *Hard Times* (about the Great Depression), was produced at the 1980 American Spoleto Festival in Charleston, S.C.

Miller also wrote a screenplay, *The Misfits* (1961), for his second wife, the actress Marilyn Monroe (1926–62). *I Don't Need You Any More,* a collection of his short stories, appeared in 1967, and a collection of theatre essays in 1977.

Miller, Cincinnatus Hiner: *see* Miller, Joaquin.

Miller, David Hunter (b. Jan. 2, 1875, New York City—d. July 21, 1961, Washington, D.C.), U.S. lawyer and an expert on treaties who participated in the drafting of the covenant of the League of Nations.

He practiced law in New York City from 1911 to 1929, served on the Inquiry, a body of experts that collected data for the Paris Peace Conference (1917–19), and was legal adviser to the American commission to the conference.

As an officer of the U.S. Department of State (1929–44), Miller headed the U.S. delegation to the 1930 Hague Conference for the codification of international law. His published works include *My Diary at the Conference of Paris, with Documents* (21 vol., 1924–26) and *Treaties and Other International Acts of the United States of America* (8 vol., 1931–48).

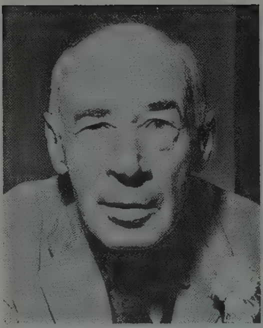
Miller, (Alton) Glenn (b. March 1, 1904, Clarinda, Iowa, U.S.—d. Dec. 16, 1944, at sea en route from London to Paris), U.S. composer and trombonist, one of the most remarkable of all popular music figures because of the intensity of his posthumous reputation.

Miller was educated at the University of Colorado, Boulder, and in 1926 became a professional trombonist with Ben Pollack's band. By 1930 he was a much sought-after New York City free-lance musician. Later he became an organizer of other men's bands, particularly those of the Dorsey brothers (1934) and Ray Noble (1935). After an abortive attempt to form his own orchestra (1937), he tried again a year later and by 1939 had achieved world fame as a big-band leader. He became captain and then major as leader of the U.S. Air Force band in Europe. While flying to Paris from England, he disappeared; neither bodies nor wreckage were ever sighted or recovered.

Miller's triumphs in the ballrooms were based on sweet orchestrations meticulously executed. The Miller saxophone sound, instantly recognizable and much copied, was based on quite simple musical precepts, as were all his big successes, including his own composition, "Moonlight Serenade," which grew out of an exercise he had written while studying with Joseph Schillinger. His two Hollywood films, *Sun Valley Serenade* (1941) and *Orchestra Wives* (1942), contributed to his reputation; but by far the biggest factor in the persistence of his memory was the release in 1953 of the somewhat sweetened movie biography, *The Glenn Miller Story.* Some critics hold that the jazz content of his orchestra was negligible, but others regard its sound as the definitive popular music of its time. Because of its great popularity, the orchestra was held together for a time under saxophonist Tex Beneke, and an organization known as the Glenn Miller Orchestra, which purveyed its original leader's sound, performed into the 1980s.

Miller, Henry (Valentine) (b. Dec. 26, 1891, New York City—d. June 7, 1980, Pacific Palisades, Calif., U.S.), U.S. writer and perennial Bohemian whose autobiographical novels achieve a candour—particularly about sex—that made them a liberating influence in mid-20th-century literature. He is also notable for a free and easy American style and a gift for comedy that springs from his willingness to admit to feelings others conceal and an almost eager acceptance of the bad along with the good. Because of their sexual frankness, his major works were banned in Britain and the United States until the 1960s, but they were widely known earlier from copies smuggled in from France.

Miller was brought up in Brooklyn, and he wrote about his childhood experiences there in *Black Spring* (1936). In 1924 he left his job with Western Union in New York to devote himself to writing. In 1930 he went to France. *Tropic of Cancer* (published in France in 1934, in the United States in 1961) is based on his hand-to-mouth existence in Depression-ridden Paris. *Tropic of Capricorn* (France, 1939; U.S., 1961) draws on the earlier New York phase.



Henry Miller

Camera Press

Miller's visit to Greece in 1939 inspired *The Colossus of Maroussi* (1941), a meditation on the significance of that country. In 1940–41 he toured the United States extensively and wrote a sharply critical account of it, *The Air-Conditioned Nightmare* (1945), which dwelt on the cost in human terms of mechanization and commercialization.

After settling in Big Sur on the California coast, Miller became the centre of a colony of admirers. Many of them were writers of the Beat generation who saw parallels to their own beliefs in Miller's whole-hearted acceptance of the degrading along with the sublime. At Big Sur, Miller produced his *Rosy Crucifixion* trilogy, made up of *Sexus, Plexus,* and *Nexus* (U.S. edition published as a whole in 1965). It covers much the same period of Miller's life as *Tropic of Capricorn* and, together with that book, traces the stages by which the hero-narrator becomes a writer. The publication of the "Tropics" in the United States provoked a series of obscenity trials that culminated in 1964 in a Supreme Court decision rejecting state court findings that the book was obscene.

Other important books by Miller are the collections of essays *The Cosmological Eye* (1939) and *The Wisdom of the Heart* (1941). He was also a watercolourist; he exhibited internationally and wrote about art in *To Paint Is To Love Again* (1960). Various volumes of his correspondence have been published: with Lawrence Durrell (1963), to Anaïs Nin (1965), and with Wallace Fowlie (1975).

Miller, Hugh (b. Oct. 10, 1802, Cromarty, Cromartyshire, Scot.—d. Dec. 24, 1856, Edinburgh), Scottish geologist and lay theologian who was considered one of the finest geological writers of the 19th century and whose writings were widely successful in arousing public interest in geologic history.

Hugh Miller, detail of an engraving by Francis Croll

The Mansell Collection

After early literary ventures and a six-year period as a bank accountant in Cromarty, Miller went to Edinburgh in 1840 as editor of the newly founded newspaper *The Witness.* The newspaper, which opposed patronage in the Church of Scotland, gained a wide reputation through Miller's leading articles. He also wrote a brilliant geological series for it, part of which was published in book form as *The Old Red Sandstone* (1841). In this work he described his discoveries, in Cromarty, of fossils found in formations of the Devonian strata (408 to 360 million years ago).

Of his remaining works on geology, *Footprints of the Creator* (1849) was the most nearly original. The book recorded Miller's reconstruction of the extinct fishes he had discovered in the Old Red Sandstone and contended, on theological grounds, that their perfection of development disproved the theory of evolution. He also discovered the fish species subsequently known as *Pterichthyodes milleri.* It was largely from Miller's writings that the Devonian Period became known as the Age of Fishes.

Miller, Joaquin, pseudonym of CINCINNATUS HINER MILLER, Hiner also spelled HEINE (b. Sept. 8, 1837, near Liberty, Ind., U.S.—d. Feb. 17, 1913, Oakland, Calif.), American poet and journalist whose best work conveys a sense of the majesty and excitement of the Old West. His best-known poem is "Columbus" with its refrain, "On, sail on!"—once familiar to millions of American schoolchildren.

Joaquin Miller
By courtesy of the Library of Congress, Washington, D.C.

Miller went west with his family and led a picaresque early life in California among miners, gamblers, and Indians. He attended Columbia College (Eugene, Ore.) briefly in 1858–59 and was admitted to the Oregon bar in 1860. Between 1862 and 1866 he owned a pony express and a newspaper (the *Eugene Democratic Register*) and was a county judge in Canyon City, Ore. For the *Register* he wrote an article defending the Mexican brigand Joaquin Murietta, whose given name he later used as a pseudonym. His first books of poems, *Specimens* (1868) and *Joaquin et al.* (1869), attracted little attention.

In 1870 he traveled to England, where his exotic manners and flamboyant western costume made him a great favourite with the literati. *Pacific Poems* (1871) was privately printed there. *Songs of the Sierras* (1871), upon which his reputation mainly rests, was loudly acclaimed in England, while generally derided in the United States for its excessive romanticism. His other books of poetry included *Songs of the Sunlands* (1873), *The Ship in the Desert* (1875), *The Baroness of New York* (1877), *Songs of Italy* (1878), *Memorie and Rime* (1884), and the *Complete Poetical Works* (1897).

Whitmanesque in temper, his work is frequently bombastic and artificial. Because of his fondness for Byronic posturings, his autobiographical writings (*e.g., Life Among the Modocs,* 1873) are usually considered untrustworthy.

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Miller, Sir Jonathan, in full SIR JONATHAN WOLFE MILLER (b. July 21, 1934, London, Eng.), actor, director, producer, medical doctor, and man of letters noted for his wide-ranging abilities.

Miller was the son of a psychiatrist and a novelist. He graduated from St. John's College, Cambridge, in 1956 and studied medicine at the University College School of Medicine of London University, from which he took a degree in medicine in 1959. Miller made his professional stage debut at the Edinburgh Festival in 1961 as actor and coauthor in the satirical review *Beyond the Fringe*. He left the show in 1963 to write television scripts and to direct live theatre. His sometimes controversial interpretations of classic works from William Shakespeare and Richard Sheridan to *Alice in Wonderland* gained him notoriety, and his appointment (1973) as associate director of the National Theatre—not noted for its innovative spirit—served only to frustrate him; he resigned in 1975. He then became involved with the world of opera and directed, most notably, P.I. Tchaikovsky's *Eugene Onegin*. In 1978 he wrote *The Body in Question,* a 13-part series on the history of medicine and of attitudes toward the human body, for the British Broadcasting Company; it also became a best-selling book. He continued his association with opera and theatre, not neglecting his interest in medicine. In 1988 he became artistic director of Old Vic in London. His directorial work took him to Germany, Italy, and the United States as well as throughout the United Kingdom. He was knighted in 2002.

Miller, Marilyn, pseudonym of MARY ELLEN REYNOLDS (b. Sept. 1, 1898, Evansville, Ind., U.S.—d. April 7, 1936, New York, N.Y.), one of the most popular American musical comedy actresses of the 1920s.

Miller made her stage debut at the age of four with her mother and stepfather as "The Three Columbians," a vaudeville trio, in Dayton, Ohio. She toured at home and abroad for the next 10 years until Lee Shubert discovered her at the Lotus Club in London and invited her to perform at the Winter Garden in New York City. She debuted there in *The Passing Show of 1914,* which was followed by appearances in later editions of *The Passing Show,* then the *Ziegfeld Follies of 1918,* and subsequently her starring role in *Sally,* which ran for 570 performances. In 1924 Miller played Peter Pan in J.M. Barrie's play, followed by other great successes, including *Sunny* (1925), *Rosalie* (1928), and Florenz Ziegfeld's *Smiles* (1930).

Miller went to Hollywood in 1930 and made successful film versions of both *Sunny* and *Sally* in that year and then in 1931 filmed *Her Majesty, Love* with W.C. Fields. She returned to Broadway to star in *As Thousands Cheer* (1933) but died of a sinus infection three years later while still at the height of her career.

Miller, Merton H., in full MERTON HOWARD MILLER (b. May 16, 1923, Boston, Mass., U.S.—d. June 3, 2000, Chicago, Ill.), American economist who, with Harry M. Markowitz and William F. Sharpe (*qq.v.*), won the Nobel Memorial Prize in Economic Science for 1990. His contribution (and that of his colleague Franco Modigliani, who received the Nobel Prize in Economic Science in 1985), known as the Modigliani-Miller theorem, was pioneering work in the field of finance theory.

Miller attended Harvard University (B.A., 1944), worked at the U.S. Treasury Department, and then graduated from Johns Hopkins University, Baltimore, Md. (Ph.D., 1952). He taught at the Carnegie Institute of Technology (now Carnegie Mellon University), Pittsburgh, Pa., until 1961, when he became professor of finance at the University of Chicago's Graduate School of Business Administration.

Miller's work was based on the work of Markowitz (whose "portfolio theory" established that wealth can best be invested in assets that vary in terms of risk and expected return) and Sharpe (who developed the "capital asset pricing model," a model to explain how securities prices reflect risks and potential returns). The Modigliani-Miller theorem explains the relationship between a company's capital asset structure and dividend policy and its market value and cost of capital; the theorem demonstrated that how a manufacturing company funds its activities is less important than the profitability of those activities. Miller was recognized as one of the most important developers of theoretical and empirical analysis in the field of corporate finance. In addition to his position as the business school's R. McCormick distinguished service professor, Miller served as a director of the Chicago Mercantile Exchange.

Miller, Neal E., in full NEAL ELGAR MILLER (b. Aug. 3, 1909, Milwaukee, Wis., U.S.—d. April 4, 2002, Hamden, Conn.), American psychologist who, with John Dollard, developed a theory of motivation based on the satisfaction of psychosocial drives, combining elements of a number of earlier reinforcement theories of behaviour and learning.

Miller attended the University of Washington (Seattle) and Stanford University (Palo Alto, Calif.) before receiving his Ph.D. in psychology from Yale University in 1935. He remained at Yale's Institute of Human Relations to continue his experiments on learning. In *Social Learning and Imitation* (1941) and *Personality and Psychotherapy* (1950), he and Dollard presented their results, which suggested that behaviour patterns were produced through the modification of biologically or socially derived drives by conditioning and reinforcement. Miller was appointed professor of psychology at Yale in 1950, resigning the position in 1966 to accept a professorship at Rockefeller University (emeritus from 1981).

Miller, Oskar von (b. May 7, 1855, Munich [Germany]—d. April 9, 1934, Munich), electrical engineer who fostered the electric-power industry in Germany and founded the Deutsches Museum of science and technology in Munich.

Miller studied at the Munich Technical Institute and organized the Munich Electrical Exposition of 1882, the first ever held in Germany. There he demonstrated the transmission of electrical energy over a wire 35 miles (57 km) long. In 1883 he founded the German Edison Company with Emil Rathenau; this company, which in 1887 was renamed Allgemeine Elektricitäts Gesellschaft (AEG), was largely responsible for installing Germany's first electrical system. Miller himself designed Berlin's first central power station. In 1891, while technical director of the Frankfurt Electrical Exposition, he captured world attention by building a cable that transmitted alternating current at 25,000 volts over a distance of 112 miles (180 km). His interest in the conversion of water power to electrical energy led to the development of hydroelectric stations in Bavaria.

In 1903 Miller proposed the construction of a museum that would not only preserve technological artifacts but also teach visitors scientific principles through the use of operating devices and dioramas. The resulting teaching museum, the first of its kind, became the model for science museums throughout the world.

Miller, Samuel Freeman (b. April 5, 1816, Richmond, Ky., U.S.—d. Oct. 13, 1890, Washington, D.C.), associate justice of the U.S. Supreme Court (1862–90), a leading opponent of efforts to use the Fourteenth Amendment of the Constitution to protect business against government regulation. He was spokesman for the court in its first attempt to construe the amendment, passed after the American Civil War largely to assure the rights of the newly freed slaves. He was in the majority then, but his view that the amendment did not bar legislative restraints on industry ceased to prevail by the 1890s and did not again predominate until the late 1930s.

Samuel Miller

By courtesy of the Library of Congress, Washington, D.C.

A practicing physician for 12 years, Miller also read law and was admitted to the bar in 1847. His opposition to slavery caused him to move in 1850 from the slave state of Kentucky to the free state of Iowa, where he became a prominent lawyer and a Republican Party leader. Appointed to the Supreme Court by President Abraham Lincoln on July 16, 1862, Miller was the first justice from any state west of the Mississippi River.

During the Civil War, Miller supported military trials of dissident civilians and the Union blockade of the Confederacy. Dissenting from the court, he also approved the federal and state loyalty oaths required of lawyers, teachers, and clergymen immediately after the war. His dissenting opinion in favour of "greenbacks" as war-emergency legal tender (*Hepburn* v. *Griswold*, 1870) became the majority's stand when the court reversed itself the next year and led to the permanent legitimation of paper money in the United States.

The court's first opportunity to construe the Fourteenth Amendment was given by the Slaughter-House cases (1873), in which a group of livestock butchers challenged a state law that granted a monopoly of their trade to a single entrepreneur. The amendment, which was supposed to confer civil rights on black Americans, was invoked by the challengers to support the proposition that the right to run a business without state-government interference was one of the protected "privileges and immunities" of citizenship. Concluding that there was no such federal right, Miller strictly limited the amendment's guarantees of "due process of law" and "equal protection of the laws," as well as "privileges and immunities of citizens." While Miller's view prevailed, business corporations were unable to shield themselves from legislative regulation by claiming to be among the "persons" or "citizens" whose rights the framers of the Fourteenth Amendment intended to safeguard. (In the 1890s, however, the court came to accept Justice Stephen J. Field's contrary conception of the amendment as an aid to big business.)

By declaring most civil rights to be aspects of state rather than of federal citizenship, Miller unwittingly deprived the federal government of jurisdiction over many problems of the political and social equality of blacks. In *Ex parte Yarbrough* (1884), however, he upheld federal protection, against repression by private persons, of blacks' right to vote in congressional elections. Another libertarian opinion by Miller, *Kilbourn* v. *Thompson* (1881), checked irresponsible investigation by congressional committees.

Miller, William (b. Feb. 15, 1782, Pittsfield, Mass., U.S.—d. Dec. 20, 1849, Low Hampton, N.Y.), American religious enthusiast, leader of a movement called Millerism that sought to revive belief that the bodily arrival ("advent") of Christ was imminent.

Miller was a farmer, but he also held such offices as deputy sheriff and justice of the peace. In the War of 1812 he served as a captain of the 30th Infantry. After years of Bible study he began to preach in 1831 that the present world would end "about the year 1843." He based this belief primarily on a passage in the Book of Daniel (8:13–14). He published a pamphlet in 1833 and a book of lectures in 1836, the first of many publications. Principal organs of the Millerite movement were the *Signs of the Times* (Boston) and the *Midnight Cry* (New York). Miller estimated that between 50,000 and 100,000 believed in his views. When 1843 passed, some of his associates set Oct. 22, 1844, as the date of the Second Coming. This date brought the movement to a sharp climax. There is no historical foundation for stories that the Millerites engaged in such fanatical excesses as ascending hills, housetops, and trees in ascension robes. The last general conference met at Albany, N.Y., April 1845. Belief in the imminence of the advent was restated, but no date was set and no church organization created.

There are two principal Adventist bodies today—the Advent Christian Church, organized in 1861, and the much larger body of Seventh-day Adventists, organized in 1863—and several small Adventist bodies.

Miller indices, group of three numbers that indicates the orientation of a plane or set of parallel planes of atoms in a crystal. If each atom in the crystal is represented by a point and these points are connected by lines, the resulting lattice may be divided into a number of identical blocks, or unit cells; the intersecting edges of one of the unit cells defines a set of crystallographic axes, and the Miller indices are determined by the intersection of the plane with these axes. The reciprocals of these intercepts are computed, and fractions are cleared to give the three Miller indices (*hkl*). For example, a plane parallel to two axes but cutting the third axis at a length equal to one edge of a unit cell has Miller indices of (100), (010), or (001), depending upon the axis cut; and a plane cutting all three axes at lengths equal to the edges of a unit cell has Miller indices of (111). This scheme, devised by British mineralogist and crystallographer William Hallowes Miller, in 1839, has the advantage of eliminating all fractions from the notation for a plane. In the hexagonal system, which has four crystallographic axes, a similar scheme of four Bravais-Miller indices is used.

Millerand, Alexandre (b. Feb. 10, 1859, Paris, Fr.—d. April 7, 1943, Versailles), French lawyer and statesman who, as president of the Republic (1920–1924), was noted for his desire to strengthen the power of the president by constitutional revision.

Educated for the bar, Millerand was elected to the Chamber of Deputies as a socialist in 1885. He soon became the leader of the socialist left and until 1896 edited their organ, *La Petite République.* In 1899 he joined René Waldeck-Rousseau's Cabinet of "republican defense" as minister of commerce and applied himself to bettering labour conditions, to upgrading the mercantile marine, and to developing trade, educational resources, and the postal system.

In 1909 Millerand became minister of public works in Aristide Briand's first Cabinet, his principal achievement being the reorganization of the state railways. With Briand he assumed responsibility for using troops to suppress the railway strike of October 1910. Appointed minister of war under Raymond Poincaré in 1912, he reorganized the higher command and for the first time gave a definite status to military aeronautics. He retained the same post in René Viviani's Cabinet until he resigned in October 1915. In 1918 he was elected a member of the Académie des Sciences Morales et Politiques.

On the resignation of Georges Clemenceau in January 1920, Millerand formed a Cabinet and became premier and minister for foreign affairs. Mainly concerned with the application of the Treaty of Versailles, in May 1920 he frustrated attempts to organize revolutionary strikes; he also did much to supply war materiel to Poland during the Polish-Soviet war.

In September 1920 Paul Deschanel, president of the Republic, was forced by ill health to resign. Millerand, at this time leader of the Bloc National (a right-centre moderate coalition), was elected Deschanel's successor. During his candidature Millerand made no secret of his wish to strengthen the power of the president by a revision of the constitution. His concept of the presidency brought him into collision with the radical and socialist majority, which, under the name of the Cartel des Gauches, was successful in the elections of May 1924. Violently attacked by the left majority for ignoring the traditional presidential neutrality by openly favouring conservatives, he was unable to form an acceptable Cabinet and had to resign.

From 1927 to 1940 Millerand played a secondary role in the Senate. Among his published works are *Le Socialisme réformiste* (1903) and *Pour la défense nationale* (1913).

millerite, a nickel sulfide mineral (NiS) found in carbonate veins, as at Keokuk, Iowa, or as an alteration product of other nickel minerals, as at Andreas-Berg, Ger. Other occurrences are in meteorites and as a sublimation product on Vesuvius. Millerite forms pale brass-yellow crystals that belong to the hexagonal system. For detailed physical properties, *see* sulfide mineral (table).

miller's-thumb, fish that is a species of sculpin (*q.v.*).

Milles, Carl, original name WILHELM CARL EMIL ANDERSSON, (b. June 23, 1875, Uppsala, Swed.—d. Sept. 19, 1955, Lidingö), one of Sweden's greatest sculptors, whose expressive rhythmical works drew inspiration from European archaic sculpture and greatly influenced the course of German Expressionist and American sculpture during the first half of the 20th century.

In 1902, during student years in Paris, Milles won recognition through the competition for the Sten Sture monument at Uppsala (completed 1925). His style, at first impressionistic under the influence of the late 19th-century French sculptor Auguste Rodin, became more abrupt and formal under the successive influences of medieval and early Greek art as interpreted by the German sculptor-theorist Adolf von Hildebrand. Later, Milles' work showed more fluent patterns within the individual figures of his elaborate compositions.

Milles worked in clay (for casting into bronze) and in stone and wood. His first major fountain, Europa, in Halmstad, Swed. (1926), has the elements of spacious design, subtle water effects, and inventive figure types (such as the fusion of classical triton or faun with Nordic goblin or troll)—also characteristic of his Orpheus Fountain in Stockholm (1936) and the Meeting of the Waters in St. Louis, Mo. (1940).

In 1931 he became head of the department of sculpture at Cranbrook Academy of Art, Bloomfield Hills, Mich., and he became a U.S. citizen in 1945. Milles' works were collected at Cranbrook, his home for 20 years, and at the Milles villa, now a museum, in Lidingö, near Stockholm. His Aganippe Fountain was set up in the Metropolitan Museum of Art, New York City, shortly after his death in 1955.

millet, any of various grasses, members of the Gramineae (Poaceae) family, producing small edible seeds used as forage crops and as food cereals. Millets, probably first cultivated in Asia or Africa more than 4,000 years ago, range in height from 1 to 4 feet (0.3 to 1.3 m), with the exception of pearl millet, which has stalks 5 to 10 feet (1.5 to 3 m) tall and about 1 inch (2.54 cm) thick. The heads may be spikes or racemes, in which the flowers are borne on stalks of about equal length along an elongated axis, or panicles, clusters of small florets. With the exception of pearl millet, seeds remain enclosed in hulls after threshing. Hulled seeds are usually creamy white.

Millets are an important food staple in much of Asia, Russia, and western Africa. In the United States and western Europe they are used chiefly for pasture or to produce hay, although they were major grains in Europe during the Middle Ages. Pearl millet, or cattail millet, called bajra in India (species *Pennisetum americanum*), is suited to soils of low fertility and limited moisture and is a popular food crop in India and Africa. Proso—the common, or broomcorn, millet (*Panicum miliaceum*)—ripening within 60–80 days after sowing, is used in birdseed and chick-feed mixtures and as livestock feed in the United States and as a food in Asia and eastern Europe. Foxtail varieties (*Setaria* [*Chaetochloa*] *italica*) having small pointed seeds are grown for hay in North America and western Europe but are important as foods in China and other Asian countries. Finger millet, or koracan millet, also called raggee (*Eleusine coracana*), is an important food grain in southern Asia and parts of Africa. Japanese millet (*Echinochloa crus-galli* variety *frumentacea*) is grown chiefly in Japan and the United States as a hay crop. Little millet (*Panicum miliare*) is chiefly a food crop of India. Browntop (*Panicum ramosum*) is grown in the southeastern United States for hay, pasture, and game-bird feed.

The millets are high in carbohydrates, with protein content varying from 6 to 11 percent and fat varying from 1.5 to 5 percent. They are somewhat strong in taste and cannot be made into leavened bread. Instead, they are mainly consumed in flatbreads and porridges or prepared and eaten much like rice. About 30,000,000 metric tons of millet are produced annually, chiefly in India, China, Nigeria, and Russia.

Pearl millet (*Pennisetum americanum*)

J.C. Allen and Son

Millet, Jean-François, byname FRANCISQUE (baptized April 27, 1642, Antwerp [Belgium]—buried June 3, 1679, Paris, Fr.), French painter whose serene landscapes made him one of the most influential followers of Nicolas Poussin in 17th-century France.

Millet is generally classed among the painters of Flanders because of the location of his birth, but his father was a Frenchman who, while on service with the prince of Condé in Antwerp, apprenticed his son to a painter there. Francisque left with the painter for Paris, where he settled in 1660 after marrying his master's daughter. He was received as a member of the Royal Academy of Painting and Sculpture at Paris in 1673.

Francisque's paintings of Italian and Arcadian scenery, though derivative, were graceful and effective. Twelve of his most important landscapes in the Tuileries were destroyed by fire; and, though many of his pieces may still be found cataloged, a great number remain unknown and unacknowledged.

Millet, Jean-François (b. Oct. 4, 1814, Gruchy, near Gréville, Fr.—d. Jan. 20, 1875, Barbizon), French painter renowned for his peasant subjects.

"Self-portrait," charcoal sketch by Jean-François Millet, 1847; in the Louvre, Paris

By courtesy of the Cabinet des Dessins, Musee du Louvre; photograph, Cliche Musees Nationaux, Paris

Millet spent his youth working on the land, but by the age of 19 he was studying art in Cherbourg. In 1837 he arrived in Paris and eventually enrolled in the studio of Paul Delaroche, where he seems to have remained until 1839.

After the rejection of one of his entries for the Salon of 1840, Millet returned to Cherbourg, where he remained during most of 1841, painting portraits. He achieved his first success in 1844 with "The Milkmaid" and a large pastel, "The Riding Lesson," that has a sensual character typical of a large part of his production during the 1840s.

The peasant subjects, which from the early 1850s were to be Millet's principal concern, made their first important appearance at the Salon of 1848 with "The Winnower," later destroyed by fire. In 1849, after a period of great hardship, Millet left Paris to settle in Barbizon, a small hamlet in the forest of Fontainebleau. He continued to exhibit paintings of peasants, and, as a result, periodically faced the charge of being a socialist. Letters of the period defending Millet's position underline the fundamentally classical nature of his approach to painting.

By the mid-1860s, Millet's work was beginning to be in demand; official recognition came in 1868, after nine major paintings had been shown at the exposition of 1867. Important collections of Millet's pictures are to be found in the Museum of Fine Arts, Boston, and in the Louvre.

millibar, unit of air pressure in the metric system, commonly used in meteorology, equal to 1,000 dynes per square cm (about 0.0145 pounds per square inch), or slightly less than one-thousandth of a standard atmosphere. It is defined as 0.001 bar, a little-used standard equal to 1,000,000 dynes per square cm.

Millicent, market and industrial town, southeastern South Australia, 250 miles (402 km) by rail southeast of Adelaide. Founded in 1871, it was named for the wife of an early settler. The locality, which has much drained swampland, supports sheep, cattle, and grains. Limestone is quarried, and pine forests, based at Snuggery and Mount Barr, supply paper, timber, and cellulose mills. Crayfish, caught off the coast (10 miles [16 km] west), are processed at Millicent, which is the terminus for a rail line from the city of Mount Gambier. At nearby Wyrie Swamp Site the world's oldest known barbed spears have been discovered, as have the oldest boomerangs yet found in Australia. Pop. (1986) 5,075.

Milligan, Ex Parte (1866), case in which the U.S. Supreme Court ruled that the federal government could not establish military courts to try civilians except where civil courts were no longer functioning in an actual theatre of war.

Lambdin P. Milligan had been arrested in 1864, charged with aiding the Confederacy, conspiring to free Confederate prisoners, and inciting insurrection. Arrested in his Indiana home by the Union general in command of the state, Milligan had been active in a secret society friendly to the Confederate cause. He was tried by a military court established in Indiana under the authority of President Abraham Lincoln, found guilty, and sentenced to hang.

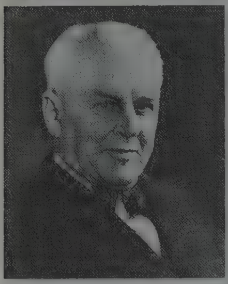
Milligan's lawyers sought a writ of habeas corpus, contesting the constitutionality of the military trial. The case eventually reached the Supreme Court, which unanimously declared that the president had no power to set up military tribunals in secure areas where civil courts were functioning. A majority of the Court also declared that Congress, too, lacked such authority. Milligan, as a consequence, had been deprived of his constitutional right to trial by jury and was freed after 18 months in jail.

Radical Republicans denounced the decision and feared the impact it might have on their plans for military rule in the South throughout Reconstruction.

Millikan, Robert Andrews (b. March 22, 1868, Morrison, Ill., U.S.—d. Dec. 19, 1953, San Marino, Calif.), American physicist honoured with the Nobel Prize for Physics in 1923 for his study of the elementary electronic charge and the photoelectric effect.

After studying at the universities of Berlin and Göttingen, Millikan joined the faculty of the University of Chicago, where in 1909 he performed his famous oil-drop experiment to determine the value of the electronic charge. He also verified Einstein's photoelectric equation and obtained a precise value for the Planck constant.

In 1921 he became director of the Norman Bridge Laboratory of Physics at the California Institute of Technology, Pasadena. There he made some initial studies of cosmic rays. He held the post of chairman of the executive council of the institute until his retirement in 1945.



Millikan

By courtesy of Caltech, Pasadena, Calif

Millikan oil-drop experiment, first direct and compelling measurement of the electric charge of a single electron. It was performed originally in 1909 by the American physicist Robert A. Millikan, who devised a straightforward method of measuring the minute electric charge that is present on many of the droplets in an oil mist. The force on any electric charge in an electric field is equal to the product of the charge and the electric field. Millikan was able to measure both the amount of electric force and magnitude of electric field on the tiny charge of an isolated oil droplet and from the data determine the magnitude of the charge itself.

Millikan's original experiment or any modified version, such as the following, is called the oil-drop experiment. A few oil droplets are directed through a small hole in the top of a closed box having a metal top and bottom and transparent sides. From an observation by microscope of the speed of a specific droplet falling slowly under the influence of gravity and air resistance, the weight of the droplet, or the force of gravity on it, can be determined. If the droplet has any net charge on it, it can be brought to a stop by properly adjusting the potential difference, or voltage, between the metal top and bottom. In effect, the amount of upward electric force on the charged droplet can be adjusted until it just equals the known downward gravitational force. The values of the electric charge on individual oil drops determined by repeated application of this method are not distributed continuously but fall into distinct groups that are whole-number multiples of a lowest value, the elementary electric charge itself. From the time of Millikan's original experiment, this method offered convincing proof that electric charge exists in basic natural units. All subsequent distinct methods of measuring the basic unit of electric charge point to the same fundamental value of electric charge.

millimetre, also spelled MILLIMETER, metric unit of length equal to 0.001 metre (*q.v.*).

Millin, Sarah Gertrude, *née* LIEBSON (b. March 19, 1889, Kimberley, Cape Province, S.Af.—d. July 6, 1968, Johannesburg), South African writer whose novels deal with the problems of South African life.

Of Jewish parentage, Millin spent her childhood near the diamond fields at Kimberley and the river diggings at Barkly West, whose white, Coloured, and black communities provided the background for much of her writing. Her first novel, *The Dark River* (1920), was set around Barkly West. Others followed, but it was *God's Step-Children* (1924; new ed. 1951)—dealing with the problems of four generations of a half-black, half-white ("Coloured") family in South Africa—that established her reputation. With *Mary Glenn* (1925), a study of a mother's reaction to her child's disappearance, she became one of the most popular South African novelists in English, identified by a nervous, sharp, vivid, often almost staccato style. She also wrote biographies of Cecil Rhodes (1933; new ed. 1952) and General Jan C. Smuts (1936). In a few of her many novels she referred to actual events in South African history—*e.g.*, *The Coming of the Lord* (1928), about a black "prophet" in the eastern Cape, and *King of the Bastards* (1949), on the life of the white chieftain Coenraad Buys. *Men on a Voyage* (1930) is a collection of essays; she also wrote a series of war diaries (1944–48) and two autobiographical books, *The Night Is Long* (1941) and *The Measure of My Days* (1955). Her last novels were *The Wizard Bird* (1962) and *Goodbye, Dear England* (1965). She is regarded less well in the late 20th century than she was in her lifetime.

milling machine, device that rotates a circular tool that has a number of cutting edges symmetrically arranged about its axis; the workpiece is commonly held in a vise or similar device clamped to a table that can move in three perpendicular directions. Disk- or barrel-shaped cutters are clamped through holes in their centres to arbors (shafts) attached to the machine spindle; they have teeth on their peripheries only or on both peripheries and faces. An end mill is a cutter shaped like a pencil with a tapered shank that fits into the machine spindle; it has cutting teeth on its face and spiral blades on the lateral surface.

In the milling operation the workpiece is carried on a table that is driven either manually or by power against the rotating cutter. Milling machines usually produce flat surfaces, but any shape that can be ground on the cutter will be reproduced on the work. To mill the teeth of a spur gear, a disk-type cutter with its cutting edges in the shape of the space (groove) between the teeth of the gear is used, milling the gear blank one space at a time.

millipede, any member of the arthropod class Diplopoda, distributed worldwide and commonly grouped with several other classes as myriapods. The approximately 10,000 species live in and eat decaying plant matter; some injure living plants, and a few are predators and scavengers. The characteristic feature of the group is the presence of diplosomites, double trunk segments formed from the fusion of two segments. They have as many as 200 pairs of legs—two pairs on each diplosomite except for the first (head) segment, which is legless, and the next three segments, which each contain one pair of legs. In addition, each diplosomite (except for the first four) contains two pairs of internal organs (*i.e.*, two pairs of ganglia and two pairs of heart arteries). The head contains antennae, simple eyes (ocelli), and only a single maxilla. The length ranges from 2 to 280 mm (0.08 inch to 11 inches). The number of segments also varies, ranging from 11 to more than 100 in some species. All but one order of millipedes are armoured with calcareous dorsal plates. In defense, they do not bite; most tuck head first into a tight coil with the exoskeleton exposed, and many secrete a pungent, toxic liquid or gas from lateral glands.

Julid millipede

E.S. Ross

The class includes myriapods common to many gardens, such as *Julus* (sometimes spelled *Iulus*) *terrestris*, a 25-millimetre (1-inch) species native to Europe and introduced into North America, and smooth-bodied forms often called wireworms. Some millipedes lack eyes and are brightly coloured; an example is the 25-millimetre (1-inch) greenhouse millipede (*Oxidus gracilis*). One of the most common and conspicuous forms is the 100-millimetre (4-inch) black and red *Narceus americanus* of southeastern U.S. forests.

Mills, Bertram (Wagstaff) (b. Aug. 11, 1873, London, Eng.—d. April 16, 1938, Chalfont St. Giles, Buckinghamshire), English circus entrepreneur who for 18 years (1920–37) staged a circus at London's Olympia Theatre at Christmas and also toured through the British Isles.

A coachmaker's son, Mills worked in his father's business until World War I broke out, when he joined the Royal Army Medical Corps. After the war, a friend who directed the Olympia challenged him on his boast that he could produce a better show than the one he saw at the Olympia on Christmas Day 1919. He thereupon formed his own company from available performers, and his impromptu circus was an immediate success. In 1929 he inaugurated the Bertram Mills Tenting Circus, which toured the provinces from April to October and required up to four trains and 75 trucks and tractors to transport performers, animals, and equipment.

He was president of the Showman's Guild from 1934 until his death. After his death, the circus was carried on by his sons, Cyril Bertram Mills and Bernard Notley Mills.

Mills, Caleb (b. July 29, 1806, Dunbarton, N.H., U.S.—d. Oct. 17, 1879, Crawfordsville, Ind.), American educator known as the father of Indiana's public schools.

Mills, the son of a farmer, was educated at local schools and at the Pembroke Academy before entering Dartmouth College in Hanover, N.H. He graduated in 1828 and then pursued theological studies at Andover Theological Seminary in Andover, Mass., completing his work there in 1833 and being ordained a Presbyterian minister in 1835.

In 1833 Mills moved to Indiana and settled in Crawfordsville, where he established a school that later became Wabash College. At first he was the sole instructor as well as principal, but by 1835 Wabash College had a faculty and Mills was professor of languages. He later served variously as principal of the preparatory department and of the normal school, professor of Greek language and literature, and college librarian.

Appalled at the low level of literacy then prevailing in Indiana, Mills began a one-man crusade to bring about the creation of a state public-school system. Starting in 1846 he wrote anonymous messages (signed "One of the People") to each Indiana state legislator. He continued writing until, in 1852, the legislature passed an act setting up a system of common schools. Owing to legislative imperfections the act was later invalidated by state courts, but a subsequent act in 1865 finally established the system.

In the interim, Mills served as state superintendent of public instruction (1854–57). During his administration, he helped found the Indiana State Teachers Association, and he awakened the people of the state to the need for normal schools to produce better-trained teachers.

Mills, Charles Wright (b. Aug. 28, 1916, Waco, Texas, U.S.—d. March 20, 1962, Nyack, N.Y.), American sociologist associated with Marxism, with the theories of Max Weber, and with issues regarding the role of intellectuals in modern life.

Mills received his A.B. and A.M. from the University of Texas in 1939 and his Ph.D. from the University of Wisconsin in 1941. As professor of sociology at Columbia University (from 1946), Mills sought to establish that social scientists should not be merely disinterested observers, engaged in what he called "abstracted empiricism," but also activists asserting their social responsibility. He was concerned about the ethics of his sociological peers, feeling that free intellectuals often failed to affirm moral leadership, thus surrendering social responsibility and allowing the less qualified to assume positions of leadership.

Mills's works focused on explaining and advancing the Marx-Weber tradition of economic determinism, and he qualified the idea of class by adding the category of status. All of his books were concerned with problems of social change, primarily in the United States. His analysis of the major echelons of American society appeared in *The New Men of Power, America's Labor Leaders* (1948), *White Collar* (1951), and *The Power Elite* (1956). Among his other works are *The Sociological Imagination* (1959), *Listen, Yankee* (1960), and *The Marxists* (1962). In his best-known book, *The Power Elite,* Mills explored the concept of an elite, or ruling class, based primarily on administrative and bureaucratic power rather than on the ownership of property. He viewed the power elite of the United States as the ruling group of the military-industrial complex, exercising arbitrary power in its own interests. A collection of Mills's essays appeared as *Power, Politics and People* (1963).

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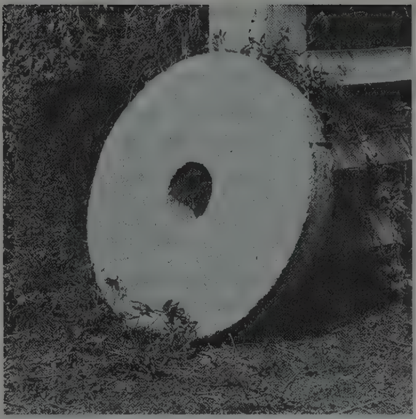
Mills, Martin: *see* Boyd, Martin (à Beckett).

Mills, Robert (b. Aug. 12, 1781, Charleston, S.C., U.S.—d. March 3, 1855, Washington, D.C.), one of the first American-born professional architects. He was associated with Thomas Jefferson, James Hoban, and Benjamin Latrobe.

A Neoclassical architect, Mills generally followed the principle, enunciated by Jefferson, that antique classical architectural forms best befitted a reincarnation of ancient republics—*i.e.,* the new United States. He used classical forms with originality. Mills's more than 50 major works included colleges, prisons, hospitals, houses, canals, bridges, and breakwaters. His best-known structures are the Treasury (built 1836–42) and the Old Patent Office (built 1836–40; later modified; now part of the Smithsonian Institution) in Washington, D.C.; the wings of Independence Hall in Philadelphia (1807); and the monuments to George Washington in Baltimore, Md. (designed 1814, erected 1815–29), and Washington, D.C. (designed 1836, completed 1884).

millstone, one of a pair of flat, round stones used for grinding grain. One millstone is stationary; the other rotates above it in a horizontal plane. Grain is poured through a hole in the centre of the rotating millstone, flowing into shallow grooves, called channels, which radiate from the centre of the stationary millstone. The channels lead the grain onto the flat grinding section, called the land, and to the edge, where it emerges as flour. Sharpening a millstone consists of recarving worn channels and checking and smoothing the land.

The best millstones are made from French buhrstone, quarried near Paris. In the United States, where there is no buhrstone, quartz conglomerate, quartzite, sandstone, or granite is substituted.



A millstone with channels
By courtesy of the U.S. Department of Agriculture

Millville, city, Cumberland county, southwestern New Jersey, U.S. It lies at the head of navigation on the Maurice River, 45 miles (72 km) south of Philadelphia. Union Lake, formed by a dam (1806), is northwest. The earliest white settlers were woodcutters who built cabins along the riverbank in the 1700s. Once a part of Maurice River and Fairfield townships, and known successively as Shingle Landing, Maurice River Bridge, and The Bridge, the town was laid out by Joseph Buck, who named it for the local mills. Millville is an industrial centre that uses the vast silica deposits found in the locality for glassmaking. The city's Wheaton Village includes the restored glass factory of Dr. T.C. Wheaton (1880s) and a glassware museum. The city's other manufactures include aircraft parts and textiles. Inc. town, 1801; city, 1866. Pop. (1994 est.) city, 26,528; (1995 est.) Vineland-Millville-Bridgeton PMSA, 138,058.

Milne, A.A., in full ALAN ALEXANDER MILNE (b. Jan. 18, 1882, London, Eng.—d. Jan. 31, 1956, Hartfield, Sussex), English humorist, the originator of the immensely popular stories of Christopher Robin and his toy bear, Winnie-the-Pooh.

Milne attended Westminster School, London, and Trinity College, Cambridge. In 1906 he joined the staff of *Punch,* writing humorous verse and whimsical essays in a style that quickly dated. He achieved considerable success with a series of light comedies such as *Mr. Pim Passes By* (1921) and *Michael and Mary* (1930). Milne also wrote one memorable detective novel, *The Red House Mystery* (1922); and a children's play, *Make-Believe* (1918), before stumbling upon his true literary métier with some verses written for his son Christopher Robin. These grew into the collections *When We Were Very Young* (1924) and *Now We Are Six* (1927). These remain classics of light verse for children.

A.A. Milne, pen and ink drawing by P. Evans, c. 1930; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

His most popular works were the two sets of stories about the adventures of Christopher Robin and his toy animals—Pooh, Piglet, Tigger, Kanga, Roo, Rabbit, Owl, and Eeyore—as told in *Winnie-the-Pooh* (1926) and *The House at Pooh Corner* (1928). Ernest Shepard's illustrations added to the books' charm. In 1929 Milne adapted another children's classic, *The Wind in the Willows,* by Kenneth Grahame, for the stage as *Toad of Toad Hall.* A decade later he wrote his autobiography, *It's Too Late Now.*

Milne, Edward Arthur (b. Feb. 14, 1896, Hull, Yorkshire, Eng.—d. Sept. 21, 1950, Dublin), English astrophysicist and cosmologist best known for his development of kinematic relativity.

Milne was educated at the University of Cambridge and served as assistant director of the Solar Physics Observatory at Cambridge from 1920 to 1924. He then became a professor of applied mathematics at the University of Manchester, and from 1929 until his death he was a professor of mathematics at the University of Oxford.

Collaborating with Sir Ralph H. Fowler, Milne became known in the 1920s for their formulation of a reliable surface-temperature scale for stars of any spectral type. His theoretical studies of the balance between gravitational forces and radiation pressure in stellar atmospheres led him to study the escape velocities of molecules from stars, and he demonstrated that the Sun can eject atoms at speeds up to 1,600 km per second (1,000 miles per second). In 1929 he turned his attention to the structure and internal conditions of stars. His work eventually led to the theory explaining the highly dense white dwarf stars.

About 1932 Milne shifted his focus to cosmology, and he developed the theory of kinematic relativity. Like cosmologies based on Einstein's general theory of relativity, kinematic relativity featured an expanding universe, but it was nonrelativistic and used Euclidean space. Milne's theory met with opposition from his contemporaries on both scientific and philosophical grounds, but his work helped to sharpen mainstream ideas about space-time and also inspired the steady-state theorists. Milne's works include *Thermodynamics of the Stars* (1930), *The White Dwarf Stars* (1932), *Relativity, Gravitation and World-Structure* (1935), and *Kinematic Relativity* (1948).

Milne, John (b. Dec. 30, 1850, Liverpool, Eng.—d. July 30, 1913, Shide, Isle of Wight), English seismologist and geologist who invented the seismograph and promoted the establishment of seismological stations.

Milne worked as a mining engineer in Labrador and Newfoundland and in 1874 served as geologist on the expedition led by Charles T. Beke, the noted British explorer and biblical scholar, to Egypt and northwestern Arabia. In 1875 Milne accepted the position of professor of geology and mining at the Imperial College of Engineering, Tokyo. He invented the seismograph in 1880 and traveled widely in Japan to set up 968 seismological stations for a survey of Japan's widespread earthquakes. After many years of seismic studies, Milne returned to England in 1894 and established a private seismological station near Newport, Isle of Wight. His attempt in 1906 to determine the velocity of shock waves through the Earth was largely unsuccessful. He served as secretary of the Seismological Committee of the British Association and organized a worldwide network of observation stations. Many of his findings were published in his books *Earthquakes* (1883) and *Seismology* (1898).

Milne Bay, bay of Papua New Guinea, southwestern Pacific. Milne Bay is the easternmost inlet on the coast of New Guinea island and measures 30 miles (50 km) by 6–8 miles (10–13 km). The bay, which receives the Gummi River, has fertile south and west shores that support plantations. The north shore is steep and rugged. The Spanish explorer Luis Váez de Torres charted the bay in 1606. In 1873 the British navigator Captain John Moresby named it for Admiral Alexander Milne. European interest in the area increased during the gold-rush years of 1889–99. Samarai, an island in the China Strait, became a boom town from which prospectors spread through the islands of Milne Bay and to the mainland. A base of Japanese operations early in World War II, the bay was the scene of Japan's first major setback of the war in a battle fought in August 1942 and was an Allied base for the duration of the war.

Milner (of Saint James's and Cape Town), Alfred Milner, Viscount, also called (1901–02) BARON MILNER, or (1895–1901) SIR ALFRED MILNER (b. March 23, 1854, Giessen, Hesse-Darmstadt [Germany]—d. May 13, 1925, Sturry Court, near Canterbury, Kent, Eng.), able but inflexible British administrator, whose attitude while he was high commissioner and governor in southern Africa helped to bring about the South African War (1899–1902).

Milner, detail of an oil painting by Hugh de Twenebrokes Glazebrook, 1901; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Of German and English ancestry, Milner was a brilliant student; he won numerous scholarships at Oxford and became a fellow of New College (1872). In 1881 he began to practice law but turned to journalism, working on the *Pall Mall Gazette.* Defeated as a Liberal candidate for Parliament (1885), he became the private secretary of the chancellor of the Exchequer, George Goschen. As an administrator, he served with distinction in Egypt (1889–92) and as chairman of the Board of Inland Revenue (1892–97), for which he was knighted in 1895. In 1892 he wrote *England and Egypt*.

An ardent imperialist, Milner in 1897 became high commissioner in southern Africa and governor of the Cape Colony. With Britain and the Transvaal close to conflict, his was the most critical post in the empire. The Transvaal's president, Paul Kruger, had become deeply mistrustful after the abortive Jameson Raid (Dec. 29, 1895) into Boer territory. Thus, when Kruger was reelected in February 1898, Milner concluded that "there is no way out of the political troubles of South Africa except for reform in the Transvaal, or war." Milner's idea of reform was to secure justice for the Uitlanders (British residents in the Transvaal) by demanding full citizenship rights for them after five years' residence. During the futile negotiations at the Bloemfontein Conference (May–June 1899), Kruger was prepared to bargain, but Milner was not. The Transvaal government made further concessions, but by this time Milner had determined that British supremacy in southern Africa should be asserted by force, hence he remained intransigent. After delivering an ultimatum, the two Boer republics, the Orange Free State and the Transvaal, declared war on Britain on Oct. 11, 1899.

When Britain annexed the Orange Free State and the Transvaal in 1901 during the war, Milner left his post as governor of the Cape and took over as administrator of those two Boer territories. Retaining the office of high commissioner, he and the military commander, Lord Kitchener, negotiated the Peace of Vereeniging (May 31, 1902) that ended both the war and the independence of the two Boer republics. For his services in South Africa, Milner was made a baron (1901) and a viscount (1902).

Milner was largely in charge of the postwar settlement, and his administration undertook the task of resettling the Boers on their farms. Meanwhile, by encouraging economic growth, particularly in the gold-mining industry, Milner hoped to attract British immigrants to create a permanent majority, and he introduced a vigorous education program with all the instruction in English.

Milner's schemes proved a failure. Though the Boers were successfully resettled, they reacted strongly against his insistence upon the use of English in the schools. During the long postwar depression, many British residents left the land, and few immigrants came. Milner persuaded the colonial secretary to permit the importation of Chinese labour for the shorthanded gold-mining industry; public opinion in Britain was outraged, and the Conservatives were defeated in the British election of January 1906. The new Liberal government, moreover, rejected his plans for a constitution that would give the Transvaal a representative government rather than responsible self-rule.

Milner had already resigned his South African posts and returned to England (1905), where he intended to retire from public life, and he began work on *The Nation and the Empire* (1913). He became an active member of the House of Lords, however, and was a member of David Lloyd George's World War I Cabinet from 1916 to 1921. In March 1918 he played a decisive part in setting up a unified Allied command under Marshal Foch of France. Appointed colonial secretary at the end of the war, Milner attended the peace conference. When the Cabinet rejected his proposal that Egypt be given a modified form of independence, Milner resigned in 1921. In 1923 he published *Questions of the Hour*. Milner's viscountcy became extinct upon his death without an heir. *The Milner Papers* (1931–33) were edited by C. Headlam.

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Milnes, Richard Monckton: *see* Houghton (of Great Houghton), Richard Monckton Milnes, 1st Baron.

Milo, Titus Annius (d. 48 BC, near Thurii, Bruttium [Italy]), Roman politician, a supporter of the Optimates and bitter rival of Publius Clodius.

Milo supported Pompey and thus became pitted against Clodius, a reckless and disruptive politician who had allied himself with Julius Caesar. Milo organized gangs of mercenaries and gladiators and led them in clashes against the partisans of Clodius in Rome from 57 to 52 BC. As tribune of the plebs in 57, Milo actively promoted the recall of Cicero, whom Clodius had managed to have exiled. Milo tried unsuccessfully to prosecute Clodius and prevent his election to the aedileship, and Clodius, in turn, failed in an attempt to press charges against Milo. After serving as praetor in 55, Milo in 53 was a candidate for the consulship, while Clodius was seeking the praetorship. A confrontation between the two leaders at Bovillae ended with the murder of Clodius (January 52). Milo's guilt in the murder was clear. He was impeached and prosecuted, his enemies using a variety of means to intimidate the judges and his supporters. Cicero was afraid to speak at the trial; his extant oration *Pro Milone* is an expanded form of the unspoken defense. Milo retired into exile at Massilia (Marseille) and was the only man barred from Julius Caesar's general amnesty. Joining Marcus Caelius Rufus in 48 in an uprising against Caesar, Milo was killed near Thurii.

Milon OF CROTON, Milon also spelled MILO (fl. late 6th century BC), Greek athlete who was the most renowned wrestler in antiquity. His name is still proverbial for extraordinary strength.

A greatly honoured native of Croton (modern Crotone, Calabria), an Achaean Greek colony in southern Italy, Milon led the Crotoniate army to victory over the Sybarites (Greeks from Sybaris, also in southern Italy) in about 510 BC. In six Olympic Games and in six Pythian Games (both events held quadrennially), Milon won the wrestling championship; in these and other Greek national games, he won 32 wrestling competitions. He is said to have carried an ox on his shoulders through the stadium at Olympia. According to the traditional account of his death, the aging Milon tried to tear apart with his hands a tree that had been split with a wedge; the wedge fell out and the tree closed on one hand, holding him captive until he was attacked and devoured by wolves.

Miloš, English MILOSH, Serbo-Croatian in full MILOŠ OBRENOVIĆ, original name MILOŠ TEODOROVIĆ (b. March 18 [March 7, Old Style], 1780, Srednja Dobrinja, Serbia—d. Sept. 26 [Sept. 14], 1860, Topčider, near Belgrade), Serbian peasant revolutionary who became prince of Serbia (1815–39 and 1858–60) and who founded the Obrenović dynasty.

Miloš Teodorović, originally a herdsman, worked for his half brother Milan Obrenović, then joined Karageorge, who was leading the Serbs in a rebellion against their Ottoman Turkish rulers (1804–13). In 1805 Miloš was appointed a commander in the rebel forces, but after his half brother was killed (1810), possibly by Karageorge, he took the surname Obrenović and assumed an enmity toward Karageorge. When Karageorge fled into Hungary following the collapse of his revolt (1813), Miloš remained in Serbia. The Turks appointed him *knez* (prince) of three central Serb districts, and he cooperated with them in pacifying the country, even helping in the suppression of a new revolt (1814). But when the Turks began large-scale massacres, Miloš gathered his followers at Takovo, Serbia, and on Palm Sunday (April 1815) began his own revolt, quickly winning a series of military victories. Because the Turks feared that Russia might intervene on the Serbs' behalf, a peace settlement was soon arranged (December 1815). The Turks recognized Miloš as prince of Serbia, which was granted a large degree of autonomy but remained a part of the Ottoman Empire; they also allowed the Serbs to retain their weapons and to hold their own national assembly, or Skupština.

Miloš, who shortly thereafter ordered that Karageorge be murdered, consolidated his position and in November 1817 was named the hereditary prince of Serbia by the Skupština. Demonstrating himself to be a patient yet determined diplomat, Miloš then conducted prolonged negotiations with the Turks, who finally recognized Miloš' position as hereditary and granted full autonomy to the Serb principality (Aug. 28, 1830). Three years later Miloš also acquired possession of the eastern Serb lands that the Turks had originally excluded from his jurisdiction (May 25, 1833).

Despite his diplomatic successes, his achievements in promoting trade, reorganizing the army, and building roads and his agricultural and land-distribution policies favouring peasants with small landholdings, Miloš' autocratic methods aroused strong opposition. In 1835 he was compelled to grant a constitution; and when Russia and Turkey forced him to repeal it (regarding it as too liberal), the Turkish sultan promulgated another constitution for Serbia in December 1838. In accordance with it, Miloš appointed a council of 17 senators, who immediately demanded his abdication. Naming his son Milan as his successor (June 13, 1839), Miloš Obrenović retired to his estates in Walachia.

Twenty years later the Skupština called on Miloš to return to the throne to replace Alexander Karageorgević (reigned 1842–58), whom it had deposed in December 1858. Resuming his autocratic methods, Miloš then adopted policies that defied Austria, which had gained a great deal of influence over Serbia during the preceding reign. He also demanded that the Turks again recognize his position as hereditary and reduce their military strength inside Serbia. Before he could accomplish his aims, however, he died.

Mílos (Greece): *see* Melos.

Milošević, Slobodan (b. Aug. 29, 1941, Požarevac, Yugos.), politician and administrator who, as leader of Serbia's main political party and as president (1989–97), pursued Serb nationalist policies that led to the breakup of Yugoslavia. He subsequently embroiled Serbia in a series of conflicts with the successor Balkan states. From 1997 to 2000 he was president of the Federal Republic of Yugoslavia.

Milošević was born of Montenegrin parents living in Serbia and joined the Communist Party when he was 18. After graduating from the University of Belgrade with a law degree in 1964, he began a career in business administration, eventually becoming head of the state-owned gas company and president of a major Belgrade bank. Milošević entered politics full-time in 1984 as a protégé of Ivan Stambolić, who was head of the League of Communists of Serbia (LCS). Milošević became head of the party organization in Belgrade that year.

Milošević soon introduced a new populist style to Serbia, appealing directly to Serbs over the heads of party officials. He used his rising popularity to oust his former mentor Stambolić and replace him as leader of the LCS in 1987. As Serbia's spokesman, Milošević demanded that the federal government restore to Serbia full control over the autonomous provinces of Vojvodina and Kosovo. He also opposed efforts to introduce free-market reforms, instead defending the socialist tradition of state economic intervention.

In 1989 the Serbian assembly ousted Stambolić from the republic's presidency in favour of Milošević. In 1990 Milošević pushed through changes to the Serbian constitution that curtailed the provinces' autonomy. But Milošević's policies created an anti-Serb backlash in the other republics, and Serbia's resistance to reform accelerated the breakup of both the Yugoslav federation and the Communist Party. Both Croatia and Slovenia elected noncommunist governments in 1990. Milošević renamed the LCS as the Socialist Party of Serbia, and in 1990 he was returned to office by a huge majority.

The popularly elected leaders of Croatia and Slovenia continued to press for the transformation of Yugoslavia into a confederation. A negotiated settlement proved impossible, and in 1991 first Slovenia and Croatia and then Macedonia declared their independence. In 1992 the Muslims and Croats of Bosnia and Herzegovina also voted to secede. Milošević sent Serb militias to wrest control of the culturally Serbian portions of Bosnia and Croatia and unite them with Serbia. After three years of full-scale warfare in Bosnia, however, Serb militias failed to defeat the Muslim forces, and in 1995 the Croatian army swept almost the entire Serb population out of their historic enclave in Croatia. By this time Serbia's economy, which had never recovered from the political crises of the late 1980s, was further crippled by UN trade sanctions imposed in 1992. In order to lift the sanctions, Milošević agreed to sign a peace agreement on behalf of the Bosnian Serbs in November 1995, thus ending the war in Bosnia.

Barred from a third term as president of Serbia, Milošević had the federal parliament elect him to the presidency of Yugoslavia, which then consisted of Serbia plus Montenegro, in 1997. The next year relations between Serbs and ethnic Albanians in Kosovo deteriorated into armed conflict, and early in the spring of 1999 the Yugoslav army moved in. Alarmed by reports of "ethnic cleansing," NATO retaliated with a bombing campaign that led to a peace accord in June.

As details of Serb atrocities became known, prosecutors for the World Court at The Hague, Neth., indicted Milošević for war crimes as commander of the Yugoslav armed forces. Defeated in his bid for reelection in 2000, Milošević was arrested by the Yugoslav government in 2001 and eventually turned over to the International Court of Justice in The Hague for trial.

Miloslavskaya, Mariya Ilinichna (b. 1625—d. 1669), first wife of Tsar Alexis of Russia. Of her 13 children, two sons survived to maturity and became tsars: Fyodor III (reigned 1676–82) and Ivan V (reigned 1682–96, jointly with Peter I the Great [*q.v.*]).

After Mariya Miloslavskaya's death her relatives formed a political faction that dominated the reign of Mariya's son Fyodor III and the regency of her daughter Sophia (served 1682–89). Sophia was able to promote the claim of her brother Ivan V to rule as co-tsar with Peter I. This arrangement continued under Sophia's regentship until she and her brother were deprived of power in 1689 by the partisans of Peter I.

After the death of Peter II (Peter I's grandson) the Russian throne reverted to Mariya Miloslavskaya's descendants: her granddaughter Anna (reigned 1730–40) and her great-great-grandson Ivan VI (reigned 1740–41 under the regentship of his mother). The latter was overthrown and imprisoned by promoters of Peter I's daughter Elizabeth, who, on becoming empress in 1741, effectively ended the political career of the Miloslavsky family.

Miłosz, Czesław (b. June 30, 1911, Šateiniai, Lithuania, Russian Empire [now in Lithuania]), Polish American author, translator, and critic who received the Nobel Prize for Literature in 1980.

The son of a civil engineer, Miłosz completed his university studies in Wilno, Pol. (now Vilnius, Lithuania). His first book of verse, *Poemat o czasie zastygłym* (1933; "Poem of Frozen Time"), expressed catastrophic fears of impending war and worldwide disaster. During the Nazi occupation he moved to Warsaw, where he was active in the Resistance and edited *Pieśń niepodległa* (1942; "Independent Song: Polish Wartime Poetry"), a clandestine anthology of well-known contemporary poems.

Miłosz's collection *Ocalenie* (1945; "Rescue") contained his prewar poems and those written during the occupation. In the same year, he joined the Polish diplomatic service and, after briefly working during 1946 in the Polish embassy in New York City, was sent to Washington, D.C., as cultural attaché, and then to Paris, as first secretary for cultural affairs in Paris. There he asked for political asylum in 1951. Nine years later he immigrated to the United States, where he joined the faculty of the University of California at Berkeley and taught Slavic languages and literature until his retirement in 1980. Miłosz became a naturalized citizen of the United States in 1970.

Miłosz's poetic works are noted for their classical style and their preoccupation with philosophical and political issues. An important example is *Traktat poetycki* (1957; "The Poetic Treatise"), which combines a defense of poetry with a history of Poland from 1918 to the 1950s. There are several volumes of his poetry in English translation, notably *The Collected Poems 1931–1987* (1988) and *Provinces* (1991). His many prose works include his autobiography, *Rodzinna Europa* (1959; *Native Realm*); *Prywatne obowiązki* (1972; "Private Obligations"), the novel *Dolina Issy* (1955; *The Issa Valley*); *The History of Polish Literature* (1969); and the diaries in *Rok myśliwego* (1990; *A Year of the Hunter*).

Though Miłosz was primarily a poet, his best-known work became his collection of essays *Zniewolony umysł* (1953; *The Captive Mind*), which condemned the accommodation of many Polish intellectuals to communism. This theme is also present in his novel *Zdobycie władzy* (1955; *The Seizure of Power*).

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Milstein, César (b. Oct. 8, 1927, Bahía Blanca, Arg.—d. March 24, 2002, Cambridge, Eng.), Argentine immunologist who in 1984, with Georges Köhler and Niels K. Jerne, received the Nobel Prize for Physiology or Medicine for his work in the development of monoclonal antibodies.

Milstein attended the universities of Buenos Aires and Cambridge (Ph.D., 1960) and was on the staff of the National Institute of Microbiology in Buenos Aires (1957–63). Thereafter he was a member of the Medical Research Council Laboratory of Molecular Biology, Cambridge, Eng., and held dual Argentine and British citizenship.

Milstein and Köhler, who was at Cambridge on a fellowship, made their discovery of the technique for producing monoclonal antibodies in 1975. It involved the fusion of short-lived, highly specific lymphocytes (antibody-producing cells) with the cells of a myeloma, a type of tumour that can be made to reproduce indefinitely. The resulting hybrid cells retained the two desired properties: like the lymphocytes, they secreted a single species of antibody molecules, and, like myeloma cells, they perpetuated themselves, providing potentially unlimited amounts of any desired antibody. This technique enabled the production of large quantities of pure, uniform antibodies that are able to recognize single antigenic determinants (*i.e.*, a single characteristic of a particular microbial invader in the body).

Milstein received the Royal Medal from the Royal Society of London in 1982, and in 1994 he was made a Companion of Honour.

Milstein, Nathan (b. Dec. 31, 1903, Odessa, Ukraine, Russian Empire—d. Dec. 21, 1992, London, Eng.), one of the leading violinists of the 20th century, especially acclaimed for his interpretations of J.S. Bach's unaccompanied violin sonatas as well as for works from the Romantic repertoire.

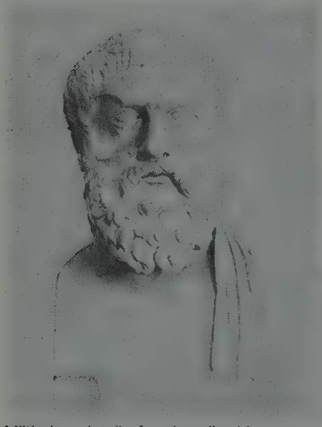
Among Milstein's teachers were two celebrated violinists, Leopold Auer in St. Petersburg and Eugène Ysaÿe in Brussels. Milstein gave concerts throughout the Soviet Union, frequently in joint recital with the pianist Vladimir Horowitz. In 1925 he moved to Paris. He toured Europe annually from 1927 until World War II, resuming in 1947.

In 1928 he went to the United States, later becoming a U.S. citizen. From his U.S. debut in 1929 as soloist with the Philadelphia Orchestra, he made extensive tours of the United States and Canada and recorded widely. He also published a number of transcriptions for the violin. In 1968 he was honoured by France by being made an officer of the Legion of Honour.

Miltiades, Saint, also spelled MELCHIADES (b. Africa?—d. Jan. 10, 314, Rome [Italy]; feast day December 10), pope from 311 to 314.

Miltiades became the first pope after the edicts of toleration by the Roman emperors Galerius (ending the persecution of Christians), Maxentius (restoring church property to Miltiades), and Constantine I the Great (favouring Christianity). Concurrently, however, dissension within the church was caused by the Donatists, North African schismatics who contested the election of Caecilian as bishop of Carthage. At the Lateran Council of 313, Miltiades supported Caecilian and condemned the Donatists, who refused to submit. Constantine then ordered the Council of Arles (Arelate), the first representative meeting of Christian bishops in the Western Roman Empire, but Miltiades died before the council convened. Miltiades is considered a martyr because of earlier sufferings under the Roman emperor Maximian.

Miltiades the Younger (b. *c.* 554 BC, Athens [Greece]—d. probably 489 BC, Athens), Athenian general who led Athenian forces to victory over the Persians at the Battle of Marathon in 490.



Miltiades, detail of an inscribed herm, *c.* 450 BC; in the National Museum of Ravenna

Fotofast S.A.S. Galleria Cavour, Bologna, Italy

Early years. Miltiades' family must have been extraordinarily wealthy; his father, Cimon, three times won the chariot races at the Olympic Games, while his uncle, after whom he was named, was the founder of an Athenian semi-independent principality in the Thracian Chersonese (now the Gallipoli Peninsula). Miltiades the Elder died childless and arranged for his stepbrother's sons to inherit the dominions he had conquered. About 516 BC, Miltiades left for the Chersonese, where he strengthened his authority by arresting his potential rivals and by surrounding himself, as tyrants were wont to do, with a heavily armed bodyguard of 500 men. He also married Hegesipyle, the daughter of a Thracian prince. Soon after, nonetheless, his authority was severely limited when Darius I of Persia expanded his power into Europe and reduced Miltiades to the rank of a Persian vassal. He led a contingent in the Scythian expedition of Darius (*c.* 513), and, according to Herodotus, he advised the destruction of the Danube bridge, which would have cut off Darius' retreat. Since Miltiades was not at once expelled by the Persians, the story is doubtful. It is a fact, on the other hand, that when the Ionian revolt against the Persians broke out in 499 BC, Miltiades decided to join the insurgents and to enter into friendly relations with the newly established Athenian democracy. Probably during the revolt Miltiades seized the isles of Lemnos and Imbros, which he eventually ceded to Athens. But the revolt collapsed by 494, and the year after, when Darius' fleet appeared off the Chersonese, Miltiades loaded five boats with his treasures and made for Athens. One of the boats, captained by Miltiades' eldest son, Metiochos, was captured. Metiochos was taken as a lifelong prisoner to Persia, but Darius treated him honourably, married him to a Persian princess, and regarded their children as members of the Persian nobility.

Because of his fabulous wealth, his foreign wife Hegesipyle (who bore him a son, Cimon the younger, about 510), and his past as a "tyrant," Miltiades was bound to raise animosities in Athens. He was prosecuted for his tyrannical role in the Chersonese, probably at the instigation of the rival clan of the pro-Persian Alcmaeonids, but he was triumphantly acquitted as the champion of resistance to Persian encroachments upon Greek freedom.

Battle of Marathon. The Persians were threatening Athens, which had supported the Ionian revolt with a punitive expedition, and Miltiades, who had first-hand experience of the Persians, was chosen, from 493 onward, as one of the 10 generals of the Athenian land forces. (Unlike Themistocles, he was still thinking in terms of land warfare and of an agreement with Sparta, which was favoured by the Athenian landowners, the peasantry, and the rural middle class.) In the summer of 490 BC the Persians landed at Marathon. The Athenians were faced with the choice of marching out and confronting them there or waiting for them at Athens; the decision was to be made by the Assembly. Miltiades was well aware of the power of the Persian cavalry, which, once out on the open plain, would wreak havoc. He was also anxious for a quick decision, because there were factions within Athens which would have welcomed a Persian victory in order to advance their own political ambitions. His arguments persuaded the Assembly, and the Athenian forces set out. A runner was sent to Sparta, to seek the support of the Spartan army, but the Spartans replied that they would participate only at the conclusion of a religious festival six days later. A conflict then arose among the 10 Athenian generals over whether to wait or to attack the Persians immediately. The deciding vote was cast by the *polemarchos* (supreme military commander) Callimachus, whom Miltiades was able to persuade to immediate action. The operational command of the army was to be held for one day in turn by each of the 10, but the four who had supported Miltiades surrendered their right to command to him.

Occupying the foothills surrounding the bay, Miltiades waited for a favourable moment to attack. He chose a time when the Persian cavalry was nonoperational, either because it reembarked for a possible direct attack on Athens or because of some other circumstance; the reason for its absence is uncertain. Charging a mile across the Marathon plain, Miltiades' forces engaged the Persian infantry, killing some 6,400 men (and capturing 7 ships) at a cost of 192 Athenian dead. The rest of the Persian force quickly embarked and put out to sea.

Following the defeat of the Persians at Marathon, Miltiades set out in the spring of 489 BC with a fleet of 70 ships on an expedition to conquer those islands that had supposedly sided with Persia. His mission was not a success, and on his return to Athens there was an outcry of indignation, ably exploited by his rivals, the Alcmaeonids. Miltiades, dying of gangrene from a leg wound suffered in a mishap, was fined 50 talents, although the death penalty had been demanded. He probably died soon after in prison.

The tragic outcome of his life, however, did not cloud the judgment of Miltiades' historical role. His fellow citizens never forgot that it was to his initiative and leadership that they owed their victory over the Persians. (P.T.)

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Milton, urban town (township), Norfolk county, eastern Massachusetts, U.S. It lies along the Neponset River, just south of Boston. Settled in 1636 as a part of Dorchester, it was early known as Uncataquisset, an Indian word meaning "head of tidewater," and was separately incorporated in 1662. At Vose House in Milton, delegates met on Sept. 9, 1774, and adopted the Suffolk Resolves (protesting the Intolerable Acts of Britain), which were then carried by Paul Revere to the Continental Congress at Philadelphia.

Utilization of the Neponset River's waterpower led to Milton's growth as a mill town, and in the 18th century it was a small but busy industrial centre. Manufacturing declined during the 19th century with the exception of stonecutting. Stone for the Bunker Hill Monument was quarried in Quincy, cut in Milton, and transported by the horse-drawn Granite Railway, the first railroad chartered (1826) in the United States. In the late 19th century, Milton became a wealthy suburb of Boston; its large estates were gradually broken up after 1930, and it became a residential community. The Milton Academy was founded there in 1807, Curry College in 1879, and Aquinas College in 1956. The Blue Hills Reservation, a 6,500-acre (2,600-hectare) year-round sports and recreation area, is immediately south of the town. Pop. (1994 est.) 25,788.

Milton, John (b. Dec. 9, 1608, London, Eng.—d. Nov. 8, 1674, Chalfont St. Giles, Buckinghamshire), one of the greatest poets of the English language, best known for his epic poem *Paradise Lost* (1667). He was also a noted historian, scholar, pamphleteer, and civil servant for the Parliamentarians and the Puritan Commonwealth.

A brief treatment of John Milton follows. For full treatment, *see* MACROPAEDIA: Milton.

Milton exhibited scholarly achievement and a devotion to Latin verse at an early age. He was educated at Christ's College, Cambridge (1625–32), where he wrote poetry in Latin, Italian, and English. From 1632 to 1638 Milton retired to his father's home and engaged in private study—producing the masque *Comus,* his first dramatization of the conflict of good and evil, and the poem "Lycidas"—and then toured Italy for a year.

Concerned with the Puritan cause in England, Milton spent much of the years 1641–60 pamphleteering for civil and religious liberty and serving as the secretary for foreign languages in Oliver Cromwell's government, producing *Of Education* and *Areopagitica* in 1644. He lost his sight (1651–52) but continued in his work, completing *The Second Defence of the People of England* in 1654. After the Restoration of Charles II in 1660, Milton was arrested as a noted defender of the Commonwealth but was soon released. The epics *Paradise Regained* and *Samson Agonistes* were published in 1671. His late, long poems were dictated to relatives, friends, disciples, and paid amanuenses.

Milton Keynes, new town and unitary authority, geographic and historic county of Buckinghamshire, England. There is no single urban centre within the unitary authority, but the whole area, which contains several preexisting towns, has been developed as a new town since 1967. The southern part is mainly urban, while the north remains largely rural.

Milton Keynes has attracted people, offices, and industry to become an area of striking growth. Earlier, the towns of Bletchley, Wolverton, and Newport Pagnell all had built-up industries, the first two largely because of their position on, and connection with, the main railway from London to the Midlands and the north. Its access to excellent rail service to London and to the M1 motorway has increased its attractiveness to commerce and industry. Among the most important institutions is the Open University, whose students receive instruction by correspondence. Area unitary authority, 120 square miles (310 square km). Pop. (1991) new town, 156,148; (1998 est.) unitary authority, 203,200.

Milwaukee, city, seat (1835) of Milwaukee county, southeastern Wisconsin, U.S., and port of entry on Lake Michigan, where the Milwaukee, Menomonee, and Kinnickinnic rivers join and flow into Milwaukee Bay. French missionary Jacques Marquette camped there in 1674, and fur traders soon followed. In 1835 three settlers bought land around Milwaukee: Solomon Juneau founded Juneautown, Byron Kilbourn founded Kilbourntown, and George Walker founded Walker's Point (not developed until 1850). Juneau and Kilbourn clashed over the building of streets and bridges, each purposely constructing them so they would not line up with those of the other. The situation climaxed in 1845 when three bridges were burned; the following year an agreement made Milwaukee a single community. It grew as an industrial and distribution centre in the 19th century, though Milwaukee's importance as a shipping point declined in the late 1800s.

German settlers played an important part in the city's early development, becoming the largest ethnic group. The Irish formed the second largest group in the mid-19th century. There were large influxes of Poles and Italians toward the end of the century. After the American Civil War the city found itself involved with labour unions, disputes, and strikes until the turn of the century. A Progressive-era reform movement brought Milwaukee a reputation for clean and efficient government. The city had three socialist mayors: Emil Seidel (1910–12), Daniel Webster Hoan (1916–40), and Frank P. Zeidler (1948–60). Milwaukee remained a leading manufacturing city until the 1980s. Although it was once a centre of beer production, by 2000 only one major brewery remained.

The port of Milwaukee is open all year and accessible to the largest ships using the St. Lawrence Seaway. The city has an international airport and extensive rail and highway connections. The modern economy is diversified, with services and high-technology industries as major factors. Manufacturing (including medical equipment, mining machinery, electronics, and motorcycle parts) and shipping are still important; printing, food processing, and tourism also contribute.

Milwaukee has an extensive park system. The Milwaukee County Zoo is on the western edge of the city, and the Mitchell Park Horticultural Conservatory (the Domes) displays tropical and desert plants and a changing flower show. Milwaukee has a symphony orchestra, ballet, and opera, as well as other theatre and music organizations. There are several museums, including those devoted to art and natural history. The city is known for its many annual summer festivals along the lakefront, including Summerfest (a music festival) and ethnic festivals celebrating a dozen different cultures. The Great Circus Parade (July) re-creates an early 20th-century circus parade. Professional sports teams include the Brewers (baseball) and Bucks (basketball).

Among Milwaukee's many educational institutions are Marquette University (1881), Milwaukee School of Engineering (1903), Milwaukee Area Technical College (1912), and the University of Wisconsin–Milwaukee (1885). Inc. 1846. Pop. (2000) city, 596,974; Milwaukee-Waukesha PMSA, 1,500,741; Milwaukee-Racine CMSA, 1,689,572.

Milwaukee County Zoological Gardens, zoo located on the outskirts of Milwaukee, Wis., U.S. The zoo, founded in 1892, was originally situated closer to the centre of the city but was relocated to its present 200-acre (80-hectare) site in 1958. It receives financial support from a local zoological society. The zoo has some 2,500 specimens representing about 300 species. Many of the animals are exhibited in barless, moated enclosures, which are positioned so that natural predators and their prey (*e.g.,* lions and zebras, tigers and deer) seem to be housed together. Many of the displays are arranged according to the animals' geographic area of origin. The zoo has an aviary and special features such as a sea lion show.

Milwaukee Depth, deepest point in the Atlantic Ocean, lying at a depth of 27,493 feet (8,380 m) about 100 miles (160 km) northwest of the island of Puerto Rico. It lies within a submarine depression called the Puerto Rico Trench, located at the southern edge of the North American Basin, between the Puerto Rico Ridge (north) and the North Antillean Arc (south); it is about 7,000 feet (2,100 m) deeper than the adjoining basin floors. The Milwaukee Depth is named after the first ship that sounded it.

Milwaukee Journal Sentinel, daily newspaper published in Milwaukee, Wisconsin's leading newspaper and generally accounted one of the great regional dailies of the United States.

It was founded in 1882 by Lucius W. Nieman as the *Daily Journal,* an independent, community-oriented paper. The *Journal* has been noted for its coverage of Milwaukee and state affairs. It has tended to support progressive or liberal candidates for political office and has maintained an international point of view. It is also distinguished for its editorial stance, which exposed the Nazi underpinning of the German-American Bund in the 1930s and attacked Wisconsin's U.S. senator Joseph R. McCarthy for his unfounded accusations of communist sympathy in the 1950s.

Nieman died in 1935 and his wife in 1936; part of their fortune went to establish the Nieman Fellowships for working journalists at Harvard University. Harry J. Grant had become editor of *The Milwaukee Journal* in 1919, and after the Niemans' deaths he organized a plan whereby employees could buy stock in the company; it is now 90 percent employee-owned. In 1962 it purchased the *Milwaukee Sentinel* from the Hearst Corp. The papers were combined as the *Milwaukee Journal Sentinel* in 1995.

Milyukov, Pavel Nikolayevich, Milyukov also spelled MILIUKOV (b. Jan. 27 [Jan. 15, Old Style], 1859, Moscow, Russian Empire—d. March 3, 1943, Aix-les-Bains, Fr.), Russian statesman and historian, who played an important role in the events leading to the Russian Revolution of 1917 and served as foreign minister in Prince Lvov's Provisional government (March–November 1917). He is one of the greatest of Russia's liberal historians.

Early career. Milyukov entered Moscow University in 1877 and attained academic distinction as a Russian history specialist. His three-volume *Ocherk po istorii russkoy kultury* (1896–1903; *Outlines of Russian Culture*) brought him nationwide renown. He became even better known as a spokesman for imperial Russia's nascent liberal movement.

Milyukov's concern with political issues led in 1895 to the loss of his teaching post, whereupon he began traveling widely and developing a deep admiration for the political values of more advanced democratic countries. In 1903 and 1904–05, he visited the United States, where he lectured on Russian history and politics. As a convinced "Westernizer," Milyukov saw tsarist absolutism as the main obstacle to Russia's progress. He strove to make Russian liberalism a more broadly based movement committed to a radical transformation of the empire's political and social structure. In particular, he stood for the rule of law, parliamentary government, universal suffrage, a broad range of civil freedoms, the expansion of popular education, and land reform. He was perhaps a better judge of abstract ideas than of human nature and was too inflexible to succeed in practical politics.

Milyukov

EB Inc.

Political journalism. As a contributor to a clandestinely circulated journal, *Osvobozhdeniye* ("Liberation"), founded in 1902, Milyukov did much to swing the moderate members of the *zemstva* (local government bodies) to the left. During the revolutionary year 1905, he was active in forming the Union of Unions, a broad alliance of professional associations, and subsequently the Constitutional Democratic, or Kadet, Party. As editor of the Kadet daily newspaper, *Rech* ("Speech"), and a member of the party's Central Committee, he directed its tactics in Russia's first nationwide election, which brought the Kadets success at the polls. The gulf between the newly created Duma, or national assembly, and the government could not be bridged, however, and in July 1906 the assembly was prematurely dissolved. Milyukov helped to draft the Vyborg Manifesto, appealing for a campaign of passive resistance to the government; this, technically speaking, was an illegal act. Many moderates thought that his tactics, which involved a measure of cooperation with the revolutionary Socialists, were too radical.

Subsequently Milyukov moved to the right. In the third and fourth Dumas (1907–17), he led the Kadets' depleted parliamentary faction in condemning bureaucratic abuses and championing progressive causes. After the outbreak of World War I, Milyukov adopted a patriotic "defensist" policy, which in 1915 led him to criticize the imperial regime for its inefficiency in organizing Russia's resources for the war effort. He helped to form a Progressive Bloc of moderate Duma leaders, who sought by gentle pressure from public opinion to secure a ministry enjoying the nation's confidence. When these overcautious tactics proved unavailing, Milyukov swung sharply to the left and, on Nov. 14, 1916, delivered a powerful speech in the chamber implying that the government was guilty of treason. His charges had no real substance, but they greatly stimulated revolutionary sentiment, which soon exceeded the bounds that Milyukov had expected or desired.

Foreign minister. When Tsar Nicholas II abdicated under this pressure on March 15, 1917, Milyukov wanted to preserve the monarchy as a stabilizing force but found little support. The revolutionary tide was now running strongly against him. In the liberal Provisional Government under Prince Georgy Lvov, which Milyukov helped to constitute, he towered intellectually over his colleagues but was soon outmaneuvered by the Socialist leader Aleksandr Kerensky, who favoured a policy of concessions to popular demands, notably on the question of taking immediate steps toward a negotiated peace. As foreign minister, Milyukov clung to Russia's wartime alliances. He resisted heavy pressure from inside and outside the government to send a note to the Allies redefining his country's war aims, and when, on May 1, he yielded, the note was phrased ambiguously. Disturbances broke out in the streets of Petrograd (St. Petersburg), and Milyukov was obliged to resign (May 15).

Last years. Thereafter he endeavoured to counter the new coalition government's leftward swing by rallying the moderates, but with little success. The Bolshevik seizure of power in November 1917 forced him to leave Petrograd for southern Russia, where he became political counselor to the leaders of the White Volunteer Army. Subsequently he emigrated to Paris. Milyukov held fast to his liberal principles and remained active in politics and scholarship until his death. (J.L.H.K./Ed.)

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Milyutin, Dmitry Alekseyevich, Count (Graf) (b. June 28 [July 10, New Style], 1816, Moscow, Russia—d. Jan. 25 [Feb. 7], 1912, Simeiz, near Yalta, Crimea, Russian Empire), Russian military officer and statesman who, as minister of war (1861–81), was responsible for the introduction of important military reforms in Russia.

Graduated from the Nicholas Military Academy in 1836, Milyutin served in the Caucasus (1838–45) and then became a professor at the academy. In 1856 Milyutin returned to active duty. In 1860 he entered the Ministry of War as deputy minister and became minister of war the following year. Milyutin reorganized the system of military education for both officers and regular troops; among other innovations, he made elementary education available to all draftees. In 1874 he introduced universal compulsory military service into Russia, compelling all Russian males at 20 years of age, except those who qualified for specific exemptions, to serve in the army; he also reduced the term of active service from 25 years to 6. In addition, Milyutin introduced the reserve system.

Despite the success of his reforms, which was demonstrated by Russia's victory over the Ottoman Empire in the Russo-Turkish War of 1877–78, Milyutin acquired many powerful enemies, especially among those who resented his reduction of the nobles' privileges within the military establishment. He chose to retire (May 1881) soon after Alexander III ascended the Russian throne.

Milyutin, Nikolay Alekseyevich (b. June 6 [June 18, New Style], 1818, Moscow, Russia—d. Jan. 26 [Feb. 7], 1872, Moscow), Russian statesman who played a prominent role in the emancipation of the serfs in Russia.

Educated at Moscow University, Milyutin entered the Ministry of the Interior at the age of 17 and advanced rapidly in the service. In the early 1840s he was responsible for the reform of the municipal governments of St. Petersburg, Moscow, and Odessa. Appointed assistant minister of the interior in 1859, Milyutin took a leading part in the framing of the Emancipation Manifesto of March 3, 1861, from which he and his progressive associates succeeded in eliminating some of the more objectionable features advocated by the ultraconservative groups. He was forced to retire in April 1861, but, after the Polish insurrection of 1863, he was appointed secretary of state for the Russian part of Poland, where in 1864 he carried out the emancipation of the peasantry at the expense of the Polish landowners, whom he considered to be the core of Polish nationalism. Milyutin also removed all Roman Catholic priests and monks from Poland's schools with a similar intent. He suffered a stroke in 1866 and lived in retirement thereafter.

Mimamsa, Sanskrit MĪMĀṂSĀ ("Reflection," or "Critical Investigation"), one of the six orthodox systems (darshans) of Indian philosophy. Probably the earliest of the six, Mimamsa is fundamental to Vedānta and has deeply influenced the formulation of Hindu law.

The aim of Mimamsa is to give rules for the interpretation of the Vedas and to provide a philosophical justification for the observance of Vedic ritual. Because Mimamsa is concerned with the earlier parts of the Vedas (called the Karmakāṇḍa), it is also referred to as Pūrva-Mīmāṃsā ("Prior Study"), or Karma-Mīmāṃsā ("Study of the Acts"). Vedānta, which deals with the later portion, the Upaniṣads, is called Uttara-Mīmāṃsā ("Posterior Study"), or Jñāna-Mīmāṃsā ("Study of Knowledge").

The earliest work of the system is the *Mīmāṃsā-sūtra* of Jaimini (*c.* 4th century BC). A major commentary was written by Śabarasvāmin (1st century BC?), who was followed by a long line of interpreters and teachers, most notably Kumārila Bhaṭṭa and Prabhākara (7th/8th century AD).

The goal of Mimamsa is to provide enlightenment on dharma, which in this school is understood as the set of ritual obligations and prerogatives that, if properly performed, maintains the harmony of the world and furthers the personal goals of the performer. Since dharma cannot be known through either perception or reasoning, one must depend on revelation in the Veda, which is considered eternal, authorless, and absolutely infallible.

To find out what one's dharma is on specific occasions, examples of direct or implicit command in the Vedic text must be relied upon. If the command is implicit, one must judge from parallels; if a text fails to detail how a priest proceeds with an action, this detail must be provided from other texts. This concern with precise statement necessitates meticulous examination of the structure of a sentence conveying a command.

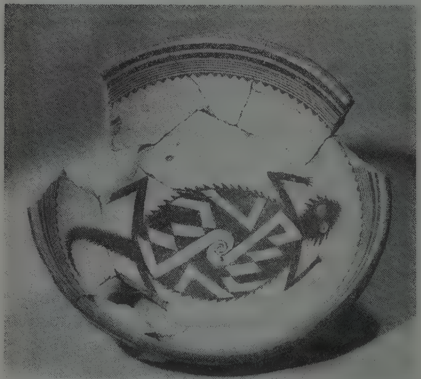
Although it was purely practical in origin, Mimamsa became a powerful intellectual force. Mimamsa, in the person of Kumārila, is traditionally credited with the defeat of Buddhism in India. It has also contributed to the direction, method, and content of Hindu erudition.

Mimana (Korean confederation): *see* Kaya.

Mimas, smallest and innermost of the eight large, regular satellites of Saturn. It has a diameter of 392 km (243 miles) and orbits the planet in a prograde, near-circular orbit at a mean distance of nearly 185,520 km (115,022 miles). The orbital period of 23 hours is half that of the Saturnian satellite Tethys, and therefore Mimas and Tethys are involved in an orbital resonance, always reaching conjunction on the same side of Saturn. The origin of this resonance is not fully understood. Mimas rotates synchronously with its orbital motion, always keeping the same hemisphere toward Saturn.

The mean density of Mimas is only 1.2 times that of water, and its surface shows characteristics of water frost. For these reasons, Mimas is believed to be composed principally of ice. Its surface is bright and heavily marked with deep, bowl-shaped craters. The depth of the craters appears to be a consequence of the low surface gravity. In spite of Mimas' small size, there is some evidence of resurfacing, possibly resulting from a partial melting of the icy crust. The most noteworthy feature on Mimas is a 130-kilometre- (80-mile-) diameter crater named Herschel, which is near the centre of the leading hemisphere. The crater walls are 5 km (3 miles) high, its floor 10 km (6 miles) deep, and the central peak 6 km (4 miles) high. This is the largest impact structure, relative to the size of the body, so far discovered in the solar system.

Mimbres, a prehistoric North American people who formed a branch of the classic Mogollon culture and who lived principally along the Mimbres River in the rugged Gila Mountains of what is present-day southwestern New Mexico, U.S. They also lived along nearby stretches of the Gila River and the Rio Grande. At the height of their culture, between AD 1000 and 1150 (known as the Classic Mimbres Period), the Mimbres lived in compact pueblolike villages of adobe and masonry, each village containing perhaps 200 people. Because of sparse rainfall in the area, they relied on irrigation to grow corn (maize), beans, and squash; they also hunted small game. The Mimbres are perhaps most famous for their pottery, which was decorated with imaginative black-on-white designs of insects, animals, and birds or of geometric lines.



Mimbres bowl with black-on-white horned toad design, *c.* 1050–1150; in the Museum of New Mexico, Santa Fe

By courtesy of the Museum of New Mexico, Santa Fe; photograph, Arthur Taylor (Neg. No. 99666)

The Mimbres, numbering perhaps 5,000 at their height, were eventually absorbed by the closely related Pueblo peoples to the north. Some may have migrated to Mexico.

mime and pantomime, Latin MIMUS and PANTOMIMUS, Greek MIMOS and PANTOMIMOS, in the strict sense, a Greek and Roman dramatic entertainment representing scenes from life, often in a ridiculous manner. By extension, the mime and pantomime has come to be in modern times the art of portraying a character or a story solely by means of body movement (as by realistic and symbolic gestures). Analogous forms of traditional non-Western theatre are sometimes also characterized as mime or pantomime.

Early Western forms. The Greco-Roman mime was a farce that stressed mimetic action but which included song and spoken dialogue. The preliterary form can only be guessed at, and even the surviving fragments of the playlets of Epicharmus, a 5th-century-BC writer of comedies, yield only the scanty information that his mimes were concerned with scenes of daily life or with mythological travesty. Other Greek writers of mimes were Sophron (fl. *c.* 430 BC) and Herodas (3rd century BC).

Drawing of an ancient Roman pantomimus wearing a mask and tunic

Historical Pictures Service, Chicago

The existence of a native Italian form of mime may safely be postulated. The first to give literary form to the Roman mime was the knight Decimus Laberius (*c.* 105–43 BC), who was eclipsed by the former slave Publilius Syrus. The presentation of mimes was a traditional feature of the annual Floralia festival, which, being licentious in spirit, opened the popular stage to naked mime actresses.

Though only fragments exist, it is clear that the usual mime plot, while free to indulge in biting topical allusion, centred principally on scenes of adultery and other vice. Evidence exists that acts of adultery were actually performed on the mime stage during the Roman Empire. Execution scenes with convicted criminals in place of actors are on record. When condemning the Roman theatre, the early Christian writers attacked primarily the mimes in this state of degeneracy. Stock characters and situations of the classical mime found their way into the comic drama of Plautus and reappeared greatly modified in the commedia dell'arte, a Renaissance extempore entertainment with roots in the Roman theatrical tradition.

The Roman pantomime differed from mime in two ways: its themes were usually loftier, and, unlike the mime actor, the pantomimus wore various masks, which identified his characters but deprived him of speech and of the use of facial expressions. Thus his art was primarily one of posture and gesture, in which hand movements were particularly expressive and important.

The pantomimus, dressed like a tragic actor in a cloak and long tunic, usually performed solo, accompanied by an orchestra that included cymbals and other rhythm instruments, flutes, pipes, and trumpets. The libretto of the piece was sung or recited by a chorus and was usually adapted from a well-known tragedy. Both the music and the librettos of the pantomimes were considered to be of little artistic value. The talent and skill of the pantomimus himself were of supreme importance, and the greatest performers enjoyed the favour of wealthy patricians and even emperors, such as Nero and Domitian.

Oriental dance-dramas. In Asia the art of mimetic drama was developed long before it achieved definite form in the Western world. In India the union of music, song, and dance with character portrayals took place several centuries BC. Out of such native drama, with added dialogue, grew the bharata natya (*bhārata-nāṭya*). One of the classical Hindu dance-dramas, it is meticulously described in the *Nāṭya-śāstra,* the great treatise of Sanskrit dramaturgy composed before the 3rd century AD. The two-hour performances feature a solo dancer backed by musicians and a singer; the dancer neither leaves the stage nor changes costumes. Sections of dance alternate with sections of conventionalized gesturing. Mimetic scenes derived from the mythology of Vishnu are still sometimes enacted by the Bengali *jātrās*, folk pageants combining words and conventionalized mime, and the rasas, folk dance-dramas. In the 20th century, authentic classical dancing of India was introduced to the West by Uday Shankar to the accompaniment of Indian music played on native instruments.

In the theatre of China and Japan, mime acquired a role unknown in the West, becoming an integral part of the major dramatic genres. In Chinese drama the conventions of gesture and movement, as well as the symbolism of the stage properties, are immense in scope and mystifying to those unfamiliar with the traditional forms.

English pantomime. The English pantomime originated in the popular harlequinade afterpieces of early 18th-century dramatic productions. Similar to the French Arlequin comic dances, these spectacles, employing commedia dell'arte characters accompanied by music and dance, initially were performed without words, although some added speech later.

Under the Victorians the subjects of pantomime shifted to fairy tales, with interludes of juggling and acrobatics, providing more wholesome entertainment for children. After the mid-19th century, performances of pantomime became limited to an extended Christmas season. It became traditional for a young actress to take the part of the hero, or principal boy, and a comic actor to portray an old woman, or dame, for comic relief. Popular pantomimes in the 20th century include *Cinderella, The Babes in the Wood, Aladdin, Robinson Crusoe, Mother Goose, Blue Beard,* and *Goody Two-Shoes.*

Marcel Marceau, French mime, as Bip, a character of his own invention, playing the violin

Ronald A. Wilford Associates, Inc.

Modern mime. Modern Western mime developed into a purely silent art whereby meanings are conveyed solely through gesture, movement, and expression. Its influence was felt strongly in ballet, where the formal posturing of classic style modulated into the descriptive silence of modern dramatic dance movement. In the United States, silent film mimes such as Charlie Chaplin and Ben Turpin, television entertainers such as Sid Caesar, and circus clowns such as Emmett Kelly were masters in the ancient tradition. The high art of modern mime, however, was reached in France, where its practice was ennobled philosophically by Étienne Decroux, Jean-Louis Barrault, and Marcel Marceau. Marceau defined mime as "the art of expressing feelings by attitudes and not a means of expressing words through gestures."

mimeograph, also called STENCIL DUPLICATOR, duplicating machine that uses a stencil consisting of a coated fibre sheet through which ink is pressed. Employing a typewriter with the ribbon shifted out of the way so that the keys do not strike it, the information to be duplicated is typed on the stencil. The keys cut the coating on the stencil and expose the fibre base, making it possible for ink to pass through it. Corrections can be made by a sealing fluid that permits retyping over the patched-error position. Signature or drawings are added on the stencil with a hand stylus.

Either of two machines is used to produce copies from stencils. In one, the stencil is fastened to the ink-saturated surface of a hollow, rotating cylinder. As the cylinder rotates, ink flows through the cuts in the stencil to the sheets of paper fed under the cylinder. The other machine has two cylinders around which a silk-screen belt rotates. The stencil is attached to the screen, and the ink is distributed to the surface of the rotating cylinders by two rollers. The ink is thus pressed through the small openings in the screen and through the stencil openings, or image areas. Paper is fed between the stencil and an impression roller to create the copy. Up to 5,000 copies can be made in either process from a single stencil. Stencils may be stored for considerable periods of time for reuse.

The mimeograph became largely obsolete with the development of xerography and other photocopiers.

mimesis, basic theoretical principle in the creation of art. The word is Greek and means "imitation" (though in the sense of "re-presentation" rather than of "copying"). Plato and Aristotle spoke of mimesis as the re-presentation of nature. According to Plato, all artistic creation is a form of imitation: that which really exists (in the "world of ideas") is a type created by God; the concrete things man perceives in his existence are shadowy representations of this ideal type. Therefore, the painter, the tragedian, and the musician are imitators of an imitation, twice removed from the truth. Aristotle, speaking of tragedy, stressed the point that it was an "imitation of an action"—that of a man falling from a higher to a lower estate. Shakespeare, in Hamlet's speech to the actors, referred to the purpose of playing as being "... to hold, as 'twere, the mirror up to nature." Thus, an artist, by skillfully selecting and presenting his material, may purposefully seek to "imitate" the action of life.

mimetite, arsenate mineral, lead chloride arsenate [$Pb_5(AsO_4)_3Cl$], in the pyromorphite series of the apatite group of phosphates. Its colour ranges from brown to olive green, yellow, or orange. It greatly resembles pyromorphite (*q.v.*), in which phosphorus replaces arsenic in the crystal structure; mimetite is similar in physical characteristics and mode of occurrence (barrel-shaped crystals or rounded masses) but is less common. Mimetite also forms a continuous solid-solution series with vanadinite in which vanadium replaces mimetite's arsenic in the crystal structure. Campylite is any member of the pyromorphite-mimetite series distinguished by distorted crystals with curved faces. For detailed physical properties, *see* arsenate mineral (table).

mimicry, in biology, form of resemblance between two or more organisms that has evolved through the survival advantage conferred upon one or more of the organisms by means of some "information flow" between these organisms and an animate agent of selection.

A brief treatment of mimicry follows. For full treatment, *see* MACROPAEDIA: Mimicry.

In 1862 the English naturalist H.W. Bates developed the theory of mimicry to explain the similar appearances of two unrelated species of butterflies. Bates observed that one species, marked by a distinctive coloration, was noxious and inedible by birds and thus served as the model for another species that was edible. The palatable species mimicked the markings of the inedible one, sending a deceptive signal to birds. The principle of Batesian mimicry is that one organism, lacking defenses against a predator, engages in mimicry to take advantage of the defenses of the model.

Bates also observed, however, that a group of butterfly species, all of which were inedible, were similar in appearance. He could not explain why such should be the case, since each of the species in question had an adequate defense to back up its warning coloration. In 1878 Fritz Müller, a German zoologist, offered an explanation for this apparent paradox. According to his line of reasoning, the resemblance between the distasteful or formidable species themselves was an adaptation that economizes life; *i.e.,* if two inedible species are alike, they will share between them the lives collectively lost before the predators have learned to associate the warning characteristics with their special means of defense. If they are dissimilar in appearance, the lives must be contributed by each species independently. Resemblances of this type—a form of common or combined warning—are termed Müllerian mimicry.

Batesian and Müllerian mimicry are essentially defensive responses made by species against their predators. There also are cases in which a predator engages in mimicry to overcome its prey. An example of aggressive mimicry occurs with the sabre-toothed blenny (*Aspidontus taeniatus*), a fish that occurs with the cleaner wrasse (*Labroides dimidiatus*). The wrasse is marked with black and white stripes and executes a characteristic swimming movement, features that identify it to other fish, who then allow it to approach and eat parasites attached to their skin. The blenny resembles the cleaner fish both in markings and behaviour, permitting it to approach other fish, on which it then feeds.

Another type of aggressive mimicry involves parasites who mimic their hosts. The European cuckoo (*Cuculus canorus*), for example, lays its eggs in the nests of other species that then raise the young. To prevent the host birds from rejecting her eggs, a cuckoo lays only in nests of species whose eggs resemble her own. Different species of cuckoos lay differently coloured eggs; thus each must learn which species it can successfully parasitize. It is thought that a female cuckoo learns to recognize the species by which she was raised and then seeks out nests of the same species for her own eggs.

Mimicry of animal colour patterns and scents also occurs in some plants, usually for the purpose of pollination and dispersal.

Mimidae, songbird family, order Passeriformes, consisting of the mockingbirds, catbirds, and thrashers. The family contains 31 species of medium-sized birds and is notable for its excellent songsters and mimics found in the Western Hemisphere.

Members range in size from 20 to 30 cm (8 to 12 inches) long. They have slender, strong bills that are often curved downward; strong feet; short, rounded wings; and long tails. They are closely related to the wrens (family Troglodytidae), which they resemble in behaviour and colour, being active, aggressive birds of gray to brownish colouring. They forage for insects and fruit in woodland litter. The family includes the common, or northern, mockingbird (*Mimus polyglottos*) and the catbird (*Dumetella carolinensis*), both of which are fine singers and mimics of other birdsong. The brown thrasher (*Toxostoma rufum*) is a good singer but does not mimic as frequently as the mockingbird. The Mimidae belongs to the songbird suborder (Passeres).

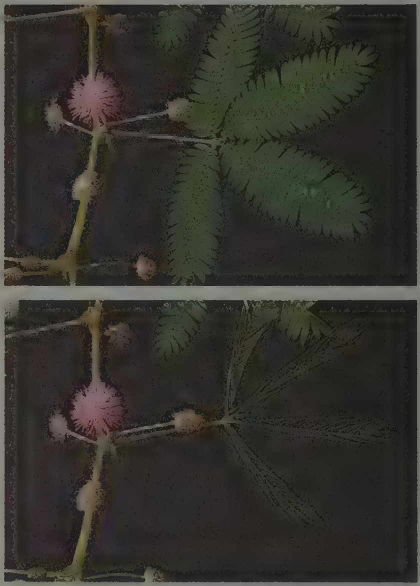
Mimir, Old Norse MÍMIR, in Norse mythology, the wisest of the gods of the tribe Aesir; he was also believed to be a water spirit. Mimir was sent by the Aesir as a hostage to the rival gods (the Vanir), but he was decapitated and his head was returned to the Aesir. The god Odin preserved the head in herbs and gained knowledge from it. According to another story, Mimir resided by a well that stood beneath one of the roots of Yggdrasill, the world tree. That well, sometimes called Mímisbrunnr, contained one of Odin's eyes, which Odin had pledged in order to drink from the waters and receive wisdom. In another myth, Mimir was a smith who taught the hero Siegfried his craft.

Mimnermus (fl. *c.* 630 BC), early Greek elegiac poet of Colophon in Asia Minor. One of his extant fragments refers to the struggle of the Ionians against Lydia. His most important poems were a set of elegies addressed to a flute girl named Nanno. Quotations in later writers indicate that mythological narratives figured largely in these poems; but it is possible that the erotic element was more important than the mythological. He took a gloomy view of the onset of old age and prayed for death at 60, for which the more optimistic Solon sternly reproved him.

mimosa, any member of a genus (*Mimosa*) of more than 450 plants in the mimosa family (Mimosaceae), native to tropical and subtropical areas throughout both hemispheres. They are so named from the movements of the leaves in certain species that "mimic" animal sensibility.

Most *Mimosa* species are herbs or undershrubs; some are woody climbers; and a few are trees. They are often prickly. The leaves of most are bipinnate (*i.e.,* the leaflets of the feather-formed leaves, in turn, bear leaflets). The roots of some species are poisonous; others contain substances irritating to the skin. Mimosas give their name to the family Mimosaceae (order Fabales), whose members are characterized by small regular flowers with valvate corolla.

Mimosas are widely cultivated partly for the beauty of their bipinnate foliage and partly for their interesting response to light and mechanical stimuli. A few species have leaves that are sensitive to light and touch; they droop in response to darkness and close up their leaflets when touched. When shaken in any way, the leaves close and droop simultaneously. The well-known sensitive plant (*q.v.*), or humble plant (*M. pudica*), native to Central America, and similar species such as *M. sensitiva* are commonly grown in greenhouses.


(Top) Unstimulated and (bottom) stimulated sensitive plant (*Mimosa pudica*)

E.R. Degginger

Many species of the related genus *Acacia* are commonly but erroneously called mimosas.

Mimpō: *see* Japanese Civil Code.

Min, in ancient Egyptian religion, a god of fertility and harvest, embodiment of the masculine principle; he was also worshiped as the Lord of the Eastern Desert. His cult originated in predynastic times (4th millennium BC). Min was represented with phallus erect, a flail in his raised right hand. His cult was strongest in Coptos and Akhmim (Panopolis), where in his honour great festivals were held celebrating his "coming forth" with a public procession and presentation of offerings. The lettuce was his sacred plant.

Min, wearing a crown with two feathers and holding a ceremonial flail, bronze statuette, *c.* 600 BC; in the Oriental Institute, the University of Chicago

By courtesy of the Oriental Institute, the University of Chicago

Min-chia (people): *see* Pai.

Min Chiang, also spelled MIN JIANG (China): *see* Min River.

Min languages, Chinese spoken in Fukien *sheng* (province) and in parts of Kwangtung and Taiwan. The Min languages are divided into Northern Min, with its centre at Foochow, and Southern Min, with its centre at Amoy. Min speakers use a pronunciation (called T'ang Min) for the literary language that differs from the one used in other Chinese languages. The T'ang Min pronunciation of the standard language preserves the final consonants of Ancient Chinese, but nonliterary spoken Min languages do not. Other differences between Min languages and other Chinese languages include differences in vocabulary and the preservation of archaic dental consonants (formed by contact of the tongue and teeth). Northern Min preserves the nasal sounds of an earlier stage of Chinese at the ends of words, but Southern Min has lost them.

Min Mountains, Wade–Giles romanization and Pinyin MIN SHAN, range in southwestern Kansu and northwest Szechwan *sheng* (provinces), China. The Min Mountains are a branch of the Kunlun Mountains and have a roughly northwest to southeast axis. The range is made up of extremely rugged limestone, with an average elevation of 8,200 feet (2,500 m) above sea level; individual peaks reach much higher elevations. In the western section of the range, several peaks reach nearly 13,000 feet (4,000 m) and occasionally even higher. The structure of the system is complex, consisting of several chains, which mingle with the northern part of the north to south Ta-hsüeh Mountains of western Szechwan.

The area is mostly very arid, and much of it consists of grassland and mountain meadow. The vegetation cover, however, varies greatly according to altitude and position. In the west, the very highest peaks have snow cover. The area is drained to the south by the Min River and its tributaries, which empty into the Yangtze River. The northern slopes are drained in the west by the headwaters of the Huang Ho (Yellow River) and in the east by the tributaries of the Chia-ling River. The region is inhabited by Tibetan herdsmen, with some Mongols living in the far west. The Chinese are confined to the market towns and to scattered cultivated areas.

The name Min is a very ancient one; in early times it was the name of one or other of the major peaks of this range, rather than of the range as a whole. Other names are applied to various parts of the Min Mountains. The far western ranges are called the Amne Machin (Chi-shih Mountains), and the northern section is called the Hsi-ch'ing Mountains. The section of the central range lying west of the Min River, which has an axis running almost north to south, is known as the Chiung-lai Mountains. The easternmost section, which joins the Ta-pa Mountains, is known as the Mo-t'ien Mountains.

Min-ning (Chinese emperor): *see* Tao-kuang.

Min River, Wade–Giles romanization MIN CHIANG, Pinyin MIN JIANG, river in Fukien *sheng* (province), China. The Min River and its various tributaries rise in the mountains of the Fukien–Kiangsi border area and flow to the sea across the grain of the southwest to northeast mountain ranges that cross the province; this flowage results in a trellislike drainage pattern, with lateral tributaries following the direction of the valleys. The name Min, though commonly applied to the whole system, properly applies only to the lower course of the river below Nan-p'ing, where it cuts through the coastal ranges. Above this are the headwaters—the Fu-t'un and Chin rivers, which flow from the western mountain ranges—and two tributaries that drain the major interior valley basin of the province, the Sha River (flowing from the southwest through Yung-an and San-ming) and the Chien River system (flowing from the northern mountains on the Kiangsi–Chekiang border). The river's total length is 358 miles (577 km), and the area of its drainage basin is 21,600 square miles (56,000 square km).

The Min River was formerly of little use for navigation, though its upper tributaries above Nan-p'ing carried considerable junk traffic. In the 1950s the lower course of the river entering the East China Sea below Fu-chou was cleared for navigation of small ships up to 80 tons. Since 1957, however, a railway system has provided a link between the central valley and the coastal ports of Amoy and Fu-chou; Nan-p'ing and San-ming have therefore become transshipment points at which riverborne goods are loaded onto the railway.

Mina, also called MEO, or MEWATI, tribe and caste inhabiting Rājasthān and Punjab states in northern India, and Punjab province, Pakistan, who speak Hindi and claim descent from the Rājputs. The Mina are possibly of inner Asiatic origin, and tradition suggests that they migrated to India in the 7th century with the Rājputs, but no other link between the two has been substantiated. In the 11th century, the Meo branch of the Mina tribe converted from Hinduism to Islām, but they retained Hindu dress. Although the Mina and Meo are regarded as variants, some Meo claim that their ancestral home is Jaipur.

Originally a nomadic, warlike people practicing animal breeding and known for lawlessness, today most Mina and Meo are farmers with respected social positions. In the late 20th century the Mina in India numbered more than 1,100,000, and the Meo, concentrated in northeastern Punjab, Pakistan, numbered more than 300,000. Both are divided into 12 exogamous clans, led by a headman (*muqaddam*) and a council (*panch*) of tribe members. They trace descent patrilineally and divide themselves into three classes: landlords, farmers, and watchmen. Both the Mina and Meo permit widow divorce and remarriage, and the Meo allow a man to exchange a sister or close female relative for his bride. Following Hindu tradition, the Mina cremate their dead while the Meo observe burial rites.

mina, the earliest of all known units of weight, created by the Babylonians and used by the Hittites, Phoenicians, Assyrians, Egyptians, Hebrews, and Greeks. Its weight and relationship to its major subdivisions varied at different times and places in the ancient world. In one surviving form, from the Babylonian period, the mina weighs about 640 grams, while in another it weighs 978 grams.

The mina, or minah, was a basic standard of weight among the ancient Hebrews. In the sacred system of weights, the sacred mina was equal to 60 shekels, and 50 sacred minas equaled one sacred talent. In the Talmudist system, one Talmudist mina equaled 25 shekels, and 60 Talmudist minas equaled one Talmudist talent. The Hebrew sacred mina has been estimated at 499 grams. The Greek, or Attic, mina, equal to 100 drachmas, has been estimated at 431 grams.

Mina, Casa da (Portuguese trading house): *see* Guiné, Casa da.

Mina Hassan Tani (Morocco): *see* Kenitra.

Minahasa, northeasternmost portion of the longest of the four peninsulas that project from the curiously shaped, mountainous island of Celebes (Sulawesi), Indonesia. The peninsula protrudes northeast between the Celebes and Molucca seas. The name is derived from the Minahasan, a local Malayan tribe that was converted to Christianity in the 19th century. *See* Celebes.

Minahasan, people inhabiting the northernmost extension of the island of Celebes, Indonesia, in and around the port town of Manado. Of Proto-Malay stock, the Minahasan, formerly headed by chiefs, are now organized patrilineally under headmen, and land is owned communally by each village. Extended families are bound to undivided estates that are apportioned according to the needs of each household. Class distinctions are no longer significant in community definition; members of a geographical area compose the basic political unit. Internally, the Minahasan are divided into societies, *malpus,* that provide reciprocal agricultural assistance. The Minahasan cultivate wet and dry rice, corn (maize), sago palms, coffee, tobacco, and cocoa. As a result of the influx of Portuguese Roman Catholic missionaries around 1850, the Minahasan are almost entirely Christian and most are well-educated. Some of the Minahasan hold low-level administrative posts on Java; a few are prosperous owners of coconut plantations. Their population was estimated at more than 1,000,000 in the late 20th century.

minai ware, in Islāmic ceramics, bowls, beakers, tankards, and bottles with enamel painting and gilding on a white ground, often with rich figure compositions in bands. Similar vessels in animal and human form were also produced. In the 13th and 14th centuries Sultanabad (now Solṭānābād, Iran) and Varāmīn turned out *minai* ware.

Minamata, city, Kumamoto *ken* (prefecture), southeastern Kyushu, Japan, on Yatsushiro Bay. A company town of the Nippon Chisso Hiryo Company, its main products are chemical fertilizer, carbide, and vinyl chloride. Minamata was traditionally a fishing port and has regular sea-route connections to Amakusa-shimo Island, the main island of the Amakusa Archipelago. Hot springs are found in the vicinity. After 1956 a sometimes-fatal disease known as "the Minamata disease" was recognized among local fishermen and their families. The cause was determined to be an organo-mercury compound in wastes discharged by local chemical factories into the sea, polluting fish and shellfish consumed by the local inhabitants. The first disease whose cause was recognized as industrial pollution of seawater, Minamata disease aroused worldwide concern and did much to stimulate the development of the environmental protection movement. Pop. (1995 prelim.) 32,842.

Minami-tori Island, Japanese MINAMI-TORI-SHIMA, also called MARCUS ISLAND, coral atoll rising to 204 feet (62 m), in the central Pacific Ocean, 700 miles (1,125 km) southeast of Japan. Prior to World War II it was administered as part of the Tokyo *fu* (urban prefecture). Occupied by U.S. troops late in the war, it was returned to Japan in 1968. It now shares a common administration with the Bonin Islands and the Volcano Islands. Minami-tori Island, with an area of 740 acres (300 hectares) was discovered by the Japanese navigator Shinroku Mizutani (1868) and was annexed by Japan (1898). The atoll was the site of a meteorological station for studying typhoons. Marine products harvested include swordfish, seaweed, and squid.

Minamoto Shitagō (b. 911, Japan—d. 983, Japan), Japanese poet of the middle Heian period (794–1185).

Although he was a descendant of the emperor Saga and was a member of the powerful Minamoto clan, Shitagō was barred from high political position because he did not belong to the Fujiwara family, which controlled the government. Instead he devoted himself to scholarly and literary pursuits and became recognized as one of the outstanding poets of ancient Japan. He helped compile the *Gosenshū* and, as one of the Nashitsubo no Go'nin

("Five Men of the Pear Garden"), also engaged in the interpretation of the *Man'yō-shū*. *Minamoto no Shitagō shū*, a collection of his works, revealed his discontent and frustration over his lack of success in official life. He frequently participated in poetry contests. During the Shōhei era (931–938) he compiled the *Wamyō ruijūshō*, a dictionary of Japanese and Chinese words by categories, which was the first dictionary in Japan. He is also thought to be the author of many other works, including *Utsubo monogatari* ("The Tale of the Hollow Tree"), written between 956 and 983.

Minamoto Tameyoshi (b. 1096, Japan—d. Aug. 17, 1156, Japan), warrior whose defeat by his own son resulted in the temporary eclipse in Japanese affairs of the Minamoto clan and the ascendancy of the Taira clan.

The scion of a noted warrior family, Tameyoshi distinguished himself at the age of 19 by suppressing a riot against the court by soldier-priests of a monastery near the capital. Following this event, Tameyoshi eliminated his rivals and became head of the Seiwa Genji, the powerful branch of the Minamoto clan in control of the strategic Kantō region in northern Japan.

Failing to receive from the court the recognition that he felt befitted his position, Tameyoshi in 1156 supported the former emperor Sutoku, a son of the former emperor Toba, in an attempted coup d'etat against Sutoku's brother, the emperor Go-Shirakawa. Tameyoshi's son and heir, Yoshitomo, however, joined the Tairas in support of Go-Shirakawa. In this conflict, known as the Hōgen Disturbance, Tameyoshi was defeated, and Yoshitomo was ordered to kill his father. He refused, but another Minamoto, saying that it would be a disgrace to allow Tameyoshi to be killed by a Taira, executed the defeated warrior.

Minamoto Yorinobu (b. 968, Japan—d. June 1, 1048, Japan), warrior whose service to the powerful Fujiwara family, which dominated Japan between 857 and 1160, helped raise the Seiwa branch of the Minamoto clan (also known as the Seiwa Genji) to a position of preeminence.

In 1028 the Fujiwaras, no longer willing to fight their own battles, hired Yorinobu to quell a rebellion that had broken out in eastern Japan. His success in crushing the rebellion three years later established his clan's influence in the east and strengthened his own position at court. Thereafter the Minamotos were known as the "claws and teeth" of the Fujiwaras, and their influence grew until, by the 12th century, they dominated all Japan.

Minamoto Yoritomo (b. 1147, Japan—d. Feb. 9, 1199, Kamakura), founder of the *bakufu*, or shogunate, a system whereby feudal lords ruled Japan for 700 years.

Defying the emperor, Yoritomo established *shugo* (constables) and *jitō* (district stewards) throughout the Japanese provinces, thus undermining the central government's local administrative power, and in 1192 he acquired the title of supreme commander (*shōgun*) over the *shugo* and *jitō*.

Aristocratic and military background. He was of noble and, as a descendant of the emperor Seiwa (reigned AD 858–876), even royal lineage. His family name, Minamoto, is Genji in Chinese (Gen being the Chinese reading of the symbol for Minamoto), and it is immortalized as the embodiment of ancient courtly ways in *The Tale of Genji* (*Genji monogatari*), one of the world's earliest and greatest novels. But the family's immediate past was military as well as aristocratic, and Yoritomo was impatient with the court's cultured and precious subtleties. He wanted power and was jealous, suspicious, and cold-hearted, even in his own circle. He went as far, in fact, as to liquidate several near relations. But once in power, he proved an excellent administrator.

Early life. Yoritomo was the third son of Minamoto Yoshitomo, who, in 1159, attempted to destroy Taira Kiyomori (scion of another dominant military family, the Taira clan) in the Heiji Disturbance, in Kyōto province. He was defeated, however, and his son Yoritomo was captured and banished to Izu province (a peninsula southwest of Tokyo), where for 20 years he lived under Taira surveillance.

Yoritomo enlivened his rustication by seducing the daughter of his jailer, Itō Sukechika. The latter's rage forced Yoritomo's flight to the protection of Itō's superior and neighbour, Hōjō Tokimasa, a Taira vassal whose hostile attitude to the Taira clan typified the contemporary split between court and country. Hōjō's daughter also succumbed to Yorimoto's blandishment but had to postpone marriage until 1180, when her official fiancé, the pro-Taira acting governor, had been eliminated. The essential feature, however—an understanding between Tokimasa and Yoritomo—was swiftly completed; and Yoritomo's political pretensions now enjoyed support.

Meanwhile Taira Kiyomori, the head of the Taira clan, exercised his power over the Imperial court, thus alienating Go-Shirakawa, the retired emperor. (At this period of Japanese history the emperor often lived in "retirement" away from court so he could rule without the hindrance of the highly detailed court ceremonials. This practice was known as *insei*.) Most of the aristocracy and the heads of the great temples and shrines were also resentful of the Taira clan's hold over the emperor.

Rise to power. In 1180 Minamoto Yorimasa, another member of the Minamoto clan, joined in a rebellion with an Imperial prince, Mochihito-ō, who summoned the Minamoto clan to arms in various provinces. Yoritomo now used this princely mandate as a justification for his own uprising. Despite Mochihito-ō's death, which occurred shortly before Yoritomo's men were led into battle, he succeeded in gaining much support from the feudal lords in the eastern provinces. Many members of the Taira family also enrolled under Yoritomo's banner, for they were disappointed with their meagre rewards from cousins at court. Yoritomo immediately advanced to Kamakura (about 10 miles [16 km] south of modern Tokyo) and established his headquarters there. As well as consolidating a hold over his own vassals in the Kantō area (west of Tokyo), Yoritomo tried to organize the Minamoto followers under his direct control. He was loath to relinquish control to any of his various relatives, and to this end he established the Samurai-dokoro ("Board of Retainers").

Minamoto Yoritomo, colour on silk cloth attributed to Fujiwara Takanobu; in the collection of Jingō Temple, Kyōto

Collection of Jingō Temple, Kyōto; photograph from the Tokyo National Museum

In 1183 Minamoto Yoshinaka, a cousin of Yoritomo, occupied the Hokuriku district and invaded Kyōto, the seat of the court. Shirakawa-Go, who always hoped to play off supporters, as well as enemies, against each other to regain some of the substance of Imperial power, invited Yoritomo to put an end to Yoshinaka's dangerously successful career; and Yoritomo accordingly crushed Yoshinaka at Kyōto. Yoritomo now established the Kumonjo ("Board of Public Papers") and Monchūjo ("Board of Questioning"), setting up not only a military but also an independent political government in the east, yet one that was recognized by the central Imperial court in Kyōto. In 1184 Yoritomo's considerable armies, commanded by his two younger half-brothers Noriyori and Yoshitsune, the latter a brilliant commander of whom Yoritomo was jealous, were ranged against the Taira forces for what was hoped would be a climactic campaign, but decisive victory was not gained until the following year. After Minamoto's next victory, the emperor supported Yoshitsune in efforts to restrain Yoritomo's power. But Yoritomo immediately expelled Yoshitsune and imposed on the emperor the establishment of *shugo* and *jitō* throughout Japan, avowedly to capture Yoshitsune, though such arrangements were instrumental in making Yoritomo's ascendancy nationwide. Soon after, Yoritomo succeeded in having Yoshitsune put to death.

The Kamakura shogunate. Yoritomo gave his *shugo*, each placed in a province, the function of administering and policing the Minamoto vassals locally. The *shugo* also administered the judicial proceedings in cases of rebellion and murder, and they thus acquired something of a military hold over each province. To supervise individual estates, the more pacific office of *jitō* was created, which levied taxes and undertook the management of the estates. And, not surprisingly, both the *shugo* and the *jitō* became feudal lords. Through these institutions, Yoritomo was thus able to undermine the central government's local administrative power, and subsequently he even made efforts to rule remote districts, such as Kyushu, Japan's southernmost island.

In 1185 he destroyed Fujiwara Yasuhira, an independent noble of the Tohoku area, demonstrating his ambition to create a power structure independent of the capital, at Kyōto. In 1192, a few months after his old rival Go-Shirakawa's death, Yoritomo, now with no one to hinder his ultimate ambition, titled himself *sei-i tai shōgun* ("barbarian-quelling generalissimo"), becoming the supreme commander over the feudal lords. The Kamakura shogunate was now formally complete.

After 1192 Yoritomo's policies were designed to relieve the strain between the military lords and the court aristocrats, and the powerful temples and shrines. Thanks to the institutions of the *shugo* and *jitō*, relations between the court of Kyōto and Yoritomo's government at Kamakura were fairly stable. Yoritomo died in 1199.

Yoritomo is often charged with cruelty, particularly in the killing of his cousin and brothers, but political circumstances of his time were difficult. He had above all to prevent discord among his vassals and the whole military class if his work was to attain the permanence that it did. *See also* Fujiwara family; Hōjō family; Taira family. (K.N.)

Minamoto Yoriyoshi (b. 988, Japan—d. Aug. 27, 1075, Japan), warrior who established the Minamoto clan in the strategic Honshu region of northern Japan.

After aiding the central government in quelling several uprisings by Ainu tribesmen, Yoriyoshi was sent to crush a rebellion led by Abe Yoritoki of the powerful Abe warrior clan of northern Japan (1051). The fighting was characterized by repeated pauses, defeats on both sides, and many barbarous incidents, but Yoriyoshi was finally victorious in 1062. These battles are known as the Earlier Nine Years' War, nine years being the actual time of the fighting, not counting the pauses between battles. In the course of the war, Yoriyoshi gained many loyal retainers who eventually served the Minamoto clan well in its struggle for dominance in Japan.

Minamoto Yoshiie (b. 1039, Kawachi, Japan—d. August 1106, Japan), warrior who shaped the Minamoto clan into an awesome fighting force that was feared and respected throughout Japan. Later generations of Minamotos worshipped Yoshiie as an almost divine ancestor.

The son of Minamoto Yoriyoshi, Yoshiie aided his father in the battles known as the Earlier Nine Years' War (1051–62), which ultimately resulted in the defeat of the Abe clan and the ascendancy of the Minamotos in northern Japan. Yoshiie's military prowess so awed his enemies that they called him Hachiman-Tarō, "the firstborn of the God of War."

Twenty years after this war, the Kiyowara family, which had aided the Minamoto family in the Earlier Nine Years' War, began to challenge Minamoto rule in northern Japan. In a series of battles lasting from 1083 to 1087, Yoshiie's reputation for ferocity in battle was not diminished. He eliminated the Kiyowaras and established the absolute sovereignty of the Minamotos in the north. Unlike the Earlier Nine Years' War, however, this conflict was fought without any commission from the court and was evidence of the Minamotos' growing independence. These later battles are collectively known as the Later Three Years' War, three years being the time of the actual fighting, not counting the pauses.

Minamoto Yoshitomo (b. 1123, Japan—d. Feb. 12, 1160, Owari Province, Japan), Japanese warrior whose support of Taira Kiyomori, the leader of the Taira clan, in the Hōgen Disturbance (1156) was decisive in a Taira victory over the Minamoto clan, headed by Yoshitomo's own father, Minamoto Tameyoshi. After Kiyomori's victory, Yoshitomo was ordered to kill his father. He refused, but another Minamoto officer, saying it would be a disgrace to allow a Taira to execute Tameyoshi, performed the deed.

Dissatisfied with his share of the spoils, Yoshitomo in 1159 took advantage of Taira Kiyomori's absence from the capital to attempt a coup d'etat. In the resulting Heiji Disturbance (1159), one of the most colourful episodes in Japanese history, Kiyomori rallied his forces and defeated Yoshitomo. Yoshitomo escaped, only to be killed while seeking refuge in eastern Japan. Two of his sons survived, however, and one, Yoritomo, later defeated Kiyomori and established Minamoto dominance over all of Japan.

Minamoto Yoshitsune (b. 1159, Japan—d. June 15, 1189, Fort Koromogawa, Mutsu Province, Japan), warrior who engineered many of the military victories that helped his half brother Yoritomo gain control of Japan. He is probably the most popular Japanese historical figure of the period, and his romantic exploits have captured the imagination of the Japanese people, who have perpetuated numerous legends, stories, and kabuki plays celebrating the adventures of Yoshitsune and his faithful follower Benkei. Many Western-style novels and films have also been based on his life.

Yoshitsune was the son of Minamoto Yoshihomo (1123–60), who was killed while seeking refuge after his defeat by Taira Kiyomori in the Heiji Disturbance (1159). Kiyomori spared the infant Yoshitsune, who was placed in a monastery near the capital at Kyōto, where he trained to become a Buddhist priest. According to legend, on a bridge near the monastery, Yoshitsune encountered Benkei, who challenged him to a sword match. Easily defeated by Yoshitsune, Benkei became a trusted retainer.

At 15 Yoshitsune ran away from the monastery to join his older brother, Yoritomo, in the Honshu region of northern Japan. Despite his youth, Yoshitsune proved to be a military genius in the revolt Yoritomo had raised against Kiyomori. Provided with an army by Yoritomo, he was ordered to advance against the forces of his cousin Minamoto Yoshinaka, who threatened Yoritomo's plans for domination of Japan. Victorious over Yoshinaka, Yoshitsune occupied Kyōto. He then attacked the remaining Taira forces along the Inland Sea, annihilating them in a famous naval battle during the spring of 1184.

While in Kyōto, Yoshitsune became a favourite of the Emperor and his court, arousing Yoritomo's jealousy. Yoshitsune's attempt to visit his brother in the northern city of Kamakura was rebuffed with a letter charging the younger man with having taken arbitrary actions during his campaigns. Yoshitsune then attempted to raise a rebellion against him with the aid of his uncle Minamoto Yukiie, but, failing, he was forced to flee.

Hunted by his brother's soldiers, Yoshitsune wandered Japan for several years, often in the guise of a monk, before taking refuge with Fujiwara Hidehira, a powerful independent lord in northern Japan. When Hidehira died in 1187, after exacting a promise from his son to protect Yoshitsune, the son, fearful of Yoritomo, sent soldiers to surround Yoshitsune and force his suicide. His head was then sent to Yoritomo preserved in sake, but Yoritomo, who was seeking to consolidate and complete his conquests, destroyed the Fujiwara quarters, bringing all Japan under his control.

Mīnanātha (Indian guru): *see* Matsyendranātha.

Minangkabau, Malay URANG PADANG (People of Padang), largest ethnic group on the island of Sumatra, Indonesia, whose traditional homeland is the west central highlands. Their numbers have been variously estimated at between 2,000,000 and 5,000,000. Although Muslim, the Minangkabau are matrilineal—*i.e.,* they trace descent and inheritance through the female line. Traditionally, the wife remained with her maternal relatives after marriage, and the husband, having no home of his own, resided in his mother's house and only visited his wife.

The domestic unit was traditionally the community house, in which a head woman, her sisters, their daughters, and their children lived. Several of these houses made up the clan, within which no marriage was allowed. Several clans made up the *negari,* the largest unit of government, roughly equivalent in size to a village. Each house was represented in the clan council by a male member, or uncle.

The family house was a large rectangular structure, raised high above the ground, with a saddle-shaped roof. A main room occupied much of the structure. Adjoining it were the living compartments, each occupied by a woman, her children, and her husband when present.

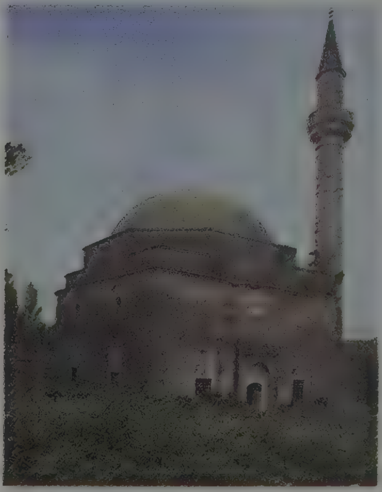
The Minangkabau have extensive terraced fields and garden plots in which they raise irrigated rice, tobacco, and cinnamon, as well as fruits and vegetables. Their crafts include wood carving, metalworking, and weaving.

Since World War II the traditional kinship structure has declined in importance, and many men have left the village to establish their own households with wives and children. Some of the kin-group land has become the personal property of these households.

Their language, closely resembling Malay, belongs to the Austronesian (Malayo-Polynesian) language family.

Some Minangkabau migrated to Malaya in the late 19th century and formed a confederation of small states that came to be known as Negri Sembilan (Nine States). Minangkabau tribesmen, closely resembling peninsular Malay physically and linguistically, left Sumatra to seek greater economic opportunity across the Strait of Malacca. Rapid expansion of Malayan tin mining after 1850 lured increasing numbers of Minangkabau as miners or as petty merchants. The immigrants secured transit to Malaya by selling property or receiving assisted passage in return for contract mine labour. By the beginning of the 20th century, however, capital-intensive mining displaced Minangkabau miners, who then shifted to agricultural pursuits in interior river valleys. Land was plentiful, and the Minangkabau frequently settled by squatting (*i.e.,* gaining title by clearing, planting, and living on the land). Malay sultans raised no objections to these racially Malay immigrants, who partially offset the influx of Chinese labourers. Minangkabau immigrants became successful smallholder farmers and in the 20th century came to control most retail trade in Malaya.

minaret (Arabic: "beacon"), in Islāmic religious architecture, the tower from which the faithful are called to prayer five times each day by a muezzin, or crier. Such a tower is always connected with a mosque and has one or more balconies or open galleries. At the time of the Prophet Muḥammad, the call to prayer was made from the highest roof in the vicinity of the mosque. The earliest minarets were former Greek watchtowers and the towers of Christian churches. The oldest minaret in North Africa is at al-Qayrawān, Tunisia. It was built between 724 and 727 and has a massive square form.



Small mosque with minaret near Edirne, Tur.

Villota—Photo Researchers

Minarets are constructed in a wide variety of forms ranging from thick, squat spiral ramps, as at Samarra, Iraq (built 848–852), to soaring, delicate, pencil-thin spires. Often the minaret is square at the base, where it is attached to the mosque. Above this square base it may rise in a series of circular, hexagonal, or octagonal stages, each marked by a projecting balcony. At the top is a bulbous dome, an open pavilion, or a metal-covered cone. The upper parts of the minaret are usually richly decorated with carving. The steps may be internal or external. The number of minarets per mosque also varies, from one to as many as six. These towers were built to be "landmarks of Islām"—to be visible from afar and to stamp a site with Islāmic character.

Minas, capital, Lavalleja department, southeastern Uruguay. Founded in 1783, the city was named for the surrounding mines. In the second half of the 20th century Minas has become increasingly attractive to tourists, since it is only 75 mi (120 km) northeast of Montevideo and offers hills and forests, both unusual in Uruguay. Its bottled mineral waters long have been distributed throughout the nation. Neighbouring mines and quarries (yielding granite, iron ore, and marble), administration, trade, and some industry provide the city's principal occupations. There is a television station in Minas. It is connected to Montevideo by the Pan-American Highway, a national railroad, and air services. Pop. (1996) 35,090.

Minas Basin, eastern inlet of the Bay of Fundy, protruding into central Nova Scotia, Canada. Up to 25 mi (40 km) in width and more than 50 mi in length (including its eastern extension, Cobequid Bay), the basin has some of the highest tides in the world; fluctuations exceeding 50 ft (15 m) have been recorded. It is connected to the Bay of Fundy by Minas Channel and receives the drainage of the Avon, Cornwallis, Salmon, and Shebenacadie rivers. Minas Basin, corrupted from the French Le Bassin des Mines, was so named in 1604 by Samuel de Champlain because of the mineral deposits (specifically at Cap d'Or) found along its shores. Walton, on the southeast coast, is the province's principal centre for mining metallic minerals (zinc, copper, silver, and lead).

Minas Gerais, inland *estado* (state) of Brazil. It is the storehouse of the mineral riches of that country, as is indicated by its name, which means "general mines." The state is bounded on the north by the states of Goiás and Bahia; on the east by Bahia, Espírito Santo, and Rio de Janeiro; on the south by Rio de Janeiro and São Paulo; and on the west by São Paulo, Mato Grosso do Sul, and Goiás. Its area is 226,708 sq mi (587,172 sq km). Its population is exceeded among Brazilian states only by that of São Paulo. The state capital and largest city is Belo Horizonte.

Minas Gerais was first explored by Fernão Dias Pais Leme between 1664 and 1677, though he was not the first European to enter the area. The discovery of gold in 1692–95 by bands of adventurers from the São Paulo settlements led to a mad rush for the new mines. Minas Gerais at first formed part of the captaincy of São Paulo, but in 1720 it was established as a separate captaincy general and was brought more directly under the Portuguese crown. Minas Gerais has traditionally played an important role in Brazilian politics, in part because of its central position but also because of the dense population in its southeast. In 1822 it became a province in the Brazilian Empire, and in 1891 a state in the federal republic. In 1897 the old colonial capital of Ouro Prêto, deprived of its administrative function, became a national monument in 1933. The new capital was placed at Belo Horizonte, where a new city, laid out on previously almost unoccupied land, was planned and built.

Minas Gerais lies almost wholly within the geologically ancient, mineral-rich uplands known as the Brazilian Highlands, a much dissected hilly upland reaching an elevation of about 2,600 ft (790 m) above sea level. Only small sections of the southern and eastern parts are within the zone of the Great Escarpment which forms the eastern margin of the highlands. In the southwest, along the border of São Paulo, is the commanding range of mountains known as the Serra da Mantiqueira, whose highest summit, Pico das Agulhas Negras (also known as Pico do Itatiaia), reaches 9,144 ft. The other principal mountain range is the Serra do Espinhaço, which begins a little south of Belo Horizonte and extends northward into Bahia. It forms the divide between the rivers draining to the São Francisco River and those draining eastward directly to the Atlantic (the Doce, Mucuri, Jequitinhonha). In the southwest Minas Gerais is drained by the Rio Grande, one of the major headwaters of the Paraná River. The whole northwestern part of the state is drained by the São Francisco, which flows northward through a rift valley to the west of the Serra do Espinhaço.

At Belo Horizonte, 2,800 ft above sea level, the average temperature of the warmest month (February) is 72° F (22° C), and the average of the coldest month (July) is 62° F (about 17° C). The rainfall throughout most parts of the state averages between 40 and 60 in. (1,000 and 1,500 mm).

The southern and eastern part of the state was originally covered with a dense tropical forest including a few species of trees that shed their leaves in the dry season. On the upper slopes of the Serra da Mantiqueira and of the Serra do Espinhaço, the forest gives way to upland meadows or to a scrubby growth of deciduous woodland. All of southwestern and western Minas Gerais is covered by a woodland savanna.

The population of Minas Gerais is chiefly of Portuguese origin, with a considerable admixture from other European countries. Persons of African and mixed (African and European or European and Indian) ancestry constitute other important elements. Outside of the cities, there is a dense rural population in the south and east, but the whole northern and western part of the state is still very thinly occupied. The language is Portuguese, and the predominant religion is Roman Catholicism.

Living conditions in general are higher in the urban areas, and health services are more accessible in the cities. Minas Gerais has been one of the leading states in providing for education. The Universidade Federal de Minas Gerais, one of the country's official universities, was founded in 1927, and the Universidade Católica de Minas Gerais was established in 1958; both are in Belo Horizonte. The Escola Nacional de Minas e Metalurgia (founded 1876) is at Ouro Prêto.

The largest source of wealth in Minas Gerais is mining, but the largest source of employment is agriculture, and the greater part of the area is used for pasture of cattle. Minas Gerais has long been known for its wealth of minerals and its mining activities, supplying more than half the mineral production of Brazil. Gold was discovered in 1698 and in 1729 diamonds were discovered. These precious commodities created great wealth in the 18th century, and Ouro Prêto, the former administrative centre of Minas Gerais, became a city of great splendour, with numerous beautifully decorated churches. By 1800, however, the richest gold sources had been used up. Minas Gerais is also widely known for its semiprecious gems, such as aquamarine, amethyst, tourmaline, and topaz, and it is an important source of industrial diamonds and large quartz crystals.

Of greater importance in modern times, however, are the vast deposits of high-grade iron ore and manganese. In the southern part of the Serra do Espinhaço there is a large reserve of iron-ore, containing few impurities and so located that it can be mined with mechanical shovels. By the late 20th century there were three large-scale steel plants using this ore. Brazil now exports about two-thirds of its iron ore, with the majority of the exported ore produced in Minas Gerais. Minas Gerais also supplies bauxite, zirconium, iron pyrite, rutile, graphite, chromite, molybdenum, nickel, tungsten, titanium, beryl, and mica.

Manufacturing and processing industries have developed in and around the cities, especially around Belo Horizonte. In addition to iron and steel, principal industries include food processing, textiles, chemicals, and furniture and other consumer and capital goods.

Slash-and-burn agriculture produces corn (maize), rice, beans, and cassava rotated with pasture grass, chiefly for cattle grazing. This area is the chief source of beef for Rio de Janeiro, São Paulo, and other cities. Dairy farming is important in southern Minas Gerais. In only a few spots is the land used for sugarcane or coffee. The state is a leading producer of rice, beans, corn, and cheese.

In the Serra da Mantiqueira and in the southwestern uplands of the state, to the north of these mountains, are a number of resort towns, most of them possessing various hot and curative baths. The mineral waters are bottled and widely dispensed in Brazil.

Minas Gerais is served by railroads, all-weather highways, airports, and by river steamers that descend the São Francisco from Pirapora to Juàzeiro in Bahia. The main railroad, Estrada de Ferro Central do Brasil, runs from Rio de Janeiro to Belo Horizonte. Since World War II all-weather motor highways provide easy access to Rio de Janeiro, São Paulo, and the capital, Brasília.

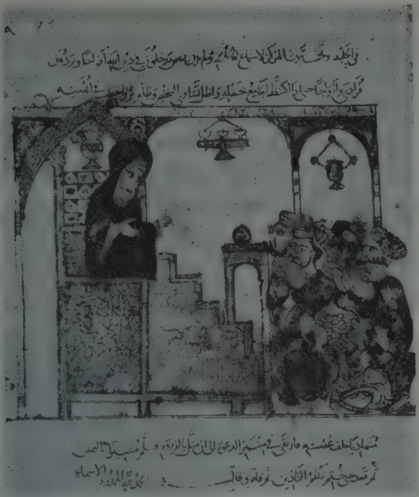
As is to be expected, the cultural life of the state is concentrated in its cities and especially in the capital, Belo Horizonte, and in Ouro Prêto, the old colonial capital. Pop. (2000 prelim.) 17,835,488.

Minatitlán, city and river port, southeastern Veracruz state, south central Mexico. It is on the Isthmus of Tehuantepec on the Río Coatzacoalcos, 20 mi (32 km) from its mouth on the Gulf of Mexico and 210 ft (64 m) above sea level. When founded in 1822 as Paso de la Fabrica, the settlement's inhabitants included North Americans, French, and Germans. The colony did not prosper until oil was discovered in the vicinity in the 1940s. Now a prosperous petrochemical centre, Minatitlán refines and distributes oil found on the isthmus. Mexico's first refinery was built in Minatitlán, and there is a network of gas and oil pipelines, the most important of which crosses the isthmus to the port of Salina Cruz, on the Gulf of Tehuantepec. Lumbering and agriculture are additional sources of income. Minatitlán is accessible by highway, railroad, river, and air. Pop. (2000 prelim.) 150,000.

minbar, in Islām, the pulpit from which the sermon (*khuṭbah*) is delivered. In its simplest form the *minbar* is a platform with three steps; often it is constructed as a domed box at the top of a staircase and is reached through a doorway that can be closed.

Muḥammad originally delivered his *khuṭbahs* while leaning against a palm-trunk pillar in the mosque at Medina. *Ḥadīth* (accounts of Muḥammad's life and sayings) report that Muḥammad later used a seat with two steps for receiving delegations in the mosque and also that he preached from this portable *minbar,* which was fashioned from tamarisk wood by a Greek or Abyssinian carpenter. His successors, the caliphs, used his *minbar* as a symbol of their authority.

During the first century of Islām, provincial governors also came to use the *minbar,* from which they made speeches and heard petitions, primarily in their capacity as rulers. When the *khuṭbah* lost its informative, political, and discursive character and became a



Sermon being preached from a *minbar*, miniature from the *Maqāmāt* of al-Ḥarīrī, 1223 (Paris, Bibliothèque Nationale, MS. Arabe 6094, fol. 93)

By courtesy of the Bibliotheque Nationale, Paris

purely religious sermon during the reign of the ʿAbbāsid caliphs, the *minbar* also became a religious object. It became more permanent in nature, the number of steps increased, and it was commonly executed in stone or brick. It was even covered with a cloth, the *qaṭīfah.*

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Minbu, town, west-central Myanmar (Burma), on the Irrawaddy River opposite Magwe (Magway) town. The river there is about 3 miles (5 km) wide but contains many islands and sandbanks, and in the dry season steamers can come no nearer than 4 miles (6.5 km) south of the town.

Although much of the surrounding land is semidesert scrub forming part of Myanmar's dry zone, large areas around Minbu are irrigated by the Mon, Maw, and Salin rivers. The area is the site of one of the three historic irrigation systems in Myanmar and has modern irrigation works. Sesame, millet, gram, peanuts (groundnuts), and other crops are grown in the nonirrigated lowland. Fishing is an important economic activity. There is oil in mud volcanoes, and small oilfields have been developed in the line of hills running through Minbu, which is the site of a diesel electric plant. Pop. (1983) 135,862.

Minch, The, also called NORTH MINCH, Atlantic sea channel between the Outer Hebrides island group on the west and the mainland of Scotland on the east. The channel varies in width between 25 and 45 miles (40 and 70 km) and has both great depth and a rapid current. The Little Minch, its southerly extension, lies between the island groups of the Outer and Inner Hebrides, separating the islands of Harris and North Uist in the west from the island of Skye in the east.

mincha, also spelled MINCHAH (Judaism): *see* minhah.

Minchō: *see* Kichizan.

Mincio, Giovanni, Latin JOHANNES MINCIUS (pope): *see* Benedict (X).

mind, in the Western tradition, the complex of faculties involved in perceiving, remembering, considering, evaluating, and deciding. Mind is in some sense reflected in such occurrences as sensations, perceptions, emotions, memory, desires, various types of reasoning, motives, choices, traits of personality, and the unconscious.

A brief treatment of mind follows. The subject of mind is treated in a number of articles in the MACROPAEDIA. For a philosophical treatment of Western conceptions, *see* Mind, Philosophy of. For scientific treatment of the so-called mental faculties, *see* Intelligence, Theories and Distribution of; Learning, Animal; Learning and Cognition, Human; Memory; Perception, Human; Thought and Thought Processes. For treatment of Eastern conceptions, in the context of the respective philosophical traditions, *see* Buddhism, Buddha and; Hinduism; etc.

To the extent that mind is manifested in observable phenomena, it has frequently been regarded as a peculiarly human possession. Some theories, however, posit the existence of mind in other animals besides human beings. One theory regards mind as a universal property of matter. According to another view, there may be superhuman minds or intelligences, or a single absolute mind, a transcendent intelligence.

Several assumptions are indispensible to any discussion of the concept of mind. First is the assumption of thought or thinking. If there were no evidence of thought in the world, mind would have little or no meaning. The recognition of this fact throughout history accounts for the development of diverse theories of mind. It may be supposed that such words as "thought" or "thinking" cannot, because of their own ambiguity, help to define the sphere of mind. But whatever the relation of thinking to sensing, thinking seems to involve more—for almost all observers—than a mere reception of impressions from without. This seems to be the opinion of those who make thinking a consequence of sensing, as well as of those who regard thought as independent of sense. For both, thinking goes beyond sensing, either as an elaboration of the materials of sense or as an apprehension of objects that are totally beyond the reach of the senses.

The second assumption that seems to be a root common to all conceptions of mind is that of knowledge or knowing. This may be questioned on the ground that, if there were sensation without any form of thought, judgment, or reasoning, there would be at least a rudimentary form of knowledge—some degree of consciousness or awareness by one thing or another. If one grants the point of this objection, it nevertheless seems true that the distinction between truth and falsity and the difference between knowledge, error, and ignorance or between knowledge, belief, and opinion do not apply to sensations in the total absence of thought. Any understanding of knowledge that involves these distinctions seems to imply mind for the same reason that it implies thought. There is a further implication of mind in the fact of self-knowledge. Sensing may be awareness of an object, and to this extent it may be a kind of knowing, but it has never been observed that the senses can sense or be aware of themselves.

Thought seems to be not only reflective but reflexive, that is, able to consider itself, to define the nature of thinking, and to develop theories of mind. This fact about thought—its reflexivity—also seems to be a common element in all the meanings of "mind." It is sometimes referred to as "the reflexivity of the intellect," as "the reflexive power of the understanding," as "the ability of the understanding to reflect upon its own acts," or as "self-consciousness." Whatever the phrasing, a world without self-consciousness or self-knowledge would be a world in which the traditional conception of mind would probably not have arisen.

The third assumption is that of purpose or intention, of planning a course of action with foreknowledge of its goal or of working in any other way toward a desired and foreseen objective. As in the case of sensitivity, the phenomena of desire do not, without further qualification, indicate the realm of mind. According to the theory of natural desire, for example, the natural tendencies of even inanimate and insensitive things are expressions of desire. But it is not in that sense of desire that the assumption of purpose or intention is here taken as evidence of mind.

It is rather on the level of the behaviour of living things that purpose seems to require a factor over and above the senses, limited as they are to present appearances. It cannot be found in the passions, which have the same limitation as the senses, for unless they are checked they tend toward immediate emotional discharge. That factor, called for by the direction of conduct to future ends, is either an element common to all meanings of "mind" or is at least an element associated with mind. It is sometimes called the faculty of will—rational desire or the intellectual appetite. Sometimes it is treated as the act of willing, which, along with thinking, is one of the two major activities of mind or understanding; and sometimes purposiveness is regarded as the very essence of mentality.

These assumptions—thought, knowledge or self-knowledge, and purpose—seem to be common to all theories of mind. More than that, they seem to be assumptions that require the development of the conception. The conflict of theories concerning what the human mind is, what structure it has, what parts belong to it, and what whole it belongs to does not comprise the entire range of controversy on the subject. Yet enough is common to all theories of mind to permit certain other questions to be formulated: How does the mind operate? How does it do whatever is its work, and with what intrinsic excellences or defects? What is the relation of mind to matter, to bodily organs, to material conditions, or of one mind to another (*see* mind–body dualism)? Is mind a common possession of men and animals, or is whatever might be called mind in animals distinctly different from the human mind? Are there minds or a mind in existence apart from man and the whole world of corporeal life? What are the limits of so-called artificial intelligence, the capacity of machines to perform functions generally associated with mind?

The intelligibility of the positions taken in the disputes of these issues depends to some degree on the divergent conceptions of the human mind from which they stem. The conclusions achieved in such fields as theory of knowledge (*see* epistemology), metaphysics, logic, ethics, and the philosophy of religion are all relevant to the philosophy of mind; and its conclusions, in turn, have important implications for those fields. Moreover, this reciprocity applies as well to its relations to such empirical disciplines as neurology, psychology, sociology, and history.

mind–body dualism, in philosophy, any theory that mind and body are distinct kinds of substances or natures. This position implies that mind and body not only differ in meaning but refer to different kinds of entities. Thus, a dualist would oppose any theory that identifies mind with the brain, conceived as a physical mechanism.

The modern problem of the relationship of mind to body stems from the thought of René Descartes, a 17th-century French philosopher and mathematician, who gave dualism its classical formulation. Beginning from his famous *Cogito, ergo sum* (Latin: "I think, therefore I am"), Descartes developed a theory of mind as an immaterial, nonextended substance that engages in various activities such as rational thought, imagining, feeling, and willing. Matter, or extended substance, conforms to the laws of physics in mechanistic fashion, with the important exception of the human body, which Descartes believed is causally affected by the human mind and which causally produces certain mental events. For example, willing the arm to be raised causes it to be raised, whereas being hit by a hammer on the finger causes the mind to feel pain. This part of Descartes's dualistic theory, known as interactionism, raises one of the chief problems faced by Descartes: the question how this causal interaction is possible.

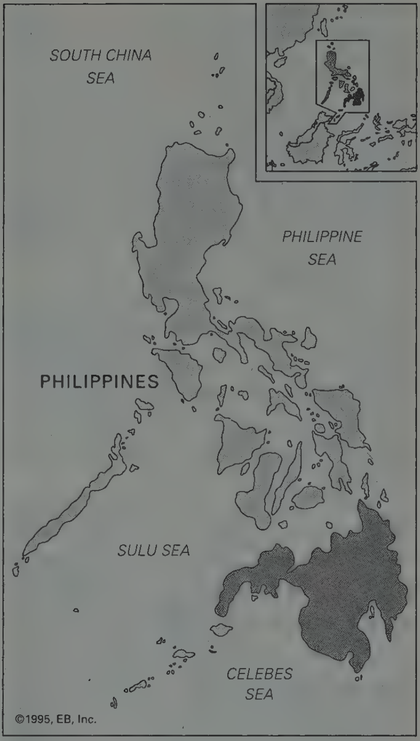
This problem gave rise to other varieties of dualism, such as occasionalism and some forms of parallelism that do not require direct causal interaction. Occasionalism maintains that apparent links between mental and physical events are the result of God's constant causal action. Parallelism also rejects causal interaction but without constant divine intervention. Gottfried Wilhelm Leibniz, a 17th-century German rationalist and mathematician, saw mind and body as two perfectly correlated series, synchronized like two clocks at their origin by God in a preestablished harmony.

Another dualistic theory is epiphenomenalism, which agrees with other theories in holding that mental events and physical events are different. The epiphenomenalist holds, however, that the only true causes are physical events, with mind as a by-product. Mental events seem causally efficacious because certain mental events occur just before certain physical events and because humans are ignorant of the events in the brain that truly cause them.

Among the difficulties of dualism is the inherent obscurity in conceiving of what sort of thing a mental substance—an immaterial, thinking "stuff"—might be. Such criticisms have led some thinkers to abandon dualism in favour of various monistic theories.

mind reading, a magician's trick involving various silent or verbal signals that cue a conjurer to answer a question as though with second sight. Philip Breslaw, the first magician of note to feature mind reading, played in 1781 at the Haymarket Theatre in London to appreciative audiences. In 1784 the Pinettis, a husband-and-wife team, advertised Mrs. Pinetti as able to guess the thoughts of the audience. In the 19th century, Jean-Eugène Robert-Houdin, Robert Heller, Compars Herrmann, and Henri Robin also used mind reading as part of their repertoire. In the 20th century there were Harry Houdini, Joseph Dunninger, and the Amazing Kreskin.

Drawing on carefully devised alphabetical and numerical arrangements and on certain methods of conveying signals, the conjurer would guess personal names and numbers. Another arrangement of objects into sets, verbal cues, and numerical signals allowed the magician to guess objects in the hands of audience members. With the aid of electricity, Robert Heller was able to answer questions correctly by using a silent signal.



Mindanao

Mindanao, island, the second largest (after Luzon) in the Philippines, in the southern part of the archipelago, surrounded by the Bohol, Philippine, Celebes, and Sulu seas. Irregularly shaped, it has an area of 36,537 square miles (94,630 square km) and measures 293 miles (471 km) north to south and 324 miles (521 km) east to west. The island is marked by peninsulas and is heavily indented by the Davao and Moro gulfs in the south and by Iligan Bay in the north. The long, semicircular Zamboanga Peninsula (west) extends southwesterly toward the Sulu Archipelago and Borneo, and the Cotabato and Surigao peninsulas extend south and north, respectively.

Rugged, faulted mountains and volcanoes occur in many areas. Mount Apo, at 9,691 feet (2,954 m), is an active volcano in the southern part of the central highlands; it is the highest peak in the Philippines. The island has narrow coastal plains, and broad, fertile basins and extensive swamps are formed by the Mindanao and Agusan river systems. Lake Sultan Alonto (formerly called Lake Lanao), created by a lava dam, has an area of 134 square miles (347 square km). The island has a marsh-game refuge and bird sanctuary. The rare monkey-eating eagle is unique to Mindanao.

Mindanao is a Muslim outpost in the predominantly Roman Catholic Philippines. Although Muslims are no longer a majority, Islāmic culture is evident; there are many mosques, and distinctive brassware, including the kris, or dagger, is manufactured. The autonomous region of Muslim Mindanao—consisting of territory in western and southwestern Mindanao along with a number of nearby islands, including Tawitawi and Jolo—was established in 1990.

Mindanao also has the largest concentration of ethnic minorities in the Philippines. They include the Magindanaw, Maranaw, Ilanum, and Sangil; all are Muslim groups known collectively as the Moro. Groups usually found in the uplands include the Tagabili, Subanon, Bukidon, Bagobo, Mandaya, and Manobo. Another important group is the Tiruay, whose religion is a mixture of Christian, Muslim, and animist beliefs.

Houses along the southern coast of Mindanao, Philippines

Paul Almasy

Because of its large expanses of undeveloped fertile land, Mindanao has been considered the nation's "pioneer frontier." It did not experience substantial population increase until migration was promoted after 1939. The chief crops are corn (maize), rice, abaca, bananas, pineapples, mangoes, and coconuts. Cotton, ramie (a fibre plant), coffee, and cacao are also grown. The timber industry is important, and there are gold, nickel, iron, and coal deposits. Chartered cities include Zamboanga City, Cotabato City, Davao City, Cagayan de Oro, and Butuan (*qq.v.*). Pop. (1990 prelim.) 13,232,000.

Mindanao Deep, also called MINDANAO TRENCH (Pacific Ocean): *see* Philippine Trench.

Mindanao River, also called RÍO GRANDE DE MINDANAO, or COTABATO RIVER, main river of the Cotabato lowland, central Mindanao, Philippines. It rises in the central highlands of northeastern Mindanao (island) as the Pulangi and then flows south to where it joins the Kabacan to form the Mindanao. It meanders northwest through the Libungan Marsh and Liguasan Swamp, which is the habitat of crocodiles. At Datu Piang the river turns to enter Illana Bay of the Moro Gulf in two tributaries—the Cotabato and Tamentaka—after a 200-mile (320-kilometre) course. With its many tributaries—Pulangi and Maridagao (north), Alah (south), Malabul, Dalapuan, and Alip (east)—the river system forms a wide fertile basin. It is a major inland-transportation artery, the banks of which are lined with trading centres that include Cotabato City, Datu Piang, and Pagalungan.

Mindanao Sea: *see* Bohol Sea.

Mindaugas (Lithuanian), Polish MENDOG, or MINDOWE, Russian MENDOVG (d. 1263), ruler of Lithuania, considered the founder of the Lithuanian state. He was also the first Lithuanian ruler to become a Christian.

Mindaugas successfully asserted himself over other leading Lithuanian nobles and tribal chiefs, including his brother and his nephews, in 1236. The state thus formed under his leadership included Lithuania proper, Samogitia, and much of Belorussia. In 1250 or 1251 Mindaugas accepted baptism from the Livonian Knights, thus easing western pressure against his state from the Teutonic and Livonian Knights and from Daniel of Halich-Volynia. In 1253 he received a royal crown from Pope Innocent IV.

With the west for a time stabilized, Mindaugas continued his eastern expansion into Russian lands, which he had begun in the 1230s. His efforts led to the incorporation of much Russian territory into Lithuania at the expense of Russia's Mongol subjugators. Indeed, Mindaugas' campaigns in the east checked a Mongol drive toward the Baltic.

Mindaugas turned his attention to the west again in the late 1250s, when the Livonian Knights encroached on Samogitia, causing a local revolt. Mindaugas unofficially supported the Samogitians and reverted to paganism. In 1263 he and two of his sons were murdered by a group of Samogitian rivals.

Mindel Glacial Stage, major division of Pleistocene time and deposits in Alpine Europe (the Pleistocene epoch began about 1,600,000 years ago and ended about 10,000 years ago). The Mindel Glacial Stage is part of the early geologic scheme (*c.* 1900) that first recognized the importance of multiple episodes of Pleistocene glaciation. The Mindel Glacial Stage, representing a period of relatively severe climatic conditions and glacial advance, preceded the Mindel-Riss Interglacial and followed the Günz-Mindel Interglacial, both periods of relatively moderate climatic conditions. The Mindel Glacial Stage lasted from about 750,000 to 675,000 years ago. At least two periods of glacial advance, separated by a moderate period, are recognized in the Mindel.

Mindelo, Portuguese PORTO GRANDE, city and main port of Cape Verde, in the Atlantic Ocean. It lies on the northwest shore of São Vicente Island, about 560 miles (900 km) off the west African coast. The city's deepwater harbour on Porto Grande Bay is an important refueling point for transatlantic freighters. Mindelo port has been a submarine cable station since 1875. A new shipyard, financed by a loan from the European Investment Bank, was completed in the early 1980s. Pop. (1990 prelim.) 47,080.

Mindelo, chief city of São Vicente Island
Walter Imber

Minden, city, North Rhine–Westphalia *Land* (state), northwestern Germany. It lies along the Weser River, near a narrow defile known as the Porta Westfalica where the river quits the mountains and enters the North German Plain. The emperor Charlemagne organized a military bishopric there in 800. The town struggled for independence from the bishopric, joined the Hanseatic League in the 13th century, and thrived as a trading centre. The bishopric was secularized in 1648, when it passed with the town to Brandenburg. Minden was fortified by Frederick II the Great of Prussia in the mid-18th century. Although it was held briefly by the French in the Seven Years' War, it reverted to Prussia after the victory of the British and Hanoverians at the Battle of Minden in 1759. It passed to Westphalia in 1807 but became Prussian again in 1814. Historic buildings in the centre of the city, including the 11th–13th-century Gothic single-naved cathedral and the early Gothic town hall, were severely damaged in World War II. Both have been rebuilt. The medieval churches of St. Martin and St. Mary and a number of "Weser Renaissance" houses survived.

An important road and rail traffic centre, Minden is the junction of waterways where the remarkable Mittelland Canal aqueduct bridges the Weser. Textiles, furniture, chemicals, glass, ceramics, and heavy metals are important in the city's economy. Other significant economic activities are based on farming and cattle breeding in the surrounding area. Pop. (1992 est.) 78,909.

Mindon (b. 1814, Amarapura, Myanmar [Burma]—d. Oct. 1, 1878, Mandalay), king of Myanmar from 1853 to 1878. His reign was notable both for its reforms and as a period of cultural flowering in the period before the imposition of complete colonial rule.

Mindon was a brother of Pagan (reigned 1846–53), who had ruled during the Second Anglo-Burmese War in 1852. As soon as he became king, Mindon sued for peace and began negotiations with the British on the status of Pegu (in southern Myanmar), which the British had occupied during the war. Frustrated in his attempts to persuade them to return Pegu, the king was obliged to accept a much-reduced dominion, cut off from the sea and deprived of some of the richest teak forests and rice-growing regions. To avoid further trouble, he signed a commercial treaty in 1867 that gave the British generous economic concessions in the unoccupied parts of Myanmar. In 1872 he sent his chief minister, the Kinwun Mingyi U Gaung, on a diplomatic mission to London, Paris, and Rome to secure international recognition of Myanmar's status as an independent country and to appeal for restoration of its lost territory.

Mindon's reign is sometimes considered to have been a golden age of Myanmar culture and religious life. In 1857 he built a new capital, Mandalay, with palaces and monasteries that are masterpieces of traditional Myanmar architecture. The king also sought to make Mandalay a centre of Buddhist learning, convening the Fifth Buddhist Council there in 1871 in an effort to revise and purify the Pāli scriptures.

Despite conservative opposition, Mindon promoted numerous reforms. The most important were the *thathameda,* the assessed land tax, and fixed salaries for government officials. He standardized the country's weights and measures, built roads and a telegraph system, and was the first Myanmar king to issue coinage. Mindon's reign compares favourably with that of Mongkut of Siam (Thailand), even though Siam enjoyed the privileged position of a buffer state between British and French possessions, while the continued existence of an independent Myanmar kingdom was a hindrance to British interests.

Mindon was succeeded by his son, Thibaw (reigned 1878–85), who was to be the last king of Myanmar.

Mindoro, island, west-central Philippines. It lies across the Verde Island Passage from Luzon (northeast) and between the Mindoro (southwest) and Tablas (southeast) straits. Unlike the majority of its sister islands, Mindoro has no deep coastal embayments or fringing islets. Oval-shaped, it has an area of 3,759 square miles (9,735 square km).

A mountainous core extending for 100 miles (160 km) along the island's entire length is surrounded by a broken coastal plain, widest along the eastern shore. Lake Naujan and Mount Halcon (8,481 feet [2,585 m]), the island's highest point, are in the northeast. Steep-sided valleys are formed by rivers, including the Pandan, Ibod, and Bongabong. The *tamaraw* (tamarau), a small water buffalo, is unique to Mindoro.

Historically, Mindoro's population growth was kept in check through raids by Muslim (Moro) seafarers from the southern islands and by the prevalence of malaria. Since 1948 the island has been one of the nation's resettlement areas, which has lent a frontier aspect to its life. The inhabitants of the rugged interior are non-Christian, seminomadic peoples who practice slash-and-burn (*kaingin*) farming; they include Negritos and Hanunóo. Coastal areas, especially in the west, are more densely populated and commercialized and are settled primarily by Christian Tagalogs, particularly from the Batangas Peninsula of Luzon. Hiligaynon peoples have migrated to the southern areas.

The University of the Philippines maintains a marine biological station at Puerto Galera on the northern coast. There are substantial deposits of coal in the south.

The island's main population centres are Calapan and Mamburao. Pop. (1990 prelim.) including adjacent islands, 833,000.

Mindowe (Lithuanian ruler): *see* Mindaugas.

Mindszenty, József, original name JÓZSEF PEHM (b. March 29, 1892, Csehimindszent, near Szombathely, Austria-Hungary [now in Hungary]—d. May 6, 1975, Vienna, Austria), Roman Catholic clergyman who personified uncompromising opposition to fascism and communism in Hungary for more than five decades of the 20th century.

Politically active from the time of his ordination as a priest in 1915, Mindszenty was arrested as an enemy of totalitarian governments twice in 1919 and again in 1944, the year in which he was consecrated bishop of Veszprém. In 1945 he was appointed primate of Hungary and archbishop of Esztergom, and in 1946 he was made a cardinal.

His refusal to permit the Roman Catholic schools of Hungary to be secularized prompted the communist government to arrest him in 1948 and convict him in 1949 on charges of treason. Sentenced to life imprisonment, he was set free during the uprising of 1956 and, when the communist government regained control, he sought asylum in the U.S. embassy in Budapest. He spent 15 years in voluntary confinement there, rejected requests from the Vatican to leave Hungary, and relented only in 1971, at the entreaty of the U.S. president Richard M. Nixon. As the guest of the Vatican and, after 1971, in Vienna, he criticized the pope's attempts to deal with Hungary's communist regime and in 1974 was retired from his posts as archbishop and primate. His *Memoirs* were published in 1974. Mindszenty was originally buried in Austria, but in 1991, after the fall of Hungary's communist government, he was reburied in the Basilica in Esztergom, Hungary.

mine, in military and naval operations, a usually stationary explosive device that is designed to destroy personnel, ships, or vehicles when the latter come in contact with it. Submarine mines have been in use since the mid-19th century; land mines did not become a significant factor in warfare until a hundred years later.

Submarine mine. A submarine mine is an underwater weapon consisting of an explosive charge fitted with a device that causes it to explode when a ship or submarine enters into close proximity. Usually emplaced by specialized vessels called minelayers or dropped by specialized aircraft, submarine mines are steel spheres or ovate shapes that contain enough air to enable the mine to float in the water. The mine is anchored in place, its depth beneath the surface depending on the length of the cable by which it is tethered. When touched or approached by the hull of a vessel, the mine explodes. Highly destructive yet relatively cheaply built, mines are effective naval weapons. They are used offensively by being placed where enemy vessels are expected to pass, especially in or just outside enemy harbours. Defensively, mines are placed in carefully and secretly charted locations adjacent to the defender's harbours and installations, and they are usually staggered at varying depths to protect against both submarines and surface vessels. Saboteurs or commandos sometimes covertly attach mines to vessels' hulls for later explosion by timer or remote control. The typical submarine mine contains about 225 kg (500 pounds) of explosives.

The most common type of detonator used in submarine mines is a contact device; rods or antennae protrude from the mine's surface and activate the firing mechanism when the hull of a passing ship strikes them. Other types of detonators used on submarine mines include magnetic, pressure, and acoustic ones. The magnetic mine is triggered by the approaching ship's magnetic field. The pressure mine employs the principle that beneath every ship in motion in shallow water there is an area of reduced pressure. The pressure mine contains a chamber divided by a diaphragm, with one side of the chamber open to the sea. Any sudden decrease in pressure on the seaward side deflects the diaphragm and closes a firing circuit in the other chamber to explode the mine. The pressure mine reacts only to a pressure change produced by a ship larger than a minesweeper (*q.v.*), thus making it difficult to clear. Acoustic mines once depended on hydrophones to pick up the sound made by a ship's propellers when the ship came within range. They had limited lifetimes owing to deterioration of their components, but techniques related to sonar and microelectronics technology have made acoustic mines more effective and less prone to breakdowns.

In World War I the mine was the most effective antisubmarine weapon. Mines were even more important during World War II; in that conflict, mines sank 1,316 Axis ships and damaged 540. Great Britain, the United States, and their allies lost 1,118 vessels to mines. The Axis and Allied nations laid a total of more than 550,000 submarine mines in World War II.

Land mine. A land mine is an encased explosive charge buried just below the surface of the ground. It may be fired by the weight of vehicles or troops on it or by the passage of time or by remote control. Though improvised land mines in the form of buried artillery shells were used in World War I, particularly by the Germans against French and British tanks, the land mine only became important in World War II. Easily manufactured and transported, the weapon in a variety of types was sown in extensive minefields in Russia, in North Africa, and on the Western Front. Most early mines had circular or square metal cases, but to prevent magnetic detection later models are sometimes made of plastic. Land mines are typically used to disrupt or prevent the massed attack of tanks and/or infantry.

There are two basic types: antitank mines designed to destroy or damage vehicles, especially tanks; and lighter antipersonnel mines. A standard antitank mine contains about 5 kg of explosives and weighs about 9 kg in all. Antipersonnnel mines, which can kill or wound soldiers upon exploding into many small fragments, usually contain less than 0.5 kg of explosives and can be detonated by a footstep on them. Land mines have been widely used since World War II, with increasing ingenuity going into both their design and their detection.

mine gas, any of various harmful vapours produced during mining operations. The gases are frequently called damps (German *Dampf*, "vapour"). Firedamp is a gas that occurs naturally in coal seams. The gas is nearly always methane (CH_4) and is highly inflammable and explosive when present in the air in a proportion of 5 to 14 percent. White damp, or carbon monoxide (CO), is a particularly toxic gas; as little as 0.1 percent can cause death within a few minutes. It is a product of the incomplete combustion of carbon and is formed in coal mines chiefly by the oxidation of coal, particularly in those mines where spontaneous combustion occurs. Black damp is an atmosphere in which a flame lamp will not burn, usually because of an excess of carbon dioxide (CO_2) and nitrogen in the air. Stinkdamp is the name given by miners to hydrogen sulfide (H_2S) because of its characteristic smell of rotten eggs. Afterdamp is the mixture of gases found in a mine after an explosion or fire.

Minedra (Indo-Greek king): *see* Menander.

Miner, Jack, byname of JOHN THOMAS MINER (b. April 10, 1865, Dover Centre, Ohio, U.S.—d. Nov. 3, 1944, Kingsville, Ont., Can.), Canadian naturalist, author, and lecturer who won a reputation as a leading bird conservationist and who conducted extensive research into migratory patterns.

Miner moved to Essex county, Ont., in 1878. In 1904, on his farm at Kingsville, he established a bird sanctuary that became widely known. Banding more than 50,000 ducks between 1910 and 1915, he made the first complete banding records of North American birds. His sanctuary eventually became the temporary home of more than 50,000 migrating Canada geese. In 1931 his friends established the Jack Miner Migratory Bird Foundation to ensure the continuation of his work. He received the Order of the British Empire in 1943 "for the greatest achievement in Conservation in the British Empire."

mineral, any naturally occurring homogeneous solid that has a definite chemical composition and a distinctive internal crystal structure. Minerals are usually formed by inorganic processes. While this definition is applicable in most cases, there are certain notable exceptions. The term mineral is also applied to certain organic substances, such as coal, graphite, oil, and natural gas, that are obtained from the Earth for commercial use. Synthetic equivalents of various minerals, such as emeralds and diamonds, can be produced in the laboratory for experimental or commercial purposes.

Although most minerals are chemical compounds, a small number (*e.g.*, sulfur, copper, gold) are elements. The composition of a mineral can be defined by its chemical formula, and the identity of its anionic group determines the group into which the mineral is classified. For example, the mineral halite (NaCl) is composed of two elements, sodium (Na) and chlorine (Cl), in a 1:1 ratio; its anionic group is chloride (Cl^-)—a halide—so halite is classified as a halide. Minerals can thus be classified into the following major groups: native elements, sulfides, sulfosalts, oxides and hydroxides, halides, carbonates, nitrates, borates, sulfates, phosphates, and silicates. Silicates are the most commonly occurring minerals because silica is the most abundant constituent of the Earth's crust (about 59 percent).

A mineral crystallizes in an orderly, three-dimensional geometric form, so that it is considered to be a crystalline material. Along with its chemical composition, the crystalline structure of a mineral helps determine such physical properties as hardness, colour, and cleavage.

Minerals combine with each other to form rocks. For example, granite consists of the minerals feldspar, quartz, mica, and amphibole in varying chemical ratios. Rocks are thus distinguished from minerals by their heterogeneous composition. A mere 100 of the several thousand known types of minerals constitute the main components of rocks.

Minerals are treated in a number of articles in the MACROPAEDIA. For the composition, physical properties, occurrence, and classification of important rock-forming minerals, *see* Minerals and Rocks. For the characteristics, origins, and distribution of the major mineral fuels, *see* Fuels, Fossil. For the methods of removing and refining or treating industrially important minerals, *see* Industries, Extraction and Processing. For minerals used primarily for personal adornment, *see* Dress and Adornment. For mineralogy, the scientific study of minerals, *see* Earth Sciences, The.

For a description of the place of minerals in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Two, Division I; Part Seven, Division II.

mineral oil, a clear, colourless, oily liquid that is a by-product of the distillation of petroleum. Mineral oil is used in medicine as a laxative and as an emollient. Given orally, it coats the bowel and softens the stool mass, thus easing the latter's passage. Mineral oil is completely indigestible and is not absorbed by the intestine. Its prolonged use may cause vitamin deficiencies, however, because it carries fat-soluble vitamins out of the digestive system and thus prevents their absorption. The possibility of the accidental inhalation of mineral oil into the lungs, where it causes lipid pneumonia, further limits its usefulness as a laxative. Mineral oil applied to the skin makes the latter softer and more pliable by retaining moisture within the epidermis. Mineral oil also has a variety of minor industrial uses, including use in hair sprays and as a solvent, lubricator, and insulator.

mineral processing, also called ORE DRESSING, mechanical treatment of crude ores to separate out the valuable minerals. Mineral-processing techniques were at first applied only to ores of precious metals such as gold and silver, but they later came to be used to recover other metals and nonmetallic minerals. They are also used during coal preparation to enrich the value of raw coal.

A brief treatment of mineral processing follows. For full treatment, *see* MACROPAEDIA: Industries, Extraction and Processing.

The primary operations of mineral processing are comminution and concentration. Comminution involves the liberation of valuable minerals from physical combination with the waste minerals. It is customarily carried out by large jaw crushers and by smaller cylindrical grinding mills. Mills may be operated either wet or dry.

Concentration consists of separating the liberated minerals from the waste. The most common methods are gravity separation and flotation separation. Gravity methods utilize the difference in density between valuable minerals and waste materials. Separation can be accomplished by jigging, an operation in which ground ore is fed into a pulsating body of water so that the heavier mineral fractions settle to the bottom while the lighter wastes remain at the top. Gravity separation can also be conducted on inclined planes, the ground ore being washed down spirals or shaking tables in such a manner that mineral and waste fractions settle in different areas.

In flotation (*q.v.*), separation is accomplished by treating ground ore with chemical reagents that cause one fraction to sink to the bottom of a body of water and the other fraction to adhere to air bubbles and rise to the top. Other important mineral-processing operations are dewatering, in which the concentrated minerals are dried and readied for transport; and sampling and analysis, in which the composition and properties of the raw materials or processed minerals are periodically characterized.

mineral water, water that contains a large quantity of dissolved minerals or gases. Mineral water from natural springs commonly has a high content of calcium carbonate, magnesium sulfate, potassium, and sodium sulfate. It may also be impregnated with such gases as carbon dioxide or hydrogen sulfide. Mineral water is produced artificially by adding salts to distilled water or aerating it with carbon dioxide. The mineral content of both natural and artificial mineral water varies greatly, and in some cases it may be less than that of ordinary tap water.

Since ancient times people have bathed in water from mineral springs, especially hot springs, because of its supposed therapeutic value for rheumatism, arthritis, skin diseases, and various other ailments. Many such springs have become sites for health spas and resorts, some of the most famous of which are Bath, Avon, Eng.; Baden-Baden and Wiesbaden, Ger.; and Saratoga Springs, N.Y. The use of mineral water as a beverage has increased greatly since the mid-1970s. Large quantities of bottled water from mineral springs in France and other European countries are exported each year.

Mineralnye Vody, town, Stavropol *kray* (region), southwestern Russia. It lies along the Kuma River and the main rail line between Rostov-na-Donu and Baku (Azerbaijan). Mineralnye Vody is a spa (its name means "mineral waters") on the northern edge of the Caucasus Mountains. It has an airport serving other Caucasian spa-resorts, and railway freight yards and workshops reflect its junction position on main rail lines. The town's food-processing industries also are important. Pop. (1993 est.) 73,700.

mineralogy, scientific discipline that is concerned with all aspects of minerals, including their physical properties, chemical composition, internal crystal structure, and occurrence and distribution in nature and their origins in terms of the physicochemical conditions of formation.

A brief treatment of mineralogy follows. For full treatment, *see* MACROPAEDIA: Earth Sciences, The.

The goals of mineralogical studies may be quite diverse, ranging from the description and classification of a new or rare mineral, to an analysis of crystal structure involving determination of its internal atomic arrangement, or to the laboratory or industrial synthesis of mineral species at high temperatures and pressures. The methods employed in such studies are equally varied and include simple physical and chemical identification tests, determination of crystal symmetry, optical examination, X-ray diffraction, isotopic analysis, and other sophisticated procedures.

Although much mineralogical research centres on the chemical and physical properties of minerals, significant work is conducted on their origin as well. Investigators are frequently able to infer the way in which a mineral species forms on the basis of data obtained from laboratory experiments and on theoretical principles drawn from physical chemistry and thermodynamics.

miner's cat, carnivorous mammal, a species of cacomistle (*q.v.*).

Minerva, in Roman religion, the goddess of handicrafts, the professions, the arts, and, later, war; she was commonly identified with the Greek Athena. Some scholars believe that her cult was that of Athena introduced at Rome from Etruria. This is reinforced by the fact that she was one of the Capitoline triad, in association with Jupiter and Juno. Her shrine on the Aventine in Rome was a meeting place for guilds of craftsmen, including at one time dramatic poets and actors.

Her worship as a goddess of war encroached upon that of Mars. The erection of a temple to her by Pompey out of the spoils of his Eastern conquests shows that by then she had been identified with the Greek Athena Nike, bestower of victory. Under the emperor Domitian, who claimed her special protection, the worship of Minerva attained its greatest vogue in Rome.

Minerva as goddess of war, bronze statuette, early Etruscan; in the British Museum

By courtesy of the trustees of the British Museum

minesweeper, naval vessel used to clear an area of mines (*see* mine). The earliest sweeping system, devised to clear anchored contact mines, consisted of two ships steaming across a minefield towing a wire rope between them; mine mooring lines were cut by sawlike projections on the sweep wire or by cutting jaws. When the released mine rose to the surface, it was destroyed by gunfire.

USS *Prime*, ocean minesweeper

By courtesy of the U.S. Navy

In naval warfare, minesweepers have two primary tactical functions: to clear mines from sea lanes in order to protect the minesweeping nation's warships and merchant shipping; and to clear a path through minefields so that other warships can engage in battle or launch an amphibious landing (such as those in the Pacific theatre during World War II). Minesweepers can be just as vitally needed after a war has ended; hundreds of minesweepers were used to clear the tens of thousands of mines left floating in the world's sea lanes after the end of World War II.

The wide use by Communist forces during the Korean War of magnetic mines (detonated by the magnetic field of steel ships) led to the development of wooden-hulled nonmagnetic sweepers to replace steel-hulled World War II types. These craft had plywood hulls, stainless-steel-alloy engines, and metal fittings of aluminum, brass, or magnesium. The typical ocean minesweeper is about 50 m (165 feet) long, has a displacement of 750 tons, and has a crew of about 60. Another addition to the U.S. minesweeping force was the minesweeping boat; this vessel was completely nonmagnetic, equipped to sweep contact, magnetic, or acoustic mines, and was operated by a crew of six enlisted men. Helicopter minesweepers were also developed; these aircraft hover safely over the sea while towing minesweeping gear that explodes magnetic or acoustic mines.

Ming ———: for rulers of the Ming dynasty, *see under* individual names.

Ming DYNASTY, Pinyin MING (1368–1644), Chinese dynasty that provided an interval of native rule between eras of Mongol and Manchu dominance. The Ming extended the Chinese empire into Korea, Mongolia, and Turkistan on the north and into Vietnam and Myanmar (Burma) on the south, exercising more far-reaching influence in East Asia than any other native rulers of China.

Founded by Chu Yüan-chang, a man of humble origins who later assumed the reign title of Hung-wu, the Ming became one of the most stable but also one of the most autocratic of all Chinese dynasties. The basic governmental structure established by the Ming was continued by the subsequent Ch'ing dynasty and lasted until the imperial institution was abolished in 1912. The civil service system was perfected; almost all the top Ming officials entered the bureaucracy by passing a government examination. The censorate, an office designed to investigate official misconduct and corruption, was made a separate organ of the government. Affairs in each province were handled by a commission of three officials, each of whom reported to separate bureaus in the capital. The position of prime minister was abolished; the emperor took over personal control of the government, ruling with the assistance of the especially appointed Nei-ko, or Grand Secretariat.

The Ming government was gradually weakened by factionalism among civil officials, interference by palace eunuchs, the burdens of a growing population, and a succession of weak and inattentive emperors. In 1644 a rebel leader, Li Tzu-ch'eng, captured the capital, and the local Ming military commander requested aid from the Manchu tribesmen who had been encroaching on China's northern borders. The Manchu drove out Li Tzu-ch'eng and then remained, establishing the Ch'ing dynasty.

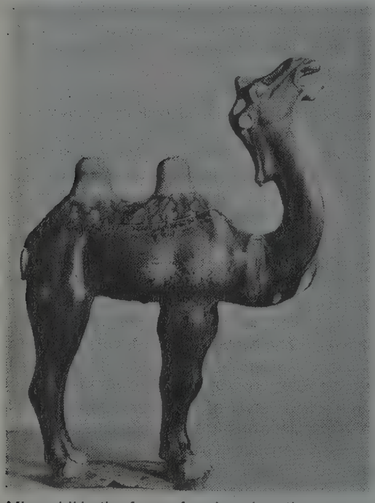
Despite the many foreign contacts made during the Ming period, cultural developments were characterized by a generally conservative and inward-looking attitude. Ming architecture is largely undistinguished, although the best of it may have been in regional applications. For all its visibility, the Forbidden City, a palace built in Peking in the 15th century by the Yung-lo emperor (and subsequently enlarged and rebuilt), unsurpassed as a symbol of imperial power, architecturally represents a decline from the adventurous planning of the Sung period. The best Ming sculpture is found not in large statues but in small ornamental carvings of jade, ivory, wood, and porcelain. Although a high level of workmanship is manifest in Ming decorative arts such as cloisonné, enamelware, bronzework, lacquerwork, and furniture, the major achievements in art were in painting and pottery.

While there were two main traditions in painting in the Ming period, that of "literati painting" (*wen-jen-hua*) of the Wu school and that of the "professional academics" associated with the Che school, artists generally stressed independent creation, impressing their work with strong marks of their personal styles.

Ceramics saw many new developments, along with the continuation of established traditions. There were three major types of decoration: monochromatic glazes, including celadon, red, green, and yellow; underglaze copper red and cobalt blue; and overglaze, or enamel painting, sometimes combined with underglaze blue. The latter, often called "blue and white," was imitated in Vietnam, Japan, and, from the 17th century, in Europe. Much of this porcelain was produced in the huge factory at Ching-te-chen in Kiangsi province. One of the period's most influential wares was the stoneware of I-hsing in Kiangsu province, which was exported in the 17th century to the West, where it was known as boccaro ware and imitated by such factories as Meissen.

The Ming regime restored the former literary examinations for public office, which pleased the literary world, dominated by Southerners. In their own writing the Ming sought a return to classical prose and poetry styles and, as a result, produced writings that were imitative and generally of little consequence. Writers of vernacular literature, however, made real contributions, especially in novels and drama. Chinese traditional drama originating in the Sung dynasty had been banned by the Mongols but survived underground in the South, and in the Ming era it was restored. This was *ch'uan ch'i,* a form of musical theatre with numerous scenes and contemporary plots. The regional music theatre that had been permitted by the Mongols was now for a time banned by the Ming so that it could be purged of Mongol influence. What emerged was *k'un chü,* less bombastic in song and accompaniment than other popular theatre. Under the Ming it enjoyed great popularity, indeed outlasting the dynasty by a century or more. It was adapted into a full-length opera form, which also survived until the development of Peking opera under the Ch'ing dynasty.

ming ch'i, Pinyin MING QI (Chinese: "spirit utensils"), funerary furniture or objects placed in Chinese tombs to provide the deceased with the same material environment enjoyed while living, thus assuring immortality. While *ming ch'i* were buried with the dead in virtually all historical periods, the custom was more popular in some periods than in others—for example, in the Han (206 BC–AD 220), T'ang (618–907), and Ming (1368–1644) dynasties.



Ming ch'i in the form of a glazed earthenware camel, T'ang dynasty (618–907); in the Metropolitan Museum of Art, New York City

By courtesy of The Metropolitan Museum of Art, New York, Rogers Fund, 1910

Ming ch'i are usually inexpensive, simply crafted clay models of that which is familiar in life—including guardians, servants, animals, and even architectural structures. A complete set of *ming ch'i* from a single tomb may amount to a model of an entire village, giving a comprehensive picture of the daily life of the period.

Ming Huang (Chinese emperor): *see* Hsüan Tsung.

Ming-ti, Pinyin MINGDI (posthumous name, or *shih*), personal name (*hsing-ming*) LIU CHUANG, temple name (TUNG HAN) HSIEN-TSUNG (b. AD 29, China—d. 75 or 76, China), second emperor of the Eastern Han dynasty (206 BC–AD 220), during whose reign (AD 57/58–75/76) Buddhism is thought to have been introduced into China.

Legend recounts that Ming-ti was visited in a dream by a golden image of the Buddha Śakyamuni, seeking to be worshiped in China. The emperor is said to have responded by recruiting two Buddhist monks from India and erecting a Buddhist temple at Lo-yang.

Ming-ti ("Enlightened Emperor") launched a military campaign to destroy the Hsiung-nu tribes plaguing China's northwest frontier. Through intrigue as well as military might, the Han armies under the general Pan Ch'ao succeeded in reestablishing Chinese influence in Inner Asia. Ming-ti was succeeded by his son Chang-ti.

Mingäçevir, Russian MINGECHAUR, also spelled MINGEČAUR, city in central Azerbaijan, on the Kura River; it is the site of the Mingäçevir Reservoir, which is used for flood control, hydroelectric power, and irrigation of the Kura lowland. There is a large cotton textile mill. Pop. (1991 est.) 90,900.

Consult the INDEX *first*

Minghetti, Marco (b. Nov. 8, 1818, Bologna, Papal States [Italy]—d. Dec. 10, 1886, Rome, Italy), statesman who was twice prime minister of united Italy (1863–64, 1873–76).

In his youth, while visiting an aunt in Paris, Minghetti came under the influence of exiled Italian patriots. Returning home he entered the University of Bologna, where he devoted himself to courses in science but was soon also attracted to the humanities and politics. He was drawn to Rome to assist in seeking reforms from the government of the Papal States under the liberal Pius IX, and he became a member of the revolutionary government of the Roman Republic (1847). He resigned in 1848 to join the Piedmont-Sardinian army fighting the Austrians, and he returned to Rome late in 1848. After the general failure of the revolutionary movement, he resumed a life of study and travel.

In 1859 Count Cavour, prime minister of Piedmont-Sardinia, appointed him secretary-general of the Piedmontese foreign office. After the successful French-Italian campaign against the Austrians, Minghetti served as president of the assembly of liberated Romagna until its annexation to Piedmont-Sardinia. He soon became minister of the interior of the expanding Piedmontese monarchy and premier of the newly united kingdom of Italy (1863). His role in shifting the capital from Turin to Florence in exchange for the withdrawal of French troops from Rome aroused popular antagonism because of the implied abandonment of Rome as united Italy's capital. He resigned eight days later (Sept. 23, 1864).

He returned to the government as minister of agriculture in 1869, and in July 1873 he again became prime minister. Taking the financial portfolio himself, he introduced reforms that led to the first balanced budgets since 1860, but his arbitrary measures against the political opposition eventually led to his losing office (March 1876). For the next few years Minghetti continued in a role of opposition to the left-leaning governments of Agostino Depretis and his successors.

Mingrelian language, also called MEGRELIAN, unwritten Kartvelian (South Caucasian) language spoken along the coast of the Black Sea in Georgia. Its speakers call it *margaluri nina;* in Georgian, it is called *megruli ena.*

Some scholars believe Mingrelian and the closely related Laz language to be dialects of a single language (called Zan) rather than independent languages, but Laz and Mingrelian are not inherently intelligible with each other. Speakers of Mingrelian use Georgian as their literary language. The Mingrelian, Laz, Georgian, and Svan languages together constitute the Kartvelian language family. *See also* Kartvelian languages.

Mingus, Charles, byname CHARLIE MINGUS (b. April 22, 1922, Nogales, Ariz., U.S.—d. Jan. 5, 1979, Cuernavaca, Mex.), American jazz composer, bassist, bandleader, and pianist whose work, integrating loosely composed passages with improvised solos, both shaped and transcended jazz trends of the 1950s, '60s, and '70s.

Mingus studied music as a child in Los Angeles and at 16 began playing bass. The foundation of his technique was laid in five years of study with a symphonic musician. After stints with Louis Armstrong and Kid Ory in the early 1940s, Mingus wrote and played for the Lionel Hampton big band from 1947 to 1948 and recorded with Red Norvo. In the early 1950s he formed his own record label and the Jazz Composer's Workshop, a musicians' cooperative, in an attempt to circumvent the commercialism of the music industry.

Mingus drew inspiration from Duke Ellington, Charlie Parker, Thelonious Monk, Negro gospel music, and Mexican folk music, as well as traditional jazz and 20th-century concert music. Though most of his best work represents close collaborations with improvising musicians such as trumpeter Thad Jones, drummer Dannie Richmond, alto saxophonist Jackie McLean, and woodwind-player Eric Dolphy, Mingus also wrote for larger instrumentations and composed several film scores.

As a bassist, Mingus was a powerhouse of technical command and invention; he was always more effective as a soloist than as an accompanist or sideman. The Mingus composition most frequently recorded by others is "Goodbye, Porkpie Hat," a tribute to Lester Young, and his most frequently cited extended work is "Pithecanthropus Erectus," a musical interpretation of human evolution. His volatile personality and opinions were captured in his autobiography, *Beneath the Underdog,* published in 1971.

Minh Mang, also spelled MINH MENH, original name NGUYEN PHUOC CHI DAM (b. May 24, 1792, Saigon [now Ho Chi Minh City], Vietnam—d. Jan. 11/21, 1841, Hue), emperor (1820–41) of central Vietnam who was known for his anti-Western policies, especially his persecution of Christian missionaries.

Prince Chi Dam was the fourth son of Emperor Gia Long (reigned 1802–20) and his favourite concubine and thus was not in line for the throne. He was chosen by Gia Long as his successor, however, because of his outspoken criticism of Europeans. Chi Dam took the reign name Minh Mang.

As a strict Confucian, Minh Mang believed that Christian doctrine undermined the basic principles of Vietnamese religious and political life, especially the worship of and obedience to the emperor as a divine emissary. In the early years of his reign he induced French missionaries to move from their posts to the capital at Hue, claiming that he needed interpreters. To persuade them to relinquish their proselytizing efforts, he conferred mandarin degrees upon them. As new priests arrived and refused to give up their missions, however, Minh Mang barred the entry of additional Christian missionaries (1825) and subsequently forbade the preaching of Christian doctrine; he also had the missionaries imprisoned. In response to pleas for moderation, Minh Mang consented to allow the priests to board a ship bound for Europe, but instead the freed missionaries returned secretly to their posts.

Because of his tenuous claim to the throne, Minh Mang felt the threat of pretenders who were soliciting help from the French for his overthrow. He also doubted the loyalty of his own people; though not indifferent to the plight of the peasants, he produced little land or social reform. Rebellion broke out in Saigon in 1833, and, when its leaders requested and received help from the Christian mission, Minh Mang was enraged and began active persecution of the Christians. He ordered the execution of the Reverend François Gagelin (Oct. 17, 1833); seven European missionaries were killed in the years to come, as were great numbers of native converts. Minh Mang's actions served as an excuse for France to invade Vietnam in 1858 so as to ensure the safety of French citizens.

minhag, Hebrew MINHAG ("custom," or "usage"), plural MINHAGIM, in Judaism, any religious custom that has acquired the legal binding force of Halakhah, the Jewish legal tradition. Because Halakhah itself can be considered to be based on custom, a minhag can come into force even though it presents an apparent contradiction to previous laws. The problem of minhagim has been a major subject for Judaic scholars.

There are two concepts closely related to that of minhag. A local minhag (*minhag ha-makom*) is a custom that is binding upon a specific Jewish community. A liturgical minhag is a Jewish religious rite that has developed in a particular locality. Thus, the acceptance by the Ashkenazi Jews of many elements of the Palestinian minhag and by the Sephardic Jews of many elements of the Babylonian minhag resulted in distinctive rites, which are also referred to as minhagim.

minhah, also spelled MINHA, MINCHA, or MINCHAH, Hebrew MINḤA ("offering"), in Judaism, the second of three periods of daily prayer. Minhah prayers are offered in the afternoon; to facilitate attendance at the synagogue, the afternoon service is often scheduled so that the evening prayers (maarib; Hebrew: *maʿariv*) can follow as soon as night has fallen. The morning period of daily prayer is known as shaharith (Hebrew: *shaḥarit*).

Minhah consists essentially of the statutory prayer called the Amidah (Hebrew: *ʿamida,* "standing"). On the Sabbath and on fast days (including Yom Kippur, the Day of Atonement), a portion of the Torah is read. The minhah service, the institution of which is traditionally ascribed to Isaac, is considered to be a substitute for the meal offering (Leviticus 2) made at dusk in the Temple of Jerusalem before its destruction in AD 70.

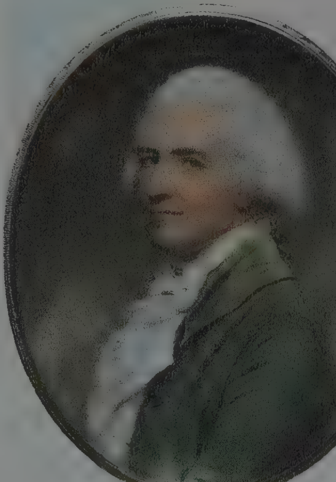
Minho, also called AQUEM-OS-MONTES, historical *provincia,* northwesternmost Portugal. Originally called Entre Douro e Minho, the region between the Minho and Douro rivers (now divided into Braga and Viana do Castelo districts) is the historical unit from which Portugal evolved. The area was occupied by both the Celts and the Romans, the former having left numerous ruins called *castra,* or hill forts. There is a narrow coastal plain stretching for about 30 miles (50 km) from north to south and extending between 2 and 10 miles (3 and 16 km) inland to the Santa Luzia Mountains. The rest of the region consists of undulating plateaus traversed by deep valleys of the Minho, Lima, Cávado, and Ave rivers.

Vineyards in the Minho area, Portugal

G. Mairani

High population densities have encouraged intensive cultivation. Corn (maize) and haricot beans are the most important crops, and the field borders are used for fruit trees and vines. The use of irrigation and of terraced fields on slopes characterize the landscape. Stock rearing is important on the higher lands, and the timber industry is significant. Fishing is of local importance at Esposende, Viana do Castelo, and Âncora-Gontinhaes. Braga, the capital of the historical *provincia,* and Guimarães are textiles centres. Many buildings are constructed out of local gray granite.

miniature painting, also called (16th–17th century) LIMNING, small, finely wrought portrait executed on vellum, prepared card, copper, or ivory. The name is derived from the minium, or red lead, used by the medieval illuminators. Arising from a fusion of the separate traditions of the illuminated manuscript and the medal, miniature painting flourished from the beginning of the 16th century down to the mid-19th century.



"Self-Portrait," by John Smart, ivory, 1797; in the Victoria and Albert Museum, London

Victoria and Albert Museum, London/Art Resource, New York City

The portrait miniature, as a separate portrait enclosed in either a locket or a covered "portrait box," is most plausibly traced to Flemish illuminators such as those of the Horenbout family. The earliest datable portrait miniatures, however, are not Flemish but French, and are all believed to have been painted by Jean Clouet at the court of Francis I. Under the patronage of King Henry VIII, Lukas Horenbout painted the first portrait miniatures recorded in England. He taught the technique to Hans Holbein the Younger, who was able to put into this small-scale work all the intensity of vision and fineness of touch apparent in his easel paintings and drawings, creating masterpieces of the then-new art form that remain unsurpassed.

Holbein inspired a long tradition of miniature painting in England. One of his pupils, Nicholas Hilliard, became the first native-born master of miniature painting in that country. He adopted the oval form, which had recently become fashionable on the continent of Europe in preference to the circular form and which remained the most popular shape until the early 19th century. Hilliard served as miniature painter to Queen Elizabeth I for more than 30 years. His chief pupil, Isaac Oliver, was a more technically sophisticated artist who became the chief miniaturist during the reign of King James I (1603–25). Oliver's pupil, Samuel Cooper, earned a preeminent reputation in Europe by his presentation of character and tight, effective brushwork.

Early miniaturists had painted in watercolour and gouache (opaque watercolour) on vellum or prepared paper. The technique of painting miniatures in enamel on a metal surface was introduced in France in the 17th century and perfected by Jean Petitot. About 1700 the Italian painter Rosalba Carriera introduced the use of ivory as a ground that could provide a luminous, glowing surface for transparent pigments and heighten their effect. This technical innovation stimulated a great revival of miniature painting in the second half of the 18th century. The chief European miniaturists of the period were Peter Adolf Hall and Niclas Lafrensen in France and Jeremiah Meyer, Richard Cosway, Ozias Humphrey, and John Smart in England.

In the early 19th century, French miniaturists such as J.B. Isabey were influenced by the easel portraits of Jacques-Louis David. Miniature portraits continued to be painted in the following decades, but they remained an expensive luxury. Inexpensive black-and-white portraits in the new medium of photography made painted miniatures obsolete in the second half of the century.

minicam, portable electronic video-camera unit. It consists of a lightweight hand-held camera, a backpack containing electronic circuitry and power supply, and a videotape cassette unit. Developed in the late 1960s, the minicam has become the main tool of television news reporting, largely supplanting the more cumbersome film-loaded motion-picture camera. The minicam enables television reporters to provide live coverage of news events, even from remote locations, since the signal can be relayed to the studio from a mobile van equipped with a microwave transmitter. The minicam also can transmit via coaxial cable (*e.g.,* telephone line). In other cases, the reporter may videotape an event or interview for later editing and use.

Minié, Claude-Étienne (b. Feb. 13, 1804, Paris, France—d. Dec. 14, 1879, Paris), French army officer who solved the problem of designing a bullet for the muzzle-loading rifle. The bullet became known as the Minié ball.

After serving in several African campaigns in the Chasseurs, Minié rose to the rank of captain. In 1849 he designed the Minié ball, a cylindrical bullet with a conical point. An iron cup was inserted in the hollow base so that when the ball was fired, the cup was forced forward, expanding the base to fit snugly against the rifling grooves.

The Minié ball produced lethally accurate fire at long ranges. It was almost universally adopted by the armies of Europe and the United States and was used throughout the American Civil War (1861–65). Minié was rewarded by the French government with 20,000 francs and an appointment to the staff of the military school at Vincennes. After retiring in 1858 with the rank of colonel, he served as a military instructor for the khedive of Egypt and as a manager at the Remington Arms Company in the United States.

Minikh, Burkhard Christoph, Count (Graf) von: *see* Münnich, Burkhard Christoph, Count von.

Minim, member of ORDER OF MINIM BROTHERS, an order of friars founded in 1435 by St. Francis of Paola in Calabria, Italy. Members consider humility the primary virtue and regard themselves as the least (*minimi*) of all the religious. To the traditional vows of poverty, chastity, and obedience they add a fourth vow binding them to abstain from meat, eggs, milk, cheese, fish, and their derivatives. The founder claimed to have received the motto "*Charitas*" in a vision from the Archangel Michael.

The rule's original order, based primarily on that of St. Francis of Assisi, was approved by

Pope Alexander VI in 1493. The rule was revised a number of times thereafter, becoming less dependent on St. Francis' rule. The order includes friars, nuns, and laypersons.

The order spread rapidly, especially in Italy and France, its greatest period of expansion occurring in the 16th century, when the Minims controlled more than 400 communities and numbered 9,000 members. Then, during the height of anticlericalism in the 19th century, the Minims fell on hard times and were drastically reduced in numbers and influence. Today the Minims have convents in Italy and Spain and a third order of laypersons in South America.

The Minims devote themselves to prayer, study, and scholarship. They have included several notable teachers, scholars, and pastors, among the best known being Blessed Gaspar de Bono and Father Bernard Boyl (Buil). Father Boyl accompanied Columbus on his second voyage to America and was the first apostolic delegate to America.

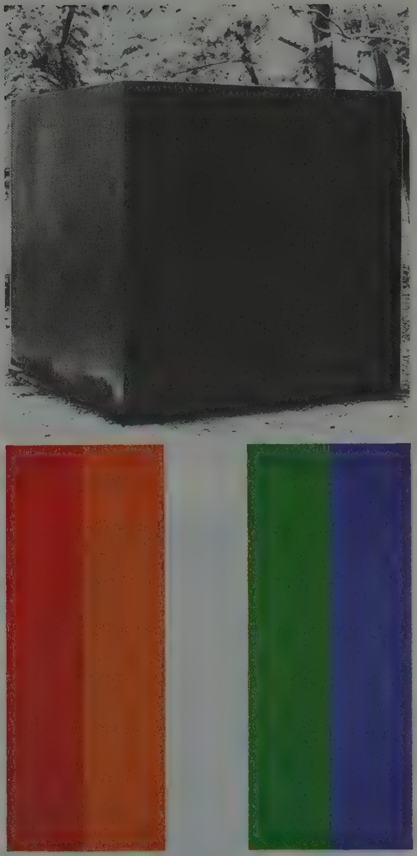
minimalism, chiefly American movement in the visual arts and music originating in New York City in the late 1960s and characterized by extreme simplicity of form and a literal, objective approach.

Minimal art, also called ABC art, is the culmination of reductionist tendencies in modern art that first surfaced in the 1913 composition by the Russian painter Kasimir Malevich of a black square on a white ground. The primary structures of the minimalist sculptors Donald Judd, Carl Andre, Dan Flavin, Tony Smith, Anthony Caro, Sol LeWitt, John McCracken, Craig Kaufman, Robert Duran, and Robert Morris and the hard-edge painting of Jack Youngerman, Ellsworth Kelly, Frank Stella, Kenneth Noland, Al Held, and Gene Davis grew out of these artists' dissatisfaction with Action painting, a branch of American Abstract Expressionism based on intuitive, spontaneous gesture that had dominated American avant-garde art through much of the 1950s. The minimalists, who believed that Action painting was too personal and insubstantial, adopted the point of view that a work of art should not refer to anything other than itself. For that reason they attempted to rid their works of any extra-visual association. Use of the hard edge, the simple form, and the linear rather than painterly approach was intended to emphasize two-dimensionality and to allow the viewer an immediate, purely visual response. They turned for inspiration to the impassive, quiet works of Barnett Newman and Ad Reinhardt, exponents of the colour-field branch of Abstract Expressionist painting.

Hard-edge painting is characterized by large, simplified, usually geometric forms on an overall flat surface; precise, razor-sharp contours; and broad areas of bright, unmodulated colour that have been stained into unprimed canvas. It differs from other types of geometric abstraction in that it rejects both lyrical and mathematical composition because, even in this simplified field, they are a means of personal expression for the artist. Minimal hard-edge painting is the anonymous construction of a simple object.

Minimal sculpture is composed of extremely simple, monumental geometric forms made of fibreglass, plastic, sheet metal, or aluminum, either left raw or solidly painted with bright industrial colours. Like the painters, minimalist sculptors attempted to make their works totally objective, unexpressive, and non-referential.

Minimal art, along with the music of Erik Satie and the aesthetics of John Cage, was a distinct influence on minimalist music. Reacting against the complex, intellectually sophisticated style of modern music, several composers began to compose in a simple, literal style, thereby creating an extremely simple and accessible music. La Monte Young, for example, composed a number of electronic "continuous frequency environments," in which he generated a few pitches and then electronically sustained them, sometimes for days or weeks. Young added very little to this texture and virtually eliminated variation as a developmental technique. Like Young, Morton Feldman tried to eliminate variation. His works explored innovative instrumental timbres through a slowly paced succession of unrelated, soft sounds. Another group of composers—Philip Glass, Steve Reich, Cornelius Cardew, and Frederic Rzewski—was influenced by the music of India, Bali, and West Africa. They used simple harmonic and melodic patterns in their highly repetitive music.



Minimal art: (top) "Die," six-foot steel cube by Tony Smith, 1962, in the Samuel Wagstaff, Jr. Collection, New York City: (bottom) "Red, Orange, White, Green, Blue," acrylic painting by Ellsworth Kelly, 1968, in the Pasadena Art Museum, California

By courtesy of (top) Fourcade-Droll Gallery, New York, (bottom) the Pasadena Art Museum, Purchase Fellows Acquisition Fund

In both music and the visual arts, minimalism was an attempt to explore the essential elements of an art form. In minimalist visual arts, the personal, gestural elements were stripped away in order to reveal the objective, purely visual elements of painting and sculpture. In minimalist music, the traditional treatment of form and development was rejected in favour of explorations of timbre and rhythm—musical elements largely unfamiliar to Western listeners.

minimum, in mathematics, point at which the value of a function is less than at any nearby point; *see* extremum.

minimum reserve system (banking): *see* fractional reserve system.

minimum wage, wage rate established by collective bargaining or by government regulation that specifies the lowest rate at which labour may be employed. The modern minimum wage, combined with compulsory arbitration of labour disputes, first appeared in Australia and New Zealand in the 1890s. In 1909 Great Britain established trade boards to set minimum wage rates in certain trades and industries. The first minimum wage in the United States (covering only women) was enacted by the state of Massachusetts in 1912. The intent of these laws was to shorten hours and raise pay in the covered industries.

Minimum-wage legislation or machinery for fixing minimum rates now exists in most of the nations of Latin America, Africa, and Asia, as well as in more industrialized countries.

Minin, Nikita (Russian patriarch): *see* Nikon.

mining, excavation of materials from the Earth's crust, including such minerals of organic origin as coal and petroleum.

A brief treatment of mining follows. For full treatment, *see* MACROPAEDIA: Industries, Extraction and Processing.

Mankind has found uses for minerals found in the Earth since prehistoric times. Materials like flint, for making fire, and pigment-bearing minerals like ochre and manganese ore were probably the first substances that people mined. The common names of archaeological periods like the Bronze Age and the Iron Age indicate significant use of those metals. Bronze (copper alloyed with tin) dates to roughly 3700 BC, and iron dates to as early as 2800 BC; both were first used in Mediterranean civilizations. Stone obtained from surface excavation, a process called quarrying, was responsible for the great Egyptian pyramids, some of which used as many as 2,300,000 blocks of limestone weighing 16 tons (14,500 kg) each.

An early method of mining, first recorded in Roman times, involved the use of log fires built at the base of rock faces. The intense heat caused expansion and cracking of the rock. The thorough treatise on mining entitled *De re metallica* (1556) by the German scholar Georgius Agricola has provided the best source of information on early mining techniques, many of which are still used or were used until relatively recently. These techniques included picks and hammers, ventilation and pumping systems, and cart-like "trucks" for hauling minerals. Later advances of great significance included the use of explosive gunpowder, which was replaced by dynamite in the mid-19th century and supplemented by ammonium nitrate fuel-blasting agents in the mid-20th century. Drilling techniques have also enhanced mining capability. The first rotary drill may have been used in England in 1813. Thirty years later mechanical piston drills came into use, and the air drill, powered by compressed air, appeared in Germany in 1853.

Modern mining is a costly and complicated business. It begins with the locating of probable mineral veins that can produce enough of the desired substance to justify the high cost of extraction. Prospecting and exploration require a vast body of knowledge in the earth sciences to find likely mining locations. Geological evidence relates the age of sample rocks to the long-term mineralization processes of the Earth's crust. Geochemical evaluations are made—as well as seismic tests, magnetic analyses, and electrical studies—to determine the geophysical character of a section of earth. Also commonly used is a hollow cylinder drill that brings up core sample materials from deep in the ground.

Once the approximate location and size of a vein or deposit are determined, mining engineers decide the best way to mine it. The familiar type of mine opening directly into the base of a hill or mountain on a horizontal plane is called an adit or crosscut tunnel. A straight vertical shaft may be drilled to one

Aluminum

country	refinery production 1991 (metric tons)*	% of world refinery production
North and South America		
Brazil	1,100,000	5.9
Canada	1,800,000	9.7
United States	4,100,000	22.2
Venezuela	600,000	3.2
Asia		
China	900,000	4.9
Europe		
France	340,000	1.8
Norway	840,000	4.5
Oceania		
Australia	1,200,000	6.5
Other	7,620,000	41.2
World total	18,500,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Antimony

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
South Africa	4,500	7.6	254,000	5.4
North and South America				
Bolivia	8,500	14.3	317,000	6.8
Mexico	2,500	4.2	227,000	4.8
United States	...	...	91,000	1.9
Other	43,900	73.9	3,806,000†	81.1
World total	59,400‡	100.0	4,695,000	100.0

*Estimated. †China also has major reserves of antimony. ‡Excludes U.S. antimony production.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Arsenic

country	mine production 1991 (metric tons)*	% of world mine production
Africa		
Namibia	3,000	6.4
North and South America		
Canada	2,000	4.3
Chile	7,000	14.9
Mexico	4,000	8.5
Peru	600	1.3
Asia		
Philippines	6,000	12.8
Europe		
Belgium	2,500	5.3
France	4,500	9.6
Sweden	8,000	17.0
Other	9,400	20.0
World total	47,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Bauxite

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
Guinea	17,500,000	16.0	5,900,000,000	24.1
North and South America				
Brazil	9,900,000	9.1	2,900,000,000	11.8
Guyana	1,600,000	1.5	900,000,000	3.7
Jamaica	11,100,000	10.2	2,000,000,000	8.2
Suriname	3,300,000	3.0	600,000,000	2.4
United States	...	...	40,000,000	0.2
Venezuela	800,000	0.7	350,000,000	1.4
Asia				
India	4,400,000	4.0	1,200,000,000	4.9
Europe				
Greece	2,500,000	2.3	650,000,000	2.7
Hungary	2,000,000	1.8	300,000,000	1.2
Oceania				
Australia	41,000,000	37.5	4,600,000,000	18.8
Other	15,200,000	13.9	5,060,000,000	20.7
World total	109,300,000†	100.0	24,500,000,000	100.0‡

*Estimated. †Excludes U.S. bauxite production. ‡Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Bismuth

country	refinery production 1991 (metric tons)*	% of world refinery production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Bolivia	70	2.2	10,000	4.0
Canada	200	6.3	30,000	12.0
Mexico	650	20.3	20,000	8.0
Peru	600	18.7	42,000	16.8
United States	...	...	14,000	5.6
Asia				
China	900	28.1	40,000	16.0
Japan	130	4.1	18,000	7.2
Oceania				
Australia	400	12.5	27,000	10.8
Other	250	7.8	49,000	19.6
World total	3,200†	100.0	250,000	100.0

*Estimated. †Excludes U.S. bismuth production.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Cadmium

country	refinery production 1991 (metric tons)*	% of world refinery production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Canada	1,500	7.4	170,000	17.5
Mexico	1,200	5.9	40,000	4.1
United States	1,600	7.9	210,000	21.6
Asia				
Japan	2,500	12.3	15,000	1.5
Europe				
Belgium	2,000	9.9	—	—
Oceania				
Australia	700	3.4	145,000	14.9
Other	10,800	53.2	390,000	40.2
World total	20,300	100.0	970,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Cement

country	production 1991 (metric tons)*	% of world production
North and South America		
United States†	64,400,000	5.6
Asia		
China	206,800,000	18.1
India	46,300,000	4.1
Japan	83,500,000	7.3
Korea, North	35,400,000	3.1
Europe		
France	24,500,000	2.1
Germany	29,000,000	2.5
Italy	37,200,000	3.3
Other	615,000,000	53.8
World total	1,142,100,000	100.0‡

*Estimated. †Includes Puerto Rico. ‡Detail does not add to total because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Chromium

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
South Africa	4,490,000	35.0	5,536,000,000	81.7
Zimbabwe	600,000	4.7	927,000,000	13.7
North and South America				
Brazil	470,000	3.7	16,000,000	0.2
United States	—	—	10,000,000	0.1
Asia				
India	990,000	7.7	77,000,000	1.1
Philippines	190,000	1.5	7,000,000	0.1
Turkey	850,000	6.6	20,000,000	0.3
Europe				
Albania	600,000	4.7	6,000,000	0.1
Finland	500,000	3.9	29,000,000	0.4
Other	4,130,000	32.2	150,000,000	2.2
World total	12,820,000	100.0	6,778,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Coal*

country	mine production 1990 (metric tons)†	% of world mine production	proven recoverable reserves, 1988 (metric tons)†	% of world proven recoverable reserves
Africa				
South Africa	175,579,000	3.7	55,333,000,000	3.5
North and South America				
Canada	68,331,000	1.4	6,966,000,000	0.4
Colombia	19,000,000	0.4	9,666,000,000	0.6
United States	944,040,000	19.7	215,241,000,000	13.5
Asia				
China	1,080,000,000	22.6	730,700,000,000	45.7
India	211,296,000	4.4	62,548,000,000	3.9
Korea, North	53,700,000	1.1	600,000,000	0.1
Turkey	46,592,000	1.0	6,104,000,000	0.4
Europe				
Germany	463,885,000	9.7	80,069,000,000	5.0
Poland	215,000,000	4.5	40,400,000,000	2.5
Romania	44,500,000	0.9	3,970,000,000†	0.3
United Kingdom	89,303,000	1.9	3,800,000,000	0.2
Oceania				
Australia	205,666,000	4.3	90,940,000,000	5.7
Other	1,166,221,000	24.4	291,643,000,000	18.2
World total	4,783,113,000	100.0	1,597,980,000,000	100.0

*Includes all grades of anthracite, bituminous, subbituminous, and lignite.
†Estimated. ‡Reserves in place.
Sources: United Nations, *1990 Energy Statistics Yearbook;* World Energy Conference, *Survey of Energy Resources* (1989).

Cobalt

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
Zaire	17,000	49.9	2,090,000	25.0
Zambia	7,000	20.5	540,000	6.5
North and South America				
Canada	2,300	6.7	260,000	3.1
Cuba	1,600	4.7	1,800,000	21.6
United States	—	—	860,000	10.3
Asia				
Philippines	—	—	400,000	4.8
Europe				
Albania	600	1.8	...	...
Finland	—	—	34,000	0.4
Oceania				
Australia	1,000	2.9	90,000	1.1
New Caledonia	800	2.3	860,000	10.3
Other	3,800	11.1	1,410,000	16.9
World total	34,100	100.0†	8,344,000‡	100.0

*Estimated. †Detail does not add to total given because of rounding.
‡Excludes Albanian cobalt reserves.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Copper

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
Zaire	300,000	3.3	30,000,000	5.4
Zambia	430,000	4.7	30,000,000	5.4
North and South America				
Canada	820,000	9.0	23,000,000	4.2
Chile	1,790,000	19.7	120,000,000	21.7
United States	1,630,000	17.9	90,000,000	16.3
Asia				
China	375,000	4.1	8,000,000	1.4
Europe				
Poland	380,000	4.2	15,000,000	2.7
Other	3,375,000	37.1	236,000,000	42.8
World total	9,100,000	100.0	552,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Diamond (gem)

country	mine production 1991 (carats)*	% of world mine production
Africa		
Angola	1,500,000	3.1
Botswana	13,000,000	27.0
Central African Republic	300,000	0.6
Namibia	900,000	1.9
South Africa	3,800,000	7.9
Zaire	2,700,000	5.6
North and South America		
Brazil	350,000	0.7
Asia		
China	200,000	0.4
Oceania		
Australia	17,300,000	35.9
Other	8,129,000	16.9
World total	48,179,000	100.0

*Estimated.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Gold

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
South Africa	600	29.1	22,000	44.5
North and South America				
Brazil	70	3.4	1,080	2.2
Canada	170	8.3	1,960	4.0
United States	300	14.6	5,250	10.6
Asia				
China	110	5.3	...	...
Oceania				
Australia	230	11.2	2,700	5.5
Other	580	28.2	16,490	33.3
World total	2,060	100.0†	49,480‡	100.0†

*Estimated. †Detail does not add to total given because of rounding.
‡Excludes gold reserves in China and other centrally planned economies.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Iron ore

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*†	% of world demonstrated reserves
Africa				
Mauritania	11,000,000	1.2	300,000,000	0.3
South Africa	31,000,000	3.4	5,900,000,000	5.8
North and South America				
Brazil	155,000,000	17.1	10,100,000,000	10.0
Canada	38,000,000	4.2	10,000,000,000	9.9
United States	53,700,000	5.9	6,000,000,000	5.9
Venezuela	21,000,000	2.3	1,700,000,000	1.7
Asia				
China	116,000,000	12.8	3,500,000,000	3.5
India	56,000,000	6.2	6,300,000,000	6.2
Europe				
France	8,000,000	0.9	900,000,000	0.9
Sweden	20,000,000	2.2	2,400,000,000	2.4
Oceania				
Australia	115,000,000	12.7	17,900,000,000	17.7
Other	281,500,000	31.1	36,100,000,000	35.7
World total	906,200,000	100.0	101,100,000,000	100.0

*Estimated. †Iron content.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Lead

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
South Africa	70,000	2.1	5,000,000	4.2
North and South America				
Canada	290,000	8.6	13,000,000	10.8
Mexico	180,000	5.3	4,000,000	3.3
Peru	200,000	5.9	3,000,000	2.5
United States	480,000	14.2	22,000,000	18.3
Asia				
China	350,000	10.4	9,000,000	7.5
Oceania				
Australia	540,000	16.0	26,000,000	21.7
Other	1,260,000	37.4	38,000,000	31.7
World total	3,370,000	100.0†	120,000,000	100.0

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Magnesium metal

country	production 1991 (metric tons)*	% of world production
North and South America		
Brazil	8,000	2.3
Canada	35,000	10.2
United States	130,000	37.9
Asia		
China	3,000	0.9
Japan	13,000	3.8
Europe		
France	14,000	4.1
Italy	7,000	2.0
Norway	40,000	11.7
Other	93,000	27.1
World total	343,000	100.0

*Estimated.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Manganese

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*†	% of world demonstrated reserves
Africa				
Gabon	2,268,000	10.2	163,000,000	4.6
South Africa	2,722,000	12.2	2,631,000,000	74.4
North and South America				
Brazil	1,814,000	8.2	59,000,000	1.7
Mexico	386,000	1.7	9,000,000	0.3
Asia				
China	3,175,000	14.3	29,000,000	0.8
India	1,271,000	5.7	25,000,000	0.7
Oceania				
Australia	1,451,000	6.5	154,000,000	4.4
Other	9,139,000	41.1	468,000,000	13.2
World total	22,226,000	100.0‡	3,538,000,000	100.0‡

*Estimated. †Manganese content. ‡Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Mercury

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
Algeria	600	10.9	3,000	1.2
North and South America				
Mexico	300	5.5	9,000	3.8
United States	...	...	4,000	1.7
Asia				
Turkey	100	1.8	7,000	2.9
Europe				
Italy	—	—	69,000	28.8
Spain	1,400	25.5	90,000	37.5
Other	3,100	56.4	58,000	24.2
World total	5,500†	100.0‡	240,000	100.0‡

*Estimated. †Excludes U.S. mercury production. ‡Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Molybdenum

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Canada	13,500	12.3	910,000	7.7
Chile	13,800	12.5	2,450,000	20.8
Mexico	4,000	3.6	230,000	1.9
Peru	3,000	2.7	230,000	1.9
United States	60,000	54.5	5,350,000	45.3
Other	15,800	14.4	2,640,000	22.4
World total	110,100	100.0	11,810,000	100.0

*Estimated.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Natural gas*

country	production 1990 (cubic metres)†	% of world production	proven reserves 1991 (cubic metres)†	% of world proven reserves
Africa				
Algeria	50,640,000,000	2.5	3,300,000,000,000	2.5
North and South America				
Canada	106,840,000,000	5.2	2,765,000,000,000	2.1
Mexico	26,730,000,000	1.3	2,024,000,000,000	1.5
United States	498,630,000,000	24.2	4,775,000,000,000	3.6
Venezuela	18,380,000,000	0.9	3,429,000,000,000	2.6
Asia				
Indonesia	43,200,000,000	2.1	2,568,000,000,000	2.0
Iran	23,710,000,000	1.1	17,010,000,000,000	12.9
Iraq	4,180,000,000	0.2	3,107,000,000,000	2.4
Qatar	6,720,000,000	0.3	4,613,000,000,000	3.5
Saudi Arabia	30,500,000,000	1.5	5,184,000,000,000	3.9
United Arab Emirates	22,100,000,000	1.1	5,623,000,000,000	4.3
Europe				
Netherlands	71,800,000,000	3.5	1,970,000,000,000	1.5
Norway	27,000,000,000	1.3	2,300,000,000,000	1.7
Romania	29,200,000,000	1.4	105,000,000,000	0.1
United Kingdom	49,550,000,000	2.4	545,000,000,000	0.4
Other	1,055,220,000,000	51.1	72,504,000,000,000	55.0
World total	2,064,400,000,000	100.0‡	131,822,000,000,000	100.0

*Excludes natural gas liquids. †Estimated. ‡Detail does not add to total given because of rounding.
Source: Petroleum Press Bureau Ltd., *Petroleum Economist* (August 1991).

Petroleum

country	crude production 1990 (barrels)*	% of world crude production	proven reserves 1991 (barrels)*	% of world proven reserves
Africa				
Libya	500,000,000	2.3	22,800,000,000	2.3
Nigeria	660,000,000	3.0	17,100,000,000	1.7
North and South America				
Canada	550,000,000	2.5	5,783,000,000	0.6
Mexico	961,000,000	4.4	51,983,000,000	5.2
United States	2,635,000,000	12.0	26,177,000,000	2.6
Venezuela	773,000,000	3.5	59,040,000,000	5.9
Asia				
China	1,006,000,000	4.6	24,000,000,000	2.4
Indonesia	465,000,000	2.1	11,050,000,000	1.1
Iran	1,139,000,000	5.2	92,850,000,000	9.3
Iraq	760,000,000	3.5	100,000,000,000	10.0
Kuwait	394,000,000	1.8	94,525,000,000	9.5
Saudi Arabia	2,268,000,000	10.3	257,504,000,000	25.8
United Arab Emirates	767,000,000	3.5	98,100,000,000	9.8
Europe				
United Kingdom	679,000,000	3.1	3,825,000,000	0.4
Other	8,459,000,000	38.4	134,376,000,000	13.5
World total	22,016,000,000	100.0†	999,113,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: PennWell Publishing Co., *International Petroleum Encyclopedia 1991.*

Nickel

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
Botswana	27,000	2.8	900,000	0.8
South Africa	36,000	3.8	2,600,000	2.3
North and South America				
Brazil	23,000	2.4	4,300,000	3.9
Canada	204,000	21.4	13,600,000	12.2
Colombia	17,000	1.8	700,000	0.6
Cuba	36,000	3.8	22,700,000	20.3
Dominican Republic	33,000	3.5	700,000	0.6
United States	8,000	0.8	2,500,000	2.2
Asia				
China	25,000	2.6	900,000	0.8
Indonesia	59,000	6.2	12,700,000	11.4
Europe				
Greece	18,000	1.9	907,000	0.8
Oceania				
Australia	73,000	7.6	6,800,000	6.1
New Caledonia	91,000	9.5	15,000,000	13.4
Other	305,000	31.9	27,293,000	24.5
World total	955,000	100.0	111,600,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Nitrogen in ammonia

country	production 1991 (metric tons)*	% of world production
North and South America		
Canada	3,000,000	3.1
Mexico	2,300,000	2.4
United States	12,700,000	13.1
Asia		
India	7,000,000	7.2
Japan	1,500,000	1.5
Europe		
France	1,600,000	1.6
Germany	2,400,000	2.5
Italy	1,100,000	1.1
Netherlands	3,000,000	3.1
United Kingdom	1,000,000	1.0
Other	61,600,000	63.4
World total	97,200,000	100.0

*Estimated.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Phosphate rock

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
Africa				
Morocco and Western Sahara	22,000,000	13.8	21,440,000,000	63.5
Senegal	2,200,000	1.4	160,000,000	0.5
South Africa	3,200,000	2.0	2,530,000,000	7.5
Togo	2,300,000	1.4	60,000,000	0.2
Tunisia	6,600,000	4.1	270,000,000	0.8
North and South America				
United States	47,000,000	29.4	4,440,000,000	13.1
Asia				
China	18,000,000	11.3	210,000,000	0.6
Israel	3,500,000	2.2	10,000,000	0.1
Jordan	6,000,000	3.8	480,000,000	1.4
Other	49,000,000	30.7	4,190,000,000	12.4
World total	159,800,000	100.0†	33,790,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Platinum-group metals*

country	mine production 1991 (metric tons)†	% of world mine production	demonstrated reserves 1991 (metric tons)†	% of world demonstrated reserves
Africa				
South Africa	139	48.4	59,000	89.3
North and South America				
Canada	11	3.8	280	0.4
United States	8	2.8	780	1.2
Other	129	44.9	6,031	9.1
World total	287	100.0‡	66,091	100.0

*Includes platinum, palladium, iridium, osmium, rhodium, and ruthenium.
†Estimated. ‡Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Silver

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Canada	1,200	8.5	47,000	11.2
Mexico	2,100	14.8	40,000	9.5
Peru	1,800	12.7	37,000	8.8
United States	1,800	12.7	72,000	17.1
Other	7,300	51.4	224,000	53.3
World total	14,200	100.0†	420,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Potash

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Brazil	30,000	0.1	600,000,000	3.5
Canada	7,500,000	27.6	9,700,000,000	56.4
Chile	25,000	0.1	50,000,000	0.3
United States	1,770,000	6.5	290,000,000	1.7
Asia				
China	60,000	0.2	320,000,000	1.9
Israel	1,350,000	5.0	600,000,000	3.5
Jordan	790,000	2.9	600,000,000	3.5
Thailand	—	—	100,000,000	0.6
Europe				
France	1,250,000	4.6	35,000,000	0.2
Germany	4,300,000	15.8	950,000,000	5.5
Italy	100,000	0.4	40,000,000	0.2
Spain	670,000	2.5	45,000,000	0.3
United Kingdom	500,000	1.8	30,000,000	0.2
Other	8,800,000	32.4	3,840,000,000	22.3
World total	27,145,000	100.0†	17,200,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Steel (raw)

country	production 1991 (metric tons)*	% of world production
North and South America		
Brazil	20,900,000	2.7
United States	78,000,000	10.2
Asia		
China	68,900,000	9.0
Japan	112,500,000	14.8
Korea, South	24,500,000	3.2
Europe		
France	19,500,000	2.6
Germany	43,500,000	5.7
Italy	25,900,000	3.4
United Kingdom	17,200,000	2.3
Other	351,100,000	46.1
World total	762,000,000	100.0

*Estimated.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Salt

country	mine production 1991 (metric tons)*	% of world mine production
North and South America		
Canada	11,100,000	6.0
Mexico	7,300,000	3.9
United States	36,300,000†	19.5
Asia		
China	25,400,000	13.7
India	9,100,000	5.0
Europe		
France	7,700,000	4.1
Germany	15,000,000	8.1
Italy	4,300,000	2.3
Poland	5,000,000	2.7
United Kingdom	5,700,000	3.1
Oceania		
Australia	7,400,000	4.0
Other	51,700,000	27.8
World total	186,000,000	100.0‡

*Estimated. †Sold or used. ‡Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Sulfur

country	production 1991 (metric tons)*	% of world production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Canada	7,000,000	12.3	330,000,000	9.4
Mexico	2,300,000	4.1	120,000,000	3.4
United States	10,600,000	18.7	230,000,000	6.6
Asia				
China	4,900,000	8.6	250,000,000	7.1
Iraq	1,050,000	1.9	500,000,000	14.2
Japan	2,700,000	4.8	15,000,000	0.4
Saudi Arabia	1,500,000	2.6	130,000,000	3.7
Europe				
France	1,050,000	1.9	20,000,000	0.6
Italy	500,000	0.9	15,000,000	0.4
Poland	5,000,000	8.8	300,000,000	8.5
Spain	1,100,000	1.9	300,000,000	8.5
Other	19,000,000	33.5	1,300,000,000	37.0
World total	56,700,000	100.0	3,510,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992.*

Tin

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Bolivia	18,000	8.6	140,000	2.3
Brazil	32,000	15.2	1,200,000	19.8
Canada	3,000	1.4	60,000	1.0
United States	...	...	40,000	0.7
Asia				
China	40,000	19.0	1,500,000	24.8
Indonesia	27,000	12.9	680,000	11.2
Malaysia	28,000	13.3	1,100,000	18.2
Myanmar	1,000	0.5	20,000	0.3
Thailand	14,000	6.7	270,000	4.5
Europe				
Portugal	3,000	1.4	70,000	1.2
United Kingdom	2,000	1.0	90,000	1.5
Oceania				
Australia	8,000	3.8	310,000	5.1
Other	34,000	16.2	570,000	9.4
World total	210,000†	100.0	6,050,000	100.0

*Estimated. †Excludes U.S. tin production.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Titanium

country	sponge metal production 1991 (metric tons)*	% of world sponge metal production
North and South America		
United States	16,000	19.5
Asia		
China	2,000	2.4
Japan	22,000	26.8
Europe		
United Kingdom	1,500	1.8
Other	40,500	49.4
World total	82,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Tungsten

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Bolivia	1,200	3.1	110,000	3.2
Brazil	400	1.0	20,000	0.6
Canada	—	—	493,000	14.3
United States	...	...	210,000	6.1
Asia				
China	20,000	51.9	1,400,000	40.7
Korea, South	1,200	3.1	77,000	2.2
Myanmar	200	0.5	34,000	1.0
Thailand	500	1.3	30,000	0.9
Europe				
Austria	1,100	2.9	15,000	0.4
France	—	—	20,000	0.6
Portugal	1,400	3.6	26,000	0.8
Oceania				
Australia	300	0.8	208,000	6.1
Other	12,200	31.7	795,000	23.1
World total	38,500	100.0†	3,438,000	100.0

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Uranium*

country	mine production 1990 (metric tons)†	% of world mine production
Africa		
Gabon	710	2.5
Namibia	3,210	11.2
Niger	2,830	9.9
South Africa	2,529	8.9
North and South America		
Canada	8,698	30.4
United States	3,547	12.4
Europe		
France	2,806	9.8
Oceania		
Australia	3,520	12.3
Other	720	2.5
World total	28,570	100.0‡

*U_3O_8. †Estimated. ‡Detail does not add to total given because of rounding.
Source: The Mining Journal Limited, *Metals and Minerals Annual Review* (1991).

Vanadium

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
United States	...	...	2,200,000	13.3
Africa				
South Africa	16,500	49.2	7,800,000	47.0
Asia				
China	8,000	23.9	1,600,000	9.6
Oceania				
Australia	—	—	200,000	1.2
Other	9,000	26.9	4,800,000	28.9
World total	33,500†	100.0	16,600,000	100.0

*Estimated. †Excludes U.S. vanadium production.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

Zinc

country	mine production 1991 (metric tons)*	% of world mine production	demonstrated reserves 1991 (metric tons)*	% of world demonstrated reserves
North and South America				
Canada	1,165,000	15.7	56,000,000	17.4
Mexico	300,000	4.1	8,000,000	2.5
Peru	610,000	8.2	12,000,000	3.7
United States	550,000	7.4	50,000,000	15.6
Oceania				
Australia	1,000,000	13.5	62,000,000	19.3
Other	3,775,000	51.0	133,000,000	41.4
World total	7,400,000	100.0†	321,000,000	100.0†

*Estimated. †Detail does not add to total given because of rounding.
Source: U.S. Department of Commerce, *Mineral Commodity Summaries 1992*.

side of a large deposit, with horizontal tunnels running at periodic levels into the deposit. The cavernous openings where minerals are excavated are called stopes. Many times a vein of ore will run from the surface, where it appears as an outcrop, deep into the ground on a diagonal. An inclined shaft runs parallel to the vein with horizontal levels connected to the vein at intervals. Ore that is found at the surface is mined from an open pit or from long strip excavations in a process called strip mining.

Excavating a mine and extracting mineral substances involves different combinations of drilling, blasting, hoisting, and hauling. Drilling a shaft itself may involve using a large circular bit that has a series of grinding wheels for cutting into rock. Drills are also commonly used for placing explosives. Drag-bit rotary drills use an abrasive, shaving action from diamond blades or steel shot, and the percussion drill pounds at the rock with a tungsten cutting edge that rotates at the same time. By carefully setting explosives in drilled holes, mining engineers can now use blasting agents of ammonium nitrate, which is effective at only 40 percent the strength of dynamite. In some hard rocks, heat applied through a flame-jet or jet-piercing drill causes the rock surface to chip or spall.

Careful consideration is given to the nature of the excavated sections to determine what support is needed in the mine. In some, the ceiling on an inclined shaft may not need support because of the lower ground weight from above in such a shaft. The ceilings of open stopes, the large cavities dug in the middle of deposits, may only need support from pillars of ore or waste rock. Rock ceilings with faults and fissures may be covered with shotcrete, a sprayed concrete that sets in and reinforces the cracks. Elsewhere, steel rods may be imbedded in the rock with large nuts threaded on the exposed end to hold up weakened segments of the ceiling. Where the span of the ceiling and the ground weight above dictate, structural support is provided. This may range from a variety of timber supports to collapsible steel arches. Timber arrangements include simple beams, or stulls, with diagonal supports into the side walls and a wood ceiling; an inclined beam against the hanging wall and wedged against the opposing foot wall with another beam; a four-piece set that consists of a complete beam frame (top, bottom, and sides); the timber square set linking frames together; and a post that supports the ceiling. In loose ground, ceiling sections are short and built at angles, and at the digging face a top section of planking called the breast boards keeps the earth from sliding backward. Supported stopes like these move slowly and produce a lower volume of ore. In unsupported stopes a number of methods help speed up production. These include slicing broad sections from the stope ceiling and also allowing large sections to cave in.

Removal of minerals from mines usually depends on trains of steel boxes drawn along tracks by an electric locomotive; vehicles running on treads or rubber wheels are also used. In some mines, large hoe-like scrapers pull rubble out by cable. Hand carrying, or mucking, is still practiced where mechanical means cannot be used.

A vital consideration in mining is how to ventilate the underground tunnels and caverns, not only to provide fresh air to miners but also to disperse harmful gases. Some mines become unbearably hot and need cooling. Sometimes ventilation ducts arranged in certain combinations can create natural drafting of air; usually, powerful fans are necessary. In addition, electric lighting must be provided. These two support systems often constitute a large part of mining costs.

mining, placer: *see* placer mining.

mining bee, also called DIGGER BEE, or SOLITARY BEE, any of several hundred species of bees in the family Andrenidae (order Hymenoptera), particularly those of the genus *Andrena.* Many species are medium-sized bees with reddish-golden hair and long, prominent abdomens. Females excavate tunnels in the soil that branch off to individual cells stocked with pollen balls, nectar, and eggs. There may be one or two generations per year. The adult has a relatively short and pointed "tongue," unsuitable for general foraging but, within each species, adapted to nectar-gathering from certain types of flowers.

ministère public, in France, the office of public prosecutor, with the responsibility for prosecuting criminal cases and representing the interests of society in civil litigation. The *ministère public* is represented by agents (*procureurs*) in most of the courts of France, except police courts.

The position of *procureur* goes back to the 13th century, when the king found it necessary to have representatives in the courts throughout the country to protect his interests and present his views on litigation that affected the public. In early times the *ministère public* was also responsible for making sure that officials did their jobs and punished those who were negligent or corrupt.

In modern times the position of the agents of the *ministère public* is somewhat different and presents something of a dichotomy to legal analysts. In theory the various *procureurs* are supposed to represent the interests of society as a whole rather than that of the state. Yet in criminal prosecutions they are clearly acting for the state. The decision to prosecute rests with the *procureur,* but he is ultimately under the control of the Ministry of Justice, a government department. Even with this underlying threat of political interference, the *procureurs* still have considerable freedom. Particularly in civil cases, in which the *procureur* may be acting as plaintiff in his own name or that of a government agency, or in which he may be merely an observer or an interested party, his main interest is that the law be correctly interpreted and applied. In addition, the *procureur général* attached to the Cour de Cassation (Supreme Court) is responsible for bringing to the attention of the court decisions of lower courts that ought to be reviewed because of possible faulty interpretation of the law. In all courts, the interpretations of the *procureurs* have considerable influence upon the judges.

ministry, in Christianity, the office held by persons who are set apart by ecclesiastical authority to be ministers in the church or whose call to special vocational service in a church is afforded some measure of general recognition. The type of ministry varies in the different churches. That which developed in the early church and is retained by the Roman Catholic, Eastern Orthodox, Old Catholic, Anglican, and some other churches is episcopal (*see* episcopacy) and is based on the three orders, or offices, of bishop, priest, and deacon.

Throughout much of the history of the church, the episcopal ministry was taken for granted, but the Protestant Reformation challenged the authority of the papacy and with it the authority of the episcopal ministry.

Martin Luther introduced the concept of the priesthood of all believers, which denied any special authority to the offices of the episcopacy. Luther intended to reassert the ministry of the whole church as a community with a mission to the world and no special restrictions on the priesthood. Ministers were encouraged to marry and were not considered a separate order in the church. Lutheran churches developed a variety of ministries, some retaining a modified episcopal form and others adopting congregational and presbyterian forms.

The presbyterian form of ministry, developed by John Calvin, is used in most Presbyterian and Reformed churches. Ministers are teaching elders and share with lay elders and collegial regional bodies (presbyteries) the governance of the church.

Congregational church government, adopted by Baptists, the United Church of Christ in the United States, and various others, accepted much of the Reformed theology but emphasized the authority of the particular congregation rather than any central or regional authority.

Methodism developed from the movement led by John Wesley, a priest of the Church of England. Although historical Methodism rejected episcopacy, in the United States a modified form was developed, retaining the office of bishop and strengthening congregational influence.

Pentecostal and evangelical groups consider charismatic gifts more important than ordination or any office as such. Some churches (*e.g.*, the Society of Friends) do not have an ordained ministry.

Minitari (people): *see* Hidatsa.

minivet, any of the 10 bird species of the Asian genus *Pericrocotus,* belonging to the family Campephagidae (*q.v.*). Males of most species are black and red, females yellowish and gray. Minivets live in forests from Afghanistan to Japan, the Philippines, and Malaysia. Small flocks, constantly chattering in loud, sweet tones, search the treetops for insects. A common and widespread species is the 23-centimetre (9-inch) scarlet minivet.

Orange, or flamed, minivet (*Pericrocotus flammeus*)

A.W. Ambler—The National Audubon Society Collection/Photo Researchers

mink, either of two weasel-like species of the genus *Mustela* (*M. vison,* New World mink, of forests in North America, and *M. lutreola,* Old World mink, of Eurasia) of the weasel family, Mustelidae, trapped and raised commercially for their prized pelts. Slightly larger than the European mink, the North American mink measures about 30–50 centimetres (12–20 inches) in length, exclusive of a 13–23-cm tail, and weighs 1.6 kilograms (3.5 pounds) or less. Both species have short legs, long necks, and broad heads with short, rounded ears. Their pelage is deep, rich brown, with or without white spots on the underparts, and consists of a dense, soft underfur overlaid with dark, glossy, almost stiff, guard hairs.

Mink are nocturnal and semi-aquatic, swimming, fishing, and foraging for various animal prey. A litter of up to 10 kits follows the gestation period of 39–76 days. Crossbreeding has led to the production of many mutant colours of fur; except for the rarer mutant colours, however, the fur of wild mink is more valuable than that of "ranch mink." The North American species of mink is found throughout North America except in the arid regions of the southwestern United States. The Eurasian species is absent from much of western Europe. The kolinsky (kolinski), or Siberian weasel (*M. sibirica*), is sometimes called the China, Japanese, or yellow mink.

New World mink (*Mustela vison*)

Karl H. Maslowski

Minkowski, Hermann (b. June 22, 1864, Aleksotas, Russian Empire [now in Kaunas, Lithuania]—d. Jan. 12, 1909, Göttingen, Ger.), German mathematician who developed the geometrical theory of numbers and who used geometrical methods to solve difficult problems in number theory, mathematical physics, and the theory of relativity. His idea of a four-dimensional space (since known as "Minkowski space"), combining the three dimensions of physical space with that of time, laid the mathematical foundation of Albert Einstein's general theory of relativity.

The son of German parents living in Russia (his brother was Oskar Minkowski), he returned to Germany with his parents in 1872 and spent his youth in the royal Prussian city of Königsberg, from whose university he received a doctorate in 1885. He taught mathematics at Bonn (1885–94), Königsberg (1894–96), Zürich (1896–1902), and the University of Göttingen (1902–09). His major work was *Raum und Zeit* (1907; "Space and Time"). His works were collected in David Hilbert (ed.), *Gesammelte Abhandlungen,* 2 vol. (1911; "Collected Papers").

Minkowski, Oskar (b. Jan. 13, 1858, Aleksotas, Russian Empire [now in Kaunas, Lithuania]—d. July 18, 1931, Fürstenberg an der Havel, Ger.), German physiologist and pathologist who introduced the concept that diabetes results from suppression of a pancreatic substance (later found to be the hormone insulin).

Minkowski taught medicine at the universities of Strassburg (1882–1904), Cologne (1904–05), Greifswald (1905–09), and Breslau (1909–26). At Strassburg he investigated the biochemical basis of diabetes and found (1884) that β-hydroxybutyric acid with a concomitant decrease in blood bicarbonate is the cause of diabetic acidosis (an acidification of the blood); he also proved that diabetic coma is accompanied by a decrease in the amount of carbon dioxide dissolved in the blood, and he introduced alkali therapy to counteract it. In 1889 he discovered (with the German physiologist Joseph von Mering) that dogs subjected to removal of the pancreas develop the symptoms of diabetes, leading Minkowski to postulate that the pancreas is the site of secretion of an "antidiabetic" substance, now known to be insulin. By removing the liver from birds, he demonstrated (1885) that the organ is responsible for the manufacture of bile pigments and is the site of uric acid formation.

Minna, town, capital of Niger State, west central Nigeria. Following the opening of the Kano-to-Baro railway (1911) and the extension of the Lagos-to-Jebba line (1915) to a junction in Minna, the town became a major collecting point for agricultural products, including peanuts (groundnuts), cotton, yams, and shea nuts. These remain its most important exports, but pigs are also railed to Lagos.

Local trade among its predominantly Gbari (Gwari) population is mainly in sorghum, yams, corn (maize), millet, peanuts, cotton, shea nuts, tobacco, indigo, kola nuts, cattle, goats, chickens, and guinea fowl. The town is known for its woven and dyed cotton cloth, raffia mats and baskets, pottery, and brass ware. Modern industry includes a brick-making plant and a nearby marble quarry.

Since becoming the capital of Niger State in 1976, Minna has developed as an administrative centre as well. It has teacher-training colleges and a hospital, and it is also the radio broadcasting centre for the state. The town is a hub for local roads serving southern Niger State. Pop. (1996 est.) 136,900.

Minnaert, Marcel Gilles Jozef (b. Feb. 12, 1893, Bruges, Belg.—d. Oct. 26, 1970, Utrecht, Neth.), Flemish astronomer and solar physicist who pioneered in solar spectrophotometry and showed how such a technique could reveal much about the structure of the Sun's outer layers.

Minnaert was first a botanist, but his desire to understand more fully the effect of light on plants led him to study physics at the University of Leiden, in The Netherlands. Exiled from Belgium for his support of the nationalist Flemish movement before and during World War I, he became a staff member of the solar observatory at Utrecht in 1921.

After the invention of the microphotometer about 1920, Minnaert undertook the measurement of the intensities of dark lines in the solar spectrum. With the help of two pupils, he prepared the monumental Utrecht *Photometric Atlas of the Solar Spectrum* (1940), still a standard reference, which includes measurements of the absorption lines from 3332 angstroms to 8771 angstroms. Other works on the Sun's spectrum followed, but perhaps his most noted work is *Die Natuurkunde van't Vrije Veld,* 3 vol. (1937–42; Eng. trans. of vol. 1, *Light and Color in the Open Air,* 1954), on optical phenomena associated with meteorology.

From 1937 until his retirement in 1963 Minnaert was director of the Sonnenborgh Observatory at Utrecht, but during most of World War II he was interned in a Nazi concentration camp.

Minneapolis, city, seat of Hennepin county, southeastern Minnesota, U.S., port of entry at the head of navigation on the Mississippi River, near the mouth of the Minnesota River. With adjoining St. Paul (*q.v.*) to the east, it forms the Twin Cities metropolitan area. The state's largest city, it has 22 lakes and some 170 parks within its limits.

Sioux and Ojibwa Indians were early inhabitants. The Franciscan missionary Louis Hennepin visited the area in 1680 and named St. Anthony Falls, which later provided power for grinding flour for Fort Snelling (1819; now a state park), a military outpost at the confluence of the rivers. The village of St. Anthony, which developed on the east side of the river, was incorporated in 1855. Settlers had begun occupying U.S. military-reservation land on the west side of the river in 1849, and the village of Minneapolis was incorporated in 1856. Its name was derived from the Sioux word *minne,* meaning "water," and the Greek *polis,* for "city." St. Anthony was chartered as a city in 1860 and Minneapolis in 1867; the two cities merged as Minneapolis in 1872. The falls were an important factor in the city's early economic growth as a lumber and flour-milling centre. By 1870 Minneapolis was the nation's top producer of flour. The lumber business reached its height in 1899, when logs from the forests of the north jammed the river. As wheat growing in the northwest increased, flour milling superseded lumbering as the leading industry (the last lumber mill closed in 1919). Railroads, multiplying connections with Chicago and the south, and with the east through Sault Ste. Marie, Mich., were completed in the late 19th century. After World War I, Great Lakes shipping shifted much of the export flour trade to Buffalo, N.Y., though Minneapolis remained the headquarters for some large milling companies. In the second half of the 20th century, the city remained one of the nation's primary wheat markets; the Minneapolis Grain Exchange is the largest cash exchange market in the world.

The Nicollet Mall in downtown Minneapolis, Minn.

Gregory K. Hunt

Minneapolis is now a commercial, industrial, transportation, distribution, health care, and financial centre. Highly diversified manufactures include metal products, electronics, precision instruments, medical devices, plastics, machinery, computers and computer equipment, chemicals, automotive parts, and agricultural products. Publishing, milling, food processing, graphic arts, insurance, and high-technology industries are also important. The Twin Cities area is a rail and trucking centre and has an international airport. The Skyway is a system of climate-controlled pedestrian walkways located on the second-floor level that connects various points around the city.

Minneapolis is the seat of the University of Minnesota (1851), Augsburg College (Lutheran; 1869), Dunwoody Institute (technical; 1914), Minneapolis College of Art and Design (1886), a campus of Metropolitan State University (1971), and North Central University (Pentecostal; 1930). Of historical and cultural interest are the Guthrie Theatre (home of the state repertory theatre), the Minnesota Opera, the Minnesota Orchestra, the American Swedish Institute, the Walker Art Center, the Minneapolis Public Library's planetarium, the Hennepin History Museum, the Minneapolis Institute of Arts, and the Bell Museum of Natural History. Minnesota's professional baseball (Twins) and football (Vikings) teams play in the city's Metrodome; the professional basketball team (Timberwolves) plays in the Target Center. The Minneapolis riverfront is part of the Mississippi National River and Recreation

Area. Pop. (2000) city, 382,618; Minneapolis–St. Paul MSA, 2,968,806.

Minnehaha Falls, waterfall in Minnehaha Park, Minneapolis, eastern Minnesota, U.S., formed by Minnehaha Creek, which flows to the Mississippi River from Lake Minnetonka. The falls have a drop of 53 feet (16 m) and were known earlier as Little Falls or Brown's Falls. They were immortalized as the "laughing water" in Longfellow's epic poem *The Song of Hiawatha* (1855).

> Where the Falls of Minnehaha
> Flash and gleam among the oak-trees,
> Laugh and leap into the valley.

A bronze statue by Jacob Fjelde of Minnehaha and Hiawatha stands above the falls.

Minnelli, Vincente (b. Feb. 28, 1910, Chicago, Ill., U.S.—d. July 25, 1986, Los Angeles, Calif.), American motion-picture director who infused a new sophistication and vitality into filmed musicals in the 1940s and '50s. Though his early work was for the Broadway stage, Minnelli, working with Arthur Freed and Gene Kelly, created successful film dramas, comedies, and musicals.

Raised by theatrical parents (an Italian-born father and French-born mother) who operated a traveling tent show, Minnelli worked in stage management and costume design from the age of 16, first in Chicago and then in New York City. After achieving success as a Broadway director—directing such successful Broadway shows as *At Home Abroad* (1935), *The Show Is On* (1936), and *Hooray for What!* (1937)—he was hired by Metro-Goldwyn-Mayer (MGM) and moved to Hollywood in 1940.

Minnelli combined daring use of colour with imaginative camera work, producing elegant and visually sophisticated movies. Adept at combining music and plot, he is best remembered for such films as *Meet Me in St. Louis* (1944) and *The Pirate* (1948), both of which starred Judy Garland. Minnelli married Garland in 1945, and their only child, Liza Minnelli, became a successful actress and singer.

In 1950 Minnelli and Kelly collaborated on *An American in Paris* (1951 release), an Academy Award-winning, innovative movie relying heavily on dance. Although he was recognized as a good dramatic director—directing such films as *The Clock* (1945), *Father of the Bride* (1950), *The Bad and the Beautiful* (1952), and *Lust for Life* (1956)—Minnelli's most popular films were his lavish musicals, most notably *The Band Wagon* (1953) and the Academy Award-winning *Gigi* (1958). In 1962 he left MGM studios and founded Venice Productions. Later films included *Goodbye Charlie* (1964), *On a Clear Day You Can See Forever* (1970), and *A Matter of Time* (1976). A volume of memoirs, *I Remember It Well,* was published in 1974.

minnesinger, German MINNESÄNGER, or MINNESINGER, any of certain German poet-musicians of the 12th and 13th centuries. In the usage of these poets themselves, the term *Minnesang* denoted only songs dealing with courtly love (*Minne*); it has come to be applied to the entire poetic-musical body, *Sprüche* (political, moral, and religious song) as well as *Minnesang.*

The songs of courtly love, like the concept, came to Germany either directly from Provence or through northern France. The minnesingers, like their Romance counterparts, the troubadours and trouvères, usually composed both words and music and performed their songs in open court, so that their art stood in an immediate relationship to their public. Some were of humble birth; at the other end of the social scale were men such as the emperor Henry VI, son of Frederick I Barbarossa. Most, however, were *ministeriales,* or members of the lower nobility, who depended on court patronage for their livelihood; from the vicissitudes of such an existence come many of the motifs in their poetry.

In form the music follows, in the main, the tripartite structure taken over from the Provençal *canso:* two identical sections, called individually *Stollen* and collectively *Aufgesang,* and a third section, or *Abgesang* (the terms derive from the later meistersingers); the formal ratio between *Aufgesang* and *Abgesang* is variable. The basic *aab* pattern was subject to much variation (*see* Bar form).

On a larger scale was the *Leich,* analogous to the French lai (*q.v.*). It was an aggregation of short stanzas (versicles), typically couplets, each line of which was sung to the same music and each versicle having its own music. The *Leiche* were often several hundred lines long, and many incorporated religious motifs (such as the veneration of the Virgin Mary), which are also found in the shorter lyrics. Musical unity in both the *Leich* and the shorter forms was often achieved by the recurrence and variation of brief motifs or even entire phrases.

Some of the early songs were probably sung to troubadour melodies, because their texts closely resemble Provençal models. Yet the German songs, in the main, differ in general musical character from the Romance songs. For example, the melodies are more often basically pentatonic (based on a five-tone scale). Popular song and Gregorian chant are other musical roots of the style.

The poems of the earliest minnesinger known by name, Kürenberger (fl. 1160), show only a tint of the troubadour, for his realistic verses show a proud, imperious knight with a woman pining for his love. But by the end of the century the courtly love themes of the troubadours and trouvères had taken control. In the 12th century the poetry of the Thuringian Heinrich von Morungen is marked by intensity of feeling and moral involvement, and the Alsatian Reinmar the Elder gives the courtly love lyric such an expression of social ideals that he was taken by his contemporaries as the most representative poet of "pure" *Minnesang.*

Walther von der Vogelweide, one of the greatest lyric poets of the European Middle Ages, absorbed much of his teacher Reinmar's craftsmanship, but he went far beyond the artificial conventions with which the *Minnesang* had been governed by introducing an element of practical realism, both in his love poetry and in his *Sprüche.* By the time of Neidhart von Reuenthal, a Bavarian squire (d. *c.* 1250), the knight had turned his attention from the ladies of the castle to the wenches of the villages; Neidhart's melodies likewise have a certain affinity with folk song.

Whereas poets like Ulrich von Lichtenstein strove to keep the conceits of chivalry alive, others—among them Reinmar von Zweter, the Marner, and Konrad von Würzburg (mid-13th century)—cultivated didactic poetry, which Walther von der Vogelweide, building on the work of earlier poets, had already raised to a high level. At the end of the 13th century stands Frauenlob (Heinrich von Meissen), who, by his versatility, his power of rhetoric, and his technical refinement, points to the stylized art of the later meistersingers.

Minnesota, constituent state of the United States of America, lying in the upper Midwestern region of the country.

Minnesota is bounded to the north by the Canadian provinces of Manitoba and Ontario, to the east by Lake Superior and Wisconsin, to the south by Iowa, and to the west by South and North Dakota. The state capital is St. Paul. Area 86,943 square miles (225,182 square km). Pop. (2000) 4,919,479.

A brief treatment of Minnesota follows. For full treatment, *see* MACROPAEDIA: United States of America: *Minnesota.*

Until the mid-19th century, two major Indian tribes occupied what is now Minnesota: the Ojibwa and the Sioux. The earliest verifiable Europeans in the area were 17th-century French explorers searching for a Northwest Passage. The area passed under U.S. control in 1803 as part of the Louisiana Purchase, but the first permanent U.S. settlement was not made until Fort Snelling was founded (1819). The first large wave of settlers came from New England to exploit the vast forestlands that covered about two-fifths of the state. Minnesota became the 32nd state in 1858.

Minnesota straddles three continental watersheds: the Mississippi River to the Gulf of Mexico, the Great Lakes to the Atlantic Ocean, and the Red and Rainy rivers to Hudson Bay. Glaciation carved more than 15,000 lakes out of the surface. Extreme southeastern Minnesota is the only unglaciated part of the state, where streams cut their ways through layers of limestone over many thousands of years and steep rocky bluffs rise 500 feet (150 m) or more above the valleys. Minnesota's vegetation makes a sharp transition from needle-leaf and hardwood forest zones to tallgrass prairie, although little of the pre-settlement vegetation remains.

Climate is extremely varied because the state stretches from the subarctic forest in the north to the Corn Belt in the south and from the Great Lakes storm belt in the east to the semiarid Great Plains in the west. July daily maximum temperatures range from 85° F (29° C) in the south to 70° F (21° C) along the shore of Lake Superior. Average daily January highs range from 25° F (−4° C) in the south to 15° F (−9° C) in the north. Average annual precipitation ranges from more than 30 inches (750 mm) in the southeast to less than 20 inches (500 mm) in the northwest. Many parts of Minnesota have continuous snow cover for at least 90 days, from about mid-December to mid-March.

Minnesota's first settlers from New England were followed by large numbers of Germans, Norwegians, and Swedes, who came to establish homesteads in the 1880s. There are Finns in the northeast, Poles in the southeast and centre, and Bohemians south of the "Twin Cities" of Minneapolis and St. Paul. The state is largely Lutheran and Roman Catholic. In the late 20th century there were some 35,000 Indians, mostly Ojibwa, nearly half of whom lived in the Twin Cities area. Some 90 percent of the population is white; the black population is about 3.5 percent of the total.

Agriculture and related businesses are Minnesota's economic mainstays. Grains, meat, and dairy products are the leading products. Mineral resources abound, especially iron ore and taconite, granite, and limestone. Manufacturing activities produce processed food, pulp and paper products, primary metals, and electronic equipment, but manufacturing employs only about one in four workers.

The Twin Cities, with service by road, rail, air, and water, are the centre of Minnesota's transportation network. Grain and ore are carried by rail to the Great Lakes ports of Duluth and Superior (in adjoining Wisconsin). The Minneapolis–St. Paul International Airport is the hub of air transportation.

The Twin Cities are also the cultural centre of Minnesota and of the region. They are home to the renowned Minnesota Orchestra, the Guthrie Theatre, the Walker Art Center, the University of Minnesota, and the Minnesota Dance Theatre. Outdoor recreation figures prominently in the state, and many residents take advantage of the state's numerous lakes and natural areas. The Mayo Clinic in Rochester is a world-renowned medical and health centre.

Minnesota Mining & Manufacturing Company (3M), diversified American corporation manufacturing a wide range of products, including abrasives, adhesive tape and related products, videocassettes, carbonless paper, and computer-synthesized graphics. It is headquartered in St. Paul, Minn.

The company was incorporated under its present name in 1902, and its first product was sandpaper. 3M grew steadily, adding waterproof sandpaper, adhesive cellophane tape, masking tape, and desktop copiers, among other goods, to its product line. The company is divided into four market groups—electronics and information technologies; graphics technologies, including graphic arts and services and products; industrial and consumer technologies, including photographic films and adhesive tapes; and life sciences, with health-care products and services.

The company is notable among diversified American corporations for its growth by largely internal means rather than by means of large-scale acquisitions.

Minnesota River, river rising at Ortonville, Minn., U.S., at the southern tip of Big Stone Lake, on the South Dakota–Minnesota boundary, and flowing south-southeast, then northeast from Mankato, Minn., to join the Mississippi River at Mendota, just south of St. Paul. The Minnesota (a Sioux name meaning "sky-tinted water") is approximately 332 miles (534 km) long. The river was once known as the St. Peter or St. Pierre and was important to early explorers and fur traders. Big Stone Lake Dam, near Ortonville, and Marsh Lake Dam, where the Pomme de Terre River joins the Minnesota, are part of a flood-control project.

minnow, in North America, any of various small fishes, especially those of the carp family, Cyprinidae. The name minnow is also applied to mud minnows (family Umbridae), killifishes (Cyprinodontidae), and, in a general way, the young of many large fishes. For topminnows, *see* live-bearer.

The North American cyprinid minnows comprise numerous species of small, freshwater fishes that are known by such names as shiner (genera *Notemigonus* and *Notropis*) and bluntnose and fathead minnow (*Pimephales*). Many are abundant, and a number are valuable as live bait; sometimes they are cultured for this purpose. One good bait species is the bluntnose minnow (*P. notatus*), an olive-coloured species up to 10 cm (4 inches) long. Others include the 6-centimetre fathead minnow (*P. promelas*) and the common shiner (*Notropis cornutus*), a blue and silver minnow up to 20 cm long. The golden shiner, or American roach (*Notemigonus cryseleucas*), a larger, greenish and golden minnow attaining a length of 30 cm and a weight of 0.7 kg (1.5 pounds), is both edible and valuable as bait.

The minnow of Europe and northern Asia is *Phoxinus phoxinus*, a slim, small-scaled fish typical of clean streams and rivers. Also a member of the carp family, it is usually about 7.5 cm long. It varies in colour from golden to green, and the male, like certain other male cyprinids, develops a bright red underside during the spring breeding season. This minnow, like many others, is a valuable source of food for fishes, birds, and other animals.

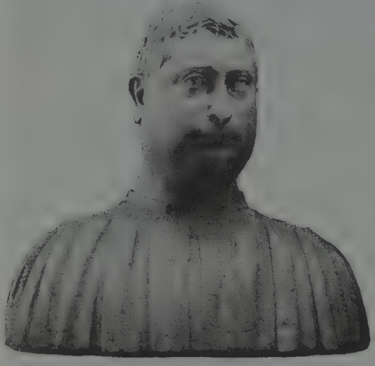
Red shiners (*Notropis lutrensis*)
Gene Wolfsheimer

Mino da Fiesole (b. 1429, Poppi, Republic of Florence [Italy]—d. 1484, Florence), early Renaissance sculptor notable for his well-characterized busts, which are among the earliest Renaissance portrait sculptures.

Mino was trained in Florence, probably in the studio of Desiderio da Settignano, and he executed monuments of Leonardo Salutati, bishop of Fiesole, and of Bernardo Giugni and Count Hugo of Andersburg. The latter work was begun in 1471 and completed after Mino's return from Rome in 1482.

Mino was active in Rome in 1454 and 1463 and from about 1473 to 1480. In that city he executed, among many other works, monuments of Cardinal Pietro Riario and Cardinal Cristoforo della Rovere. Much of Mino's work in Rome was undertaken in conjunction with Andrea Bregno.

Mino enjoyed popularity as a portrait sculptor. His earliest portrait bust, that of the wealthy and politically prominent Florentine merchant Niccolò Strozzi, was carved in Rome in 1454. Included among other of his major portrait busts are those of Astorgio Manfredi, Rinaldo della Luna (1461), and Diotisalvi Neroni (1464).

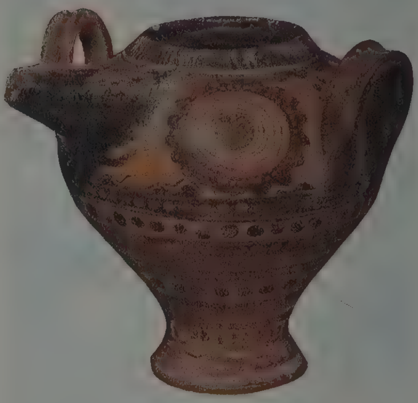

"Niccolò Strozzi," marble portrait bust by Mino da Fiesole, 1454; in the Staatliche Museen Preussischer Kulturbesitz, Berlin
By courtesy of the Staatliche Museen Preussischer Kulturbesitz Skulpturengalerie, Berlin—Art Resource/EB Inc.

Though much admired in the 19th century, Mino's sculptures have come to occupy a place below those of the contemporary Desiderio da Settignano and Antonio Rossellino. In his larger works the treatment of form is frigid and mannered, and he appears to have lacked the technical proficiency of his great contemporaries.

Minoan civilization, Bronze Age civilization of Crete that flourished from about 3000 BC to about 1100 BC. Its name derives from Minos, either a dynastic title or the name of a particular ruler of Crete who has a place in Greek legend.

A brief treatment of Minoan civilization follows. For full treatment, *see* MACROPAEDIA: Greek and Roman Civilizations, Ancient: *Aegean civilizations*.

Crete became the foremost site of Bronze Age culture in the Aegean Sea, and in fact it was the first centre of high civilization in that area, beginning at the end of the 3rd millennium BC. Reaching its peak about 1600 BC and the later 15th century, Minoan civilization was remarkable for its great cities and palaces, its extended trade throughout the Levant and beyond, and its use of writing. Its sophisticated art included elaborate seals, pottery (especially the famous Kamáres ware with its light-on-dark style of decoration), and, above all, delicate, vibrant frescoes found on palace walls. These frescoes display both secular and religious scenes, such as magical gardens, monkeys, and wild goats or fancifully dressed goddesses that testify to the Minoans' predominantly matriarchal religion. Among the most familiar motifs of Minoan art are the snake, symbol of the goddess, and the bull; the ritual of bull-leaping, found, for example, on cult vases, seems to have had a religious or magical basis.


Bridge-spouted jar decorated in polychrome, Late Minoan period (*c.* 1400–*c.* 1100 BC); in the Ashmolean Museum, Oxford
By courtesy of the Ashmolean Museum, Oxford

By about 1580 BC Minoan civilization began to spread across the Aegean to neighbouring islands and to the mainland of Greece. Minoan cultural influence was reflected in the Mycenean culture of the mainland, which began to spread throughout the Aegean about 1500 BC.

By the middle of the 15th century the palace culture on Crete was destroyed by conquerors from the mainland. They established a new order on Crete, with centres at Knossos and Phaistos. Following the conquest, the island experienced a wonderful fusion of Cretan and mainland skills. The Late Minoan period (*c.* 1400–*c.* 1100 BC), however, was a time of marked decline in both economic power and aesthetic achievement.

Minobe Tatsukichi (b. May 7, 1873, Hyōgo prefecture, Japan—d. May 23, 1948, Tokyo), legal expert who reinterpreted the position of the imperial institution within the Japanese constitution as that of an "organ of state." This view of the emperor, who until that time had been considered the divine embodiment of the state, greatly altered Japanese political theory.

After doing graduate work in Germany, Minobe became a law professor at Tokyo University. He utilized German legal theory to set forth the view that the emperor, although symbolizing the unique character of the Japanese state as the nationalists claimed, was still merely the highest organ of the state invested with the authority to carry out the nation's executive functions. This idea in effect made the emperor subject to the laws of the state; imperial authority was no greater than that of elected organs of the government. In fact, Minobe maintained, true sovereign power could be vested only in the people. This argument weakened the sanction for autocratic rule (in the name of the emperor) and produced a theoretical basis for the growing democratic movement.

Since Minobe's works were prescribed reading for the government civil-service examinations required for higher bureaucratic positions, almost all leading officials held his views. Nevertheless, as Japan prepared for war in the xenophobic atmosphere of the 1930s, his theories came under increasing criticism from these same bureaucrats. In 1932 he retired from the university and was elevated to the House of Peers. Three years later nationalistic pressure forced him to resign. His books were then banned until the end of World War II.

After the war Minobe opposed the new U.S.-sponsored constitution on the grounds that it had reduced the emperor's power too much, making the imperial institution only a symbol of the state.

Minomura Rizaemon (b. Nov. 25, 1821, Edo [now Tokyo], Japan—d. Feb. 21, 1877, Tokyo), Japanese businessman responsible for making the house of Mitsui the largest of the *zaibatsu* ("financial clique") that dominated the economic life of Japan throughout the 19th and early 20th centuries. Under Minomura's leadership Mitsui became one of the few financial giants of the Tokugawa period (1603–1867) that were able to make the transition to modern industrial conditions.

An orphan, Minomura worked his way up, eventually becoming an exchange broker and developing close ties with the government. Invited to join the Mitsui firm, the largest exchange brokerage of the time, he soon rose to the top position in that house.

After the Meiji Restoration (1868), which overthrew feudal rule in Japan, Minomura instituted modern banking methods, becoming president of the Mitsui Bank, the first private institution of its type in Japan. He also helped launch Mitsui into other enterprises, laying the foundation for a great industrial empire.

minor, also called INFANT, person below the legal age of majority or adulthood. The age of majority varies in different countries, and even in different jurisdictions within a country. It also differs with the type of activity concerned, such as marrying, purchasing alcohol, or driving an automobile. Twenty-one years is a common division between minors and adults.

The concept of minority rests on the assumption that children are incapable of self-management. A minor also has special protection against strangers and irresponsible parents. A minor in most countries can acquire property but cannot sell it; and his acquisitions are controlled by his parents, subject always to review by the courts for abuses.

Similarly, minors—even if they misrepresent their age—cannot be bound to contracts they sign; these are said to be voidable but not void. Thus, if a minor contracts to buy a car, he can cancel the contract before the actual exchange of the car for the money. The contract is said to be voidable at his discretion.

Minors are, however, liable for harm they cause others—*e.g.,* injuries to another child. Formerly, minors who committed crimes were held liable as if they were adults. In the 20th century this practice changed. Although minors were still disciplined for crimes, the emphasis was increasingly placed on rehabilitation, not punishment (*see* juvenile court).

minor planet: *see* asteroid.

Minor Prophets, The (biblical literature): *see* Twelve, The.

Minorca, Spanish MENORCA, island and *comunidad autónoma* ("autonomous community"), Baleares *provincia,* Spain. It is the second largest of the Balearic Islands and lies in the western Mediterranean Sea. Most of the island's area of 258 square miles (668 square km) is dry, monotonous tableland with rugged hills rising in the north centre to Toro hill (1,175 feet [358 m]). Its northern coast has many capes and is deeply indented with inlets such as the bays of La Albufera, Addaya, and Fornells. The fine natural harbour of Mahón, the island's chief town, is the best port of the Balearics and was much prized for its strategic value in the wars of the 18th century. The south coast is more regular and has long stretches of cliffs.

Prehistoric *taula* (table), rectangular stone slab on Minorca; these structures were once probably central supports for ancient ceremonial halls

Shostal

Minorca's first inhabitants were probably cave dwellers. Prehistoric remains, dating from about the middle of the 2nd millennium BC and representing a culture that continued with little change until Roman times, include talayots and *taulas,* both structures of unknown purpose. The former, a type of tower, was roofed, generally with the aid of a central pillar composed of circular superimposed slabs, and faced with clay to produce a monolithic structure. The *taulas,* so-called "tables," may well have been used for ceremonial purposes but certainly formed a normal element of the habitations associated with the talayots. Both talayot and *taula* are usually contained within an enclosure, frequently of D-shaped plan, with the entrance in the straight side; within the area stands a *taula,* a rectangular slab of dressed stone set horizontally on a vertical shaft. The stone *naus,* or *navetas* (Catalan: "ships"), of Minorca, so termed from their resemblance to an upturned boat, were graves.

Many of the plateau limestone soils are suitable only for light grazing, but some of the higher districts are terraced and yield rich harvests, as do the few alluvial valleys, which run down to the south coast. The land irrigated by artesian wells is especially productive, and its windmills are a characteristic feature of the Minorcan landscape. The principal crops are cereals, potatoes, melons, pomegranates, figs, and almonds. Cattle, horses, sheep, and goats are kept, and cheese is exported to the mainland. The farming system is that of peasant proprietorship, and the domestic economy is supplemented by fishing, lobsters being plentiful off the north coast. The manufacture of leather shoes employs about 10 percent of the population in a number of small factories throughout the island. Minorca has many fine beaches, and its tourist business, formerly much inferior to that of Majorca and Ibiza, is expanding. Air and maritime services link the island with Barcelona and Majorca, and there are air services from London. Pop. (1981) 58,727.

minority, a culturally, ethnically, or racially distinct group living within a larger society. When used to describe such a group, the term carries with it a web of political and social implications.

As the term is used by politicians and social scientists, a minority is necessarily subordinate to the dominant group within a society. This subordinancy, rather than a numerical minority, is the chief defining characteristic of a minority group. In certain cases, as in South Africa, where the black population is considered a minority by dint of the dominance of the nation's whites, the "minority group" may be several times the size of the dominating group.

In sociological parlance, a minority must be a distinct social group. As such, it has specific rules of membership and proscribed guidelines of cultural behaviour that distinguish it from the majority. It must have specific, easily recognizable characteristics that mark it off from the rest of society.

In their separation from the dominant forces of a society, members of a minority group usually are cut off both from a full involvement in the workings of the society and from an equal share in the society's rewards. A minority group is typically poorer and politically less powerful than the dominant group, although certain exceptions exist.

The lack of significant distinguishing characteristics keeps certain groups from being classified as minorities. In modern American society, religion seldom defines a minority. The society as a whole is too secularized for differences in religious practice to be felt that keenly. Similarly, Freemasons, though they subscribe to beliefs different from those of most Western people, lack clear identifying features that would distinguish them, and they cannot be considered a coherent minority. A group assembled for primarily economic reasons is seldom considered a minority unless its activity is linked with unifying principles of kinship, race, or culture.

The role of minority groups varies from society to society, depending on the structure of the social system and the relative power of the minority group. In general, the society as a whole has two options when confronted with the presence of a minority group: the minority can be either eliminated or tolerated. A minority group can be eliminated through one of several methods. It can be ejected or suppressed. In the 17th century the dominant Roman Catholics forbade the practice of Protestantism in France. Protestants had the choice of changing religions, practicing Protestantism in secret, or leaving the country. Protestantism as a subculture was thus effectively eradicated. An extreme example of the suppression of minorities is the Nazi extermination of several million Jews.

A less violent means of minority elimination is assimilation. In this process the minority assumes the cultural attributes of the dominant majority. In the 19th and early 20th centuries the United States saw an influx of European immigrants. Rather than allowing them to maintain their original cultural characteristics, the dominant English-speaking, Protestant majority indoctrinated the immigrants in the prevailing culture. The immigrant groups adopted the dominant language and ideology. As a result, they did not establish autonomous social groups but rather became assimilated into American society.

Assimilation is seldom a process of pure elimination. In the course of assimilation, the dominant group usually acquires aspects of the minority culture while imposing its own culture. A society that makes a practice of assimilation usually evolves in the process, and the dominant culture becomes increasingly eclectic.

When a minority group is allowed to exist within the context of a larger society, the resulting social system is called pluralistic. The dominant forces in a pluralistic society opt to tolerate minorities for one of two reasons. The dominant majority may see no reason to rid themselves of the minority. On the other hand, even if the minority is disliked, there may be political, ideological, or moral impediments to a process of elimination. The commercial trade of certain European countries in the 12th and 13th centuries depended on Jewish merchants. This made it impossible, or at least suicidal, for the anti-Semitic rulers to drive the Jews out. Another example of toleration coerced from an unwilling dominant group can be seen in Britain in the 20 years following 1950, which saw an influx of immigrants from the Caribbean, Pakistan, and India. Many British did not like these new minority groups, but the nation's prevailing democratic ideology prevented any move to eject them.

The structure of the society as a whole affects the role that minority groups play in it. By definition, minority groups are ranked somewhere below the top rung of the social hierarchy. The degree of social mobility of a member of a minority group depends on whether the society in which he lives is closed or open. A closed society is one in which an individual's role and function can theoretically never be changed—*e.g.*, the traditional Hindu caste system. An open society, on the other hand, allows the individual to change his role, with corresponding changes in status. Unlike a closed society, which stresses hierarchical cooperation between social groups, an open society permits different social groups to vie for the same resources, so that their relations are competitive. In an open society the ranking of an individual according to his social group has less weight than the rank that the individual attains for himself.

Such a situation can be seen in the United States—an open society that allows the individual social mobility. Sociologists have suggested that part of the difficulty encountered by black people in being absorbed into American society has arisen because, unlike other groups, they are uniquely regarded as an autonomous social group. This stereotyped view, a holdover from notions of a closed society, has caused black people to be segregated from a society that is primarily open and devoid of such autonomous groups. The difficulties encountered by blacks in the United States can be seen as typical of the problems that minorities face in modern Western society.

minority carrier injection, in electronics, a process taking place at the boundary between *p*-type and *n*-type semiconductor materials, used in transistors. Each semiconductor material contains two types of freely moving charges: electrons (negative charges) and holes (positive charges). Electrons are the more abundant, or majority, carrier in *n*-type materials, holes being the less abundant, or minority, carrier. In *p*-type materials, however, holes are the majority carrier, and electrons the minority carrier. If a battery is properly connected to the semiconductor material, the *p*-type material may acquire additional electrons (minority carriers), injected into the *p*-type material from the *n*-type material by the flow of electrons from the battery. This is minority carrier injection.

As a newly injected electron moves through the *p*-type material, it is attracted by the oppositely charged holes. Collision between an electron and a hole stops the free motion of both charges. Thus only a fraction of the injected electrons are able to pass completely through the *p*-type material. In a transistor, those left over are collected by a second piece of *n*-type material.

minority education, the attempt of national educational systems to preserve the cultural identity of linguistic, religious, and racial or ethnic minorities while assimilating those minorities into the nation's economic and social mainstream.

In countries characterized by the use of several languages, such as Belgium, Switzerland, and India, careful compromises have been worked out to acknowledge cultural differences. Belgium, which recognizes three languages of instruction in the schools, has parallel ministries of education for French and Flemish speakers. India encourages the use of the official language of a particular Indian state in the early stages of education, and in upper secondary or higher education, the use of Hindi or English. Conversely, the Malaysian government insists on the use of Bahasa Malaysian as the language of schooling, with the stated aim of establishing national unity in a country characterized by sizable minority groups.

The problem of having several religious minorities within a country became pressing with the establishment of mass elementary education in the 19th century. Up until then, the church—whichever church it might be—had controlled education, but since the 19th century educational systems have been increasingly financed by national governments. One solution to the religious problem was to insist upon a state monopoly in education, as in the Soviet Union or China after their communist revolutions. Another solution was to insist upon a secularized public educational system, as in France or the United States, where religion is not permitted to be taught in the public schools, but where religious groups may establish their own private schools. In countries where there is a high degree of religious homogeneity, as in some Arab countries, religious teaching is encouraged in the schools, and the interests of church and state are deemed to coincide.

In many countries the problems posed by race and ethnicity have affected not only political stability but also educational policy. The UN Declaration of Human Rights has made it increasingly difficult for governments to base their educational policies explicitly on the category of race—as was done in South Africa. Most governments usually concede, in law, that equality of educational opportunity will be provided without reference to race or ethnicity. Because such equality of educational opportunity is rarely achieved in practice, some governments are moving toward educational policies of positive discrimination in favour of minority groups.

This policy takes different forms in different countries. China's constitution recognizes that China is a multinational state and that all nationalities are equal. Research institutes for the nationalities were established from the 1950s onward, and Chinese and minority teachers were trained for work in the autonomous regions, districts, and counties. Bilingualism became official policy, even where this occasionally meant the preparation of glossaries and dictionaries in the local languages. In its broadest aspects the Chinese problem was not dissimilar from that of the Soviet Union, where, although Russians made up half the population, more than 100 other nationalities existed. As in China, separate glossaries and dictionaries were developed. In both countries the difficulties were often practical: a certain density of population was required for the efficient organization of instruction in minority languages. The other difficulty with the policies was their long-term goal: Chinese and Soviet commentators tended to avoid the term assimilation.

In contrast, assimilation was the overt aim in educating minorities, mainly immigrants, in 19th- and early 20th-century United States and Canada. In recent years both countries have recognized the implications of sociological research on minority education and the political power of minority groups to enter claims at national, regional, and local levels for equal educational treatment. Changes in Canadian law have guaranteed the right to education in French in several provinces, and, where appropriate, in English as a minority language. In addition to the special provisions for Indians, Inuit, and Métis in some provinces and territories, the policies have been extended to permit initial instruction in "heritage languages," for example, Ukrainian in Edmonton and Winnipeg, or Italian and Chinese in Toronto.

Similar, though not identical, developments have occurred in the United States. Most notable was the removal by the Supreme Court in 1954 of the legal basis for racial discrimination in education. The Civil Rights Act of 1964 also provided a basis for improvements in several areas of minority education. Provisions for bilingual education entitle non-English-speaking students to special language assistance. These provisions are utilized mainly by Hispanic students.

Minos, legendary ruler of Crete; he was the son of Zeus, the king of the gods, and of Europa, a personification of the continent of Europe. Minos obtained the Cretan throne by the aid of the Greek god Poseidon, and from Knossos (or Gortyn) he gained control over the Aegean islands, colonizing many of them and ridding the sea of pirates. He married Pasiphae, the daughter of Helios, who bore him, among others, Androgeos, Ariadne, and Phaedra, and who was also the mother of the Minotaur (*q.v.*).

Minos successfully warred against Athens and Megara to obtain redress after his son Androgeos was killed by the Athenians. In Athenian drama and legend Minos became the tyrannical exactor of the tribute of children to feed the Minotaur. Minos was killed in Sicily by the daughters of King Cocalus, who poured boiling water over him as he was taking a bath. After his death he became a judge in Hades.

Although Athens preserved a hostile tradition, the general account shows Minos as a powerful, just ruler, very closely associated with religion and ritual. In light of excavations in Crete, many scholars consider that Minos was a royal or dynastic title for the priestly rulers of Bronze Age, or Minoan, Knossos.

Minot, city, seat of Ward county, northwestern North Dakota, U.S. It lies on the south bank of the Souris (Mouse) River, 50 miles (80 km) south of the Canadian border. The settlement originated in 1886 as a tent town of the Great Northern Railway. Incorporated in 1887, it was named to honour Henry D. Minot, an Eastern railroad investor. The city is now an important shipping point, a regional trade centre, and the site of the annual North Dakota State Fair. Its economy is based largely upon the processing and distribution of agricultural products. Lignite strip mines and a major oil field are in the vicinity. The city is the seat of Minot State College (1913) and Northwest Bible College (1934). Minot Air Force Base and the Upper Souris and J. Clark Salyer national wildlife refuges are nearby. Pop. (1990) 34,544.

Minot, George Richards (b. Dec. 2, 1885, Boston, Mass., U.S.—d. Feb. 25, 1950, Brookline, Mass.), American physician who received (with George Whipple and William Murphy) the Nobel Prize for Physiology or Medicine in 1934 for the introduction of a raw-liver diet in the treatment of pernicious anemia, which was previously an invariably fatal disease.

Minot received his medical degree at Harvard University in 1912. He did research at the Massachusetts General Hospital, Boston (1915–23), the Collis P. Huntington Memorial Hospital, Harvard University (1922–28), and the Peter Bent Brigham Hospital, Boston (1923–28). He served as director of the

Thorndike Memorial Laboratory, Boston City Hospital, from 1928 until his death.

Whipple had shown that anemia in dogs, induced by excessive bleeding, is reversed by a diet of raw liver, and in 1926 he and Murphy found that ingestion of a half pound of raw liver a day dramatically reversed pernicious anemia in human beings. With the American chemist Edwin Cohn, Minot succeeded in preparing effective liver extracts, which, taken orally, constituted the primary treatment for pernicious anemia until 1948, when a therapeutic factor was isolated and named vitamin B_{12}.

George Richards Minot

Boyer—H. Roger-Viollet

Minotaur, Greek MINOTAUROS ("Minos' Bull"), in Greek mythology, a fabulous monster of Crete that had the body of a man and the head of a bull. It was the offspring of Pasiphae, the wife of Minos (*q.v.*), and a snow-white bull sent to Minos by the god Poseidon for sacrifice. Minos, instead of sacrificing it, kept it alive; Poseidon as a punishment made Pasiphae fall in love with it. Her child by the bull was shut up in the Labyrinth created for Minos by Daedalus.

A son of Minos, Androgeos, was later killed by the Athenians; to avenge his death, Minos demanded that seven Athenian youths and seven maidens should be sent every ninth year (or, according to another version, every year) to be devoured by the Minotaur. When the third time of sacrifice came, the Athenian hero Theseus volunteered to go, and, with the help of Ariadne, daughter of Minos and Pasiphae, he killed the monster.

Minseitō, English DEMOCRATIC PARTY, or PROGRESSIVE PARTY, prominent pre-World War II Japanese political party that first came to power in 1929 and then vied with the more conservative Rikken Seiyūkai (*q.v.;* "Friends of Constitutional Government") for Cabinet control during the next 11 years.

Formed in 1927 by the merger of the former Kenseikai ("Constitutional Association") and a minor party, the Minseitō attempted to improve Japan's relations with the West and to lessen military control over the government. A centrist party, the Minseitō was controlled by politicians willing to deal with government bureaucrats for patronage and with business interests to gain funds.

In 1940 the government forced the Minseitō and the Rikken Seiyūkai to merge with the government-controlled Taisei Yokusankai ("Imperial Rule Assistance Association"). After 1945 a new Democratic Party was formed, which included many former Minseitō members.

Minshatō (Japan): *see* Democratic Socialist Party.

Minsk, *oblast* (province), central Belarus. It extends from the rolling, morainic hills of the Belorussian Ridge in the northwest across the Berezina plain, which slopes gently to the southeast. The natural vegetation is dense forest of pine, spruce, oak, and birch, and alder in wetter areas, but on the uplands most of the forest has been cleared for agriculture, with consequent gully erosion. In the south and east, grass marsh and peat bog are extensive. The economy is dominated by the capital city, Minsk. Apart from Borisov and the vehicle-making centre of Zhodino, the *oblast*'s towns are small and are engaged in processing timber and local farm produce. Cultivation of rye, wheat, buckwheat, barley, and flax is chiefly concentrated on the uplands and around Slutsk in the south; dairying is widespread. The chief industries are machine and instrument building (automobiles, tractors, lathes, motorcycles, televisions, and radio receivers). In the 1960s large deposits of potassium salts at Starobin began to form the base for fertilizer production in Soligorsk. This area has become one of the most important potash-producing centres in Europe. Area 15,500 square miles (40,200 square km). Pop. (1999) 1,558,600.

Minsk, Belarusian MANSK, city, capital of Belarus, and administrative centre of Minsk *oblast* (province). The city lies along the Svisloch River. First mentioned in 1067, it became seat of a principality in 1101. Minsk passed to Lithuania in the 14th century and later to Poland, being regained by Russia in the second partition in 1793. The city has suffered many disasters, including frequent destruction by fire, sacking by the Crimean Tatars in 1505, occupation and damage by French troops in 1812, German occupation in 1918, Polish occupation in 1919–20, and almost total destruction in World War II, especially during the Soviet advance in 1944. Nevertheless Minsk steadily increased in importance, first as a provincial centre after 1793 and later as an industrial centre after the building of the Moscow-Warsaw and Liepaja-Romny railways through Minsk in the 1870s. In 1919 it became the capital of the Belorussian republic.

Belarusians in traditional dress at a winter carnival, Minsk city, Belarus

© AFP/Corbis

The city's large Jewish community was systematically massacred during the German occupation (1941–44) in World War II. Minsk itself was almost completely demolished in the course of the war, and it was subsequently rebuilt with abundant parks, wide boulevards, and many blocks of multistory apartment buildings. Minsk grew in population faster than any comparable Soviet city in the period 1959–89, its inhabitants more than tripling from 500,000 to nearly 1,600,000 during that time. Minsk remained the capital when Belarus gained independence in 1991. That same year, the city became the administrative centre of the Commonwealth of Independent States.

The present-day city, sprawling over gently hilly relief, is almost entirely of new construction; most of the principal buildings in the centre are in the ponderous architectural style of the early Soviet period. The Mariinsky Cathedral and the church of the Bernadine monastery survive as relics of the past.

Minsk is the major industrial centre of Belarus. The economy is based on machine-building, particularly the manufacture of trucks and tractors. Other products include electric motors, bearings, machine tools, radio and television equipment, refrigerators, watches, textiles, and foodstuffs. The city is also a major educational, cultural, and printing centre, with the Academy of Sciences of Belarus, a university founded in 1921, and numerous other institutions of higher education. Minsk has a music conservatory, a palace of winter sports, and a number of theatres, including the Belarus State Theatre of Opera and Ballet. Pop. (2000 est.) 1,688,000.

minstrel (Old French and Provençal: *menestrel;* from Latin *ministerium,* "service"), between the 12th and 17th centuries, a professional entertainer of any kind, including juggler, acrobat, and storyteller; more specifically, a secular musician, usually an instrumentalist. In some contexts, "minstrel" more particularly denoted a player of wind instruments, and in the 15th century it was sometimes even used for an instrument that he played, the shawm (an early form of oboe). The word minstrel replaced the earlier jongleur (Provençal: *joglar*) about the 14th century.

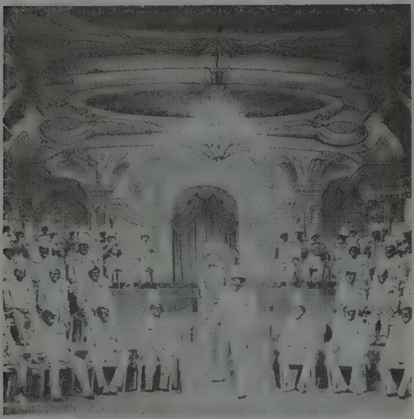
The minstrel profession antedates its name. In the 4th century the *glêoman* is heard of among the Angles, and in the 6th century the Germanic *scop* is referred to. The Old English poem "Widsith" (*q.v.*) describes the role of a fictitious *scop* in Germanic society. In the 12th century there emerges a clearer picture of the performance and social situation of the minstrel. Many were attached to courts, some as musicians. Others, the great majority, traveled widely, staying for short times at places of potential patronage. Most minstrels were unable to write their music down; their art was one of memory and improvisation. Consequently, little of their music survives, but it is not unlikely that the best minstrels, some of whom commanded large salaries, performed music equal in sophistication to surviving examples of the 12th- and 13th-century polyphony (part music) that was composed by clerics (those who could write).

The 14th and 15th centuries witnessed the development of minstrel guilds in towns all over Europe. The guilds made the minstrel more a part of his society, required that he be properly trained by another member of the guild, and saw to it that there was work for him. In the later 15th century, town ordinances in Flanders even stipulated that the minstrels practice together regularly and give concerts at specified times. Their performances were mostly outdoors or at large gatherings, and so the preferred instruments were the louder ones—shawms, pipes, trumpets, and drums.

The little surviving instrumental music from these centuries apparently comes not from the town guilds but from the musicians established in noble houses. At the accession of Philip the Good, duke of Burgundy, in 1419, his court included six trumpeters, four *menestrels,* and a harpist. Later the number of musicians was increased. The relative stability of musicians at that court (one stayed 34 years) suggests a high degree of group improvisational skill among minstrels. Similar groups of musicians were employed at many European courts, and there was a fair degree of contact between them. The Burgundian court records show that during Lent, when entertainment was not permitted, the minstrels were given a special allowance to visit "minstrel schools" in various parts of Europe so that they could learn new tunes and find out what their colleagues elsewhere were playing.

The later 15th century saw a marked increase in literacy among the laity as well as a more simplified musical notation (essentially that still in use). Sixteenth-century manuscripts of wind-band music often also contain church music, suggesting that the distinction between reading clerical musicians and nonreading minstrels was breaking down. Also, the popular dance forms were being used by composers as a framework for composition rather than for improvisation. This convergence of the hitherto distinct styles of minstrelsy and art music contributed to the decline of the minstrel profession. Though the guilds, town bands, and wandering musicians continued to exist, the importance of the minstrel as a separate part of the musical profession faded after the 16th century. The minstrel is related to such other medieval singers as the meistersinger, the minnesinger, the troubadour, and the trouvère (*qq.v.*).

minstrel show, indigenous American theatrical form comprising a group of blackfaced white minstrels whose material caricatured the singing and dancing of Negro slaves. It was popular in England as well as the United States, reaching its zenith between 1850 and 1870. The form gradually declined, eventually disappeared from the professional theatres, and became purely a vehicle for amateurs. Although its influence was evident in vaudeville, radio, television, and motion pictures in the 20th century, its chief impact came through its folk music and dances, which made permanent contributions to American culture.



An American minstrel show with interlocutor and performers, first half of the 20th century

Brown Brothers

The father of the American minstrel show was Thomas Dartmouth Rice, popularly known as "Jim Crow." He was an early Negro impersonator whose art created a vogue for blackfaced minstrelsy. The pioneer company, the Virginia Minstrels, a quartet headed by Daniel Decatur Emmett, first performed in 1843. Other noteworthy companies were Bryant's, Campbell's, and Haverly's, but the most important of the early companies was the Christy Minstrels, who played on Broadway for nearly 10 years; Stephen Foster wrote songs for this company.

The format of the minstrel show, usually in two parts, was established by the Christy company and changed little thereafter. In part one the performers were arranged in a semicircle, with the interlocutor in the centre and the end men—Mr. Tambo, who played the tambourine, and Mr. Bones, who rattled the bones—at the ends. The interlocutor, in whiteface, usually wore formal attire; the others, in blackface, wore gaudy swallow-tailed coats and striped trousers. The program opened with a chorus, often as a grand entrance, and at the conclusion of the song the interlocutor gave the command, "Gentlemen, be seated." Then followed a series of jokes between the interlocutor and end men, interspersed with ballads, comic songs, and instrumental numbers, chiefly on the banjo and violin. The second part, or olio (mixture or medley), consisted of a series of individual acts that concluded with a hoedown or walk-around in which every member did a specialty number while the others sang and clapped. Occasionally there was a third part consisting of a farce, burlesque, or comic opera.

mint, in botany, any fragrant, strong-scented herb of the *Mentha* genus, comprising about 25 species of perennial herbs, and certain related genera of the mint family (Lamiaceae, or Labiatae) and including peppermint, spearmint, oregano, marjoram, rosemary, and thyme (*qq.v.*). Native to Europe, Asia, and Australia, mints are naturalized in North America and are widely distributed throughout the temperate and subtropical areas of the world but principally in the temperate regions of the Old World. Many are used as flavourings for foods, but, in cookery, the term mint usually refers to peppermint or spearmint.

True mints belong to the *Mentha* genus. They have square stems, opposite, aromatic leaves, and small flowers usually of a pale purple, pink, or white colour arranged in clusters, either forming separate whorls or crowded together in a terminal spike. All *Mentha* abound in volatile oil, contained in resinous dots in the leaves and stems. Oils of mints are used as scents in perfumery and as flavouring in candy, liqueur, gum, dentifrices, and medicines. The mint of the Bible is presumed to be *Mentha longifolia* because it is extensively cultivated in the Middle East; it was one of the bitter herbs with which the paschal lamb was eaten. This plant has hairy leaves with silky undersides and dense flower spikes. The water mint, *Mentha aquatica,* grows in ditches and has rounded flower spikes and stalked, hairy leaves. Pennyroyal, *Mentha pulegium,* has small oval, obtuse leaves and flowers in axillary whorls and is remarkable for its creeping habit and pungent odour. It has been used in folk medicine to induce perspiration and menstruation.

Other members of the family Lamiaceae are also called mints: *Monarda,* the bergamots, are called horsemint; *Pycnanthemum* is called mountain mint; *Nepeta cataria* is called catnip, or catmint; *Cunila origanoides* is called stonemint, or Maryland dittany; *Prostanthera,* tender Australian shrubs, are called mint bushes.

mint, in economics, a place where coins are made according to exact compositions, weights, dimensions, and tolerances, usually specified by law.

The first state mint was probably established by the Lydians, an Anatolian people, in the 7th century BC. The Greeks of the Aegean Islands soon followed their example, and the art spread into Italy and other Mediterranean countries, as well as to Persia and India. The Romans, who probably began coining in the 4th century BC, laid the foundations of modern minting.

Coining originated independently in China in the 7th century BC and spread into Japan and Korea.

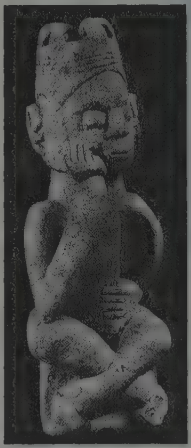
In medieval Europe, mints proliferated as commerce revived, and every feudal authority—kings, counts, bishops, and free cities—exercised the mint privilege; there were more than 50 mints in 13th-century France alone. The result was a wide variation in coinage that often handicapped commerce.

In the 16th century, mints were set up by the Spaniards in South America and Mexico to coin the gold and silver mined there.

Most modern countries operate only one mint (although in Great Britain the mint at Llantrisant, Wales, produces the vast bulk of coinage while the London mint at Tower Hill is largely an administrative centre). Of the seven coinage mints in operation at various times in the United States only two were active in the early 1980s, in Philadelphia and Denver; proof sets of coins for collectors were minted at San Francisco, however.

Countries in which the demand for coins is not sufficient to make a national mint economically feasible have their coins struck in foreign mints. The British mint has struck coins for other countries since the 16th century. Many mints perform functions other than minting, notably refining precious metals and manufacturing medals and seals.

mintadi, steatite (soapstone) figure from Angola. According to Italian documents, *mintadi* figures were brought to the Museo Preistorico Etnografico Luigi Pigorini (Luigi Pigorini Prehistoric Ethnographic Museum) in Rome by missionaries from Africa in the 17th century. Traditional *mintadi*, similar to those antique figures, were still being carved centuries later.



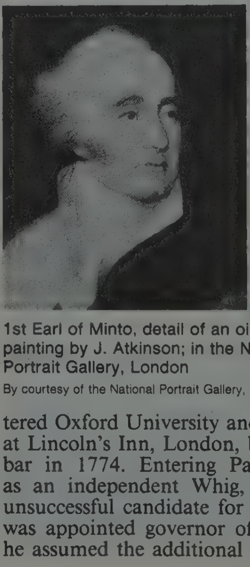
Kongo *mintadi*, steatite, from Angola; in the Musée de l'Homme, Paris

By courtesy of the Musee de l'Homme, Paris

Mintadi, kneeling or seated, were created for the purpose of guarding the graves of ancestors. They also served as portraits of the buried kings and chiefs, as evidenced by emblematic identifications carved on the headdresses.

Minto, Gilbert Elliot-Murray-Kynynmound, 1st earl of, Viscount Melgund of Melgund, also called (from 1797) baron Minto of Minto, original name Gilbert Elliot (b. April 23, 1751, Grey Friars, Edinburgh—d. June 21, 1814, Stevenage, Hertfordshire, Eng.), governor general of India (1807–13) who successfully restrained the French in the East Indies.

Gilbert and his brother Hugh studied in Paris under the supervision of the philosopher David Hume, then secretary to the British embassy. Returning to England, Gilbert entered Oxford University and then studied law at Lincoln's Inn, London, being called to the bar in 1774. Entering Parliament in 1776 as an independent Whig, he was twice an unsuccessful candidate for speaker. When he was appointed governor of Corsica in 1794, he assumed the additional names of Murray-



1st Earl of Minto, detail of an oil painting by J. Atkinson; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Kynynmound (from his mother's family); he was created Baron Minto in 1798. After serving briefly as envoy extraordinary to Vienna and then president of the Board of Control, he became governor general of India in 1807.

Supporting a policy of nonintervention, Minto avoided major war in India; by a show of force he prevented the Pindari bandit leader Amīr Khān from interfering in Berār in 1809. His Treaty of Amritsar in 1809 with Ranjit Singh of the Punjab recognized the Sutlej River as the boundary between the Sikh state in the Punjab and the British Indian territories. He negotiated an end to the Franco-Russian threat to India in 1810 and in the same year conquered the French islands of Bourbon (now Réunion) and Mauritius in the Indian Ocean and Napoleon's Dutch East Indies possessions of Amboina and the Spice Islands (Moluccas), followed by the island of Java in 1811. He was created Viscount Melgund and Earl of Minto in 1813.

Minto, Gilbert John Elliot-Murray-Kynynmound, 4th earl of, VISCOUNT MELGUND OF MELGUND, BARON MINTO OF MINTO (b. July 9, 1845, London—d. March 1, 1914, Minto, Roxburgh, Scot.), governor general of Canada (1898–1905) and viceroy of India (1905–10); in India he and his colleague John Morley sponsored the Morley–Minto Reforms Act (1909). The act moderately increased Indian representation in government but was criticized by Indian nationalists because of its creation of separate electorates for Hindus and Muslims, which they believed fostered divisions among the Indian population in order to facilitate British rule.

Educated at Eton College and Trinity College, Cambridge, Minto served in the Scots Guards (1867–70), left for a brief career in riding, and then was a newspaper correspondent in Spain and Turkey (1874–77). He participated in the Second Afghan War (1879) and in the Egyptian campaign (1882) before going to Canada in 1883 as a military secretary. In 1886 he returned to England, where he succeeded to his father's titles in 1891. Appointed governor general of Canada in 1898, he moderated conflicts between Canadian prime minister Sir Wilfrid Laurier and British colonial secretary Joseph Chamberlain.

In 1905 Minto was appointed viceroy of India, with Morley as secretary of state. The two men agreed that certain political reforms were needed to satisfy educated Indians, to strengthen moderate leaders of the Indian National Congress Party, and to control rising nationalism. Consequently, two Indian members were appointed to the council of the secretary of state and one to the viceroy's executive council. Minto's desire to secure better representation for the landed and commercial interests and for Muslims in the legislative councils resulted in the establishment of separate Hindu and Muslim electorates. He also encouraged the foundation of the Muslim League as a rival organization to the Congress. His critics saw this as part of a "divide and rule" policy that has been blamed for the eventual partition of India.

Minto revived the government's power of deportation without trial in order to deal with the revolutionaries Lajpat Rai and Ajit Singh, and he instituted stringent measures against those who advocated armed resistance to British rule.

Mintoff, Dom(inic) (b. Aug. 6, 1916, Cospicua, Malta), leader of Malta's Labour Party who served twice as prime minister (1955–58; 1971–84).

Educated at the University of Malta and Hertford College, Oxford, Mintoff was general secretary of the Malta Labour Party in 1936–37 and worked as a civil engineer in Great Britain during the Italian–German siege of Malta in 1941–43. Back in Malta, he practiced as an architect and helped reorganize the Labour Party in 1944, becoming its leader in 1949. He served as Malta's prime minister and minister of finance from 1955 to 1958 but resigned in 1958 to lead the Maltese Liberation Movement, which spearheaded the drive for independence, achieved in 1964, within the Commonwealth of Nations.

From 1962 to 1971 Mintoff was leader of the opposition to the Nationalist government and then in 1971 again became prime minister. Aggressively proclaiming Malta's sovereignty, he posed financial and other demands to the British that forced British and NATO evacuation of the island's bases by March 1979. By the end of the 1970s he had expelled British journalists and many businessmen and drawn close to the leftist governments in Libya and Algeria. But relations with Libya suffered as a result of a dispute over the continental-shelf boundary. In the 1981 elections Mintoff's Labour Party kept its majority in spite of losing the popular vote. Mintoff resigned as prime minister in 1984.

Minton, Sherman (b. Oct. 20, 1890, near Georgetown, Ind., U.S.—d. April 9, 1965, New Albany, Ind.), associate justice of the United States Supreme Court (1949–56).

While at Yale Law School, Minton helped to organize the university's legal aid society. His law practice in New Albany in Indiana was interrupted by his service in World War I, and after his return home he joined a law firm in the same town. His political career began with his appointment in 1933 as counsel to the Indiana Public Service Commission, in which capacity he was responsible for reducing the state's utility rates.

Minton was a champion of New Deal programs in the U.S. Senate (1935–39) and as a special assistant to Pres. Franklin D. Roosevelt. In 1941 he was appointed to the seventh Circuit Court of Appeals, on which he served until named to the U.S. Supreme Court in 1949. The previous year he had served on a three-member board that investigated a coal strike called by mine-union leader John L. Lewis, who had violated an injunction and was subsequently fined for contempt.

On the court, Minton frequently demonstrated conservative points of view, consistently upholding actions taken by the federal government in cases involving free-speech claims or cases involving alleged subversives. In an important opinion in *United States* v. *Rabinowitz* (1950) Minton reversed a lower-court ruling that search warrants must be procured when "practicable," declaring that the 4th Amendment prohibited only "unreasonable searches." He retired from the court in 1956 for reasons of health.

Minton ware, cream-coloured and blue-printed earthenware maiolica, bone china, and Parian porcelain produced at a factory founded in 1793 in Stoke-upon-Trent, Staffordshire, Eng., by Thomas Minton, who popularized the famous so-called Willow pattern. In the 1820s he started production of bone china; this early Minton is regarded as comparable to French Sèvres, by which it was greatly influenced.

Minton pilgrim flask with pâte-sur-pâte decoration by Marc-Louis Solon, 1875; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Minton's was the only English china factory of the 19th century to employ a Sèvres technical process called pâte-sur-pâte (*q.v.*; painted decoration in white clay slip instead of enamel before glazing). Minton also produced Parian figures. The Minton factory was the most popular supply source in the 19th century of dinnerware made to order for embassies and for heads of state.

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minuet (from French *menu:* "small"), elegant couple dance that dominated aristocratic European ballrooms, especially in France and England, from *c.* 1650 to *c.* 1750. Reputedly derived from the French folk dance branle de Poitou, the court minuet used smaller steps and became slower and increasingly etiquette-laden and spectacular. Dancers, in the order of their social position, often performed versions with especially choreographed figures, or floor patterns, and prefaced the dance with stylized bows and curtsies to partners and spectators. The basic floor pattern outlined by the dancers was at first a figure 8 and, later, the letter Z.

Minuet, "Fêtes vénitiennes," oil painting by Antoine Watteau (*c.* 1718); in the National Gallery of Scotland, Edinburgh

By courtesy of the National Gallery of Scotland, Edinburgh; photograph, Tom Scott

Musically, the minuet is in triple time (as $\frac{3}{4}$ or $\frac{3}{8}$) with two sections: minuet and trio (actually a second minuet, originally for three instruments; it derives from the ballroom practice of alternating two minuets). Each consists of two repeated phrases (AA–BB), but the repetition may be varied (AA′–BB′). The overall form is minuet–trio–minuet. The minuet frequently appears in 18th-century suites (groups of dance pieces in the same key), and in Mozart's opera *Don Giovanni* onstage musicians play a minuet in the fourth act. Typically, the third movement of a classical sonata or symphony is a minuet. In his symphonies Beethoven often replaced the minuet with a scherzo, similar or identical in form but much faster and more exuberant.

Minūfīyah, Al-, also spelled MUNUFIA, *muḥāfaẓah* (governorate) of Lower Egypt in the western part of the apex of the Nile River delta, between the Damietta (east) and Rosetta (west) branches of the Nile. Its 592 square miles (1,532 square km) of settled area includes some of the most productive land of the delta, supporting a rural population that reaches 2,500 persons per square mile (970 persons per square km). Agriculture is the principal occupation, employing more than three-fifths of the workers. Nearly one-third of the land is under corn (maize); other crops include cotton, wheat, clover, dates, and onions. Milk and dairy products also are produced. The major source of irrigation water is Al-Minūfīyah Canal, which flows from the Delta (Al-Khayrīyah) Barrage on the Nile via Shibīn and Baquriyah canals. Most of the population lives in villages and small towns. The principal centres are Shibīn al-Kawm (capital of the *muḥāfaẓah*), Minūf, and Ashmūn—all with cotton-ginning facilities. Pop. (1986 prelim.) 2,227,087.

Minuit, Peter, Minuit also spelled MINNEWIT (b. *c.* 1580, Wesel, Kleve [Germany]—d. June 1638, Caribbean Sea), Dutch colonial governor of New Amsterdam who is mainly remembered for his fabulous purchase of Manhattan Island (the nucleus of New York City) from the Indians for a mere 60 guilders.

Though probably of French or Walloon ancestry, Minuit wrote in Dutch and was a deacon in the local Dutch Church in his hometown of Wesel in Germany. In 1625 he left Wesel, perhaps in flight from the Spanish who had occupied the town, and from Holland he sailed to the Dutch colony of New Netherland. He apparently returned to Holland the same year, for in January 1626 he sailed westward again, arriving at the mouth of the Hudson River on May 4, 1626. On September 23 the Dutch West India Company named him director general of the colony on Manhattan. To legitimize European occupation of the territory, he called together the Indian sachems and persuaded them to sell the entire island for a handful of merchandise—mostly trinkets. On the southern tip he founded New Amsterdam, building a fort around which the early Dutch settlers could make their homes.

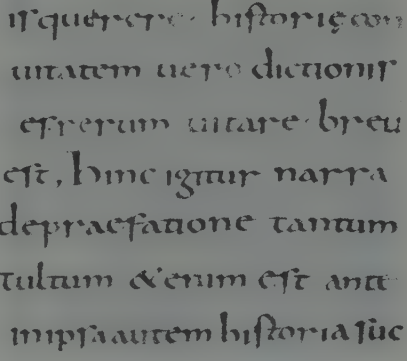
In 1631 Governor Minuit was recalled to Holland, presumably for granting privileges to the patroons at the expense of the Dutch West India Company. A few years later he entered Swedish service and was given command of two vessels of mainly Swedish colonists, who established (March 1638) New Sweden—the first settlement on the Delaware River. There Minuit again purchased land from the Indians and built Fort Christina (later Wilmington). On a trading expedition soon after to the island of Saint Christopher in the West Indies, Minuit was lost at sea in a hurricane.

Minuit, detail of a painting by an unknown artist

By courtesy of the Library of Congress, Washington, D.C.

minuscule, in calligraphy, small, or lowercase, letter in most alphabets, in contrast to the majuscule, or uppercase, capital letter. Unlike capitals, minuscules are not fully contained between two real or hypothetical lines; the stems of such ascending letters as *b, d, f, h, k,* and *l* range above the upper line, and such descending letters as *p* and *q* go below the lower.

Carolingian minuscule was the first such style to emerge. This clear and manageable script was developed by Alcuin of York and his English monks at the Abbey of St. Martin's at Tours, Fr. Alcuin was the emperor Charlemagne's organizer of educational reforms between 781 and 790 AD. In order to carry out the enormous task assigned, Alcuin needed an easy-to-read script that could set a standard for the copying of the Vulgate Bible of St. Jerome.



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Minuscule script from the Maurdramnus Bible, Corbie, Fr., Carolingian, *c.* 772–781; in the Bibliothèque Municipale, Amiens, Fr.

By courtesy of the Bibliotheque Municipale, Amiens, France

The beautiful and legible Carolingian minuscule that resulted introduced small, or lowercase, letters and, by beginning sentences with capital letters and ending them with periods, made possible the division of writing into sentences and paragraphs. The script was originally round and widely spaced. Over the years, however, it became laterally condensed, the strokes became heavier, and it took on Gothic characteristics. Gothic minuscule script originated in northern Europe and became popular throughout Europe in the 10th to the 15th century. It is an angular and compact letter form. *See also* black letter.

minute, in timekeeping, 60 seconds, now defined in terms of radiation emitted from atoms of the element cesium under specified conditions. The minute was formerly defined as the 60th part of an hour, or the 1,440th part (60×24 [hours] $= 1{,}440$) of a mean solar day—*i.e.,* of the average period of rotation of the Earth relative to the Sun. The minute of sidereal time (time measured by the stars rather than by the Sun) was a fraction of a second shorter than the mean solar minute. The minute of atomic time is very nearly equal to the mean solar minute in duration.

minute pirate bug (insect): *see* flower bug.

minuteman, in U.S. history, an American Revolution militiaman who agreed to be ready for military duty "at a minute's warning."

The first minutemen were organized in Worcester county, Massachusetts, in September 1774, when revolutionary leaders sought to eliminate Tories from the old militia by requiring the resignation of all officers and reconstituting the men into seven regiments with new officers. One-third of the members of each regiment were to be ready to assemble under arms at instant call and were specifically designated "minutemen." Other counties began adopting the same system, and, when Massachusetts' Provincial Congress met in Salem in October, it directed that the reorganization be completed. The first great test of the minutemen was at the Battles of Lexington and Concord on April 19, 1775. On July 18, 1775, the Continental Congress recommended that other colonies organize units of minutemen; Maryland, New Hampshire, and Connecticut are known to have complied.

Minuteman missile, intercontinental ballistic missile (ICBM) that constituted most of the land-based nuclear arsenal of the United States from the 1960s.

There have been three generations of the Minuteman missile. The Minuteman I was first deployed in 1962. This 56-foot (17-metre), three-staged missile was the first ICBM to use solid fuels (which are safer than the more volatile liquid fuels) and the first U.S. ICBM to be based in underground silos (previous missiles were stored on above-ground launch pads). Between 1966 and 1973 the Minuteman I was replaced by the Minuteman II. Improved propulsion gave this missile a longer range of about 8,000 miles (13,000 km), and its reentry vehicle, carrying a 1.2-megaton thermonuclear warhead, was equipped with electronic jammers and other devices designed to penetrate radar-directed antiballistic missile defenses around cities and military sites in the Soviet Union.

The Minuteman III was deployed between 1970 and 1975 with two or three independently targetable reentry vehicles, each carrying a 170-kiloton thermonuclear warhead. In the 1980s three 335-kiloton warheads were installed on some Minuteman IIIs, along with a more accurate guidance system that gave them a "hard-target kill" potential to destroy reinforced ICBM silos and command bunkers in the Soviet Union.

Beginning in 1986, some Minuteman IIIs were replaced by the Peacekeeper missile. By that time about 1,000 Minuteman II and III missiles had been deployed at air-force bases in Wyoming, North Dakota, South Dakota, Montana, and Missouri.

Minyā, Al-, *muḥāfaẓah* (governorate) in Upper Egypt, between Banī Suwayf governorate to the north and Asyūṭ governorate to the south. It occupies a settled area of 873 square miles (2,262 square km) in the floodplain of the Nile River and extends for about 75 miles (120 km) along the river but also includes a section of the Western Desert, extending out toward the oases. To the west and east it merges into desert terrain, and the cultivated floodplain on the eastern bank is very narrow. Iron ore is found in the desert west of the river valley, and limestone is quarried on the eastern bank, north of Al-Minyā city. The area is heavily agricultural, the chief crops being cotton, corn (maize), wheat, dates, sugarcane, millet, and onions. Industrial activities include cotton ginning and flour milling. Al-Minyā city, Abū Qurgaṣ, and Shaykh Faḍl have sugar mills. Other towns include Mallawī and Banī Mazār.

Sites with antiquities are located at Banī Ḥasan ash-Shurūq, Ash-Ashmūnein (ancient Hermopolis), and Tūnat al-Jabal, all south of Al-Minyā city. Mallawī has a regional museum with antiquities from sites in the governorate. Pop. (1986 prelim.) 2,648,043.

Minyā, Al-, also spelled MENIA, city and capital of Al-Minyā *muḥāfaẓah* (governorate), in the Nile River valley of Upper Egypt. Al-Minyā is linked to Cairo (140 miles [225 km] north-northeast) by rail; it is a trading and administrative centre on the west bank of the Nile. Besides serving as a market and financial centre for the governorate, Al-Minyā has cotton gins and flour mills, a sugar refinery, and a carpet- and rug-weaving industry. The city has a television station, a university, and an automobile ferry to the east bank of the Nile. Because of its road and rail links, it has become a transit point for tourists visiting Middle Egypt, and there are several hotels in the city. Across the Nile to the southeast, at Zāwiyat al-Amwāt, lie ruins of the ancient town Menat Khufu, from which Al-Minyā derives its name. It was the ancestral home of the pharaohs of the 4th dynasty (*c.* 2575–*c.* 2465 BC). Remains of the Gerzean prehistoric period have been found, and a small pyramid of the 3rd dynasty stands there. About half the population is Coptic Christian. Pop. (1996) 201,360.

minyan (Hebrew: "number"), plural MINYANIM, or MINYANS, in Judaism, the minimum number of males (10) required to constitute a representative "community of Israel" for liturgical purposes. A Jewish boy of 13 may form part of the quorum after his Bar Mitzvah (religious adulthood). When a minyan is lacking for synagogue services, those who have gathered merely recite their prayers as private individuals. There is thus no public reading from the Torah (first five books of the Bible) and no Hafṭarah (selection from the prophetic books of the Bible). Such invocations as the Kaddish and *qedusha* are likewise omitted, for none of these is considered appropriate unless the "Jewish community" prays as one.

Similarly, the recital of the seven benedictions (*sheva‘ berakhot*) at a wedding and their repetition on the seven succeeding days require a minyan—with one new member participating each day. During grace after meals, "Our God" is inserted into the introductory invitation when a minyan is present, indicating again that the prayer is communal rather than private. In cases of necessity, a boy nearing his Bar Mitzvah is sometimes counted as the 10th male member. Reform and Conservative Judaism have modified the custom by allowing women to complete a minyan.

Minyan ware, first wheel-made pottery to be produced in Middle-Bronze-Age Greece. It was first found at sites at Orchomenus. It was first introduced onto the mainland from Asia Minor in the third phase of the Early Helladic (2200–2000 BC); production continued during the Middle Helladic (*c.* 2000–*c.* 1600 BC). Uniformly gray in colour, the ware has a soaplike feeling, and its shapes are modeled after metal objects.

Miocene epoch, major worldwide division of the Tertiary period that extended from 23.7 to 5.3 million years ago. It is often divided into the Early Miocene epoch (23.7 to 16.6 million years ago), the Middle Miocene epoch (16.6 to 11.2 million years ago), and the Late Miocene epoch (11.2 to 5.3 million years ago). The Miocene may also be divided into six ages and their corresponding rock stages: from oldest to youngest these ages or stages are the Aquitanian, Burdigalian, Langhian, Serravallian, Tortonian, and Messinian. The Miocene epoch precedes the Pliocene epoch and follows the Oligocene epoch.

Important Miocene deposits occur in North and South America, southern Europe, India, Mongolia, East Africa, and Pakistan. Marine and terrestrial environments are represented in the Miocene stratigraphic record. The record of terrestrial life is extensive and varied, providing a rather complete view of the development of vertebrates, especially mammals.

Miocene mammalian faunas are essentially modern; many archaic groups were extinct by the end of the Oligocene, and fully half of the known modern families of mammals are present in the Miocene record. Some interchange of faunas occurred between the Northern Hemispheres of the Old and New Worlds. Free communication was possible between Africa and Eurasia, but South America and Australia remained isolated. The very fossiliferous Harrison Formation of Nebraska has produced an abundance of mammalian remains, including large, slender camels; strange deerlike creatures; bear dogs; foxes; peccaries; a small, archaic beaver that apparently had the habits of a ground squirrel; and the Miocene horse. During the Miocene, horse evolution occurred mainly in North America; forms such as *Parahippus, Miohippus* (a form carried over from the preceding Oligocene epoch), *Anchitherium, Hypohippus, Pliohippus,* and *Merychippus* are genera that represent great diversification and development. The first dogs and bears appeared; the bear dog *Hemicyon* is close to the origin of the bears. The first hyenas, springing from primitive civets, appeared in the Miocene, as did the early sabre-toothed cats. Primitive antelope, deer, and the earliest giraffids appeared in the Miocene of Eurasia. The early elephantlike forms, previously known only from the Oligocene of Africa, spread to the Eurasian continent in the Miocene and became more diverse.

In Argentina the Santa Cruz Formation of Middle Miocene time provides an excellent record of the unusual Miocene fauna of South America. Marsupial carnivores, aberrant edentates, litopterns, and toxodonts are among the odd groups represented. These forms were able to evolve because of South America's isolation from other regions. The evolution of the South American monkeys, the platyrrhines, was under way during the Miocene.

By the end of the Miocene epoch almost all the modern groups of whales had appeared, as had the early seals and walruses. Birds such as herons, rails, ducks, eagles, hawks, crows, sparrows, pheasants, owls, and partridges were present in the Miocene of Europe, where the uplifting of the Alps continued through Miocene time.

The Miocene epoch is of great importance in primate evolution. The last primate to occur in the fossil record of North America, a tarsier-like creature, is known in the United States. Elsewhere, the higher primates, especially the apes, underwent a great deal of evolution. The fossil evidence seems to indicate that advanced primates, including apes, were present in southern Europe. An early gibbon, *Pliopithecus,* as well as the dryopithecines, a group of advanced manlike apes that probably represent the stock from which modern apes and man originated, are found in Miocene rocks of Europe. The dryopithecines also are present in the Miocene of Africa, the region where manlike forms and the direct ancestors of man probably originated. *Ramapithecus,* a form known from the latest Miocene or, perhaps, the earliest Pliocene, represents an advancement over dryopithecines toward the human condition.

Miohippus, genus of extinct primitive horses that originated in North America during the middle Oligocene epoch (36.3 to 23.7 million years ago). *Miohippus* evolved from the earlier and more primitive genus *Mesohippus* and showed a tendency toward increased size and a more advanced dentition. The limbs of *Miohippus* were better adapted for running, although three functional toes were still present on all feet. *Miohippus* persisted into the succeeding Miocene epoch side by side with its more horselike and advanced descendants.

Miohippus intermedius

By courtesy of the American Museum of Natural History, New York

miqve, also spelled MIQWE (Judaism): *see* mikvah.

mir, in Russian history, a self-governing community of peasant households that elected its own officials and controlled local forests, fisheries, hunting grounds, and vacant lands. To make taxes imposed on its members more equitable, the mir assumed communal control of the community's arable land and periodically redistributed it among the households, according to their sizes (from 1720).

After serfdom was abolished (1861), the mir was retained as a system of communal land tenure and an organ of local administration. It was economically inefficient; but the central government, having made members of the commune collectively responsible for the payment of state taxes and the fulfillment of local obligations, favoured it. The system was also favoured by Slavophiles and political conservatives, who regarded it as a guardian of old national values, as well as by revolutionary Narodniki ("Populists"), who viewed the mir as the germ of a future socialist society. Despite the efforts of Prime Minister Pyotr A. Stolypin, who initiated a series of agricultural reforms encouraging peasants to assume private ownership, the peasantry universally reverted to communal landholding after the 1917 Revolution.

Mir, Soviet/Russian modular space station, the core module (base block) of which was launched into Earth orbit by the U.S.S.R. in 1986. Over the next decade additional modules were sent aloft on separate launch vehicles and attached to the core unit, creating a large habitat that served as a versatile space laboratory for more than 14 years.

Mir (Russian: "peace" or "world") was the third generation of space stations developed by the Soviet Union. Its core module resembled its simpler predecessors in the Salyut (*q.v.*) series but had additional docking ports (a total of six) that accommodated not only a succession of manned spacecraft and cargo ferries but also permanently attached expansion modules equipped for scientific research.

Mir's core module was launched on Feb. 20, 1986. It had the form of a stepped cylinder about 13 m (43 feet) long and 4.2 m (13.8 feet) in diameter at its widest point. The module had a docking port at each end and four ports sited radially at its forward end. Between March 1987 and April 1996 five expansion modules were added—Kvant 1, an astrophysics observatory; Kvant 2, containing supplementary life-support equipment and a large airlock; Kristall, a materials-sciences laboratory; and Spektr and Priroda, two science modules containing remote-sensing instruments for ecological and environmental studies of Earth.

Mir supported human habitation between March 14, 1986, and June 15, 2000, which included an uninterrupted stretch of occupancy of almost 10 years. It hosted more than 100 people from 12 countries, including a series of U.S. astronauts between 1995 and 1998 as part of a Mir-space shuttle cooperative endeavour. Designed for only a five-year life, the aging station suffered a series of equipment failures and accidents in 1996–97 but remained in service. On March 23, 2001, the abandoned Mir made a controlled reentry, with the surviving pieces falling into the Pacific Ocean.

Mīr Dāmād, original name MUḤAMMAD BĀQIR IBN AD-DĀMĀD (d. 1631/32, near Najaf, Iraq), philosopher, teacher, and leader in the cultural renascence of Iran during the Ṣafavid dynasty.

A descendant of a well-known Shī'ī family, Mīr Dāmād spent most of his life in Isfahan as a student and teacher. Mīr Dāmād's major contribution to Islāmic philosophy was his concept of time and nature. A major controversy as to whether the universe was created or eternal had engaged the attention of Western and Islāmic philosophers; Mīr Dāmād was the first to advance the notion of *ḥuduth-e dahrī* ("eternal origination") as an explanation of creation. He argued that, with the exception of God, all things, including the Earth and other heavenly bodies, are of both eternal and temporal origin. He influenced the revival of *al-falsafah al-yamanī* ("philosophy of Yemen"), a philosophy based on revelation and the sayings of prophets rather than the rationalism of the Greeks.

Mīr Dāmād's many works on Islāmic philosophy include *Taqwīm al-īmān* ("Calendar of Faith," a treatise on creation and God's knowledge). He also wrote poetry under the pseudonym of Ishrāq. As a measure of his stature, he was given the title *al-mu'allim ath-thālith* (*i.e.,* "third teacher"—the first two being Aristotle and al-Fārābī). His work was continued by his pupil Mullā Ṣadrā, who became a prominent Muslim philosopher of the 17th century.

Mīr Ja'far, in full MĪR MUḤAMMAD JA'FAR KHĀN (b. 1691?—d. Feb. 5, 1765, Bengal, India), first Bengal ruler (1757–60; 1763–65) under British influence, which he helped bring about by working for the defeat of Mughal rule there.

An Arab by birth, Mīr Ja'far assisted his brother-in-law, Gen. 'Alī Vardī Khān, in seizing the government of Bengal in 1740. Discontented, he conspired with others in 1756 to depose Sirāj-ud-Dawlah, the grandson and successor of 'Alī Vardī. In 1757 he assured Robert Clive, British governor of Madras, that he would enter into an alliance with the British to exclude the French from Bengal and pay £500,000 to the East India Company and £250,000 to the European inhabitants of Calcutta to compensate them for the loss of the city to Sirāj the previous year, provided that the British support his bid to be ruler of Bengal. He also promised large gratuities to British military and naval forces and to the Calcutta city council members. He and his fellow conspirators took no active role in the Battle of Plassey (June 1757), in which Sirāj was overthrown, but he was installed afterward as the nawab (Muslim ruler) of Bengal.

Although he found the Bengal treasury unexpectedly small, Mīr Ja'far undertook the fulfillment of his financial promises and issued free passes for the private trade of the English merchants, policies that led to the state's financial ruin and a demoralization of the East India Company's servants that marked the early years of British rule. After Clive's departure in 1760, he was deposed in favour of his son-in-law Mīr Qāsim. Reinstated in 1763 on the outbreak of war between the English and Mīr Qāsim, he made concessions to the English that led to his financial and political downfall. At his death he was addicted to opium and suffered from leprosy.

Mīr Sayyid 'Alī (fl. 16th century, India), Persian miniaturist who, together with his fellow countryman 'Abd-uṣ-Ṣamad, emigrated to India and helped to found the Mughal school of painting (*see* Mughal painting).

He was born probably in the second quarter of the 16th century in Tabrīz, the son of a well-known artist of the Ṣafavid school, Mīr Muṣawwir of Solṭānīyeh. He went to India at the invitation of the Mughal emperor Humāyūn, arriving first in Kābul about 1545 and from there going on to Delhi. He and 'Abd-uṣ-Ṣamad instructed the artists of the imperial atelier, most of them Indians, and superintended the production of the giant "miniatures" illustrating the *Dāstān-e Amīr Ḥamzeh* ("Stories of Amīr Ḥamzeh"), a colossal undertaking that consisted of some 1,400 paintings, each of unusually large size. The few of his paintings that have survived were for the most part painted before his arrival in India. They are sufficient, however, to denote him as a highly gifted painter, wielding an unusually delicate brush and possessed of great powers of observation.

"Mejnūn Being Brought by a Beggar Woman to Leylā's Tent," miniature by Mīr Sayyid 'Alī in the *Khamseh* of Neẓāmī done for Shāh Ṭahmāsp I, 1539–43; in the British Library (OR. MS. 2265 fol 157v)

By courtesy of the British Library Board

Mīrā Bāī (b. 1450?, Kudaki, India—d. 1547?, Dwārkā, Gujarāt), Hindu mystic and poet whose lyrical songs of devotion to the god Krishna are widely popular in northern India.

Mīrā Bāī was a Rājput princess, the only child of Ratan Singh, younger brother of the ruler of Merta. Her royal education included music and religion as well as instruction in politics and government. An image of Krishna given her during childhood by a holy man began a lifetime of devotion to Krishna, whom she worshipped as her Divine Lover.

Mīrā Bāī was married in 1516 to Bhoj Rāj, crown prince of Mewar. Her husband died in 1521, probably of battle wounds, and thereafter she was the victim of much persecution and intrigue at the hands of her brother-in-law, Ratan Singh, when he ascended the throne, and by his successor, Vikram Singh. Mīrā Bāī was something of a rebel, and her religious pursuits did not fit the established pattern for a Rājput princess and widow. She spent most of her days in her private temple dedicated to Krishna, receiving *sādhus* (holy men) and pilgrims from all over India and composing songs of devotion. At least two attempts made on her life are alluded to in her poems. Once a poisonous snake was sent to her in a basket of flowers, but when she opened it, she found an image of Krishna; on another occasion she was given a cup of poison but drank it without harm.

Finally, Mīrā Bāī left Mewar and returned to Merta, but finding that her unconventional behaviour was not acceptable there either, she set out on a series of pilgrimages, eventually settling in Dwārkā. In 1546 Udai Singh, who had succeeded Vikram Singh as *rānā*, sent a delegation of Brahmans to bring her back to Mewar. Reluctant, she asked permission to spend the night at the temple of Ranchorji (Krishna) and the next morning was found to have disappeared. According to popular belief, she miraculously merged with the image of Ranchorji, but whether she actually died that night or slipped away to spend the rest of her years wandering in disguise is not known.

Mīrā Bāī belonged to a strong tradition of bhakti (devotional) poets in medieval India who expressed their love of God through the analogy of human relations—a mother's love for her child, a friend for a friend, or a woman for her beloved. The immense popularity and charm of her lyrics lies in their use of everyday images and in the sweetness of emotions easily understood by the common people of India.

Mira Ceti, also called OMICRON CETI, first variable star (apart from novae) to be discovered, lying in the southern constellation Cetus. There is some evidence that ancient Babylonian astronomers noticed its variable character. In a systematic study in 1638, a Dutch astronomer, Phocylides Holwarda, found that the star disappeared and reappeared in a varying cycle of about 330 days. It thus acquired the name Mira (Latin: Miraculous). Its brightness varies from cycle to cycle. In the 1960s a minimum apparent visual magnitude of 8.71 and a maximum of 3.42 were observed; in 1779 the star attained first magnitude. Mira is a binary; the red giant primary has a faint bluish white companion.

Mirabeau, André-Boniface-Louis Riqueti, vicomte de (viscount of) (b. Nov. 30, 1754, Paris—d. Sept. 15, 1792, Fribourg-en-Brisgau, Fr.), brother of the famous orator, the comte de Mirabeau, and one of the reactionary leaders at the opening of the French Revolution.

Sent to the army in Malta in 1776, he spent part of his two years there in prison for insulting a religious procession. During the War of American Independence he was in several sea fights with the English and was at the taking of Yorktown in 1781. In 1789, with his debts paid up by his father, he was elected by the noblesse of Limoges a deputy to the States General. He was a violent conservative and opposed everything that threatened the old regime. His drunkenness produced a corpulency which brought him the nickname Mirabeau Tonneau ("Barrel Mirabeau"), but he was not lacking in some of that insight that distinguished his brother. He shared fully in the eccentric family pride and boasted of his brother's genius even when bitterly opposing him. He emigrated about 1790 and raised a legion that was to bear his name; but his insolence alienated the German princes, and his command was taken from him.

Mirabeau, Honoré-Gabriel Riqueti, comte de (count of) (b. March 9, 1749, Bignon, near Nemours, Fr.—d. April 2, 1791, Paris), French politician and orator, one of the greatest figures in the National Assembly that governed France during the early phases of the French Revolution. A moderate and an advocate of constitutional monarchy, he died before the Revolution reached its radical climax.

Troubled youth. Mirabeau was the elder son of the noted economist Victor Riqueti, marquis de Mirabeau, by his unhappy marriage to Marie-Geneviève de Vassan. Disfigured by smallpox at the age of three, the precocious Honoré-Gabriel suffered even in early childhood the disfavour of his formidable father. At the age of 15 he was sent as a pupil to the strict Abbé Choquard in Paris, and at 18 he went as a volunteer to serve in a cavalry regiment at Saintes, where his father hoped that military discipline would curb him. His mis-

Honoré-Gabriel Riqueti, comte de Mirabeau, portrait by Joseph Boze, 1789; in the Musée National de Versailles et des Trianons

Giraudon—Art Resource/EB Inc.

behaviour, however, led to his imprisonment on the Île de Ré, under a *lettre de cachet,* a written order permitting imprisonment without trial. Released to serve in Corsica with the rank of sublieutenant in the army, he distinguished himself there in 1769.

Reconciled with his father, he married a rich Provençal heiress, Émilie de Marignane, in 1772, but his heavy spending and further misconduct led his father to have him imprisoned under another *lettre de cachet* in order to put him out of reach of his creditors. He was detained first at the Château d'If (1774), then at the Fort de Joux, near Pontarlier. Having obtained permission to visit the town of Pontarlier, he there met his "Sophie"—who, in fact, was the marquise de Monnier, Marie-Thérèse-Richard de Ruffey, the young wife of a very old man. He eventually escaped to Switzerland, where Sophie joined him; the couple then made their way to Holland, where Mirabeau was arrested in 1777.

The tribunal at Pontarlier had meanwhile sentenced him to death for seduction and abduction, but Mirabeau escaped execution by submitting to further imprisonment under a *lettre de cachet.* In the château of Vincennes he composed the *Lettres à Sophie,* some erotic works, and his essay *Des lettres de cachet et des prisons d'état* ("Of *Lettres de Cachet* and of State Prisons"). Released in December 1780, he finally had to surrender himself to arrest at Pontarlier in order to have the death sentence revoked, but by August 1782 he was entirely free. He now became involved in a lawsuit against his wife, who wanted a judicial separation. Pleading on his own behalf, he gained the sympathy of the public but lost his case (1783). Rejected by his wife and by his father, he had to renounce the aristocratic society into which he had been born.

For the next five years Mirabeau lived the life of an adventurer. He was employed sometimes as a hired pamphleteer, sometimes as a secret agent. He came into contact with Louis XVI's ministers Charles-Alexandre de Calonne; Charles Gravier, comte de Vergennes; and Armand-Marc, comte de Montmorin-Saint-Hérem. He also made an enemy of the Swiss banker Jacques Necker, at that time director of the finances, and engaged the playwright Pierre-Augustin Caron de Beaumarchais in controversy.

His activities necessitated much travelling. In London he was introduced into the best Whig society by Gilbert Elliot (later 1st earl of Minto), who had been his fellow pupil under the Abbé Choquard; he had to take refuge in Liège when his *Dénonciation de l'agiotage* (against stockjobbing) annoyed Calonne; and he undertook a secret mission to Berlin in 1786. With the active assistance of a Brunswick friend, Jakob Mauvillon, he wrote *De la monarchie prussienne sous Frédéric le Grand* (1788; "The Prussian Monarchy Under Frederick the Great"), which he dedicated to his father; but *Histoire secrète de la cour de Berlin* ("Secret History of the Court of Berlin"), in which he made unscrupulous use of material derived from his mission in Germany, created a scandal in 1789.

Election to the States General. Within France, affairs were moving toward a crisis. The country, bankrupted by its 18th-century wars, was burdened with an archaic system of taxation and social privilege. The States General, an assembly of the three estates of the realm—the clergy, the nobility, and the commons—was summoned to meet in Paris in May 1789 in an attempt to implement the necessary reforms. It was that meeting that set in motion the great French Revolution of 1789.

When the States General were summoned, Mirabeau hoped to be elected as a deputy for the nobility of Provence. For this he needed his father's support. Pleased by the book dedicated to him, the Marquis had summoned Mirabeau to Argenteuil in the autumn of 1788 but had not given him any real help. Mirabeau presented himself in the chamber of the nobility in the estates of Provence in January 1789 and uttered violent diatribes against the privileged classes but was not elected deputy, as he held no fief. Turning reluctantly to the Third Estate, he was elected to represent both Marseilles and Aix-en-Provence, choosing to represent Aix.

Mirabeau came to the States General without any precise constitutional doctrine. An avowed enemy of despotism (he had written *Essai sur le despotisme* ["Essay on Despotism"] before he was 25), he was, nevertheless, a firm supporter of the monarchy and of the executive power. Without expressly adhering to the English system, he wanted representative government. A nobleman rejected by his class, he opposed the idea of an aristocratic second chamber. Like most of his contemporaries, he had no political experience, but his intelligence and his knowledge of men made him supremely capable of acquiring such experience rapidly. Lack of money, however, exposed him to pressure and to temptation.

From May to October 1789 Mirabeau played a decisive part in the battle between the Third Estate and the privileged orders. His aim was to become the spokesman of the nation to the King and at the same time to moderate the expression of the nation's wishes. Thus, on June 15 and 16 he was careful not to suggest the name National Assembly, which was the rallying cry of the Third Estate in its revolutionary debate of June 17, when it set itself up as representative of the whole nation. Yet, at the ending of the "royal session" of June 23, when Henri Évrard, marquis de Dreux-Brézé, in the King's name ordered the assembled estates to return each to its separate chamber, Mirabeau's answer did much to confirm the deputies in their resolution to disobey and establish the National Assembly, and, in the feverish atmosphere of the early days of July, his speeches inspired the Assembly to demand the dispersal of the troops concentrated around Paris.

After the fall of the Bastille (July 14), he urged the Assembly to demand the dismissal of the ministers who were to blame for the disorders. His popularity in Paris was then considerable. On the other hand, he disapproved of the Assembly's precipitate action in abolishing feudalism (on the night of August 4) and of the abstract Declaration of Rights, and, while he was openly against a second chamber, he yet wanted the king to have an absolute veto. In October, when the Parisians marched on Versailles and took Louis XVI back to Paris, Mirabeau's attitude was ambiguous and gave rise to the suspicion that he might be plotting against the King. To clear himself and to keep open the door to the court's favour, he addressed a memorandum to the King, advising him to leave Paris for Rouen, to secure the support of a small army, and to appeal to the provinces.

Mirabeau's prime concern, however, was to win "the battle of the ministry." Ostensibly a supporter of Necker, Mirabeau, in fact, did his utmost to destroy him: his brilliant speech on the bankruptcy of the nation was a masterstroke against this minister. Furthermore, he tried skillfully to induce the Assembly to grant to the king the option of choosing members of it to be his ministers, but the Assembly's decree of Nov. 7, 1789, which precluded all deputies from the ministry for the duration of the session, frustrated his hopes of ministerial office for himself.

Intrigue with the court. From November 1789, notwithstanding his oratorical triumphs of January–April 1790 in the cause of the Revolution, Mirabeau was a prey to despondency and aimlessness until his friend Auguste, prince d'Arenberg, comte de La Marck, with the approval of Florimund, Graf Mercy d'Argenteau, Austrian ambassador to Paris and confidant of the queen, Marie-Antoinette, approached him with the proposal from Louis XVI and the Queen that he should become their secret counsellor. Mirabeau accepted with delight: "I shall make it my chief business to see that the executive power has its place in the constitution" (letter of May 10). Part of the promised remuneration was to be the paying off of his debts.

In May 1790, when the Assembly was debating the king's right to make war and peace, Mirabeau successfully opposed the left-wing orator Antoine Barnave, whom he challenged with the words: "Tell us that there should be no king, do not tell us that there should only be a powerless, superfluous king." He impeded the progress of the Jacobins but risked his own popularity, and a pamphlet accusing him of treason was circulated ("Trahison découverte du comte de Mirabeau" ["The Uncovered Treason of the Comte de Mirabeau"]).

From June to October he had to work to recapture his prestige. This was the more necessary because the King and the Queen, despite their secret interview of July 3 with Mirabeau at Saint-Cloud, took little notice of his advice and continued to be influenced by his rival for court favour, the Marquis de Lafayette, who had scorned Mirabeau's offer of alliance. In October 1790 the Assembly further disappointed Mirabeau by refusing, after more discussion, to revoke the decree of November 1789 on the noneligibility of its members for the ministry.

While the court was displeased by some of Mirabeau's outbursts and by his "incurable mania of running after popularity," Mirabeau, for his part, was enraged to see a new ministry formed under the influence of his rivals Lafayette and Alexandre, comte de Lameth. By the end of November 1790 his relations with the court were severely strained. He restored them by submitting to the King's adviser Montmorin a "Plan" concocted for bringing pressure to bear by various means on the Assembly, on Paris, and on the provinces so as to coordinate "the means of reconciling public opinion with the sovereign's authority."

The plan was perfect in theory but very difficult to put into practice. From January 1791 it was clear that Mirabeau had no intention of doing anything that might compromise his own popularity, though he was willing enough to sabotage the Assembly by getting it to adopt ill-considered measures of religious persecution and was eagerly and adroitly working to discredit Lameth's faction at court. His popularity rose to its zenith, and the eyes of all Europe were on him.

As spokesman of the diplomatic committee, on Jan. 28, 1791, he made a speech that bore the unmistakable stamp of statesmanship. Anxious to avoid anything that might compromise France's relations with neighbouring countries, particularly with England, he yet would not repudiate any of the Revolution's political victories or allow any necessary military precautions to be overlooked. On the following day he at last became president of the Assembly for a fortnight. In this office, from which he had been so long excluded, his control of the debates was masterly.

Mirabeau's problem was to know how and for how long his Machiavellian game could be continued before his intrigue with the court would be exposed. The people of Paris were restless, worried by rumours. Mirabeau's position was made difficult by his intervention on behalf of the King's aunts (who had fled from Paris), by his hostility to the law against the *émigrés,* and by his harsh words against the Lameths and their satellites in the Assembly ("Silence to the factious! Silence to the 33!"). On February 28 he was sorely pressed to justify himself to the Jacobins after a pitiless attack by Alexandre, comte de Lameth. The newspapers of the left redoubled their accusations of treason against him, and in March he experienced some notable reverses in the Assembly.

Death may have saved him from political defeat. Gravely ill since his presidency of the Assembly, he worsened his condition by excessive indulgence. He took to his bed on March 27, 1791, and died a week later. The people's grief for him was boundless; he was given a magnificent funeral; and it was for him that the new church of Sainte-Geneviève was converted into the Panthéon, for the burial of great men. In the insurrection of Aug. 10, 1792, however, papers proving Mirabeau's relations with the court were found in an iron chest in the Tuileries Palace, and on Sept. 21, 1794, his remains were dislodged from the Panthéon by order of the Convention.

Assessment. As a statesman, Mirabeau failed in his main object, that of reconciling the monarchy with the Revolution and a strong executive with national liberty. He was too much of a monarchist for the Revolution, too revolutionary for the monarchy. As an orator he was unsurpassed. Even though his eloquence was fed by material gathered from every quarter and by a "workshop" of collaborators, it was Mirabeau who found the striking images and expressions that give to his speeches their brilliant individuality. Generally bad at extemporizing, Mirabeau could be moved by anger or by injured pride to an impassioned tone that would carry the Assembly with him. (J.-J.C.)

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Mirabeau, Victor Riqueti, marquis de (b. Oct. 5, 1715, Pertuis, Fr.—d. July 13, 1789, Argenteuil), French political economist, the forerunner and later patron of the Physiocratic school of economic thought. He was the father of the renowned French revolutionary the Comte de Mirabeau.

After serving as an officer in the War of the Polish Succession (1733–38) and the War of the Austrian Succession (1740–48), Mirabeau left the army to devote himself to the study of political economy. In his first major work, *Mémoire concernant l'utilité des états provinciaux . . .* (1750; "Memorandum Concerning the Usefulness of the Provincial Estates . . ."), he criticized the highly centralized governmental system that had been set up by King Louis XIV and proposed that the provincial assemblies, which then existed in only a small part of France, be established throughout the kingdom. In his popular *Ami des hommes, ou Traité de la population* (1756–58; "The Friend of Man, or Treatise on Population"), Mirabeau borrowed heavily from the ideas of Richard Cantillon, an earlier 18th-century British writer, in stressing the primacy of agriculture over commerce as a source of wealth. Mirabeau's approach to economics had anticipated the doctrines that were being formulated by the Physiocratic school of François Quesnay, and the Marquis soon associated himself with the Physiocrats' attempts to reform France's antiquated, inefficient system of taxation. In his *Théorie de l'impôt* (1760; "Theory of Taxation") he attacked the tax farmers (financiers who purchased from the crown the right to collect indirect taxes) and proposed that they be replaced with a system of direct taxes on land and on personal income. Although the tax farmers pressured the government into exiling Mirabeau to his estates at Bignon, he continued to devote his efforts to the advancement of Physiocracy.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Mirabéllo, Gulf of, Modern Greek KÓLPOS MIRABÉLLOU, deep gulf of the Aegean Sea on the northern coast of eastern Crete, the *nomós* (department) of Lasíthi, Greece. It separates Dhíkti massif on the west from a range of hills on the east that include Mt. Thriptís and Mt. Ornón. The gulf, named after the village of Mirabello, located north of the port of Áyios Nikólaos, is separated on the east from the Órmos (bay) Sitías by an indented and blunted promontory. Around the gulf are Olonte (Olus) and Lato, two ruined classical settlements; on the islets of Psíra and Mókhlos (Konídha) as well as at Gourniá at the head of the gulf are the remains of Late Minoan I (1600–1450 BC) settlements. Gourniá, excavated 1901–04 by the U.S. archaeologist Mrs. Boyd Hayes, is the only well-preserved Minoan town in Crete.

mirabilite, a widespread sulfate mineral, hydrated sodium sulfate ($Na_2SO_4 \cdot 10H_2O$), that forms efflorescences and crusts, particularly in arid regions. It occurs in deposits from salt lakes, springs, and playas, especially in the winter (its solubility decreases markedly at lower temperatures). It is abundant in California, Wyoming, and other areas of the western and southwestern United States; it also occurs in Austria, Spain, abundantly in Bohemia, and in the Kara-Bogaz-Gol Gulf of the Caspian Sea. For detailed physical properties, *see* sulfate mineral (table).

miracle, an extraordinary and astonishing happening that is attributed to the presence and action of a supernatural or divine power. Belief in miraculous happenings occurs in all cultures and is a feature of practically all religions.

A brief treatment of miracles follows. For full treatment, *see* MACROPAEDIA: Doctrines and Dogmas, Religious.

Although members of nonliterate cultures lack a fully developed scientific conception of natural causality—and hence also the notion of a "supernatural" miracle—they know of extraordinary events, forces, and operations. These are integrated in various ways, such as by ritual, magic, or shamanism, with the more ordinary modes of behaviour. Similarly the religions of the ancient world (*e.g.,* Babylonia and Egypt) had few formal miracles, precisely because certain kinds of divine action or cosmic operation (*e.g.,* oracles) were accepted as part of the normal order of things.

Ancient Indian mythology, like all mythologies, abounds in fantastic accounts of the doings of the gods, but the *Upaniṣad*s and *Brāhmaṇa*s evince an increasing indifference to miracles. Like other expressions of higher mysticism, they consider the spiritual experience of religious insight and transformation as the only "miracle" worth talking about. Nevertheless Hindu popular religion sets no bounds to the miraculous powers of ascetic yogis, and India has become the classic land of wonders.

There is little room for the miraculous element in Confucianism, but Taoism has produced a rich crop of thaumaturgy and magic on all levels of Chinese folk religion. Miracles are taken for granted throughout the Old Testament: God "does wondrous things" especially in the history of his people Israel (*e.g.,* the ten plagues of Egypt). In the Greco-Roman world miracles were not uncommon; there were miraculous cures (*e.g.,* at the sanctuary of Asclepius in Epidaurus), moving statues of gods, resurrections of the dead, virgin births, and the like, though philosophical criticism too was articulate: Cicero in the *De divinatione* denied the possibility of miracles.

According to the earliest Buddhist accounts, Gautama Buddha deprecated the miraculous powers that he possessed as a matter of course, being "the greatest of all yogis," as utterly devoid of spiritual significance. Nevertheless, miraculous accounts of his birth and life (and those of later Buddhist saints), as well as miracles in connection with his relics, proliferated as time went on, particularly in the Mahāyāna tradition.

The Christian New Testament records various miracles of healing and of providing abundantly for specific human needs performed by Jesus Christ, and miracles did not cease after the New Testament period. They form part of the career, in life as well as after death, of the Christian saints, and their occurrence continues (*e.g.,* Lourdes); duly established miracles are among the requirements for a process of canonization.

Muḥammad was the only great founder who renounced miracles and miraculous powers as a matter of principle—the Qur'ān was the great miracle—but subsequent hagiography invested his life with superlatively miraculous details. Muslim popular religion, particularly under Ṣūfī influence, abounds in miracles, pilgrimages to the tombs of wonder-working saints, and the like.

miracle play, also called SAINT'S PLAY, one of three principal kinds of vernacular drama of the European Middle Ages (along with the mystery play and the morality play). A miracle play presents a real or fictitious account of the life, miracles, or martyrdom of a saint. The genre evolved from liturgical offices developed during the 10th and 11th centuries to enhance calendar festivals. By the 13th century they had become vernacularized and filled with unecclesiastical elements. They had been divorced from church services and were performed at public festivals. Almost all surviving miracle plays concern either the Virgin Mary or St. Nicholas, the 4th-century bishop of Myra in Asia Minor. Both Mary and Nicholas had active cults during the Middle Ages, and belief in the healing powers of saintly relics was widespread. In this climate, miracle plays flourished.

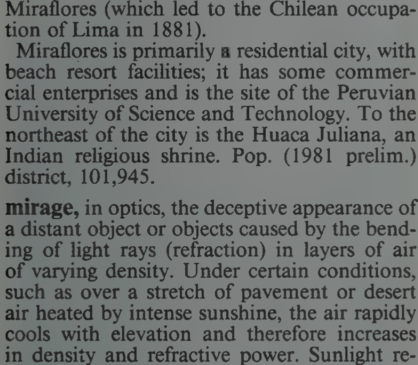
The Mary plays consistently involve her in the role of deus ex machina, coming to the aid of all who invoke her, be they worthy or wanton. She saves, for example, a priest who has sold his soul to the devil, a woman falsely accused of murdering her own child, and a pregnant abbess. Typical of these is a play called *St. John the Hairy*. At the outset the title character seduces and murders a princess. Upon capture, he is proclaimed a saint by an infant. He confesses his crime, whereupon God and Mary appear and aid John in reviving the princess, which done, the murderer saint is made a bishop.

The Nicholas plays are similar, an example being Jean Bodel's *Le Jeu de Saint Nicolas* (*c.* 1200), which details the deliverance of a crusader and the conversion of a Saracen king. Few English miracle plays are extant, because they were banned by Henry VIII in the mid-16th century and most were subsequently destroyed or lost.

Miraflores, city and district of the Lima–Callao metropolitan area of Peru, south of central Lima on the Pacific coast. The city abounds in bougainvillea for most of the year; thus, in the mid-16th century, while still an Inca Indian village, it came to be known by its present name (meaning "look at the flowers"). Although an 1850 census mentioned it as a district of Lima, it was not legally declared such until 1866. It was involved in the battles of La Palma (a civil war engagement in 1855 that led to Ramón Castilla's victory) and of Miraflores (which led to the Chilean occupation of Lima in 1881).

Miraflores is primarily a residential city, with beach resort facilities; it has some commercial enterprises and is the site of the Peruvian University of Science and Technology. To the northeast of the city is the Huaca Juliana, an Indian religious shrine. Pop. (1981 prelim.) district, 101,945.

mirage, in optics, the deceptive appearance of a distant object or objects caused by the bending of light rays (refraction) in layers of air of varying density. Under certain conditions, such as over a stretch of pavement or desert air heated by intense sunshine, the air rapidly cools with elevation and therefore increases in density and refractive power. Sunlight reflected downward from the upper portion of an object—*e.g.,* the top of a tree as shown in the figure (top)—will be directed through the cool air in the normal way; although the light would not be seen ordinarily because of the angle, it curves upward after it enters the rarefied hot air near the ground, thus being refracted to the observer's eye as though it originated below the heated surface. A direct image of the tree is seen also because some of the reflected rays enter the eye in a straight line without being refracted. The double image seems to be that of the tree and its upside-down reflection in water. When the sky is the object of the mirage, the land is mistaken for a lake or sheet of water.



(Top) mirage; (bottom) looming

From F.W. Sears, *Optics*, Third Edition, 1949, Addison-Wesley, Reading, Mass.

Sometimes, as over a body of water, a cool, dense layer of air underlies a heated layer. An opposite phenomenon will then prevail (*see* figure [bottom]), in which light rays will reach the eye that were originally directed above the line of sight. Thus, an object ordinarily out of view, like a ship below the horizon, will be apparently lifted into the sky. This phenomenon is called looming.

Mirage, any member of a family of combat aircraft produced by the Dassault-Breguet aeronautics firm of France. These relatively inexpensive, simple, durable aircraft were adopted by many of the world's smaller air forces from the 1960s. The first Mirage aircraft was the single-engine, delta-wing Mirage III. This craft was first flown in 1956 but subsequently underwent significant development. One variant of it became a basic interceptor, another a fighter-bomber, and a third a reconnaissance aircraft. During the 1960s the Mirage III was the basic air superiority fighter of the Israeli air force, and it performed spectacularly in the Six-Day War of 1967. Other countries whose air forces adopted the Mirage III included Brazil, Lebanon, South Africa, Argentina, Pakistan, Spain, Australia and Switzerland.

An export version of the Mirage III, called the Mirage 5, was adapted for ground attack and equipped with simplified avionics. It was first flown in 1967 and was sold to Belgium (in a coproduction arrangement), Pakistan, Peru, Colombia, Libya, Abu Dhabi, and Venezuela. The Mirage F-1, a multipurpose fighter developed as a replacement for the Mirage III in the French air force, entered service in 1973. This aircraft lacked the delta-wing design that had characterized all previous Mirages. F-1s were purchased by Greece, Morocco, South Africa, Spain, Jordan, and Iraq, among other countries. The French air force's F-1 was replaced by a newer multipurpose fighter, the Mirage 2000, beginning in 1984. This aircraft once again had a delta-wing design.

miʿrāj, in Islāmic legend, the ascension of the Prophet Muḥammad into heaven. In this legend, Muḥammad is prepared for his meeting with God by the archangels Jibrīl and Mīkāl one evening while he is asleep in the Kaʿbah, the sacred shrine of Mecca. They open up his body and purify his heart by removing all traces of error, doubt, idolatry, and paganism and by filling it with wisdom and belief. In the original version of the *miʿrāj,* the prophet is then transported by Jibrīl directly to the lowest heaven. But early in Muslim history the story of the ascension came to be associated with the story of Muḥammad's night journey (*isrāʾ*) from the "sacred place of worship" (Mecca) to the "further place of worship" (Jerusalem). The two separate incidents were gradually combined so that chronologically the purification of Muḥammad in his sleep begins the sequence; he is then transported in a single night from Mecca to Jerusalem by the winged mythical creature Burāq (*q.v.*), and from Jerusalem he ascends to heaven, possibly by ladder (*miʿrāj*), accompanied by Jibrīl.

Muḥammad and Jibrīl enter the first heaven and proceed through all seven levels until they reach the throne of God. Along the way they meet the prophets Adam, Yaḥyā (John), ʿĪsā (Jesus), Yūsuf (Joseph), Idrīs, Hārūn (Aaron), Mūsā (Moses), and Ibrāhīm (Abraham) and visit hell and paradise. Mūsā alone of all the inhabitants of heaven speaks at any length to the visitors; he says that Muḥammad is more highly regarded by God than himself and that Muḥammad's following outnumbers his own. Once Muḥammad appears before God—there is some question as to whether he actually saw him—he is told to recite the salat (ritual prayer) 50 times each day. Mūsā, however, advises Muḥammad to plead for a reduction of the number as being too difficult for believers, and the obligation is eventually reduced to five prayers each day.

بلسنجه ایدی رسول حضرتنه قورقودوشدی جبرائیل ایلرو یوریدی رسو
توحیدی سلام ردکردی

Night angels preparing Muḥammad for his ascension (*miʿrāj*) to paradise, miniature from a 16th-century manuscript in the New York Public Library (Spencer Turkish MS. 3)

By courtesy of the New York Public Library, the Spencer Collection, Astor, Lenox and Tilden Foundations

Muḥammad's *miʿrāj* has been a constant source of speculation among Muslims. Some state that the ascension was merely a dream; others speculate that only Muḥammad's soul entered heaven, while his body remained on earth. Parallels have been drawn between the *miʿrāj* and the manner in which a dead man's soul will progress to judgment at God's throne; and the Ṣūfīs (Muslim mystics) claim it describes the soul's leap into mystic knowledge. Popularly the ascension is celebrated with readings of the legend on the 27th day of Rajab, called *Laylat al-Miʿrāj* ("Night of the Ascension"). *See also* isrāʾ.

Mirambo (d. 1884, Tanganyika [now Tanzania]), Nyamwezi warlord of central Africa whose ability to unite the many hitherto separate Nyamwezi clans into a powerful kingdom by the 1870s gave him strategic control of Arab trade routes and threatened the preeminence of the Arabs' colony in Unyanyembe (near present Tabora, Tanzania). His capital, Urambo (now in Tanzania), became a major rival trading centre.

Mirambo's success lay partly in his ability to get large supplies of firearms (often from Arab traders) and in his skillful use of the *ruga-ruga* (Ngoni mercenary warriors from the south). Between 1876 and 1880 he gained control of the major routes northwest to Buganda and west to Ujiji, on Lake Tanganyika. According to one source, in 1880 the Arabs asked for peace and even agreed to pay tribute.

In the 1870s Mirambo received support from the Arab sultan of Zanzibar, Barghash, who was then trying to extend his influence into the interior. In 1880, however, when two members of an expedition sponsored by the Belgian king Leopold II were killed by one of Mirambo's client chiefs, the sultan, already in a precarious position with Europeans, dropped the alliance. After Mirambo's death his kingdom rapidly disintegrated.

Miramón, Miguel (b. Sept. 29, 1832, Mexico City—d. June 19, 1867, near Querétaro, Mex.), Mexican soldier and politician, the leader of the forces that briefly established Maximilian as the emperor of Mexico.

Educated at a military school, Miramón served in the Mexican army in the battles against the United States in 1847 and rose to the rank of colonel in 1855. The next year he participated in the struggle against the Liberal forces led first by the provisional president Ignacio Comonfort and later by Comonfort's successor, Benito Juárez. In the bitter, three-year civil war (1857–60) that ensued, Miramón succeeded Félix Zuloaga as leader and as temporary president of Mexico.

When Liberal troops took Mexico City in December 1860, Miramón fled to Cuba and then to Europe. There he entered into negotiations with Napoleon III of France, who, for imperialistic reasons, persuaded Archduke Maximilian of Austria to assume the crown of Mexico. Miramón returned to Mexico in 1863 as the grand marshal of Maximilian's empire. He served as the Mexican minister to Germany (1864–66) but rushed back to Mexico when it appeared that Maximilian would abdicate his tottering throne. Miramón was instrumental in persuading the Emperor to continue the struggle and was appointed one of the leaders of the imperial army. Defeated by the forces of Juárez at Querétaro, he was taken prisoner and executed on a nearby hill with the Emperor.

Miramón

By courtesy of the Library of Congress, Washington, D.C.

Miranda, state, northern Venezuela, bounded on the northeast by the Caribbean Sea, by the Venezuelan states of Guárico on the south and Aragua on the west, and by the Distrito Federal on the north. The mountainous northern and southern parts of the territory of 3,070 square miles (7,950 square km) are separated by the Tuy River, which flows eastward to the Caribbean. Miranda ranks high among Venezuelan states in agricultural and pastoral production, and government irrigation projects have resulted in the expansion of its large-scale farming and in the diversification of its agriculture. Almost half of the nation's cacao is grown around the Barlovento region of Miranda and neighbouring Anzátegui, in the Tuy valley. Coffee plantations cover the higher elevations; sugarcane and citrus trees thrive on the valley floor. The state also produces bananas, corn (maize), peanuts (groundnuts), cassava, and coconuts. Miranda has a high rural population density, and the city of Caracas has expanded into neighbouring parts of northwestern Miranda. The highway network is extensive; Los Teques (*q.v.*), the state capital and major industrial centre, lies on the Pan-American Highway. Pop. (1986 est.) 1,771,680.

Miranda, innermost and smallest of the major satellites of Uranus. It was discovered in 1948 by the American astronomer G.P. Kuiper. Miranda's orbit is elliptical, and on the average it lies about 129,390 km (80,220 miles) from the centre of Uranus. Its orbital period is 1.4135 days. Its estimated diameter is 484 km (300 miles), and its mass is about 0.2×10^{-5} that of Uranus. Like the other major Uranian satellites, Miranda appears to be composed largely of water ice probably intermixed with frozen methane and rocky material. Photographs taken by the U.S. Voyager 2 space probe in 1986 indicate that Miranda's surface is a patchwork of winding valleys, parallel grooves, fault scarps, and cratered highlands. Such topographical features point to extensive tectonic activity during Miranda's past.

Miranda, Bartolomé de: *see* Carranza, Bartolomé de.

Miranda, Francisco de (b. March 28, 1750, Caracas—d. July 14, 1816, Cádiz, Spain), Venezuelan revolutionary who helped to pave the way for independence in Latin America. His own plan for the liberation of Spain's American colonies with the help of the European powers failed, but he remains known as El Precursor—*i.e.,* "the forerunner" of Bolívar and other more effective revolutionaries.

Educated in Caracas, Miranda purchased a captaincy in the Spanish Army at the age of 22. He was imprisoned for disobedience but was released in 1780 and sent to Cuba to fight against Great Britain. There he was accused of misuse of funds. Protesting his innocence, he fled to the United States in 1783.

There he met many of the leaders of the American Revolution and formed his plans for the liberation of South and Central America from Spanish domination. Hounded by Spanish agents, he fled to London, where he tried to enlist the aid of Prime Minister William Pitt in his plan of revolution. Pitt, realizing that Spain would eventually lose its grip on its American colonies, thought that Miranda was useful for Britain's purposes and provided him with limited support and protection. Miranda envisioned an independent empire, stretching from the Mississippi to Cape Horn, under the leadership of a hereditary emperor from the Incan royal family and with a legislature of two houses.

The French Revolution delayed Miranda's plans for a few years. He served as a French Revolutionary general and was jailed for suspected treason and then acquitted. Returning once again to London, he became the leader of all the exiled plotters against Spain. He embarked on an invasion of Venezuela in 1806, but he was forced to turn back when the peasants failed to rally to his side. In 1810 he met Simón Bolívar, who was in London attempting to get British support for the revolution that had finally begun in South America. Bolívar persuaded Miranda to return to Venezuela, where he was made a general in the revolutionary army. When the country formally declared independence on July 5, 1811, he assumed dictatorial powers.

The Spanish forces counterattacked, and Miranda, fearing a brutal and hopeless defeat, signed an armistice with them in July 1812 at San Mateo. The other revolutionary leaders, including Bolívar, believed his surrender was treasonable and thwarted Miranda's attempt to escape; they allowed him to be handed over to the Spanish. Transported in chains to Cádiz, he eventually died in his prison cell.

Miranda de Ebro, city, Burgos province, in the autonomous community (region) of Castile-León, northern Spain. It lies south of Bilbao on a plain straddling the Ebro River. Although historians ascribe Roman origins to Miranda ("Admirable Place"), it is probably older and named after local dolmens. Reconquered from the Moors by Alfonso I, Miranda later (1076) was reunited with Castile and given *fueros* (charters of privileges) by Alfonso VI in 1099. The community prospered under the Catholic and Austrian kings until it was ruined by floods and epidemics in the 18th century. Active in resisting the French invasion (1795), it was later the scene of a Popular Front demonstration that destroyed the church of San Nicolás in 1936; the Romanesque structure, once a mosque, has been restored. Miranda was declared a city in 1907. A rail junction between Madrid and the north, Miranda produces beet sugar, chocolate, and synthetic fibres. Pop. (1981) 36,812.

Miranda v. Arizona, 384 U.S. 436 (1966), U.S. Supreme Court case which resulted in a ruling that specified a code of conduct for police interrogations of criminal suspects held in custody. Chief Justice Earl Warren, writing for the five-to-four majority of the justices, ruled that the prosecution may not use statements made by a person under questioning in police custody unless certain minimum procedural safeguards were followed. The court established new guidelines to ensure "that the individual is accorded his privilege under the Fifth Amendment" not to be compelled to incriminate himself. Known as the Miranda warnings, these guidelines include informing arrested persons prior to questioning that they have the right to remain silent, that anything they say may be used against them as evidence, and that they have the right to the counsel of an attorney.

The Miranda decision was one of the most controversial decisions of the Warren Court, which under Chief Justice Warren had become increasingly concerned about the methods used by local police to obtain confessions. In an earlier (1964) case, *Escobedo* v. *Illinois*, 378 U.S. 478, the court had ruled that criminal suspects must be advised of their right to consult an attorney. But that decision had failed to specify the precise procedures police must follow to ensure that the suspect's rights in this regard are not violated.

In *Miranda* v. *Arizona* the court reversed an Arizona court's conviction of Ernesto Miranda on charges of kidnapping and rape. After being identified in a police lineup, Miranda had been questioned by police; he confessed and then signed a written statement without first being told that he had the right to have a lawyer present to advise him or that he had the right to remain silent. Miranda's confession was later used at his trial to obtain his conviction. The court held that the prosecution could not use his statements obtained by the police while the suspect was in custody unless the police had complied with several procedural safeguards to secure the Fifth Amendment privilege against self-incrimination.

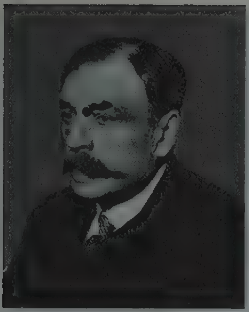
The Miranda ruling shocked the law-enforcement community and was hotly debated. Critics of the Miranda decision said that the court, in seeking to protect the rights of individuals, had seriously weakened law-enforcement agencies. Under Chief Justice Warren Burger, a more conservative Supreme Court later issued several decisions that limited the scope of the Miranda safeguards.

Mirandola, town, Modena province, Emilia-Romagna region, north central Italy. It has automobile assembly, footwear, food-canning, and hemp industries. The Romanesque-Gothic church of S. Francesco is a historic landmark. The town was the birthplace of Pico della Mirandola, the 15th-century scholar. Pop. (1984 est.) mun., 21,979.

Mirandola, Giovanni Pico della: *see* Pico della Mirandola, Giovanni.

Mirbeau, Octave(-Henri-Marie) (b. Feb. 16, 1850, Trévières, Fr.—d. Feb. 16, 1917, Paris), French writer of novels and plays who unsparingly satirized the clergy and social conditions of his time and was one of the 10 original members of the Académie Goncourt, founded in 1903.

His first work was as a journalist for Bonapartist and Royalist newspapers. He made his reputation as a storyteller with tales of the Norman peasantry, *Lettres de ma chaumière* (1886; "Letters from My Cottage") and *Le Calvaire* (1887; "The Calvary"), a chapter of



Mirbeau

H. Roger-Viollet

which, on the French defeat of 1870, aroused much rancour. In 1888 he wrote the story of a mad priest, *L'Abbé Jules* ("The Priest Jules"), and, in 1890, *Sébastien Roch,* a merciless picture of the Jesuit school he had attended. All his novels, from *Le Jardin des supplices* (1899; "The Garden of Torture") and *Le Journal d'une femme de chambre* (1900; "Journal of a Lady's Maid") to *La 628-E8* (1907) and *Dingo* (1913), were bitter social satires. His dramatic work was of high quality, and *Les Mauvais Bergers* (1897; "The Bad Shepherds") was compared to the work of Henry Becque. His greatest success as a playwright was achieved with *Les Affaires sont les affaires* (1903; "Business Is Business").

Mirbel, Charles-François Brisseau de (b. March 27, 1776, Paris, France—d. Sept. 12, 1854, Champerret), French botanist whose book *Traité d'anatomie et de physiologie végétale,* 2 vol. (1802; "Treatise on Plant Anatomy and Physiology"), earned him recognition as a founder of plant cytology and plant physiology. His most notable contribution to plant cytology was his observation (1809) that each plant cell is contained in a continuous membrane.

In 1798 Mirbel joined the staff of the National Museum of Natural History in Paris. Four years later the first volume of his *Histoire naturelle des végétaux classés par familles* ("Natural History of Plants Classified by Families") appeared. In 1803 he became director of the gardens of La Malmaison, where he studied the structure of plant tissue and the evolution of plant organs. The results were published in *Eléments de physiologie végétale et de botanique* (1815; "Elements of Plant Physiology and Botany").

Miri, port town, East Malaysia, on the South China Sea coast of northwestern Borneo. It lies south of Baram Point in a rubber- and rice-growing region. The town began in 1911, when nearby oil fields were opened. Peak production came in the 1930s; the fields declined, but there were later discoveries offshore at Salbiah. Lutong, 7 miles (11 km) north, has a refinery and is linked by pipeline to Brunei's Seria field. Because of site obstruction, the oil is transferred to tankers 3 miles offshore by a submarine pipe. About half the town's population is Chinese. Pop. (1991) 87,230.

Mirim Lagoon, Portuguese LAGOA MIRIM, Spanish LAGUNA MERÍN, shallow Atlantic tidewater lagoon on the border between Brazil (Rio Grande do Sul state) and Uruguay. It is approximately 118 miles (190 km) long and 30 miles across at its widest point, covering an area of 1,542 square miles (3,994 square km). A low, marshy bar, 10 to 35 miles wide and containing smaller lagoons, separates the Mirim Lagoon from the ocean. It drains northeastward into the Patos Lagoon through the São Gonçalo Canal and is navigable by shallow-draft vessels.

Mīrkhwānd, also spelled MIRKHOND, byname of MUḤAMMAD IBN KHĀVANDSHĀH IBN MAḤMŪD (b. 1433, Balkh [now in Afghanistan]—d. June 22, 1498, Herāt), one of the most important Persian chroniclers of Iran under the Timurid dynasty (15th century).

He was a member of an old family of sayyids (those who claim descent from the Prophet Muḥammad) established in Bukhara. Spending most of his life in Herāt in the court of the last Timurid sultan, Ḥusayn Bayqarah (1469–1506), Mīrkhwānd enjoyed the protection of Ḥusayn's renowned minister, ʿAlī Shīr Navāʾī, a celebrated patron of literature and himself a writer of great distinction. At the request of his patron, he began about 1474 his general history, *Rowzat oṣ-ṣafāʾ* (Eng. trans. begun as *History of the Early Kings of Persia,* 1832; continued as *The Rauzat-us-Safa; or, Garden of Purity,* 1891–94). The work is composed of seven large volumes and a geographic appendix, sometimes considered an eighth volume. The history begins with the age of the pre-Islāmic Persian kings and surveys the major Muslim rulers of Iran up to the events of 1523. The seventh volume may have been finished by Mīrkhwānd's grandson, the historian Khwāndamīr (Khondamir), and in the 19th century Rezā Qolī Khān Hedāyat wrote a supplement to the work.

Mīrkhwānd is often criticized for his highly embellished and bombastic style and for his uncritical approach to the sources, but his history preserves sections from earlier works that have since been lost. Volumes 5 and 6 are particularly reliable, for they utilize the abundant historiographic materials of the Mongol and Timurid periods and furnish independent information on the events that are contemporary or nearly contemporary with the author's lifetime.

mirliton, pseudomusical instrument or device in which sound waves produced by the player's voice or by an instrument vibrate a membrane, thereby imparting a buzzing quality to the vocal or instrumental sound. A common mirliton is the kazoo, in which the membrane is set in the wall of a short tube into which the player vocalizes. Mirlitons are also set in the walls of some flutes (*e.g.,* the Chinese *ti*) and xylophone resonators to colour the tone. The mirliton is one of the few membranophones (membrane instruments) not sounded by percussion.

Miró, Gabriel (b. July 28, 1879, Alicante, Spain—d. May 27, 1930, Madrid), Spanish writer distinguished for the finely wrought but difficult style and rich, imaginative vocabulary of his essays, stories, and novels.

Miró studied law at the universities of Granada and Valencia and in 1922 became secretary of the Concursos Nacionales de Letras y Artes in Madrid. His many novels include *Nuestro padre San Daniel* (1921; *Our Father, Saint Daniel*) and *El obispo leproso* (1926; "The Leprous Bishop"), both of which are critical of religious customs. Among his nonfictional works are *Figuras de la pasión del Señor* (1916; *Figures of the Passion of Our Lord*) and a series of books describing the life of his region whose protagonist is Sigüenza, Miró's literary alter ego.

Miró, Joan (b. April 20, 1893, Barcelona, Spain—d. Dec. 25, 1983, Palma, Majorca, Spain), Catalan artist, one of the foremost exponents of abstract art and Surrealist fantasy. The influence of Paul Klee is apparent in his "dream pictures" and "imaginary landscapes" of the late 1920s. His mature style evolved from the tension between this fanciful, poetic impulse and his vision of the harshness of modern life. He worked extensively in lithography and produced numerous murals, tapestries, and sculptures for public spaces.

Miró's father was a watchmaker and goldsmith. Both the artisan tradition and the austere Catalan landscape were of great importance to his art.

Miró's artistic development did not progress with the directness of his countryman Picasso, who could draw like a master while still a boy. Instead of being allowed to go to an art school, Miró was expected to complete high school, though he failed to do so. He then attended a commercial college and worked for two years as a clerk in an office, until he had a mental and physical breakdown. His parents took him for convalescence to an estate, Montroig, near Tarragona, which they bought especially for this purpose, and finally allowed him to attend an art school in Barcelona. His teacher at this school, Francisco Galí, showed a great understanding of his 18-year-old pupil, advising him to touch the objects he was about to draw, a procedure that strengthened Miró's feeling for the spatial quality of objects. Galí also introduced his pupil to examples of the latest schools of modern art from Paris as well as to the buildings of Antonio Gaudí, Barcelona's famous Art Nouveau architect.

Miró, photograph by Yousuf Karsh, 1966

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Whereas artists of the contemporary Fauve and Cubist schools deliberately attempted to destroy the canons of tradition in order to attain a new kind of pristine vision, Miró possessed such a vision naturally. In his paintings and drawings he sought above all to establish means of metaphorical expression—that is, to discover signs that stand for concepts of nature in a transcendent, poetic sense. He wanted to depict nature as it would be depicted by a primitive man or a child equipped with the intelligence of a 20th-century adult; in this respect, he had much in common with the Surrealists and Dadaists, two other schools of modern artists who were striving to achieve similar aims by more intellectual means than Miró used. Miró's art developed slowly from his first clumsy attempts at expression to the apparently playful masterpieces of his later period. His fanatical honesty and his conscientious craftsmanship compelled him to work on many of his pictures for years.

From 1915 to 1919 Miró worked in Barcelona, at Montroig, and on Majorca, painting landscapes, portraits, and nudes in which his interest centred on the rhythmic interplay of volumes and areas of colour. His colours were still dark and heavy, though he delineated details as if superimposing on a heavy earthly ground a filigree of luminous leaves and blossoms. His manner was the same in landscapes, portraits, and nudes.

From 1919 onward Miró lived alternately in Spain and Paris. In the paintings he produced in the period between World Wars I and II—the great still lifes, landscapes, and phantasmagorias set free from both space and time—he gradually removed the objects he portrayed from their natural context and reassembled them as if in accordance with a new, mysterious grammar, creating a ghostly, eerie impression.

From 1925 to 1928, under the influence of the Dadaists, Surrealists, and Paul Klee, he painted "dream pictures" and "imaginary landscapes" in which the linear configurations and patches of colour look almost as though they were set down randomly. After a trip to The Netherlands, where he studied the 17th-century Dutch realist painters in the museums, the figurative elements in his pictures once more assumed a firmer shape. But, when a tendency toward beautiful, tasteful forms emerged in his works, he countered it with more brutal signs, collages, and objects made up of the waste products of industry.

By the 1930s Miró's artistic horizons were expanding. He designed decor for ballets. His paintings began to be exhibited regularly in French and American galleries. In 1934 he designed tapestries, and that led to an interest in the monumental and in murals.

At the time of the Spanish political turmoil and Civil War in the late 1930s, Miró was living in Paris. In their demonic expressiveness, his pictures of this period mirrored the fears and horrors of those years. At the Paris World Exhibition of 1937, he painted for the pavilion of the Spanish Republic a mural, "The Reaper," containing a strong element of social criticism.

During World War II Miró returned to Spain, where he painted his "Constellations," a series of small works that constitute symbols of the happy collaboration of everything creative, of the elements and the cosmos. They represent a challenge to the anonymous powers of corruption in social and political life, the cause of misery and wars. During the last year of the war, Miró, together with his potter friend Artigas, produced ceramics that revealed a new impetuosity of expression.

From 1948 onward he once more divided his time between Spain and Paris. That year saw the start of the series of very poetic works the symbols of which were based on the theme of woman, bird, and star. Pictures wildly spontaneous in character came into being alongside others whose forms were executed with punctilious craftsmanship. Both approaches were also combined in Miró's sculptures; in them all his earlier figurations were happily amalgamated to form erotic fetishes or signals towering into space.

In the years following World War II, Miró became world famous; his sculptures, drawings, and paintings were exhibited in many countries. In 1950 he painted a wall for Harvard University. His ceramic experiments were crowned by the great ceramic wall in the UNESCO building in Paris (1958), for which he received the Great International Prize of the Solomon R. Guggenheim Foundation. In 1962 Paris honoured him with the first major exhibition of his collected works in the National Museum of Modern Art. The architect José Luis Sert built for him on Majorca the large studio of which he had dreamed all his life. Among his later works were several monumental sculptures, such as those executed for Chicago and for Houston, Texas. In 1980, in conjunction with his receipt of Spain's Gold Medal of Fine Arts, a plaza in Madrid was named in Miró's honour.

In spite of his fame, however, Miró continued to devote himself exclusively to looking and creating. A taciturn, introverted man of short stature, Miró had not found it easy to attain the wisdom permeated by irony that ultimately characterized his work. From his youth, he had felt compelled by an almost anarchic obstinacy to keep his eyes firmly fixed on his goal despite the resistance he met from society or from the prevailing artistic theories. His late works manifest an even greater simplification of figure and background than his early ones. In order to realize his inner visions, it had become enough for Miró to set down a dot and a sensitive line on a sea-blue surface; in this the spectator could still find himself in a state of total enchantment. His early works anticipated the representational techniques of his later style; thus, although the former playful or aggressive irony gave way to a quasi-religious meditation, all of his works form a coherent whole manifested by a common quality of rejuvenation and deepening. (W.Er./Ed.)

BIBLIOGRAPHY. James Johnson Sweeney, *Joan Miro* (1941, reprinted 1969), a brief work, was the first comprehensive presentation of Miró's life and work. Walter Erben, *Joan Miró* (1959), reproduces many different examples of the artist's work at his home and studio on Majorca. Jacques Dupin, *Miró* (1962), is a standard work written by an art historian and longtime friend of the painter and containing a detailed (though now dated) bibliography of writings on Miró as well as a catalog of his pictorial and sculptural works. Roland Penrose, *Miró* (1970, reissued 1985), is also by a longtime friend. Works written since the artist's death include Pere A. Serra, *Miró and Mallorca* (1986); and Guy Weelen, *Miró* (1989).

Mīrpur Khās, town, southern Sindh province, Pakistan. It lies on the Let Wāh Canal and is connected by rail and road with Hyderābād (40 miles [65 km] west-southwest) and by road with Umarkot. Founded in 1806 by Mīr ʿAlī Murād Tālpur, it remained the capital of the Tālpur rulers until their defeat by British forces under Sir Charles James Napier in 1843. The town increased in importance after the Jāmrao Canal was opened in 1900 and is now a trade centre for grain, fabrics, and cotton products. It was constituted a municipality in 1901. Pop. (1981) 124,371.

Mirrlees, James A., in full JAMES ALEXANDER MIRRLEES (b. July 5, 1936, Minnigaff, Scot.), Scottish economist known for his analytic research on economic incentives in situations with incomplete, or asymmetrical, information. He shared the 1996 Nobel Prize for Economic Sciences with William Vickrey of Columbia University.

Mirrlees studied mathematics at the University of Edinburgh (M.A., 1957) and Trinity College, Cambridge (Ph.D., 1963). He taught at the University of Oxford (1969–95) and at Cambridge. Mirrlees's groundbreaking models and equations, published in the 1970s, illustrated the "optimal income taxation" (a progressive tax that included incentives for earning) and "moral hazard" (increasing the care taken by insurance policyholders) problems often treated in Vickrey's books. Mirrlees's methodology became the standard in the economics of asymmetrical information and was used by later economists in a variety of applications.

mirror, any polished surface that diverts a ray of light according to the law of reflection.

The typical mirror is a sheet of glass that is coated on its back with aluminum or silver that produces images by reflection. The mirrors used in Greco-Roman antiquity and throughout the European Middle Ages were simply slightly convex disks of metal, either bronze, tin, or silver, that reflected light off their highly polished surfaces. A method of backing a plate of flat glass with a thin sheet of reflecting metal came into widespread production in Venice during the 16th century; an amalgam of tin and mercury was the metal used. The chemical process of coating a glass surface with metallic silver was discovered by Justus von Liebig in 1835, and this advance inaugurated the modern techniques of mirror making. Present-day mirrors are made by sputtering a thin layer of molten aluminum or silver onto the back of a plate of glass in a vacuum. In mirrors used in telescopes and other optical instruments, the aluminum is evaporated onto the front surface of the glass rather than on the back, in order to eliminate faint reflections from the glass itself.

When light falls on a body some of the light may be reflected, some absorbed, and some transmitted through the body. In order for a smooth surface to act as a mirror, it must reflect as much of the light as possible and must transmit and absorb as little as possible. In order to reflect light rays without scattering or diffusing them, a mirror's surface must be perfectly smooth or its irregularities must be smaller than the wavelength of the light being reflected. (The wavelengths of visible light are on the order of 5×10^{-5} cm.) Mirrors may have plane or curved surfaces. A curved mirror is concave or convex depending on whether the reflecting surface faces toward the centre of curvature or away from it. Curved mirrors in ordinary usage have surfaces that are spherical, cylindrical, paraboloidal, ellipsoidal, and hyperboloidal. Spherical mirrors produce images that are magnified or reduced—exemplified, respectively, by mirrors for applying facial makeup and by rearview mirrors for automobiles. Cylindrical mirrors focus a parallel beam of light to a line focus. A paraboloidal mirror may be used to focus parallel rays to a real focus, as in a telescope mirror, or to produce a parallel beam from a source at its focus, as in a searchlight. An ellipsoidal mirror will reflect light from one of its two focal points to the other, and an object situated at the focus of a hyperboloidal mirror will have a virtual image.

Mirrors have a long history of use both as household objects and as objects of decoration. The earliest mirrors were hand mirrors; those large enough to reflect the whole body did not appear until the 1st century AD. Hand mirrors were adopted by the Celts from the Romans and by the end of the Middle Ages had become quite common throughout Europe, usually being made of silver, though sometimes of polished bronze.

The use of glass with a metallic backing commenced in the late 12th and early 13th centuries, and, by the time of the Renaissance, Nürnberg and Venice had established outstanding reputations as centres of mirror production. The mirrors produced in Venice were famous for their high quality. Despite the strictures of the doges, Venetian workmen succumbed to the temptation to carry the secrets of their craft to other cities, and, by the middle of the 17th century, mirror making was practiced extensively in London and Paris. Generally, mirrors were extremely expensive—especially the larger variety—and the wonderment created at the time by the royal palace at Versailles was due in part to the profusion of mirrors that adorned the state rooms.

From the late 17th century onward, mirrors—and their frames—played an increasingly important part in the decoration of rooms. The early frames were usually of ivory, silver, ebony, or tortoiseshell or were veneered with marquetry of walnut, olive, and laburnum. Needlework and bead frames were also to be found. Craftsmen such as Grinling Gibbons (1648–1721) often produced elaborately carved mirror frames to match a complete decorative ensemble. The tradition soon became established of incorporating a mirror into the space over the mantelpiece: many of the early versions of these mirrors, usually known as overmantels, were enclosed in glass frames. The architectural structure of which these mirrors formed a part became progressively more elaborate; designers such as the English brothers Robert and James Adam cre-

Gothic mirror, detail from "The Marriage of Giovanni(?) Arnolfini and Giovanna Cenami(?)" by Jan van Eyck, 1434; in the National Gallery, London

Reproduced by permission of the trustees of the National Gallery, London

ated fireplace units stretching from the hearth to the ceiling and depending largely for their effect on mirrors. On the whole, mirror frames reflected the general taste of the time and were often changed to accommodate alterations in taste, frames usually being cheaper and hence more easily replaced than the mirror itself.

By the end of the 18th century, painted decoration largely supplanted carving on mirrors, the frames being decorated with floral patterns or classical ornaments. At the same time, the French started producing circular mirrors, usually surrounded by a Neoclassical gilt frame that sometimes supported candlesticks, which enjoyed great popularity well into the 19th century. Improved skill in mirror making also made possible the introduction of the cheval glass, a freestanding full-length mirror, supported on a frame with four feet. These were mainly used for dressing purposes, though occasionally they had a decorative function.

New, cheaper techniques of mirror production in the 19th century led to a great proliferation in their use. Not only were they incorporated into pieces of furniture, such as wardrobes and sideboards, but they were also used extensively in decorative schemes for public places.

mirror nucleus, atomic nucleus that contains a number of protons and a number of neutrons that are mutually interchanged in comparison with another nucleus. Thus, nitrogen-15, containing seven protons and eight neutrons, is the mirror nucleus of oxygen-15, comprising eight protons and seven neutrons. Study of mirror nuclei has aided in showing that the nuclear force binding protons and neutrons in the nucleus remains nearly the same when a neutron is replaced by a proton.

MIRV, abbreviation of MULTIPLE INDEPENDENT REENTRY VEHICLE, any of several nuclear warheads carried on the front end, or "bus," of a ballistic missile. Each MIRV allows separately targeted nuclear warheads to be sent on their independent ways after the main propulsion stages of the missile launch have shut down. The warheads can be released from the bus at different speeds and on different trajectories. MIRV technology was first developed by the United States. By the late 20th century both the United States and the Soviet Union had many intercontinental and submarine-launched ballistic missiles equipped with MIRVs.

Mirzachul (Uzbekistan): *see* Gulistan.

Mirzāpur-Vindhyāchal, city, southeastern Uttar Pradesh state, northern India, southwest of Vārānasi (Benares), on the Ganges River. Mirzāpur was probably founded in the 17th century; by 1800 it had become the greatest trading centre in northern India. When the railway to Allahābād was opened in 1864, Mirzāpur began to decline, but it became increasingly important in local trade. Located at a road junction on a major rail line, it is also a centre of industry, including cotton milling, sandstone dressing, and brassware and carpet manufacture. There are temples and *ghāṭ*s, or bathing stairs, along the river; in Vindhyāchal is an old temple of Kālī, visited by pilgrims.

The surrounding region includes part of the Ganges alluvial plain to the north and some of the Vindhya Range to the south. The area to the south is drained by the Son River; its tributary, the Rihand, has been dammed to create a large reservoir and provide hydroelectric power. Most of the land is irrigated by canals, and rice, barley, and wheat are grown. Pop. (1991 prelim.) city, 169,368.

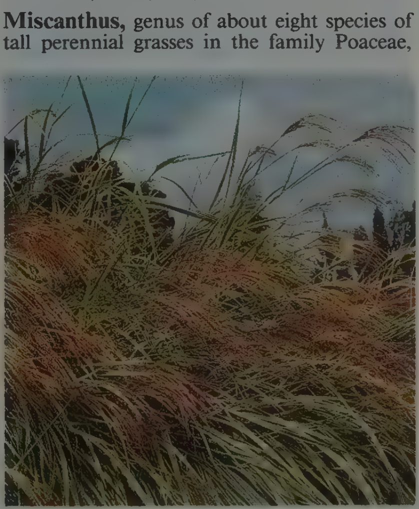
Misau, also spelled MISSAU, or MESSAU, town and traditional emirate, northern Bauchi state, northern Nigeria, 5 miles (8 km) northwest of the Misau River, the upper stretch of the Komadugu Gana. Originally inhabited by Hausa people, the town was captured in 1827 by the emirs Yakubu of Bauchi and Dan Kauwa of Katagum. The ensuing dispute between them led the sultan of Sokoto to place (1831) the town and its surrounding area under the jurisdiction of Mamman Manga (the son of Gwani Mukhtar, the Fulani warrior who had conquered Birni Ngazargamu, capital of the Bornu kingdom, in 1808 during the Fulani jihad, or holy war). He is credited with founding Misau emirate.

During Emir Ahmadu's reign (1833–50) the town wall was constructed. The military exploits of Emir Sale (ruled 1860–86) led the sultan to enlarge the emirate. The second emir Ahmadu (1900–03) fled before the advance of the British, who placed the emirate under Katagum in 1904 but restored its independence as a separate emirate of Kano province in 1907. Enlarged by minor additions in 1915, the emirate of 713 square miles (1,847 square km) was transferred to Bauchi province in 1926. The emir, now a traditional and religious leader, retains the historical title of *sarkin Bornu ta gabas* (king of eastern Bornu).

Most of Misau's Muslim inhabitants, mainly Fulani and Hausa, are now farmers who cultivate millet, sorghum, peanuts (groundnuts), cotton, cowpeas, and indigo and who raise cattle, goats, sheep, donkeys, and horses. Cotton weaving and dyeing are important local activities. The town is the site of the Alhapri Farm Institute. It is served by a secondary school and a hospital. Misau is located on the northern branch of the main highway network and is at a local highway crossroads. Pop. (latest census) town, 105,416.

Miscanthus, genus of about eight species of tall perennial grasses in the family Poaceae, native primarily to southeastern Asia. Eulalia (*M. sinensis*) and two other species sometimes are grown as lawn or border ornamentals for their silvery or white, plumelike flower clusters.

The leaves of several varieties have yellow or white stripes or bands. The dried heads often are used in decoration. *Eulalia* also is the botanical name for a genus of perennial grasses that includes browntop (*E. fulva*), an important forage plant in Australia, Malaysia, and Southeast Asia.



Eulalia (*Miscanthus sinensis*)

Douglas David Dawn

miscarriage, also called SPONTANEOUS ABORTION, spontaneous expulsion of the embryo or fetus from the uterus before it has developed sufficiently to live without maternal support. The most common cause, accounting for more than 60 percent of miscarriages, is an inherited defect in the fetus, which might result in a deformed or otherwise abnormal child. An acute infectious disease may play a role in causing some miscarriages, particularly if it reduces the oxygen supply to the fetus. Certain uterine tumours or other uterine abnormalities also may induce a miscarriage. Death of the fetus stemming from external trauma or from knotting of the umbilical cord is another cause of miscarriage. Physical traumas (such as blows to or falls of the mother) and psychic traumas are rarely implicated in miscarriage.

Endocrine disorders such as the deficient secretion of the hormone progesterone may cause poor development of the decidua (the mucal lining of the uterus) or an abnormally irritable uterus and may thus sometimes result in miscarriage. The principal sign of an impending or threatened miscarriage is vaginal bleeding.

miscegenation, marriage or cohabitation by persons of different race. Theories of anatomical disharmony resulting from miscegenation have been largely discredited by 20th-century genetics and anthropology. Although it is now accepted that modern populations are the result of continuous racial crossing since prehistoric times, taboos on miscegenation—in some instances legally enforced—have existed and continue to exist in many biracial societies. In South Africa the official policy of apartheid for many years included legal prohibitions on miscegenation. In the United States many states had laws against interracial marriage until the Supreme Court declared them unconstitutional in 1967.

misch metal, alloy consisting of about 50 percent cerium, 25 percent lanthanum, 15 percent neodymium, and 10 percent other rare-earth metals and iron. Misch metal has been produced on a relatively large scale since the early 1900s as the primary commercial form of mixed rare-earth metals. Misch metal alloyed with iron is the flint (spark-producing agent) in cigarette lighters and similar devices. Misch metal is also used as a deoxidizer in various alloys and to remove oxygen in vacuum tubes. As an alloying agent in magnesium, it contributes to high strength and creep resistance.

misdemeanour (law): *see* felony and misdemeanour.

mise, in medieval England, any outlay of money and in particular the payment of taxation. The mise rolls (*rotuli misae*) of King John's reign (1199–1216), which record payments made from the Exchequer to various departments of the royal household, illustrate the general meaning of the word. It was used to denote taxation in the document known as the Confirmatio Cartarum granted by Edward I in 1297, when the king promised not to treat as customary certain "aids, mises and prises" recently levied. The word was also used to indicate the settlement of a dispute by arbitration. Louis IX's judgment (1264) on the quarrel between Henry III and the rebel English barons is known as the Mise of Amiens; after Henry's defeat at Lewes in May 1264, an agreement known as the Mise of Lewes, of which the text is lost, was made between victors and vanquished.

Misenum, ancient port of Campania, Italy, located about 3 miles (5 km) south of Baiae at the west end of the Gulf of Puteoli (Pozzuoli). Until the end of the Roman Republic it was a favourite villa resort dependent on Cumae. Agrippa made the fine natural harbour into the main naval station of the Mediterranean fleet (31 BC). Pliny the Younger was stationed in Misenum, from which he witnessed (and wrote about) the eruption of Mount Vesuvius in AD 79. In 890 it was destroyed by the Saracens. The harbour consisted of the outer basin, or Porto di Miseno, protected by moles (mounds of large stones used as a breakwater), of which remains still exist, and the present Mare Morto, separated from it by a comparatively modern embankment. The town lay on the south side of the outer harbour, near the village of Miseno, where remains of a theatre and baths have been found. Remains of villas can also be traced; the largest of these, which occupied the summit of the promontory, belonged first to Marius, then to Lucullus, and then to the imperial house. Tiberius died in it.

Mises, Ludwig (Edler) von (b. Sept. 29, 1881, Lemberg, Austria-Hungary [now Lviv, Ukraine]—d. Oct. 10, 1973, New York City), Austrian-American libertarian economist known for his contribution to liberalism in economic theory and his belief in the power of the consumer.

Von Mises was a professor at the University of Vienna (1913–38) and at New York University (1945–69). In *The Anti-Capitalistic Mentality* (1956), an examination of American socialism, he dealt with the opposition of a variety of intellectuals to the free market; in his view, these persons bear an unwarranted resentment toward the necessity of obeying mass demand, which is the basis of prosperity in big business. Among his other books are *Planned Chaos* (1947), concerning socialist totalitarianism, and *Human Action* (1949; rev. ed. 1966), a treatise on economics.

Mises, Richard von (b. April 19, 1883, Lemberg, Austria-Hungary [now Lviv, Ukraine]—d. July 14, 1953, Boston), Austrian-born American mathematician and aerodynamicist who notably advanced statistics and the theory of probability.

Von Mises' scientific and mathematical contributions range widely. His early work centred on aerodynamics, in which he made fundamental advances in boundary-layer-flow theory and airfoil design. In 1915 he constructed a 600-horsepower airplane for the Austrian army and served in it as a pilot during World War I.

Von Mises was a professor of applied mathematics at the University of Strassburg (1909–18), and in 1920 he became professor of applied mathematics and director of the Institute for Applied Mathematics at the University of Berlin. After the Nazi Party gained power, he left Germany in 1933 to accept a post with the University of Istanbul. In 1939 he joined the staff of Harvard University, where in 1944 he became Gordon McKay professor of aerodynamics and applied mathematics.

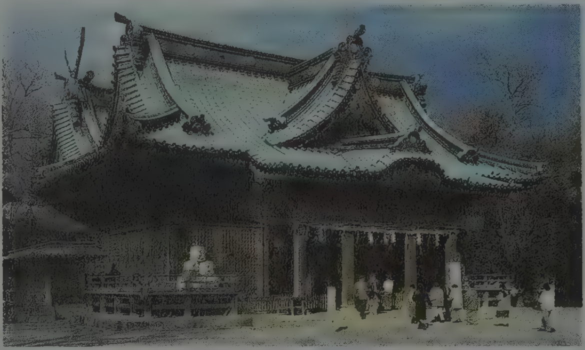
Von Mises' primary work in statistics concerned the theory of measure and applied mathematics. He also wrote a philosophical work, *Positivism: A Study in Human Understanding* (1951), summarizing his views on science and life.

Mishawaka, city, St. Joseph county, northern Indiana, U.S. It lies along the St. Joseph River, just east of South Bend. Laid out in 1833, it probably derived its name from the Potawatomi word for "country of dead trees." Discoveries of bog iron immediately following the initial settlement attracted industry and workers to the site. Several thousand Belgian immigrants after World War I formed a substantial Flemish-speaking community in the city. Mishawaka is an industrial centre with manufactures including rubber, plastic, food products, power-transmission units, electrical and heavy machinery, structural steel, foundry equipment, and missiles. Bethel College (1947) is operated by the Missionary Church. There are recreation facilities on the St. Joseph River and nearby lakes. Inc. 1899. Pop. (1990) city, 42,608; South Bend–Mishawaka MSA, 247,052.

Consult the INDEX *first*

Mishima, city, Shizuoka *ken* (prefecture), Honshu, Japan. It is situated on the Izu Peninsula at the western foot of Mount Hakone. In early historic times it was the capital of Izu province (now part of Shizuoka prefecture), and at the beginning of the Tokugawa period (1603–1867) it became a major post town on the Tōkaidō (Eastern Sea Highway). The city's scenic spots include the well-known Mishima Shrine with its beautiful landscaped gardens.

Mishima is now an important railway and highway hub, serving as the gateway to many of the spas on the Izu Peninsula, such as Nagaoka and Shuzenji. Dairy cattle are raised in the surrounding area, and there are several dairy-processing plants in the city. Abundant groundwater fed by Mount Fuji has attracted many other manufactures to the city, including paper, machinery, textiles, and rubber. Pop. (1990) 105,419.



Mishima Shrine, Mishima, Honshu, Japan

JTB Photo Library, Tokyo

mishima: *see* punch'ŏng pottery.

Mishima Yukio, pseudonym of HIRAOKA KIMITAKE (b. Jan. 14, 1925, Tokyo—d. Nov. 25, 1970, Tokyo), prolific writer who is regarded by many critics as the most important Japanese novelist of the 20th century.

Mishima was the son of a high civil servant and attended the aristocratic Peers School in Tokyo. During World War II, having failed to qualify physically for military service, he worked in a Tokyo factory and after the war studied law at the University of Tokyo. In 1948–49 he worked in the banking division of the Japanese Ministry of Finance. His first novel, *Kamen no kokuhaku* (1949; *Confessions of a Mask*), is a partly autobiographical work that describes with exceptional stylistic brilliance a homosexual who must mask his abnormal sexual preferences from the society around him. The novel gained Mishima immediate acclaim, and he began to devote his full energies to writing.

He followed up his initial success with several novels whose main characters are tormented by various physical or psychological problems or who are obsessed by unattainable ideals that make everyday happiness impossible for them. Among these works are *Ai no Kanaki* (1950; *Thirst for Love*), *Kinjiki* (1954; *Forbidden Colours*), and *Shiosai* (1954; *The Sound of Waves*). *Kinkaku-ji* (1956; *The Temple of the Golden Pavilion*) is the story of a troubled young acolyte at a Buddhist temple who burns down the famous building because he himself cannot attain to its beauty. *Utage no Ato* (1960; *After the Banquet*) explores the twin themes of middle-aged love and corruption in Japanese politics. In addition to novels, short stories, and essays, Mishima also wrote plays in the form of the Japanese Nō drama, producing reworked and modernized versions of the traditional stories. His plays include *Sado kōshaku fujin (*1965; *Madame de Sade*) and *Kindai nōgaku shu* (1956; *Five Modern Nōh Plays*).

Mishima's last work, *Hōjō no umi* (1965–70; *The Sea of Fertility*), is a four-volume epic that is regarded by many as his most lasting achievement. Its four separate novels, *Haru no yuki* (*Spring Snow*), *Homma* (*Runaway Horses*), *Akatsuki no tera* (*The Temple of Dawn*), and *Tennin gosui* (*The Decay of the Angel*), are set in Japan and cover the period from about 1912 to the 1960s. Each of them depicts a different reincarnation of the same being: as a young aristocrat in 1912, as a political fanatic in the 1930s, as a Thai princess before and after World War II, and as an evil young orphan in the 1960s. These books effectively communicate Mishima's own increasing obsession with blood, death, and suicide, his interest in self-destructive personalities, and his rejection of the sterility of modern life.

Mishima's novels are typically Japanese in their sensuous and imaginative appreciation of natural detail, but their solid and competent plots, their probing psychological analysis, and a certain understated humour helped make them widely read in other countries.

Mishima Yukio

By courtesy of Mrs. Mishima Yukio

The short story "Yukoku" ("Patriotism") from the collection *Death in Midsummer, and Other Stories* (1966) revealed Mishima's own political views and proved prophetic of his own end. The story describes, with obvious admiration, a young army officer who commits seppuku, or ritual disembowelment, to demonstrate his loyalty to the Japanese emperor. Mishima was deeply attracted to the austere patriotism and martial spirit of Japan's past, which he contrasted unfavourably with the materialistic, Westernized people and the prosperous society of Japan in the postwar era. Mishima himself was torn between these differing values. Although he maintained an essentially Western life-style in his private life and had a vast knowledge of Western culture, he raged against Japan's imitation of the West. He diligently developed the age-old Japanese arts of karate and kendo and formed a controversial private army of about 80 students, the Tate no Kai (Shield Society), with the idea of preserving the Japanese martial spirit and helping protect the emperor (the symbol of Japanese culture) in case of an uprising by the left or a Communist attack.

On Nov. 25, 1970, after having that day delivered the final installment of *The Sea of Fertility* to his publisher, Mishima and four Shield Society followers seized control of the commanding general's office at a military headquarters near downtown Tokyo. He gave a 10-minute speech from a balcony to a thousand assembled servicemen in which he urged them to overthrow Japan's post-World War II constitution, which forbids war and Japanese rearmament. The soldiers' response was unsympathetic, and Mishima then committed seppuku in the traditional manner, disemboweling himself with his sword, followed by decapitation at the hands of a follower. This shocking event aroused much speculation as to Mishima's motives, and regret that his death had robbed the world of such a gifted writer.

Mishmi, tribal people mostly of Arunachal Pradesh (formerly North East Frontier Agency) in extreme northeastern India, near Tibet and Assam, speaking dialects of the Tibeto-Burman linguistic family. Numbering about 35,000 in the late 20th century, the Mishmi live along the valleys of the Dibang (where they are known as Midu) and Luhit rivers. Those of the Luhit Valley are divided into two groups, the Miju on the upper Luhit and the Digaru on that river's lower reaches.

The Mishmi trace their descent through the paternal line, and young people are expected to marry outside the paternal clan. Settlements are small and frequently shifted. There are no chiefs. Each family group is virtually autonomous and inhabits a longhouse built on piling.

Mishmi agriculture is extremely primitive; corn (maize) and buckwheat are the staple crops; barley and wheat are grown at higher altitudes, rice in the foothills. Cattle are kept for slaughter and are also used as currency. Other pursuits include hunting and fishing. The Mishmi carry on considerable barter with peoples living in Tibet and Assam, trading musk, medicinal herbs, paper bark, and aconite poison in exchange for clothing, salt, copperware, and swords. They worship their tribal gods with animal sacrifices and offerings, and some Tibetan influence is evident. Slavery and headhunting are no longer practiced.

Mishna, also spelled MISHNAH (Hebrew: "Repeated Study"), plural MISHNAYOT, the oldest authoritative postbiblical collection and codification of Jewish oral laws, systematically compiled by numerous scholars (called tannaim) over a period of about two centuries. The codification was given final form early in the 3rd century AD by Judah ha-Nasi. The Mishna supplements the written, or scriptural, laws found in the Pentateuch. It presents various interpretations of selective legal traditions that had been preserved orally since at least the time of Ezra (*c.* 450 BC).

Intensive study of the Mishna by subsequent scholars (called amoraim) in Palestine and Babylonia resulted in two collections of interpretations and annotations of it called the Gemara, or Talmud. In the broader sense of the latter terms, the Mishna and Gemara together make up the Talmud (*q.v.*).

The Mishna comprises six major sections, or orders (*sedarim*), that contain 63 tractates (*massekhtaot*) in all, each of which is further divided into chapters.

Zeraʿim ("Seeds"), the first order of the Mishna, has 11 tractates. It begins by discussing daily prayer and then devotes 10 tractates to religious laws involving agriculture. *Zeraʿim* discusses the prescription that fields must periodically lie fallow, the prohibition on plant hybridization, and regulations governing what portion of a harvest is to be given to priests, to Levites (a priestly clan), and to the poor.

The second order, *Moʿed* ("Festival"), consists of 12 tractates that deal with ceremonies, rituals, observances, and prohibitions related to the Sabbath, to religious festivals, to fast days, and to such other days as are marked by regular religious observance—*e.g.*, periodic contributions to the Temple of Jerusalem.

Nashim ("Women"), the third order of the Mishna, discusses married life in seven tractates. It thus explains religious laws concerning betrothals, marriage contracts, divorce, bills of divorce, and certain ascetic vows that affect married life.

The fourth order, *Neziqin* ("Damages"), has 10 tractates covering civil and criminal law as related to damages, theft, labour relations, usury, real estate, partnerships, tenant relations, inheritance, court composition, jurisdiction and testimony, erroneous decisions of the Sanhedrin (high court), and physical punishments, including death. Idolatry, which is punishable by death, is also discussed. The tractate *Avot* ("Fathers") seems to have been included in the fourth order to teach a moral way of life that would preclude serious transgressions of the law and thereby diminish the necessity of punishment. It became one of the most popular pieces of Talmudic literature; in English translations it is usually called *The Ethics of the Fathers.*

Qodashim ("Holy Things"), the fifth order, provides a detailed description of the Temple of Jerusalem complex and discusses laws regulating Temple sacrifices, other offerings, and donations. It has 11 tractates.

The last of the Mishna orders is *Ṭohorot* ("Purifications"), divided into 12 tractates. It considers laws regarding the ritual purity of vessels, dwellings, foods, and persons and deals with various rituals of purification. The text also provides considerable information on ritual objects.

Mishne Torah, extensive commentary on the Talmud, composed in the 12th century by the renowned Jewish philosopher and scholar Moses Maimonides. Each of its 14 volumes deals with a group of laws covering one subject. Among the subjects are ethical conduct, civil laws, torts, marriage and divorce, and gifts to the poor.

Maimonides intended the Mishne Torah to combine religious law and philosophy and to serve as a code of laws that teaches as well as prescribes conduct. He attempted to make the Mishne Torah accessible to as many readers as possible, rather than restricting it for use only by scholars. Readers are encouraged to probe into the rationale underlying the laws. Like the Talmud that is its base, the Mishne Torah contains instruction in secular subjects, such as physics, astronomy, dietetics, and psychology.

Misima Island, also called SAINT AIGNAN, volcanic island of the Louisiade Archipelago in Papua New Guinea. It is situated 125 miles (200 km) southeast of the island of New Guinea in the southwestern Pacific. The island measures 25 miles by 6–7 miles (40 by 10–11 km) and has a total land area of 100 square miles (260 square km). The terrain is mountainous, rising to 3,400 feet (1,050 m) at Mount Oiatau. The site of gold discoveries in the late 1890s and of gold mining in the early 20th century, Misima now produces some copra. The largest settlement on the island is Bwagaoia, in the southeast. Pop. (1980 prelim.) 7,230.

Misiones, isolated province of northeastern Argentina. Misiones lies between the Paraná River and Paraguay to the west, the Iguaçu (Iguazú) River (and tributaries) and Brazil to the north, the Uruguay River (and tributaries) and Brazil to the east and southeast, and the Corrientes province of Argentina to the southwest. Its area of 11,506 square miles (29,801 square km) is mostly a 650–2,600-foot- (200–800-metre-) high basalt continuation of the Paraná Plateau of Brazil. The province's rough terrain is covered mostly by subtropical evergreen rain forest and is accented by canyons, rivers, and low ranges of the Victoria, Imán, and Misiones mountains. The province contains Iguazú National Park, which, with an area of 121,600 acres (49,200 hectares), includes part of Iguaçu Falls. One of the world's largest and most impressive cataracts, Iguaçu Falls descends 269 feet (82 m) over a distance of 1.7 miles (2.7 km).

The region received its name from the Jesuit missions established among the Guaraní Indians there in the 17th and 18th centuries. It became an Argentine territory after years of dispute with Paraguay and Brazil and the Paraguayan War of 1864–70. In 1882 it received territorial status and acquired its capital, Posadas (*q.v.*), from Corrientes province. Colonization of the land, beginning in the 1880s by assorted ethnic groups (including Poles, Ukrainians, Japanese, Brazilians, German-Brazilians, and Germans), continued into the mid-20th century. In 1953 the territory gained provincial status.

The principal economic staple is maté (Paraguayan tea), followed by lumber, tung oil, tea, and cassava (manioc). Industry, centred in Posadas, deals primarily with wood processing. Jesuit mission ruins and Iguaçu Falls are popular tourist attractions. Pop. (1999 est.) 972,672.

Miskito, also spelled MOSTIQUE, or MOSQUITO, Central American Indians of the lowlands along the Caribbean coast of northeastern Nicaragua. They were encountered by Columbus on his fourth voyage and have been in steady European contact since the mid-17th century. In the late 20th century five subgroups existed, with a total population of perhaps 70,000.

The modern Miskito are agricultural, their staple crop being cassava. They also keep poultry, cattle, and other farm animals. The Miskito culture has been strongly influenced by European contacts and by intermarriage with Africans brought to the area as slaves. In colonial times it was very similar to that of the neighbouring Sumo. Many Miskito Indians fled to neighbouring Honduras in the 1980s after conflicts developed between them and the Sandinista government of Nicaragua, and some Miskitos joined rebel groups seeking to overthrow the Sandinistas.

Miskito Coast (Nicaragua): *see* Mosquito Coast.

Miskolc, town with county status, in Borsod-Abaúj-Zemplén *megye* (county), northeastern

Hungary. It lies in the valley of the Szinva, a small tributary of the Sajó River, on the eastern margin of the Avas Hills, which form part of the Bükk limestone plateau. Caves in the limestone hills were inhabited from prehistoric times, and Germanic tribes, Sarmatians, and Avars later lived in the area. From the time of the Hungarian conquest in the 10th century, its history has been linked with a small iron field and with Diósgyőr, farther up the Szinva River valley, which in the 14th and 15th centuries was a regular retreat for royalty; its splendid castle is now largely in ruins. The long-established wealth and importance of Miskolc are apparent in some fine old buildings, including St. Stephen's, a 13th-century Gothic church, the National Theatre, the Protestant church, a Minorite church and monastery, and the Reformed Church of Avas and its belltower. Miskolc is also the site of a university founded in 1949, which offers instruction in engineering, law, and economics.

Liberty Square in Miskolc, Hung.
Interphoto—FPG

The chief town of the Borsod-Miskolc industrial region, it is after Budapest the second industrial town of Hungary. Industries include cement, glass, textiles, and food processing, and there is a large food refrigeration plant. Wine making is important, notably in the limestone caves of Mount Avas, which are used as cellars.

The Miskolc town-county administrative district extends for several miles up the Szinva valley to the boundary with Heves *megye.* Newer residential districts in Miskolc are located on the Sajó River plain.

The Borsod industrial district follows the Sajó River valley and includes several important settlements. Diósgyőr, which developed rapidly in the late 19th and early 20th centuries, now part of Miskolc proper, has been modernized since World War II; it has a large iron- and steelworks, produces heavy machinery and machine tools, and has a large cement and lime works. Kazincbarcika, a new town comprising several villages, especially Kazinc and Barcika, has a heavy chemicals industry and also produces iron and steel. At Borsodnádasd are sheet metal and plating works. Miskolc has rail and road connections with Budapest, 90 miles (145 km) to the southwest, and with eastern Hungary, Slovakia, Romania, and Ukraine. Pop. (1991 est.) 194,033.

Misnagid (Judaism): *see* Mitnagged.

Misool Island, Indonesian PULAU MISOOL, island in the Raja Ampat group in the Ceram Sea, Irian Jaya *provinsi* ("province"), Indonesia. Misool is located about 40 miles (64 km) southwest of the Doberai (Vogelkop) Peninsula on Irian Jaya. Flat lowlands cover the coastal regions except in the south, which is hilly and mountainous; the hills in the central part of the island reach an elevation of 3,250 feet (991 m). The climate is hot, with heavy rainfall; seasonal streams flow seaward from the central highlands, where there are dense hardwood forests. The island is sparsely populated by Papuans, who engage in seminomadic hunting and gathering. Some produce sago and fish, which are exported to the Irian Jaya ports of Inanwatan and Taminabuan. The chief settlements are Adua on the western tip of the island and Lelintah on the southeastern part of the island.

Misore Islands (Indonesia): *see* Schouten Islands.

mispickel (mineral): *see* arsenopyrite.

misprision, in law, criminal misconduct of various types. Concealment of a serious crime by one who knows of its commission but was not a party to it is misprision. Similarly, the failure of a citizen to attempt to prevent the perpetration of an offense can be characterized as misprision. (*See also* accomplice; accessory; and abettor.)

The term misprision also embraces the conduct of government officials charged with maladministration in public office. A third kind of misprision includes contempt for the sovereign or seditious conduct against the government or the courts.

Miṣrātah, also spelled MISURATA, town, northwestern Libya. It is separated from the Mediterranean Sea by a band of sand dunes and occupies a coastal oasis above an underground water table. The town originated about the 7th century as a caravan supply centre. By the 12th century, as Thubactis, it was engaged in interregional commerce. International trade developed through the port of Qaṣr Aḥmad, or Misurata Marina (now closed), lying 7 miles (11 km) east on Cape Miṣrātah, but the town reverted to a local market under Ottoman Turkish rule. By the 20th century, irrigation had greatly increased agricultural production, and the town, on the federal coastal road, became a main market and administrative centre.

Part of the modern section of Miṣrātah, Libya
Kay Muldoon

Old Miṣrātah is characterized by Arab architecture and narrow arched or covered streets. The modern town, however, is a mixture of Turkish and European buildings with a public garden and tree-lined avenues. The town's market economy is supplemented by light manufactures (textiles and hardware) and handicrafts (carpets, basketry, and pottery). It is linked by the coastal highway that connects Tripoli with Banghāzī and Cairo. Miṣrātah is an educational centre with several seminaries, a technical college, and a primary-teacher-training institute and hospital facilities. Pop. (1988 est.) 121,669.

misrepresentation, in law, any representation by words or other means made by one person to another that, under the circumstances, amounts to an assertion not in accordance with the facts. A misrepresentation is an assertion not in accord with the facts that is made with the intent to mislead or deceive; as such it can constitute fraud (*q.v.*).

Misrepresentation most commonly occurs in insurance and real-estate contracts; in such cases, a false statement regarding a matter of fact may be material to the contract and even influential in producing it. In many such cases, the injured party relies upon the false statement because it is the business of the other party to know all of the facts pertaining to it.

When a person has been induced to enter into a contract by misrepresentation, the contract is usually rendered void and the representee may even recover damages. In some jurisdictions, the representee may affirm the contract and insist that the misrepresentation be made good. The injured party in any case avoids contractual liability, either by instituting an action to rescind the contract or by using the misrepresentation as a defense in the event that he is sued for failure to perform his side of the contract.

Misrule, Lord of, also called ABBOT OF MISRULE, or KING OF MISRULE, official of the late medieval and early Tudor period in England, who was specially appointed to manage the Christmas festivities held at court, in the houses of great noblemen, in the law schools of the Inns of Court, and in many of the colleges at the universities of Cambridge and Oxford. During his reign, which lasted anywhere from 12 days to 3 months, the Lord of Misrule was responsible for arranging and directing all Christmas entertainment, including elaborate masques and processions, plays, and feasts. The lord himself usually presided over these affairs with a mock court and received comic homage from the revelers.

Scotland had an official similar to the Lord of Misrule, known as the Abbot of Unreason (suppressed in 1555), and both are thought by scholars to be descended from the "king" or "bishop" who presided over the earlier Feast of Fools. Another related functionary was the Boy Bishop, the leader of children's Christmas festivities in the choir schools.

After the death of Edward VI in 1553, the English court ceased to appoint a Lord of Misrule. *See also* Master of the Revels.

missal, type of book containing the prayers, important chants, and necessary instructions for the celebration of the mass (Latin: *missa*) in the Roman Catholic church throughout the year.

The missal developed from various books used in the early church, for by the 5th century a separate mass book had been developed for the use of each participant in the liturgy. The priest at the altar, for instance, used the sacramentary, a book containing the orations and prefaces that vary from feast to feast. The fixed prayers that form the ordinary of the mass were contained in the sacramentary. For Scripture readings, a Bible with marked passages had originally been used, but after about 1000, a special book, the lectionary, was developed that contained only the Epistles and Gospels to be read at each feast. The soloist who led the congregation in responsive singing of the Psalms used a book called the cantatorium. The chants to be sung by the choir were contained in the antiphonary. Finally, a separate book, the ordo (Ordines Romani), gave the directions for the proper carrying out of the liturgical functions.

All these books were gradually combined into one volume, the *Missale plenum* ("full missal"), which by the 13th century had replaced the older books. All modern missals are of this type. The *Missale plenum* existed in various forms; the most popular was the missal of the Roman Curia, which had evidently developed primarily during the time of Pope Innocent III (1198–1216). This missal was adopted by the Franciscan friars and spread by them throughout Europe.

The Council of Trent (1545–63) proposed that the Roman liturgy be reformed, and in 1570 Pope Pius V promulgated a new missal, which was adopted throughout the Latin rite.

This missal was frequently, though not radically, revised. The liturgical movement in the 20th century was influential and led to the revision of the liturgy of Holy Week under Pius XII in 1955 and culminated in the decree of the second Vatican Council (1963) that allowed the introduction of the vernacular in the variable parts of the liturgy and ordered a complete revision of the missal to be carried out by a postconciliar commission.

The Eastern church has never adopted one book to be used by the celebrant of the liturgy. The Anthologion, an Eastern book similar to the Western missal, was used by some beginning in the 13th century, and an edition was published in Athens as late as 1882. Small hand missals are commonly used by the worshipers in the Eastern church.

Missau (Nigeria): *see* Misau.

missi dominici, emissaries of some Frankish kings and emperors who supervised provincial administration. *See* missus dominicus.

missile, a rocket-propelled weapon designed to deliver an explosive warhead with great accuracy at high speed. Missiles vary from small tactical weapons that are effective out to only a few hundred feet to much larger strategic weapons that have ranges of several thousand miles. Almost all missiles contain some form of guidance and control mechanism and are therefore often referred to as guided missiles. An unguided military missile, as well as any launch vehicle used to sound the upper atmosphere or place a satellite in space, is usually referred to as a rocket. A propeller-driven underwater missile is called a torpedo, and a guided missile powered along a low, level flight path by an air-breathing jet engine is called a cruise missile.

A brief treatment of military missiles follows. For full treatment, *see* MACROPAEDIA: War, The Technology of.

Propulsion, control, and guidance. Although missiles can be propelled by either liquid-fueled or solid-fueled rocket engines, solid fuel is preferred for military uses because it is less likely to explode and can be kept ready-loaded for quick launch. Such engines commonly propel tactical guided missiles—*i.e.,* missiles intended for use within the immediate battle area—toward their targets at twice the speed of sound. Strategic missiles (weapons designed to strike targets far beyond the battle area) are either of the cruise or ballistic type. Cruise missiles are jet-propelled at subsonic speeds throughout their flights, while ballistic missiles are rocket-powered only in the initial (boost) phase of flight, after which they follow an arcing trajectory to the target. As gravity pulls the ballistic warhead back to Earth, speeds of several times the speed of sound are reached.

Almost all missiles are steadied in flight by stabilizing fins. In addition, guided missiles contain control systems to adjust their flight paths. The simplest control systems are aerodynamic, making use of movable vanes or flaps that alter the flow of air past the stabilizing fins. A more complicated system—used especially in ballistic missiles, which often travel beyond the Earth's atmosphere—is thrust vectoring. In this system the stream of gases from the rocket engine is deflected by placing vanes within the exhaust nozzle or by swiveling the entire engine.

The guidance system is the most important and sophisticated part of the missile. In tactical missiles, electronic sensors locate the target by detecting energy emitted or reflected from it. For example, heat-seeking missiles carry infrared sensors that allow them to "home" onto the hot exhaust of jet engines. Antiradiation missiles home onto radar emissions, while one type of optically homing missile may "lock" onto an image of the target that is captured by a television camera. Upon receiving information through its sensor, the guidance system relays instructions for course correction to the control mechanism through some type of autopilot contained within the missile or through commands transmitted from the launch platform.

Ballistic missiles contain some type of inertial guidance system (*q.v.*), which compares the missile's actual speed and position to the positions that it must assume in order to hit the target. The guidance system then generates correcting commands to the control system. Inertial guidance has become so accurate that the United States' MX Peacekeeper ballistic missile, with a range of more than 6,000 miles (more than 9,650 km), has a 50-percent chance of delivering its 10 nuclear warheads within 400 feet (120 m) of its target.

Types. Tactical guided missiles are generally categorized according to the location of the launch platform and target. There are five types, air-to-air, air-to-surface, surface-to-air, antiship, and antitank, or assault.

Ballistic missiles are most often categorized as short-range, medium-range, intermediate-range, and intercontinental ballistic missiles (SRBMs, MRBMs, IRBMs, and ICBMs). SRBMs are effective to 300 miles (480 km), MRBMs from 300 to 600 miles (480 to 965 km), IRBMs from 600 to 3,300 miles (965 to 5,310 km), and ICBMs more than 3,300 miles (5,310 km).

ICBMs are usually launched from silos, which are reinforced canisters sunk into the ground for protection. Shorter-range ballistic missiles and some ICBMs are launched from railroad cars or wheeled trailers that offer the protection of mobility. "Hot-launched" ballistic missiles are launched directly from their canisters, while "cold-launched" missiles are ejected from the canisters by compressed gas before the rocket engines ignite. Submarine-launched ballistic missiles (SLBMs) are ejected in this manner to the ocean surface from tubes within the submerged vessel. *See also* cruise missile; rocket; smart bomb; torpedo.

Missile Defense Alarm System (series of reconnaissance satellites): *see* Midas.

missing link, hypothetical extinct creature halfway in the evolutionary line between modern human beings and their anthropoid progenitors. In the latter half of the 19th century, a common misinterpretation of Darwin's work was that humans were lineally descended from existing species of apes. To accept this theory and reconcile it with the hierarchical "great chain of being," some fossil ape-man or man-ape seemed necessary in order to complete the chain. *Pithecanthropus erectus* (now *Homo erectus*), *Eoanthropus dawsoni* (the "Piltdown man" later discovered to have been a hoax), and even the modern Khoikhoi (then called Hottentots) of southern Africa (when newly discovered) were suggested as the missing link. Today it is recognized that man's relationship to the present anthropoid apes (*e.g.,* chimpanzees) is through common ancestors rather than through direct descent. These ancestors have yet to be identified, but ape–hominid divergence may have occurred 6 million to 10 million years ago.

Articles are alphabetized word by word, not letter by letter

Mission, city, Hidalgo county, southern Texas, U.S., part of the McAllen–Edinburg–Mission metropolitan area, in the Lower Rio Grande valley. A settlement was made in 1908 near a mission established (1824) by Oblate Fathers of the Franciscan order. It developed as a shipping and packing centre for citrus fruits and is the site of the annual Texas Citrus Fiesta (a salute to the Texas Ruby Red Grapefruit). The American Poinsettia Society has its national headquarters in Mission. Inc. 1910. Pop. (1990) city, 28,653; McAllen-Edinburg-Mission MSA, 383,545.

mission, in Christianity, an organized effort for the propagation of the Christian faith.

During the early years, Christianity expanded through the communities of the Jewish dispersion. Soon the separate character of Christianity was recognized, and it was freed from the requirements of Hebrew law. Paul, the greatest and the prototype of all missionaries, evangelized much of Asia Minor and the chief Greek cities and was also active in Rome. Because of his work and that of other missionaries, the new religion spread rapidly along the trade routes of the Roman Empire into all the great centres of population.

By the time of Constantine (reigned AD 306–337), Christianity had spread to all parts of the Roman Empire, both East and West. Although paganism lingered, by about AD 500 the population of the Roman Empire was predominantly Christian. During this period, missionary endeavour moved to the empire's borders and beyond.

The advance of Christianity slowed after 500 as the Roman Empire, with which it had become identified, disintegrated. In the 7th and 8th centuries, Arab invasions established Islām as the dominant religion in about half the area in which Christianity had been dominant. During this time, however, Celtic and British missionaries spread the faith in western and northern Europe, while missionaries of the Greek church in Constantinople worked in eastern Europe and Russia.

From about 950 to 1350 the conversion of Europe was completed, and Russia became Christian. Missions to Islāmic areas and to the Orient were begun.

From 1350 to 1500 Christianity suffered a serious recession. The new empire of the Ottoman Turks replaced the Arab state and destroyed the Byzantine Empire. The old Eastern Christian churches declined; and in addition the Black Death killed hundreds of missionaries, who were not replaced.

The Roman Catholic church, reformed and revitalized after the Council of Trent (1545–63), sent missionaries into the newly discovered and conquered territories of three Catholic empires: Spain, Portugal, and France. As a result, Christianity was established in Central and South America, in the Caribbean, and in the Philippines. Jesuits established missions in Japan, China, and India. Central direction to the whole vast enterprise was provided by the establishment at Rome in 1622 of the Congregation for the Propagation of the Faith. From 1750 to 1815 was a period of decline: missionary interest diminished, the empires disintegrated, and the Society of Jesus was suppressed. Subsequently, mission work by Roman Catholics revived, and native clergy and bishops were ordained to serve new churches in Asia, Africa, and throughout the world. A radical new direction was given to the missions by the second Vatican Council (1962–65): missions were to be directed only to non-Christians; and, although the aim of conversion was not disavowed, the main approach was to be through dialogue.

The Protestant churches were slow to undertake foreign missions, but their emphasis on a personal gospel and their recovery of the Scriptures prepared the way for a massive outreach once the Protestant nations acquired colonies from the 16th to the 19th century. In the 19th and early 20th centuries there developed a great upsurge of Protestant mission activity, and many more agencies and boards were formed. Many were voluntary and unofficial, but most denominations also established official organizations for missions. Early missionary activities of the various denominations were often very competitive and even disruptive, but eventually a cooperative spirit developed that helped lead to the ecumenical movement. By the mid-20th century, as former colonies won independence, the new states sharply restricted mission activities, often forbidding such efforts as conversions and permitting only nonproselytizing educational and medical service—both of which had been important elements in most Christian mission programs.

Missionary efforts in the Orthodox churches during the 19th and 20th centuries were limited to the Russian church, and this activity ceased with the establishment of the Soviet regime in Russia.

Mission, Congregation of the, a community of priests and brothers that was founded by Saint Vincent de Paul. *See* Vincentian.

Mission Indians, the coastal Indians of southern and central California among whom Spanish Franciscans established 21 missions between 1769 and 1823. The major groups were, from south to north, the Diegueño, Luiseño, Juaneño, Gabrielino, Chumash, and Costanoan (*qq.v.*).

The role of the missions, in addition to spreading the Roman Catholic faith, was to act as "civilizing agents" for the Spanish monarchy; however, beyond some instruction in the Spanish language, Christian dogma, and hymn singing, the Indians seem to have received little formal education. They were discouraged from leaving the mission area and encouraged to tend farms, to herd, and to learn trades. Many were converted, many died of European diseases, and many became fatally dependent upon the missions. When the authority of the missions was officially ended by the Mexican government in 1834, many of the Indians were left adrift. By law they were promised rights of citizenship and one-half of all former mission property; but, shorn of protection, many were exploited and despoiled by speculators. A few, however, became successfully assimilated within the Mexican system. A few, like the Agua Caliente band, became relatively wealthy in the 20th century, selling and leasing land for the elite resort of Palm Springs.

Missionaries of Africa, Society of, Roman Catholic international missionary society of priests and brothers who work in Africa. *See* White Father.

Missionary Ridge, Battle of, in the American Civil War, battle that ended the Confederate siege of Union troops at Chattanooga, Tenn. *See* Chattanooga, Battle of.

Mississauga, city, regional municipality of Peel, southeastern Ontario, Canada. It lies at the western end of Lake Ontario, immediately southwest of Toronto. First settled in the early 19th century on land purchased from the Mississauga Indians, the township of Toronto gave rise to the villages of Port Credit (incorporated 1934) and Streetsville (incorporated 1958), both of which became towns in the early 1960s. On Jan. 1, 1968, the entire township, exclusive of Port Credit and Streetsville, was incorporated as a town, one of the largest and most densely populated in Canada, and in 1974 Mississauga became a city.

Mississauga is both a residential suburb of Toronto and an important industrial centre in its own right. Its manufactures include aircraft, engines and turbines, motor vehicles, chemicals and pharmaceuticals, petroleum, rubber and steel products, construction materials and equipment, plastics, cement, household appliances, and printed material. The city has port facilities and is on major expressways and railway lines. It is also the site of Toronto International Airport, Canada's busiest air terminal, and Erindale College, an affiliate of the University of Toronto. Pop. (2001) 612,925.

Mississippi, constituent state of the United States of America lying in the south-central part of the country.

A brief treatment of Mississippi follows. For full treatment, *see* MACROPAEDIA: United States of America: *Mississippi.*

Mississippi is bounded on the north by Tennessee, on the east by Alabama, and on the south by the Gulf of Mexico and Louisiana; on the west it is separated by the Mississippi River from Louisiana and Arkansas. The state capital is Jackson.

The Mississippi Territory was created by Congress in 1798. After several boundary changes, it entered the United States in 1817 as the 20th state. A plantation-based economy using slave labour developed in the 1820s and '30s. Mississippi seceded from the Union in 1861 and gave the Confederacy its president, Jefferson Davis. The Union capture of Vicksburg, on the Mississippi River, in 1863, proved a turning point in the American Civil War. Mississippi was readmitted to the Union in 1870. Reconstruction was followed by a segregationist entrenchment that did not begin to ease until the 1960s.

Mississippi is divided into a number of physiographic regions that encompass hills, plains, prairies, river lowlands, and pine woods. There are five major river systems with a host of smaller ones. Most of the state is low-lying, the highest point reaching only 806 feet (246 m) above sea level. Climatically, the growing season is long, rainfall is abundant, and extreme temperatures are unusual. Summers are warm and humid, with temperatures sometimes exceeding 95° F (35° C). January temperatures average from 42° to 50° F (6° to 10° C). The annual average precipitation is more than 50 inches (1,270 mm).

The white population of Mississippi is predominantly of British, Scots-Irish, and northern European ancestry. Blacks were in the majority until 1940, when waves of emigration to Northern cities occurred. In 1990 they constituted one-third of the population. There are some 8,000 Indians (mostly Choctaw). Most Mississippians are either Baptists or United Methodists.

Mississippi still grows substantial amounts of cotton, but soybeans now exceed cotton in value of production. Minor quantities of rice and wheat are also grown. Poultry and cattle are important. Petroleum and natural gas account for most of Mississippi's minerals. Iron ore has been mined intermittently, and there is unexploited bauxite. More than half the land area is commercial forest, producing lumber, paper pulp, and naval stores. The state's largest employers include the apparel and textile, lumber- and wood-products, food-processing, electrical-equipment, and transportation-equipment industries.

Water transportation is important. There are two major ports on the Gulf of Mexico, and the Mississippi, Pearl, and Yazoo rivers are all navigable. The state also is served by major highways and railroads.

Mississippi is well known for its writers, who, in the 20th century, have included William Faulkner, Eudora Welty, and Tennessee Williams. In music, the Mississippi Delta blues tradition greatly influenced both urban blues and rock music. The University of Mississippi at University, near Oxford, dates from 1844. Area 47,689 square miles (123,514 square km). Pop. (2000) 2,844,658.

Mississippi Bubble, a financial scheme in 18th-century France that triggered a speculative frenzy and ended in financial collapse. The scheme was engineered by John Law, a Scottish adventurer, economic theorist, and financial wizard who was a friend of the regent, the Duke d'Orléans. In 1716 Law established the Banque Générale, a bank with the authority to issue notes. A year later he established the Compagnie d'Occident ("Company of the West") and obtained for it exclusive privileges to develop the vast French territories in the Mississippi River valley of North America. Law's company also soon monopolized the French tobacco and African slave trades, and by 1719 the Compagnie des Indes ("Company of the Indies"), as it had been renamed, held a complete monopoly of France's colonial trade. Law also took over the collection of French taxes and the minting of money; in effect, he controlled both the country's foreign trade and its finances.

Given the potential for profits involved, public demand for shares in the Compagnie des Indes increased sharply, sending the price for a share from 500 to 18,000 livres, which was out of all proportion to earnings. By 1719 Law had issued approximately 625,000 stock shares, and he soon afterward merged the Banque Générale with the Compagnie des Indes. Law hoped to retire the vast public debt accumulated during the later years of Louis XIV's reign by selling his company's shares to the public in exchange for state-issued public securities, or *billets d'état,* which consequently also rose sharply in value. A frenzy of wild speculation ensued that led to a general stock-market boom across Europe. The French government took advantage of this situation by printing increased amounts of paper money, which was readily accepted by the state's creditors because it could be used to buy more shares of the Compagnie. This went on until the excessive issue of paper money stimulated galloping inflation, and both the paper money and the *billets d'état* began to lose their value. Meanwhile the expected profits from the company's colonial ventures were slow to materialize, and the intricate linking of the company's stock with the state's finances ended in complete disaster in 1720, when the value of the shares plummeted, causing a general stock market crash in France and other countries. Though the crash was not directly attributable to Law, he was the obvious scapegoat and was forced to flee France in December 1720. The enormous debts of his company and bank were soon afterward consolidated and taken over by the state, which raised taxes in order to retire it.

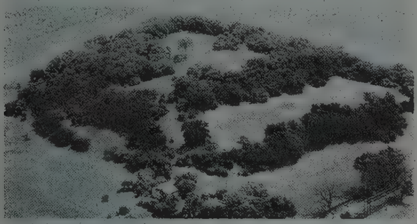
Mississippi River, the largest river of North America, draining with its major tributaries an area of approximately 1,200,000 square miles (3,100,000 square km), or about one-eighth of the entire continent. The Mississippi River lies entirely in the United States. Rising in Lake Itasca in Minnesota, it flows almost due south across the continental interior, collecting the waters of its major tributaries, the Missouri and the Ohio, approximately halfway along its journey to the Gulf of Mexico. It enters the Gulf through a vast delta southeast of New Orleans, a total distance of 2,350 miles (3,780 km) from its source. With its tributaries, the Mississippi drains all or part of 31 U.S. states and two Canadian provinces.

A brief treatment of the Mississippi River follows. For full treatment, *see* MACROPAEDIA: North America.

The character and physical appearance of the Mississippi divide it into three stages. From its source to the head of navigation at St. Paul, Minn., it is a clear stream, winding irregularly through low countryside dotted with lakes and marshes. From St. Paul to the mouth of the Missouri it grows into the powerful, dominating river immortalized in Mark Twain's *Tom Sawyer* and *Huckleberry Finn* as it gathers in the streams and rivers of Minnesota, Wisconsin, Illinois, and Iowa. Its union with the Missouri at St. Louis changes the Mississippi completely. The turbulent, sediment-laden Missouri, especially when in flood, adds impetus as well as enormous quantities of silt to the already muddy Mississippi. Beyond the junction with the Ohio at Cairo, Ill., the Mississippi swells to its full grandeur. Often a mile and a half from bank to bank, it becomes a brown flood, descending with deceptive quiet toward the Gulf of Mexico. Its annual average discharge rate is greater than 600,000 cubic feet per second (17,000 cubic m per sec), less than one-tenth that of the Amazon River and only about half that of the Congo River.

As the central river artery of the United States, the Mississippi has become one of the busiest commercial waterways in the world. Leading cargoes, by bulk, are petroleum and petroleum products, coal and coke, iron and steel, chemicals, sand and gravel, and sulfur. Its role as a transportation route has been strengthened in the second half of the 20th century through the operation of a complicated flood-control system. The Mississippi's unique contribution to the history and literature of the United States has woven it like a bright thread through the folklore and national consciousness of North America.

Mississippian culture, the last major prehistoric cultural development in North America, lasting from about AD 800 to the time of the arrival of the first European explorers. It spread over a great area of the Southeast and the mid-continent, in the river valleys of what are now the states of Mississippi, Alabama, Georgia, Arkansas, Missouri, Kentucky, Illinois, Indiana, and Ohio, with scattered extensions northward into Wisconsin and Minnesota and westward into the Great Plains. The culture was based on intensive cultivation of corn (maize), beans, squash, and other crops, which resulted in large concentrations of population in towns along riverine bottomlands. Politically and culturally each large town or village dominated a satellite of lesser villages; government was in the hands of priest-rulers. Thus the complexes might be called theocratic village-states. Moreover, warfare, which was apparently frequent, produced larger alliances and even confederacies.


Mississippian culture mound in the Cahokia Mounds State Park, near Cahokia, Ill.

By courtesy of the Illinois Division of Parks and Memorials

A central ceremonial plaza provided the nucleus of a Mississippian town, and each settlement had one or more pyramidal or oval earth mounds, surmounted by a temple or chief's residence, grouped around the plaza. This settlement pattern was typical of most of Middle America (central and southern Mexico and Guatemala) since as early as 850 BC, but it had not diffused into North America until the advent of the Mississippian culture. The scale of public works in the Mississippian culture can be estimated from the largest of the earthworks, Monk's Mound, near Cahokia, Ill., which is approximately 1,000 feet (300 m) long, 700 feet (200 m) wide, and 100 feet (30 m) high. The magnitude of such public works and the distribution of temples suggest a dominant religious cult and a cadre of priest-rulers who could command the services of a large, stable, and docile population, as well as several artist-craftsman guilds.

Craftwork was executed in copper, shell, stone, wood, and clay and in such forms as elaborate headdresses, ritual weapons, sculptured tobacco pipes, effigy pottery, effigies, and masks of wood or copper-jacketed wood. The elaborate designs included feathered serpents, winged warriors, swastikas, spiders, human faces with weeping or falcon eyes, as well as human figures and many geometric motifs. These elements were delicately engraved, embossed, carved, and molded.

The Mississippian culture had begun to decline by the time European explorers first penetrated the Southeast and described the customs of the aboriginals. The last remnant seems to have been the Natchez, whose decline and dispersal were caused, and described, by the French between 1698 and 1731.

Mississippian period, in North America, interval of geologic time roughly equivalent to what is internationally designated the Early Carboniferous epoch (360 to 320 million years ago). Because the rocks associated with this period are typified by those in the Mississippi valley region (where the strata consist largely of very fossiliferous marine limestones), some American geologists prefer the designation Mississippian to Early Carboniferous, which was introduced in Europe. *See* Carboniferous period.

Missolonghi (Greece): *see* Mesolóngion.

Missoula, city, seat (1866) of Missoula county, western Montana, U.S. It is situated on Clark Fork of the Columbia River, at the mouth of the Bitterroot River, near the Bitterroot Mountains in a broad valley (elevation 3,223 feet [982 m]). The first white settler in the area was Father Pierre Jean de Smet, who founded (1841) St. Mary's Mission at nearby Stevensville. Missoula originated in the 1860s as a trading post on the Mullan Road, a wilderness trail between Fort Benton and Walla Walla, Wash. It was formerly called Hellgate; the etymology of its present name is uncertain. Its development was stimulated after 1883, when it became a division point on the Northern Pacific Railway, and with the founding there of the University of Montana in 1893.

Missoula's economy centres on lumber and paper milling, beet-sugar refining, dairying, agricultural marketing, tourism, and educational facilities. An entry point to Lolo National Forest (headquartered at Missoula) and Clearwater, Bitterroot, and Flathead national forests, it is the regional headquarters for the U.S. Forest Service and Montana State Forest Service. It is also the site of the Northern Forest Fire Laboratory and is the training centre for the smoke-jumping crews of forest-fire fighters. Fort Missoula (a pioneer stockade) and the Flathead Indian Reservation are nearby. Inc. 1885. Pop. (1990) 42,918.

Consult the INDEX *first*

Missouri, extinct North American Indian people of the Chiwere branch (including the Oto and Iowa) of the Siouan linguistic family. In their historic past the Missouri, together with the Iowa and the Oto, separated from the Winnebago and moved southwest. The Missouri settled at the mouth of the Grand River, while the Oto continued to follow the Missouri River. Jacques Marquette and Louis Jolliet encountered them on the Missouri in 1673. Defeated in a war with the Sauk and Fox in 1798, the remnants of the tribe scattered to live with the Osage, Kansa, and Oto. By 1805 some of the tribe had reassembled, but another defeat, by the Osage, dispersed them among the Oto and Iowa.

Missouri, constituent state of the United States of America situated in the Middle Western region of the country. It is bounded on the north by Iowa, on the east by Illinois, Kentucky, and Tennessee, on the south by Arkansas, and on the west by Oklahoma, Kansas, and Nebraska. The state capital is Jefferson City.

A brief treatment of Missouri follows. For full treatment, *see* MACROPAEDIA: United States of America: *Missouri.*

The state was originally settled by a diverse group of American Indian peoples, one of which, the Missouri, gave the state its name. Numerous mounds and other archaeological remains indicate a large, prosperous settled populace. The first permanent white settlement in Missouri was made in 1735 at Ste. Genevieve by French lead miners and hunters. St. Louis was founded in 1764. Missouri became a U.S. possession in 1803 as part of the Louisiana Purchase. At that time its population was about 10,000, most of whom were French. The great rush of American settlers occurred after the War of 1812. Missouri entered the Union in 1821 as the 24th state, but only after the Missouri Compromise allowed its admission as a slave state.

The 1850s were years of increasing dissension in Missouri that pitted slave- and free-state advocates against one another, but Missouri was already moving toward a free economy, and a wave of immigrants from the Northeast and from Europe was influential in keeping the state within the Union. Missourians fought on both sides during the American Civil War, but its Union soldiers outnumbered Confederates by nearly four to one.

North of the Missouri River, the state's landscape is characterized by gently rolling hills, open, fertile plains, and well-watered prairie country. South of the Missouri, except in the extreme southeastern corner of the state and along the western boundary, the land is rough and hilly, with some deep, narrow valleys and clear, swift streams. Much of the land lies 1,000 to 1,400 feet (300 to 425 m) above sea level, though the alluvial plain of southeastern Missouri is less than 500 feet (150 m) in elevation. Maximum January temperatures in Missouri range from about 36° F (2° C) in the north and northwest to 48° F (9° C) in the southeast. Summer temperatures above 100° F (38° C) with high humidity may occur in any part of the state. Rainfall varies from about 34 inches (864 mm) in the north and northwest to 50 inches (1,270 mm) or more in the extreme southeast. Tornadoes average 27 a year.

After the early French settlers, immigration came largely from other, especially Southern, U.S. states. Immigration from abroad, especially German, Irish, and English, accelerated after 1820. Migration of blacks to the state increased after 1940, and by 1980 blacks comprised more than 10 percent of the state's population, although they constituted nearly half of the population of St. Louis and more than a quarter of Kansas City. The population of St. Louis declined by nearly one-third from 1970 to the mid-1980s, the largest percentage decline of any large American city.

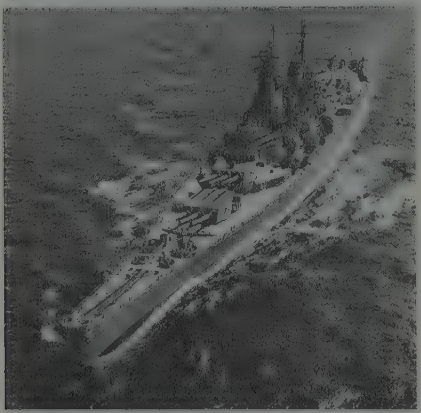
Drainage and soil conditions permit farming in all of Missouri's counties. Livestock, mostly cattle and sheep, account for a higher proportion of farm marketings than crops. Soybeans, corn (maize), and wheat are the major crops. Missouri leads the nation in lead production, mainly from the Ozarks region. It also has significant deposits of iron ore and limestone. Almost a third of the state remains forested, and timber is becoming an increasingly important resource. Manufacturing is one of the major components of the economy. Production of aerospace and transportation equipment is the leading activity, followed by the processing of food and kindred products and the production of chemicals.

Missouri has an extensive highway system that includes six interstate highways. Its railroads are linked with most of the nation's major trunk lines. The Mississippi and Missouri rivers, providing more than 1,000 miles (1,600 km) of navigable waterways within the state, connect waterborne traffic with New Orleans and the Gulf of Mexico. St. Louis and Kansas City are regional air hubs.

Diversity characterizes Missouri's cultural milieu, from the centres of fine art, music, and theatre along the St. Louis–Kansas City axis to the folk culture and native crafts of the Ozarks. The St. Louis Symphony Orchestra is the second oldest in the country. Independence is the home of the Harry S. Truman Library and Museum. Both Kansas City and St. Louis have professional sports teams. Artists George Caleb Bingham and Thomas Hart Benton and writers Mark Twain and T.S. Eliot were all from Missouri. The *St. Louis Post-Dispatch* was founded by Joseph Pulitzer, and the University of Missouri had the world's first school of journalism. Area 69,697 square miles (180,516 square km). Pop. (2000) 5,595,211.

Missouri, flagship of the U.S. Pacific Fleet in World War II and scene of the Japanese surrender. One of the four battleships of the Iowa class that were completed during the war, the USS *Missouri* numbered among the largest warships afloat, displacing 58,000 tons, carrying a main battery of nine 16-inch guns, and capable of a speed of 35 knots. The ship participated in combat action in the Pacific theatre throughout the later stages of the war.

Chosen by General Douglas MacArthur, the Allied commander in chief, for the surrender ceremony, the *Missouri* entered Tokyo Bay flying the flag that had flown over the White House on Dec. 7, 1941. On Sunday morning, Sept. 2, 1945, the nine-man Japanese delegation arrived on board, and, at MacArthur's invitation, Foreign Minister Shigemitsu Mamoru and General Umezu Yoshijiro signed two copies of the document proclaiming "unconditional surrender . . . of all Japanese armed forces."



USS *Missouri*

By courtesy of the U.S. Navy

The *Missouri* was occasionally recommissioned for service in the latter half of the 20th century.

Missouri Botanical Garden, also called SHAW'S GARDEN, botanical garden in St. Louis, Mo., most notable for its Climatron, a geodesic-dome greenhouse in which 1,500 species of plants from different environments are grown under computer-controlled conditions simulating four major climates. The 26-hectare (65-acre) garden also has special collections of orchids and tropical plants. The herbarium contains 1,700,000 dried specimens. Privately administered, the garden was established in 1859 as the gift of Henry Shaw, a merchant. The garden's periodical *Missouri Botanical Gardens Bulletin* contains material of interest to the general public.

Missouri Compromise (1820), in U.S. history, measure worked out between the North and the South and passed by the U.S. Congress that allowed for admission of Missouri as the 24th state (1821). It marked the beginning of the prolonged sectional conflict over the extension of slavery that led to the American Civil War.

The territory of Missouri first applied for statehood in 1817, and by early 1819 Congress was considering enabling legislation that would authorize Missouri to frame a state constitution. When Representative James Tallmadge of New York attempted to add an antislavery amendment to that legislation, however, there ensued an ugly and rancorous debate over slavery and the government's right to restrict slavery. The Tallmadge amendment prohibited the further introduction of slaves into Missouri and provided for emancipation of those already there when they reached age 25. The amendment passed the House of Representatives, controlled by the more populous North, but failed in the Senate, which was equally divided between free and slave states. Congress adjourned without resolving the Missouri question.

When it reconvened in December 1819, Congress was faced with a request for statehood from Maine. The Senate passed a bill allowing Maine to enter the Union as a free state and Missouri to be admitted without restrictions on slavery. Senator Jesse B. Thomas of Illinois then added an amendment that allowed Missouri to become a slave state but banned slavery in the rest of the Louisiana Purchase north of latitude 36°30′. Henry Clay then skillfully led the forces of compromise, and on March 3, 1820, the decisive vote in the House admitted Maine as a free state, Missouri as a slave state, and made free soil all western territories north of Missouri's southern border.

When the Missouri constitutional convention empowered the state legislature to exclude free blacks and mulattoes, however, a new crisis was brought on. Enough northern congressmen objected to the racial provision that Henry Clay was called upon to formulate the Second Missouri Compromise. On March 2, 1821, Congress stipulated that Missouri could not gain admission to the Union until it agreed that the exclusionary clause would never be interpreted in such a way as to abridge the privileges and immunities of U.S. citizens. Missouri so agreed and became the 24th state on Aug. 10, 1821; Maine had been admitted the previous March 15.

Although slavery had been a divisive issue in the United States for decades, never before had sectional antagonism been so overt and threatening as it was in the Missouri crisis. Thomas Jefferson described the fear it evoked as "like a firebell in the night." The compromise measures appeared to settle the slavery-extension issue, however, and the sectional conflict did not grow to the point of civil war until after the Missouri Compromise was repealed by the Kansas-Nebraska Act (1854) and was declared unconstitutional in the Dred Scott decision (*q.v.*) of 1857.

Missouri fox-trotting horse, breed of horse that originated in Missouri and the Ozark Mountains region and is characterized by the "fox trot" gait, a broken gait that occurs when the horse walks briskly with the front feet while trotting with the back feet. Developed from light horses taken to the Ozarks by settlers, the fox-trotting horse was originally a general utility horse but now is a show and riding horse. Sorrel is the usual colour; height varies from 14 to 16 hands (56 to 64 inches, or 142 to 163 cm), and weight averages about 1,000 pounds (450 kg). The Missouri Fox Trotting Horse Breed Association was organized in 1948.

Missouri gourd: *see* calabazilla.

Missouri Pacific Railroad Company, formerly (1849–72) PACIFIC RAILROAD, American railroad founded to build the first rail line west of the Mississippi River. Ground was broken in 1851 and the first section of track completed in 1852. It was the first railroad to serve Kansas City, reached in 1865, after construction was interrupted by the American Civil War.

In 1872 the line was reorganized as the Missouri Pacific Railway, and in 1879 it came under the control of New York financier Jay Gould, who developed a system extending through Colorado, Nebraska, Arkansas, Texas, and Louisiana. In 1917 the line was merged with the St. Louis, Iron Mountain and Southern Railway Company and reorganized as the Missouri Pacific Railroad. Later it acquired other lines in the Gulf area and in Texas, extending its operating area to several midwestern and southwestern states.

The line's passenger operations were turned over to the National Railroad Passenger Corporation (Amtrak) in 1971. In 1982 the Missouri Pacific merged with the Union Pacific and Western Pacific Railroad companies to form the "Union Pacific System," under the holding company Union Pacific Corporation. Missouri Pacific, however, maintained its own corporate and commercial identity.

Missouri Plan, method of selecting judges that originated in the state of Missouri and subsequently was adopted by other U.S. jurisdictions. It involves the creation of a nominating commission that screens judicial candidates and submits to the appointing authority (such as the governor) a limited number of names of individuals considered to be qualified. The appointing authority chooses from the list, and any one so chosen assumes the judgeship for a probationary period. After this period the judge stands for popular election for a much longer term, not competing against other candidates but basing his candidacy on previous judgments. Under the Missouri Plan, voters decide whether or not to retain the judge in office.

Missouri River, longest tributary of the Mississippi River, formed by the confluence of the Jefferson, Madison, and Gallatin rivers in the Rocky Mountain area of southwestern Montana (Gallatin county), U.S., about 4,000 feet (1,200 m) above sea level. The Missouri flows eastward to central North Dakota, where it turns southward across South Dakota to form a section of the South Dakota–Nebraska boundary, the Nebraska–Iowa boundary, the Nebraska–Missouri boundary, and the northern section of the Kansas–Missouri boundary. Then it meanders eastward across central Missouri to join the Mississippi River, about 10 miles (16 km) north of St. Louis, after traveling a course of 2,315 miles (3,726 km).

Its drainage basin occupies about 529,400 square miles (1,371,100 square km) of the Great Plains, of which 2,550 square miles (16,840 square km) are in Canada. Elevations within its basin are extreme: from 14,000 feet (4,300 m) above sea level in the Rockies near the Continental Divide to 400 feet (120 m) where it joins the Mississippi. The flow of the Missouri and of most of its tributaries is exceedingly varied—the minimum flow being 4,200 cubic feet (120 cubic m) per second and the maximum 900,000 cubic feet (25,500 cubic m) per second. With unprotected slopes and with such violent fluctuations in flow, erosion and silting are major problems.

Chief tributaries include the Cheyenne, Kansas, Niobrara, Osage, Platte, and Yellowstone rivers, flowing in on the south and west sides, and the James and Milk rivers, entering from the north. Other tributaries are the Bad, Blackwater, Cannonball, Gasconade, Grand, Heart, Judith, Knife, Little Missouri, Moreau, Musselshell, and White rivers, which enter from the south and west. The Big Sioux, the Chariton, Little Platte, Marias, Sun, and Teton rivers enter from the north and east.

The Missouri was named Peki-tan-oui on some early French maps and, later, Oumessourit; it has been nicknamed "Big Muddy" because of the amount of solid matter it carries in suspension. Its mouth was discovered in 1673 by the French explorers Jacques Marquette and Louis Jolliet while they were canoeing down the Mississippi River. In the early 1700s French fur traders began to navigate upstream. The first exploration of the river from its mouth to its headwaters was made in 1804–05 by Meriwether Lewis and William Clark. For many years commerce on the river was restricted to the fur trade, and the river was little used by the earliest American settlers moving west. The American Fur Company began to use steamers on the river in 1830. Steamboat traffic on the river reached its height in 1858 but began to decline in the following year with the completion of the Hannibal and St. Joseph Railway to St. Joseph, Mo.

For the first 150 years after settlement along the river, little was done to develop the Missouri as a useful waterway or as a source of irrigation and power. In 1944 the U.S. Congress authorized a comprehensive program for flood control and water-resource development in the Missouri River basin. It envisioned a system of more than 100 dams and reservoirs on the Missouri and certain of its tributaries. Local flood protection, involving levees and bank stabilization, and a deeper river channel were provided on the Missouri itself from Sioux City, Iowa, to the Mississippi, a distance of 760 miles (1,220 km). By the time an even more ambitious plan, the Missouri River Basin program, or simply the Pick-Sloan program, was adopted in the 1950s, channel maintenance had enabled commercial barge lines to begin operating on the Missouri in 1953. The major dams built on the Missouri were Fort Peck (near Glasgow, Mont.), Garrison (N.D.), and Gavin's Point, Fort Randall, and Oahe (S.D.). The Fort Peck Dam is one of the largest earthfill dams in the world. The entire system of dams and reservoirs has greatly reduced flooding on the Missouri and provides water to irrigate millions of acres of cropland along the main river and its tributaries. Hydroelectric installations along the river generate electricity for many communities along the river's upper course.

The chief cities along the Missouri are Great Falls, Mont.; Williston and Bismarck, N.D.; Pierre, S.D.; Sioux City and Council Bluffs, Iowa; Omaha and Nebraska City, Neb.; Atchison, Leavenworth, and Kansas City, Kan.; and St. Joseph, Kansas City, Columbia, Jefferson City, and St. Charles, Mo.

missus dominicus (Latin: "envoy of the lord"), plural MISSI DOMINICI, officials sent by some Frankish kings and emperors to supervise provincial administration. Used sporadically by Merovingian and early Carolingian rulers, the *missi* became a normal part of the administrative machinery under Charlemagne (reigned 768–814). From about 802 onward almost all of his empire was periodically divided into *missatica,* or inspection circuits; these were visited—in theory for four months out of every year but often in practice less regularly—by at least two *missi,* one a bishop or abbot, the other a layman, probably a count. The *missi* were powerful men protected with a wergild (price paid to a slain man's relatives) equal to that of a member of the sovereign's family. They had full investigatory powers and were to rectify all error and injustice. *Missi* administered the oath of allegiance exacted from all freemen on the occasion of a new sovereign, informed local communities of the content of imperial decrees, and reported back on local conditions and needs. The difficulties that beset the Carolingian empire after about 830 paralyzed and finally virtually destroyed the system of *missi dominici* by the end of the 9th century.

mist, suspension in the atmosphere of very tiny water droplets (50–200 microns in diameter) or wet hygroscopic particles that reduces horizontal visibility to 1 km (0.6 mile) or more; if the visibility is reduced below 1 km, the suspension is called a fog. Mist appears to cover the landscape with a thin, grayish veil. In the United States the term mist is sometimes used loosely to designate a drizzle, a very light precipitation composed of small water droplets (200–500 microns in diameter) falling to the ground. In Scotland and parts of England, a combination of thick mist or fog and heavy drizzle is called Scotch mist.

Mistassini Lake, French LAC MISTASSINI, largest lake in Quebec province, Canada. It is located in Nord-du-Québec region in west-central Quebec and forms the headwaters of the Rupert River, which drains into James Bay. Bisected by a chain of islands, the lake is about 100 miles (160 km) long, 12 miles (19 km) wide, and 902 square miles (2,335 square km) in area. The lake was discovered in 1672 by the French missionary-explorer Charles Albanel. Its Indian name means "great stone," referring to a large rock in the lake. Mistassini Post and an Anglican mission are located at its south end.

Misti Volcano, Spanish VOLCÁN MISTI, also called VOLCÁN DE AREQUIPA, or EL MISTI, volcano of the Andes mountains of southern Peru. It is flanked by Chachani and Pichupichu volcanoes and rises to 19,098 feet (5,821 m) above sea level, towering over the city of Arequipa. Its perfect, snowcapped cone is thought to have had religious significance for the Incas and has inspired both legends and poetry. Now dormant, Misti last erupted during an earthquake in 1600.

Mistinguett, original name JEANNE-MARIE BOURGEOIS (b. April 5, 1875, Enghien-les-Bains, France—d. Jan. 5, 1956, Bougival), popular French comedienne noted especially for her beautiful legs and stage personality.

The name Mistinguett (Miss Tinguett), derived from a song in a musical show, *Miss Helyett,* was suggested by her allegedly English-looking, protruding front teeth. Her greatest fame was achieved in Paris in spectacular revues at the Moulin Rouge and the Casino de Paris. She often appeared with Maurice Chevalier, and her best-remembered songs are "Mon Homme" ("My Man") and "J'en ai marre" ("I've Had Enough of It"). Her long career included appearances in London and the Americas.

Mistinguett was not highly talented as a dancer, nor did she have a good voice; but she had vitality and conviction, and even in old age she was able to play young parts. She wrote *Toute ma vie* (1954; *Mistinguett, Queen of the Paris Night*).

mistletoe, any of many species of semiparasitic green plants of the families Loranthaceae and Viscaceae, especially those of the genera *Viscum, Phoradendron,* and *Arceuthobium,* all members of the Viscaceae. *Viscum album,* the traditional mistletoe of literature and Christmas celebrations, is distributed throughout Eurasia from Great Britain to northern Asia. Its North American counterpart is *Phoradendron serotinum.* Species of the genus *Arceuthobium,* parasitic primarily on coniferous trees, are known by the name dwarf mistletoe (*q.v.*).

The legendary mistletoe was known for centuries before the Christian era. It forms a drooping yellowish evergreen bush, 0.6 to 0.9 m (about 2 to 3 feet) long, on the branch of a host tree. It has thickly crowded, forking branches with oval to lance-shaped, leathery leaves about 5 cm (2 inches) long, arranged in pairs, each opposite the other on the branch. The flowers, in compact spikes, are bisexual, unisexual, or regular. They are yellower than the leaves and appear in the late winter and soon give rise to one-seeded, white berries, which when ripe are filled with a sticky, semitransparent pulp. These berries, and those of other mistletoes, contain toxic compounds poisonous to animals and to humans.

Leaves and berries of American mistletoe (*Phoradendron serotinum*)

John H. Gerard

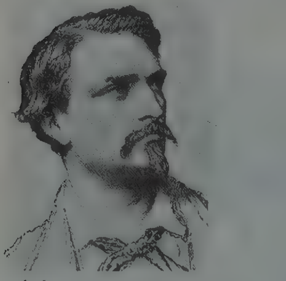
Most tropical mistletoes are pollinated by birds, most temperate species by flies and wind. Fruit-eating birds distribute the seeds in their droppings or by wiping their beaks, to which the seeds often adhere, against the bark of a tree. After germination a modified root (haustorium) penetrates the bark of the host tree and forms a connection through which water and nutrients pass from host to parasite. Mistletoes contain chlorophyll and can make some of their own food. Most mistletoes parasitize a variety of hosts, and some species even parasitize other mistletoes, which, in turn, are parasitic on a host. The Eurasian *Viscum album* is most abundant on apple trees, poplars, willows, lindens, and hawthorns. Species of *Phoradendron* in America also parasitize many deciduous trees, including oaks. In some parts of Europe the midsummer gathering of mistletoe is still associated with the burning of bonfires, a remnant of sacrificial ceremonies performed by ancient priests, or druids. Mistletoe was once believed to have magic powers as well as medicinal properties. Later, the custom developed in England (and, still later, the United States) of kissing under the mistletoe, an action that once was believed to lead inevitably to marriage.

Mistletoes are slow-growing but persistent; their natural death is determined by the death of the hosts. They are pests of many ornamental, timber, and crop trees and are the cause of abnormal growths called "witches' brooms" that deform the branches and decrease the reproductive ability of the host. The only effective control measure is complete removal of the parasite from the host.

mistral, also spelled MAESTRALE, cold and dry, strong wind in southern France that blows down from the north along the lower Rhône River valley toward the Mediterranean Sea. It may blow continuously for several days at a time, attain velocities of about 100 km (60 miles) per hour, and reach to a height of 2 to 3 km. It is strongest and most frequent in winter, and it sometimes causes considerable damage to crops. The velocity of the wind is intensified as it blows down from the highlands to the coast and by the "jet effect" that results as it is funneled through the narrow Rhône valley.

Mistral, Frédéric (b. Sept. 8, 1830, Maillane, France—d. March 25, 1914, Maillane), poet who led the 19th-century revival of Occitan (Provençal) language and literature and shared the Nobel Prize in 1904 for his contributions in literature and philology.

Mistral's father was a well-to-do farmer in the former French province of Provence. He attended the Royal College of Avignon (later renamed the Frédéric Mistral School). One of his teachers was Joseph Roumanille, who had begun writing poems in the vernacular of Provence and who became his lifelong friend. Mistral took a degree in law at the University of Aix-en-Provence in 1851.



Frédéric Mistral, etching, 1864

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Wealthy enough to live without following a profession, he early decided to devote himself to the rehabilitation of Provençal life and language. In 1854, with several friends, he founded the Félibrige, an association for the maintenance of the Provençal language and customs, extended later to include the whole of southern France (*le pays de la langue d'oc,* "the country of the language of *oc,*" so called because the Provençal language uses *oc* for "yes," in contrast to the French *oui*). As the language of the troubadours, Provençal had been the cultured speech of southern France and was used also by poets in Italy and Spain. Mistral threw himself into the literary revival of Provençal and was the guiding spirit and chief organizer of the Félibrige until his death in 1914.

Mistral devoted 20 years' work to a scholarly dictionary of Provençal, entitled *Lou Tresor dóu Félibrige,* 2 vol. (1878). He also founded a Provençal ethnographic museum in Arles, using his Nobel Prize money to assist it. His attempts to restore the Provençal language to its ancient position did not succeed, but his poetic genius gave it some enduring masterpieces, and he is considered one of the greatest poets of France.

His literary output consists of four long narrative poems: *Mirèio* (1859; *Mireio: A Provencal Poem*), *Calendau* (1867), *Nerto* (1884), and *Lou Pouèmo dóu Rose* (1897; Eng. trans. *The Song of the Rhône*); a historical tragedy, *La Reino Jano* (1890; "Queen Jane"); two volumes of lyrics, *Lis Isclo d'or* (1876; definitive edition 1889) and *Lis Oulivado* (1912); and many short stories, collected in *Prose d'Armana,* 3 vol. (1926–29).

Mistral's volume of memoirs, *Moun espelido* (*Mes origines,* 1906; Eng. trans. *Memoirs of Mistral*), is his best-known work, but his claim to greatness rests on his first and last long poems, *Mirèio* and *Lou Pouèmo dóu Rose,* both full-scale epics in 12 cantos.

Mirèio, which is set in the poet's own time and district, is the story of a rich farmer's daughter whose love for a poor basketmaker's son is thwarted by her parents and ends with her death in the Church of Les Saintes-Maries-de-la-Mer. Into this poem Mistral poured his love for the countryside where he was born. *Mirèio* skillfully combines narration, dialogue, description, and lyricism and is notable for the springy, musical quality of its highly individual stanzaic form. Under its French title, *Mireille,* it inspired an opera by Charles Gounod (1863).

Lou Pouèmo dóu Rose tells of a voyage on the Rhône River from Lyon to Beaucaire by the barge *Lou Caburle,* which is boarded first by a romantic young prince of Holland and later by the daughter of a poor ferryman. The romance between them is cut short by disaster when the first steamboat to sail on the Rhône accidentally sinks *Lou Caburle*. Though the crew swims ashore, the lovers are drowned. Although less musical and more dense in style than *Mirèio,* this epic is as full of life and colour. It suggests that Mistral, late in life, realized that his aim had not been reached and that much of what he loved was, like his heroes, doomed to perish.

Mistral, Gabriela, pseudonym of LUCILA GODOY ALCAYAGA (b. April 7, 1889, Vicuña, Chile—d. Jan. 10, 1957, Hempstead, N.Y., U.S.), Chilean poet, the first Latin-American woman to win the Nobel Prize for Literature (1945).

Of Spanish, Basque, and Indian descent, Mistral grew up in a village of northern Chile and became a schoolteacher at 15, advancing later to the rank of college professor. Throughout her life she combined writing with a career as an educator, cultural minister, and diplomat; her diplomatic assignments included posts in Madrid, Lisbon, Genoa, and Nice.

Gabriela Mistral, 1941

By courtesy of the Library of Congress, Washington, D.C.

Her reputation as a poet was established in 1914 when she won a Chilean prize for three "Sonetos de la muerte" ("Sonnets of Death"). They were signed with the name by which she has since been known, which she coined from those of two of her favourite poets, Gabriele D'Annunzio and Frédéric Mistral. A collection of her early works, *Desolación* (1922; "Desolation"), includes the poem "Dolor," detailing the aftermath of a love affair that was ended by the suicide of her lover. Because of this tragedy she never married, and a haunting, wistful strain of thwarted maternal tenderness informs her work. *Ternura* (1924, enlarged 1945; "Tenderness"), *Tala* (1938; "Destruction"), and *Lagar* (1954; "The Wine Press") evidence a broader interest in humanity, but love of children and of the downtrodden remained her principal themes.

Mistral's extraordinarily passionate verse, which is frequently coloured by figures and words peculiarly her own, is marked by warmth of feeling and emotional power. A selection translated into English by Langston Hughes was published in 1957 and another selection by Doris Dana in 1971.

mistrial, in law, a trial that has been terminated and declared void before a judge can hand down a decision or a jury can render a verdict. It has the effect of nullifying all the preceding proceedings as if they had not taken place. Therefore, should another trial on the same charges, with the same defendants, be ordered, that trial would start all over again, with the previous testimony or other findings not reckoned as necessarily relevant in the newer court proceedings.

There are several factors that can result in a mistrial, including the death of an attorney or juror (if the latter is not replaceable by one of the alternates); a remark that would be highly prejudicial to the defendant and that the judge may feel cannot, in spite of instructions, be ignored by the jury; or the discovery that members of the jury had discussed the case contrary to court instructions or that a sequestered jury was able to read or hear newspaper or other media reports of the trial. Most often, a mistrial may be declared if the jury itself cannot arrive at a verdict after repeated attempts—*i.e.,* if it is a hung jury.

Misurata (Libya): *see* Miṣrātah.

MIT: *see* Massachusetts Institute of Technology.

mita (Spanish land system): *see* repartimiento.

Mitaka, city, Tokyo *to* (metropolis), Honshu, Japan. It lies on the western border of Tokyo city. The city developed from settlements in the rice paddies of the Musashino plateau during the Tokugawa period (1603–1867). It served as a hawking field, and its name is Japanese for "three hawks." The Mitaka station on the Chūō Line (railway) was opened in 1931, and industry subsequently developed there. Mitaka's major products are electrical machinery and transport equipment. The city, now a residential suburb of the Tokyo-Yokohama metropolitan area, is the site of the International Christian University (1953) and an astronomical observatory of the University of Tokyo. Pop. (1993 est.) 166,473.

mitama (Shintō spirit): *see* tama.

Mitanni, Indo-Iranian empire centred in northern Mesopotamia that flourished from about 1500 to about 1360 BC. At its height the empire extended from Kirkūk (ancient Arrapkha) and the Zagros Mountains in the east through Assyria to the Mediterranean Sea in the west. Its heartland was the Khābūr River region, where Wassukkani, its capital, was probably located.

Mitanni was one of several kingdoms and small states (another being Hurri) founded by the Indo-Iranians in Mesopotamia and Syria. Although originally these Indo-Iranians were probably members of Aryan tribes that later settled in India, they apparently broke off from the main tribes on the way and migrated to Mesopotamia instead. There they settled among the Hurrian peoples and soon became the ruling noble class, called *maryannu.*

The foreign policy of Mitanni during its early years was based largely on competition with Egypt for control of Syria, but amicable relations were established with the Egyptian king Thutmose IV (reigned 1425–17 BC). Perhaps the most outstanding Mitannian king was Saustatar (Shaushshatar; reigned *c.* 1500–*c.* 1450 BC), who is said to have looted the Assyrian palace in Ashur. The last independent king of Mitanni was Tushratta (died *c.* 1360 BC), under whose reign Wassukkani was sacked by the Hittite king Suppiluliumas I. Tushratta was later assassinated, and dynastic struggles ensued until Mattiwaza, a son of Tushratta, was aided by Suppiluliumas against Shuttarna of Hurri; thereafter Mitanni became part of the Hittite empire and was called Hanigalbat. Shortly afterward, however, it was captured by the Assyrian Adad-nirari I (reigned *c.* 1307–*c.* 1275 BC) and again by Shalmaneser I (reigned *c.* 1275–*c.* 1245 BC), who turned the territory east of the Euphrates River into an Assyrian province. *See also* Hurrian.

Mitau, also spelled MITAVA (Latvia): *see* Jelgava.

Mitchell, city, seat of Davison county, southeastern South Dakota, U.S., in the James River valley by Firesteel Creek (there dammed to form Lake Mitchell). Established in 1879 as a railroad town, it was named for Alexander Mitchell, president of the Chicago, Milwaukee, and St. Paul Railroad. Its farm-based economy (corn [maize], livestock, and dairying) is supplemented by light manufacturing and tourism (chiefly in the pheasant-hunting season). The Mitchell Corn Palace (built 1921, replacing an original built in 1892) is a unique Byzantine structure decorated annually with corn and distinguished by minarets and towers. Dakota Wesleyan University (1885) is in the city. Inc. 1883. Pop. (1991 est.) 13,936.

The Corn Palace, Mitchell, S.D.
Milt and Joan Mann from CameraMann

Mitchell, Arthur (b. March 27, 1934, New York, N.Y., U.S.), American dancer, choreographer, and director of the Dance Theatre of Harlem.

Mitchell attended the High School for the Performing Arts in New York City and began performing in Broadway musicals and with the companies of Donald McKayle and John Butler. In 1956 Mitchell became the only black dancer in the New York City Ballet. He soon became a principal with the company, and George Balanchine created several roles for him, notably those in *A Midsummer Night's Dream* (1962) and *Agon* (1967).

Mitchell was sensitive to the prejudice against blacks in the world of ballet and determined to form an all-black ballet company. In 1968 he and Karel Shook founded an integrated school, whose associated company made its debut in 1971 in New York City and at the Spoleto Festival in Italy. Mitchell choreographed a number of ballets for the Dance Theatre of Harlem.

Mitchell, Charles E(dwin) (b. Oct. 6, 1877, Chelsea, Mass., U.S.—d. Dec. 14, 1955, New York, N.Y.), American banker and chairman of the National City organization.

Mitchell took his first job with the Western Electric Company in Chicago and became the president's assistant in 1903. Three years later he left the firm and became assistant to the president at The Trust Company of America in New York City, a position he held for five years. Mitchell formed his own investment house, C.E. Mitchell & Co., in 1911. Five years later he took part in the reorganization of the National City Company, which oversaw investments for the National City Bank, and he soon became its president. The company was capitalized at $55,000,000 and had 50 offices throughout the world. Mitchell also became president of the National City Bank of New York and maintained both positions until 1929. He resigned them to head the National City organization, the parent company for several banks and financial institutions.

After the collapse of the stock market in 1929, Mitchell became a major target for government investigations. He left his posts at National City when it was disclosed that he had made illegal stock transactions, speculated in his own bank's securities, and engaged in income tax evasion. The passage of the Securities Act of 1933 and the Banking Acts of 1933 and 1935 was largely in response to Mitchell's example of financial chicanery.

After resigning from the National City organization, Mitchell founded his own financial consulting firm, C.E. Mitchell, Inc. At the same time, he assumed the position of chairman of the board for the investment banking firm of Blyth & Co.

Mitchell, Edgar D(ean) (b. Sept. 17, 1930, Hereford, Texas, U.S.), American astronaut who took part in the Apollo 14 mission (Jan. 31–Feb. 10, 1971), in which the uplands region north of the Fra Mauro crater on the Moon was explored by Mitchell and Commander Alan B. Shepard, Jr.

Mitchell entered the U.S. Navy upon graduation from the Carnegie Institute of Technology, Pittsburgh, Pa. He was awarded an engineering degree by the Navy Postgraduate School, Monterey, Calif., in 1961 and a doctorate in aeronautics and astronautics by the Massachusetts Institute of Technology in 1964. He joined the manned space program in 1966.

Edgar D. Mitchell, 1970
By courtesy of the National Aeronautics and Space Administration

He retired from the Navy and the space program in 1972, and, interested in parapsychology, he founded the Institute of Noetic Sciences in Palo Alto, Calif.

Mitchell, James Leslie (novelist): *see* Gibbon, Lewis Grassic.

Mitchell, Joan (b. Feb. 12, 1926, Chicago, Ill., U.S.—d. Oct. 30, 1992, Paris, Fr.), American painter who was a member of the second generation of Abstract Expressionists.

Mitchell attended Smith College (1942–44), Northampton, Mass., U.S., and then studied at the Art Institute of Chicago, receiving a bachelor of fine arts degree (1947) and, after scholarship study in France, a master of fine arts degree (1950). In the early 1950s she studied art briefly at Columbia University and New York University and gained membership in the Eighth Street Club, or The Club, founded by the Abstract Expressionists of the New York school.

In the 1950s she painted heroic-sized slashes of lines—sometimes calligraphic—in vivid colours. She visited France regularly and in 1959 set up a studio in Paris, later moving to the country village of Vétheuil. During the 1960s she added to her linear images various clusters or blocks of colours. Her canvases were generally huge, some extending as much as 20 feet (8 m) or more and some divided into panels to be viewed sequentially. Though completely abstract, her paintings evoke associations of landscapes, foliage, and flowers, and her lavish brushwork has a quality of robust and tumultuous lyricism.

Mitchell, John Newton (b. Sept. 5, 1913, Detroit, Mich., U.S.—d. Nov. 9, 1988, Washington, D.C.), U.S. attorney general during the Nixon administration who served 19 months in prison (1977–79) for his participation in the Watergate Scandal (*q.v.*).

Mitchell played semiprofessional hockey while working his way through Fordham University (New York City) and Fordham law school. During World War II he served in the Navy as a torpedo boat commander.

It was for his expertise in state and municipal bonds that Mitchell achieved fame while an attorney with a prominent New York law firm. He became acquainted with Richard M. Nixon early in 1967, when their respective law firms merged. Mitchell quickly became a close political adviser to Nixon, and in 1968 he managed Nixon's successful campaign for the presidency.

Appointed attorney general, Mitchell took office in January 1969 and remained there until March 1972, when he resigned to head Nixon's reelection committee. During his tenure at the Justice Department, Mitchell became controversial for his backing of two of President Nixon's nominees to the Supreme Court who were rejected as unqualified by the Senate, his approval of wiretaps without court authorization (declared unconstitutional by the Supreme Court), his prosecutions of antiwar protesters, and his suit to block publication of the so-called Pentagon Papers (rejected by the Supreme Court).

Mitchell resigned as head of the Committee for the Reelection of the President in July 1972, shortly after the arrest of several men discovered burglarizing the headquarters of the Democratic National Committee in the Watergate apartment complex in Washington, D.C. In 1974 he was indicted on charges that he had conspired to plan the break-in and that he had obstructed justice and perjured himself during the subsequent cover-up of the affair. He was convicted in 1975 and sentenced to 2½ to 8 years in prison; he entered prison in 1977 and was released on parole in 1979.

Mitchell, John Thomas Whitehead (b. Oct. 18, 1828, Rochdale, Lancashire, Eng.—d. March 16, 1895, Rochdale), dominant figure in the 19th-century English consumers' cooperative movement.

At an early age, Mitchell joined the Rochdale Society of Equitable Pioneers and was appointed its secretary in 1857. He shaped the policy of the Co-operative Wholesale Society, established in 1863, and was its chairman from 1874 until his death. Mitchell emphasized the fundamental importance of the consumer in the economy. His ideas provided the theoretical and practical basis of the cooperative movement in Great Britain. An essential feature of the Rochdale system, which was subsequently adopted in many other countries, was the return of dividends to members based on the total amount of their purchases in consumer-owned stores.

John Thomas Whitehead Mitchell
By courtesy of the Co-operative Union Ltd., Manchester

Mitchell, Margaret (b. 1900, Atlanta, Ga., U.S.—d. Aug. 16, 1949, Atlanta), U.S. author of the enormously popular novel *Gone with the Wind.*

Mitchell attended Washington Seminary in Atlanta and Smith College, Northampton, Mass. She wrote for *The Atlanta Journal* from 1922 until 1926, when an ankle injury forced her retirement from the newspaper.

Margaret Mitchell
By courtesy of the Trust Company of Georgia

She then began to write her one book, *Gone with the Wind,* a novel about the American Civil War and the Reconstruction as seen from a Southern point of view, featuring a strong-willed coquette and jezebel, Scarlett O'Hara. She worked on the book for 10 years; it was published in June 1936. The motion-picture rights were sold for $50,000, and the film that premiered in 1939 in Atlanta, starring Vivien Leigh and Clark Gable and produced by David O. Selznick, won nine major Oscars and two special Oscars at the Hollywood Academy Awards in 1940.

Gone with the Wind was almost certainly the largest selling novel in the history of U.S. publishing to that time. In the first six months after publication 1,000,000 copies were sold, 50,000 of them in one day. By 1939 sales had reached 2,000,000 copies in the United States, and before the author's death they had totaled 8,000,000 in 40 countries. The motion picture held the record for gross earnings for more than two decades. Four decades after Mitchell's death, her estate permitted the writing of a sequel by Alexandra Ripley, *Scarlett: The Sequel to Margaret Mitchell's "Gone with the Wind"* (1991), which was generally unfavourably appraised by critics.

Mitchell, Maria (b. Aug. 1, 1818, Nantucket Island, Mass., U.S.—d. June 28, 1889, Lynn, Mass.), first professional woman astronomer in the United States.

Mitchell was a self-taught astronomer, reading mathematics and science while a librarian at the Nantucket (Mass.) Atheneum (1836–56). In 1847, while helping her father, William Mitchell, survey the sky for the U.S. Coast Survey, she discovered a comet, for which she received worldwide attention. In 1848 she became the first woman elected to the American Academy of Arts and Sciences.

In 1865 Mitchell was appointed professor of astronomy at Vassar College, where she taught such future scientists as Christine Ladd-Franklin and Ellen Swallow Richards. In 1873 her concern with the status of professional women led her to help found the Association for the Advancement of Women.

Mitchell pioneered in the daily photography of sunspots; she was the first to find that they were whirling vertical cavities, rather than clouds, as had been earlier believed. She also studied comets, nebulae, double stars, solar eclipses, and the satellites of Saturn and Jupiter.

Mitchell, Mount, highest peak (6,684 feet [2,037 m]) in North Carolina and in the United States east of the Mississippi River. It is located 20 miles (30 km) northeast of Asheville in the Black Mountains. The peak, covered with a mantle of hardwoods, pine, spruce, and balsam, is within Mount Mitchell State Park and the Pisgah National Forest. Formerly called Black Dome, it was renamed for a University of North Carolina professor, Elisha Mitchell, who, in 1835, surveyed it as the highest point in the eastern United States and who, in 1857, fell to his death on the mountain and is buried at its top.

Mitchell, Peter Dennis (b. Sept. 29, 1920, Mitcham, Surrey, Eng.—d. April 10, 1992, Bodmin, Cornwall), British chemist who won the 1978 Nobel Prize for Chemistry for formulating the chemiosmotic theory that explained the mechanisms by which energy is generated in the mitochondria of living cells.

Mitchell received his Ph.D. from the University of Cambridge in 1950. He served as director of the chemistry and biology unit in the department of zoology of the University of Edinburgh from 1955 to 1963. In 1964 he joined the Glynn Research Laboratories as director of research.

Mitchell, R.J., in full REGINALD JOSEPH MITCHELL (b. May 20, 1895, Talke, near Stoke-upon-Trent, Staffordshire, Eng.—d. June 11, 1937, Southampton, Hampshire), British aircraft designer, developer of the Spitfire, one of the best-known fighters in World War II.

After secondary schooling Mitchell was an apprentice at a locomotive works and attended night classes at technical colleges. In 1916, before the age of 22, he went to work at Supermarine Aviation Works in Southampton, where he remained the rest of his life, serving as the company's director for his last 10 years. He designed seaplanes (used largely for racing) between 1922 and 1931 and by 1936 had designed and developed the Spitfire, more than two dozen versions of which were eventually created before and after his death and which was known for its aerodynamic sleekness and maneuverability.

Mitchell, S. Weir, in full SILAS WEIR MITCHELL (b. Feb. 15, 1829, Philadelphia, Pa., U.S.—d. Jan. 4, 1914, Philadelphia), American physician and author who excelled in novels of psychology and historical romance.

After study at the University of Pennsylvania and Jefferson Medical College (M.D., 1850), Mitchell spent a year in Paris specializing in neurology. As an army surgeon during the American Civil War, he became well known for his "rest cure." His war experiences were the basis for "The Case of George Dedlow" (1866), a story about a quadruple amputee notable for its psychological insights and realistic war scenes. He wrote some 170 medical monographs on topics ranging from snake venom to neurasthenia and published short stories, poems, and children's stories anonymously. Of later novels perhaps his most notable are: *Roland Blake* (1886), *Hugh Wynne* (1898), *The Adventures of François* (1898), *Circumstance* (1901), *Constance Trescott* (1905), and *The Red City* (1908).

Mitchell, Sir Thomas Livingstone (b. June 15, 1792, Craigend, Stirlingshire, Scot.—d. Oct. 5, 1855, Sydney, N.S.W. [Australia]), surveyor general of New South Wales who explored and surveyed widely in Australia.

As a soldier in the Peninsular War in Spain (1811–14), Mitchell worked in topographical intelligence. He became a major in 1826 but was placed on half pay. In 1827 he went to New South Wales as assistant surveyor general to John Oxley at Sydney. He succeeded Oxley in 1828, assuming responsibility for roads and bridges in 1829 and in 1830 sole responsibility for the whole department. By 1830 he had established permanent routes from Sydney to Parramatta and to Liverpool and through the Blue Mountains.

In 1831–32 Mitchell explored between the Castlereagh and Gwydir rivers. In 1835 he traced the Darling River from the point at which Charles Sturt had left off in 1828 to the junction with the Murray. In 1836 his exploration of land around the Murray River led him to call the area Australia Felix (Happy Australia; later, Victoria state). The area was settled rapidly thereafter.

In 1837 Mitchell went on leave to England and wrote *Three Expeditions into Eastern Australia* (1838) and began a campaign for knighthood (granted in 1839). He also published his Peninsular War battle plans in 1840.

Mitchell returned to Australia in 1841 and in 1844 was elected to the legislative council. His fourth expedition (1845–46) sought in vain an overland route to Port Essington, but he surveyed a vast area.

Again on leave in England (1847–48), Mitchell wrote *Journal of an Expedition into the Interior of Tropical Australia* (1848) and *The Australian Geography* (1850), used as a textbook in Australian schools.

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Mitchell, W.O., in full WILLIAM ORMOND MITCHELL (b. March 13, 1914, Weyburn, Sask., Can.—d. Feb. 25, 1998, Calgary, Alta.), writer of stories that deal humorously with the hardships of western Canadian prairie life.

Mitchell received favourable notice for his first novel, *Who Has Seen the Wind?* (1947), a sensitive picture of a grim prairie town seen from the point of view of a small boy. Mitchell's *Jake and the Kid* (1961) was later developed into a popular, long-running radio and television series. His novel *The Kite* (1962) is about a newsman's interview with "Daddy Sherry," supposedly the oldest and wisest man in western Canada. Another novel, *The Vanishing Point* (1973), deals with a teacher's involvement with Indians in southwest Alberta.

Mitchell, Wesley C., in full WESLEY CLAIR MITCHELL (b. Aug. 5, 1874, Rushville, Ill., U.S.—d. Oct. 29, 1948, New York, N.Y.), American economist, the world's foremost authority of his day on business cycles.

Mitchell was educated at the University of Chicago, where he came under the influence of Thorstein Veblen and John Dewey. He taught at numerous universities, including the University of Chicago (1900–02), the University of California (1902–12), Columbia University (1913–19; 1922–44), and the New School for Social Research, New York City (1919–21). Despite his extensive teaching, Mitchell was primarily devoted to economic research.

Wesley C. Mitchell
By courtesy of Columbia University

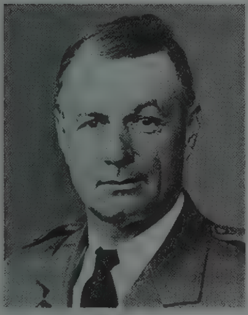
In 1920 he helped to organize the National Bureau of Economic Research and was its director of research until 1945. He served as chief of the price section of the War Industries Board during World War I, as chairman of President Herbert Hoover's Research Committee on Social Trends, and as a member of the National Planning Board (1933) and of the National Resources Board (1934–35). Under Mitchell's leadership, the Social Science Research Council, of which he was chairman (1927–30), and the Bureau of Educational Experiments greatly influenced the development of quantitative studies of economic behaviour in the United States and abroad.

Among his publications are *Business Cycles* (1913), *Business Cycles: The Problem and Its Setting* (1927), *The Backward Art of Spending Money* (1937), and *Measuring Business Cycles* (1946), written with A.F. Burns.

Mitchell, William, byname BILLY MITCHELL (b. Dec. 29, 1879, Nice, France—d. Feb. 19, 1936, New York, N.Y., U.S.), U.S. Army officer who early advocated a separate U.S. air force and greater preparedness in military aviation. He was court-martialed for his outspoken views and did not live to see the fulfillment during World War II of many of his prophecies: strategic bombing, mass airborne operations, and the eclipse of the battleship by the bomb-carrying airplane.

After serving as a private in the infantry during the Spanish-American War (1898), Mitchell received a commission as a second lieutenant in the signal corps. He served in Cuba, the Philippines, and Alaska and in 1909 graduated from the Army Staff College at Fort Leavenworth, Kan. In 1915 he was assigned to the aviation section of the signal corps. During World War I Mitchell became the outstanding U.S. combat air commander, advancing to the rank of brigadier general. In September 1918 he commanded a French-U.S. air armada of almost 1,500 planes—the largest concentration of air power up to that time. In the Meuse-Argonne campaign he used formations of up to 200 planes for mass bombing of enemy targets.

After the war Mitchell was appointed assistant chief of the air service. He became a strong proponent of an independent air force and of unified control of air power, both of which were opposed by the army general staff and the navy. As a result, he became increasingly outspoken in his criticism of the military hierarchy, and, when his term ended in April 1925, he was sent to the remote post of San Antonio, Texas. The climax came in September 1925, when the loss of the navy dirigible *Shenandoah* in a storm inspired him publicly to accuse the War and Navy departments of "incompetency, criminal negligence, and almost treasonable administration of the national defense." In December an army court-martial convicted him of insubordination. Sentenced to suspension from rank and duty for five years, he resigned from the army (Feb. 1, 1926).



Billy Mitchell, 1925

By courtesy of the Library of Congress, Washington, D.C.

Nevertheless, Billy Mitchell was awarded many decorations and honours during his lifetime, and in 1946 the U.S. Congress authorized a special medal in his honour; it was presented to his son in 1948 by the chief of staff of the newly created U.S. Air Force.

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Mitchell River, river in northern Queensland, Australia. It rises near Rumula on the Atherton Plateau section of the Eastern Highlands, 30 miles (48 km) northwest of Cairns, and flows for 350 miles (560 km) northwest across Cape York Peninsula to the Gulf of Carpentaria. Although the stream, fed by the Palmer, Walsh, and Lynd rivers, has the state's largest discharge, it is intermittent and may be dry for three months each year. The river was explored in 1845 by Ludwig Leichhardt and was named for Sir Thomas Mitchell, surveyor general for New South Wales. The river flows through country covered with wild scrub, and crocodiles abound along its banks.

mite, any of about 20,000 species of tiny arthropod invertebrates belonging to the subclass Acari (sometimes Acarina, or Acarida) of the class Arachnida.

A brief treatment of mites follows. For full treatment, *see* MACROPAEDIA: Arachnids.

Mites live in varied habitats: in brackish water, in fresh water, in hot springs, in soil, on plants, and as parasites on and in animals. Parasitic forms may live in the nasal passages, lungs, stomach, or deeper body tissues of animals. Some mites are carriers of human and animal diseases. Plant-feeding mites cause damage by feeding on leaf tissues or by transmitting viral diseases.

Red velvet mite (*Dinothrombium;* magnified about five times)

Anthony Bannister from Natural History Photographic Agency

Mites are small, often microscopic in size—the smallest being about 0.1 mm (0.004 inch) in length and the largest being about 6 mm (0.25 inch)—and they usually have four pairs of legs. In general, they breathe by means of tracheae, or air tubes; in many species, however, respiration takes place through the skin.

Mites of the suborder Mesostigmata (order Parasitiformes) include the chicken mite, the northern fowl mite, and the rat mite (all of which attack humans); nasal mites of dogs and birds; lung mites of monkeys; and predatory mites, which are sometimes of benefit in controlling plant-feeding mites.

The suborder Oribatida (oribatid, or beetle, mites) of the order Acariformes occur in soil and humus and occasionally on tree trunks and foliage. In general, they are not harmful and may play a role in the breakdown of organic matter. A few species transmit tapeworms to cattle or other ruminants.

Mites of the suborder Astigmata (order Acariformes) include the grain and cheese mites (Acaridae), itch mites (Sarcoptidae) of humans and animals, scab mites (Psoroptidae), feather mites of birds, mites associated with insects, and many free-living forms. Grain mites (Glycyphagidae) not only damage stored products but also cause skin irritations in those who handle such products. Itch mites burrow into the layers of the skin of humans, as well as into the hides of dogs, pigs, sheep, and goats, causing injury. Scab mites are found on sheep and cattle, sometimes causing serious injury. Others are found in the air sacs of birds' lungs or in the nasal passages and stomachs of bats. Some mite larvae of the suborder Prostigmata (order Acariformes) are parasitic on insects.

miter (headdress): *see* mitre.

Mitford, Jessica, in full JESSICA LUCY MITFORD (b. Sept. 11, 1917, Gloucestershire, Eng.—d. July 23, 1996, Oakland, Calif., U.S.), English-born writer and journalist noted for her witty and irreverent investigations of various aspects of American society.

The fifth daughter of the 2nd Baron Redesdale, Mitford grew up in England with her brother and five sisters, one of whom was the novelist Nancy Mitford. She moved to the United States in 1939, became a naturalized U.S. citizen in 1944, and began to write in the late 1950s. Her first published book, the autobiography *Hons and Rebels* (1960; U.S. title *Daughters and Rebels*), is an entertaining account of her childhood, her eccentric family, and her early adult life. Mitford's second book, *The American Way of Death* (1963), a caustic examination of unscrupulous practices in the American funeral industry, became a best-seller. Her long-standing interest in civil-rights cases found expression in the book *The Trial of Dr. Spock* (1969), an account of the famous pediatrician's trial on conspiracy charges for antiwar activities during the Vietnam War. *Kind and Usual Punishment: The Prison Business* (1973) is Mitford's critical examination of the American prison system. *A Fine Old Conflict* (1977) is mainly an account of her experiences as a member of the U.S. Communist Party in the 1940s and '50s.

Mitford, Mary Russell (b. Dec. 16, 1787, Alresford, Hampshire, Eng.—d. Jan. 10, 1855, Swallowfield, near Reading), dramatist, poet, and essayist, chiefly remembered for her delightful sketches of English village life.

She was the only daughter of George Mitford, a dashing, irresponsible character whose extravagance compelled the family, in 1820, to leave their house in Reading (built when Mary, at the age of 10, won £20,000 in a lottery) for a labourer's cottage in the nearby village of Three Mile Cross. Thereafter, until his death in 1842, his daughter struggled to provide for him and to pay his gambling debts out of her literary earnings.

In 1810 she published *Miscellaneous Poems,* and other volumes of mildly romantic verse followed. Her narrative poem *Christina* (1811) was revised by Samuel Taylor Coleridge, who inserted a number of lines. She then turned to the theatre, with some success, most notably in the blank-verse tragedy *Rienzi,* which had 34 performances at London's Drury Lane in 1828.

Her reputation, however, rests on the sketches, started in *The Ladies Magazine* (1819), that fill the five volumes of *Our Village*. Based on her observation of life in and around Three Mile Cross, they catch the pleasant atmosphere of the English countryside and the quaintness of village characters.

Mary Russell Mitford, drawing by John Lucas, 1852; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Mitford, Nancy, married name HONOURABLE MRS. PETER RODD (b. Nov. 28, 1904, London, Eng.—d. June 30, 1973, Versailles, France), English writer noted for her witty novels of upper-class life.

Nancy Mitford was one of six daughters (and one son) of the 2nd Baron Redesdale; the family name was actually Freeman-Mitford. The children were educated at home and were all highly original. Nancy's sister Unity (d. 1948) was notorious in Great Britain for her admiration of Adolf Hitler, and her sister Diana married Sir Oswald Mosley, leader of the British Union of Fascists, while Deborah became the wife of the 11th Duke of Devonshire. Her sister Jessica became a well-known writer on American society.

Mitford's chief satirical novels are the quasi-autobiographical *The Pursuit of Love* (1945), *Love in a Cold Climate* (1949), *The Blessing* (1951), and *Don't Tell Alfred* (1960). These books chronicle the antics and attitudes of a family of eccentric English aristocrats headed by "Uncle Matthew," who is a lively caricature of Mitford's own father, Lord Redesdale. Several biographies that Mitford wrote exhibit her Francophilia: *Madame de Pompadour* (1954), *Voltaire in Love* (1957), and *The Sun King* (1966), about Louis XIV. One of Mitford's most widely read books was *Noblesse Oblige: An Enquiry into the Identifiable Characteristics of the English Aristocracy* (1956), a volume of essays of which she was coeditor and which brought to the attention of the world the distinction between linguistic usages that are U (upper class) and those that are non-U (not upper class).

mithan, cattle species also known as gayal (*q.v.*).

Mithra, also spelled MITHRAS, Sanskrit MITRA, in ancient Indo-Iranian mythology, the god of light, whose cult spread from India in the east to as far west as Spain, Great Britain, and Germany. (*See* Mithraism.) The first written mention of the Vedic Mitra dates to 1400 BC. His worship spread to Persia and, after the defeat of the Persians by Alexander the Great, throughout the Hellenic world. In the 3rd and 4th centuries AD, the cult of Mithra, carried and supported by the soldiers of the Roman Empire, was the chief rival to the newly developing religion of Christianity. The Roman emperors Commodus and Julian were initiates of Mithraism, and in 307 Diocletian consecrated a temple on the Danube River to Mithra, "Protector of the Empire."

According to myth, Mithra was born, bearing a torch and armed with a knife, beside a sacred stream and under a sacred tree, a child of the earth itself. He soon rode, and later killed, the life-giving cosmic bull, whose blood fertilizes all vegetation. Mithra's slaying of the bull was a popular subject of Hellenic art and became the prototype for a bull-slaying ritual of fertility in the Mithraic cult.

As god of light, Mithra was associated with the Greek sun god, Helios, and the Roman Sol Invictus. He is often paired with Anahita, goddess of the fertilizing waters.

Mithradates, also spelled MITHRIDATES, name of rulers grouped below by country and indicated by the symbol •.

Parthia

• **Mithradates I,** also called ARSACES VI (fl. 2nd century BC), king of Parthia (reigned 171–138 BC); he succeeded his brother Phraates I.

Before 160 Mithradates I seized Media from the Seleucid ruler Timarchus. Turning to the east, he won two provinces, Tapuria and Traxiana, from the Bactrian king Eucratides. Mithradates then captured the province of Elymais (ancient Elam) and invaded Babylonia (142 or 141). The Seleucid king Demetrius II Nicator recaptured Babylon (141 or 140) but was defeated and held by Mithradates in honourable captivity. Generally, Mithradates was regarded as a mild ruler, and his epithet Philhellene ("Greek-loving") indicates that he tried to conciliate his Greek subjects.

• **Mithradates II** (d. 88 BC), king of Parthia (reigned 123–88 BC); he was the son and successor of Artabanus II.

Mithradates recovered the eastern provinces that had been overrun by invading Śaka nomads during his father's reign. In the west he conquered Mesopotamia and defeated the Armenian king Artavasdes, whose son Tigranes (later Tigranes II) became a Parthian hostage and was redeemed only for the cession of 70 valleys. One of the most successful of the Parthian kings, Mithradates concluded the first treaty between Parthia and Rome in 92 BC.

Pontus

• **Mithradates VI** EUPATOR, byname MITHRADATES THE GREAT (d. 63 BC, Panticapaeum [now in Ukraine]), king of Pontus in northern Anatolia (120–63 BC). Under his energetic leadership, Pontus expanded to absorb several of its small neighbours and, briefly, contested Rome's hegemony in Asia Minor.

Mithradates VI, bust in the Louvre, Paris

Cliche Musees Nationaux, Paris

Life. Mithradates the Great was the sixth—and last—Pontic ruler by that name. Mithradates (often misspelled Mithridates and meaning "gift of [the god] Mithra") was a common name among Anatolian rulers of the age. When Mithradates VI succeeded his father, Mithradates Euergetes, in 120 BC, he was then only a boy, and for a few years his mother ruled in his place. About 115 BC, she was deposed and thrown into prison by her son, who thereafter ruled alone. Mithradates began his long career of conquest by dispatching successful expeditions to the Crimea and to Colchis (on the eastern shore of the Black Sea). Both districts were added to the Pontic kingdom. To the Greeks of the Tauric Chersonese and the Cimmerian Bosporus (Crimea and Straits of Kerch), Mithradates was a deliverer from their Scythian enemies, and they gladly surrendered their independence in return for the protection given to them by his armies. In Anatolia, however, the royal dominions had been considerably diminished after the death of Mithradates V: Paphlagonia had freed itself, and Phrygia (*c.* 116 BC) had been linked to the Roman province of Asia. Mithradates' first move there was to partition Paphlagonia and Galatia between himself and Nicomedes III of Bithynia, but next he quarreled with Nicomedes over Cappadocia. Successful at first on two occasions, he was on both deprived of his advantage by Roman intervention (*c.* 95 and 92). While appearing to acquiesce, he resolved to expel the Romans from Asia. A first attempt to depose Nicomedes IV of Bithynia, who was completely subservient to the Romans, was frustrated (*c.* 90). Then Nicomedes, instigated by Rome, attacked Pontic territory, and Mithradates, after protesting in vain to the Romans, finally declared war (88).

Nicomedes and the Roman armies were defeated and flung back to the coasts of the Propontis and the Aegean. The Roman province of Asia was occupied, and most of the Greek cities in western Asia Minor allied themselves with Mithradates, though a few held out against him, such as Rhodes, which he besieged unsuccessfully. He also sent large armies into Greece, where Athens and other cities took his side. But the Roman generals, Sulla in Greece and Fimbria in Asia, defeated his forces in several battles during 86 and 85. In 88 he had arranged a general massacre of the Roman and Italian residents in Asia (80,000 are said to have perished), in order that the Greek cities, as his accessories in the crime, should feel irrevocably committed to the struggle against Rome. As the war turned against him, his former leniency toward the Greeks changed to severity; every kind of intimidation was resorted to—deportations, murders, freeing of slaves. But this reign of terror could not prevent the cities from deserting to the victorious side. In 85, when the war was clearly lost, he made peace with Sulla in the Treaty of Dardanus, abandoning his conquests, surrendering his fleet, and paying a large fine.

In what is called the Second Mithradatic War, the Roman general Lucius Licinius Murena invaded Pontus without provocation in 83 but was defeated in 82. Hostilities were suspended, but disputes constantly occurred, and in 74 a general war broke out. Mithradates defeated Marius Aurelius Cotta, the Roman consul, at Chalcedon, but Lucullus worsted him outside Cyzicus (73) and drove him, in 72, to take refuge in Armenia with his son-in-law Tigranes. After scoring two great victories at Tigranocerta (69) and Artaxata (68), Lucullus was disconcerted by the defeat of his lieutenants and by mutiny among his troops. In 66 Lucullus was superseded by Pompey, who completely defeated both Mithradates and Tigranes.

Mithradates then established himself in 64 at Panticapaeum (Kerch) on the Cimmerian Bosporus and was planning an invasion of Italy by way of the Danube when his own troops, led by his son Pharnaces II, revolted against him. After failing in an attempt to poison himself, Mithradates ordered a Gallic mercenary to kill him. His body was sent to Pompey, who buried it in the royal sepulchre at Sinope, the Pontic capital.

Assessment. Mithradates was a man of great stature and physical strength, a brave fighter, and a keen hunter. He also had some of the worst traits often associated with the Oriental despot—cruelty and sensuality, in particular. But it cannot be denied that Mithradates was a ruler of astonishing energy and determination, or that he possessed political skill of a high order. That he was one of the few men to offer a serious challenge to the Roman Republic is sufficient testimony to his ability. He organized the forces at his disposal very effectively, and he had a good grasp of strategy. He was unlucky in having to face three exceptionally brilliant Roman generals; unlucky, too, in coming to power at a time when the Hellenistic world was in the final stage of its collapse. It is quite conceivable that had he been born a century earlier he could have constructed an enduring Greco-Asiatic empire. A cunning, brutal tyrant, he concerned himself solely with maintaining and strengthening his own power. He posed as the champion of Hellenism, but this was mainly to further his political ambitions; it is no proof that he was deeply imbued with Greek culture or that he felt a mission to promote its extension within his domains. Hellenism made advances in Pontus during his reign, as it had under his predecessors, but this was a natural process. He treated all alike;

Greek, Roman, and Asiatic were welcome at his court provided that they could be of use to him (his military subordinates were mostly Greeks, though in later years he employed several Roman renegades), but he trusted no one. Just as it is impossible to speak of his favouring one religion or culture above another, so it is impossible to believe that he had any notion of bringing Greeks and Asiatics closer together in a new kind of political and social system. His posing as a liberator of the Greeks from Roman oppression and, later, his encouragement of social revolution in the Greek cities of the province of Asia can only be interpreted, in both cases, as the actions of an opportunist seeking immediate political advantages. (R.H.S.)

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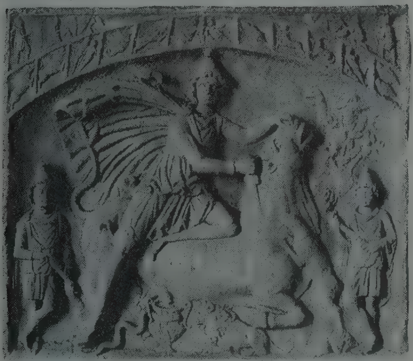
Mithraism, the worship of Mithra, the Iranian god of the sun, justice, contract, and war in pre-Zoroastrian Iran. Known as Mithras in the Roman Empire during the 2nd and 3rd centuries AD, this deity was honoured as the patron of loyalty to the emperor. After the acceptance of Christianity by the emperor Constantine in the early 4th century, Mithraism rapidly declined.

History. Before Zoroaster (6th century BC or earlier), the Iranians had a polytheistic religion, and Mithra was the most important of their gods. First of all, he was the god of contract and mutual obligation. In a cuneiform tablet of the 15th century BC that contains a treaty between the Hittites and the Mitanni, Mithra is invoked as the god of oath. Furthermore, in some Indian Vedic texts the god Mitra (the Indian form of Mithra) appears both as "friend" and as "contract." The word *mitra* may be translated in either way, because contracts and mutual obligation make friends. In short, Mithra may signify any kind of communication between men and whatever establishes good relations between them. Mithra was called the Mediator. Mithra was also the god of the sun, of the shining light that beholds everything, and, hence, was invoked in oaths. The Greeks and Romans considered Mithra as a sun god. He was probably also the god of kings. He was the god of mutual obligation between the king and his warriors, and, hence, the god of war. He was also the god of justice, which was guaranteed by the king. Whenever men observed justice and contract, they venerated Mithra.



Mithra slaying the bull, bas-relief, 2nd century AD; in the Städtisches Museum, Wiesbaden, Ger.

Bavaria-Verlag

The most important Mithraic ceremony was the sacrifice of the bull. Opinion is divided as to whether this ceremony was pre-Zoroastrian or not. Zoroaster denounced the sacrifice of the bull, so it seems likely that the ceremony was a part of the old Iranian paganism. This inference is corroborated by an Indian text in which Mitra reluctantly participates in the sacrifice of a god named Soma, who often appears in the shape of a white bull or of the moon. On the Roman monuments, Mithra reluctantly sacrifices the white bull, who is then transformed into the moon. This detailed parallel seems to prove that the sacrifice must have been pre-Zoroastrian. Contract and sacrifice are connected, since treaties in ancient times were sanctioned by a common meal.

Beginning with Darius (522–486), the Persian kings of the Achaemenid dynasty were Zoroastrians. But Darius and his successors did not intend to create political difficulties by attempting to eradicate the old beliefs still dear to the heart of many nobles. Thus, the religion of Zoroaster was gradually contaminated with elements of the old, polytheistic worship. Hymns (the Yashts) were composed in honour of the old gods. There is a Yasht dedicated to Mithra, in which the god is depicted as the all-observing god of heavenly light, the guardian of oaths, the protector of the righteous in this world and the next, and, above all, as the archfoe of the powers of evil and darkness—hence, the god of battles and victory.

In the mixed religion of the later Achaemenid period, however, the Zoroastrian aspects clearly dominate the heathen aspects. The sacrifice of the bull, abhorred by every Zoroastrian, is never mentioned. When Alexander the Great conquered the Persian Empire in about 330 BC, the old structure of society appears to have broken down completely and about the worship of Mithra in Persia no more is heard.

Local aristocrats in the western part of the former Persian Empire retained their devotion to Mithra. The kings and nobles of the border region between the Greco-Roman and the Iranian world still worshipped him. When Tiridates of Armenia acknowledged the Roman emperor Nero as his supreme lord, he performed a Mithraic ceremony, indicating that the god of contract and of friendship established good relations between the Armenians and the mighty Romans. The kings of Commagene (southeast of Turkey) venerated Mithra. Mithradates VI of Pontus may have been a worshipper of the god, and his allies, the Cilician pirates, are known to have performed Mithraic ceremonies (67 BC). The worship of Mithra, however, never became popular in the Greek world, because the Greeks never forgot that Mithra had been the god of their enemies the Persians.

There is little notice of the Persian god in the Roman world until the beginning of the 2nd century, but, from the year AD 136 onward, there are hundreds of dedicatory inscriptions to Mithra. This renewal of interest is not easily explained. The most plausible hypothesis seems to be that Roman Mithraism was practically a new creation, wrought by a religious genius who may have lived as late as *c.* AD 100 and who gave the old traditional Persian ceremonies a new Platonic interpretation that enabled Mithraism to become acceptable to the Roman world.

Roman Mithraism, like Iranian Mithraism, was a religion of loyalty toward the king. It seems to have been encouraged by the emperors, especially Commodus (180–192), Septimius Severus (193–211), and Caracalla (211–217). Most adherents of Mithra known to us from inscriptions are soldiers of both low and high rank, officials in the service of the emperor, imperial slaves, and freedmen (who quite often were very influential people)—persons who probably knew which god would lead them to quick promotion.

Mithraic sanctuaries and dedications to Mithra are numerous at Rome and Ostia, along the military frontier, in Britain, and on the Rhine, the Danube, and the Euphrates. Few dedications are found in peaceful provinces; when they do occur the dedicator is usually a provincial governor or an imperial official. Within a few generations, the Roman world had completely assimilated the Persian god. When Diocletian attempted a renewal of the Roman state and religion, he did not forget Mithra. In AD 307, in a dedication from Carnuntum (at the Danube, near Vienna), Diocletian and his colleagues dedicated an altar to Mithra, as the patron of their empire (*fautori imperii sui*). But in 312, Constantine won the battle at the Milvian Bridge under the sign of the cross. Instantaneously, the dedications to Mithra ceased, even though there was no immediate public interdiction of Mithraic ceremonies. The worship seems to have collapsed quite suddenly when imperial favour ceased to be with the Mithraists. Dedications to Mithra appear again between about 357 and 387, but only at Rome. The dedicators all come from the old pagan aristocracy of the city of Rome, which in this period was in open opposition to the new Christian emperor at Constantinople. In these inscriptions, however, Mithra is only one of many traditional pagan gods. The Mithraic mysteries had gradually faded long before. And when the Roman opposition was defeated, pagan worship was suppressed altogether.

Mythology and theology. The creation of the world is the central episode of Mithraic mythology. According to the myths, the sun god sent his messenger, the raven, to Mithra and ordered him to sacrifice the bull. Mithra executed the order reluctantly; in many reliefs he is seen turning aside his face in sorrow. But at the very moment of the death of the bull, a great miracle happened. The white bull was metamorphosed into the moon; the cloak of Mithra was transformed into the vault of the sky, with the shining planets and fixed stars; from the tail of the bull and from his blood sprang the first ears of grain and the grape; from the genitals of the animal ran the holy seed which was received by a mixing bowl. Every creature on earth was shaped with an admixture of the holy seed. One Mithraic hymn begins: "Thou hast redeemed us too by shedding the eternal blood." The plants and the trees were created. Day and Night began to alternate, the Moon started her monthly cycle, the Seasons took up their round dance through the Year, and thus Time was created. But, awakened by the sudden light, the creatures of the dark emerged from earth. A serpent licked the bull's blood. A scorpion tried to suck the holy seed from the genitals. On the reliefs, a lion often is also seen. With the bull's death and the creation of the world, the struggle between Good and Evil began: thus is the condition of man's life. The raven symbolizes Air, the lion Fire, the serpent Earth, and the mixing bowl Water. So the four elements (air, fire, earth, and water) came into being, and from them all things were created. After the sacrifice, Mithra and the sun god banqueted together, ate meat and bread, and drank wine. Then Mithra mounted the chariot of the sun god and drove with him across the ocean, through the air to the end of the world.

The myth was interpreted by the Roman Mithraists in terms of Platonic philosophy. The sacrifice took place in a cave, an image of the world, as in the simile of the cave in Plato's *Republic.* Mithra himself was equated with the creator (demiurge) of the *Timaeus:* he was called "demiurge and father of all things," like the Platonic demiurge. The four elements, the mixing bowl, the creation of Time, and the attack of the wicked animals upon the newborn creature are well-known features of the *Timaeus.* The Mithraic doctrine of the soul is intimately linked with the myth of creation and with Platonic philosophy. As in the *Timaeus,* the soul of man came down from heaven. It crossed the seven spheres of the planets, taking on their vices (*e.g.,* those of Mars and of Venus) and was finally caught within the body. The task of man is to liberate his divine part (the soul) from the shackles of the body and to reascend through the seven spheres to the eternal, unchanging realm of the fixed stars. This ascension to the sky was prefigured by Mithra himself, when he left the earth in the chariot of the sun god.

Worship, practices, and institutions. The Mithraic sanctuaries were subterranean caverns, which presented obvious limitations of size. None of the many excavated shrines could receive more than a hundred persons, and most even fewer. All ceremonies were of necessity enacted in artificial light. The cavern always contained a well. Access to the cavern often consisted of a system of subterranean passages, which were used in the initiation ceremonies. Men only were admitted to this religion of soldiers, and no organizational hierarchy seems to have existed.

The initiates were organized in seven grades: *corax,* Raven; *nymphus,* Bridegroom; *miles,* Soldier; *leo,* Lion; *Perses,* Persian; *heliodromus,* Courier of (and to) the Sun; *pater,* Father. To each rank belonged a particular mask (Raven, Persian, Lion) or dress (Bridegroom). The rising of the Mithraist in grade prefigured the ascent of the soul after death. The series of the seven initiations seems to have been enacted by passing through seven gates and climbing a ladder of seven steps. Each grade was attributed to one of the seven planetary gods. The zealous Mithraist gradually passed the spheres of these minor deities and finally reached the region of the fixed stars.

Little is known about initiation ceremonies. Ancient texts refer to ablutions (baptism) and purifications and chastisements, to fetters and liberation, and to certain ceremonial passwords. Frescoes at Capua (Italy) show the initiates blindfolded, kneeling, and prostrated. A simulated death and resurrection was probably part of the ceremony. Tertullian, the 2nd-century North African Christian theologian, describes the test of courage to which the *miles* was subjected. Weapon in hand, he had to force his way—probably by a sham duel—to a wreath. When he had succeeded, an officiant offered to crown him with the wreath. But the candidate had to decline, saying that Mithra alone was his wreath; and throughout the rest of his life, he never again bore a wreath.

The Mithraic caverns were decorated with frescoes, reliefs, and statues of minor deities and of the planetary gods. A narrow aisle was flanked on both sides by a broad, raised bench on which the worshippers kneeled or reclined. At one end of the aisle (often apselike) there was always a relief or fresco representing the sacrifice of the bull. Sometimes, the relief could be turned on a pivot; the back of the stone represented the repast of Mithra and the sun god. While it is unlikely that the ceremony of the bull's sacrifice was frequently performed, the common meal of the initiates was a regular feature of Mithraic worship.

Mitiaro, island in the lower Cook Islands, a dependency of New Zealand, southwest Pacific Ocean. It is a raised coral atoll, with a land area of 8.6 sq mi (22.3 sq km), and is encircled by a reef. Its interior of fertile volcanic soil, ringed by swamps and limestone, supports copra and citrus fruits. Stands of sandalwood occur. Pop. (1981) 256.

miticide, also called ACARICIDE, any chemical substance used to control mites or ticks (especially species that damage ornamental or food plants), which are not susceptible to commonly used insecticides. Azobenzene, dicofol, ovex, and tetradifon are commonly used miticides. Many miticides kill eggs and larval stages as well as adult animals. Some are also toxic to honeybees and other beneficial insects.

Mitilíni (island, Greece): *see* Lesbos.

Mitilíni (town, Greece): *see* Mytilene.

Mitla, Meso-American archaeological site, Oaxaca state, southern Mexico. One of Mexico's best known ruins, Mitla lies at an elevation of 4,855 ft (1,480 m) on the eastern edge of one of several cold, high valleys surrounded by the mountains of the Sierra Madre del Sur, 24 mi (38 km) southeast of Oaxaca city. It is generally believed that Mitla (Nahuatl: Place of the Dead) was established as a sacred burial site long before the Christian Era, probably by the Zapotecs, whose influence was predominant until about AD 900. Between 900 and 1500 the Mixtecs moved down from northern Oaxaca and took possession of Mitla; it is the Mixtec influence that is most pronounced on the existing ruins. The Spaniards arrived at Mitla in 1521, and the first European account of the area was given by Diego García de Palacio in 1576.

The archaeological zone of Mitla includes five main groups of structures—Grupo de las Columnas (Columns Group), Grupo de las Iglesias (Churches Group), Grupo del Arroyo (Arroyo Group), Grupo de los Adobes (Adobe Group), and Grupo del Sur (Southern Group)—of which only the first two had been fully excavated and restored by the early 1980s. Each group has several rectangular patios (some connected by long, winding passages and others separate) bordered by long, narrow rooms. The patios in the Grupo de los Adobes and those in the Grupo del Sur are also bordered by rooms, as well as by stepped pyramids.

The method of above-ground wall construction appears to have been the same for all groups: a core of mud and stone covered with plaster or well-cut trachyte. The door frames are decorated with mosaics of intricately worked small stones perfectly fitted into stepped fret (geometric) patterns. Cruciform lithic tombs have been discovered beneath both the Grupo de las Columnas and the Grupo del Sur.

The modern village of Mitla, composed mainly of thatched huts and adobe houses situated on the hillside below the ruins, is the operation base for the Regional Studies Centre of the Universidad de las Americas. The Museo Frissell de Arte Zapoteca (Frissell Museum), located in the village, contains a collection of artifacts from the state of Oaxaca.

Mitnagged, also spelled MISNAGID (Hebrew: Opponent), plural MITNAGGEDIM, or MISNAGIDIM, member of a group of tradition-minded Jews who vigorously opposed the mid-18th-century Hasidic movement of eastern Europe when it threatened to encompass large numbers of Jews. Under the leadership of Elijah ben Solomon, called the Vilna Gaon, the Mitnaggedim excommunicated all Hasidic groups from Orthodox Jewish communities. The Hasidim were accused of espousing doctrines tinged with pantheism and were severely criticized for establishing independent synagogues with Sefardic (Spanish-rite) liturgy. The Mitnaggedim were further incensed that Hasidic religious leaders (*tzaddiqim*) were looked upon as mediators between man and God and that undue emphasis on religious emotionalism undermined the traditional authority of the rabbis by downgrading serious study of the Torah. The controversy subsided in the 19th century, when the two sides turned their attention to combatting Haskala, a secularizing movement.

Mito, capital, Ibaraki Prefecture (*ken*), Honshu, Japan, on the left bank of the Naka-gawa (Naka River). During the Heian era (794–1185) Mito developed around a Yoshida shrine, and its first castle was built during the Kamakura era (1192–1333). The city changed hands several times during the 15th and 16th centuries; in 1609 it became a fief of the Mito branch of the Tokugawa family, one of the three branches of that clan (*sanke*) from which the shogun could be chosen. The Kasawara Aqueduct was constructed by the scholar and ruler Tokugawa Mitsukuni in 1663 and is still in use.

During the Tokugawa era (1603–1867) Mito was an important commercial and cultural centre, known for its administrative and agrarian reforms. Its political support of the reestablishment of secular Imperial rule led to the Meiji Restoration in 1868.

Since the opening of the Mito railway in 1889, the city has been a major transport centre. Industrialization was slow before the 1960s, consisting mainly of traditional manufactures including furniture, paper, and handicrafts. Since then, new industries have begun operation in the city, manufacturing electrical machinery, iron and steel products, and chemicals.

Mito Park, in the city centre, contains the ruins of the Tokugawa castle; the Kodokan, an educational institution founded in the 19th century; and Shintō and Confucian shrines. Kairaku-en (Tokiwa Park) is one of Japan's most visited gardens, graced with numerous plum trees. Pop. (1983 est.) 223,740.

mitosis, a process of cell duplication, or reproduction, during which one cell gives rise to two genetically identical daughter cells. Strictly applied, the term mitosis is used to describe the duplication and distribution of chromosomes, the structures that carry the genetic information.

A brief treatment of mitosis follows. For a full treatment, *see* MACROPAEDIA: Cells: Their Structures and Functions.

Prior to the onset of mitosis, the chromosomes have replicated and the proteins that will form the mitotic spindle have been synthesized. Mitosis begins at prophase with the thickening and coiling of the chromosomes. The nucleolus, a rounded structure, shrinks and disappears. The end of prophase is marked by the beginning of the organization of a group of fibres to form a spindle and the disintegration of the nuclear membrane.

The chromosomes, each of which is a double structure consisting of duplicate chromatids, line up along the midline of the cell at metaphase. In anaphase each chromatid pair separates into two identical chromosomes that are pulled to opposite ends of the cell by the spindle fibres. During telophase, the chromosomes begin to decondense, the spindle breaks down, and the nuclear membranes and nucleoli re-form. The cytoplasm of the mother cell divides to form two daughter cells, each containing the same number and kind of chromosomes as the mother cell. The stage, or phase, after the completion of mitosis is called interphase.

Mitosis is absolutely essential to life because it provides new cells for growth and for replacement of worn-out cells. Mitosis may take minutes or hours, depending upon the kind of cells and species of organisms. It is influenced by time of day, temperature, and chemicals.

Mitra, in the pantheon of Vedic Hinduism, one of the gods in the category of Ādityas, or sovereign principles of the universe. He represents friendship, integrity, harmony, and all else that is important in the successful maintenance of order in human existence. He is usually paired with the god Varuṇa, the guardian of the cosmic order, whose powers he complements as guardian of the human order. As spirit of the day he is sometimes attributed with solar characteristics. His Iranian counterpart is Mithra, who eventually came to be worshipped as the god of one of the great mystery cults, Mithraism.

mitral insufficiency, also called MITRAL REGURGITATION, inability of the mitral valve to prevent the flow of blood back from the left ventricle, or lower chamber of the heart, into the left atrium, or upper chamber. Normally, the valve permits blood to flow from the atrium to the ventricle but prevents its return. Most often, the inability of the mitral valve to close adequately is caused by scarring from rheumatic heart disease; it may also be due to a congenital defect of the valve or may arise from defects in the muscles and tendons (the papillary muscles and chordae tendineae) that operate the valve. Less frequently it may be due to endocarditis (inflammation of the heart lining) or cardiac tumour. The condition is recognized from characteristic heart sounds and from patterns that show up in echocardiography or electrocardiography.

Persons with mitral insufficiency may not be conscious of any effect of the condition or may be easily fatigued and may experience difficulty in breathing after exertion or while lying down. The left atrium may become greatly enlarged, and left ventricular failure eventually develops.

Medical treatment is restriction of vigorous exercise, reduction of sodium intake and increase in sodium excretion, and administration of anticoagulants to avoid the formation of blood clots in the veins. Some persons with severe defects are treated surgically by replacement of the valve.

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mitral stenosis, narrowing of the mitral valve, the function of which is to permit blood to flow from the atrium, or upper chamber, to the ventricle, or lower chamber, of the left side of the heart and to prevent its backflow. Narrowing of the mitral valve is usually a result of rheumatic fever; rarely, the narrowed valve is a congenital defect. The condition, most common in women under 45, is diagnosed by recognition of typical heart sounds and confirmed by certain patterns that appear in echocardiography or electrocardiography.

Narrowing of the valve increases pressure in the left atrium and in the pulmonary veins and capillaries (oxygenated blood from the lungs enters the left atrium by way of the pulmonary veins). The increased pressure in the pulmonary vessels may lead to congestion of the lungs and the collection of fluid in the pulmonary tissues. Difficulty in breathing, particularly after exercise, is one consequence. If the small vessels of the lungs develop resistance, possibly by the thickening of their walls, accumulation of fluid in the lungs decreases, but increased back pressure in the right ventricle of the heart (from which blood is pumped to the lungs) may lead to early failure of the right side of the heart.

Atrial fibrillation, or uncontrolled and irregular twitching of the upper chambers of the heart, occurs in most persons who have mitral stenosis. Another possible complication is the development of blood clots in the left atrium; these may break loose and travel through the arteries to the kidneys, the spleen, the legs, or the brain, obstructing blood flow at those points with consequent death of tissue.

Medical treatment includes the regulation of exercise so as to avoid fatigue and to minimize difficulty in breathing; reduction of sodium intake and increase in sodium excretion to reduce accumulation of fluids in the tissues; and administration of anticoagulants to reduce the possibility of clot formation. Surgical treatment is replacement of the valve with one of Dacron, stainless steel, or some other special material, or with a transplant of a valve from a pig heart.

mitre, also spelled MITER, liturgical headdress worn by Roman Catholic bishops and abbots and some Anglican and Lutheran bishops. It has two shield-shaped stiffened halves that face the front and back. Two fringed streamers, known as lappets, hang from the back. It developed from the papal tiara and came into use in the 11th century.

Contemporary mitre
Algimantas Kezys, S.J.

Three types of mitres are worn in the Roman Catholic Church. The *simplex* is made of undecorated white linen or silk and is worn at funerals, Good Friday, and some other services. The *auriphrygiata* is made of plain gold cloth or white silk with gold or silver embroidered bands and is worn during penitential seasons and at some other times. The *pretiosa* is decorated with precious stones and gold and worn on Sundays and feast days.

The Greek *mitra* worn by bishops and some Russian clergy in the Eastern churches is similar to a closed crown with a cross on top.

Mitre, Bartolomé (b. June 26, 1821, Buenos Aires—d. Jan. 18, 1906, Buenos Aires), politician, soldier, and author, who as president of Argentina was instrumental in uniting a war-torn nation and inaugurating an era of peace and economic progress in the last half of the 19th century.

Growing up in Buenos Aires under the dictatorship of Juan Manuel de Rosas, Mitre began a 15-year exile in 1837. Travelling to Uruguay, Bolivia, and Peru, he served in military campaigns, edited the newspaper *El Mercurio,* and wrote constantly against the Rosas regime. In 1852 he returned to Argentina as the leader of the Uruguayan forces in the Battle of Caseros, which led to the downfall of Rosas.

The next year Mitre became the leader of secessionist Buenos Aires province, whose citizens had refused to accept the new federal constitution, which minimized the role of their city in Argentine affairs. He held a number of offices in the provincial government and was the governor when the province defeated the federal forces in 1861. The national capital was moved again to Buenos Aires, and he was elected president of a united Argentina. Establishing an efficient administration, he suppressed the rural *caudillos* (bosses), extended the postal service and telegraph lines, organized public finances, and established new courts. He fostered increased foreign trade and encouraged immigration. When Paraguay declared war in 1864, he assumed command of the Argentine forces.

At the end of his presidential term in 1868, he was elected to the Senate, in which he served as leader of the middle-class interests in the nation. In 1874 he ran for president again, only to claim that his defeat was fraudulent and to lead an unsuccessful rebellion against the victor. He tried for the presidency again in 1891 but withdrew in favour of the Conservative candidate. Throughout these years and until his death, he stood as a symbol of Argentine unity and as a spokesman for economic development.

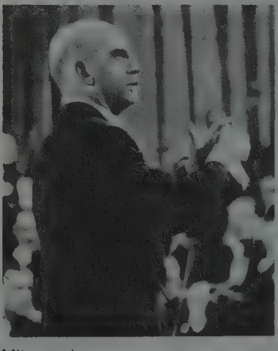
Mitre's contributions to the cultural life of Argentina were also of the first importance. He was founder of the newspaper *La Nación* (1870) and the Argentine Academy of History. He wrote much poetry and many prose works and did considerable translating (including Dante) and numerous historical studies, including the multi-volume *Historia de Belgrano* (1858–59) and *Historia de San Martín* (1887–88).

mitre shell, any of several marine snails constituting the family Mitridae (subclass Prosobranchia of the class Gastropoda), in which the thick shell typically is bullet shaped, vaguely resembling a bishop's headdress, or mitre. Mitres are most common in the Indo-Pacific region, where one of the largest species occurs: the 10-centimetre (4-inch) episcopal mitre (*Mitra mitra*), which has an orange-checked shell.

Episcopal mitre (*Mitra mitra*)
Lynwood M. Chace—The National Audubon Society Collection/Photo Researchers

Mitropoulos, Dimitri (b. March 1, 1896, Athens—d. Nov. 2, 1960, Milan), conductor known for his performances of 20th-century works.

Mitropoulos studied in Athens, where his opera *Soeur Béatrice* (after Maeterlinck) was performed in 1919. Later in Berlin he studied piano under the brilliant pianist, composer, and teacher Ferruccio Busoni. An excellent


Mitropoulos
UPI—EB Inc.

pianist, Mitropoulos sometimes conducted from the keyboard (*e.g.,* in 1930 and 1932 with Sergey Prokofiev's *Third Piano Concerto*). He did not use a baton, and even in rehearsal he conducted from memory. He was one of the earliest conductors to perform twelve-tone works of Arnold Schoenberg, Alban Berg, and others.

Mitropoulos conducted at the Berlin State Opera (1921–24) and directed the Athens Conservatory until 1930. From 1937 to 1949 he directed the Minneapolis Symphony Orchestra. Although he rejected the traditional social obligations of the position, he won a devoted following. He was musical director of the New York Philharmonic (1951–58), where he introduced concert performances of contemporary operas. From 1954 he conducted at the Metropolitan Opera, becoming principal conductor in 1958. He died while rehearsing with the orchestra of La Scala in Milan.

Mitscher, Marc A., in full MARC ANDREW MITSCHER (b. Jan. 26, 1887, Hillsboro, Wis., U.S.—d. Feb. 3, 1947, Norfolk, Va.), U.S. naval officer who commanded the aircraft carriers of Task Force 58 in the Pacific area during World War II.

Mitscher

By courtesy of the U.S. Navy

A graduate of the U.S. Naval Academy at Annapolis, Md. (1910), Mitscher qualified as the 33rd naval pilot in 1916. In the years that followed, he played an important part in the development of naval aviation and its integration into the fleet.

Early in World War II, Mitscher commanded the aircraft carrier *Hornet* in the Battle of Midway (June 1942), the first important U.S. victory after the Japanese attack on Pearl Harbor the previous December. As a rear admiral, he was in charge of all aircraft in the Solomon Islands during the bitter fighting there in 1943. He next commanded the fast carriers of Task Force 58, leading the air strikes on Truk (now Chuuk) Islands in the Carolines (February 1944); in the Battle of the Philippine Sea (June); in the Battle of Leyte Gulf (October); and in the capture of Iwo Jima and Okinawa (February–June 1945).

Mitscher was made admiral in 1946 and served as commander in chief of the U.S. Atlantic Fleet until his death.

Mitscherlich, Eilhardt (b. Jan. 17, 1794, Neuende, duchy of Oldenburg [Germany]—d. Aug. 28, 1863, Berlin, Prussia), German chemist who promulgated the theory of isomorphism, a relationship between crystalline structure and chemical composition.

From 1818 to 1820 Mitscherlich worked in the Berlin laboratory of the German botanist Heinrich F. Link, where he first undertook the study of arsenates and phosphates. In 1819 he discovered from this study that compounds with similar composition often have the same crystalline structure. In 1821 he became professor of chemistry at the University of Berlin. He continued his studies of isomorphism and also made other important discoveries, including selenic acid (1827) and the monoclinic crystal form of sulfur (1823). He also named benzene, became the first to synthesize nitrobenzene in 1832, and was one of the first to recognize contact action, now known as catalytic action.

Mitsiwa (city, Eritrea): *see* Massawa.

Mitsotakis, Konstantinos, also called CONSTANTINE MITSOTAKIS (b. Oct. 18, 1918, Khaniá, Crete, Greece), prime minister of Greece from 1990 to 1993.

Mitsotakis came from a political family; his father and grandfathers were members of parliament, and the statesman Eleuthérios Venizélos was his uncle. Mitsotakis studied law and economics in Athens. Active in the resistance during the Nazi occupation of Crete (1941–44), he was twice arrested and sentenced to death.

Mitsotakis was first elected to parliament in 1946 as a member of the Liberal Party. In the early 1960s he joined the new Centre Union, a centre-left coalition organized by Georgios Papandreou, and he became minister of finance in Papandreou's government. In July 1965 Papandreou became involved in a power struggle with Greece's King Constantine II. Mitsotakis, with other Centre Union deputies, defected from the party and joined the promonarchist forces in a series of coalition governments. His actions incurred the lasting animosity of Papandreou's son, Andreas (later to become prime minister himself), and the government crises that followed led in April 1967 to the imposition of a military dictatorship. This government arrested Mitsotakis, who eventually fled to Paris, where he was active in the opposition to the regime.

Mitsotakis returned to Greece in 1973. In 1974, after the fall of the military government, he stood for parliament as an independent liberal but failed to be elected. He founded the centrist New Liberal Party in 1977, and in that same year he was elected to parliament. In the following year Mitsotakis accepted a cabinet post in the government of Konstantinos Karamanlis, and shortly afterward he joined Karamanlis' centre-right New Democracy Party. In 1984 Mitsotakis became party leader, and in 1990 he became prime minister. His government's economic-reform policies attracted opposition, however, as did its foreign policy, and in 1993 New Democracy lost its majority in parliament. Mitsotakis stepped down as prime minister and resigned as leader of the party.

Mitsubishi GROUP, loose consortium of independent Japanese companies that were created out of the giant, family-owned Mitsubishi business combine, or zaibatsu, which was broken up after World War II.

The first of the Mitsubishi companies was a trading and shipping concern, Mitsubishi Commercial Company (Mitsubishi Shōkai), formed in 1873 by Iwasaki Yatarō out of a government-operated shipping company he had purchased in 1871. In its effort to promote Japanese commerce and industry, the government gave Iwasaki considerable financial assistance for several years, and the company grew to be Japan's largest shipping firm.

At the same time, Iwasaki began to diversify the company, first into mining and then finance, warehousing, shipbuilding, and real estate; banking was soon added. In 1893 these interests were organized into a family-owned holding company, Mitsubishi, Ltd. (Mitsubishi Gōshi Kaisha). During and after World War I, several subsidiaries were created out of Mitsubishi, Ltd., which in addition to the earlier interests included iron and steel, insurance, oil refining, aircraft production, and chemicals. By the 1930s Mitsubishi was the second largest zaibatsu in the country.

Mitsubishi was also one of the major military contractors during the 1930s and '40s; it built many of Japan's warships, but probably its best-known product was the Zero fighter airplane. Because of its war production, Mitsubishi grew to enormous size, controlling some 200 companies by the end of World War II. After Japan's defeat the Mitsubishi zaibatsu was broken up by the U.S. occupation authorities. Mitsubishi, Ltd., was dissolved, and the stock of the former subsidiary firms was sold to the public.

At the end of the occupation in 1952, the independent Mitsubishi companies began to reassociate. The new grouping that emerged was significantly different from the old zaibatsu in that there was no central, family-controlled holding company; instead, it was characterized by informal policy coordination among the various company presidents and by a degree of financial interdependency among the corporations.

The Mitsubishi group consists of more than a dozen independent companies. The major firms of the group are all large multinational corporations that are based in Tokyo and have offices and subsidiaries overseas; some of these firms are engaged in joint ventures with foreign companies.

Mitsubishi Heavy Industries Ltd. (Mitsubishi Jūkōgyō KK) is one of the largest manufacturers of heavy machinery in Japan. The company acquired its present name in 1934 and became one of the major subsidiaries of the Mitsubishi zaibatsu. It was an important munitions maker during World War II. After the war the company was divided into three firms by the U.S. occupation authorities, but these were reunited in 1964. The company manufactures such products as thermal and nuclear power plants, machine tools, aircraft, construction and agricultural equipment, and rolling stock. It also builds and maintains ships and constructs factories. In 1970 the automotive division of the company was split off to form Mitsubishi Motors Corporation.

The Mitsubishi Bank Ltd. (Mitsubishi Ginkō) was at first part of the financial arm of the Mitsubishi combine, but it became independent of the parent firm under its present name in 1919; between 1948 and 1953 it was called the Chiyoda Bank. In 1996 the bank completed a merger with the Bank of Tokyo. (*See* Tokyo-Mitsubishi, Bank of.)

Mitsubishi Kasei Corporation (formerly Mitsubishi Chemical Industries Limited; Mitsubishi Kasei Kōgyo KK) was established in 1934 as Japan Tar Industries and emerged in its present form in 1950. Originally a manufacturer of tar products, coke, fertilizers, and dyestuffs, the company added the production of petrochemicals in the 1960s and has since diversified into such products as pharmaceuticals and medical equipment, pesticides, analytical instruments, and electronics materials.

The Mitsubishi Corporation (Mitsubishi Shōji KK), one of Japan's largest trading companies, grew out of the original shipping and trading firm. The company was split into numerous small firms by the occupation authorities, but these firms reunited in the mid-1950s; it took its present name in 1971. The company acts primarily as an agent for other companies, financing trading and other business ventures, handling orders and arranging shipping for thousands of types of goods and commodities, and maintaining a worldwide telecommunications network to monitor its own activities.

The Mitsubishi Electric Corporation (Mitsubishi Denki KK) was established in 1921 and acquired its present name in 1963. At first the company was primarily a manufacturer of such heavy equipment as generators, transformers, railroad equipment, and elevators, but it began producing more consumer goods (such as refrigerators and television sets) after World War II. The company also started making a wide variety of electronic equipment, including semiconductors and computers, and has added such diverse products as videocassette recorders and telecommunications equipment.

Mitsubishi Trust & Banking Corporation (Mitsubishi Shintaku Ginkō KK) is one of the leading trust banks in Japan. Known as the Asahi Trust Bank for the period during which Japan was occupied, it resumed its former name after 1952. Reunited with the other members of the Mitsubishi group, the trust became a major multiservice financial institution, fully enmeshed in the combine's domestic business.

Other members of the combine include Mitsubishi Oil Company, Ltd., one of Japan's leading oil importers and refiners; Mitsubishi Materials Corporation, which makes cement and other building materials, imports oil and coal, and engages in the overseas mining of gold, silver, and copper; and Mitsubishi Rayon Company, Ltd., which produces plastics and resins, acrylic fibres, polyester filaments, and acetate fibres.

Mitsubishi A6M (aircraft): *see* Zero.

Mitsui GROUP, loose consortium of independent Japanese companies that were created out of the giant, family-owned Mitsui business combine, or *zaibatsu,* which was broken up after World War II. That *zaibatsu,* in turn, grew out of the House of Mitsui (Mitsui-ke), the largest Japanese merchant house of the Tokugawa period (1603–1867).

The original enterprise dates from 1673, when Mitsui Takatoshi (1622–94), the son of a sake brewer, opened textile shops in Kyōto and Edo (modern Tokyo). The success of these and subsequent shops allowed him to expand into moneylending and other financial services. Starting in 1691, members of the Mitsui family were designated chartered merchants (*goyō shōnin*) by the shogunate. These appointments were lucrative for Mitsui and gave it considerable influence in the government. The cultivation of close ties with the government became a great asset to Mitsui, especially during the Meiji period (1868–1912), when the government was encouraging rapid economic development.

In the late 19th century the interests of the emerging Mitsui combine were centred on banking, trading, and mining, activities that Mitsui came to dominate. The family council that had been established in the early 18th century to oversee operations soon became inadequate, and in 1909 it was replaced by a family-controlled holding company. The Mitsui combine underwent tremendous expansion and diversification in the 20th century, becoming the largest *zaibatsu* in Japan; by the end of World War II it comprised some 270 companies. After Japan's defeat, the Mitsui *zaibatsu* was split up by U.S. occupation authorities. The holding company was dissolved, and the stock of the former subsidiary companies was sold to the public.

The independent Mitsui companies began to reassociate in the 1950s. In contrast to the structuring of the former *zaibatsu,* in which the family-dominated holding company had complete control of the combine, the new grouping was characterized by informal policy coordination among the various company presidents and by a degree of financial interdependency among the corporations.

The Mitsui group comprises several dozen companies, including cement, petrochemicals, commerce, construction, energy, engineering, finance and insurance, food, machinery, mining, nonferrous metals, real estate, and shipping industries. All of the major firms are large multinational corporations that are based in Tokyo or Ōsaka and have offices and subsidiaries overseas; some are engaged in joint ventures with foreign companies.

Mitsui and Company, Ltd. (Mitsui Bussan KK), is one of Japan's largest general trading companies and is a major component of the Mitsui group. The company was established as the trading subsidiary of the Mitsui combine in 1876. In the 1950s several of the small trading firms that emerged from the dissolved *zaibatsu* subsidiary regrouped around the Daiichi Trading Company (Daiichi Bussan Kaisha); the company took its present name in 1959. The firm acts primarily as an agent for other companies, handling orders and arranging shipping for thousands of industrial, agricultural, and consumer goods and commodities. As a leader of the Mitsui group, the company coordinates the domestic and overseas activities of affiliated companies.

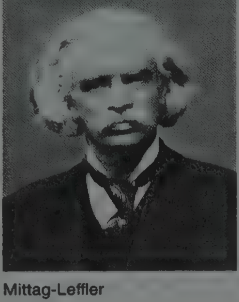
Mitsui Taiyo Kobe Bank, Ltd. (Mitsui Taiyo Kobe Ginkō KK), was formed from the merger (1990) of Taiyo Kobe Bank, Ltd., and Mitsui Bank Ltd. (1876), the first private bank in Japan. Mitsui Bank, formed by merger with another bank during World War II, was reestablished as a separate bank in 1948. Taiyo Kobe was formed by merger in 1973. Mitsui Taiyo Kobe is the major financial institution of the Mitsui group, its activities centring on securities and foreign exchange.

Other members of the combine include Mitsui Real Estate Development Company, Ltd., a leading home builder and developer of office and commercial buildings in Japan; Mitsui Mutual Life Insurance Company, one of Japan's major life insurers; Mitsui Mining & Smelting Company, Ltd., engaged in the smelting and processing of zinc, copper, and other nonferrous metals; and Mitsui Mining Company, Ltd., which produces domestic coal, coke, and cement.

Mittag-Leffler, Magnus Gösta (b. March 16, 1846, Stockholm, Swed.—d. July 7, 1927, Stockholm), Swedish mathematician who founded the international mathematical journal *Acta Mathematica* and whose contributions to mathematical research helped advance the Scandinavian school of mathematics.

In 1872 Mittag-Leffler became a lecturer in mathematics at the University of Uppsala, Swed., and five years later was appointed professor of mathematics at the University of Helsinki. In 1881 he became professor of mathematics at the University of Stockholm. With the financial patronage of King Oscar II of Sweden, he founded *Acta Mathematica* in 1882, set up an editorial staff from the four Scandinavian countries, and served as chief editor for 45 years.

Mittag-Leffler made numerous contributions to mathematical analysis (concerned with limits and including calculus, analytic geometry, and probability theory). He worked on the general theory of functions, concerning relationships between independent and dependent variables, and in 1875 gave a proof of the French mathematician Augustin-Louis Cauchy's theorem (a theorem that is largely the basis for the modern theory of functions of a complex variable). His best-known work concerned the analytic representation of a one-valued function; this work culminated in the Mittag-Leffler theorem. His estate and his mathematical library now form part of the Mittag-Leffler Mathematical Institute at Djursholm, Swed.



Mittag-Leffler

Archiv fur Kunst und Geschichte, Berlin

Mittelfranken, English MIDDLE FRANCONIA, *Regierungsbezirk* (administrative district), west-central Bavaria *Land* (state), southern Germany. Mittelfranken is bordered by Baden-Württemberg *Land* to the west and the *Regierungsbezirke* of Unterfranken (Lower Franconia) and Oberfranken (Upper Franconia) to the north, Oberpfalz (Upper Palatinate) to the east, and Oberbayern (Upper Bavaria) and Schwaben (Swabia) to the south. The district is coextensive with the larger historic region of Franconia (*q.v.*). The Bavarian *Regierungsbezirke* of Mittelfranken, Oberfranken, and Unterfranken were first created as provinces of the kingdom of Bavaria in 1837 by King Louis I.

The Franconian Terrace, composed of the Steiger Forest and the Franconian Heights in western Mittelfranken, is a prominent north-south sandstone scarp averaging 1,600 feet (500 m) in elevation. Many rivers originate in the Franconian Heights and traverse the terrace through broad flat valleys, most importantly the southeast-flowing Altmühl. Coniferous forest is dominant on the sandstone surface that slopes gradually to the east and merges into the Middle Franconian Basin. Ansbach, located on the Rezat River, is the chief centre of the thinly populated terrace slopes and serves as the administrative seat of the *Regierungsbezirk.* The city is an important rail-and-road junction and produces electronics equipment, foodstuffs, and plastic articles.

The Rednitz River rises in the mountainous Franconian Jura near the district's southern border and flows northward across the Middle Franconian Basin of eastern Mittelfranken. The cities of Nürnberg, Erlangen, and Fürth are located on a wide plain of glacial deposits at the confluence of the Rednitz and the westward-flowing Pegnitz River. Sheltered by the hills of the Franconian Terrace to the west, the basin receives only 28 inches (700 mm) of rain per year, and its climate is almost continental. Cultivated land predominates over woodland, and the most important agricultural area of the basin is the Rangau, an intensive hop-growing district centred between the towns of Schwabach and Weissenburg. Wheat, barley, and rye also are produced, and intensive market gardening is found immediately outside Nürnberg.

Along the eastern border of Mittelfranken, the steep limestone scarp of the Franconian Jura plateau faces west toward the Middle Franconian Basin. The town of Hersbruck, situated at the base of the scarp in the sharply indented Pegnitz River valley, is well known for its beautiful scenery.

Nürnberg, Erlangen, and Fürth form Bavaria's second largest urban agglomeration and are exceeded in regional importance only by Munich. Industry in Mittelfranken is heavily concentrated in the three cities and radiates south and east along the Rednitz and Pegnitz rivers. Nürnberg is one of Germany's leading centres of electrical manufacture and also produces many types of machinery, from heavy equipment to precision instruments. The Nürnberg toy industry enjoys an international reputation for quality and selection. Fürth specializes in the electrical and chemical industries and manufactures toys, clothing, and metal products. Electrical engineering is the leading industry in Erlangen. Each city has a modern port facility that is on or linked to the Rhine-Main-Danube Canal.

The small medieval towns of Rothenburg and Dinkelsbühl have surrounding walls and watchtowers that are almost completely preserved. Nürnberg also has a picturesque circuit of medieval walls surrounding the old city, which is home to an imperial castle where the German kings resided from 1050 to 1571.

The people of Mittelfranken speak Franconian, one of the three main German dialects in Bavaria. The population is predominantly Protestant. Higher education in the *Regierungsbezirk* is centred at the Friedrich Alexander University of Erlangen-Nürnberg (founded 1743). Area 2,798 square miles (7,246 square km). Pop. (1994 est.) 1,652,236.

Mittelland Canal, also called EMS-WESER-ELBE CANAL, German waterway begun in 1905 and completed in 1938. It extends from the Dortmund-Ems Canal east of Rheine, Ger., eastward along the northern border of the Central Uplands, to the Elbe River north of Magdeburg (a distance of about 199 miles [321 km]), linking there with the Havel Canal eastward to Berlin. Side canals connect it with Osnabrück, Hannover, Salzgitter, and Hildesheim. Peine, between Hannover and Braunschweig (Brunswick), and Wolfsburg are both on the main canal, which carries barges of up to 1,000 tons. Locks connect it with the Weser and Elbe rivers. Coal and iron ore make up a large part of the barge traffic.

Mittenwald, village, Bavaria *Land* (state), southern Germany. It lies along the Isar River, at the foot of the Karwendel Mountains, at the Austrian border. Chartered in 1307, it was an important trading centre in the 15th and 16th centuries. The village has been famous for its violins since the 17th century, and it has a museum and school of violin making. Zithers and guitars are also made. Mittenwald is a health and vacation resort and a winter sports centre with a chair lift up the nearby Höher Kranzberg (4,564 feet [1,391 m]). Pop. (1994 est.) 8,480.

Mitterrand, François, in full FRANÇOIS-MAURICE-MARIE MITTERRAND (b. Oct. 26, 1916, Jarnac, France—d. Jan. 8, 1996, Paris), politician who served two terms (1981–95) as president of France, leading his country to closer political and economic integration with western Europe. The first socialist to hold the office, Mitterrand abandoned leftist economic policies early in his presidency and generally ruled as a pragmatic centrist.

The son of a stationmaster, Mitterrand studied law and political science in Paris. On the outbreak of World War II, he enlisted in the infantry and in June 1940 was wounded and captured by the Germans. After escaping from a prison camp in late 1941, he worked with the collaborationist Vichy government—a fact that did not become publicly known until 1994—before joining the Resistance in 1943.

In 1947 he became a cabinet minister of the Fourth Republic in the coalition government of Paul Ramadier, having been elected to the National Assembly the previous year. Over the next 12 years, Mitterrand held cabinet posts in 11 short-lived Fourth Republic governments.

Originally somewhat centrist in his views, he became more leftist in politics, and from 1958 he crystallized opposition to the regime of Charles de Gaulle. In 1965 he stood against de Gaulle as the sole candidate of the socialist and communist left for the French presidency, collecting 32 percent of the vote and forcing de Gaulle into a runoff election.

After his election as first secretary of the Socialist Party in 1971, Mitterrand began a major party reorganization, which greatly increased its electoral appeal. Although Mitterrand was defeated in his second presidential bid, in 1974, his strategy of making the Socialist Party the majority party of the left while still allied with the Communist Party led to the upset Socialist victory of May 10, 1981, when he defeated the incumbent president, Valéry Giscard d'Estaing. Mitterrand called legislative elections soon after his victory, and a new left-wing majority in the National Assembly enabled his prime minister, Pierre Mauroy, to effect the reforms Mitterrand had promised. These measures included nationalizing financial institutions and key industrial enterprises, raising the minimum wage, increasing social benefits, and abolishing the death penalty. In foreign policy Mitterrand advocated a relatively hard stance toward the Soviet Union and cultivated good relations with the United States.

Mitterrand
Camera Press—Globe Photos

Mitterrand's socialist economic policies caused increased inflation and other problems, so in 1983 the government began to cut spending. By the end of Mitterrand's first term in office, the Socialist Party had abandoned socialist policies in all but name and essentially had adopted free-market liberalism. In 1986 the parties of the right won a majority of seats in the National Assembly, and so Mitterrand had to ask one of the leaders of the right-wing majority, Jacques Chirac, to be his prime minister. Under this unprecedented power-sharing arrangement, known as "cohabitation," Mitterrand retained responsibility for foreign policy. He soundly defeated Chirac in the presidential elections of 1988 and thus secured to another seven-year term.

The newly reelected Mitterrand again called elections, and the Socialists regained a working majority in the National Assembly. His second term was marked by vigorous efforts to promote European unity and to avoid German economic domination of France by binding both countries into strong European institutions. Mitterrand was thus a leading proponent of the Treaty on European Union (1991), which provided for a centralized European banking system, a common currency, and a unified foreign policy.

Mitterrand was less successful in domestic matters, particularly in coping with France's persistently high unemployment rate, which had risen to 12 percent by 1993. In 1991 he appointed the socialist Edith Cresson to be prime minister; she became the first woman in French history to hold that office. The Socialist Party suffered a crushing defeat in the legislative elections of 1993, and Mitterrand spent the last two years of his second term working with a centre-right government under Prime Minister Edouard Balladur.

mitzvah, also spelled MITSVAH (Hebrew: "commandment"), plural MITZVOTH, MITZVOT, MITZVAHS, MITSVOTH, MITSVOT, or MITSVAHS, any commandment, ordinance, law, or statute contained in the Torah (first five books of the Bible) and, for that reason, to be observed by all practicing Jews.

The Talmud mentions 613 such mitzvahs, 248 mandatory (*mitzwot ʿase*) and 365 prohibitive (*mitzwot lo taʿase*). Many more (some virtually equated with divine law) have been added throughout the ages on the authority of outstanding rabbinical leaders, such as reciting the Hallel (specific psalms) at prescribed times, reading the Book of Esther on Purim, washing the hands before meals, and lighting candles on certain festivals. Though nonobservance of a mitzvah constitutes a transgression (*ʿavera*), it is understood that not all mitzvahs are of equal importance; circumcision, for instance, is a direct response to a divine command, while the wearing of a skullcap (yarmulke) in public is not. In a broader context, Jews consider all good deeds as the fulfillment of mitzvahs, for such actions express God's will.

Miura, city, Kanagawa *ken* (prefecture), east-central Honshu, Japan. It lies on the southwestern part of the Miura Peninsula, with the city of Yokosuka farther north on the peninsula. Miura was first mentioned in the 8th century. Its port of Misaki is a base for commercial deep-sea fishing, especially of tuna. Besides tuna, the city is well known for its locally grown radishes, and cabbages and watermelons are also produced. Jōga Island, in Aburatsubo Bay, is linked to the mainland at Miura by a large bridge. The island and bay, together with the Aburatsubo Marine Park and local beaches, help make Miura a popular tourist and recreational centre. The city also serves as a dormitory suburb for the expanding Tokyo-Yokohama metropolitan area to the north. Pop. (1990) 52,440.

Miura Baien, original name MIURA SUSUMU (b. Sept. 1, 1723, Tominaga, Bungo province [modern Ōita prefecture], Japan—d. April 9, 1789, Tominaga), Japanese economist and Confucianist philosopher during the Tokugawa period (1603–1867). He formulated the *jōrigaku* ("rationalist studies") doctrine, which was a precursor to modern scientific and philosophical thought in Japan.

Although schooled in the Chinese Classics, Miura studied scientific methods of approaching physics, medicine, and economics. Influenced by Western ideology, he wrote *Kagen* ("Source of Value"), discussing wealth and poverty, and his key philosophical works, *Gengo* ("Abstruse Language"), *Zeigo* ("Superfluous Language"), and *Kango* ("High-flown Language"), in which he appealed to reason and nature, rather than written doctrine or tradition, as the sources of knowledge. He opposed the Buddhist view of emptiness and preferred a dynamic eternal universe in which death is organic change but not extinction. His traditional views of religion and authority were evident in *Samidare-shō* ("Early Summer Rain Collection"), a book criticizing Christianity while advocating loyalty to a supreme being. Miura's works in Japanese were collected in *Baien zenshū,* 2 vol. (1912; "Collected Works of Baien").

Mivart, Saint George Jackson (b. Nov. 30, 1827, London, Eng.—d. April 1, 1900, London), British biologist, a leading critic of Charles Darwin's theory of natural selection.

Unable to enter the University of Oxford after his conversion to Roman Catholicism (1844), Mivart continued his studies at St. Mary's, Oscott (1844–46). His research into the anatomy of carnivores and insectivores, conducted while he was lecturing at the medical school of St. Mary's Hospital (1862–84), greatly increased knowledge of the subject. In 1881 he published *The Cat: An Introduction to the Study of Backboned Animals,* which is considered to rank with T.H. Huxley's *Crayfish* for its accuracy, detail, and clarity.

Mivart supported the general concept of evolution but minimized the contribution of natural selection, preferring to believe that the appearance of new species resulted from an innate plastic power that he called individuation. He also denied the evolution of human intellect, insisting that it was conferred by divine power. His publication of *On the Genesis of Species* (1871), *Nature and Thought* (1882), and *The Origin of Human Reason* (1889) alienated both Darwin and Huxley.

Miwok, California Indians speaking languages of Penutian stock and originally comprising seven dialectally and territorially discrete branches: the Coast Miwok in an area just north of what is now San Francisco; the Lake Miwok in the Clear Lake Basin; the Bay Miwok (or Saclan), living along the delta of the San Joaquin and Sacramento rivers; the Plains Miwok, living farther up the lower Sacramento and San Joaquin rivers; and, just eastward, three groups of Sierra Miwok—Northern, Central, and Southern—in the western foothills of the Sierra Nevada. The Sierra branches constituted by far the bulk of the Miwok and had more than 100 villages at the time of European contact.

The groups near or on the coast—the Coast, Lake, and Bay Miwok—gathered acorns, fished, and hunted deer and other game with bow and arrow. They lived in semisubterranean pole- and earth-covered lodges and produced watertight basketry ornamented with beads or feathers.

The interior Miwok—those of the Sierra and Plains—remained in the foothills or lowlands and moved into the high sierras only in summer or for hunting. Their main abodes were semisubterranean earth-covered houses, but summer mountain shelters were mere lean-tos of bark. Their chief food staple was acorns, which were stored in basketlike granaries. Various baskets were made but apparently no pottery.

Society was organized into lineages and contrasting halves, or moieties, governing such matters as descent and marriage; and it was seemingly ranked. There were chiefs and subchiefs, and women could acquire such titles through the male line. The interior Miwok followed the so-called Kuksu cult, which included various rituals, costumed dances using animal skins, and impersonations of spirits.

There remained in the late 20th century more than 100 coastal Miwok and more than 100 interior Miwok.

Mix, Tom, byname of THOMAS HEZIKIAH MIX (b. Jan. 6, 1880, Mix Run, Pa., U.S.—d. Oct. 12, 1940, near Florence, Ariz.), American film actor, a celebrated star of western cowboy films during the silent era.

Mix worked as a cowhand in Texas, Arizona, Wyoming, and Montana and served in the U.S. Army in the Spanish-American War and in the pursuit of Pancho Villa during the Mexican Revolution. He was also a deputy sheriff in Oklahoma and served in the Texas Rangers. In 1906 he joined a Wild West show and, three years later, the Sells-Floto Circus. He began to act in motion pictures in 1910, playing the part of a roughriding hero, defender of right and justice. Over the years his horse "Tony" became almost as famous as Mix himself. Mix appeared in more than 200 one- and two-reelers and feature films, many of which he also produced or directed.

After gaining riches and worldwide fame during the silent era, Mix suffered a decline with the coming of sound, appearing in only a few pictures after 1929. In 1933 he organized Tom Mix's Circus and Wild West Show, but, by the time of his death in an automobile accident seven years later, his wealth had largely disappeared.

Mixe-Zoque languages, family of North American Indian languages spoken in southern Mexico. There are seven languages in the family, divided into two branches, or divisions—Zoquean and Mixean. Zoque is spoken in the Mexican states of Chiapas, Tabasco, and Oaxaca. Sierra Popoluca and Texistepec Popoluca, spoken in Veracruz, are the other Zoquean languages. Mixe, spoken in eastern Oaxaca, and Sayula and Oluta (both sometimes called Popoluca), spoken in Veracruz, are Mixean languages. An extinct language, Tapachultec, formerly spoken along the southeast coast of Chiapas, is also classified as a Mixean language.

Mixe-Zoquean, group of Middle American Indian peoples inhabiting territories in southern Mexico. The Mixe-Zoquean peoples today comprise the Mixe, living in northeastern Oaxaca; the Zoque, primarily inhabiting northwestern Chiapas; and the Popoluca (not to be confused with the Popoloca), who live in eastern Veracruz and Oaxaca, about midway between the Mixe and Zoque. The languages of these people are closely related, and their cultures share a common origin.

The Mixe live in a rugged mountainous area and are quite traditional in culture and language. The Zoque live in a lower, more tropical region and are becoming rapidly assimilated into modern Mexican culture. There are several distinct Zoque dialects, but many Zoque have intermarried with the general population and may speak only Spanish. The Popoluca live in scattered highland villages and three lowland towns (Oluta, Sayula, and Texistepec); those of the highlands are more remote and more likely to retain their native language and culture than are the town Popoluca. Each of these Popoluca groups—highland (or Sierra), Oluta, Sayula, and Texistepec—speaks a distinct language.

All the traditional Mixe-Zoquean peoples are agricultural, growing the Middle American staples of corn (maize), beans, and squash. The digging stick is their chief agricultural implement, and they clear their land by burning the underbrush. Most Mixe-Zoquean groups live in central villages of thatched or adobe huts surrounded by their fields. Crafts are generally poor and undeveloped, but cotton weaving is of high quality. Traditional costume is still worn by many women, but ready-made clothing is replacing it in less remote areas. The traditional woman's costume consists of a long wraparound skirt and an overblouse, or tunic (*huipil*).

The Mixe-Zoquean religious tradition shows many parallels with that of the Maya. Nominally Roman Catholic, modern Mixe-Zoqueans still practice many of their former rituals and ceremonies, including hunting and agricultural fertility rites. The *compadrazgo,* a system of ritual kinship established with godparents, is important among them.

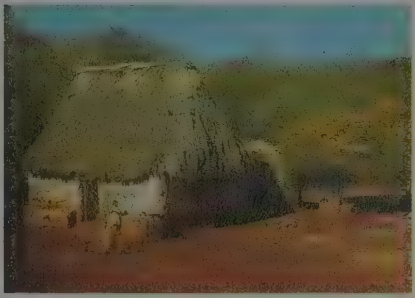
Mixolydian mode, in music, seventh of the eight medieval church modes. *See* church mode.

Mixtec, Middle American Indian population living in the northern and western sections of the state of Oaxaca and in neighbouring parts of the states of Guerrero and Puebla in southern Mexico. Historically the Mixtec possessed a high degree of civilization in Aztec and pre-Aztec times.

The modern Mixtec are primarily farmers who practice slash-and-burn cultivation and use the hoe and digging stick or oxen and the plow. Corn (maize), beans, and squash are the staple crops. Other subsistence activities are hunting, fishing, herding, gathering wild foods, and producing and selling items of woven palm fibre. Settlement patterns vary; there are central villages (which may be vacant except during fiestas or market days, the families living on their farms most of the time), and there are dispersed villages with family groups living scattered over the countryside.

Weaving (of cloth and palm fibre) and ceramics are common crafts. Dress is largely traditional or semitraditional. Men wear a white cotton shirt and trousers, straw hat, and sandals. Women wear a wraparound skirt, a long tunic (*huipil*), and a shawl (*rebozo*). Women generally are barefoot and may go without the *huipil,* nude above the waist, in the coastal areas.

Although nominally Christian, most Mixtec believe in an assortment of pre-Christian spirits and deities, and in some areas they worship stone idols representing the rain god. Hills, caves, streams, springs, and swamps may also be sacred. Agricultural rituals and the harvest feast are important, and *curanderos* (shaman-healers) are common. Christian fiestas and masses for patron saints are also celebrated, with church brotherhoods (*cofradías*) organizing the festivities.

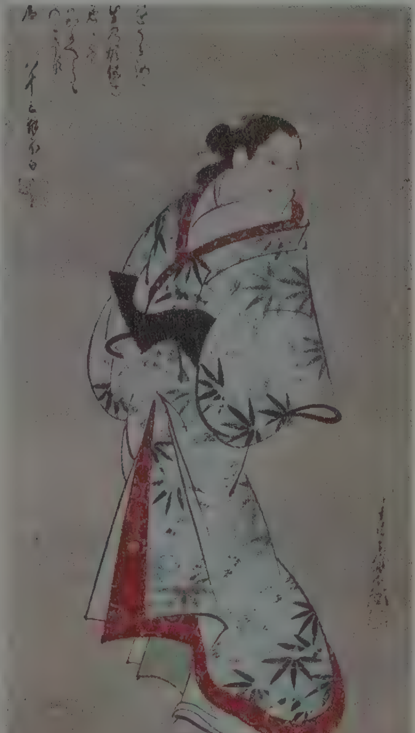


Mixtec house

Harrison Forman

Miya-shima, also spelled MIYA-JIMA (Japan): *see* Itsuku-shima.

Miyagawa Chōshun, Chōshun also rendered NAGAHARU, original name KIHEIJI, also called CHŌZAEMON (b. 1682, Owari province [now in Aichi prefecture], Japan—d. Dec. 18, 1752, Edo [now Tokyo]), Japanese painter of the ukiyo-e style of popular, colourful art based on everyday life. He was the founder of the Miyagawa school of painting.



Portrait of a beautiful woman by Miyagawa Chōshun, colour on paper; in the Museum Yamato Bunkakan, Nara, Japan

By courtesy of the International Society for Educational Information, Tokyo

Chōshun went to Edo about 1700 and fell under the influence of the works of Hishikawa Moronobu (d. *c.* 1694), who established the basic ukiyo-e style in both painting and wood-block printing. Chōshun concentrated on painting, rather than on print designs, and drew his pictures with fluid lines and subtle colouring. He was also adept at depicting crowds.

At one time, when some painters were commissioned to repair the family shrine of the Tokugawa shogunate at Nikkō, the artist Kanō Shunga invited Chōshun, famous as a colourist, to participate. But in a dispute over fees, Chōshun was insulted and physically hurt at Shunga's home. Chōshun's son and pupils retaliated by attacking and wounding members of the Kanō clan. Chōshun was then expelled from Edo for two years.

Among Chōshun's notable paintings are the picture scroll "Engeki zukon" ("Theatre Scenes") and "Fūzoku zukan" ("Panorama of Contemporary Life").

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Miyagi, *ken* (prefecture), northern Honshu, Japan, its indented coastline forming Sendai Bay of the Pacific Ocean. Much of its area is mountainous. The Sendai Plain in the south contains the prefectural capital, Sendai. To the north is the beautiful Matsushima Bay, long celebrated for its more than 200 islands covered with pines. Agricultural products of the area include rice, vegetables, and cattle. The fishing industry yields herring and sardines. Other industries produce lumber, foodstuffs, pulp, electrical machinery, and transport equipment.

Pine-clad islets in Matsushima Bay, Miyagi prefecture, Japan
Shiro Shirahata—Bon

Sendai, the largest city in Tohoku (northern Honshu) region, is an industrial, administrative, and transportation centre. Tohoku University (1907) is located there. Ishinomaki and Shiogama, on Sendai Bay, are important seaports. Area 2,815 square miles (7,292 square km). Pop. (1991 est.) 2,263,998.

Miyako, city, Iwate *ken* (prefecture), Honshu, Japan, on the estuary of the Hei River, facing Miyako Bay. The city has been an important fishing port since the Tokugawa period (1603–1867) and is known for its salmon, trout, and mackerel. The manufacture of fertilizer, metal, and construction materials was introduced after World War II. The port was enlarged in the 1950s, and Miyako is now a major importer of timber for its lumber industry. Nearby Jōdoga Beach, renowned for its blowhole, is part of Rikuchu-kaigan National Park. Pop. (1990) 58,505.

Miyako Harbour, Japan
Kokunai Jigyo Kouku

Miyakonojō, city, Miyazaki *ken* (prefecture), Kyushu, Japan, on the upper Ōyodo River. The city developed around the castle built by the Shimazu family in the early 11th century. During the Tokugawa period (1603–1867), sericulture and silk manufacture were prominent activities. The weaving and textile industries developed after the Meiji Restoration (1868), and synthetic textiles were introduced after World War II.

Miyakonojō is now a railway hub and trading centre for southeastern Kyushu. Manufactures include textiles, dairy products, and lumber; agriculture produces sweet potatoes, rapeseed, tobacco, and tea. Pop. (1992 est.) 130,436.

Miyamoto Musashi, original name MIYAMOTO MASANA, also called NITEN (b. 1584, Mimasaka or Harima, Japan—d. June 13, 1645, Higo), famous Japanese soldier-artist of the early Tokugawa period (1603–1867).

An artist of *sumi-e,* or ink painting, he painted in a powerful and direct style with an amazing economy of strokes. He is particularly remembered for his paintings of birds, such as "Koboku meikakuzu" ("Shrike Perched in a Dead Tree") and "Rozanzu" ("Wild Geese Among Reeds"). All of his extant works are in ink monochrome. To improve his swordsmanship he traveled extensively so that he could challenge other swordsmen. He invented the *nitōryū,* or fencing with two swords.

Miyazaki, *ken* (prefecture), southeastern Kyushu, Japan, facing the Pacific Ocean. Most of its area is mountainous, and there is a small coastal plain. The southern coast contains Nichinan-kaigan Quasi-national Park, which includes the offshore island of Ao and is noted for its tropical and subtropical vegetation, wild horses, and monkeys. In the southwest, Kirishima-Yaku National Park is dotted with volcanoes, craters, and crater lakes. The prefecture is a major honeymoon spot.

Haniwa Garden of Heiwadai Park, Miyazaki, Japan
Minoru Warashina—Bon

Miyazaki prefecture produces two rice crops annually. Major industrial products are chemical fertilizers and medicines, cedar pulp, bamboo goods, and charcoal. The prefectural capital, Miyazaki, is an agricultural trade and communications centre. It contains the Miyazaki Shrine, dedicated to the first emperor of Japan, and Heiwadai Park, containing a Peace Tower (1940) and the Haniwa ("Clay Figurine") Garden. A university was founded in Miyazaki in 1949. Area 2,986 square miles (7,735 square km). Pop. (1992 est.) city, 291,036; (1991 est.) prefecture, 1,166,943.

Miyazaki Yūzen, also called MIYAZAKI YŪZENSAI (b. Kyōto, Japan—d. 1758), Japanese painter credited with perfecting a rice-paste dyeing method that made possible the economical production of sumptuously decorated cloth. He gave his name to the process (*yūzen-zome*) by which elaborate designs and pictures were drawn on silk with a rice-paste coating. Later, *yūzen* came to denote the cloth produced in this way and also the kind of designs (*yūzen-moyō*) created by Miyazaki Yūzen. The rich, colourful *yūzen* cloth, a product of Kyōto, is still popular in the 20th century.

Miyazawa Kiichi (b. Oct. 8, 1919, Tokyo, Japan), prime minister of Japan from 1991 to 1993.

Born into a family of politicians, Miyazawa graduated in law from Tokyo Imperial University in 1941 and soon secured a civilian position in the finance ministry (1942–52). In 1953 he was elected to the Diet and in 1962 secured his first cabinet position, as director general of the Economic Planning Agency. Subsequently Miyazawa served as minister of international trade and industry (1970–71), of foreign affairs (1974–76), and of finance (1986–88). He also acted as cabinet secretary in the early 1980s and, briefly, as deputy prime minister in Takeshita Noboru's cabinet.

Like other senior politicians in the ruling Liberal-Democratic Party (LDP), Miyazawa was tainted by the bribery scandals that rocked the Japanese establishment, and he was forced to resign as finance minister in December 1988. He soon returned to power, however, and, after being elected president of the LDP on Oct. 27, 1991, he took over as prime minister on November 5. His reascension in the early 1990s tended to mark a return to old-style politics. Nevertheless, he proved unable to unite or control the warring factions within the LDP. In June 1993 some of these factions joined with opposition parties to pass a vote of no confidence. Miyazawa was forced to resign as prime minister, and in the ensuing general elections the LDP lost control of the Diet for the first time in its 38-year history.

Mizar, also called ZETA URSAE MAJORIS, first star found (by the Italian astronomer Giovanni Battista Riccioli in 1650) to be a visual binary—*i.e.,* to consist of two optically distinguishable components revolving around each other. Later, each of the visual components was determined to be a spectroscopic binary; Mizar is actually a quadruple star. Apparent visual magnitudes of the two visual components are 2.27 and 3.95. Set in the middle of the Big Dipper's handle, Mizar (Arabic: "Veil," or "Cloak") makes a visual double with the fainter Alcor (Arabic: "Faint One").

Mizo, also called LUSHAI, or LUSHEI, Tibeto-Burman-speaking people numbering about 500,000. They inhabit the mountainous tract on the India-Myanmar (Burma) border known as the Mizo (formerly Lushai) Hills, in the Indian state of Mizoram. Like the Kuki tribes, with which they have affinities, the Mizo traditionally practiced shifting slash-and-burn cultivation, moving their villages frequently. Their migratory habits facilitated rapid expansion in the 18th and 19th centuries at the expense of weaker Kuki clans.

Mizo villages traditionally were situated on the crests of hills or spurs and, until the pacification of the country under British rule, were fortified by stockades. Every village, though comprising members of several distinct clans, was an independent political unit ruled by a hereditary chief. The stratified Mizo society consisted originally of chiefs, commoners, serfs, and slaves (war captives). The British suppressed feuding and headhunting but administered the area through the indigenous chiefs. Many of the Mizo have been Christianized and educated.

Mizo Hills, formerly LUSHAI HILLS, mountain range in southeastern Mizoram state, northeastern India, forming part of the north Arakan Yoma system. They rise to about 7,000 feet (2,125 m), and their slopes are covered with thick evergreen forest containing valuable timber and bamboo. In the intermontane valleys, slash-and-burn agriculture and some terrace cultivation are practiced.

Mizoguchi Kenji (b. May 16, 1898, Tokyo, Japan—d. Aug. 24, 1956, Kyōto), Japanese motion-picture director whose pictorially beautiful films dealt with the nature of reality, the conflict between modern and traditional values, and the redeeming quality of a woman's love.

In 1919, after he had studied painting and had spent a short time designing advertisements for the *Kōbe Soshin Daily News* in the city of Kōbe, Mizoguchi returned to Tokyo and became an actor at the Nikkatsu Motion Picture Company, in which, within three years, he was a director.

His *Gaitō no suketchi* (1925; *Street Sketches*) and *Kami-ningyo haru no sasayaki* (1926; *A Paper Doll's Whisper of Spring*) presaged the rise of Japanese realism in the 1930s. Mizoguchi's outstanding films of the 1920s and '30s included *Tōkyō koshinkyoku* (1929; *Tokyo March*) and *Tokai kōkyògaku* (1929; *Metropolitan Symphony*), which considered contemporary social problems, and *Gion no shimai* (1936; *Sisters of the Gion*) and *Naniwa ereji* (1936; *Osaka Elegy*), films dealing with the rejection of traditional values by modern Japanese society.

Zangiku monogatari (1939; *The Story of the Last Chrysanthemums*) initiated a long series of period dramas set in the Meiji period (1868–1912). The dramas filmed during World War II avoided controversial issues, but the ones made after the war became increasingly concerned with the problems of modern life. *Ugetsu monogatari* (1953), considered one of the finest of all Japanese films, is an outstanding example of Mizoguchi's period drama. Notable as a study of the nature of reality and for its sense of place created by carefully controlled camera movement, *Ugetsu* is an allegorical commentary on postwar Japan. Among Mizoguchi's postwar films are some of his most important dramas about women—*e.g., Joyū Sumako-no-koi* (1947; *The Love of Actress Sumako*), the biography of one of Japan's first emancipated women; *Yoru no onnatachi* (1948; *Women of the Night*); and *Akasen chitai* (1956; *Street of Shame*).

Mizoram, state, northeastern India, established in 1987 from the Mizoram union territory, which was formerly the Mizo Hills district. The state has an area of 8,140 square miles (21,081 square km).

A brief treatment of Mizoram follows. For full treatment, *see* MACROPAEDIA: India.

The territory was set up to satisfy the national aspirations of the Mizo (Lushai) tribes, which had been in sporadic revolt against India for several decades. The formation of Mizoram as a union territory in 1972 failed to end the Mizo secessionist insurgency, which continued throughout the 1970s. The formation of Mizoram as an Indian state and the election of a Mizo-led state government in 1987 seemed to mark the settlement of the conflict.

Mizoram is bounded by Myanmar (Burma; east), Tripura state (west), Manipur state (northeast), Bangladesh (south), and Assam state (north). The state is largely mountainous, the Mizo Hills being the main physiographic feature. Numerous streams flow south-north. The Kaladan River system drains south into Myanmar; the northern rivers flow north to the Kusiyāra River, entering the Ganges delta in Bangladesh.

The population is composed of numerous ethnic groups, loosely called the Mizo, a local term meaning "highlander." They speak a variety of Tibeto-Burman dialects, some of which are mutually unintelligible. English also is spoken. Missionaries were formerly active in the area; most of the population is Christian, and about three-fifths is literate.

Nearly two-thirds of Mizoram is forested. Agriculture is extensively practiced; the chief crop is rice. Some sugarcane and (on the higher slopes) potatoes are grown. There is little trade or commerce, but the tribesmen are skillful weavers; cottage industries produce fine woolen carpets, cane hats, and baskets. The territorial capital is Aīzawl. Pop. (1991 prelim.) 686,217.

Mizraḥi, acronym for MERKAZ RUḤANI (Hebrew: "Spiritual Centre"), religious movement within the World Zionist Organization and formerly a political party within Zionism and in Israel. It was founded in 1902 by Rabbi Yitzḥaq Yaʿaqov Reines of Lida, Russia, to promote Jewish religious education within the framework of Zionist nationalism; its traditional slogan was "The Land of Israel, for the people of Israel, according to the Torah of Israel." It became the principal party of the Orthodox religious Zionists.

Though a minority party, Mizraḥi wielded a disproportionate influence in Zionism, because of both its religiohistorical weight and its hold on the masses of Orthodox Jews in eastern Europe. In post-World War I Palestine, it played an active role in the Jewish community, establishing religious schools and firmly backing the sole authority of the chief rabbinate over matters of personal status among Jews, particularly marriage and divorce.

Younger Orthodox elements founded ha-Poʿel ha-Mizraḥi (the Mizraḥi Worker Party) in 1922. After the creation of Israel in 1948, the Mizraḥi became an influential partner with the Mapai party in coalition governments with the Israel Labour Party, then the country's largest political party, which could not obtain an absolute majority in the Knesset (Parliament) without allying with the Mizraḥi.

The Mizraḥi movement united with ha-Poʿel ha-Mizraḥi in 1956 to form the National Religious Party (Miflegit Datit Leumit). This Mizraḥi bloc consistently received about 10 percent of the votes cast in Knesset elections and participated in almost every coalition government from the founding of Israel in 1948. It was generally flexible on defense and foreign-policy matters in return for the coalition partner's support of Mizraḥi's Orthodox religio-social agenda.

Though formerly allied with Labour, it went into opposition in 1973 and allied with the conservative Likud from 1977. The National Religious Party's representation in the Knesset eventually fell, however, leaving it little influence.

Mizuno Tadakuni (b. July 19, 1794, Edo [now Tokyo], Japan—d. March 12, 1851, Edo), chief adviser to Tokugawa Ieyoshi (reigned 1837–53), 12th Tokugawa shogun, or military dictator, of Japan. Mizuno was responsible for the Tempō reforms, the Tokugawa shogunate's final effort to halt the growing social and economic decline that was undermining its rule.

The son of a prominent feudal lord, Mizuno in 1828 was appointed tutor to the Tokugawa heir apparent, Ieyoshi. Although Mizuno was elevated to the position of chief shogunal adviser in 1834, he exercised little power until Tokugawa Ienari (reigned 1787–1837), the 11th shogun, finally died three years later and Ieyoshi succeeded him. Thereafter, until his dismissal from office in 1843, Mizuno virtually controlled the government.

Mizuno came to power at a time when popular unrest was sweeping the country after almost a decade of serious famines. His rise also coincided with China's defeat by Great Britain in the trading dispute known as the Opium War (1839–42); and Mizuno recognized that, if Japan did not solve its internal problems, it would be helpless in the face of the inevitable Western encroachment. To this end, he made a vain effort to reinstate the simple martial virtues of the early Tokugawa period. He insisted on personal and governmental frugality, introducing sumptuary laws that went to unenforceable extremes. In an attempt to hamper the growing trade economy, which he considered frivolous, Mizuno canceled all debts owed by noblemen to members of the middle class, abolished many of the merchant guilds licensed by his predecessors, and ordered peasants who had migrated to the cities to return to the countryside. A program to appropriate vassals' domains near Edo and Ōsaka aroused much opposition, and Mizuno's measures became so unpopular that the shogun had to dismiss him.

Mizusawa, city, Iwate *ken* (prefecture), Japan. It lies in the valley of the Kitakami River. Established as a fort to exterminate the aboriginal Ainu peoples in the northern frontier of ancient Japan (*c.* 802), it later developed as a castle town along the Ōwu Highway during the Tokugawa period (1603–1867). The city is now a commercial centre for agricultural products such as rice, apples, and dairy products, as well as for traditional cast metalware produced in the Kitakami valley. It is also internationally known as the location of the Mizusawa Latitude Observation Station (39°08′34″ N). Pop. (1990) 58,189.

mizzonite, calcium-rich variety of the mineral scapolite (*q.v.*).

Mjollnir, Old Norse MJÖLLNIR, in Norse mythology, the hammer of the thunder god, Thor, and the symbol of his power. Forged by dwarfs, the hammer never failed Thor; he used it as a weapon to crash down on the heads of giants and as an instrument to hallow people and things. Mjollnir was stolen by the giant Thrym, who asked as ransom the hand of the goddess Freyja. When Freyja refused to go to Thrym, Thor masqueraded as her and succeeded in grabbing the hammer, which had been brought out to consecrate him as Thrym's bride. Thor then slaughtered Thrym and the other giants with the hammer.

Mjøsa, Lake, lake, Oppland and Hedmark *fylker* (counties), southeastern Norway. Lying 35 miles (56 km) north of Oslo at the southern end of famed Gudbrands Valley, it is the largest lake in Norway. It is long and narrow, with a roughly north-northwest to south-southeast axis, and is a link between the Lågen River to the north and the Vorma-Glåma river system to the south. Its length is 62 miles (100 km), and its width ranges from 1 to 9 miles (1.6 to 14 km); its greatest depth is 1,473 feet (449 m), and its area is 142 square miles (368 square km). Lake Mjøsa is a popular tourist centre (boating and fishing), and Lillehammer, at its northern end, and Hamar, on its eastern shore, are the largest lakeshore towns. The small island of Helgøya is in the centre of the lake. On the east coast, north of Hamar, are the ruins of a 12th-century cathedral built by Nicholas Breakspear, papal legate to Scandinavia (and later Pope Adrian IV). The use of Mjøsa by both tourists and municipal water systems was endangered in the 1970s by algal growth, but a program completed in 1980 to eliminate the inflow of untreated sewage improved the quality of nearby rivers and restored swimming to the lake.

Mladá Boleslav, German JUNGBUNZLAU, city, Středočeský *kraj* (region), Czech Republic. It lies northeast of Prague, at the confluence of the Jizera and Klenice rivers. Occupied in 995 and founded as a city in 1334, it was a centre of the Bohemian Unitas Fratrum ("Unity of Brethren") Protestant group in the 16th century. It has a 15th-century cathedral, a Brethren church (1554), a castle, and other landmarks.

The town grew rapidly after a new automobile plant began production there in 1964. Mladá Boleslav also produces tractors and other agricultural machinery. Pop. (1991 prelim.) 44,471.

Mlanje (Malaŵi): *see* Mulanje.

mlechchha, Sanskrit MLECCHA, people of foreign extraction (*i.e.,* non-Aryans) in ancient India. A Sanskrit term, *mlechchha* was used by the Aryans much as the ancient Greeks used *barbaros,* originally to indicate the uncouth and incomprehensible speech of foreigners and then extended to their unfamiliar behaviour. Mlechchhas were found in northwestern India, and there is reason to believe that the people known in Akkadian as Mlakkha were the original mlechchhas. As a mlechchha, any foreigner stood completely outside the caste system and the ritual ambience. Thus, historically, contact with them was viewed by the caste Hindu as polluting.

Mmabatho, town, North-West province, South Africa. It was formerly (until 1994) the capital of the republic (never internationally recognized) of Bophuthatswana. Mmabatho is situated between Mafikeng (formerly Mafeking) and the Botswana border. The site of the town was chosen in 1976, and construction began shortly after Bophuthatswana was declared independent in 1977. Mmabatho ("Mother of the People") is located in a portion of the southern African veld consisting of scattered acacia trees among a dense cover of grass; cattle raising and subsistence agriculture are the major economic activities. Household industries produce wood products, leather goods, and paper. The town is closely allied with nearby Mafikeng, particularly for employment.

mnemonic, any device for aiding the memory. Named for Mnemosyne, the personification of memory in Greek mythology, mnemonics are also called memoria technica. The principle is to create in the mind an artificial structure that incorporates unfamiliar ideas or, especially, a series of dissociated ideas that by themselves are difficult to remember. Ideally, the structure is designed so that its parts are mutually suggestive. Grouping items in rhymed verse has long been a popular mnemonic technique, from the "gender rhymes" of the Latin grammars to the verse for remembering the number of days in the months ("Thirty days hath September, April, June and November . . . ").

Numerous attempts have been made to invent mnemonic systems—generalized codes to improve all-around capacity to remember. The Greek and Roman system of mnemonics was founded on the use of mental places and signs or pictures in terms of the location of the items of interest. The method combines a familiar structure (*locus*) and the item or thing to be remembered (*res*). This mnemonic method, which is referred to as *loci et res,* is an effective way to remember a series of items in serial order. The most usual method is to choose a large house, of which the apartments, walls, windows, statues, and furniture were severally associated with certain names, phrases, events, or ideas by means of symbolic pictures; to recall these it is only necessary to search over the apartments of the house until the particular place is discovered where they had been deposited by the imagination. In accordance with this system, if it is desired to fix a historic date in the memory, it is localized in an imaginary town divided into a certain number of districts, each with 10 houses, each house with 10 rooms, and each room with 100 quadrates, or memory places, partly on the floor, partly on the four walls, partly on the roof. Using this system, the traditional date of the invention of printing in Europe (1440) could be fixed in the memory by mentally placing a book or some other symbol of printing in the 40th quadrate, or memory place, of the 4th room of the 1st house of the imaginary town.

Scientific interest in mnemonics was heightened in 1968 when the renowned Soviet psychologist Aleksandr R. Luria wrote *The Mind of a Mnemonist,* which suggested the field was worthy of deeper psychological study. Luria was particularly impressed with the ability of individuals to remember long lists of numbers for periods of years.

Mnemonists use a variety of procedures to facilitate recall. One method, called linking, associates any pair of items—a pen and a chair, for example—and then links those items with a third, the chain proceeding indefinitely. Interaction, and not mere association, is necessary; one could imagine the pen writing on the chair. This method has proven effective with grammar-school children as well as with adults. Other methods include rhymes ("i before e, except after c") or substitution (the name Tchaikovsky can become "chew-cow-ski"; Reagan becomes "ray-gun"; etc.). One point stressed by mnemonists is that the imagery has to be bizarre if it is to be effective. Simple or common associations are said to be quickly forgotten.

In fact, mnemonic devices, all of which depend upon the use of some method of coding of what is to be remembered, may be very useful in limited fields, especially if the coding is made up by the person who is going to use it. Completely generalized and impersonal mnemonic systems are apt to break down, largely because of their inevitable complexity and ambiguity; thus their importance has declined.

Mnemosyne, in Greek mythology, the goddess of memory. A Titaness, she was the daughter of Uranus (Heaven) and Gaea (Earth), and, according to Hesiod, the mother (by Zeus) of the nine Muses.

Traditionally, after the Olympians defeated the Titans, they asked Zeus to create divinities who were capable of celebrating their victory. Zeus then went to Pieria and stayed with Mnemosyne nine consecutive nights, after which she gave birth to the Muses.

Mnesicles, also spelled MNESIKLES (fl. 5th century BC), Greek architect known (from Plutarch) to have been the designer of the Propylaea, or the entrance gateway to the Acropolis at Athens.

The only entranceway to the Acropolis at its western end, the Propylaea was built of Pentelic marble, with some details of black Eleusian stone. Construction was begun in 437 BC but was halted in 431 BC with the outbreak of the Peloponnesian War. Several scholars have theorized that Mnesicles—a contemporary of Pericles, Phidias, Ictinus, and Callicrates—was the architect (otherwise unknown) of the Erechtheum. The suggestion is made on the basis of Mnesicles' fine design of the Propylaea and on his success in adjusting the design to the slope of the Acropolis. The architect of the "split-level" Erechtheum handled a difficult design in much the same way as did Mnesicles in the Propylaea.

Mnevis, also called MENUIS, Egyptian NEMUR, Greek form of MERWER, in ancient Egyptian religion, sacred bull deity worshiped at Heliopolis. As one of several sacred bulls in Egypt, he was most closely associated with the sun god Re-Atum. Although not attested until later, the cult of Mnevis probably dated to the 1st dynasty (*c.* 2925–*c.* 2775 BC), if not earlier. The Mnevis bull was either black or piebald in colour, and in sculptures and paintings he was represented with a solar disc between his horns.

Mnong language, also called (in Cambodia) PHNONG, a language of the Bahnaric branch of the Mon-Khmer family, itself part of the Austroasiatic stock. The terms Mnong and Phnong cover a large group of closely related dialects spoken in the highlands of southern Vietnam and southeastern Cambodia.

Speakers of different varieties of Mnong in Vietnam, numbering approximately 70,000, are divided into three groups: Central Mnong, including Bu Dang, Biat, Bu Nar, Bu Dih, and Preh; Eastern Mnong, including Chil, Kuanh, Mnong Gar, and Mnong Rlam; and Southern Mnong, including Prang and Nong.

Mnyampala, Mathias E. (b. 1917, Dodoma, Tanganyika [now Tanzania]—d. June 8, 1969, Dodoma), Tanzanian poet, scholar, jurist, and author of short fiction who wrote in Swahili.

In his early career, Mnyampala served as a schoolteacher, a government clerk, and finally a *liwali* (a type of local administrator), but he spent most of his life in the judicial system. He was an expert on inheritance law and on Swahili legal terminology.

Mnyampala's first literary works were prose efforts intended for the colonial educational system; his most widely known publications from this period are *Historia, mila na desturi za Wagogo wa Tanganyika* (1954; "History, Traditions, and Customs of the Gogo People of Tanganyika") and *Kisa cha mrina asali na wenzake wawili* (1961; "The Tale of the Honey Gatherer and His Two Friends"). Mnyampala, however, is most revered today in East Africa for his contributions in his later years to modern Swahili poetry. He followed the traditional formal patterns of Swahili verse but adapted them to modern—particularly political—themes. His most important poetic works are *Waadhi wa ushairi* (1960; "Poetic Exhortations"), *Diwani ya Mnyampala* (1960; "Mnyampala's Poetry Book"), *Mashairi ya hekima* (1965; "Poems of Wisdom"), and *Ngonjera za UKUTA,* 2 vol. (1970–71; "Educational Verses from UKUTA"). UKUTA is the acronym of the Swahili poets' association that Mnyampala founded. He also published short fiction and educational essays.

MO (criminology): *see* modus operandi.

mo-chi (calligraphy): *see* bokuseki.

Mo-chi-lien (Mongol khan): *see* Bilge.

Mo-tzu, Pinyin MOZU, original name MO TI, also spelled MOTZE, MOTSE, or MICIUS (b. 470? BC, China—d. 391?, China), Chinese philosopher whose fundamental doctrine of universal love challenged Confucianism for several centuries and became the basis of a religious movement known as Mohism.

Life. Born a few years after Confucius' death, Mo-tzu was raised in a period when the feudal hierarchy instituted at the beginning of the Chou dynasty (12th or 11th century BC to 255 BC) was swiftly disintegrating and China was divided into small, constantly warring, feudal states. He thus confronted the problem that faced all thinkers in 5th-century BC

China: how to bring political and social order out of chaos.

According to tradition, Mo-tzu was originally a follower of the teachings of Confucius, until he became convinced that Confucianism laid too much emphasis on a burdensome code of rituals and too little on religious teaching, at which time Mo-tzu decided to go his own way. Confucius, from all accounts, was aristocratic by temperament and orientation and dreamed of a return of the calm and peaceful days of pomp and splendour at the beginning of the Chou dynasty. Mo-tzu, on the other hand, was drawn to the common people and looked much further back to a life of primitive simplicity and straightforwardness in human relations.

Mo-tzu's life, however, resembled that of Confucius in many important respects. He was widely read and well versed in the tradition of the Chinese Classics. Except for a brief period when he held public office, Mo-tzu spent most of his life traveling from one feudal state to another in the hope of meeting a prince who would allow him to put his teachings into practice. In the absence of such a prince, he had to be content with maintaining a school and recommending his disciples for administrative positions. He commanded respect partly because he lived a very simple life and was a teacher who took his own teachings seriously. He not only condemned offensive war but also journeyed to distant states to prevent the outbreak of a war whenever he heard of such a possibility.

The Mo-tzu, the principal work left by Mo-tzu and his followers, contains the essence of his political, ethical, and religious teachings. The gist of it is found in the three sets of chapters of its second section, which give an overview of the 10 major tenets: exaltation of the virtuous, identification with the superior, universal love, condemnation of offensive war, economy of expenditures, simplicity in funerals, will of heaven, on ghosts, denunciation of music as a wasteful activity, and antifatalism. Since Mohism split into three schools after Mo-tzu's death, the three sets of chapters may well represent the three sets of texts preserved by the three schools. The other sections of the *Mo-tzu* might be listed as follows: I, summaries and abstracts of Mo-tzu's teachings; III, discussions on logic and physical sciences; IV, records of Mo-tzu's doings and sayings; V, a manual of military defense.

Teachings. As a thinker Mo-tzu was distinctive in his insistence on methodology. He insisted that standards of judgment be established, and his criteria may be summarized as the threefold test and the fourfold standard. The threefold test reminded thinkers that the basis, verifiability, and applicability of any proposition must be analyzed; the fourfold standard reminded thinkers that one should always assess the benefits any proposition could bring to the country and the people. Benefits were defined as enrichment of the poor, increase of the population, removal of danger, and regulation of disorder. To Mo-tzu the tests and standards were indispensable. Generalizing further, Mo-tzu declared that, before anything could be said to be good, it was necessary first to demonstrate what it was good for.

The cornerstone of Mo-tzu's system was universal love. If the world is in chaos, he said, it is owing to man's selfishness and partiality, and the prescribed cure—in striking parallel with Christianity—is that "partiality should be replaced by universality," for, "when everyone regards the states and cities of others as he regards his own, no one will attack the others' state or seize the others' cities." The same principle was to be applied to the welfare of the family and of the individual. The peace of the world and the happiness of humanity lie in the practice of universal love. Many objections—its impracticability, its neglect of the special claims of one's parents—were raised against this new doctrine, but Mo-tzu demonstrated that the principle of universal love had in it both utilitarian justification and divine sanction. He spoke of "universal love and mutual profit" in one breath, and he was convinced that this principle was both the way of man and the way of God.

Mo-tzu's stand on religion makes him exceptional among Chinese philosophers. His call to the people was for them to return to the faith of their fathers. He might be said to be a revivalist, a champion of religious orthodoxy with a personal god. To Mo-tzu, there is heaven, heaven has a will, and this will of Heaven is to be obeyed by man and accepted as the unifying standard of human thought and action: "What is the will of Heaven that is to be obeyed? It is to love all the people in the world universally." Heaven not only "desires righteousness and abominates unrighteousness" but also metes out reward and punishment accordingly. The system of Mo-tzu, with its gospel of universal love and the ascetic discipline as exemplified by his own life, soon after the master's death, was embodied in an organized church with a succession of Elder Masters and a considerable body of devotees. The religion prospered for several generations before completely disappearing.

The teachings of Mo-tzu, however, continued to be held in high respect for several centuries. Down to the beginning of the 2nd century BC, writers referred to Confucianism and Mohism in one breath as the two leading schools of thought. But from that time, Mohism suddenly disappeared from the intellectual scene. Critics have generally agreed in admiring the high-minded character of Mo-tzu himself but considered his teachings overdemanding and contrary to human nature. It was not until the 20th century that Mo-tzu was rediscovered and his teachings reappraised. (Y.P.M.)

BIBLIOGRAPHY. Yi-pao Mei (I-pao Mei), *Motse, the Neglected Rival of Confucius* (1934, reprinted 1973), is a general study of the man and his age, his works, and his teachings, with an extensive bibliography.

moa, any of several extinct, ostrichlike flightless birds native to New Zealand and constituting the order Dinornithiformes. The number of different species is in dispute, with estimates varying from 13 to 25. Among these species, individuals ranged in size from that of a turkey to larger than that of an ostrich; some stood as much as 3 m (10 feet) high. The name moa came from a Polynesian word for fowl.

According to Maori tradition, moas were swift runners that, when cornered, defended themselves by kicking. Early Polynesian peoples hunted moas for food; they made spear points, hooks, and ornaments from their bones, and water carriers from their eggs. Although the larger moas probably had become extinct by the end of the 17th century, a few smaller species may have survived into the 19th.

Moas were chiefly browsers and grazers. Inference from skeletal and other remains reveals that they ate seeds, fruits, leaves, and grasses, which were ground with the help of more than 3 kg (6.5 pounds) of stones in the gizzard. Moas laid one large egg—up to 18 cm (7 inches) in diameter and 25 cm (10 inches) long—in a hollow in the ground.

Whether the moas, with the other ratites (birds with a flattened breastbone), shared a common ancestor or were polyphyletic (from several ancestral lines that come to resemble each other because of similar environments) is as debatable as their mode of arrival in New Zealand. One interesting point is that such ratite features as feather type, palatal structure, and the persistence of skull sutures into adulthood suggests that moas were "permanent chicks," examples of neoteny.

The lesser moas formed the family Anomalopterygidae, with about two-thirds of the species in the order; the greater moas, in the family Dinornithidae, included the giants of the order. The fossil record for moas is poor; the earliest remains are regarded as originating in the Late Miocene Epoch (11.2 to 5.3 million years ago).

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Moabite, member of a West-Semitic people who lived in the highlands east of the Dead Sea (now in west-central Jordan) and flourished in the 9th century BC. They are known principally through information given in the Old Testament and from the inscription on the Moabite Stone. The Moabites' culture is dated by scholars from about the late 14th century BC to 582 BC, when, according to the Jewish historian Josephus (1st century AD), they were conquered by the Babylonians.

In Old Testament accounts (*e.g.,* Genesis 19:30–38), the Moabites belonged to the same ethnic stock as the Israelites. Their ancestral founder was Moab, a son of Lot, who was a nephew of the Israelite patriarch Abraham. The god-protector of their nation was Chemosh, just as Yahweh was the national God of the Israelites. The Moabites were in conflict with the Israelites from the 13th century. They are noted several times in the Old Testament. King Saul of Israel in the 11th century fought against the Moabites (1 Samuel 14:47), who later granted asylum to the family of the young rebel and future king David (1 Samuel 22:3–4). David in turn fought against the Moabites and forced them to pay heavy tribute (2 Samuel 8:2). David's great-grandmother, Ruth, was a Moabite (Ruth 4:17–22), and his son Solomon, as a sign of his authority, obtained Moabite princesses for his harem (1 Kings 11:1–8) and erected near Jerusalem a shrine dedicated to Chemosh.

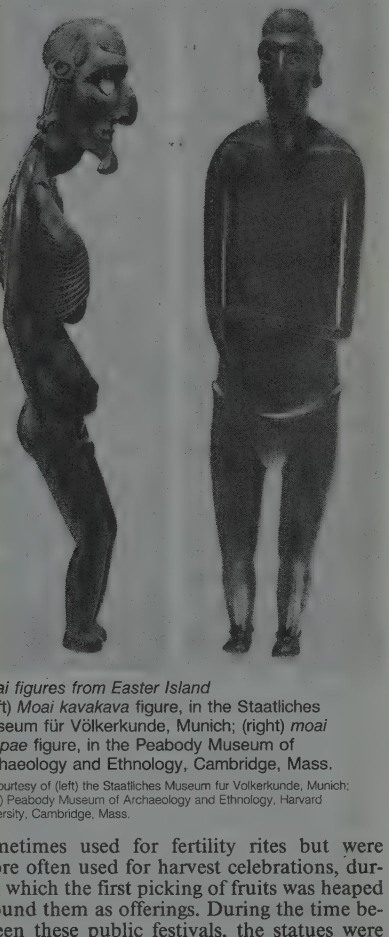
King Omri of Israel (reigned *c.* 884–*c.* 872 BC), who is mentioned in 1 Kings 16:23–28, reconquered Moabite lands that had been lost since Solomon's death in 922 BC, when Israel split into two kingdoms. Omri's reconquest is known from the Moabite Stone, a stela that the Moabite king Mesha erected about 40 years later in the city of Dibon (modern Dhiban, Jordan). This black basalt stone, 1.1 m (44 inches) high, was discovered at Dhiban in 1868 and is now in the Louvre Museum in Paris. The stone's text of 34 lines, written in a Canaanite alphabet similar to contemporary Hebrew, is the only written document of any length that survives from Moab and the only royal stela known from Israel's neighbours. In its inscription, Mesha (fl. *c.* 870 BC) tells of King Omri's reconquest of Moab and ascribes the renewed Israelite domination over Moab to the anger of Chemosh. Mesha then describes his own successful rebellion against Israel, which probably occurred during the reign of Omri's successor, Ahab.

Moab had become a tributary of Assyria by the late 8th century BC and was conquered by the Babylonians in 582 BC, upon which the Moabites disappeared from history. Their territory was resettled by the Nabataeans in the 4th–3rd century BC.

The Moabite language differed only dialectally from Hebrew, and Moabite religion and culture were very closely related to those of the Israelites. Nevertheless, Moabites were excluded from the Jewish community (Deuteronomy 23:3–6), where the name Moab became a typical denomination for the enemies of God (Isaiah 25:10).

Moabite alphabet, eastern subdivision of the Canaanite branch of the early Semitic alphabet, closely related to the early Hebrew alphabet. The best-known example of the Moabite alphabet is from the Meshaʿ, or Moabite, Stone (Louvre, Paris), which was discovered in 1868 at Dibon, east of the Dead Sea. The stone bears a 34-line inscription of Meshaʿ, king of Moab, dating from the middle of the 9th century BC. Until the discovery of the Aḥiram inscription in 1923 at Byblos, the Meshaʿ Stone was considered the earliest extant alphabetic inscription.

moai figure, small wooden statue of uncertain religious significance, carved on Easter Island. The figures, thought to be representations of ancestors who live on in the form of skeletons, are of two types, *moai kavakava* (male) and *moai paepae* (female). They were sometimes used for fertility rites but were more often used for harvest celebrations, during which the first picking of fruits was heaped around them as offerings. During the time between these public festivals, the statues were wrapped in bark cloth and kept in private homes, where it is possible that they served decorative or private ritualistic purposes. It has been reported, for example, that from time to time the islanders picked the figures up like dolls and executed slight dancing motions with them.



Moai figures from Easter Island
(Left) *Moai kavakava* figure, in the Staatliches Museum für Völkerkunde, Munich; (right) *moai paepae* figure, in the Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
By courtesy of (left) the Staatliches Museum fur Volkerkunde, Munich; (right) Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Mass.

The *moai kavakava* were fashioned as slumping human figures that displayed the rib cage and spinal cord through decaying flesh. The head is of a standard type, in which circular eyes are placed under bushy, protruding eyebrows and often filled with shells. A large, blunted beak nose dominates the facial profile, and the downward-curving nostrils direct attention to the open mouth and bared teeth. A goatee always ornaments the chin of the *moai kavakava,* and a fantasy animal or human is sometimes incised on the crown of the head.

The *moai paepae,* which appear to have been executed at a later date, had a flat, relieflike quality resulting from a shallow demarcation of the breasts, torso, limbs, and genitals. The long face with huge, staring eyes gives the female figure a haunting expression that makes it an appropriate pendant to its male counterpart.

Moanda (Gabon): *see* Mouanda.

Moawiyah I (caliph): *see* Muʿāwiyah I.

Moberg, (Carl Artur) Vilhelm (b. Aug. 20, 1898, Algutsboda, Swed.—d. Aug. 8, 1973, Väddö), Swedish novelist and dramatist, best-known for his novels of the Swedish emigration to America but concerned primarily with the people of the countryside from which he came and with the system that made life so miserable for them.

In his autobiographical novel, *Soldat med brutet gevär* (1944; *When I Was a Child*), Moberg considers it his calling to give a voice to the illiterate class from which he came. His most widely read and translated works include the Knut Toring trilogy (1935–39; *The Earth Is Ours*) and his four-volume epic of the folk migration from Sweden to America in the 1850s, *Utvandrarna* (1949–59; *The Emigrants*), *Invandrarna* (1952; *Unto a Good Land*), *Nybyggarna* (1956), and *Sista brevet till Sverige* (1959). The last two volumes were combined in the translation *The Last Letter Home*. During World War II, Moberg also wrote a novel eloquently attacking tyranny and oppression, *Rid i natt!* (1941; *Ride This Night!*), in which he dramatizes the necessity of men acting in the cause of freedom and justice.

Mobil Corporation, former name of one of the largest U.S. holding companies, primarily engaged in petroleum operations but with major interests in chemical products, oil and gas exploration, coal mining, and retailing. It merged with Exxon Corp. (*q.v.*) to become Exxon Mobil Corp. in 1999. With headquarters in Irving, Texas, it has production and processing facilities around the world, with major operations in the Gulf of Mexico, California, the Atlantic Coast, the Alaskan North Slope, the North Sea, and Saudi Arabia.

Mobil Oil's origins date to the 19th century. One predecessor, Vacuum Oil Company, was founded in 1866 and, after 1882, became part of the Standard Oil Trust (*see* Standard Oil Company and Trust). Another predecessor was Standard Oil Company of New York (Socony), established by the trust in 1882. Both companies became independent in 1911 when the U.S. Supreme Court dissolved the Standard Oil combine, but the two merged in 1931 to form Socony-Vacuum Corporation. The name was changed in 1934 to Socony-Vacuum Oil Company, Inc., in 1955 to Socony Mobil Oil Company, Inc., and then in 1966 to Mobil Oil Corporation.

In an effort to diversify beyond its oil holdings, Mobil in 1974 acquired 54 percent of the voting shares of Marcor Inc. (then the parent company of Container Corporation of America and Montgomery Ward & Co.), and two years later Marcor merged into Mobil. Mobil sold the Container Corporation of America in 1986 and sold Montgomery Ward & Co. in 1988, thus clearing the way for Mobil to concentrate on its petroleum extraction and processing operations again.

Mobile, city, seat of Mobile County, southwestern Alabama, U.S. It lies on Mobile Bay (Gulf of Mexico) at the mouth of the Mobile River and is a river port and Alabama's only seaport.

The site was explored by Spaniards as early as 1519. In 1702 French colonists under Jean-Baptiste Le Moyne de Bienville established a fort 27 miles (43 km) above the river mouth. The fort was moved to the present site in 1711, and the town that was built there served as the capital of French Louisiana until 1720. Mobile was a French adaptation of the name of a local Indian tribe, the Maubilla, meaning "canoe paddler." In 1763 the town was ceded to the British. During the U.S. War of Independence, Spanish forces under the leadership of Bernardo de Gálvez captured Mobile. Seized by the United States during the War of 1812, it was incorporated as a town in 1814; as a part of West Florida, however, Mobile's status was not finally clarified until the United States purchased Florida from Spain in 1819.

Oakleigh mansion, Mobile, Ala.
By courtesy of the Alabama Bureau of Publicity and Information

During the American Civil War, Mobile was one of the most important Confederate ports, and it maintained its trade with the West Indies and Europe despite a Federal blockade begun in 1861. The port functioned until August 1864, when the Battle of Mobile Bay, fought between the opposing Federal and Confederate fleets, was won by the Federal admiral David G. Farragut. Two forts at the bay's entrance, Fort Gaines on Dauphin Island (*q.v.*) and Fort Morgan on Mobile Point, surrendered immediately thereafter. In the spring of 1865 the Union general Edward R.S. Canby successfully laid siege to Fort Blakely and Spanish Fort, on the east side of the bay. After 25 days the forts, and then the city, were evacuated, and Federal forces entered Mobile on April 12, 1865.

In 1879 the municipality went bankrupt, but the economy gradually improved and in 1887 Mobile was again chartered as a city. Banana importing commenced in 1893, supplementing the old export trade in lumber and cotton that were produced inland. The port's commerce was progressively stimulated by the opening of the Panama Canal (1914), the completion of a system of locks and dams on the Warrior–Tombigbee rivers (1915), the development of the Gulf Intracoastal Waterway and federal barge lines, the construction of the Alabama State Docks and Terminals (begun in 1923), the completion of Cochrane Bridge across the Mobile River (1927), the construction of Bankhead Tunnel under the Mobile River (1941) and the opening of the Tennessee-Tombigbee Waterway (1985). Controlling the depth of the ship channel has been a vital factor in the commercial history of the city; the original minimum depth and width have gradually been greatly increased.

Industrialization increased after 1900. Mobile played a major role as a port and shipbuilding and repair centre during World Wars I and II. The city's varied manufactures now include pulp, paper, chemical and petroleum products, and textiles; the refinement of bauxite and food processing are among its other industries. The city is the site of Spring Hill College (1830; Roman Catholic), University of South Alabama (1963), and University of Mobile (1961).

Bellingrath Gardens, a local estate, is noted for its varieties of azalea plants. Other points of interest include a statue of Admiral Raphael Semmes, the Confederate naval hero; Oakleigh, an antebellum home; the Battleship USS Alabama Memorial Park; and Forts Morgan and Gaines. Pop. (1990) city, 196,278; MSA, 476,923.

mobile, abstract sculpture that has moving parts, driven either by motors or the natural force of wind. The word mobile was initially suggested by Marcel Duchamp for a 1932 Paris exhibition of such works by the American artist Alexander Calder. One of Calder's first mobiles consisted of coloured spheres motorized to move up and down curving wires at different speeds. Later, he developed wind mobiles from flat metal shapes suspended by wires from movable rods, which allowed for rotation. The revolving parts created a new visual experience of constantly changing volumes and forms; Calder, as he expressed it, was "making one or two objects at a time find actual relationship in space." Although experiments in kinetic sculpture with one moving element had been made in 1920 by the Russian-born artist Naum Gabo, Calder's mobiles of the 1930s were the first full exploitation of the idea. *Compare* stabile.

"Lobster Trap and Fish Tail," mobile of painted steel wire and sheet aluminum by Alexander Calder, 1939; in the Museum of Modern Art, New York

Collection, the Museum of Modern Art, New York, gift of the Advisory Committee

Mobile Bay, arm of the Gulf of Mexico, extending 35 miles (56 km) north from its outlet to the mouth of the Mobile River in southwestern Alabama, U.S. It is 8–18 miles (13–29 km) wide and has a dredged channel (32 feet [10 m] deep, 300–500 feet [90–150 m] wide) that enters the Gulf between Dauphin Island and Mobile Point. Commercial traffic uses the Warrior-Tombigbee river system for travel north between the cities of Mobile (on the bay's northwestern shore) and Birmingham, Ala., and the Gulf Intracoastal Waterway for travel east and west along the Gulf of Mexico. The bay was the scene of an American Civil War naval battle (Aug. 5–23, 1864) in which the Union admiral David Farragut ran a blockade of mines, dispersed the Confederate fleet, and secured surrender of the forts defending the bay, including the strongest—Fort Morgan at Mobile Point.

Mobile Bay, Battle of (August 1864), in U.S. history, triumph of Admiral David Farragut in sealing off the port of Mobile from Confederate blockade runners.

By 1864 Mobile Bay in Alabama was the most important Confederate port left on the Gulf of Mexico. It was protected by Fort Morgan, the ironclad *Tennessee,* and a string of mines (called torpedoes) in the narrow entrance passage to the bay. Farragut's fleet sailed into Mobile Bay on the morning of Aug. 5, 1864. The Union ship *Tecumseh* hit a mine and sank. Farragut then climbed into the rigging of his flagship *Hartford* and cried out, "Damn the torpedoes: Full speed ahead!"

With the *Hartford* in the lead, the fleet sailed on into Mobile Bay, where for two hours it fought the *Tennessee* while coming under shelling from the guns at Fort Morgan. With the surrender of the *Tennessee,* Mobile Bay was in Union hands. On August 23 Fort Morgan surrendered, thereby sealing the Gulf coast from further blockade running.

To make the best use of the Britannica, consult the INDEX *first*

Mobile River, river formed by the confluence of the Tombigbee and Alabama rivers, southwestern Alabama, U.S. It enters Mobile Bay after a southerly course of 45 miles (72 km) through the delta region. With its tributaries it drains 42,300 square miles (109,600 square km). Mobile, on the west side of the river near the head of the bay, is its chief city and a centre for the heavy volume of river traffic.

mobility, in solid-state physics, measurement of the ease with which a particular type of charged particle moves through a solid material under the influence of an electric field. Such particles are both pulled along by the electric field and periodically collide with atoms of the solid. This combination of electric field and collisions causes the particles to move with an average velocity, called the drift velocity. Their mobility is defined as the value of the drift velocity per unit of electric field strength.

The mobility can be determined experimentally. The mobility of a particular type of particle in a given solid may vary with temperature. Particles of the same type may have slightly different mobilities, in which case the average of their mobilities is measured.

The charge carrier in most metals is the negatively charged electron. Only some of the electrons in the metal are free to move through the solid. The ease with which a metal carries an electric current, called its conductivity, is equal to the number of these free electrons present multiplied by their charge and by their mobility.

Some metals carry electric currents by the motion of positively charged particles called holes, each of which corresponds to the absence of an electron. In materials called semiconductors, both electrons and holes are present, a condition that complicates the determination of their separate mobilities.

mobilization, in war or national defense, organization of the armed forces of a nation for active military service in time of war or other national emergency. In its full scope, mobilization includes the organization of all resources of a nation for support of the military effort.

The technological advances of the 20th century, particularly since the advent of nuclear weapons, have vastly increased the complexities of the planning and implementation of mobilization. The ratio of a nation's standing forces, which provide for defense during the mobilization period, to that nation's full war potential has always varied and has depended on such factors as foreign policy, world tensions, strength and situation of allies, and estimates of the time required to implement mobilization. Because of the tremendous power of nuclear weapons and the speed with which they can be delivered to their targets, it is conceivable that a nation's war potential could be destroyed before mobilization could be started. This situation has increased the need for adequately prepared forces in being—*i.e.,* the standing army, navy, and air force—which might be the only means available to continue the defense and launch a counterattack.

Military mobilization, for any kind of war, includes the procurement and training of manpower for military purposes; the selection of areas and the construction of facilities for training and other military purposes; and the procurement and issuance of arms, ammunition, uniforms, equipment, vehicles, and stores. The procurement of military manpower is in itself a complex task that includes the calling up of reserves; the induction of large numbers of raw recruits; and the allocation of manpower to the army, navy, and air force and, within these major components, to the respective arms, services, and other subdivisions.

The procurement of military manpower during mobilization must be correlated with the procurement of arms and equipment necessary for training and for combat and must be synchronized with timetables for training and strategic deployment. Mobilization, to be effective, not only must be well organized but must have everything in step.

Möbius, August Ferdinand (b. Nov. 17, 1790, Schulpforta, Saxony [Germany]—d. Sept. 26, 1868, Leipzig), German mathematician and theoretical astronomer who is best known for his work in analytic geometry and in topology. In the latter field he is especially remembered as one of the discoverers of the Möbius strip.

In 1815 Möbius became professor of astronomy at the University of Leipzig, later being chosen also as director of the university observatory, which was erected (1818–21) under his supervision.

Möbius' reputation as a theoretical astronomer was established with the publication of *De Computandis Occultationibus Fixarum per Planetas* (1815; "Concerning the Calculation of the Occultations of the Planets"). *Die Hauptsätze der Astronomie* (1836; "The Principles of Astronomy") and *Die Elemente der Mechanik des Himmels* (1843; "The Elements of Celestial Mechanics") are among his other purely astronomical publications. His mathematical papers, appearing mostly in *Crelle's Journal* (1828–58), are chiefly geometric, and in many of these papers he developed and applied the methods laid down in his *Der barycentrische Calkul* (1827; "The Calculus of Centres of Gravity"). In this work he introduced homogeneous coordinates into analytic geometry and also dealt with geometric transformations, in particular projective transformations. He discussed the configuration known as the Möbius net, which later played an essential part in the systematic development of projective geometry. In the *Lehrbuch der Statik* (1837; "Handbook on Statics") Möbius gave a geometric treatment of statics (a branch of mechanics), leading to the null sys-

August Ferdinand Möbius, detail from an engraving by an unknown artist

By courtesy of the Staatsbibliothek, Berlin tem of points and planes and to the study of systems of lines in space. Möbius was a pioneer in topology; in a memoir presented to the Academy of Sciences, discovered after his death, he discussed the properties of one-sided surfaces, including the Möbius strip, which was named after him. His *Gesammelten Werke,* 4 vol. ("Collected Works"), appeared in 1885–87.

Möbius, Karl August (b. Feb. 7, 1825, Eilenburg, Prussia [Germany]—d. April 26, 1908, Berlin, Ger.), German zoologist who is chiefly known for his contributions to marine biology.

Möbius was trained for elementary teaching at a private college in Eilenburg, and from 1844 to 1849 he taught at Seesen in the Harz Mountains. He went to the University of Berlin to study in the natural sciences under Johannes Muller (1849–53), then took up teaching again at the Johanneum Grammar School in Hamburg. There his continuing studies in the natural sciences gained him a reputation that led to a post at the Hamburg Museum of Natural History.

Möbius' research on corals and foraminiferans (*i.e.,* protozoans of the rhizopodan order Foraminiferida) led to the discovery of symbiosis in marine invertebrates. He also proved that *Eozoon canadense,* long thought to be a species of living marine organisms, was actually an aggregate of minerals. Interested in fishery biology, Möbius investigated mussel and oyster breeding as well as the artificial cultivation of pearls.

Möbius helped to develop various impressive zoological collections. In 1863 he cofounded the Hamburg Zoo and was chief designer of Germany's first public aquarium. While professor of zoology at the University of Kiel, he created a museum for its zoological institute (1881), which became a model for such establishments for years to come. Later, as director of the newly founded Natural History Museum in Berlin (1887), Möbius succeeded in setting the groundwork for its large and impressive collection.

His *Fauna der Kieler Bucht,* 2 vol. (1865–72; "Fauna of Kiel Bay"), established an important methodology for modern ecology and helped secure his own appointment to the University of Kiel.

Möbius strip, a one-sided surface that can be constructed by affixing the ends of a rectangular strip after first having given one of the ends a one-half twist. This space exhibits interesting properties, such as having only one side and remaining in one piece when split down the middle. The properties of the strip were discovered independently and almost simultaneously by two German mathematicians, August Ferdinand Möbius and Johann Benedict Listing, in 1858. *See also* Klein bottle.

Mobridge, city, Walworth county, northern South Dakota, U.S. It lies along the Missouri River (there broadened to form Lake Oahe). It was founded in 1906 on the site of Arikara and Sioux Indian villages as a division point of the Chicago, Milwaukee, and St. Paul Railroad. Its name combines the abbreviation "Mo." (Missouri) and "bridge" (across the river). It developed as an agricultural-trade centre. The grave of the Sioux Indian chief Sitting Bull and a monument to Sacajawea ("Bird Woman"), who was a guide for the Lewis and Clark Expedition, are across the river near where the Standing Rock and Cheyenne River Indian reservations merge. The Mobridge Municipal Auditorium has murals by Oscar Howe, a Sioux artist, and the Land of the Sioux Museum displays Indian relics. The Sitting Bull Stampede is an annual rodeo. Inc. 1907. Pop. (1990) 3,768.

Mobutu Nile (Uganda): *see* Albert Nile.

Mobutu Sese Seko, also called MOBUTU SESE SEKO KOKO NGBENDU WA ZA BANGA, original name JOSEPH(-DÉSIRÉ) MOBUTU (b. Oct. 14, 1930, Lisala, Belgian Congo [now Democratic Republic of the Congo]—d. Sept. 7, 1997, Rabat, Mor.), president of Zaire (now Congo [Kinshasa]), who seized power in a 1965 coup and ruled (dictatorially until 1991) for some 32 years before being ousted by a rebellion in 1997.

Mobutu was educated in missionary schools and began his career in 1949 in the Belgian Congolese army, the Force Publique, rising from a clerk to a sergeant major, the highest rank then open to Africans. After his discharge in 1956 he became a reporter for the daily *L'Avenir* ("The Future") and later editor of the weekly *Actualités Africaines.*

Through his press contacts Mobutu met the Congolese nationalist leader Patrice Lumumba, whose Congolese National Movement (Mouvement National Congolais; MNC) he joined soon after its founding in 1958. In 1960 Mobutu represented Lumumba at the Brussels Round Table Conference on the Congo's independence until the release of Lumumba, who had been jailed for his nationalist activities in the Congo. During the conference, Mobutu supported Lumumba's proposals (which were adopted) for a strongly centralized state for the independent Congo.

At the Congo's attainment of independence on June 30, 1960, the coalition government of President Joseph Kasavubu and Premier Lumumba appointed Mobutu secretary of state for national defense. Eight days later the Congo's Force Publique mutinied against its Belgian officers. As one of the few officers with any control over the army, Mobutu was in a position to influence the developing power struggle between Kasavubu and Lumumba.

Mobutu covertly supported Kasavubu's attempt to dismiss Lumumba. When Lumumba rallied his forces in September 1960, Mobutu seized control of the government and announced that he was "neutralizing" all politicians. In February 1961, however, Mobutu turned over the government to Kasavubu, who made Mobutu commander in chief of the armed forces. Many believe that Mobutu bore some responsibility for the death of Lumumba, who was arrested by Mobutu's troops and flown to Katanga, where, it is believed, he was killed by Congolese or Katangese troops.

As commander in chief Mobutu reorganized the army. In 1965, after a power struggle had developed between President Kasavubu and his premier, Moise Tshombe, Mobutu removed Kasavubu in a coup and assumed the presidency. Two years later Mobutu put down an uprising led by white mercenaries attached to the Congolese army. His efforts to revive the Congo's economy included such measures as nationalizing the Katanga copper mines and encouraging foreign investment. Agricultural revitalization lagged, however, and consequently, the need for food imports increased.

Mobutu Sese Seko, 1989
John McDonnell—*The Washington Post*

Mobutu attempted to soften the military nature of his regime by filling government posts with civilians. He sought to build popular support through his Popular Movement of the Revolution (Mouvement Populaire de la Révolution; MPR), which until 1990 was the country's only legal party. Opposition to his rule came from numerous Zairean exiles, tribal groups that had played decisive roles in previous governments, small farmers who gained no share in the attempted economic revival, and some university students. He also faced a continuing threat of attacks on Shaba province by Katangese rebels based in Angola.

As president, Mobutu moved to Africanize names in the nation. The name of the country was changed in October 1971 from the Democratic Republic of the Congo (Congo [Kinshasa]) to the Republic of Zaire. In January 1972, he changed his own name from Joseph-Désiré Mobutu to Mobutu Sese Seko Koko Ngbendu Wa Za Banga ("The all-powerful warrior who, because of his endurance and inflexible will to win, will go from conquest to conquest, leaving fire in his wake").

In 1977 Mobutu had to ask for French military intervention in order to repel an invasion of Zaire by Angolan-backed Katangese. He was reelected to the presidency in one-man contests in 1970 and 1977. Over the years Mobutu proved adept at maintaining his rule in the face of internal rebellions and attempted coups, but his regime had little success in establishing the conditions needed for economic growth and development. Endemic governmental corruption, mismanagement, and neglect led to the decline of the country's infrastructure, while Mobutu himself reportedly amassed a large personal fortune.

With the end of the Cold War in the 1990s, Mobutu lost much of the Western financial support that had been provided in return for his intervention in the affairs of Zaire's neighbours. Marginalized by the multiparty system and ill, Mobutu finally relinquished control of the government in May 1997 to rebel forces led by Laurent Kabila. Mobutu went into exile and died a short time later.

Moca, city, north-central Dominican Republic. It lies just east of Santiago. Founded in 1780, the city retained its Indian name, referring to moca (partridgewood), an indigenous cabbage palm tree. In 1858 Moca hosted a constitutional congress, which produced one of the more notable of the republic's many constitutions. Moca's economy is agriculturally based, centred on the production of cacao, tobacco, coffee, and sugarcane. It is connected by paved highway with Santiago de los Caballeros and Santo Domingo. Pop. (1993) 50,449.

Moçambique, also spelled MOZAMBIQUE, town, northeastern Mozambique. Located on a small coral island at the mouth of Mossuril Bay (on the Mozambique Channel of the Indian Ocean), it is an important commercial centre and has good harbour facilities. Moçambique was originally an Arab settlement; the Portuguese settled there by 1507 and erected St. Sebastian fort. Until 1897 it was the capital of Portuguese East Africa, but it declined in influence after the development of the towns of Beira and Lourenço Marques (now Maputo). Its prominence as a port has been diminished by the port of Nacala (to the north), which was opened to navigation in 1951; until the completion of that harbour, all maritime traffic relating to the fertile interior areas had passed through Moçambique. Pop. (1997) 42,407.

Moçambique, Canal de (Mozambique): *see* Mozambique Channel.

Moçâmedes (Angolan city): *see* Namibe.

Moçâmedes Desert, Portuguese DESÉRTICA DE MOÇÂMEDES, desert, southwestern Africa, extending north along the Atlantic coast of Angola from the Angola-Namibia border for about 275 miles (450 km) and constituting the northernmost extension of the Namib Desert. Fronting the Atlantic Ocean to the west, it gradually ascends in elevation eastward to a semiarid plain (dominated by acacia and mopane [African ironwood] trees) that abuts the steep Serra de Chela escarpment. The Moçâmedes Desert is an area of gravel plains and rock platforms interspersed with sand dune fields. The frequent fog and relatively cool temperatures of the area are caused by the cool offshore Benguela Current. Namibe (formerly Moçâmedes) city in the centre of the desert receives less than 2 inches (50 mm) of rainfall annually. The desert is almost totally uninhabited except for the residents of the small coastal fishing towns and the iron-ore exporting centre of Namibe. *Welwitschia mirabilis,* a curious plant whose two gigantic leaves sprawl over the surface of the ground, is unique to the area.

Mocatta, Frederic David (b. Jan. 15, 1828, London, Eng.—d. Jan. 16, 1905, London), British philanthropist, historian, bibliophile, and patron of learning who subsidized the publication of a number of major works of Jewish literature.

From 1857 to 1874, Mocatta directed the firm (founded by his grandfather) of Mocatta and Goldsmid, bullion brokers to the Bank of England. Upon retirement he devoted his time to charitable works—supporting better housing for workers, contributing money to almost every hospital in London, and promoting education. As a Jew, he was especially concerned with the plight of the Jewish poor.

Mocatta's chief historical work is the survey *The Jews of Spain and Portugal and the Inquisition* (1877), which was later translated into several languages. Mocatta is perhaps best remembered as a patron of learning and as a bibliophile. He subsidized the publication of such major works as *Zur Geschichte und Literatur* (1845; "On History and Literature") by Leopold Zunz and the classic *History of the Jews* (1891–92), a condensed and updated translation of Heinrich Graetz's *Geschichte der Juden von den ältesten Zeiten bis auf die Gegenwart,* 11 vol. (1853–76). Mocatta bequeathed his fine library of Jewish history and English Judaica to the University College of London. The Mocatta Library is administered jointly with the Jewish Historical Society of England, of which Mocatta was president from 1900 to 1902.

moccasin, either of two venomous, aquatic New World snakes of the viper family (Viperidae): the water moccasin (species *Agkistrodon piscivorus*) or the Mexican moccasin (*A. bilineatus*). Both are pit vipers (subfamily Crotalinae), so named because of the characteristic sensory pit between each eye and nostril.

The water moccasin inhabits marshy lowlands of the southeastern United States. It is also known as the cottonmouth because it threatens with the mouth open, showing the white interior. It is up to 1.5 m (5 feet) long and is brown with darker crossbands or completely black. A dangerous snake with a potentially lethal bite, it tends to stand its ground when alarmed. It eats almost any small animals, including turtles, fish, and birds.

Water moccasin (*Agkistrodon piscivorus*) in threatening posture
© 1992 E.R. Degginger

The Mexican moccasin, or cantil, is found in lowland regions from the Río Grande to Nicaragua. It is a dangerous snake and is brown or black with narrow, irregular whitish bars on its back and sides. It is usually about 1 m (3 feet) long. For highland moccasin, *see* copperhead.

moccasin, heelless shoe of soft leather, the sole of which may be hard or soft and flexible; in soft-soled moccasins, the sole is brought up the sides of the foot and over the toes, where it is joined by a puckered seam to a U-shaped piece lying on top of the foot. The upper part of the moccasin is often adorned with embroidery, beading, or other ornament.

Moccasins of the Eastern Woodland Indians of North America, decorated with quillwork and beads
© Lee Boltin

From earliest times the moccasin was the footwear of North American Indians and was also worn by hunters, traders, and settlers. In the second half of the 20th century, moccasins became a popular sport and casual shoe. The term can also apply to slip-on shoes with a lap seam on the forefront of the vamp, imitating the seam of the true moccasin.

Mocenigo FAMILY, one of the most renowned patrician families of the Venetian Republic, to which it supplied military leaders, scholars, churchmen, diplomats, and statesmen, including seven doges.

Tommaso Mocenigo (1343–1423) commanded a crusading fleet that sacked Nicopolis (now Nikopol, Bulg.) in 1396. Elected doge in 1414, he extended Venetian dominion over the Trentino, Friuli, and Dalmatia. Yet his statesmanship was essentially pacific, and he is best remembered for a deathbed address in which he described with many details the flourishing commercial state of Venice and admonished against military adventures. Tommaso's nephew Pietro (1406–76) was one of the greatest Venetian admirals. Reorganizing the Venetian fleet after the defeat of Negroponte (1470) at the hands of the Turks, he conducted successful reprisals, taking Smyrna in 1472 and raising the Turkish siege of Scutari (now Shkodër, Alb.). He was elected doge in 1474; a new Venetian coin struck during his reign was given the family name. His brother Giovanni (1408–85) became doge in 1478 and succeeded in concluding peace with the Ottoman Empire; in the War of Ferrara he acquired Rovigo and Polesine for Venice.

The next outstanding Mocenigo was Giovanni's grandson Andrea (1473–1542), who added literary lustre to the family name with a verse history of the Turkish war of 1500 and a prose history of that of the League of Cambrai. His nephew Alvise I (1507–77) was doge from 1570; his reign was dominated by a new war with the Turks in which Nicosia and Famagusta were lost but in which the great naval victory of Lepanto was won. The family suffered a political eclipse for the next 125 years, until a great-grandnephew of Alvise I became doge as Alvise II from 1700 to 1709, followed a few years later by Alvise III Sebastiano, doge from 1723 to 1732. A distant cousin, Alvise IV (1701–78), was doge from 1763 to 1778 and sought to reverse the declining fortunes of the republic by an enlightened commercial policy and a series of measures in restraint of clerical wealth and privilege that provoked a conflict with Pope Clement XIII.

The Palazzo Mocenigo survives on the Grand Canal in Venice.

Mocha, Arabic AL-MUKHĀ, also spelled MOKHA, or MUKHA, town, southwestern Yemen, on the Red Sea and the Tihāmah (coastal plain). Yemen's most renowned historic port, it lies at the head of a shallow bay between two headlands, with an unprotected anchorage 1.5 miles (2.5 km) offshore. It was long famous as Arabia's chief coffee-exporting centre; the term mocha and variations of the word have entered European languages as a synonym for the high-quality coffee of the species *Coffea arabica,* still grown in the Yemen Highlands and formerly exported through the town.

Mocha's founding in the 14th century is traditionally associated with the Muslim holy man Shaykh Shādhilī, who is supposed to have introduced coffee drinking to Arabia. An important trade centre through the 17th century, it was regularly visited by Indian traders, who traded finished metal products for Yemeni coffee and myrrh. It also dealt with Egyptian merchants, who sailed to Mocha on the summer northwesterly Red Sea winds.

Coffee for the European and Middle East markets was Mocha's chief export from the 15th century. Trading establishments (known as factories because they were headed by commercial agents, or factors) were maintained there by the British, the Dutch (1614–1738), and, briefly, the Danes and the French.

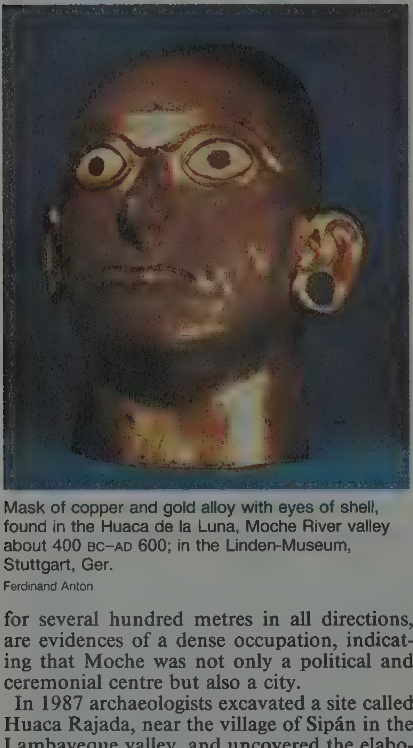
Long under Ottoman suzerainty, Mocha was surrendered to the Yemeni imam (leader) Muḥammad al-Muʾayyad I in 1636. It prospered in the 17th and early 18th centuries; even the port of Zeila (in present Somalia, across the Gulf of Aden) became tributary to Mocha and its rulers until 1884. The Ottomans held the town again from 1849 to 1918. The conflicts between the European powers and the Ottoman Empire, and those between the Ottoman Empire and the imams of Yemen, contributed to the port's decline, which was hastened by the development of coffee plantations in Java (now in Indonesia) by the Dutch and by the rise of the South American coffee industry (early 18th century). The British moved their base of operations in the area from Mocha to Aden in 1839 and were followed by the other European trading nations. This sealed the fate of the port; Yemen's trade thereafter was diverted either to Aden or to the Yemeni port of Al-Ḥudaydah. One estimate puts the decline of Mocha's population from about 20,000 in the early 1800s to about 1,000 in the 1930s. Some efforts toward resettlement were made under the monarchy in the 1950s.

Most of the formerly fine public buildings, residences, and mosques are in ruins. Mocha is on a sandy, arid stretch of the coast, and blowing sand and inadequate water supply have contributed to its decline. It is the coastal terminus of a modern road (completed 1965), built partly with United States aid, leading eastward to Taʿizz, thence north, via Ibb and Dhamār, to the city of Ṣanʿāʾ, the national capital. Mocha's port, capable of berthing only small vessels, underwent construction improvements in the early 1980s. Pop. (latest est.) 1,163.

mocha stone: *see* moss agate.

Moche, also called MOCHICA, the dominant civilization on the northern coast of present-day Peru from the 1st to the 8th century AD, during the Early Intermediate Period (*c.* 400 BC–AD 600). The name is taken from the great site of Moche, in the river valley of the same name, which appears to have been the capital or chief city of the Moche peoples. Their settlements extended along the hot, arid coast of northern Peru from the Lambayeque River valley south for more than 215 miles (350 km) to the Nepeña River valley.

Until the 1980s, the culture's best-known remains were those of Moche itself, near Trujillo in the Moche River valley. Two giant structures, known as the Temple of the Sun (Huaca del Sol) and the Temple of the Moon (Huaca de la Luna), dominate the site, though there is no evidence that they were ever so dedicated. The Temple of the Sun is a causeway and stepped pyramid, about 1090 by 446 feet (340 by 136 m) at the base and 135 feet (41 m) high. A short distance away, the Temple of the Moon is a terraced platform built against a natural hillside and capped with large rooms and courtyards. Over the surrounding ground, for several hundred metres in all directions, are evidences of a dense occupation, indicating that Moche was not only a political and ceremonial centre but also a city.



Mask of copper and gold alloy with eyes of shell, found in the Huaca de la Luna, Moche River valley about 400 BC–AD 600; in the Linden-Museum, Stuttgart, Ger.

Ferdinand Anton

In 1987 archaeologists excavated a site called Huaca Rajada, near the village of Sipán in the Lambayeque valley, and uncovered the elaborate, jewelry-filled tomb of a Moche warrior-priest. Several more burial chambers containing the remains of Moche royalty were soon excavated, all dating from about AD 300. These finds greatly aided the understanding of Moche society, religion, and culture. Dozens of other Moche pyramid-platform sites exist in the coastal valleys of northern Peru, with most either looted by artifact hunters or still unexcavated.

The Moche channeled streams flowing down from the Andes into an extensive system of irrigation canals that were used to grow corn (maize), beans, and other crops. This intensive agriculture supported numerous urban centres. Political authority was fragmented, however, with each river valley or string of valley towns and villages having its own royalty and warrior-priesthood. The Moche produced sophisticated craft goods, including mold-made pottery that is among the finest naturalistic sculpture in pre-Columbian Peru. These vessels—fine-quality water jars with characteristic stirrup spouts—bear portrait heads of individuals, animals, plants, buildings, and fantastic or demonic beings. Painted scenes on some vessels have yielded an understanding of ceremonial and everyday life in the Moche culture, including the sacrifice of prisoners-of-war and the ritual consumption of their blood. The Moche also were skilled metalworkers who in their jewelry used chemical means to electroplate gold and silver. Moche architecture featured flat-topped pyramids and platforms connected by ramps and dotted with courtyards and plazas.

The reasons for the demise of the Moche are unknown, but the civilization may have succumbed to earthquakes, prolonged drought, catastrophic flooding arising from the El Niño climatic anomaly, the encroachment of sand dunes on populated areas, or less tangible social and cultural factors.

Mochudi, village, southeastern Botswana. It lies 23 miles (37 km) northeast of Gaborone, the national capital. Settled by the Tswana people in 1871, Mochudi is the administrative seat of the chief of the Bakgatla tribe. In Setswana, *Mochudi* means "a person who dishes out food from a pot" and refers to the traditional hospitality of the Tswana people toward visitors. Situated in an area adjacent to the Kalahari (desert), the town is subject to recurring periods of severe drought; subsistence farming and livestock raising are the basis of the local economy. Water is obtained from boreholes. Pop. (1997 est.) 25,542.

mock-epic, also called MOCK-HEROIC, form of satire that adapts the elevated heroic style of the classical epic poem to a trivial subject. The tradition, which originated in classical times with an anonymous burlesque of Homer, the *Batrachomyomachia* (*Battle of the Frogs and the Mice*), was honed to a fine art in the late 17th- and early 18th-century Neoclassical period. A double-edged satirical weapon, the mock-epic was sometimes used by the "moderns" of this period to ridicule contemporary "ancients" (classicists). More often it was used by "ancients" to point up the unheroic character of the age by subjecting thinly disguised contemporary events to a heroic treatment. The classic example of this is Nicolas Boileau's *Lutrin* (1674–83; "The Lectern"), which begins with a quarrel between two ecclesiastical dignitaries about where to place a lectern in a chapel and ends with a battle in a bookstore in which champions of either side hurl their favourite "ancient" or "modern" authors at each other. Jonathan Swift's "Battle of the Books" (1704) is a variation of this theme in mock-heroic prose. The outstanding English mock-epic is Alexander Pope's brilliant tour de force *The Rape of the Lock* (1714), which concerns a society beau's theft of a lock of hair from a society belle.

Most mock-epics begin with an invocation to the muse and use the familiar epic devices of set speeches, supernatural interventions, and descents to the underworld, as well as infinitely detailed descriptions of the protagonist's activities. Thus, they provide much scope for display of the author's ingenuity and inventiveness. An American mock-epic, Joel Barlow's *Hasty Pudding* (written 1793), celebrates in three 400-line cantos his favourite New England dish, cornmeal mush.

mock privet, any shrub or small tree of the genus *Phillyrea* in the olive family, Oleaceae. The four species of mock privet, native to the Mediterranean area, sometimes are grown as ornamentals for their handsome, glossy, evergreen leaves. *P. decora* reaches 3 m (10 feet) and has shining leaves and clusters of small, white flowers. The small, bright red, one-seeded fruits turn purple-black as they mature. *P. latifolia* reaches 10 m, and *P. angustifolia,* about 5 m.

mockingbird, any of several versatile songbirds of the New World family Mimidae (order Passeriformes). The common, or northern, mockingbird (*Mimus polyglottos*) is well known as a mimic; it has been known to imitate the songs of 20 or more species within 10 minutes. It is 27 cm (10.5 inches) long and gray with darker wings and tail both marked with white. It ranges from the northern United States to Mexico—or to Brazil, if the tropical mockingbird (*M. gilvus*) is considered a race rather than a separate species—and has been introduced into Hawaii. It thrives in suburban areas. This bird sings from high perches and vigorously defends its territory; it may even sing at night.

Blue mockingbird (*Melanotis caerulescens*)

Drawing by H. Jon Janosik

Other species of *Mimus* range from Central and South America to Patagonia, and the blue mockingbird (*Melanotis*) inhabits much of Mexico. The Galapagos mockingbird (*Nesomimus*) has various races or subspecies on the different islands, showing an adaptive radiation similar to, but not as extreme as, that found in the Galapagos finch.

Mocoa, capital of Putumayo *departamento,* southern Colombia. It lies in the eastern flanks of the Andes Mountains, on a tributary of the Caquetá River. Founded in 1551, it is a commercial centre for the surrounding agricultural (principally sugarcane-growing) and pastoral (cattle-raising) lands and tropical rainforests of the Amazon River basin. Mocoa is just off the highway linking Pasto, capital of Nariño department, located 45 miles (72 km) to the west-northwest, and Puerto Asís, situated 50 miles (80 km) to the south on the Putumayo River. Pop. (1999 est.) 17,000.

Moctezuma II: *see* Montezuma II.

modal logic, branch of logic that deals with modalities (such properties of propositions as necessity, contingency, possibility, and impossibility), as opposed to truth and falsity; thus the statements "Some men may be immortal" and "Men are necessarily social animals" are modal propositions. Although modal syllogisms were considered by Aristotle, modal logic remains today an uncertain field. Modern attempts to deal with the problem are found in the many-valued logics, which allow other truth-values between truth and falsity, and in systems of strict implication—systems of theorems that differ somewhat depending upon the relations between the different modalities that are set forth in their axioms. *Compare* truth-value.

modality, in logic, the classification of logical propositions according to their asserting or denying the possibility, impossibility, contingency, or necessity of their content. Modal logic, which studies the logical features of such concepts, originated with Aristotle, was extensively studied by logicians in antiquity and the European Middle Ages, and, for the most part, was neglected after the Renaissance until revived in modern mathematical logic. The basic statement on this subject, presupposed in most contemporary discussions, is by C.I. Lewis and Cooper Harold Langford in *Symbolic Logic* (1932), which develops a modal system of "strict implication" for interpreting the logical force of "if . . . then."

mode, in music, any of several ways of ordering the notes of a scale according to the intervals they form with the tonic note, thus providing a theoretical framework for melodic music. A mode is the vocabulary of a melody; it specifies which notes can be used and indicates which notes will have special importance. Of these notes, there are two principal ones: the final, the note on which the melody will end; and the dominant, the note that it will take as its secondary centre.

A brief treatment of mode follows. For full treatment, *see* MACROPAEDIA: Music, The Art of.

In ancient and exotic traditions the notion of mode is quite elaborate and prescribed: a certain mode may have certain turns of phrase associated with it (this is particularly so in the case of the ragas of India, which embody a concept and practice whereby a given set of notes is used throughout a performance). In most Western art music, however, the mode is simply a scale in which the final and dominant are determined. This was the concept of mode developed by Greek theorists from the time of the 6th-century-BC mathematician Pythagoras, who theorized on the functional significance of numbers in music, up to the first two centuries of the Christian era. The concept of the mode became the basic theory for music in the Western church. The word mode now normally implies one of the eight types (Dorian, Hypodorian, Phrygian, Hypophrygian, Lydian, Hypolydian, Mixolydian, and Hypomixolydian) found in plainchant, or plainsong, which were described by writers on music from about the 9th century. They are sometimes known as the church modes, but, though they are the basic material of the vast repertoire of liturgical chant in the West, they were the substance too of every other kind of medieval music, from troubadour songs to the great masses of the 15th-century French composer Guillaume Dufay. From church and court they spread into the surrounding country, so that most folk music in western Europe is grounded in the same modes.

The Renaissance, associated with the emergence of the system of major and minor keys, brought changes in compositional practice that 16th-century theorists sought to contain by adding four new modes. Two of these, the Ionian and the Aeolian, may be seen as the ancestors of the major and the minor scales, respectively. During the 17th century the modes dwindled in importance, and the major-minor system of scales became definitively established. Modes remained in the background, however, to effect harmonic nuance. One may speak, for instance, of a "Lydian F major" to describe music in F major in which the fourth is persistently raised from B flat to B.

Certain composers turned to modal practice from an interest in folksong, sometimes giving a modal colour to music that remains in the major-minor system, sometimes using modes more systematically to develop alternatives to the major and minor keys. Many composers in the 20th century have done this in order to escape from the old system without adopting atonality, and normally they have constructed modes of their own rather than returning to those of the Middle Ages. Béla Bartók, Igor Stravinsky, Olivier Messiaen, and Peter Maxwell Davies all offer evidence of the new vitality of modal composition after a lapse of half a millennium in the Western tradition, while the music of Asia and Africa has its roots in modes that have never died.

mode (grammar): *see* mood.

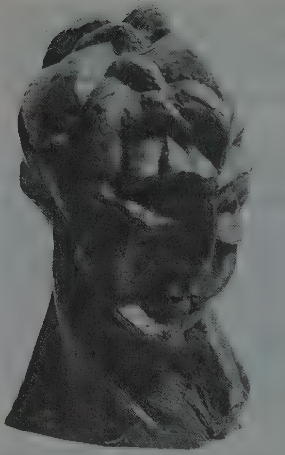
Model Army, New (English Civil War): *see* New Model Army.

Model T, automobile built by the Ford Motor Company from 1908 until 1927. Conceived by Henry Ford as practical, affordable transportation for the common man, it quickly became prized for its low cost, durability, versatility, and ease of maintenance. More than 15 million Model Ts were built in Detroit and Highland Park, Mich. (The automobile was also assembled at a Ford plant in Manchester, Eng., and at plants in continental Europe.) Assembly-line production allowed the price of the touring car version to be lowered from $850 in 1908 to less than $300 in 1925. At such prices the Model T at times comprised as much as 40 percent of all cars sold in the United States. Even before it lost favour to larger, more powerful, and more luxurious cars, the Model T, known popularly as the "Tin Lizzie" or the "flivver," had become an American folkloric symbol, essentially realizing Ford's goal to "democratize the automobile."

The Model T was offered in several body styles, including a five-seat touring car, a two-seat runabout, and a seven-seat town car. All bodies were mounted on a uniform 100-inch-wheelbase chassis. A choice of colours was originally available, but from 1913 to 1925 the car was mass-produced in only one colour—black. The engine was simple and efficient, with all four cylinders cast in a single block and the cylinder head detachable for easy access and repair. The engine generated 20 horsepower and propelled the car to modest top speeds of 40–45 miles per hour (65–70 km/h). In most models the engine was started by a hand crank, which activated a magneto connected to the flywheel, but after 1920 some models were equipped with battery-powered starters. The transmission, consisting of two forward gears and one reverse, was of the planetary type, controlled by foot pedals rather than the more common hand lever used in sliding-gear transmissions. Spark and throttle were controlled by a hand lever on the steering column. The 10-gallon fuel tank was located under the front seat. Because gasoline was fed to the engine only by gravity, and also because the reverse gear offered more power than the forward gears, the Model T frequently had to be driven up a steep hill backward. Such deficiencies, along with its homely appearance, less-than-comfortable ride at top speeds, and incessant rattling, made the Model T the butt of much affectionate humour in innumerable jokes, songs, poems, and stories.

modeling, also spelled MODELLING, in sculpture, working of plastic materials by hand to build up form. Clay and wax are the most common modeling materials, and the artist's hands are the main tools, though metal and wood implements are often employed in shaping. Modeling is an ancient technique, as indicated by prehistoric clay figurines from Egypt and the Middle East.

Modeling is an additive process, as opposed to carving, the other main sculptural technique, in which portions of a hard substance are cut away to reveal form. Unlike carving, corrections are possible during modeling, and the result—fired clay or preserved wax—is not as permanent as a stone or wood carving. Modeled work, however, may be reproduced in stone by pointing (transferring the proportions of the model to the block of stone by mechanical means) or, in metal, by casting. Finished works modeled in clay or wax should not be confused with bozzetti, small wax or clay models serving as preliminary sketches for large carvings.



"Woman's Head," sculpture modeled in clay and reproduced by casting in bronze by Pablo Picasso, *c.* 1909; in the Museum of Modern Art, New York

Collection, the Museum of Modern Art, New York

modem (from "*mo*dulator/*dem*odulator"), any of a class of electronic devices that convert digital data signals into analog signals suitable for transmission over analog telecommunications circuits. A modem also receives modulated signals and demodulates them, recovering the digital signal for use by the data equipment. Modems thus make it possible for established communications channels to support a wide variety of data communication, such as electronic mail between personal computers, facsimile transmission between fax machines, or the downloading of audio-video files from a database server to a home computer.

A brief treatment of modems follows. For full treatment, *see* MACROPAEDIA: Telecommunications Systems.

Most modems are "voiceband"; *i.e.,* they enable digital terminal equipment to communicate over telephone channels, which are designed around the narrow bandwidth requirements of the human voice. So-called cable modems, on the other hand, support the transmission of data over wider-bandwidth cable and cable/fibre-optic channels. Both voiceband and cable modems are marketed as free-standing, book-sized modules that plug into a telephone or cable outlet and a port on a personal computer. In addition, voiceband modems are often installed as circuit boards directly into computers and fax machines. They are also available as small card-sized units that plug into laptop computers.

Modems operate in part by communicating with each other, and to do this they must follow matching protocols, or operating standards. Worldwide standards for voiceband modems are established by the V-series of recommendations published by the International Telecommunication Union's Telecommunication Standardization sector (ITU-T; formerly the International Telegraph and Telephone Consultative Committee, or CCITT). Among other functions, these standards establish the signaling by which modems initiate and terminate communication, establish compatible modulation and encoding schemes, and arrive at identical transmission speeds. Some operating specifications of prominent V-series standards are shown in the Table on page 214. Modems that transmit at the bit rates shown also have the ability to "fall back" to lower speeds in order to accommodate slower modems. "Full-duplex" standards allow simultaneous transmission and reception, which is necessary for interactive communication. "Half-duplex" standards also allow two-way communication, but not simultaneously; such modems are sufficient for facsimile transmission.

Voiceband modem operating standards

ITU-T standard	transmission rate	modulation method	transmission mode
V.27ter	4.8 kbps	PSK	half-duplex
V.29	9.6 kbps	QAM	half-duplex
V.17	14.4 kbps	QAM/TCM	half-duplex
V.21	300 bps	FSK	full-duplex
V.22	1.2 kbps	PSK	full-duplex
V.22bis	2.4 kbps	QAM	full-duplex
V.32	9.6 kbps	QAM/TCM	full-duplex
V.32bis	14.4 kbps	QAM/TCM	full-duplex
V.34	28.8 kbps	QAM/TCM	full-duplex

Data signals consist of multiple alternations between two values, represented by the binary digits, or bits, 0 and 1. Analog signals, on the other hand, consist of time-varying, wavelike fluctuations in value, much like the tones of the human voice. In order to represent binary data, the fluctuating values of the analog wave (*i.e.,* its frequency, amplitude, and phase) must be modified, or modulated, in such a manner as to represent the sequences of bits that make up the data signal. Modems employ a number of modulation methods to do this. The most important are frequency-shift keying (FSK), in which the carrier wave is shifted between two established frequencies, each frequency element representing one bit; phase-shift keying (PSK), in which the carrier wave is shifted among as many as eight different phase angles, each phase element representing up to three bits; and quadrature amplitude modulation (QAM), in which the signal is simultaneously shifted among four phase angles and a number of amplitude levels, each quadrature-amplitude element representing as many as six bits.

Each element of the modulated carrier wave is known as a baud. In FSK, employed by early voiceband modems beginning in the early 1960s, one baud represents one bit, so that a modem operating at 300 bauds per second (or, more simply, 300 baud) will transmit data at 300 bits per second (bps). In PSK and QAM, each baud represents several bits; with some modern modems operating at greater than 2,400 baud, it is possible to achieve data transmission rates as high as 28,800 bits, or 28.8 kilobits, per second. At the highest bit rates, channel-encoding schemes such as trellis-coded modulation (TCM) must be employed in order to reduce transmission errors. In addition, various source-encoding schemes can be used to compress the data into fewer bits, increasing the rate of information transmission without raising the bit rate.

Voiceband modems achieve the bit rates outlined above by modulating a carrier wave of approximately 1,800 hertz. Cable modems, by using QAM on a carrier wave with a frequency as high as 6 megahertz (6 million hertz), achieve a throughput of several million bits per second.

Modena, Latin MUTINA, city, capital of Modena *provincia,* Emilia-Romagna *regione,* northern Italy. It lies between the Secchia and Panaro rivers, northwest of Bologna. Modena was the Mutina of the Boii, a Celtic people, and was subdued by the Romans about 218 BC, becoming a Roman colony on the Via Aemilia in 183 BC. It was attacked and ruined by the Huns under Attila and by the Lombards and was restored at the end of the 9th century under the direction of its bishop (later archbishop). As a dependency of the house of Canossa and later as a free commune, it was the scene of violent conflicts between the Guelf and Ghibelline (papal and imperial) factions until it passed to the house of Este in 1288; it became a duchy in 1452 and the Este capital after their loss of Ferrara in 1598. After internal difficulties under the reactionary policies of the last Este rulers, the representatives of Modena declared it part of the kingdom of Italy in 1859, a decision confirmed by the plebiscite of 1860.

The old city's fortified walls, now converted to promenades, give it a pentagonal shape. Notable buildings include the cathedral, begun in 1099 in Romanesque style on the site of earlier structures and celebrated for its sculptural decoration; the bell tower (Torre Ghirlandina), completed in 1319, the symbol of the city; and the imposing ducal palace (begun 1634), now a military academy. The Palazzo dei Musei houses the municipal collections, including the Este Gallery and Museum (rich in Renaissance paintings) and the Este Library, noted for its collection of illuminated manuscripts. The picture collection was given by Francesco V in 1869; the library, established by the Este family in Ferrara in 1393, was moved to Modena in 1598. Modena also has a university, founded in 1175.

Ducal palace, now a military academy, Modena, Italy

G. Barone—SCALA from Art Resource

The modern city, which includes residential and industrial areas, extends outward from the city walls. The automobile industry is most important; and there are metalworks, cast-iron and light-alloy foundries, and machine industries. An agricultural centre, Modena has a busy cattle market and leatherwork factories. Pop. (1994 est.) mun., 176,588.

modern art, painting, sculpture, architecture, and graphic arts characteristic of the 20th century and of the later part of the 19th century. Modern art embraces a wide variety of movements, theories, and attitudes whose modernism resides particularly in a tendency to reject traditional, historical, or academic forms and conventions in an effort to create an art more in keeping with changed social, economic, and intellectual conditions.

The beginnings of modern painting cannot be clearly demarcated, but there is general agreement that it started in 19th-century France. The paintings of Gustave Courbet, Edouard Manet, and the Impressionists represent a deepening rejection of the prevailing academic tradition and a quest for a more naturalistic representation of the visual world. These painters' Postimpressionist successors can be viewed as more clearly modern in their repudiation of traditional techniques and subject matter and their expression of a more subjective personal vision. From about the 1890s on, a succession of varied movements and styles arose that are the core of modern art and that represent one of the high points of Western visual culture. These modern movements include Neo-Impressionism, Symbolism, Fauvism, Cubism, Futurism, Expressionism, Suprematism, Constructivism, Metaphysical painting, De Stijl, Dada, Surrealism, Social Realism, Abstract Expressionism, Pop art, Op art, Minimal art, and Neo-Expressionism. Despite the enormous variety seen in these movements, most of them are characteristically modern in their investigation of the potentials inherent within the painting medium itself for expressing a spiritual response to the changed conditions of life in the 20th century. These conditions include accelerated technological change, the expansion of scientific knowledge and understanding, the seeming irrelevance of some traditional sources of value and belief, and an expanding awareness of non-Western cultures.

An important trend throughout the 20th century has been that of abstract, or nonobjective, art—*i.e.,* art in which little or no attempt is made to objectively reproduce or depict the appearances or forms of objects in the realm of nature or the existing physical world. It should also be noted that the development of photography and of allied photomechanical techniques of reproduction has had an obscure but certainly important influence on the development of modern art, because these mechanical techniques freed (or deprived) manually executed drawing and painting of their hitherto crucial role as the only means of accurately depicting the visible world.

Modern architecture arose out of the rejection of revivals, classicism, eclecticism, and indeed all adaptations of past styles to the building types of industrializing late 19th- and 20th-century society. It also arose out of efforts to create architectural forms and styles that would utilize and reflect the newly available building technologies of structural iron and steel, reinforced concrete, and glass. Until the spread of Postmodernism, modern architecture also implied the rejection of the applied ornament and decoration characteristic of premodern Western buildings. The thrust of modern architecture has been a rigorous concentration on buildings whose rhythmical arrangement of masses and shapes states a geometric theme in light and shade. This development has been closely tied to the new building types demanded by an industrialized society, such as office buildings housing corporate management or government administration. Among the most important trends and movements of modern architecture are the Chicago School, Functionalism, Art Deco, Art Nouveau, De Stijl, the Bauhaus, the International Style, the New Brutalism, and Postmodernism.

Modern Art, Museum of (MOMA), comprehensive collection of primarily American and European art ranging from the late 19th century to the present that was established in New York City in 1929. The museum's holdings of Cubist, Surrealist, and Abstract Expressionist paintings are especially extensive. Besides paintings, sculpture, and graphic art, the museum specializes in industrial design, architecture, photography, and motion pictures.

The 1939 museum building by Philip Goodwin and Edward Durell Stone was later expanded with an addition designed by Philip Johnson, who also planned the garden in 1953. A condominium tower and a west wing that doubled the museum's exhibition space were completed in 1984.

modern dance, theatrical dance that began to develop in the United States and Europe late in the 19th century, receiving its nomenclature and a widespread success in the 20th. It evolved as a protest against both the balletic and the interpretive dance traditions of the time.

A brief treatment of modern dance follows. For full treatment, *see* MACROPAEDIA: Dance, The Art of.

The forerunners of modern dance in Europe include Émile Jaques-Dalcroze, proponent of the eurythmics system of musical instruction, and Rudolf Laban, who analyzed and systematized forms of human motion. A number of the modern dance movement's precursors appeared in the work of American women. Loie Fuller, an American actress turned dancer, first gave the free dance artistic status in the United States. Her use of theatrical lighting and transparent lengths of China-silk fabrics at once won her acclaim from artists as well as general audiences. She preceded other modern dancers in rebelling against any formal technique, in establishing a company, and in making films.

Dance was only part of Fuller's theatrical effect; for another American dancer, Isadora Duncan, it was the prime resource. Duncan brought a vocabulary of basic movements to heroic and expressive standards. She performed in thin, flowing dresses that left arms and legs bare, bringing a scale to her dancing that had immense theatrical projection. Her revelation of the power of simple movement made an impression on dance that lasted far beyond her death.

Formal teaching of modern dance was more successfully achieved by Ruth St. Denis and Ted Shawn. St. Denis based much of her work on Eastern dance styles and brought an exotic glamour to her company. Shawn was the first man to join the group, becoming her partner and soon her husband. Nonballetic dance was formally established in 1915, when they founded the Denishawn school.

From the ranks of Denishawn members, two women emerged who brought a new seriousness of style and initiated modern dance proper. Doris Humphrey emphasized craftsmanship and structure in choreography, also developing the use of groupings and complexity in ensembles. Martha Graham began to open up fresh elements of emotional expression in dance. Humphrey's dance technique was based on the principle of fall and recovery, Graham's on that of contraction and release. At the same time in Germany, Mary Wigman, Hanya Holm, and others were also establishing comparably formal and expressionist styles. As in Duncan's dancing, the torso and pelvis were employed as the centres of dance movement. Horizontal movement close to the floor became as integral to modern dance as the upright stance is to ballet. In the tense, often intentionally ugly, bent limbs and flat feet of the dancers, modern dance conveyed certain emotions that ballet then eschewed. Furthermore, modern dance dealt with immediate and contemporary concerns in contrast to the formal, classical, and often narrative aspects of ballet. It achieved a new expressive intensity and directness.

A revolt in turn against Graham's expressionism was led by Merce Cunningham, who rejected psychological and emotional elements in choreography. Cunningham's dance technique began to incorporate as much ballet as it did modern dance, while his choreographic methods admitted chance as an element of composition and organization. Also in the 1950s Alwin Nikolais began to develop productions in which dance was immersed in effects of lighting, design, and sound, while Paul Taylor achieved a generally vigorous and rhythmic style with great precision and theatrical projection in several works responding to classical scores.

Cunningham was a prime influence on the development of postmodern dance in the 1960s and later. Based especially in New York City, a large number of new dancers and choreographers began to abandon virtuoso technique, to perform in nontheatre spaces, and to incorporate repetition, improvisation, minimalism, speech or singing, and mixed-media effects, including film. Out of this context emerged such artists as Twyla Tharp, who gradually reintroduced academic virtuosity, rhythm, musicality, and dramatic narrative to her dance style, which was based in ballet and yet related to the improvisatory forms of popular social dance.

Catherine Wheel, a modern dance choreographed by Twyla Tharp, 1981

Martha Swope

Since its founding, modern dance has been redefined many times. Though it clearly is not ballet by any traditional definition, it often incorporates balletic movement; and though it may also refer to any number of additional dance elements (those of folk dancing or ethnic, religious, or social dancing, for example), it may also examine one simple aspect of movement. As modern dance changes in the concepts and practices of new generations of choreographers, the meaning of the term modern dance grows more ambiguous.

moderne gennembrud, det (Danish: "the modern breakthrough"), literary movement beginning about 1870, dominated by the Danish critic Georg Brandes, that introduced the literary trends of naturalism and realism to the Scandinavian world.

Brandes—influenced by Hippolyte Taine, Charles-Augustin Sainte-Beuve, and John Stuart Mill—felt his mission as a critic was to bring Denmark out of its backwater and isolation. His *Hovedstrømninger i det 19de aarhundredes litteratur* (1872–90; *Main Currents in 19th Century Literature*) caused a great sensation not only in Denmark but throughout the rest of Scandinavia; and his demands that literature should concern itself with life and reality, not with fantasy, and that it should work in the service of progress rather than reaction provoked much discussion. He influenced the Norwegian dramatist Henrik Ibsen and the Swedish dramatist August Strindberg. Jens Peter Jacobsen was among the first Danish writers to exhibit the influence of Brandes' theories; his novel *Niels Lyhne* and his short stories deal with the problem of dreams versus reality. Holger Drachmann, the greatest lyrical poet of the period, began his career as a staunch supporter of Brandes, against whom he reacted strongly later.

Henrik Pontoppidan emerged as one of Denmark's great novelists. His early stories reveal social injustices; and in several of his short novels he discusses the political, moral, and religious problems of his day. Herman Bang was another novelist who cultivated a determined realism. His works deal with insignificant people, the gray and lonely and miserable men and women who are normally overlooked because nothing ever seems to happen in their undramatic lives.

Other novelists associated with the movement are Sophus Schandorph, Vilhelm Topsøe, Edvard Brandes, and Karl Gjellerup. Sven Lange, Einar Christiansen, and Henri Nathansen are three notable playwrights.

moderne gymnastics, also called MODERN RHYTHMIC GYMNASTICS: *see* rhythmic sportive gymnastics.

Modernism, in Roman Catholic church history, a movement in the last decade of the 19th century and first decade of the 20th that sought to reinterpret traditional Catholic teaching in the light of 19th-century philosophical, historical, and psychological theories and called for freedom of conscience. Influenced by non-Catholic biblical scholars, Modernists contended that the writers of both the Old and the New Testaments were conditioned by the times in which they lived and that there had been an evolution in the history of biblical religion. Modernism also reflected a reaction against the increasing centralization of church authority in the pope and the Roman Curia (papal bureaucracy).

In France the movement was closely associated with the writings of Alfred Firmin Loisy, who was dismissed in 1893 from his teaching position at the Institut Catholique in Paris for his views about the Old Testament canon. These views, later expressed in *La Religion d'Israel* (1900; "The Religion of Israel"), and his theories on the Gospels in *Études évangéliques* (1902; "Studies in the Gospels") were both condemned by François Cardinal Richard, the archbishop of Paris. In England George Tyrrell, an Irish-born Jesuit priest, was dismissed from his teaching post and from the Jesuits for his views on papal infallibility and for a doctrine that minimized the intellectual element of revelation and thus seemed to contradict the teachings of the first Vatican Council (1869–70). His theories influenced others, notably the French layman Édouard Le Roy. Also in England, an Austrian-born scholar, Baron Friedrich von Hügel, was critical of some methods of church government and defended the right of Loisy and Tyrrell to publish their views; he did not, however, reject the papacy or share some of Tyrrell's philosophical opinions. In Italy the writings of Loisy and Tyrrell influenced the priest-scholars Ernesto Buonaiuti and Giovanni Semeria, the novelist Antonio Fogazzaro, and other Catholics. In Italy, as also in Germany, concern with reform of church institutions was a more prominent theme than rejection of doctrine.

The reaction of Rome included the suspension or excommunication of certain priests and scholars who were associated with the movement, the placement of books on the *Index of Forbidden Books,* the establishment in 1903 by Pope Leo XIII of the Pontifical Biblical Commission to monitor the work of Scripture scholars, and the formal condemnation in 1907 in the papal encyclical *Pascendi Dominici Gregis* and the decree *Lamentabili Sane Exitu* of the Curia's Holy Office. In order to ensure enforcement, the priest-scholar Umberto Benigni organized, through personal contacts with theologians, a nonofficial group of censors who would report to him those thought to be teaching condemned doctrine. This group, known as Integralists (or *Sodalitium Pianum,* "Solidarity of Pius"), frequently employed overzealous and clandestine methods and hindered rather than helped the combating of Modernism. On June 29, 1908, Pius X publicly admitted that Modernism was a dead issue, but at the urging of Benigni on Sept. 1, 1910, he issued *Sacrorum antistitum,* which prescribed that all teachers in seminaries and clerics before their ordination take an oath denouncing Modernism and supporting *Lamentabili* and *Pascendi.*

Modernismo, late 19th- and early 20th-century Spanish-language literary movement, begun in the late 1880s by the Nicaraguan poet Rubén Darío and initiated by the publication of his book of poems and short stories *Azul* (1888; "Blue"). While the movement had no manifesto or organized principles, it stemmed from a reaction against the literary naturalism of Émile Zola and against the wider bourgeois conformity and materialism of Western society. The poets of the Modernismo movement used free verse and sensuous imagery to express their own highly individual spiritual values. They were influenced by the French Symbolists and Parnassians in their use of daring metaphors and innovative metres. The principal members of the movement were, besides Darío, the poets Antonio Machado and Juan Ramón Jiménez and the novelist Ramba del Valle Inclán.

The first phase of Modernismo was marked by the establishment of the periodical *La Revista Azul* (1894–96) in Mexico. Darío traveled widely at this time, promoting Modernismo in Spain during stays in 1892 and 1898 and throughout Latin America. A second important Modernismo periodical, *La Revista Moderna* (1898–1911), was also founded in Mexico. While Modernismo as a movement ended by 1920, its influence continued well into the 20th century in both poetry and prose.

Modernismo, in Brazil, a post-World War I aesthetic movement that attempted to bring national life and thought abreast of modern times by creating new and authentically Brazilian methods of expression in the arts. Rebelling against the academicism and European influence that they felt dominated the arts in Brazil, the Modernists rejected traditional dependence on Portuguese literary values, attempting in their works to reflect colloquial Brazilian speech (rather than "correct" Portuguese) and often treating distinctively Brazilian themes based on native folklore and legend. They experimented with literary form and language, using free verse and unconventional syntax, but their concern with literary reform was primarily as a means to social reform rather than as an end in itself.

The Modernist movement first gained wide recognition with its Semana de Arte Moderna ("Week of Modern Art"), an event held in São Paulo in 1922, provoking controversy with lectures on the aims of Modernism and readings from works by such Modernist poets as Mário de Andrade (*q.v.*).

The movement, however, soon splintered into several groups with differing goals—some Modernists, among them Oswald de Andrade (*q.v.*), focused specifically on the nationalistic aims of the movement and agitated for radical social reform; others, such as Manuel Bandeira (*q.v.*), who is generally considered the greatest of the Modernist poets, sympathized with its aesthetic principles but lost interest in its political activism.

By 1930 Modernism had lost its coherence as a movement, although its organizers continued to write in the Modernist idiom. Its influence on the development of contemporary Brazilian literature has been profound both through its stylistic innovations and through its emphasis on folklore and native themes.

modernization, in sociology, the transformation from a traditional, rural, agrarian society to a secular, urban, industrial society.

A brief treatment of modernization follows. For full treatment, *see* MACROPAEDIA: Modernization and Industrialization.

The progression of human civilization from prehistory can be seen as falling into three general stages. The first saw the emergence of primitive societies and communities. In the second, primitive societies were linked and transformed into civilizations. The third started in the 18th century with the Industrial Revolution and continues to the present time, with the spreading of modern industrial culture around the world.

The force of the modern has always been partly a reactive one, a force that derived meaning and momentum by a comparison or contrast with, and by rejection or negation of, what preceded it. This point suggests a general view of modernization as a process of individualization, specialization, and abstraction. First, the structures of modern society take as their basic unit the individual rather than, as with agrarian or peasant societies, the group or community. Second, modern institutions are assigned the performance of limited, specialized tasks in a social system with a highly developed division of labour. Third, rather than attaching rights and prerogatives to particular groups and persons or being guided by custom or tradition, modern institutions tend to be governed and guided by general rules and regulations that derive their legitimacy from the methods and findings of science.

The conditions for societal transformation that led to modernization grew out of European socioeconomic conditions. Chief among these conditions was the development of commercial capitalism in medieval Europe. For the first time, the economy changed its goal from consumption to production. A new type of exchange market arose, relying on the mechanism of supply and demand. The economy began to be shaped according to the need for future production, giving rise to capital investments.

Europe in the Renaissance was the first civilization to create the conditions for uninterrupted change. For the first time, rural and agricultural interests ranked below those of the towns, the centres of trade. Owning land no longer had the social value it did in ancient times; the preeminent position of the landowner was gradually usurped by the merchant and craftsman. The premodern social division between the landed and the landless gave way to the distinction between employer and worker. The importance of the military waned as the central concerns of society were trade and industry.

The new bourgeoisie were the prime movers and creators of urban society. No longer was such a great social stigma attached to the merchant trades. The new money economy saw a dissolution of the old social structure.

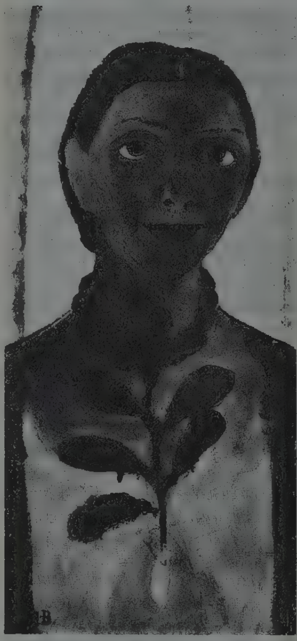
Since its inception, modernity has worn two faces. One is dynamic, forward-looking, and progressive, promising unprecedented abundance, freedom, and fulfillment. The other, equally visible face is grim, revealing the new problems of alienation, poverty, crime, and pollution.

Many features of modernity, intensified beyond a certain level, produce a reactive response. Populations from crowded urban centres, for example, "recolonize" the surrounding countryside with suburbs and exurbs, vitally linked to the city but harking back to a village form of community. Disenchantment with the slickness of mass-produced goods gives rise to renewed interest in handcrafting and natural materials. Protests against rationality and uniformity are seen in the successive waves of youth cultures and religious revivals that have marked late industrial society. As ethnic and religious groups have reasserted their identities, cultural and nationalist movements have emerged worldwide. These developments are considered by some historians to signify the advent of the postmodern period.

Modersohn-Becker, Paula, *née* BECKER (b. Feb. 8, 1876, Dresden, Ger.—d. Nov. 30, 1907, Worpswede), German painter, one of those who introduced into German art the style of such late 19th-century French Postimpressionist painters as Pierre Bonnard, Édouard Vuillard, Paul Gauguin, and Paul Cézanne.

Becker was interested in art from her youth, and she began to learn drawing in 1888, when her family moved to Bremen. Sent to England to complete her education, she attended St. John's Wood School of Art, where she received her first rigorous, coeducational training. Upon her return to Germany, she attended (1896–98) the traditional School for Women Artists. In 1898, as a pupil of Fritz Mackenson, she became a member of the group of regional artists known as the Worpswede school, an artists' colony near Bremen. There she formed a friendship with the sculptor Clara Westhoff, who later married Rainer Maria Rilke. Together they traveled to Paris, where Becker first encountered the work of the Gauguin circle and the Nabis group and other French artists who inspired her. In 1901 she married Otto Modersohn, a widower and father. She spent three more periods of study in Paris, leaving her husband to settle there in 1906. He followed her there, and she returned to Worpswede with him in 1907. She died shortly after giving birth to her only child.

Modersohn-Becker's early works reflect her academic training and are meticulously naturalistic. During a certain period, her works bear some resemblance to those of Käthe Kollwitz. Modersohn-Becker's style continued to evolve, however, and her mature paintings, such as the "Self-Portrait with a Camellia" (1907), combine a lyrical naturalism with the broad areas of simplified colour characteristic of Gauguin and Cézanne. Since her painting is more concerned with the expression of her inner feelings than with the accurate portrayal of reality, she is frequently called an Expressionist.



"Self-Portrait with a Camellia," oil on canvas by Paula Modersohn-Becker, 1907; in the Museum Folkwang, Essen, Ger.

By courtesy of the Museum Folkwang, Essen, Ger.

Modesto, city, seat (1871) of Stanislaus county, central California, U.S., on the Tuolumne River in the northern San Joaquin Valley, 94 miles (151 km) east of San Francisco. Founded in 1870 by the Central Pacific Railway, it was called Modesto (Spanish: "Modest") when W.C. Ralston, a railway director, "modestly" declined to have the community named in his honour. It developed as a shipping centre for agricultural produce (especially peaches). Food processing is supplemented by light manufacturing. Modesto Junior College was founded in 1921. To the east are the Don Pedro and La Grange dams, the Turlock and Modesto irrigation reservoirs, historical and recreational areas, and the Stanislaus National Forest. Inc. 1884. Pop. (1990) city, 164,730; Modesto MSA, 370,522.

Modica, Latin MOTYCA, or MUTYCA, town, Ragusa *provincia,* southeastern Sicily, Italy, at the confluence of two mountain torrents on the south margin of the Monti (mountains) Iblei, just south of Ragusa city. On the site of a Bronze Age (and perhaps Stone Age) fortress (*c.* 4000 BC), it emerged as Motyca, a town of the Siculi, an ancient Sicilian tribe (*c.* 400 BC). It was the capital of a fief from the 12th to the 17th century, and its counts rivaled the viceroys of Sicily in power and wealth. It was almost entirely destroyed by the earthquake of 1692 and devastated by flood in 1902. Its past wealth is reflected by the church of Sta. Maria di Gesù, the portal and rose window of the church of the Carmine, and the massive Baroque church of S. Giorgio. Nearby is the famous Cava d'Ispica, with thousands of natural grottoes, which were used for habitation and as tombs from before the 14th century BC. Agriculture is presently important in Modica, and there is manufacturing of foodstuffs and traditional crafts. Pop. (1984 est.) mun., 48,542.

Modigliani, Amedeo (b. July 12, 1884, Livorno, Italy—d. Jan. 24, 1920, Paris), Italian painter and sculptor whose portraits and nudes, characterized by asymmetry of composition, elongation of the figure, and a simple but monumental use of line, are among the most important of the 20th century. They have also earned popularity for the entirely personal atmosphere with which they are invested: a kind of mute sympathy between the artist and sitter that implicates the spectator.

Modigliani was born into a Jewish family of small merchants. After suffering from pleurisy and typhus in 1895 and 1898, he was forced to give up a conventional education, and it was then that he began to study painting. After a brief stay in Florence in 1902, he continued his artistic studies in Venice, remaining there until the winter of 1906, when he left for Paris. His early admiration for Italian Renaissance painting—especially that of Siena—was to last throughout his life.

In Paris Modigliani was overwhelmed by the painting of Paul Cézanne, which exerted a decisive influence on the earliest phase of his work. His initial important contacts were with the poets André Salmon and Max Jacob, with Pablo Picasso, and with—in 1907—Paul Alexandre, a friend of the avant-garde artists and the first to become interested in Modigliani and to buy his works. In 1908 he exhibited five or six paintings at the Salon des Indépendants. He also met the Romanian sculptor Constantin Brancusi, by whose work he was impressed and on whose advice he made a serious study of African sculpture. To prepare himself for sculpture, he intensified his graphic experiments. He detested what he considered the false Impressionism of Auguste Rodin, with its pictorial modeling and susceptibility to the play of light. In his drawings he tried to give to his contours the function of limiting or enclosing the volume. In 1912 he exhibited eight stone heads at the Salon d'Automne whose elongated and simplified forms reflect the influence of African sculpture.

"Self-Portrait," oil on canvas by Modigliani, 1919; in the Museu de Arte Contemporânea of the Universidade de São Paulo, Braz.

By courtesy of the Museu de Arte Contemporanea da Universidade de Sao Paulo, gift of Mr. Francisco M. Sobrinho and Mrs. Yolanda Penteado; photograph, Gerson Zanini

Modigliani soon returned entirely to painting, but his experience as a sculptor had fundamental consequences for his style. The characteristics of Modigliani's sculptured heads—long necks and noses, simplified features and long oval faces—soon invaded his painting. By reducing and almost eliminating chiaroscuro—that is, the use of gradations of light and shadow to achieve the illusion of three-dimensionality—he achieved, by the strength of his contours and the richness of juxtaposed colours, a solidity in the flat image that is similar to that of sculpture.

The outbreak of war in 1914 increased the difficulties of Modigliani's life. Alexandre and other friends were at the front; his pictures did not sell; his already delicate health was deteriorating because of his poverty, feverish work, and the abuse of alcohol and drugs. He was in the midst of a troubled affair with the English poet Beatrice Hastings, with whom he lived for two years, from 1914 to 1916. He was assisted, however, by the art dealer Paul Guillaume and especially by the Polish poet Leopold Zborowski, who bought or helped him to place a few paintings and drawings.

Modigliani was not a professional portraitist; for him the portrait was only an occasion to isolate a figure as a kind of sculptural relief through firm and expressive contour drawing. He painted his friends, personalities of the Parisian artistic and literary world, but also unimportant people: models, servants, girls from the neighbourhood. In 1917 he began painting a series of large female nudes that, with their warm, glowing colours and sensuous, rounded forms, are among his best works. In December, Berthe Weill organized a one-man show for him in her gallery, but the police judged the nudes indecent and had them removed.

His last love affair began in the same year, 1917, with the young painter Jeanne Hébuterne, with whom he went to live on the Côte d'Azur. Their daughter Jeanne was born in November 1918. This was also a happy period for his painting, which became increasingly refined in line and delicate in colour. A more tranquil life and the climate of the Mediterranean, however, did not restore the artist's undermined health. After returning to Paris in May 1919, he became ill in January 1920 and 10 days later died of tubercular meningitis. Next day, Jeanne Hébuterne killed herself and an unborn child by jumping from a window.

Little known outside avant-garde Parisian circles, Modigliani seldom participated in official exhibitions, and his single one-man show was the one held in 1917 at Berthe Weill's. Fame came after his death with the 1922 exhibition at the Galerie Bernheim-Jeune and, later, with a monograph by the poet André Salmon.

His original sculptures, mostly in sandstone, are 25 in number; the number of drawings cannot be determined. Except for some 30 large female nudes (1916–19) and 4 landscapes (1919), his paintings are almost always portraits of relatives, artists, writers, musicians, actors, dealers, and collectors, along with many of unidentified persons. The names of the individuals portrayed may give an idea of the Montparnasse milieu frequented by the artist: Constantin Brancusi, Diego Rivera, Henri Laurens, Pablo Picasso, Chaim Soutine, Juan Gris, Max Jacob, Jean Cocteau, Jacques Lipchitz. Some—such as Paul Guillaume, Hanka and Leopold Zborowski, Beatrice Hastings, and Jeanne Hébuterne—were painted several times. Of Modigliani himself, there is only a single self-portrait, painted in 1919, shortly before his death.

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Modigliani, Franco (b. June 18, 1918, Rome), Italian-born American economist and finance educator who received the Nobel Prize for Economics in 1985 for his work on household savings and the dynamics of financial markets.

The son of a Jewish physician, Modigliani initially studied law but fled Fascist Italy in 1939 for the United States, in which country he became a naturalized citizen in 1946. He studied economics at the New School for Social Research and obtained his doctorate there in 1944. Modigliani went on to hold teaching positions at a number of American universities, notably the post of professor of economics at the Massachusetts Institute of Technology from 1962 on.

Modigliani received the Nobel Prize for his pioneering research in several fields of economic theory that had practical applications. One of these was his analysis of personal savings, termed the life-cycle theory. The theory posits that individuals build up a store of wealth during their younger working lives for the purpose of consuming these savings during their own old age, not for the purpose of passing them on to their descendants. The theory helped explain the varying rates of savings in societies with relatively younger or older populations and proved useful in predicting the future effects of various pension plans.

Modigliani also did important research on financial markets, particularly on the respective effects that a company's financial structure (*e.g.,* the structure and size of its debt) and its future earning potential have on the market value of its stock. He found that the market value of a company's stock depended primarily on investors' expectations of what that company would earn in the future. This dictum had come to be regarded as self-evident by the 1970s, and the technique Modigliani invented for calculating the value of a company's expected future earnings became a basic tool in corporate decision-making and finance.

modinha, light and sentimental Portuguese song popular in the 18th and 19th centuries. Some of the earliest examples of *modinhas* are in the *Óperas Portuguesas* (1733–41) by António José da Silva, who interspersed the songs into the prose dialogue of his dramas. Originally simple melodies, *modinhas* often were embellished with intricate and elaborate musical effects when performed at court or for the nobility. *Modinhas* were introduced in Brazil in the late 19th century, where they remained simple expressions of urban life.

Modiolopsis, extinct genus of pelecypods (clams) found as fossils in Ordovician rocks (430,000,000 to 500,000,000 years old). Its form and structure is distinct, with a shell roughly elliptical in outline and broader at the margins. Markings on the shell consist of prominent growth lines in an arcuate or concentric pattern. *Modiolopsis* is a useful guide fossil for Ordovician rocks.

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Modisane, Bloke, original name WILLIAM MODISANE (b. Aug. 28, 1923, Johannesburg), South African-born British writer, actor, and broadcaster whose moving autobiography, *Blame Me on History,* is a passionate documentation of the degradation and oppression of blacks living under the laws of apartheid in South Africa.

Educated in Johannesburg, he served on the editorial staff of the *Drum* magazine until life became intolerable, and he fled to England in 1959. In London he published short stories, poetry, and articles in a number of periodicals. He also played the lead role in the London production of Jean Genet's *The Blacks.* Modisane's autobiography was generally well received, and his story "The Dignity of Begging" (1951) was praised for its satire. His short stories have been criticized for a documentary technique in which the plot does not grow out of character but is merely journalistic.

Modjeska, Helena, Modjeska also spelled MODRZEJEWSKA, original name HELENA OPID (b. Oct. 12, 1840, Kraków, Pol.—d. April 9, 1909, Bay Island, Newport Beach, near Los Angeles), Polish-American actress whose repertory included 260 Shakespearean and contemporary roles, some in both Polish and English.

The daughter of a musician, she married an actor, Gustav Modrzejewski, and they joined a company of strolling players. In 1868 she married Count Bozenta Chlapowski, a politician and critic, and began to act at Warsaw, where she remained for a number of years.

Her chief tragic roles were Shakespeare's Ophelia, Juliet, Desdemona, and Queen Anne in *Richard III,* Schiller's Princess Eboli, Victor Hugo's Tisbé, and Juliusz Słowacki's *Mazeppa.* In comedy her favourite roles included Beatrice in *Much Ado About Nothing.* Modjeska also played in modern pieces by Gabriel Legouvé, Dumas (father and son), Guillaume Augier, Alfred de Musset, Octave Feuillet, and Victorien Sardou.

Helena Modjeska, 1869

By courtesy of the Library of Congress, Washington, D.C.

In 1876 she went with her husband to California, where they settled on a ranch. This enterprise was a failure, and Modjeska returned to the stage. She appeared in San Francisco in 1877, in an English version of *Adrienne Lecouvreur,* in which she was very successful despite her poor English. She continued to act principally in the United States but was also seen from time to time in London, where in 1881 she fulfilled her ambition to play Shakespeare on an English stage, and elsewhere in the United Kingdom. Her autobiographical *Memories and Impressions of Helena Modjeska* was published in 1910.

Modjeski, Ralph (b. Jan. 27, 1861, Kraków, Pol.—d. June 26, 1940, Los Angeles), Polish-born American bridge designer and builder, outstanding for the number, variety, and innovative character of his projects.

He was the son of the actress Helena Modjeska (1840–1909). After study in Paris, he settled in the United States and from 1892 practiced as a consulting bridge engineer in Chicago.

Among his best known bridges were the seven-span railroad and highway bridge over the Mississippi at Rock Island, Ill.; the McKinley Bridge at St. Louis, Mo.; the Northern Pacific railroad bridge over the Missouri at Bismarck, N.D.; and bridges over the Columbia and Willamette rivers in Oregon. His double-track railroad bridge over the Ohio River at Metropolis, Ill., contained several striking innovations, including a simple truss span of 720 feet (219 metres) and the unusual use of alloys: silicon steel for the bridge proper and nickel steel for the tension members. He was chief engineer and chairman of the board of engineers of the Benjamin Franklin Bridge over the Delaware River, which, upon completion in 1926, was the longest suspension bridge in the world.

Modjeski was also chief engineer of the Huey P. Long Bridge over the Mississippi at New Orleans and, as his last undertaking, served as chairman of the board of consulting engineers for the San Francisco–Oakland Bay Bridge (California), completed in 1936. By the time he died, he had been associated with more than 50 major bridges.

Mödling, town, *Bundesland* Niederösterreich (federal province of Lower Austria), northeastern Austria. Mödling lies at the entrance to the picturesque Brühl Valley, just southwest of Vienna. First mentioned in 907, it developed around a castle (now in ruins). It was a district of Vienna from 1938 until it was returned to Niederösterreich in 1954. Beethoven composed part of his *Missa Solemnis* there in 1818–19. Notable churches are St. Othmarkirche (originally 12th century; rebuilt 1454–1523) and the Spitalskirche (1443–53). The castle of the princes of Liechtenstein (restored 1820–22) is owned by the Austrian Boy Scouts. Metal products and shoes are manufactured. Pop. (1981) 19,333.

Modoc and Klamath, two neighbouring North American Indian tribes of south central Oregon and northern California, speaking related languages (or dialects) of Penutian stock and sharing many cultural traits. Their territory lay in a great trough in the southern Cascade Range, some 100 miles (160 kilometres) long and 25 miles wide, dotted with marshes, lakes, rivers, and streams. The Klamath, in the northern sectors, were primarily fishers and hunters of waterfowl; the Modoc, in the southern sectors, were also fishers but relied more on gathering edible roots, seeds, and berries and on hunting various game. Both tribes are considered to be of the Plateau culture area, though they were influenced by surrounding Indians in California, the north Pacific coast, and the Great Basin to the east.

The tribes were divided into relatively autonomous villages, each with its own leaders and shaman (medicine man); the villages, though, would ally for war, and members of different villages often married. During winter, when snowdrifts could reach six feet (two metres) or more, most village families lived in semi-subterranean, earth-covered lodges, usually one family to a lodge. Poorer families lived in simpler mat-covered houses. In summer the usual dwelling was either a domed house of poles and matting or a lean-to of brush. Sweat houses, used by both men and women, doubled as community centres for prayers and other religious activities. Religious belief focused largely on guardian spirits, whose aid was sought for all manner of human accomplishments.

In 1864 the U.S. government pressed the two tribes to relinquish most of their territory and take up residence on a reservation around Upper Klamath Lake. The land was traditionally Klamath, however, and the Klamath treated the Modoc as intruders; the U.S. government, moreover, failed in its treaty obligations to supply rations to the Modoc. Hence, in 1870 an insurgent band of Modocs under Kintpuash, a subchief known to the whites as Captain Jack, bolted the reservation, and efforts to induce their return precipitated the Modoc War of 1872–73. About 80 warriors and their families retreated to the California Lava Beds, a land of complex ravines and caves, where they were able to resist dislodgment. After the murder of Brig. Gen. Edward Canby, who headed a peace commission in April 1873, the war was prosecuted more vigorously. Betrayed by four of his followers, Captain Jack surrendered and was hanged on October 3. His followers were removed to Oklahoma, though in 1909 survivors were allowed to return to Oregon.

In 1954 the federal government terminated its relationship with the inhabitants of the Klamath reservation. In 1961 and 1974 the land was sold, and the proceeds were distributed among the former residents. Most of the land was incorporated in the Winema National Forest.

Modrzewski, Andrzej, in full ANDRZEJ FRYCZ-MODRZEWSKI (b. *c.* 1503, Wołborz, Pol.—d. 1572, Wołborz), considered the most eminent Polish writer in Latin of the 16th century.

He studied at the Jagiellonian University in Kraków and later at Wittenberg and Nürnberg. Returning to Poland, he wrote *De poena homicidii* (1543; "The Punishment for Homicide"), a pamphlet urging repeal of the laws that provided heavy prison sentences, large fines, or even death. In a pamphlet of 1545 he sided with the burghers against the gentry, who were monopolizing agriculture. In his most important work, *Commentariorum de* *republica emendanda libri quinque* (1551–54; "Commentary on Reforming the Republic in Five Books"), he elaborated his bold utopian ideals. He also urged a religious reformation uniting the Roman Catholic and Protestant churches, with mass to be said in Polish and priests allowed to marry. His ideas antagonized both the church and the gentry, who attacked him bitterly and persecuted him, occasionally driving him into hiding.

modulation, in electronics, technique for impressing information (voice, music, picture, or data) on a radio-frequency carrier wave by varying one or more characteristics of the wave in accordance with the intelligence signal. There are various forms of modulation, each designed to alter a particular characteristic of the carrier wave. The most commonly altered characteristics include amplitude, frequency, phase, pulse sequence, and pulse duration.

Amplitude modulation. In amplitude modulation (AM), auditory or visual information is impressed on a carrier wave by varying the amplitude of the carrier to match the fluctuations in the audio or video signal being transmitted. AM is the oldest method of broadcasting radio programs. Commercial AM stations operate at frequencies spaced 10 kHz apart between 535 and 1,605 kHz. Radio waves in this frequency range are effectively reflected back to the Earth's surface by the ionosphere and can be detected by receivers hundreds of miles away. In addition to its use in commercial radiobroadcasting, AM is employed in long-distance shortwave radio broadcasts and in transmitting the video portion of television programs.

Frequency modulation. In frequency modulation (FM), unlike AM, the amplitude of the carrier is kept constant, but its frequency is altered in accordance with variations in the audio signal being sent. This form of modulation was developed by the American electrical engineer Edwin H. Armstrong during the early 1930s in an effort to overcome interference and noise that affect AM radio reception. FM is less susceptible than is AM to certain kinds of interference, such as that caused by thunderstorms as well as random electrical currents from machinery and other related sources. These noise-producing signals affect the amplitude of a radio wave but not its frequency, and so an FM signal remains virtually unchanged.

FM is better adapted than is AM to the transmission of stereophonic sound, audio signals for television programs, and long-distance telephone calls by microwave radio relay. Commercial FM broadcasting stations are assigned higher frequencies than are AM stations. The assigned frequencies, spaced 200 kHz apart, range from 88 to 108 MHz.

Phase modulation. The phase of a carrier wave is varied in response to the vibrations of the sound source in phase modulation (PM). This form of modulation is often considered a variation of FM. The two processes are closely related because phase cannot be changed without also varying frequency, and vice versa. Also, the rate at which the phase of a carrier changes is directly proportional to the frequency of the audio signal.

Like FM, PM minimizes various types of interference to broadcast reception at frequencies below 30 MHz. The two techniques are commonly used together. FM cannot be applied during the amplification of a sound signal in broadcasting, and so PM is used instead. PM is also utilized in some microwave radio relays and in certain kinds of telegraphic and data-processing systems. Other important applications of PM include communications between mobile radio units employed by the police and military.

Pulse-coded modulation. In pulse-coded modulation (PCM), the intelligence signal converts the carrier into a series of constant-amplitude pulses spaced in such a manner that the desired intelligence is contained in coded form. Continuous signals, such as voice messages, television pictures, and computer data, are commonly transformed into the Baudot Code or its variations, which are composed of patterns of 5 or 7 "on" and "off" pulses. PCM minimizes transmission losses and eliminates noise and interference problems because the receiving unit need only detect and identify simple pulse patterns. Moreover, the pulses, unlike continuous signals, can be regenerated electronically by repeater stations along the transmission route with virtually no distortion.

PCM, invented by H.A. Reeves of the United States in 1939, is employed by many communications companies and organizations, including Comsat and Intelsat, for telegraph, telephone, and television transmission. The technique has proved especially useful for the exchange of digital information between computer terminals.

Pulse-duration modulation. Another kind of pulse modulation is pulse-duration modulation (PDM), in which intelligence is represented by the length and order of regularly recurring pulses. A familiar example of PDM is the International Morse Code, used in ship-to-shore communications, amateur radio, and certain other forms of radiotelegraphy.

PDM was devised by the American physicist Raymond A. Heising in 1924. Besides its use in telegraphic communications by means of microwave radio relay systems, its chief application is telemetering.

modulation, in music, most commonly the transition from one key (set of interrelated notes and chords) to another. The Latin word *modulare* was originally used with reference to melody. Thus, medieval theorists frequently defined music as *ars bene moduland* ("the art of modulating well"). More recently, modifications in vocal and instrumental tone production have been labeled modulation. Still, modulation retains its primary significance, both expressive and structural, in the realm of harmony.

There are three principal methods of modulation in classical harmony: diatonic, in which a pivot chord is common to both keys; chromatic, in which the notes of the pivot chord are altered by a semitone (*i.e.,* by the addition of a sharp, flat, or natural sign); and enharmonic, in which the notes of the pivot chord, while retaining their original tones, simply assume different names (*e.g.,* the chord c♯–e♯–g♯ becomes d♭–f–a♭). Modulation may be transitory, as in the course of thematic development, or structural, contributing to the harmonic definition of form.

modulator, light: *see* light modulator.

module, in architecture, an arbitrary unit adopted to regulate the dimensions, proportions, or construction of the parts of a building. A number of modules, based on the diameter of a column, were used in determining the proportions of the order in Classical architecture. In Japanese architecture, room sizes were determined by combinations of rice mats called tatami (*q.v.*), which were three feet by six feet (a little less than one metre by two metres). In modern architecture, design modules may be used to organize the proportioning and dimensioning of plans. The metre has proved useful for this purpose; Frank Lloyd Wright used a 4-foot (1.3-metre) rectilinear or diagonal grid; and Le Corbusier developed and widely published an additive proportioning system named by him the Modulor.

Modules can also serve as the basis for coordinating the dimensions of the various materials and pieces of equipment to be assembled in the course of constructing a building. The purpose is to assure that all of the elements will go together without wasteful cutting and fitting at the building site and to lower costs by permitting quantity production and distribution of modular products with the assurance that they can be incorporated into any building plan. Concrete, either precast or prestressed, is frequently used to produce modules that can be assembled in a variety of designs; they may include plumbing, channeling, electric wiring, heating units, and other equipment. Modular construction has been widely favoured for low-cost housing, school construction, and other purposes.

An increasing amount of attention was devoted to modules after the development in the 1930s of the Bemis 4-inch (10-centimetre in Europe) cubical module. In the 1950s an effort was made to combine into a single "number pattern" several of these modular systems to offer the designer a larger range of approved dimensions. Most architects and producers of building materials continued, however, to use modules based on their own special needs and interests.

modus operandi (Latin: "operating method"), abbreviation MO, in criminology, distinct pattern or manner of working that comes to be associated with a particular criminal. Criminologists have observed that, whatever his specialty—burglary, auto theft, or embezzling—the professional criminal is very likely to adhere to his particular way of operating. If, for example, a burglar begins his career by entering houses from the roof, he will, in all probability, continue this method for as long as he is able to work. Some burglars become so attached to their *modus operandi* that they burglarize the same places or people again and again.

modus ponens and modus tollens (Latin: "method of affirming" and "method of denying"), in propositional logic, two types of inference that can be drawn from a hypothetical proposition—*i.e.,* from a proposition of the form "If *A*, then *B*" (symbolically $A \supset B$, in which $\supset$ signifies "If . . . then"). *Modus ponens* refers to inferences of the form $A \supset B; A$, therefore *B*. *Modus tollens* refers to inferences of the form $A \supset B; \sim B$, therefore, $\sim A$ ($\sim$ signifies "not"). An example of *modus tollens* is the following:

If an angle is inscribed in a semicircle, then it is a right angle; this angle is not a right angle; therefore, this angle is not inscribed in a semicircle.

For disjunctive premises (employing $\vee$, which signifies "either . . . or"), the terms *modus tollendo ponens* and *modus ponendo tollens* are used for arguments of the forms $A \vee B; \sim A$, therefore *B*, and $A \vee B; A$, therefore $\sim B$ (valid only for exclusive disjunction: "Either *A* or *B* but not both"). The rule of *modus ponens* is incorporated into virtually every formal system of logic.

Moe, city in western Gippsland, Victoria, Australia. It lies in the La Trobe River valley about 84 miles (135 km) by rail southeast of Melbourne. Its name is derived from an Aboriginal word for mud swamp. Moe was settled in 1856 and was proclaimed a borough in 1955 and a city in 1963. Its industries include engineering, photographic processing, concrete pipe manufacturing, sawmilling, textile making, and dairying. Many of the residents of Moe are employed in Yallourn (4 miles [6 km] to the east) by the State Electricity Commission, a company that has planned and developed the area since 1921. Formerly a town, Yallourn was demolished in the 1970s to allow open-cut mining of the coal below. Large brown-coal mines at Yallourn supply briquette plants, gas-manufacturing plants, and two power stations, which produce much of the state's electricity. Pop. (1991 prelim.) 16,718.

Moe, Jørgen Engebretsen (Norwegian folklorist): *see* Asbjørnsen, Peter Christen; and Moe, Jørgen Engebretsen.

Moʿed (Hebrew: "Festival"), second of the six major divisions, or orders (*sedarim*), of the Mishna (codification of Jewish oral laws), which was completed early in the 3rd century AD by Judah ha-Nasi. *Moʿed* deals with the observance of major and minor religious holidays and consists of 12 tractates (treatises): *Shabbat* ("Sabbath"), *ʿEruvin* ("Blendings"), *Pesaḥim* ("Paschal Lambs"), *Sheqalim* ("Shekels"), *Yoma* ("The Day"; *i.e.,* Yom Kippur), *Sukka* ("Booth"), *Betza* ("Egg"), *Rosh Hashana* ("New Year"), *Taʿanit* ("Fast"), *Megilla* ("Scroll"), *Moʿed qaṭan* ("Minor Festival"), and *Ḥagiga* ("Festival Offering"). The Palestinian Talmud has Gemara (critical commentaries) on all 12 tractates and the Babylonian Talmud on all but *Sheqalim.*

Moeller van den Bruck, Arthur (b. April 26, 1876, Solingen, Ger.—d. May 30, 1925, Berlin), German cultural critic whose book *Das Dritte Reich* (1923; "The Third Empire," or "Reich") provided Nazi Germany with its dramatic name.

Moeller left Germany after the turn of the century (to avoid military service) and lived in France, Italy, and Scandinavia. While abroad he wrote an eight-volume history of the German people, *Die Deutschen* (1904–10), in which he classified his countrymen according to psychological types (drifting, dreaming, decisive, etc.). He returned to Germany when World War I began and in the same year (1914) completed the editing of the first German edition of the works of Fyodor Dostoyevsky.

In the postwar period Moeller began to seek in politics the solution to what he saw as Germany's cultural poverty. He regarded western Europe's "civilization" (by which he meant enlightened rationalism and its political manifestations, liberalism and socialism) as destructive of "true culture." He called for a new Germanic faith to save the country from what he viewed as the disintegration and vulgarity of modern industrial society.

Moeller suffered from an emotional disturbance and, apparently in despair over the course of German history, took his own life. Though the Nazis denied him as an intellectual precursor, his thought helped create an atmosphere that was receptive to the National Socialist ideology.

Moen (Denmark): *see* Møn.

Moeran, Ernest John (b. Dec. 31, 1894, Heston and Isleworth, Middlesex, Eng.—d. Dec. 1, 1950, near Kenmare, County Kerry, Ire.), composer whose music reflects English and Irish roots.

Moeran studied at the Royal College of Music (1913–14) and with John Ireland (1920–23) and was influenced by Frederick Delius. Much influenced also by folk song, he made arrangements of tunes that he collected in Norfolk and Suffolk. His solo and choral songs include settings of poems by William Shakespeare, Robert Herrick, A.E. Housman, and James Joyce. Among his more ambitiously designed works are the *Symphony in G Minor,* concerti for violin and cello, and several chamber works, many of which show the influence of Jean Sibelius. Although limited in emotional range and thematic invention, his larger works are well-sustained and are meticulously polished in their form and the varied musical textures they display.

Moere, Peeter van der (educator): *see* Gante, Pedro de.

Moeris, Lake, Arabic BIRKAT QĀRŪN, ancient lake that once occupied a large area of the al-Fayyūm depression in Egypt and is now represented by the much smaller Lake Qārūn. Researches on the desert margin of the depression indicate that in early Paleolithic times the lake's waters stood about 120 feet (37 m) above sea level and probably filled the depression; the lake's level gradually fell until about 10,000 BC, when it was about 15 feet (4½ m) below sea level, perhaps because its connection with the Nile River was temporarily cut off. Early in the Neolithic Period (nearly 4,000–11,000 years ago), the lake rose again and then gradually subsided. Neolithic and Early Dynastic people made their homes on the slowly shrinking shores.

Not until the Egyptian Middle Kingdom (*c.* 2040–1786 BC) were attempts made to stop the gradual silting of the channel connecting the lake with the Nile. Probably either Sesostris II or Amenemhet III widened and deepened the channel, thus setting the lake once more in hydraulic equilibrium with the river. The lake, which was then 55 feet (17 m) above sea level, served both as a flood control that was able to take excess water from overly high Nile floods and as a reservoir whose waters could be used for irrigation after the Nile flood had subsided. In about 450 BC when Herodotus visited the lake, he assumed it to be artificial and was told that it had been dug by King Moeris at least 900 years before.

Large land-reclamation projects in the Fayyum region were carried out by the Ptolemaic kings of Egypt. Under Ptolemy II Philadelphus in the 3rd century BC, Lake Moeris was partially drained by means of a dam that restricted the entry of Nile water into it. The rich alluvial soil that was thus laid bare (approximately 450 square miles [1,200 square km] of it) was irrigated by canals and subjected to intensive cultivation. The population around the lake thus increased at a rapid rate, and a number of new towns sprang up. The modern-day excavation of several of these sites has yielded a rich harvest of Hellenistic and Roman papyri. The Fayyum region continued to flourish during the first two centuries of Roman rule, but thereafter it declined. The water levels of Lake Moeris subsequently continued to decrease, leading to the shallow and relatively small Lake Qārūn of modern times.

Moeritherium, extinct genus of primitive mammals that represent a very early stage in elephant evolution. Its fossils are found in Late Eocene and Early Oligocene deposits in northern Africa (the Eocene Epoch, which preceded the Oligocene, ended about 36.6 million years ago). *Moeritherium* did not resemble the modern elephant very closely. It was about as large as a tapir, with short, strong legs and a relatively long body. The feet were broad and terminated in flat-hoofed toes. The skull was relatively long, the eyes were set very far forward, and the cheek bone was very long. The nasal openings were on the upper side of the skull, but it is unlikely that an elephant-like trunk was present; at most, *Moeritherium* had a short, flexible proboscis much like that of the modern tapirs. The front incisors were strongly developed in upper and lower jaws and represent a stage in the development of the familiar elephant tusks. Strong neck muscles were attached to the broad back end of the skull. The tail was short. It is probable that *Moeritherium* inhabited marshy regions and was at least partly aquatic, feeding on vegetation.

Moeritherium, reconstruction painting by Charles R. Knight

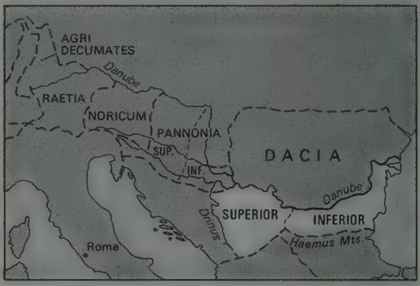
By courtesy of the American Museum of Natural History, New York

Moers, also spelled MÖRS, city, North Rhine–Westphalia *Land* (state), western Germany. It lies immediately west of Duisburg, in the Ruhr industrial region. The site of the Roman town Asciburgium, Moers was first mentioned in the 9th century and developed as a medieval flax market around the castle of the counts of Moers (now a museum). It was chartered about 1300. In 1601 Moers became the property of Maurice of Nassau, prince of Orange, who fortified it. The city passed to Prussia in 1712.

The old section of the town is partly ringed by a fortification wall that is 2 miles (3 km) long with a moat and star-shaped dam. Moers became important industrially after 1900 as a coal- and salt-mining centre. The city has several technical schools, and the Gymnasium Adolfinum continues the tradition of the Protestant college founded there in 1582. The city's manufactures now include machinery and construction materials. Pop. (1991 est.) 104,595.

Moesi Rivier (Indonesia): *see* Musi River.

Moesia, province of the Roman Empire, in the southeastern Balkans. The lower Danube River was the province's northern border, with the Drinus (now Drina) River on the west, the Haemus (Balkan) Mountains on the south, and the Black Sea on the east. Moesia was conquered by Marcus Licinius Crassus (grandson of the famous triumvir) in 30–28 BC and became a Roman province in AD 15.



Moesia in the time of Augustus

Adapted from R. Treharne and H. Fullard (eds.), *Muir's Historical Atlas: Ancient, Medieval and Modern,* 9th ed. (1965); George Philip & Son Ltd., London

During the Dacian Wars (AD 85–89), Moesia was divided into western and eastern provinces: Moesia Superior and Moesia Inferior, separated by the Ciabrus (modern Tsibritsa) River. Under the emperor Trajan, parts of present Romania were added to Moesia Inferior. Because Moesia was a frontier region, the area had to be garrisoned by Roman troops, whose legionary camps were built along the Danube River. Several Greek cities sprang up near the mouth of the Danube, and the other principal cities of Moesia grew out of the legionary camps along the Danube; these, too, had sizable Greek elements in their population, given the predominantly Greek composition of the legions there.

Moesia was a fairly prosperous province, since surplus wheat from the Black Sea area was always assured of a market in the Roman Empire. In the province's interior, agriculture and fruit-growing flourished, and there was mineral wealth in the Balkan Mountains. The province suffered heavily from barbarian invasions in the 3rd century AD, and when the neighbouring province of Dacia was abandoned about 270, its inhabitants were largely transferred to Moesia. Despite these difficulties, Moesia remained part of the Eastern Roman Empire until the 7th century.

Moeskroen (Belgium): *see* Mouscron.

mofette (French: "noxious fume"), also spelled MOFFETTE, fumarole (*q.v.*), or gaseous volcanic vent, that has a temperature well below the boiling point of water, though above the temperature of the surrounding air, and that is generally rich in carbon dioxide and perhaps methane and other hydrocarbons. When the winds are right, the issuing gases may drift and settle into nearby hollows or small valleys and cause the asphyxiation of animals and birds wandering into the areas. Such potentially deadly hollows have been noted in the Absaroka Range near Yellowstone National Park, Wyoming, U.S., and at the base of Iceland's Hekla volcano during its eruption in 1947–48. In August 1986 clouds of toxic gas of volcanic origin emanating from Lake Nyos, near Wum, Cameroon, caused more than 1,700 human deaths.

Moffat, David Halliday (b. July 22, 1839, Washingtonville, N.Y., U.S.—d. March 18, 1911, New York, N.Y.), American capitalist and railway promoter after whom the Moffat Tunnel in Colorado is named.

After a common-school education, Moffat worked in banks in New York City, in Des Moines, Iowa, and in Omaha, Neb. In 1860 he went to Denver, Colo., and became involved in mercantile enterprises, banks, mines, utilities, real estate, and a newspaper. His vision of Denver as a great transportation centre led him to invest in several railroads that were to provide routes to the Pacific Coast, the Gulf of Mexico, and the Colorado mining districts of Leadville and Cripple Creek. For his Denver, Northwestern and Pacific line (later the Denver and Salt Lake; incorporated into the Denver and Rio Grande Western Railroad), he planned a tunnel through the continental divide, but he died before he could raise the necessary money. The tunnel was built in the 1920s with public funds.

Moffat, Robert (b. Dec. 21, 1795, Ormiston, East Lothian, Scot.—d. Aug. 9, 1883, Leigh, Kent, Eng.), Scottish missionary to Africa and Bible translator, who was known for his efforts to improve local living standards in Africa. He was also the father-in-law of the missionary and explorer David Livingstone (1813–73).

With little training, Moffat was assigned in 1816 by the London Missionary Society to go to South Africa. After spending seven years in several locations that were disrupted by warfare among Zulu tribesmen, he settled at Kuruman, southeast of the Kalahari (desert). There he lived for 49 years, building one of the foremost Protestant missionary communities in Africa. He traveled widely, and he encountered numerous tribes and mastered the Tswana language, into which he translated the Gospel According to Luke (1830). Through his influence the number of converts rose rapidly, and by 1857 he had completed a Tswana translation of the entire Bible. In 1838 he wrote *A Book of Hymns in Chuana* (Tswana).

Robert Moffat, oil painting by William Scott, 1842; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Though criticized by some as paternalistic, he laboured not only to alter the conduct but also to raise the standard of living of African peoples by introducing improved methods of agriculture and irrigation. On his first meeting with Livingstone, in 1840, Moffat recognized Livingstone's capacities and urged him to come to Africa, directing him to the region north of the Kalahari. After the death of his wife, Mary, with whom he shared his work for half a century, Moffat lived his remaining 13 years in retirement in England.

Among Moffat's writings are *Missionary Labours and Scenes in Southern Africa* (1842) and *Rivers of Water in a Dry Place* (1863).

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Moffatt, James (b. July 4, 1870, Glasgow, Lanarkshire, Scot.—d. June 27, 1944, New York, N.Y., U.S.), Scottish biblical scholar and translator who singlehandedly produced one of the best-known modern translations of the Bible.

Educated at Glasgow Academy and Glasgow University, Moffatt was ordained in the Church of Scotland in 1896 and immediately began a career of pastoral service that was to last 16 years, during which time he produced his first scholarly writings. His *Introduction to the Literature of the New Testament,* a comprehensive survey of contemporary biblical scholarship, appeared in 1911, while he was pastor of a church at Broughton Ferry, Scot. The next year he joined the faculty at the University of Oxford and in 1913 published his translation of the New Testament. From 1915 to 1927 he was professor of church history at the University of Glasgow, publishing his Old Testament in 1924, and in 1927 he took a similar position at Union Theological Seminary in New York City. Although his own chief interest was in church history, he is better known for his New Testament criticism; he edited a series of commentaries on the New Testament, published 1928–49. After his formal retirement in 1938, he continued teaching and served as a consultant to a radio serial dramatization of the Bible.

moffette (volcanic vent): *see* mofette.

Mofolo, Thomas Mokopu (b. Dec. 22, 1876, Khojane, Basutoland [now Lesotho]—d. Sept. 8, 1948, Teyateyaneng, Basutoland), the first important writer from what is now Lesotho, who created the first Western-style novels in the Southern Sotho language.

After graduating in 1898 with a teacher's certificate from the missionary training college at Morija in Basutoland, Mofolo worked at the Sesuto Book Depot there for more than a decade as a manuscript reader, proofreader, and secretary. He also taught elsewhere in Basutoland and in Cape Colony, S.Af., and he contributed to *Leselinyana* ("The Little Light"), the Sotho-language mission newspaper in Morija.

Mofolo began his career at a time when Sotho writers were deeply influenced by two works that had been translated and widely distributed by European missionaries: the Bible and John Bunyan's *Pilgrim's Progress.* Mofolo's first novel, *Moeti oa Bochabela* (1907; *The Traveller of the East*), is an allegory in which a young African in search of truth and virtue journeys to a land where white men help bring him to Christian salvation. Mofolo's second novel, *Pitseng* (1910), is also a Christian fable, but in this case his young hero understands that white people have betrayed the promise of their religion. Mofolo's third and last book, *Chaka* (1925), became the classic on which his reputation rests. A historical novel about the Zulu king Shaka, it presents its hero not as an allegorical figure but as a fully realized tragic character that some critics have likened to Macbeth.

The publication of *Chaka* was delayed for 15 years by missionaries at the Sesuto Book Depot who were disturbed by Mofolo's failure to condemn pagan tribal customs. Discouraged by such misunderstanding, Mofolo gave up writing and worked at various business ventures. Eventually reduced to financial straits by business losses, Mofolo suffered a stroke in 1941 from which he never fully recovered.

Mogadishu, Somali MUQDISHO, Italian MOGADISCIO, Arabic MAQDISHU, capital, largest city, and a major port of Somalia, located just north of the Equator on the Indian Ocean. One of the earliest Arab settlements on the East African coast, its origins date to the 10th century. It declined in the 16th century after a period of extensive trade with the Arab states, but it had commercial relations with the Portuguese and the imams of Muscat before coming under the control of the sultan of Zanzibar in 1871.

The port was leased to the Italians in 1892 and sold to them in 1905 under pressure from the British, who had established a protectorate over the Sultanate of Zanzibar. Subsequently the capital of Italian Somaliland and of the Somalia trust territory, Mogadishu became the capital of independent Somalia in 1960. Old buildings and mosques in the Islāmic style were blended harmoniously with the modern architecture of the Somalia National University (founded 1954; university status, 1959) and of the hospital. The city also developed schools of Islāmic law, teacher training, industrial arts, public health, and veterinary science and became the seat of the National Museum (housed in the former palace of the sultan of Zanzibar).

Mogadishu's port was extended in the late 1960s. During the 1980s and early '90s civil war in Somalia caused widespread destruction in the city. There is an international airport 5 miles (8 km) west of Mogadishu. Pop. (1999 est.) 1,162,000.

Mogado (king of Myanmar [Burma]): *see* Wareru.

Mogador (Morocco): *see* Essaouira.

Mogen David (Judaism): *see* David, Star of.

Mogi das Cruzes, city, southeastern São Paulo *estado* ("state"), Brazil. It lies at 2,493 feet (760 m) above sea level on the Tietê River, just east of São Paulo city. Formerly known as M'bboygi and Santana das Cruzes de Mogi Mirim, it gained town status in 1611 and was made the seat of a municipality in 1855.

Mogi das Cruzes is now important in both agriculture and industry. It supplies *feijão* (beans) and fruits for urban centres on the São Paulo–Rio de Janeiro axis, and it has sawmills, tanneries, steel mills, and plants manufacturing ceramics, paper, textiles, and chemical products. Goods are transported by rail or road; the city also has an airport. The University of Mogi das Cruzes (1973) is located there. Pop. (2000 prelim.) 301,551.

Mogila, Peter, Romanian PETRU MOVILĂ, Ukrainian PETRO MOHYLA (b. Dec. 21, 1596, Moldavia [now in Romania]—d. Dec. 22, 1646, Kiev, Pol. [now in Ukraine]), Moldavian Orthodox monk, theologian, and metropolitan of Kiev who was the author of the *Orthodox Confession of the Catholic and Apostolic Eastern Church.* He reformed Slavic theological scholarship and generally set doctrinal standards for Eastern Orthodoxy that endured until the 19th century.

Of royal Moldavian lineage, Mogila migrated to the Polish Ukraine; he was educated in Jesuit schools in Poland and became proficient in classical languages and Latin Scholastic theology. He entered the famous Monastery of the Caves at Kiev in 1625 and was made its superior in 1627. In 1633 he was elected metropolitan of Kiev. As metropolitan, Mogila made great efforts to improve the education of his clergy and laity at a time when both Roman Catholic and Protestant missionaries were very active among the Orthodox population of Poland and the Ukraine. In 1633 he transformed the theological college of the Kiev monastery into a school of humanities and theology and enlisted a Western-trained faculty for it. The academy became the source of a theological revival in the entire Russian Orthodox church, and its influence was felt in Russia until the end of the 19th century. Mogila also obtained the Polish monarch's acknowledgment of the rights of the Orthodox church in Polish territory, and he restored to Orthodox control the churches and properties that had been expropriated by Roman Catholics.

To bring order to Orthodox theology in its two-fronted controversy with the Roman church and with Protestant Reformers, Mogila in 1640 composed *The Orthodox Confession of Faith* of the Eastern Orthodox church. It was approved by the four Eastern patriarchs and was formally approved at the Synod of Jerusalem in 1672. It remains one of the primary outlines of Eastern Orthodox doctrines as set forth in refutation of Roman Catholic and Protestant claims.

Mogilyov, also spelled MOGILEV, or MOGIL'OV, *oblast* (province), east-central Belarus, occupying an area of 11,200 square miles (29,000 square km) in the middle Dnieper River lowland, astride the Dnieper, which bisects it north–south. It consists of a level plain of loesslike deposits, sloping gently southward from the rolling morainic hills of the Orsha and Smolensk–Moscow uplands in the north. Much of the province is in mixed forest of pine, spruce, oak, and birch; areas of reed and grass marsh and peat bog are extensive. Communities, other than Mogilyov and Bobruysk, are small local centres engaged in processing timber and farm produce. The principal branches of agriculture are flax growing and livestock husbandry; winter rye, barley, and buckwheat are the main grain crops. Vegetable and fruit growing is important locally. Pop. (1991 est.) 1,269,400.

Mogilyov, also spelled MOGILEV, or MOGIL'OV, city and administrative centre of Mogilyov *oblast* (province), east-central Belarus, on the Dnieper River. It was founded in 1267 as a fortress and became a town in 1526, when it was under Lithuania. Later passing to Poland, it became Russian by the First Partition of Poland, in 1772. In 1812 a major engagement with Napoleon's troops took place outside the town. Long a significant trading centre, its importance was much enhanced by the coming of the railway in 1904. Serious damage was inflicted in World War II, but four churches of the 16th and 17th centuries have survived. Modern Mogilyov is a major industrial city, producing synthetic fibres, industrial equipment, electric motors, and a range of consumer goods. Mogilyov has teacher-training and machine-building institutes. Pop. (1991 est.) 363,000.

Mogollon culture, culture of a group of North American Indians who, between about 200 BC and AD 1200, lived in the mostly mountainous region of what is now southeastern Arizona and southwestern New Mexico. (The name derives from the Mogollon Mountains in New Mexico.) The culture is presumed to have developed out of the earlier Cochise culture (*q.v.*), with additional influences from elsewhere. The first pottery in the Southwest was made by the Mogollon, and it was well-made from the beginning, suggesting that the craft may have been imported from Mexico.

The Mogollon culture has been variously divided into developmental periods; consensus is lacking because of incomplete evidence and because of the different rates of development at different communities at different times. Frequently, however, scholars make reference to five developmental periods, named after representative sites: Pine Lawn period, about 200 BC–AD 500; Georgetown period, 500–700; San Francisco period, 700–900; Three Circle period, 900–1050; and Mimbres period, 1050–1200.

During the earliest, or Pine Lawn, period the Mogollon Indians lived in small villages of circular pole-and-mud-covered pit houses, the floors of which were from 10 to 40 inches (25 to 100 cm) below ground level; entrance was usually through tunnels. Food was obtained principally from wild seeds, roots, and nuts, though incipient agriculture apparently existed. Hunting was probably unimportant since neither arrow or spear points nor animal bones are often found. Pottery, as already noted, was being made and differed in type from that which would be developed by neighbouring Indians.

The same basic pattern continued in the Georgetown period, except that corn (maize) cultivation and game hunting assumed preeminence and more varieties of pottery appeared. This modified pattern persisted into the San Francisco period, though the pit houses became rectangular and stronger in construction; more pottery types also developed.

In the Three Circle period the means of subsistence continued as before, but, along with the older type of pit houses with mud-plastered walls, there appeared rectangular pit houses constructed of stone masonry. Separate ceremonial pit houses were also present. Both developments suggest influences from the Anasazi culture to the north. Pottery types became more various and sophisticated.

In the final, or Mimbres, period profound changes occurred: pit houses were replaced by surface apartment houses from one to three stories in height with masonry walls. The pueblos, or villages, sometimes contained 40 or 50 rooms arranged around a plaza. These traits, together with others, were probably introduced to the area by Anasazi (Pueblo) Indian immigrants, whose homeland was in northern New Mexico. There is evidence that these newcomers lived peacefully with the older inhabitants of the area in the same villages.

For unknown reasons the Mogollon culture ended in the 13th century. The villages were abandoned, and the people disappeared to parts unknown. *Compare* Anasazi culture.

Mogollon Mountains, mountain range extending for 50 miles (80 km) east of the San Francisco River in southwestern New Mexico, U.S. Topped by Whitewater Baldy Peak (10,892 feet [3,320 m]), the mountains are named for Don Juan Mogollon, Spanish governor (1712–15) of New Mexico province. Sometimes considered a segment of the southern Rockies, they are a headstream region for the Gila River and form part of the Gila National Forest and Wilderness Area. Mining and tourism are the main economic activities.

Mogul: *see under* Mughal.

Mogwandi (people): *see* Ngbandi.

Mohács, Battle of (Aug. 29, 1526), decisive defeat of Hungary by the Turks, which marked the effective destruction of the Hungarian monarchy and paved the way for Habsburg and Turkish domination in Hungary. In 1521 the Turkish sultan Süleyman I (reigned 1520–66), taking advantage of Hungary's political, economic, and military decline during the regimes of Vladislav (Ulászló II) Jagiełło (reigned 1490–1516) and his son Louis II (reigned 1516–26), demanded tribute. When Louis refused to pay, the Turks advanced toward Hungary, capturing the fortresses of Sabac and Belgrade. Although they postponed further attacks, Hungary was too weak to rally its forces and was unprepared when the Turks resumed their advance and seized Petervárad (Peterwardein) in July 1526.

Louis hurriedly assembled a force of fewer than 20,000 men and advanced from Buda to meet the Turks. Without waiting for reinforcements from Transylvania and Croatia, he attacked Süleyman's army of more than 100,000 troops at Mohács. The Hungarian force was annihilated; Louis was killed in his flight. Süleyman proceeded into Buda (September 10) but then withdrew from the country, taking more than 100,000 captives with him.

Hungary never recovered from this defeat. A prolonged civil war (1526–38) ultimately resulted in the incorporation of the central and southern two-thirds of Hungary into the Ottoman Empire (1547) and in the establishment of Transylvania and the eastern Hungarian provinces as an autonomous principality within the Ottoman Empire.

mohair, animal-hair fibre obtained from the Angora goat and a significant so-called specialty hair fibre. The word mohair is derived from the Arabic *mukhayyar* ("goat's hair fabric"), which became *mockaire* in medieval times. Mohair is one of the oldest textile fibres, produced exclusively in Turkey for thousands of years, achieving importance in European textile manufacture during the 19th century. In the mid-1800s herds of common goats in southern Africa and the southwestern United States were upgraded by the importation of Angora sires.

The fleece of the Angora goat grows in uniform locks. Annual growth averages about 8 to 12 inches (20 to 30 cm), and the animals are usually clipped twice yearly, each yielding about 5 pounds (2.25 kg) of fleece per clipping. Controlled breeding has eliminated most of the outer protective coat; only a small amount of the undesirable coarse guard hair remains.

Fleece produced in the United States may be sold on consignment at local warehouses and then shipped to marketing centres in Boston and Philadelphia or may be purchased directly by mills. Istanbul is the main market for Turkish fleece. Mohair from the African continent is exported chiefly to the United Kingdom. Processing—involving the removal of natural grease, dirt, and vegetable matter—eliminates the brownish colour imparted by impurities. Yields of cleaned fleece range from about 70 to 90 percent of the original weight.

Mohair fibre, like wool, is composed chiefly of the protein substance keratin. Fibre structure is similar to that of wool, although the outer layer, or epidermis, has about half the number of scales found in fine wools. Because the scales lie almost flat, with little overlapping, the fibre surface is fairly smooth. The cortex portion, striated throughout its length, often contains air-filled pockets, and less than 1 percent of the fibres have a central canal, or medulla.

Mohair fibre is long, lustrous, strong, resilient, and durable. It absorbs and retains moisture much like wool and has good affinity for dyestuffs but is more sensitive to chemicals. It reacts much like wool when subjected to heat, sunlight, moth larvae, and aging. Because of its scale structure, mohair felts less readily than wool.

Woven mohair fabrics, frequently in pile form, are used for a variety of garments, including outerwear, summer-weight suits, and dresses, and mohair fibre is also used to manufacture knitted goods and knitting yarns. Mohair is often combined with other fibres, either blended in yarns or serving as either the warp or the filling yarn in woven fabric. It has had extensive use in lining fabrics for shaped garments but has recently received competition from synthetic fibres used for that purpose. Mohair pile upholstery fabric, once popular, is now limited to certain upholstery uses requiring both luxury and durability. The demand for mohair in both apparel and home furnishings varies with changes in fashion.

Turkey, the United States, and southern Africa are the largest producers of mohair. Leading consumers are the United Kingdom, The Netherlands, and Belgium.

Mohaka River, river, east-central North Island, New Zealand. It derives its name from a Maori term meaning "place for dancing." Rising on the Kaweka and Ahimanawa ranges, the river flows southeast, northeast, and southeast once again, entering Hawke Bay of the Pacific Ocean. Its principal tributaries are the Waipunga, Taharua, and Hautapu rivers. The main stream, 107 miles (172 km) long, drains a basin 910 square miles (2,357 square km) in area. It flows through many gorges, and in its lowest 17 miles (27 km) it is set below terraces 250 feet (75 m) high.

The town of Mohaka, on the coast, is the centre of a sheep-grazing district. At Raupunga, a few miles upstream, the Napier–Gisborne rail line crosses the river by a viaduct (1937) more than 300 feet (90 m) high and 900 feet (275 m) long. The river was the scene of the 1869 Mohaka Massacre, when 60 Europeans were killed by Maoris.

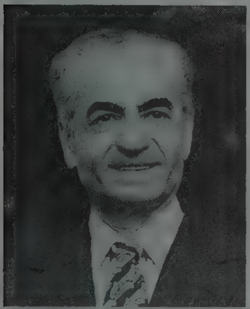
Mohale's Hoek, village, southwestern Lesotho. The area in which the village is situated is predominantly agricultural (subsistence farming of wheat, corn [maize], and sorghum) and pastoral, the main cash income coming from livestock (sheep, cattle, goats) and the production of wool and mohair for export. As much as one-fifth of the area's population (mostly adult male) may be absent from the district at any given time, working in the mines and farms of South Africa. Mohale's Hoek has a hospital and is connected by road to Maseru, the national capital, 60 miles (100 km) north. Pop. (latest est.) village, 3,763.

Mohammad (Arabic or Turkish personal name): *see under* Mahmud, Mehmed, Muḥammad, or Mohammed, except as below.

Moḥammad Khudābanda: *see* Öljeitü.

Mohammad Reza Shah Pahlavi (b. Oct. 26, 1919, Tehrān—d. July 27, 1980, Cairo), shah of Iran from 1941 to 1979, who maintained a pro-Western foreign policy and fostered economic development in Iran.

Mohammad Reza was the eldest son of Reza Shah Pahlavi (*q.v.*), an army officer who became the ruler of Iran and founder of the Pahlavi dynasty in 1925. Mohammad Reza was educated in Switzerland and returned to Iran in 1935. In 1941 the Soviet Union and Great Britain, fearing that the shah would cooperate with Nazi Germany to rid himself of their tutelage, occupied Iran and forced Reza Shah into exile. Mohammad Reza then replaced his father on the throne (Sept. 16, 1941).



Mohammad Reza Pahlavi, 1979

Alain Keler—Sygma

In the early 1950s a struggle for control of the Iranian government developed between the shah and Mohammad Mosaddeq, a zealous Iranian nationalist. In March 1951 Mosaddeq secured passage of a bill in the Majles (parliament) to nationalize the vast British petroleum interests in Iran. Mosaddeq's power grew rapidly, and by the end of April Mohammad Reza was forced to appoint Mosaddeq premier. A two-year period of tension and conflict followed. In August 1953 the shah tried to dismiss Mosaddeq but was himself forced to leave the country by Mosaddeq's supporters. Several days later, however, Mosaddeq's opponents, probably with the covert support and assistance of the United States, restored Mohammad Reza to power.

The shah reversed Mosaddeq's nationalization. With U.S. assistance he then proceeded to carry out a national development program, called the White Revolution, that included construction of an expanded road, rail, and air network; a number of dam and irrigation projects; the eradication of diseases such as malaria; the encouragement and support of industrial growth; and land reform. He also established a literacy corps and a health corps for the large but isolated rural population. In the 1960s and '70s the shah sought to develop a more independent foreign policy and established working relationships with the Soviet Union and eastern European nations.

The White Revolution solidified domestic support for the shah, but he faced continuing political criticism from those who felt that the reforms did not move far or fast enough and religious criticism from those who believed westernization to be antithetical to Islām. Opposition to the shah himself was based upon his autocratic rule, corruption in his government, the unequal distribution of oil wealth, forced westernization, and the activities of Savak (the secret police) in suppressing dissent and opposition to his rule. These negative aspects of the shah's rule became markedly accentuated after Iran began to reap greater revenues from its petroleum exports beginning in 1973. Widespread dissatisfaction among the lower classes, the Shīʿite clergy, the bazaar merchants, and students led in 1978 to the growth of support for the Ayatollah Ruhollah Khomeini, a Shīʿite religious leader living in exile in Paris. Rioting and turmoil in Iran's major cities brought down four successive governments; on Jan. 16, 1979, the shah left the country, and Khomeini assumed control. Although the shah did not abdicate, a referendum resulted in the declaration on April 1, 1979, of an Islāmic republic in Iran. The shah traveled to Egypt, Morocco, The Bahamas, and Mexico before entering the United States on Oct. 22, 1979, for medical treatment of lymphatic cancer. Two weeks later Iranian militants seized the U.S. embassy in Tehrān and took hostage more than 50 Americans, demanding the extradition of the shah in return for the hostages' release. Extradition was refused, but the shah later left for Panama and then Cairo, where he was granted asylum by President Anwar-as-Sadat.

The shah had two marriages that ended in divorce when they failed to produce a male heir to the throne. In October 1960 a third wife, Farah Diba, gave birth to the crown prince, Reza.

Moḥammad Shams od-Dīn Ḥāfeẓ: *see* Ḥāfeẓ.

Mohammed (Arabic or Turkish personal name): *see under* Mahmud, Mehmed, Muḥammad, or Mohammad, except as below.

Mohammed Ali, F.: *see* Fard, Wallace D.

Mohammed Dib: *see* Dib, Mohammed.

Moḥammed Shāh, Sultan Sir: *see* Aga Khan III.

Mohammedia, formerly FEDALA, port city, northwestern Morocco. It lies along the Atlantic Ocean 15 miles (24 km) northeast of Casablanca city. The harbour, at what is now Mohammedia, was frequented in the 14th and 15th centuries by merchant ships from Europe seeking cereals and dried fruits. In the 18th and 19th centuries, it was intermittently an official grain-export entrepôt for Christian merchants. The modern port facilities were initially developed by French businessmen after 1913. The name of the city was changed from Fedala in 1959 to honour Muḥammad V, the king (earlier sultan) of Morocco (ruled 1927–61). Contemporary Mohammedia is both a popular seaside resort with a casino and a major industrial port. Imported crude oil is refined at Morocco's largest refinery directly southwest of the city, and Mohammedia also has many fish canneries and a factory that produces chlorine and sodium carbonate. Pop. (1994) 170,083.

Mohammerah (Iran): *see* Khorramshahr.

Mohave (people): *see* Mojave.

Mohawk, Iroquoian-speaking North American Indian tribe, the easternmost group of the Iroquois League (*q.v.*); they occupied three villages west of what is now Schenectady, N.Y., U.S. Like the other Iroquois tribes, the Mohawk were semisedentary. Women practiced corn (maize) agriculture while men hunted during the fall and winter and fished during the summer. Related families lived together in longhouses, the symbols of Iroquois society.

According to traditional accounts the Mohawk leader Hiawatha was the first to accept the principles of peace preached by the prophet of peace, Dekanawida, who founded the Iroquois League. The Mohawk had nine representatives in the league, three from each of their clans of the Turtle, Wolf, and Bear. Each Mohawk community also had a local council that guided the village chief or chiefs.

The Mohawk frequently warred against neighbouring Algonkian tribes; the Dutch introduction of firearms in trade for beaver skins increased the number of Mohawk victories. After contact with Europeans, however, their population decreased rapidly. Most Mohawk took the part of the British in the French and Indian War, but some Catholic converts (the "praying Indians of Quebec") at mission settlements on the St. Lawrence River, principally at Caughnawaga, espoused the French cause and guided expeditions against their former brothers of the league. Later, during the American Revolution, the Mohawk were pro-British, under their leader Joseph Brant and followed him to Canada, where they have descendants at the Bay of Quinte and Six Nations Indian Reserve at Brantford, Ont. Their total number in the late 20th century was about 5,000. Some are successful farmers, and others are workers in structural steel in the United States and Canada, traveling from city to city to find jobs. The danger of this work seems to constitute part of its attraction for the Mohawk.

Mohawk River, largest tributary of the Hudson River, east-central New York, U.S. Draining 3,412 square miles (8,837 square km), the Mohawk forms in Oneida County at the junction of its East and West branches and flows 148 miles (238 km) south and east past Rome, Utica, Amsterdam, and Schenectady, joining the Hudson at Waterford, north of Troy. A 117-mile (188-kilometre) section of the

Erie Canal (after 1918 part of the New York State Barge Canal system) that parallels the river from Rome to its mouth has been largely abandoned and is now replaced by the river itself, whose channel was deepened and straightened. The Mohawk Valley (Mohawk Trail) was the historic route through the Appalachian Mountains into the Great Lakes region and served westbound pioneers. The Five Nations of the Iroquois (including the Mohawk) lived in the fertile valley, which was a major battleground during the French and Indian War and the U.S. War of Independence.

The Mohawk River, near Utica, N.Y.

Milt and Joan Mann from CameraMann

Mohegan, Algonquian-speaking Indian tribe who originally occupied most of what is now the upper Thames valley in Connecticut, U.S. They later seized from other tribes land in Massachusetts and Rhode Island. Mohegan economy was based on the cultivation of corn (maize), hunting, and fishing.

At the time of the first European settlement of New England early in the 17th century, the Mohegan and the Pequot tribes were ruled jointly by the Pequot chief, Sassacus, but later a rebellion of the subchief Uncas led to Mohegan independence. After the destruction of the Pequot in 1637, most of the Pequot survivors and the former Pequot territories came under Mohegan control. Uncas strengthened his position by making an alliance with the English; and, at the end of King Philip's War against the colonists, the Mohegan were the only important tribe remaining in southern New England. White settlements gradually displaced the Mohegan, and their numbers dwindled. Many of them scattered, joining other Indian settlements; a remnant of mixed ancestry remains in the area of Norwich, Conn. *See also* Pequot.

Mohenjo-daro, group of mounds on the right bank of the River Indus, in Sind province, southern Pakistan. The name signifies "the mound of the dead."

The archaeological importance of Mohenjo-daro was first recognized in 1922, and subsequent excavations revealed that the mounds contain the remains of what was once the largest city of the Indus Valley Civilization (*q.v.*). Because of the city's size—about 3 miles (5 km) in circuit—and the comparative richness of its monuments and their contents, it has been generally regarded as a capital of an extensive state.

The city of Mohenjo-daro, now 2 miles (3 km) from the Indus, from which it seems to have been protected, anciently as today, by artificial barriers, was laid out with astonishing regularity into something like a dozen blocks, or "islands," each about 1,260 feet (384 m) from north to south and 750 feet (228 m) from east to west, subdivided by straight or doglegged lanes. The central block on the western side was built up artificially to a dominating height of 20–40 feet (6–12 m) with mud and mud brick and was fortified to an unascertained extent by square towers of baked brick. Buildings on the high summit included an elaborate bath or tank surrounded by a veranda, a large residential structure, a massive granary, and at least two aisled halls of assembly. It is clear that this citadel (for such it evidently was) carried the religious and ceremonial headquarters of the site. In the lower town were substantial courtyard houses indicating a considerable middle class. Most houses had small bathrooms and, like the streets, were well-provided with drains and sanitation. Brick stairs indicate at least an upper story or a flat, habitable roof. The walls were originally plastered with mud, no doubt to reduce the deleterious effect of the salts that are contained by the bricks and react destructively to varying heat and humidity.

There is no surviving evidence of architectural elaboration, though this may well have been confined to perished timberwork. Stone sculpture, too, is scarce; some fragments, however, include the competent head and shoulders of a bearded man with low forehead, narrowed and somewhat supercilious eyes, a fillet round the brow, and across the left shoulder a cloak carved in relief with trefoils formerly filled with red paste. Aesthetically the most notable work of figurative art from the city is a famous bronze of a young dancing girl, naked save for a multitude of armlets. Among innumerable terra-cottas the most expressive are small but vigorous representations of bulls and buffalo. Female figurines may wear elaborate headdresses, and occasional figurines of small, fat grotesques, male or female, betray a crude sense of humour.

The evidence suggests that Mohenjo-daro suffered more than once from devastating floods of abnormal depth and duration, owing not merely to the encroaching Indus but possibly also to a ponding back of the Indus drainage by tectonic uplifts between Mohenjo-daro and the sea.

Mohican (people): *see* Mahican.

Mohism, also spelled MOISM, school of Chinese philosophy founded by Mo-tzu (*q.v.*) in the 5th century BC. This philosophy challenged the dominant Confucian ideology until about the 3rd century BC. Mo-tzu taught the necessity for individual piety and submission to the will of heaven, or Shang-ti (the Lord on High), and deplored the Confucian emphasis on rites and ceremonies as a waste of government funds.

In contrast to the Confucian moral ideal of jen ("humanity," or "benevolence"), which differentiated the special love for one's parents and family from the general love shown to fellowmen, the Mohists advocated the practice of "universal love," that is, a love without distinctions. The Confucianists, in particular Mencius, bitterly attacked the Mohist concept of universal love because it challenged the basis of Confucian family harmony, which was in fact and theory the foundation for the social harmony of the Confucian state.

Mohl, Hugo von (b. April 8, 1805, Stuttgart, Württemberg [Germany]—d. April 1, 1872, Tübingen, Ger.), German botanist noted for his research on the anatomy and physiology of plant cells.

Von Mohl received his degree in medicine from the University of Tübingen in 1828. After studying for several years at Munich, he became professor of botany at Tübingen in 1835 and remained there until his death.

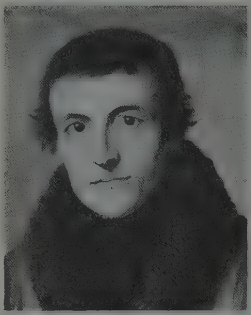
As a result of his studies on the plant cell, von Mohl developed the idea that the nucleus of the cell was within the granular, colloidal material that made up the main substance of the cell. In 1846 he named this substance protoplasm, a word that had been invented by the Czech physiologist Jan Evangelista Purkinje with reference to the embryonic material found in eggs. Von Mohl was also first to propose that new cells are formed by cell division, a process he observed in the alga *Conferva glomerata.* In 1851 he proposed the now-confirmed view that the secondary walls of plant cells have a fibrous structure.

Mohl, lithograph after a drawing by J. Kull, *c.* 1850

Archiv fur Kunst und Geschichte, Berlin

Theorizing on the nature and function of plastids (small bodies within specialized cells), von Mohl provided the first clear explanation of the role of osmosis (passage of a substance through a membrane from a region of higher to one of lower concentration) in the physiology of a plant and was one of the first to investigate the phenomenon of the movement of stomatal openings in leaves.

Möhler, Johann Adam (b. May 6, 1796, Igersheim, Würzburg [Germany]—d. April 12, 1838, Munich), German Roman Catholic church historian whose theories on and efforts toward uniting the Catholic and Protestant churches made him an important source of ideas for the ecumenical movement of the 20th century.



Möhler, detail of a painting by Eduard Istas, *c.* 1830

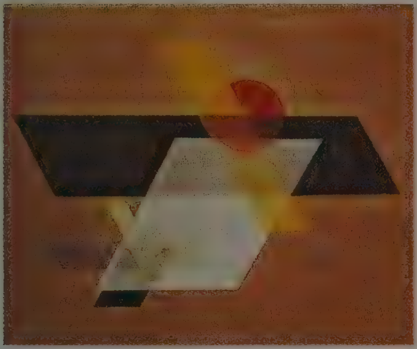
Archiv fur Kunst und Geschichte, Berlin

Ordained priest in 1819, Möhler taught church history at the German universities of Tübingen (1826–35) and Munich (1835–38). One of his outstanding books is *Symbolik* ("On the Creeds"), first published in 1832. In this work, as in his earlier volume *Die Einheit in der Kirche* (1825; "Unity in the Church"), Möhler argued that man's journey to God could be made only in the church founded by Christ. He sympathized with Protestantism, and his longing for church unity induced him to tour key universities in Germany and Austria and to engage in discourses with contemporary Protestant scholars. His hope that a mutual understanding between Protestants and Roman Catholics would bring about an undivided church has inspired modern ecclesiastics. His other works include *Neue Untersuchung der Lehrgegensätze zwischen Katholiken und Protestanten* (1834; "New Examination of the Doctrinal Differences Between Catholics and Protestants") and lives of Saints Athanasius the Great and Archbishop Anselm of Canterbury.

Moholy-Nagy, László (b. July 20, 1895, Bacsbarsod, Hung.—d. Nov. 24, 1946, Chicago), Hungarian painter, photographer, and art teacher, whose vision of a nonrepresentational art consisting of pure visual fundamentals—colour, texture, light, and equilibrium of forms—was immensely influential in the arts in the mid-20th century.

Moholy-Nagy studied law in Budapest, joined the poetry circle of Endre Ady, and published woodcuts of Cubist influence in the avant-garde journal *Ma.* He went to Berlin in 1921, and in 1923 he headed the metal workshop of the famous avant-garde school of design known as the Bauhaus and edited the publications known as the *Bauhausbook* series. During his Bauhaus years (1923–29) he evolved the contributions to art and to art education for which he is known.

As painter and photographer he worked predominantly with light. His photograms were composed directly on the film, and his "light modulators" (oil paintings on transparent or polished surfaces) included mobile light effects. As an educator, Moholy-Nagy evolved a widely accepted curriculum developing natural visual gifts instead of specialized skills in the student. His dictum was: "Everybody is talented." Fine-arts training was abolished in favour of "designing the whole man." Fleeing from Nazi Germany in 1935, he went to London and then in 1937 organized and headed in Chicago the New Bauhaus (later the Institute of Design of the Illinois Institute of Technology), the first American school based on the Bauhaus program.



"A II," oil on canvas by László Moholy-Nagy, 1924; in the Solomon R. Guggenheim Museum, New York City

The Solomon R. Guggenheim Collection, New York City

Mohorovičić, Andrija (b. Jan. 23, 1857, Volosko, Croatia, Austrian Empire [now in Croatia]—d. Dec. 18, 1936, Zagreb, Yugos.), Croatian meteorologist and geophysicist who discovered the boundary between the Earth's crust and mantle—a boundary subsequently named the Mohorovičić discontinuity.

The son of a shipyard carpenter, he was a precocious youth and by the age of 15 spoke not only Croatian but English, French, and Italian, to which he later added Latin and Greek as well as Czech and German. He studied under the physicist and philosopher Ernst Mach at the University of Prague and was graduated in mathematics and physics (1875). After teaching in a secondary school for seven years, he received an appointment to the Royal Nautical School at Bakar, near Rijeka. He taught meteorology and oceanography, and he established a meteorological station there in 1887. In 1891 he became a professor at the Main Technical School at Zagreb, where he continued his studies. He was named director of the meteorological observatory there in 1892, and he received his Ph.D. from the University of Zagreb in 1897.

As early as 1908 Mohorovičić had made the Zagreb observatory one of the most advanced in Europe, and on October 8 of the following year the station recorded a destructive earthquake in the Kulpa Valley. From these readings and those of other stations, Mohorovičić observed that certain seismic waves arrived at detecting stations sooner than anticipated, and he deduced that the earthquake was centred in an outer layer of Earth—since called its crust—and that the fast waves had traveled through an inner layer—the mantle. Between them lay what was later named the Mohorovičić discontinuity. Much later observations by more sophisticated instruments confirmed his discovery. Often referred to as simply the Moho, this crust–mantle interface lies at a depth of about 35 km (22 miles) on continents and about 7 km (4.3 miles) beneath the oceanic crust. Modern instruments have determined that seismic-wave velocity rapidly increases to more than 8 km per second (5 miles per second) at this boundary.

Mohorovičić later discovered a technique for locating earthquake epicentres and calculated the travel time of seismic waves. He was an early advocate of earthquake-resistant construction.

Mohs hardness, rough measure of the resistance of a smooth surface to scratching or abrasion, expressed in terms of a scale devised (1812) by the German mineralogist Friedrich Mohs. The Mohs hardness of a mineral is determined by observing whether its surface is scratched by a substance of known or defined hardness.

To give numerical values to this physical property, minerals are ranked along the Mohs scale, which is composed of 10 minerals that have been given arbitrary hardness values. The scale contains the following minerals, in ascending order of hardness:

1. talc
2. gypsum
3. calcite
4. fluorite
5. apatite
6. orthoclase
7. quartz
8. topaz
9. corundum
10. diamond

Thus, if a mineral is scratched by orthoclase but not by apatite, its Mohs hardness is between 5 and 6. In the determination procedure it is necessary to be certain that a scratch is actually made and not just a "chalk" mark that will rub off. If the species being tested is fine-grained, friable, or pulverulent, the test may only loosen grains without testing individual mineral surfaces.

Supplements to the mineral scale include the fingernail (2+), a copper coin (about 3), a pocketknife blade (5+), window glass (5½), and a steel file (6½).

Moi, Daniel arap, in full DANIEL TOROITICH ARAP MOI (b. 1924, Sacho, Kenya Colony [now Kenya]), politician who was president of Kenya from 1978.

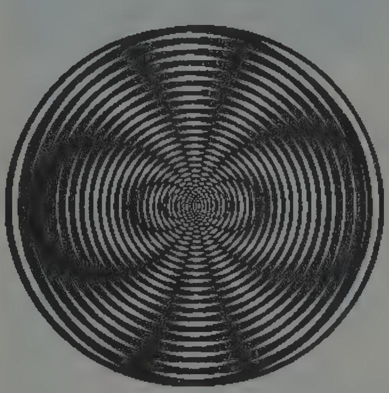
Born a member of the minority Kalenjin, Moi became a teacher at age 21. He was appointed minister of education in the transitional government of Kenya in the early 1960s. Although he had been cofounder and chairman of the Kenya African Democratic Union, a party composed of minority peoples, he joined the Kikuyu-dominated Kenya African National Union (KANU) in 1964. That same year he was appointed minister of home affairs.

Named vice president in 1967, Moi became president in 1978 following the death of Jomo Kenyatta (*q.v.*). He quickly consolidated his power, banning opposition parties and promoting his Kalenjin countrymen to positions of authority. He also shrewdly curried the favour of the army, which proved loyal to him in suppressing a coup attempt in 1982. Moi continued Kenyatta's pro-Western policies, and under Moi's stewardship Kenya emerged as one of the most prosperous African nations.

Facing calls for reform, Moi legalized opposition parties in 1991. He won the first multiparty election in 1992 and won again in 1997, both times amid charges of fraud that continued to plague his government.

Moira, Francis Rawdon-Hastings, 2nd earl of: *see* Hastings, Francis Rawdon-Hastings, 1st marquess of.

moiré pattern, in physics, the geometrical design that results when a set of straight or curved lines is superposed onto another set; the name derives from a French word for "watered." The effect may be seen by looking through the folds of a nylon curtain of small mesh, or two sheets of graph paper twisted 20 or 30 degrees with respect to one another. If a grating design made of parallel black and white bars of equal width is superposed on an identical grating, moiré fringes will appear as the crossing angle is varied from about one second of arc to about 45°. The pattern will consist of equispaced parallel fringes. If two gratings of slightly different spacing are superposed, "beat" fringes will appear, which shift positions much faster than does the displacement of one grating with respect to the other. This principle is used to measure small displacements in mechanical devices (*e.g.,* comparator). Moiré patterns are useful in representing fluid flow and potential fields. In the Figure the moiré fringes resemble the lines of force between two point charges of opposite sign. Problems in optics, wave motion, stress analysis, crystallography, mathematics, and the psychology of perception may also be solved. A different kind of moiré pattern results when two families of curves of different colours are superposed: fringes of a third colour are produced.



Moiré pattern

From G. Oster, "Moire Patterns in Physics," *Endeavor,* vol. 27, no. 101 (1968)

Moiseyev, Igor Aleksandrovich (b. Jan. 21 [Jan. 8, Old Style], 1906, Kiev), Russian choreographer and founder of the State Academic Folk Dance Ensemble of the U.S.S.R., popularly called the Moiseyev Ensemble. He re-created for theatrical presentation numerous national dances of the Soviet Union.

Trained in Moscow by the Bolshoi ballet school, from which he graduated in 1924, he became admired both as a character dancer and as a choreographer at the Bolshoi Theatre. In 1936 he was appointed head of the choreography department of the newly established Theatre of Folk Art in Moscow. After organizing a national folk dance festival, he founded (1937) the State Academic Folk Dance Ensemble with 35 dancers, principally amateurs, and with dances from the 11 republics then forming the U.S.S.R. Subsequently he built a company of about 100 professional dancers trained by either the Bolshoi Theatre School or its National Dance Department, which Moiseyev headed; all Ensemble dancers have background in classical ballet.

Moiseyev's choreography often featured sequential geometric patterns performed with great precision. His work was especially admired, however, for the balance that it maintained between authentic folk dance and theatrical effectiveness. Thus, although the ensemble became famous for its spectacular and acrobatic leaps and jumps, Moiseyev's choreography consistently derived from what he called "root movements," the basic steps characteristic of a particular type of folk dance. He created more than 170 dances for the ensemble, including *Ukrainian Suite,* portraying a young couple's betrothal; *Soccer Dance,* a comic version of this game; and the well-known *Partisans,* with its representations of guerrilla warfare and men on horseback. His *Bulba* so effectively re-created the folklore of Belorussia that it was adopted as that region's national dance. After 1955 the ensemble toured France, England, Egypt, Japan, and the United States. Moiseyev married Tamara Zeifert, a leading ensemble soloist.

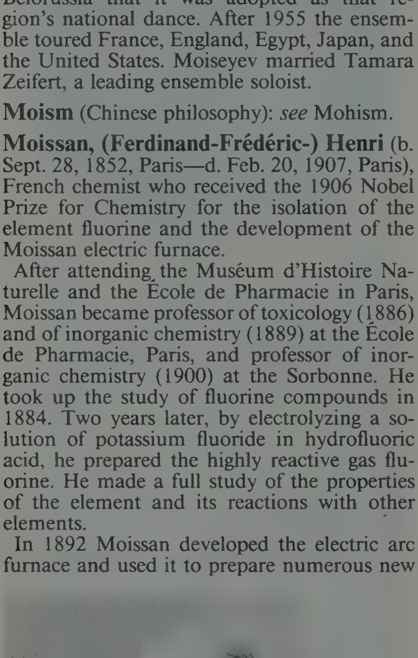
Moiseyev, 1966
Tass—Sovfoto

Moism (Chinese philosophy): *see* Mohism.

Moissan, (Ferdinand-Frédéric-) Henri (b. Sept. 28, 1852, Paris—d. Feb. 20, 1907, Paris), French chemist who received the 1906 Nobel Prize for Chemistry for the isolation of the element fluorine and the development of the Moissan electric furnace.

After attending the Muséum d'Histoire Naturelle and the École de Pharmacie in Paris, Moissan became professor of toxicology (1886) and of inorganic chemistry (1889) at the École de Pharmacie, Paris, and professor of inorganic chemistry (1900) at the Sorbonne. He took up the study of fluorine compounds in 1884. Two years later, by electrolyzing a solution of potassium fluoride in hydrofluoric acid, he prepared the highly reactive gas fluorine. He made a full study of the properties of the element and its reactions with other elements.

In 1892 Moissan developed the electric arc furnace and used it to prepare numerous new compounds and to vaporize substances previously regarded as infusible. He devised a commercially profitable method of producing acetylene. Although he claimed to have synthesized diamonds in his furnace (1893), his success is now seriously doubted.


Moissan, 1906
By courtesy of the Nobel Foundation, Stockholm

Moissan's scientific works include *Le Four électrique* (1897; "The Electric Furnace"), *Le Fluor et ses composés* (1900; "Fluorine and Its Compounds"), and *Traité de chimie minérale,* 5 vol. (1904–06; "Treatise on Inorganic Chemistry").

Moivre, Abraham de (b. May 26, 1667, Vitry, Fr.—d. Nov. 27, 1754, London), French mathematician who was a pioneer in the development of analytic trigonometry and in the theory of probability.

A French Huguenot, de Moivre was jailed as a Protestant upon the revocation of the Edict of Nantes in 1685. When he was released shortly thereafter, he fled to England. In London he became a close friend of Sir Isaac Newton and the astronomer Edmond Halley. De Moivre was elected to the Royal Society of London in 1697 and later to the Berlin and Paris academies. Despite his distinction as a mathematician, he never succeeded in securing a permanent position but eked out a precarious living by working as a tutor and a consultant on gambling and insurance.

De Moivre expanded his paper "De mensura sortis" (written in 1711), which appeared in *Philosophical Transactions,* into *The Doctrine of Chances* (1718). Although the modern theory of probability had begun with the unpublished correspondence (1654) between Blaise Pascal and Pierre de Fermat and the treatise *De Ratiociniis in Ludo Aleae* (1657; "On Ratiocination in Dice Games") by Christiaan Huygens of Holland, de Moivre's book greatly advanced probability study. The definition of statistical independence—namely, that the probability of a compound event composed of the intersection of statistically independent events is the product of the probabilities of its components—was first stated in de Moivre's *Doctrine.* Many problems in dice and other games were included, some of which appeared in the Swiss mathematician Jakob (Jacques) Bernoulli's *Ars conjectandi* (1713; "The Conjectural Arts"), which was published before de Moivre's *Doctrine* but after his "De mensura." He derived the principles of probability from the mathematical expectation of events, just the reverse of present-day practice.

De Moivre's second important work on probability was *Miscellanea Analytica* (1730; "Analytical Miscellany"). He was the first to use the probability integral in which the integrand is the exponential of a negative quadratic,

$$\int_0^\infty e^{-x^2}dx = \frac{\sqrt{\pi}}{2}.$$

He originated Stirling's formula, incorrectly attributed to James Stirling (1692–1770) of England, which states that for a large number n, $n!$ equals approximately $(2\pi n)^{1/2}e^{-n}n^n$; that is, n factorial (a product of integers with values descending from n to 1) approximates the square root of $2\pi n$, times the exponential of $-n$, times n to the nth power. In 1733 he used Stirling's formula to derive the normal frequency curve as an approximation of the binomial law.

De Moivre was one of the first mathematicians to use complex numbers in trigonometry. The formula known by his name, $(\cos x + i \sin x)^n = \cos nx + i \sin nx$, was instrumental in bringing trigonometry out of the realm of geometry and into that of analysis.

mojarra, any of approximately 40 species of fishes in the family Gerreidae (order Perciformes), found in marine environments in most warm regions of the world. Brackish habitats or fresh water are entered on occasion by some species. Mojarras are silvery fishes with compressed bodies; they are distinguished by their highly protrusible mouths, with the opened jaws forming an extended tube. Although their maximum length is about 35 cm (14 inches), most species of mojarra do not attain lengths greater than 25 cm (10 inches). The spotfin mojarra (*Eucinostomus argenteus*), which is one of the most widespread species, occurs along the Atlantic, Gulf of Mexico, and Pacific coasts of North America, even entering freshwater habitats in the lower reaches of river systems.

Mojave, also spelled MOHAVE, Yuman-speaking Indian farmers of the Mojave Desert along the lower Colorado River, U.S. This valley was a patch of green surrounded by barren desert and was subject to an annual flood that left a large deposit of silt. Planting began as soon as the floodwaters receded. Unlike some of the desert farmers to the east, whose agricultural endeavours were surrounded by considerable ritual intended to ensure success, the Mojave almost totally ignored ritual associated with crops. In addition to farming, there were considerable fishing, hunting, and gathering of wild plants.

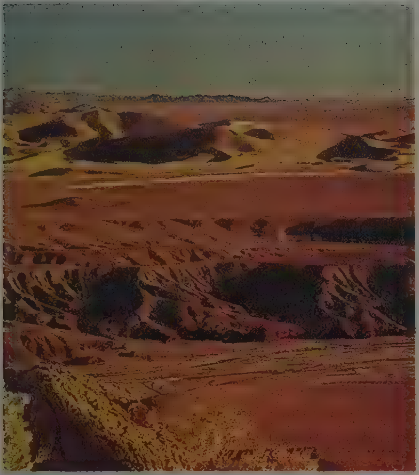
The essential social unit among the Mojave was the family and the patrilineage. There were no settled villages; wherever there was suitable land for farming, there were scattered houses and the fields were owned by the man who cleared them. The formal government among the Mojave consisted mainly of a hereditary tribal chief who functioned as a natural leader and adviser. The Mojave possessed a strong national identity, most evident in time of war; prestige was based on success and bravery in battle, and all able-bodied men took part, led by a single war chief. The usual enemies were other riverine Yuman tribes, except for the Yuma proper, who were trusted allies. Combatants were divided into archers, clubbers, and stick men, and battles frequently were highly stylized.

Mojave Indians building houses along the Colorado River in Arizona, 1880s
By courtesy of the Smithsonian Institution, Washington, D.C.; Bureau of American Ethnology

In religion the Mojave believed in a supreme creator and attached great significance to dreams, which were considered the source of all special powers. Public ceremonies took the form of singing a cycle of dreamed songs that recited a myth, usually the narrative of a journey. Some cycles consisted of hundreds of songs.

The Mojave now live on the Colorado River Reservation in Arizona. About 650 Mojave live both on and off the reservation.

Mojave Desert, arid region of southeastern California and portions of Nevada, Arizona, and Utah, U.S. Occupying more than 25,000 square miles (65,000 square km), it extends from the Sierra Nevada range to the Colorado Plateau and merges with the Great Basin Desert to the north and the Sonoran Desert to the south and southeast. It abuts the San Gabriel–San Bernardino mountains in the southwest. Its desert climate is characterized by extreme variation in daily temperature, with frequent winter frosts and an average annual precipitation of less than 5 inches (127 mm). Near the undefined Great Basin–Mojave border lies Death Valley, the



Mojave Desert, California
David Muench

lowest point in North America (now a national park). The Mojave has a typical mountain-and-basin topography with sparse vegetation (creosote bush, Joshua trees, burroweed, and occasional cacti). Sand and gravel basins drain to central salt flats from which borax, potash, and salt are extracted. Silver, tungsten, gold, and iron deposits are worked.

The intermittent Mojave River (named for the Mojave Indians) flows predominately underground to Soda Lake. The Colorado River and Lake Mead is situated close to the eastern edge of the desert. Cattle grazing is common in the northern portion of the Mojave, while the southwestern part, adjacent to Los Angeles, is undergoing urban and recreational development. Several U.S. military installations and Joshua Tree National Park are located there. Las Vegas, Nev., and Lancaster, Victorville, Mojave, and Barstow, Calif., are the chief towns.

moji (calligraphy): *see* bokuseki.

Mojilian (Mongol khan): *see* Bilge.

Mokau River, river in North Island, New Zealand. It rises in the Rangitoto Range south of Te Kuiti and flows southwest for 98 miles (158 km) to enter North Taranaki Bight of the Tasman Sea. The Mokau River drains a basin of 550 square miles (1,425 square km); its lower valley is a dairying area subject to periodic flooding. Despite a sandbar at its mouth, the Mokau is navigable to a falls 23 miles (37 km) upstream. The towns below the falls include Mokau, a former port a mile from the sea. Mokau is a Maori word meaning "winding stream."

Moke, Camille: *see* Pleyel, Marie-Félicité-Denise.

Mokha (Yemen): *see* Mocha.

Mokken (Japanese scholar): *see* Nakae Tōju.

Mokoš, also spelled MOKOSH, the goddess of life-giving in ancient Slavic mythology. She is the only female deity mentioned in the Old Kievan pantheon of AD 980 and has survived in East Slavic folk beliefs as Mokoša, or Mokuša. A tall woman with a large head and long arms, she spins flax and wool at night and shears sheep. Her name is connected, on the one hand, with spinning and plaiting and, on the other, with moisture. Associations with spinning, plaiting, and moisture suggest early European roots: the Great Goddess, or Fate, the spinner of life's thread, dispenser of life's water.

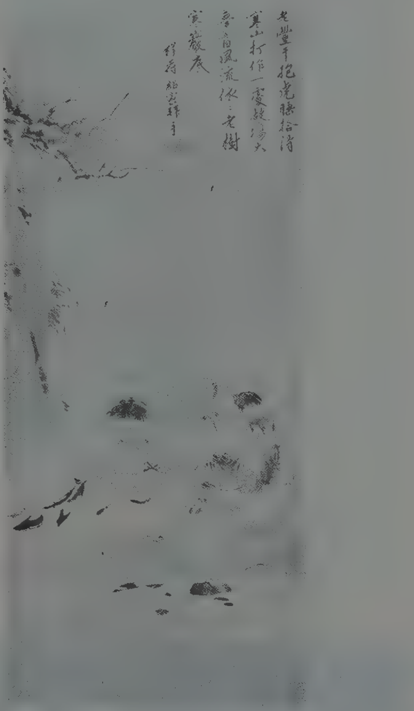
Mokp'o, port city, South Chŏlla *do* (province), southwestern South Korea. On the tip of Muan Peninsula, at the southwestern end of the Korean Peninsula, it is the door to Honam Plain, the largest granary in the country. During the Chosŏn (Yi) dynasty (1392–1910), it was a navy base and was opened to foreign trade in 1879. In 1955 the port was redeveloped with the expansion of its harbour facilities. The sea off the coast, with some 1,430 islands within the area, provides good fishing grounds. Mokp'o is a rail and road terminus connected with Seoul through Taejŏn. Its principal industries are the manufacture of marine products and salt chemicals. Mokp'o Junior Teachers' College (1964) is located there. Pop. (1990) 243,064.

Mokrān (Iran): *see* Makran.

moksha, also spelled MOKSA, Sanskrit MOKṢA ("release"), also called MUKTI, or APAVARGA, in Hinduism and Jainism, the ultimate spiritual goal, designating the individual soul's release from the bonds (*bandha*) of transmigration. The soul, once entered upon a bodily existence, remains trapped in a chain of successive rebirths (samsara) until it has reached perfection or the enlightenment that allows it release, or moksha. The methods by which release is sought after and attained differ from school to school, but most schools consider moksha to be a person's highest purpose in life.

Mokuan Reien (b. late 13th century?, Japan—d. 1343?, China), Zen Buddhist priest, one of the first Japanese artists to work in the Chinese monochromatic ink style.

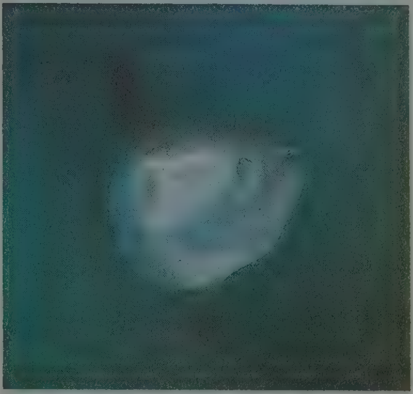
Originally a priest in a Japanese temple, Mokuan went to China about 1333, and, while making a pilgrimage to major temples, did paintings of flowers, birds, and human figures in the manner of Mu-ch'i Fu-ch'ang, the great Ch'an (Zen) painter of 13th-century China. Mokuan was honoured both in China, where he was called the reincarnation of Mu-ch'i, and in Japan, where his paintings were collected by the shoguns (military dictators) Ashikaga Yoshimitsu and Ashikaga Yoshimasa. Among existing paintings believed to be originals by Mokuan, the best authenticated is a portrait of Hotei, the god of fortune.



"The Four Sleepers," painting by Mokuan Reien, hanging scroll, ink on paper, with laudatory inscription by Hsiang-fu Shao-mi; in the Maeda Ikutokukai Foundation, Ryōzen, Japan
By courtesy of the Maeda Ikutokukai Foundation, Tokyo

mola, also called OCEAN SUNFISH, or HEADFISH, any of three species of oceanic fishes of the family Molidae. Molas are distinctive in appearance, with short bodies that end abruptly just behind the tall, triangular dorsal and anal fins. The fishes are also flattened from side to side and have tough skins, small mouths, and fused, beaklike teeth.

The mola (*Mola mola*) is an enormous, gray or brownish species reaching a maximum length and weight of about 3.3 m (11 feet) and 1,900 kg (4,000 pounds). More or less oval or circular in shape, it takes its name from the millstone, or mola, to which it was likened by Linnaeus. An inhabitant of temperate and tropical regions throughout the world, it is usually found in the open sea, often at the surface.

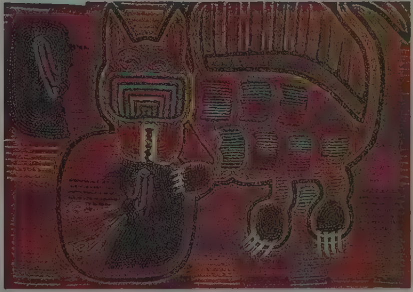


Common mola, or ocean sunfish (*Mola mola*)
Bob Evans—Peter Arnold, Inc.

The other varieties of mola are longer in the body but are similarly cut short behind the dorsal and anal fins. The sharptail mola (*Mola lanceolata,* or *Masturus lanceolatus*) is also very large, but the slender mola (*Ranzania laevis*) is smaller, being about 70 cm (30 inches) long.

mola, type of embroidered woman's outer garment, worn as part of the blouse by the Cuna Indians of the San Blas Archipelago, off the eastern coast of Panama. The mola's brightly coloured designs, done in reverse appliqué technique, traditionally are abstract, often based on the patterns of brain coral. Recently, schematically drawn figurative designs have become frequent.

The origin of the mola remains uncertain. It is known, however, to have first appeared during the early period of Spanish colonization, and its patterns may constitute a residual of pre-Hispanic body-painting designs. Today the mola is used not only for a garment but also for a wall hanging or other interior home decoration.



Stylized cat depicted on a mola, reverse appliqué work by the Cuna Indians of the San Blas Archipelago, off the eastern coast of Panama; in the collection of Anne Wenzel
Andrew L. Young

Mola di Bari, town, Bari *provincia,* Puglia (Apulia) *regione,* southern Italy. In the European Middle Ages it was an embarkation point for the crusaders, and it has a 13th-century cathedral of Renaissance reconstruction. A fishing port and bathing resort, the modern town has tanneries and soap and button factories. Pop. (1989 est.) mun., 26,942.

molar gas constant (symbol R), fundamental physical constant arising in the formulation of the general gas law. For an ideal gas (approximated by most real gases that are not highly compressed or not near the point of liquefaction), the pressure p times the volume V of the gas divided by its absolute temperature T is a constant. When one of these three is altered for a given mass of gas, at least one of the other two undergoes a change so that the expression pV/T remains constant. The constant, further, is the same for all gases, provided the mass of gas being compared is one mole, or one molecular weight in grams. For one mole, therefore, $pV/T = R$.

The dimensions of the universal gas constant R are energy per degree per mole. In the metre-kilogram-second system the value of R is 8.31441 joules per Kelvin (K) per mole. Other frequently used equivalent values are 8.314×10^7 ergs per Kelvin per mole, 1.986 calories per Kelvin per mole, and 0.08207 litre-atmosphere per Kelvin per mole.

molasse, thick association of continental and marine clastic sedimentary rocks that consists mainly of sandstones and shales formed as shore deposits. The depositional environments involved include beaches, lagoons, river channels, and backwater swamps. The sands are deposited on beaches and in river channels and eventually form shoestring bodies (thickness:width = 1:5) that are mainly calcareous or sideritic (iron carbonate-bearing) subgraywackes and protoquartzites. The shales are deposited in the lagoons and swamps and are mica-rich and red to gray in colour. In addition, thin beds of freshwater limestone and coal seams (called coal measures) are present. The deposits show repetitive bedding, and their characteristics stand in contradistinction to deepwater marine deposits called flysch.

molasses, also called TREACLE, syrup remaining after sugar is crystallized out of cane or beet juice. Molasses syrup is separated from sugar crystals by means of centrifuging. Molasses is separated from the sugar crystals repeatedly during the manufacturing process, resulting in several different grades of molasses; that obtained from the first extraction contains more sugar, tastes sweeter, and is lighter in colour than molasses obtained at the second or third extractions. The third and final extraction yields blackstrap molasses, a heavy, viscous, dark-coloured product that has had all the sugar removed from it that can be separated practically by ordinary crystallization.

The lighter grades of molasses made from sugarcane are edible and are used in baking and candy-making and to make rum. Blackstrap and other low grades of cane molasses are used in mixed animal feed and in the industrial production of vinegar, citric acid, and other products. The molasses obtained from sugar beets has a very low sugar content and is generally inedible. Before 1948 molasses was fermented to make industrial ethyl alcohol, which is now made principally from ethylene, thus decreasing the demand for molasses.

Blackstrap molasses from cane is composed of roughly 55 percent sucrose and other sugars, 20 percent water, 15 percent organic nonsugars, and 10 percent ash.

Molasses Act (1733), in American colonial history, a British law that imposed a tax on molasses, sugar, and rum imported from non-British foreign colonies into the North American colonies. The act specifically aimed at reserving a practical monopoly of the American sugar market to British West Indies sugarcane growers, who otherwise could not compete successfully with French and other foreign sugar-producers on more fertile neighbouring West Indian islands. The American colonists protested the act, claiming that the British West Indies alone could not produce enough molasses to meet the colonies' needs. The American colonists feared that the act's effect would be to increase the price of rum manufactured in New England, thus disrupting the latter's exporting capacity. The Molasses Act was among the least effective of the British Navigation acts, since it was largely circumvented through smuggling. It was later amended by the Sugar Act of 1764.

Molay, Jacques de (b. 1243, Molay, Fr.—d. March 19, 1314, Paris), last grand master of the Knights Templars, an order of knighthood founded during the Crusades that had attained extensive power and wealth. He failed to exercise effective leadership at the time of the suppression of the order by King Philip IV the Fair of France and Pope Clement V.

Molay entered the order in 1265, fought in Syria, and after 1291 was at Cyprus. He was elected grand master of the Templars about 1298. Summoned to France (1306 or 1307) by Pope Clement V to discuss a new crusade, Molay asked the pope to investigate certain spurious accusations of blasphemy and sodomy that had recently been made against his order. On Oct. 13, 1307, all the Templars in France, including Molay, were arrested and interrogated by command of Philip IV, who was intent on crushing the order and seizing its wealth. On Oct. 24, 1307, Molay, probably under torture, confessed that some of the charges brought against the order were true, but he rejected a charge of sodomy. He wrote to Templars throughout France, enjoining confession; but when the pope sent his own delegates to conduct the inquiries, Molay and many of his subjects retracted their statements, saying they had been exacted by torture. In November 1309 and in March 1310, Molay appealed for a personal judgment by the pope. But Clement decided to suppress the order (March 1312); and on March 18 or 19, 1314, a commission of three cardinals condemned Molay and other dignitaries of the order to perpetual imprisonment. On hearing this sentence, Molay again retracted his confession, and as a final punishment he was burned as a relapsed heretic by Philip IV's officers the same afternoon.

Molcho, Solomon, original name DIOGO PIRES (b. *c.* 1500, Portugal—d. 1532, Mantua [Italy]), martyr who announced the messiah, arousing the expectations of European Jews.

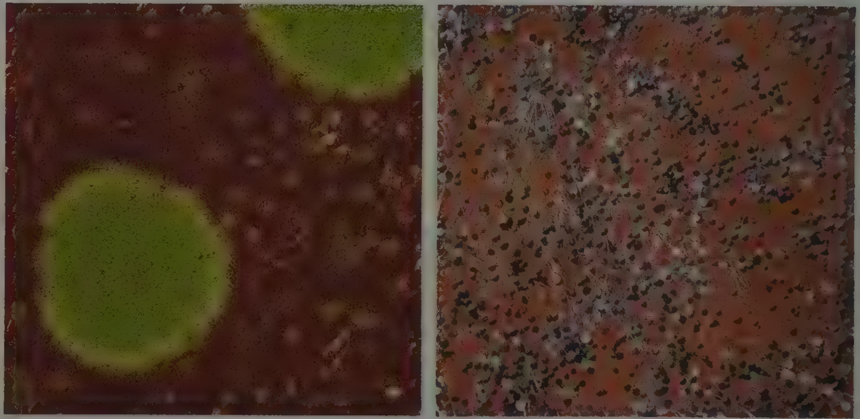
The son of Marrano parents (Portuguese or Spanish Jews forced to become Christians), Pires attained the position of royal secretary in a Portuguese high court of justice. When an Arabian adventurer, David Reubeni, arrived in Portugal, Pires became possessed by mystic visions and was convinced that Reubeni was an augur of the Jewish messiah, the divinely chosen leader who would destroy the enemies of the Jews and initiate the Golden Age. Reubeni, claiming to be the brother of an Arabian Jewish king, had asked the Portuguese king for weapons so that he could lead a Jewish army to drive the Turks out of Palestine.

Pires circumcised himself, took the name Solomon Molcho, and approached Reubeni, telling him of his conversion and desire to openly espouse Judaism. He was rebuffed, however, by Reubeni. Molcho left Portugal and for a time lived in Salonika, Tur., where he joined a circle of Kabbalists (believers in the Kabbala, Jewish mystical writings). He began to preach that the messiah would arise in 1540 and published several sermons. After dwelling for a time in Safed, Palestine, he went to Rome (1529) and managed to win Pope Clement VII's protection from the Inquisition. Preaching at the great synagogue in Rome, Molcho accurately predicted two natural catastrophes—a flood in Rome (1530) and an earthquake in Portugal (1531).

In the meantime, Reubeni had come to Rome and joined forces with Molcho. In 1532 they went to Regensburg, Ger., to see Emperor Charles V in a vain attempt to persuade him to arm the Marranos against the Turks. Charles imprisoned them and turned them over to the Inquisition in Mantua. Given the choice of returning to Christianity, Molcho refused and was burned at the stake. Reubeni died in prison, probably poisoned.

Mold, Welsh YR WYDDGRUG, town, seat of Delyn district and of Clwyd county, Wales. The town, formerly known as Flintshire, is situated on a small stretch of farmland between the two industrial centres of Deeside and Wrexham. Mold grew up around a motte-and-bailey castle that was built by the Normans in the 12th century. The native Christians of the area defeated the Picts and Scots in an important battle waged in AD 430; an obelisk, built in 1736 and located 1 mile (1.6 km) northwest of town, commemorates the victory. Mold has long been a market centre for the area. The town's emergence as the administrative centre of Clwyd county was aided by the building of Shire Hall there in 1967. The 19th-century writer Daniel Owen, considered by many to be the father of the Welsh novel, was born in Mold, and the town's cultural centre contains some of his original manuscripts and personal items. Pop. (1981) 8,505.

mold, also spelled MOULD, in biology, a conspicuous mass of mycelium (masses of

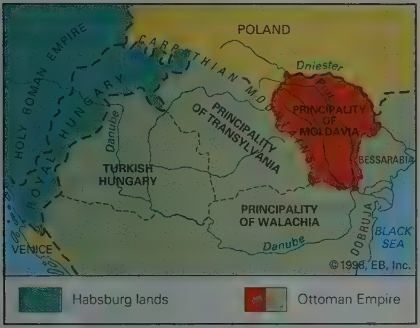


(Left) Mold on surface of jelly, (right) close-up of peach mold (*Rhizopus*)

(Left) Ingmar Holmasen, (right) Stephen Collins vegetative filaments, or hyphae) and fruiting structures produced by various fungi (division Mycota). Fungi of the genera *Aspergillus, Penicillium,* and *Rhizopus* form mold and are associated with food spoilage and plant diseases.

Moldau River (Czech Republic): *see* Vltava River.

Moldavia, Romanian MOLDOVA, Turkish BOGDAN, principality on the lower Danube River that joined Walachia to form the nation of Romania in 1859. Its name was taken from the Moldovo River. It was founded in the first half of the 14th century by a group of Vlachs, led by Dragoş, who emigrated southward from Maramureş in the Hungarian-controlled Carpathian Mountains. About 1349 Moldavia achieved its independence under its prince, Bogdan. At its greatest extent, Moldavia included Bessarabia and was bounded on the north and northeast by the Dniester (Dnestr) River, on the south by the Black Sea and the regions of Dobruja and Walachia, and on the west by Transylvania. The new principality successfully resisted pressures from Hungary and Poland, and, under Prince Stephen IV the Great (reigned 1457–1504), it also tried to defend its independence against Turkish encroachments. After Stephen's death, however, his son and successor, Bogdan III the One-Eyed (reigned 1504–17), was compelled to pay tribute to the sultan. By the middle of the 16th century Moldavia had become an autonomous, tribute-paying vassal-state of the Ottoman Empire.



Moldavia in the mid-16th century

For the next 300 years the principality remained subject to the Turks, except for a few brief periods when Moldavia rejected Turkish domination—*e.g.,* when John the Terrible (reigned 1572–74) rebelled against a demand for higher tribute payments; when Michael the Brave, prince of Walachia, united his principality with Moldavia and Transylvania in 1600; and when Moldavia recognized Polish suzerainty (1601–18). The Turks dominated Moldavia's markets and selected its princes, often in response to bribery; initially the princes came from among the native dynasty but after 1711 from the Phanariotes—*i.e.,* Greeks who had acquired great economic and political power in the Ottoman Empire. Under the Turks, Moldavia was transformed into a strongly fortified border region.

During the 18th century, Russian influence in Moldavia increased, and the region became a source of contention between the Turks and the Russians. In 1774, while continuing to recognize Turkish suzerainty, Moldavia was placed under Russian protectorship. Also at this time the principality lost its northwestern territory—Bukovina—to Austria, gave up its eastern portion and Bessarabia to Russia (Treaty of Bucharest; 1812), and was relieved of the unpopular Phanariot regime after a revolt in 1821. Under Russia's guidance, a series of political and economic reforms was initiated, and a constitution, the Règlement Organique, was adopted (1832). In 1859, influenced by Romanian nationalism, the ruling assembly of Moldavia voted to unite with Walachia under Prince Alexandru Ion Cuza to form a single state of Romania (formal unity was delayed until 1861).

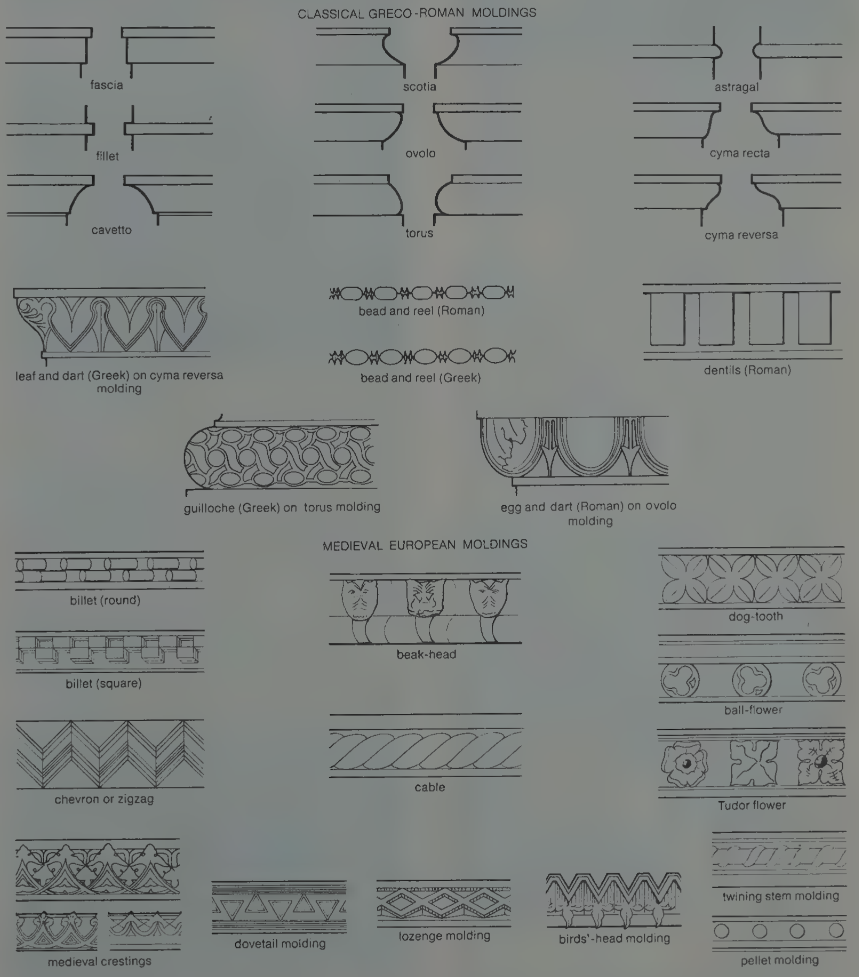
In 1918 those portions of historic Moldavia east of the Prut River threw off Russian rule and joined Romania. In 1924 the Soviet Union created a Moldavian Autonomous Soviet Socialist Republic on territory east of the Dniester River, within the Ukrainian S.S.R. In 1940 Romania was compelled to cede its territories between the Prut and Dniester rivers back to the Soviet Union, and the former Romanian and Ukrainian regions together became the Moldavian S.S.R. This Soviet republic became the independent nation of Moldova in 1991.

Molde, town and seat of Møre og Romsdal *fylke* (county), western Norway. It lies along Molde Fjord, an inlet of the Norwegian Sea. A port since the 15th century, Molde was partially destroyed by fire in 1916, damaged during World War II, then rebuilt completely. During April 1940 it was the temporary home of the Norwegian government. Local industry includes fish export, textile mills, and furniture manufacture. Molde's outstanding gardens have earned it the nickname "Town of Roses." The town hosts a summer jazz festival. Pop. (1995 est.) mun., 22,892.

molding, also spelled MOULDING, in architecture and the decorative arts, a defining, transitional, or terminal element that contours or outlines the edges and surfaces on a projection or cavity, such as a cornice, architrave, capital, arch, base, or jamb. The surface of a molding is modeled with recesses and reliefs, which either maintain a constant profile or are set in rhythmically repeated patterns. Of primary importance in the design of a molding is the type of shadow it will cast.

Moldings doubtlessly originated in prehistoric building, where they served specific structural functions, such as supporting, binding, or separating surfaces. As monumental architecture developed, moldings were gradually translated from wood or other ephemeral materials into more permanent ones, most often stone. In this gradual transition, moldings were retained as a matter of conservatism or taste; in stone they were elaborated and refined, contributing order and richness to a decorative system. Although their original structural function was often satisfied by other means, moldings were used in a manner that implied a structural logic. From this usage, best characterized in the orders of architecture of ancient Greece, it was possible later to develop theories for the correct form and employment of moldings, according to which several basic shapes were standardized in the vocabulary of architectural design, as follows:

Flat or Angular. (1) The fascia, face, or band is a continuous member with a flat surface, parallel to the surface that it ornaments and either projecting from or slightly receding into it. (2) The fillet, listel, or regula is a relatively narrow band, usually projecting, commonly used to separate curved moldings or to finish them at the top or bottom. (3) A bevel, or chamfer, molding is an inclined



Various types of Greco-Roman and medieval European moldings

From M.S. Briggs, *Everyman's Concise Encyclopaedia of Architecture,* E.P. Dutton & Co., Inc., and J.M. Dent & Sons Ltd., and H.H. Sayler, *Dictionary of Architecture;* John Wiley & Sons, Inc.

band, fascia, or fillet. (4) A splay is a large bevel.

Single Curved. (1) The cavetto is a concave molding with a profile approximately a quarter-circle, quarter-ellipse, or similar curve. (2) A scotia molding is similar to the cavetto but has a deeper concavity partially receding beyond the face of the general surface that it ornaments. (3) A flute is a small groove of a semicircular, segmental, or similar section. (4) An ovolo, a convex molding, has a profile approximately a quarter-circle or quarter-ellipse. (5) A torus, a convex molding, approximates a semicircle or semiellipse. (6) A roll, or bowtell, molding is convex, approximating three-quarters of a circle. (7) An astragal is a small torus. (8) An apophyge molding is a small, exaggerated cavetto.

Compound or Composite. (1) The cyma recta, a projecting molding, consists essentially of a cavetto above an ovolo, forming in profile one continuous double curve, often used as a crowning member, in which case it is sometimes known as a cymatium. When used as a base the convex portion is uppermost. (2) The cyma reversa, or ogee—a projecting molding that is essentially a reversed cyma recta with ovolo above cavetto—is used for a crown or a base. (3) A bird's beak, or thumb, molding is essentially similar to the cyma reversa, except that the upper convexity is separated from the lower concavity by a sharp edge. (4) A keel molding is a projection, which resembles the keel of a ship, consisting of a pointed arch with a small fillet attached at its outermost surface.

The basic profiles of moldings have traditionally been enhanced by carvings on them inspired by natural forms. These carvings might consist of stylized flower or leaf forms, geometric motifs, spirals, or combinations of rounded and angular forms such as the familiar egg and dart pattern. The combination of basic profiles and decorative carvings created a rich vocabulary for moldings that has been utilized by Western architects from the time of the ancient Greeks onward.

Moldova, officially REPUBLIC OF MOLDOVA, Moldovan REPUBLICA MOLDOVA, formerly (1940–91) MOLDAVIA, or MOLDAVIAN SOVIET SOCIALIST REPUBLIC, country in the northeastern Balkans. It is surrounded by Ukraine on the north, east, and south and is bordered on the west by the Prut River, which it shares with Romania. The capital is Chişinău (Kishinyov). Area 13,000 square miles (33,700 square km). Pop. (1996 est.) 4,372,000.

A brief treatment of Moldova follows. For full treatment, *see* MACROPAEDIA: Balkan States.

Moldova

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

Physical and human geography. Moldova lies east of the Carpathian Mountains. The climate is warm and moderately continental, with comparatively mild winters. Most of the country lies between the Dniester and Prut rivers, which flow southward into the Black Sea. Soils are rich; fertile chernozems cover three-quarters of the republic. Northern and central Moldova is a forest zone, while a steppe belt, mostly cultivated, crosses the south.

The majority of the people are ethnic Moldovans, who speak a language that is virtually identical to Romanian. In the so-called Transdniester region, east of the Dniester River, however, there are large numbers of Russians and Ukrainians (who rebelled against Moldovan authority in 1992). The national language is Romanian (also called Moldovan), which officially switched from the Cyrillic to the Roman alphabet in 1989.

Agriculture, the most important sector of Moldova's economy, has been highly mechanized and centres on viticulture, fruit and vegetable growing, and other specialized farming. Grapes are the most important crop, while winter wheat and corn (maize) are the chief grains. Dairying and cattle breeding account for about a third of the agricultural output, followed by pig farming.

Moldova's industry consists chiefly of food processing, with machinery manufacturing and metalworking, electrical power engineering, consumer goods, and building material industries being developed. The food industry includes wine making, canning, sugar refining, and oilseed pressing. Machine building, established in the mid-1950s, is important, and tractors made in Moldova are supplied to neighbouring countries. Chişinău is the largest industrial centre of Moldova and is also an important railway and motor transport centre.

Under the 1994 constitution, the highest legislative authority is the unicameral Parliament, whose members are directly elected to four-year terms. Executive power is divided between a president and a Council of Ministers, which is headed by a prime minister. The president is elected to a four-year term and designates the prime minister, who must be approved by Parliament.

History. Historically, the area of present-day Moldova consisted of that part of the principality of Moldavia (*q.v.*) lying east of the Prut River and, adjoining it on the south, the region of Bessarabia (*q.v.*) along the Black Sea coast. Both regions came under Ottoman rule in the 16th century, and both Bessarabia and the eastern portions of Moldavia were ceded to Russia by the Turks in 1812. Henceforth the entire region lying between the Prut and Dniester rivers took the name Bessarabia. The rest of Moldavia joined with Walachia to form the nation of Romania in 1859, and in 1918 Bessarabia threw off Russian rule and united with Romania. In 1940, however, Romania was forced to cede Bessarabia to the Soviet Union, which incorporated the region (along with a small strip of territory east of the Dniester River) as the Moldavian S.S.R. Between 1941 and 1944 Bessarabia again became part of Romania, but in 1944 Soviet troops retook the territory. In August 1991 Moldavia declared independence from the Soviet Union, adopting the Moldovan (or Romanian) spelling Moldova.

mole, also spelled MOL, in chemistry, a standard scientific unit for measuring large quantities of very small entities such as atoms, molecules, or other specified particles.

The mole designates an extremely large number of units, 6.0221367×10^{23}, which is the number of atoms determined experimentally to be found in 12 grams of carbon-12. Carbon-12 was chosen arbitrarily to serve as the reference standard of the mole unit for the International System of Units (SI). The number of units in a mole also bears the name Avogadro's number, or Avogadro's constant, in honour of the Italian physicist Amedeo Avogadro (1776–1856). Avogadro proposed that equal volumes of gases under the same conditions contain the same number of molecules, a hypothesis that proved useful in determining atomic and molecular weights and which led to the concept of the mole. (*See* Avogadro's law.)

The number of atoms or other particles in a mole is the same for all substances. The mole is related to the atomic weight, or mass, of an element in the following way: one mole of carbon-12 atoms has 6.022137×10^{23} atoms and an atomic weight of 12 grams. In comparison, one mole of oxygen consists, by definition, of the same number of atoms as carbon-12, but it has an atomic weight of 16 grams. Oxygen, therefore, has a greater mass than carbon. This reasoning also can be applied to molecular or formula weights.

The concept of the mole helps to put quantitative information about what happens in a chemical equation on a macroscopic level. The mole can be used to determine the simplest formula of a compound and to calculate the quantities involved in chemical reactions. When dealing with reactions that take place in solutions, the related concept of molarity is useful. Molarity (M) is defined as the number of moles of a solute in a litre of solution.

mole, in dermatology, pigmented, flat or fleshy skin lesion, composed for the most part of an aggregation of melanocytes, the cells of the skin that synthesize the pigment melanin. In thicker moles, nerve elements and connective tissue are also present. Moles vary in colour from light to dark brown or black; when deposition of melanin occurs in the dermis, the deeper layer of the skin located underneath the epidermis, the lesion has a bluish cast. Moles may be present at birth; more frequently, they appear and evolve in character during childhood.

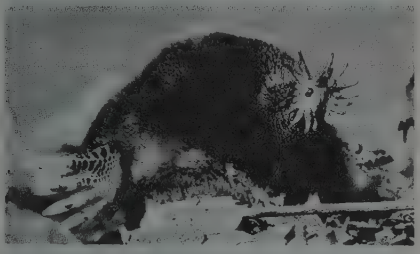
A new mole is usually flat and of the junctional type (junction nevus), so called because it is located between the dermis and the epidermis. It sometimes remains there, in which case the possibility of malignant development is increased. In most instances, however, the original mole evolves into a slightly raised lesion located in the dermis (intradermal nevus). Examination of the tissue of an actively changing mole in a child may show transformations resembling cancer, but actually such lesions are benign; malignant melanoma is almost never seen until after puberty.

The following developments are indicative that a mole may be undergoing cancerous changes, giving rise to malignant melanoma: (1) development of a flat pigment zone around the base of the mole, (2) progressive enlargement of an existing mole in adults, (3) increase in pigmentation, or darkening, of a mole and, more frequently, a loss of evenness in pigmentation, with variations from very light to very dark (probably the single most significant sign of developing malignant melanoma), (4) loss of hair from a mole (hairy moles rarely undergo cancerous changes), and (5) advanced obvious symptoms, such as ulceration and bleeding. It should be noted that melanomas do not derive from pigmented moles only; approximately 25 percent of these tumours arise in normal skin. During pregnancy, existing moles may enlarge and new ones may appear. Moles will sometimes disappear with age. *See also* nevus.

mole, in zoology, any of numerous small, often blind, burrowing mammals—especially the 22 species constituting the family Talpidae (order Insectivora), the true moles. For ordinal relatives of this name, *see* golden mole; for analogues in Australia, *see* marsupial mole.

Talpids occur throughout temperate Eurasia and North America. Most are quite small, with round bodies, short legs and tail, flat, pointed head, and small or vestigial eyes; most lack external ears. Typically, the forelimbs are set almost on opposite sides of the shoulders and are shortened and rotated. The five toes of the forefoot are broad clawed, making a shovel for digging or a paddle for swimming. The fur is velvety and brushes in any direction without resistance. Most moles have one to seven young (usually about four) once or twice a year, usually in a grassy nest underground. Sexual maturity is reached in 6 to 12 months, and the life span is brief.

Moles are active day and night in rapid cycles of work and rest. Most spend their lives making galleries in the soil. Tunnels near the surface are made in search of earthworms, grubs, and other invertebrates: a mole may consume more than its weight in food daily. Deeper burrows, to about 3 metres (10 feet), are for occupancy. The surface-burrow ridges on the ground and the deep-burrow vents (molehills) annoy gardeners; furthermore, moles sometimes damage the roots of plants. On the other hand, moles stir and aerate the soil and kill noxious organisms. A few birds and mammals prey on moles despite their strong odour.


Star-nosed mole (*Condylura cristata*)
Russ Kinne—Photo Researchers

Typical moles are the four species of the Old World genus *Talpa,* including the 15-centimetre (6-inch) common mole (*T. europaea*) of Britain to Japan. They have stubby tails. The American shrew mole (*Neurotrichus gibbsii*) is a long-snouted species of wet coastal forests of northwestern North America; at 10.5 cm, including its 3-cm tail (minimum measurements), it is the smallest American mole. It swims and climbs. In the shrew moles (*Uropsilus, Nasillus*) of eastern Asia, the forefoot is virtually unmodified: these are primarily surface animals.

Perhaps the tiniest talpid is the long-tailed shrew mole (*Scaptonyx fusicaudus*) of western China and northern Burma: its head and body may be only six cm long, but it has a three-cm tail.

The North American common, or eastern, mole (*Scalopus aquaticus*), of the U.S. east of the Rockies, may be 20 cm long and is gray in the north, coppery brown in the south and west.

The star-nosed mole (*Condylura cristata*) of northeastern North America has 22 pink, tentacle-like touch organs set radially on its nose. It often leaves its burrow, and it swims well.

Semi-aquatic talpids of the Old World include the desman (*q.v.*).

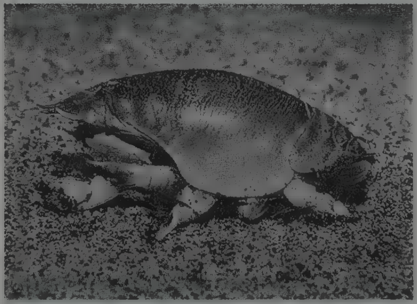
Molé, Louis-Mathieu, Comte (Count) (b. Jan. 24, 1781, Paris—d. Nov. 23, 1855, Champlâtreux, Fr.), French monarchist statesman who held office under Napoleon I, Louis XVIII, and Louis-Philippe.

The young Molé left France during the Revolution but returned in 1796. He gained Napoleon's approval after his publication of *Essais de morale et de politique* (1806), a justification of monarchical government; Napoleon made him auditor to the Council of State in 1806, with successive promotions, to minister of justice in 1813. A peer of France during the Second Restoration (1815), Molé was minister for the navy (1817–18) but thereafter entered the opposition to the regime.

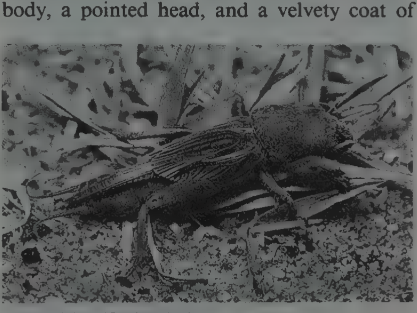
Molé, detail from a lithograph
H. Roger-Viollet

After the July Revolution of 1830, Molé served Louis-Philippe as prime minister and minister of foreign affairs (1836–39). His ministry strengthened the French hold on Algeria, achieved a satisfactory solution of the Belgian question, and sought conciliation at home. The ministry, however, was attacked for being a mouthpiece of the King, and Molé resigned in 1839 (though he continued to serve in the Chamber of Deputies). When revolution broke out in 1848, Louis-Philippe again asked Molé to form a government (February 23), but to do so proved impracticable. He was a right-wing deputy in the Legislative Assembly in 1848–51, but after the coup d'etat of Dec. 2, 1851, he retired from public life.

mole crab, also called SAND BUG (*Emerita,* or *Hippa, talpoida*), crab of the Atlantic beaches from New England to Mexico. It is so named from its digging mole-fashion in sand. The shell is about 3.75 centimetres (1.5 inches) long, somewhat egg shaped and yellowish white with purplish markings. It lives on beaches in the intertidal zone. *E. analoga,* a broader and flatter species, occurs on the California coast.


Mole crab (*Emerita*)
Walter Dawn—The National Audubon Society Collection/Photo Researchers

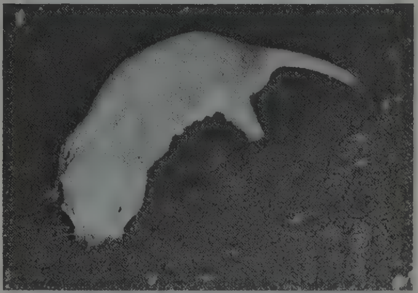
mole cricket, any member of the orthopteran insect family Gryllotalpidae (about 65 species), sometimes considered part of the family Gryllidae. This cricket lives underground, its common name deriving from its molelike appearance and habits. The mole cricket has forelegs modified for shovelling, a cylindrical body, a pointed head, and a velvety coat of hairlike setae. It burrows 15 to 20 centimetres into moist soil.


Mole cricket (*Gryllotalpa*)
Anthony Bannister—EB Inc.

The mole cricket has wings and may leave its burrow at night. The female lacks long ovipositors for egg-laying; eggs are placed in underground chambers that sometimes include plant material, which serves as food for newly hatched nymphs. Unlike most insects, one European mole cricket species (*Gryllotalpa gryllotalpa*) guards its eggs and young. The mole cricket feeds on roots and, when present in sufficiently large numbers, injures crops and gardens. The Puerto Rico mole cricket (*Scapteriscus vicinus*), also known as a changa, can be a serious pest. The male mole cricket's song is deep-toned and regularly repeated.

mole rat, any of several distinct types of burrowing Old World rodents, among them members of the families Spalacidae and Bathyergidae (order Rodentia).

Mole rats of the family Spalacidae comprise three species of a single genus, *Spalax,* found in eastern and southeastern Europe and in Asia Minor. Short-legged, tailless, molelike rodents, these animals are 15 to 30 centimetres (6 to 12 inches) long. They have no external ears, and they have small eyes entirely covered by skin. The soft fur is yellowish gray and the broad snout is edged with bristles that presumably help the animal feel its way about. Solitary animals, spalacid mole rats feed on the underground parts of plants and dig extensive burrow systems with separate toilet, nest, and storage chambers. They dig with their strong incisor teeth and pack down the walls of the burrow with their snouts. Where abundant, they sometimes become pests by damaging crops.


Naked mole rat (*Heterocephalus glaber*)
Des and Jen Bartlett—Bruce Coleman Ltd.

The family Bathyergidae includes five genera and about 20 species of mole rats variously known as blesmols, mole rats, sand rats, and sand moles. These animals are found in much of Africa in the plains and deserts. They are stocky rodents, with small or minute eyes and ears, short legs, and short tails. The fur is short and soft except in one unusual form, the naked mole rat (*Heterocephalus glaber*), which has only a few hairs scattered over its wrinkled, pinkish or yellowish skin. The other bathyergids may be whitish, pale brown, reddish brown, gray, or blackish. The members of this family burrow just under the surface of the earth, digging with their front claws or their incisor teeth. They feed mainly on roots and bulbs, sometimes damaging cultivated plants, and they store food in chambers in their burrows. Unlike other species, which are solitary, the naked mole rat congregates in large underground colonies. Researchers have observed that each colony selects a female "queen" for exclusive breeding, and males and females perform specialized chores for the colony.

The bandicoot and pest rats (*see* bandicoot rat) are sometimes known as mole rats; the name is also given to members of the genera

Myospalax (5 species) and *Tachyoryctes* (14 species). Mole rats of the genus *Myospalax* are Asian members of the large family Cricetidae. They are stout, short-tailed rodents with strong limbs and claws, and soft, gray or brownish fur. They inhabit wooded areas and range in length from 16 to 27 cm (6 to 10.5 inches). They are vegetarian and dig burrows as long as 40 m (about 130 feet).

The members of the genus *Tachyoryctes* are placed with the bamboo rats in the family Rhizomyidae. These mole rats are African and inhabit both open and wooded or bamboo-covered areas. Gopherlike in appearance, they are 18 to 25 cm (7 to 10 inches) long without the 5- to 8-centimetre tail and have soft, brown, gray, reddish brown, or black fur. In some areas, they are so common that the ground is riddled with their burrows.

Môle Saint-Nicolas, village, just northeast of Cap Saint-Nicolas, on the northwestern coast of Haiti. Situated on an inlet of the Windward Passage (a strait between Haiti and Cuba), it was the site where Christopher Columbus first landed (Dec. 6, 1492) on the island, which he named La Isla Española (taken into English as Hispaniola). Saint-Nicolas was named for the saint on whose day it was discovered. Pop. (1982 prelim.) 1,960.

Mole Valley, district, county of Surrey, England. The River Mole, from which the district takes its name, flows northward across it to join the Thames at Hampton Court, west of London; the river cuts through a line of chalk hills (the North Downs) in a steep-sided valley that is followed by road and rail routes. South of the Downs is a narrow lowland and then a second line of sandstone heights.

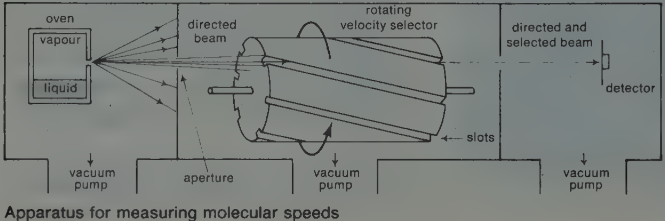
From the northern end of the district, near Leatherhead, the built-up area is virtually continuous to central London, but the North Downs and other parts of the district fall within London's Greenbelt or are designated Areas of Outstanding Natural Beauty, thereby enjoying protection from residential development. A considerable number of the district's residents are commuters to the London area.

The town of Dorking stands at the point where the River Mole enters its narrow valley section from the south, and it is the service centre of the district. The district has an area of 100 square miles (259 square km). Pop. (1989 est.) 76,200.

Molech (Judaism): *see* Moloch.

molecular beam, any stream or ray of molecules moving in the same general direction, usually in a vacuum—*i.e.,* inside an evacuated chamber. In this context the word molecule includes atoms as a special case. Most commonly, the molecules comprising the beam are at a low density; that is, they are far enough apart to move independently of each other. Because of the one-directional motion of the atoms or molecules, their properties can be studied in experiments that involve deflecting the beam in electric and magnetic fields or directing the beam onto a target. The target may be a solid, a gas, or a second beam of atoms or molecules.

Applications. Deflections of beams in electric and magnetic fields can give information about the structure and properties (such as rotation and spin) of the molecules, or atoms, in the beam. In more sophisticated experiments, two beams are allowed to intersect, producing scattering interactions or collisions between molecules in pairs, one from each beam. Scattering can demonstrate such properties of these pairs as the potential energy of their interaction as it varies with the distance of separation, their chemical reactivity, and the probability that they will exchange internal energy on collision.



Apparatus for measuring molecular speeds

The first experiment with molecular beams, in 1911, confirmed a postulate of kinetic theory that molecules of a gas at a very low pressure travel in straight lines until they hit the walls of their container. At higher pressures, molecules have a shorter free path because they collide with each other before arriving at the wall. The first extensive experiments with molecular beams were made in Germany between 1920 and 1933. The use of beams to study chemical reactions and the transfer of energy between colliding molecules increased rapidly after 1955.

Production, control, and detection. A molecular beam is produced by allowing gas to enter a vacuum chamber through a small hole or slit in a box containing vapour of the molecules that are to make up the beam (*see* Figure). The vapour often comes from evaporation of a liquid sample in the box, called an oven, that can be heated to a suitable temperature. At low pressures of vapour in the box, when the free path of the molecules is greater than the width of the exit hole, the molecules will effuse through the hole; at higher pressures they will flow through the hole as fluids do under pressure, forming a jet. The molecules in the jet are at first close enough together to interact with each other, but the jet rapidly expands in the vacuum until the molecules move independently. Only those molecules from the oven that happen to be moving in just the proper direction to pass through a second hole become part of the beam that is used for the experiment. The others are pumped away.

Molecules in the beam move at various speeds. If molecules of nearly uniform speed are needed for a particular experiment, the beam can be put through a filter called a velocity selector that permits only molecules within a small range of speeds to pass through. These selectors are often made of slotted disks or cylinders spinning rapidly on an axis parallel to the beam. The molecules that emerge from the selector are those with the right speed to stay in a given slot as they move along the cylinder. Molecules of other speeds are removed as they stick to or reflect from the sides of the slots. Changing the speed of rotation of the cylinder changes the speed at which the molecules are transmitted.

To be useful in experiments, the deflection or scattering of a beam must be detected. This detection may be difficult because there are relatively few molecules in a typical beam and their velocities, and hence kinetic energies, are low. A detector should have high sensitivity, and there must be little interference from molecules coming from other sources, such as the residual gas in the vacuum chamber. When an experiment is performed with beams consisting of atoms of metals such as the alkalis, which are easily ionized (*i.e.,* given a net positive charge) by the loss of one electron, an efficient detector can be made with a tungsten wire heated to redness. Because of the relatively high energy available for the capture of an electron by a hot tungsten surface, almost all alkali atoms hitting the wire give up one of their electrons to the wire, passing on as ions to be recorded as an electric current at a collecting electrode. A different kind of detector is needed for other kinds of beam molecules. Atoms and molecules can be ionized by bombarding them with a stream of electrons, and the resulting ions can then be sorted and identified as to mass and charge by directing them into an instrument called a mass spectrometer. Although versatile, a mass spectrometer is much less sensitive for alkali atoms than is the tungsten wire because it is generally able to register no more than one-tenth of 1 percent of all the beam molecules that enter it.

molecular biology, field of science concerned with studying the chemical structures and processes of biological phenomena at the molecular level. Of growing importance since the 1940s, molecular biology developed out of the related fields of biochemistry, genetics, and biophysics. The discipline is particularly concerned with the study of proteins, nucleic acids, and enzymes—*i.e.,* the macromolecules that are essential to life processes. Molecular biology seeks to understand the three-dimensional structure of these macromolecules through such techniques as X-ray diffraction and electron microscopy. The discipline particularly seeks to understand the molecular basis of genetic processes; molecular biologists map the location of genes on specific chromosomes, associate these genes with particular characters of an organism, and use recombinant-DNA technology to isolate and modify specific genes.

In its early period during the 1940s, the field was concerned with elucidating the basic three-dimensional structure of proteins. Growing knowledge of the structure of proteins in the early 1950s enabled the structure of deoxyribonucleic acid (DNA)—the genetic blueprint found in all living things—to be described in 1953. Further research enabled scientists to gain an increasingly detailed knowledge not only of DNA and ribonucleic acid (RNA) but also of the chemical sequences within these substances that instruct the cells and viruses to make proteins.

Molecular biology remained a pure science with few practical applications until the 1970s, when certain types of enzymes were discovered that could cut and recombine segments of DNA in the chromosomes of certain bacteria. The resulting recombinant-DNA technology became one of the most promising branches of molecular biology because it promised the ability to modify the genetic sequences that determine the basic characters of plants and animals.

molecular sieve, a porous solid, usually a synthetic or a natural zeolite, that separates particles of molecular dimension. Zeolites are hydrated metal aluminosilicate compounds with well-defined crystalline structures. The silicate and aluminate groupings form three-dimensional crystal lattices surrounding cavities in which the metal ions and the water molecules are loosely held. Channels run through the entire crystal, interconnecting the cavities and terminating at the crystal surface. Upon heating, the zeolites lose their water content with little or no change in their crystal structure. The dehydrated zeolite can reversibly absorb water or other molecules that are small enough to pass through the channels or pores. The metal ions are also readily replaceable by other ionic units of similar charge and size.

Molecular sieves are used for drying gases and liquids and for separating molecules on the basis of their sizes and shapes. When two molecules are equally small and can enter the pores, separation is based on the polarity (charge separation) of the molecule, the more polar molecule being preferentially adsorbed. *Compare* gel chromatography.

molecule, the smallest identifiable unit into which a pure substance can be divided and still retain the composition and chemical properties of that substance.

A brief treatment of molecules follows. For full treatment, *see* MACROPAEDIA: Chemical Bonding.

The division of a sample of a substance into progressively smaller parts produces no change in either its composition or its chemical properties until parts consisting of single molecules are reached. Further subdivision of the substance leads to still smaller parts that usually differ from the original substance in composition and always differ from it in chemical properties. In this latter stage of fragmentation the chemical bonds that hold the atoms together in the molecule are broken.

Atoms consist of a single nucleus with a positive charge surrounded by a cloud of negatively charged electrons. When atoms approach one another closely, the electron clouds interact with each other and with the nuclei. If this interaction is such that the total energy of the system is lowered, then the atoms bond together to form a molecule. Thus, from a structural point of view, a molecule may consist of a single atom, as in a molecule of a noble gas such as helium (He), or it may consist of an aggregation of atoms held together by valence forces. Diatomic molecules contain two atoms that are chemically bonded. If the two atoms are identical, as in, for example, the oxygen molecule (O_2), they compose a homonuclear diatomic molecule, while if the atoms are different, as in the carbon monoxide molecule (CO), they make up a heteronuclear diatomic molecule. Molecules containing more than two atoms are termed polyatomic molecules, *e.g.,* carbon dioxide (CO_2) and water (H_2O). Polymer molecules may contain many thousands of component atoms.

The ratio of the numbers of atoms that can be bonded together to form molecules is fixed; for example, every water molecule contains two atoms of hydrogen and one atom of oxygen. It is this feature that distinguishes chemical compounds from solutions and other mechanical mixtures. Thus hydrogen and oxygen may be present in any arbitrary proportions in mechanical mixtures but when sparked will combine only in definite proportions to form the chemical compound water (H_2O). It is possible for the same atoms to combine in different but definite proportions to form different molecules; for example, two atoms of hydrogen will chemically bond with one atom of oxygen to yield a water molecule, whereas two atoms of hydrogen can chemically bond with two atoms of oxygen to form a molecule of hydrogen peroxide (H_2O_2). Furthermore, it is possible for atoms to bond together in identical proportions to form different molecules. Such molecules are called isomers and differ only in the arrangement of the atoms within the molecules. For example, ethyl alcohol (CH_3CH_2OH) and methyl ether (CH_3OCH_3) both contain one, two, and six atoms of oxygen, carbon, and hydrogen, respectively, but these atoms are bonded in different ways.

Not all substances are made up of distinct molecular units. Sodium chloride (common table salt), for example, consists of sodium ions and chloride ions arranged in a lattice so that each sodium ion is surrounded by six equidistant chloride ions and each chloride ion is surrounded by six equidistant sodium ions. The forces acting between any sodium and any adjacent chloride ion are equal. Hence, no distinct aggregate identifiable as a molecule of sodium chloride exists. Consequently, in sodium chloride and in all solids of similar type—in general, all salts—the concept of the chemical molecule has no significance. The formula for such a compound, however, is given as the simplest ratio of the atoms—in the case of sodium chloride, NaCl.

Molecules are held together by shared electron pairs, or covalent bonds. Such bonds are directional, meaning that the atoms adopt specific positions relative to one another so as to maximize the bond strengths. As a result, each molecule has a definite, fairly rigid structure, or spatial distribution of its atoms. Structural chemistry is concerned with valence, which determines how atoms combine in definite ratios and how this is related to the bond directions and bond lengths. The properties of molecules correlate with their structures; for example, the water molecule is bent structurally and therefore has a dipole moment, whereas the carbon dioxide molecule is linear and has no dipole moment. The elucidation of the manner in which atoms are reorganized in the course of chemical reactions is important. In some molecules the structure may not be rigid; for example, in ethane (H_3CCH_3) there is virtually free rotation about the carbon-carbon single bond.

The nuclear positions in a molecule are determined either from microwave vibration-rotation spectra or by neutron diffraction. The electron cloud surrounding the nuclei in a molecule can be studied by X-ray diffraction experiments. Further information can be obtained by electron spin resonance or nuclear magnetic resonance techniques. Advances in electron microscopy have enabled visual images of individual molecules and atoms to be produced. Theoretically the molecular structure is determined by solving the quantum mechanical equation for the motion of the electrons in the field of the nuclei (called the Schrödinger equation). In a molecular structure the bond lengths and bond angles are those for which the molecular energy is the least. The determination of structures by numerical solution of the Schrödinger equation has become a highly developed process entailing use of computers and supercomputers.

The molecular weight of a molecule is the sum of the atomic weights of its component atoms. If a substance has molecular weight M, then M grams of the substance is termed one mole. The number of molecules in one mole is the same for all substances; this number is known as Avogadro's number (6.0221367×10^{23}). Molecular weights can be determined by mass spectrometry and by techniques based on thermodynamics or kinetic transport phenomena.

Molenbeek-Saint-Jean (French), Flemish SINT-JANS-MOLENBEEK, *commune,* Brabant *province,* central Belgium. A residential and industrial suburb west of Brussels, it is one of the *communes* that make up Greater Brussels. It originated as a distinct village on a slope overlooking a brook (*molenbeek,* "mill stream"). Molenbeek Ridge was the site from which Louis XIV's forces bombarded Brussels in 1695. Today Molenbeek-Saint-Jean is a highly urbanized inner suburb of Brussels, with a high population density; many foreigners reside in the town. The Charleroi ship canal passes through it and forms part of its boundary with Brussels proper. Its manufactures include leather, clothing, chemicals, rubber goods, tobacco, and wood and metal products. Pop. (1991) mun., 68,759.

Moleschott, Jacob (b. Aug. 9, 1822, 's Hertogenbosch, Neth.—d. May 20, 1893, Rome, Italy), physiologist and philosopher noted for his belief in the material basis of emotion and thought. His most important work, *Kreislauf des Lebens* (1852; "The Circuit of Life"), added considerable impetus to 19th-century materialism by demanding "scientific answers to scientific questions."

Moleschott studied medicine (1842–45) at the University of Heidelberg in Germany. He worked for a time in Utrecht as a general practitioner and continued his studies. From 1847 to 1854 he was a *Privatdozent* at the University of Heidelberg; he resigned when he came up against the "official philosophy" of German universities, which held that speculation about consciousness and similar topics was not the proper pursuit of the university. Moleschott had also scandalized the university authorities by speaking out in favour of cremation. In 1856 he was appointed professor of physiology at the University of Zürich. While there he founded a journal, *Untersuchungen zur Naturlehre des Menschen und der Thiere* (1857–94; "Research on the Natural Philosophy of Man and the Animals"). In 1861 he was appointed professor of experimental physiology and physiological chemistry at Turin, and in 1879 he accepted a professorship in Rome. He became an Italian citizen.

Moleschott's researches, especially those on blood and metabolism, were instrumental in the development of the field of physiological chemistry. He espoused the theory that even emotions and thoughts had a physiological basis and was noted for the statement "no phosphorus, no thought."

Moley, Raymond (Charles) (b. Sept. 27, 1886, Berea, Ohio, U.S.—d. Feb. 18, 1975, Phoenix, Ariz.), American journalist and public figure, leader of the so-called Brain Trust of advisers to President Franklin D. Roosevelt.

After graduating from Baldwin-Wallace College in his hometown, Moley took a job as superintendent of schools at Olmstead Falls, Ohio. He then attended Oberlin College, where he received his master's degree in 1913. Five years later he received his doctorate in political science from Columbia University, and in 1923 he joined the Columbia faculty. It was while teaching at Columbia that Moley came to the attention of Louis Howe, a close associate of Franklin Roosevelt.

Howe first hired Moley to study criminal justice in a number of cities, and then in 1928 he persuaded Moley to work for Roosevelt's election as governor of New York. When Roosevelt was preparing for the presidential race of 1932, Moley recruited fellow Columbia professors Rexford G. Tugwell and Adolph A. Berle, Jr., to form the Brain Trust (Howe's designation) to advise the Democratic nominee on national issues.

In a departure from the traditional conservative laissez-faire and progressive antibusiness ideologies, Moley and the Brain Trust counseled cooperation between government and business to resuscitate the moribund American economy. Moley wrote many Roosevelt campaign speeches and invented the famous label "New Deal" for Roosevelt's political program. He soon became chief policy adviser to the president-elect.

As the Roosevelt administration began, Moley was a central figure in the day-to-day operation of the executive branch. During the hectic "hundred days," he was the chief liaison between the White House and Congress. But he lost considerable prestige over a disagreement with Roosevelt during the London Economic Conference of 1933, and, soon after, he resigned his State Department post.

Moley thereafter became disenchanted with what he believed to be the too-radical drift of the New Deal. By 1936 he had broken with Roosevelt and the Democratic Party, and thereafter he endorsed Republicans (including Wendell Willkie, Barry Goldwater, and Richard Nixon) for the presidency. Never again active in electoral politics, Moley spent the remainder of his life as a writer, publishing numerous books of political theory and commentary.

Molfetta, town and episcopal see, Bari *provincia,* Puglia (Apulia) *regione,* southeastern Italy. It lies along the Adriatic Sea, northwest of Bari city. An important port in the Middle Ages and a free city for a time, it was sacked by the French in 1529. Although Molfetta is mainly modern, its outstanding Romanesque–Apulian-style Duomo Vecchio ("Old Cathedral"), a national monument, dates from the 12th and 13th centuries. Fishing, boatbuilding, food processing, and the manufacture of cement are important, and fish and vegetables are exported. Pop. (1993 est.) mun., 66,668.

Molière, original name JEAN-BAPTISTE POQUELIN (baptized Jan. 15, 1622, Paris, France—d. Feb. 17, 1673, Paris), French actor and playwright, the greatest of all writers of French comedy.

A brief treatment of Molière follows. For full treatment, *see* MACROPAEDIA: Molière.

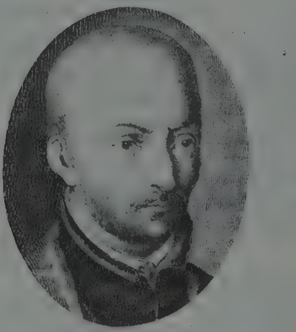
Molière, the son of a well-to-do upholsterer, received a good education but left home in 1643 to become an actor. He helped form the Illustre Théâtre company and then toured the French provinces (1645–58) with a theatre troupe, writing plays and also acting in them. His *Précieuses ridicules* (1659; *The Affected Young Ladies*) was the success that established him in Paris. He soon had a permanent theatre and wrote plays both for bourgeois audiences in Paris and for the court.

Molière's major plays are *L'École des femmes* (1662; *The School for Wives*); *Le Tartuffe* (first performed 1664; *The Imposter*), which outraged the religious authorities and was banned until it had been revised; *Le Misanthrope* (1666); *L'Avare* (1668; *The Miser*); and *Le Bourgeois Gentilhomme* (1670). Others include *Dom Juan* (1665) and *Les Femmes savantes* (1672; *The Blue-Stockings*).

Molière's theory of comedy was expounded in *La Critique de l'École des femmes* (1663). In 1673 Molière collapsed onstage during an early performance of his last play, *Le Malade imaginaire* (*The Imaginary Invalid*), and died that same night.

Molina, Luis de (b. September 1535, Cuenca, Spain—d. Oct. 12, 1600, Madrid), Spanish Jesuit who devised the theological system known as Molinism, which endeavoured to confirm that man's will remains free under the action of divine grace.

Molina became a Jesuit at the University of Coimbra, Port. (1553), where he studied philosophy and theology (1554–62). He taught at Coimbra (1563–67) and at Évora (1568–83) and spent his last years writing.



Luis de Molina, engraving by F.G. Wolffgang

By courtesy of the Biblioteca Nacional, Madrid

Molina's works include his celebrated *Concordia liberi arbitrii cum gratiae donis* (1588–89; "The Harmony of Free Will with Gifts of Grace"), *Commentaria in primam partem divi Thomae* (1592; "Commentary on the First Part of [the Summa of] St. Thomas"), and *De jure et justitia,* 6 vol. (1593–1609; "On Law and Justice").

Molinism led to a serious theological struggle between the Dominicans and the Jesuits for more than three centuries. Special assemblies at Rome (1598–1607) and other efforts to appease both sides failed. Molina in his *Concordia* aimed at a unified conception of divine justice and mercy, foreknowledge and divine guidance, predestination and condemnation, and grace and human freedom. The significance of his theory resided in its optimistic view of human nature, allowing for the possibility of sufficient grace—*i.e.,* grace made effective by the assent of the recipient's will—and predestination in the expectation of the merits to be attained. His originality lay in the reformulation of traditional views on divine knowledge. There is a critical edition of the *Concordia* by J. Rabeneck (1953).

Molina, Mario, in full MARIO JOSÉ MOLINA (b. March 19, 1943, Mexico City, Mex.), Mexican-born American chemist who was jointly awarded the 1995 Nobel Prize for Chemistry, along with chemists F. Sherwood Rowland and Paul Crutzen (*qq.v.*), for research in the 1970s concerning the decomposition of the ozonosphere, which shields the Earth from dangerous solar radiation. The discoveries of Molina and Rowland—that some industrially manufactured gases deplete the ozone layer—led to an international movement in the late 20th century to limit the widespread use of chlorofluorocarbon (CFC) gases.

Molina studied chemical engineering at the National Autonomous University of Mexico (B.S., 1965) in Mexico City and received an advanced degree from the University of Freiburg (1967) in West Germany before returning to his alma mater to become an associate professor (1967–68). He resumed his education in the United States at the University of California, Berkeley (Ph.D., 1972), where he worked for a year before joining Rowland at the University of California, Irvine. The pair conducted experiments on pollutants in the atmosphere, discovering that CFC gases rise into the stratosphere, where ultraviolet radiation breaks them into their component elements of chlorine, fluorine, and carbon. There, each chlorine atom is capable of destroying about 100,000 ozone molecules before becoming inactive.

Molina was the principal author of the paper describing their theories, which was published in the scientific journal *Nature* in 1974. Their findings sparked a nationwide debate on the environmental effects of CFC gases and were validated in the mid-1980s when a region of stratospheric ozone depletion, known as the ozone hole, was discovered over Antarctica. Molina worked in the Jet Propulsion Laboratory at the California Institute of Technology in Pasadena from 1982 to 1989, when he became a professor at the Massachusetts Institute of Technology in Cambridge.

Molina, Tirso de: *see* Tirso de Molina.

Moline, city, Rock Island county, northwestern Illinois, U.S. It lies just above the upper rapids of the Mississippi River (there crossed by the Twin Bridges to Iowa). With East Moline, Rock Island, and Davenport (*qq.v.*), Iowa, it forms the Quad Cities. The site was laid out in 1843 by a milling firm. Its name is apparently from the French *moulin* ("mill"). John Deere, inventor of an improved steel plow, established a workshop there in 1847, and Moline, sometimes called "The Plow City," was by 1890 a centre of plow production. Farm implements and machinery remain important to the diversified Quad Cities industrial complex. Moline is the seat of Black Hawk (junior) College (1946). Inc. town, 1848; city, 1872. Pop. (1994 est.) city, 43,472; Davenport–Rock Island–Moline MSA, 357,775.

Molinos, Miguel de (b. June 29, 1628, Muniesa, Spain—d. Dec. 28, 1696, Rome, Papal States [Italy]), Spanish priest condemned for advocating an extreme form of Quietism, a doctrine that came to be considered heretical by the Roman Catholic church.

Molinos, detail of an engraving by Johann Hainzelmann after a portrait

By courtesy of the Biblioteca Nacional, Madrid

Ordained in 1652, Molinos in 1663 was sent to Rome. There, in 1675, he published his *Spiritual Guide,* a small handbook teaching that Christian perfection is achieved by a mixture of contemplation and divine assistance. Molinos believed that men must banish their individual wills so that God's will can work unhampered within them.

The *Guide* caused a sensation; but in 1685, at the height of Molinos' influence and when his friend Innocent XI was pope, Molinos was arrested by the papal police, tried, and sentenced to life imprisonment for heresy.

Because the doctrines that resulted in his condemnation cannot be found in the *Guide,* this abrupt reversal of opinion is attributed to the discovery of personal immorality on the part of Molinos, the exact nature of which remains locked in the files of the Congregation for the Doctrine of the Faith. Some 20,000 of his letters were examined, and he and numerous witnesses were interrogated, resulting in the condemnation (1687) by Innocent of 68 propositions embodying Molinos' doctrine. In the "Summation" of his trial, Molinos defended sexual aberrations committed by himself and his followers as sinless, purifying acts caused by the devil. He claimed they were passively allowed in order to deepen a quiet repose in God. Still, he admitted being wrong and offered no further defense. He died in prison. His "Summation" is preserved in the Vallicellian Library in Rome, and his letters are in the archives of the Congregation for the Doctrine of the Faith.

Molise, *regione,* southeast-central Italy. It consists of the provinces of Campobasso and Isernia and was created in 1965 from the southern portion of the former region of Abruzzi e Molise. The region's western sector is part of the mountainous Apennines; it is drained by the Volturno River westward to the Tyrrhenian Sea. The rest of Molise consists mostly of low mountains and hills, with a narrow strip of lowlands along the Adriatic coast; 90 percent of the region is considered upland. Central and eastern Molise are drained by the Biferno River to the Adriatic Sea.

One of the nation's most rural regions, Molise is unique in showing virtually no change in population during the first century of existence of the Italian state; from 1861 to 1961 its population increased approximately 1 percent, mainly because the growth rate was offset by constant emigration, mostly to other regions within Italy. Wheat and potatoes are the principal crops, and livestock raising (pigs, sheep, goats, cattle) is extensive. Industrial development is slight, though there are small plants associated with the food and garment industries. Campobasso (*q.v.*), the regional capital, is the only city of any size. The history of Molise is closely connected with that of neighbouring Abruzzi (*q.v.*). Area 1,713 square miles (4,438 square km). Pop. (1993 est.) 331,494.

Molle Islands, group of four small formations on the Great Barrier Reef, in Whitsunday Passage in the Coral Sea, 3 miles (5 km) off the northeastern coast of Queensland, Australia. In 1815 the patch of water behind the group was named Port Molle for Colonel George Molle. The name was later applied to the islands and to the deepwater passage between them and the mainland. The islands are coral-fringed, with steep grassy hills. South Molle, the largest (1,040 acres [421 hectares]), measures 2.5 by 1.5 miles and rises to 622 feet (190 m) at Mount Jeffrey. It is a national park and resort accessible by launch from Shute Harbour (south). A rocky bar connects it to 25-acre Mid Molle. North Molle (600 acres), the highest of the group (760 feet), is a resort, as is West Molle (80 acres), also known as Daydream Island.

Mollendo, city, Arequipa *departamento* and *región,* Peru, on the Pacific coast. Founded in 1872, its site was chosen by the American engineer Henry Meiggs, builder of the Arequipa-Mollendo Railroad. Additional rail connections to local mines and to Puno and Lake Titicaca, supplemented by its artificial harbour and the Pan-American Highway, have made Mollendo an export-import point for southern Peru and Bolivia, although after 1941 much of its port trade was lost to Matarani, just to the northwest. The irrigated Tambo River valley, southeast of the city, yields rice, sugar, cotton, grain, and fruits. Mollendo has fish canneries, cement works, textile mills, and cheese factories. Its beaches have attracted a growing tourist trade. Pop. (1990 est.) 27,900.

Møller, Poul Martin (b. March 21, 1794, near Nakskov, Den.—d. March 13, 1838, Copenhagen), author whose novel of student life, the first in his country's literature that dealt with contemporary events, marked an important stage in the history of Danish literature. His aphorism, "All poetry that does not come from life is a lie," sums up his realistic approach in a romantic age.

After taking a degree in divinity at the University of Copenhagen, Møller began his literary career by translating Homer. To recover from a broken engagement, he went to China as a chaplain on a Danish ship (1819–21), a journey from which came some journals, a number of *Strøtanker* ("Aphorisms"), nostalgic poems about Denmark and Copenhagen (*e.g.,* "Scener i Rosenborg Have"), and a witty parody of statistical-topographical descriptions, *Statistisk Skildring af Lægdsgaarden i Ølsebymagle.* After his return he earned his living by teaching classics while studying philosophy.

Møller first read his most famous work, *En dansk students eventyr* ("The Adventures of a Danish Student"), to the students' union at Copenhagen in 1824. Originally planned as a historical novel in the manner of Sir Walter Scott, it describes, in its final (though fragmentary) form, contemporary student life. "Blade af dødens dagbog" ("Leaves from Death's Diary"), a poetic fragment inspired by Lord Byron, and other sketches, such as his witty essay "Quindelighed," demonstrate both his mastery of style and his tendency to leave works unfinished. Møller was a lecturer in philosophy at the university in Christiania (now Oslo) from 1826 to 1828, when he became professor, and from 1831 he held the chair of philosophy at Copenhagen. Among his students was Søren Kierkegaard, who much admired him.

Mollet, Guy (b. Dec. 31, 1905, Flers-de-l'Orne, France—d. Oct. 3, 1975, Paris), Socialist politician who served as premier of France from January 1956 to May 1957. His premiership failed to deal successfully with the pressing issue of the day, the Algerian rebellion.

A teacher of English at the Arras lycée, Mollet joined the Socialist Party in 1921. In 1939 he was elected secretary-general of the Teaching Federation, a Socialist teachers' trade union. He was captured by the Germans in 1940 during World War II, and after his release in 1942 he joined the Résistance. At war's end in 1945 he became mayor of Arras and was elected to the Chamber of Deputies from the Pas-de-Calais. As secretary-general of the Socialist Party from 1946 to 1969, Mollet resisted all moves for an electoral alliance of the Socialists with the French Communist Party. From July 1950 to July 1951 he served as minister of state, dealing with the Council of Europe. With Pierre Mendès-France he led the centre-left Republican Front to victory in the election of 1956 and, in that year, became premier.

Mollet
Harlingue—H. Roger-Viollet

As premier, Mollet was responsible for sending French conscripts to fight Algerian insurgents seeking independence. After the failure of his policy of negotiation with the Algerian rebels, his government, believing that Egypt had supplied aid to the rebels, joined the British in a futile military expedition that briefly occupied the Suez Canal in November 1956. In other matters, Mollet granted partial autonomy to the French colonies south of the Sahara, and during his premiership the decision was made to build a French nuclear strike force. He also signed treaties establishing the Common Market and Euratom (European Atomic Energy Commission). His government was overthrown because of rightist criticism of his push for social reform on a budget badly depleted by the Suez invasion.

In May–June 1958 Mollet succeeded in defusing Socialist opposition to General Charles de Gaulle's assumption of the premiership, and he joined de Gaulle's government as minister of state (June 1958–January 1959). Thereafter he assumed a position of constructive opposition to de Gaulle's domestic policy while continuing to serve as a deputy and as mayor of Arras.

Mollien, Gaspard-Théodore (b. Aug. 29, 1796, Paris, France—d. June 28, 1872, Nice), French explorer and diplomat who was one of the earliest European explorers of the West African interior; his reports revealed an unimagined variety of geography and cultures to Europe.

Mollien reached the French colonial station of Saint-Louis, Senegal, in 1817 and in January 1818 began his expedition to discover the sources of the Sénégal, Gambia, and Niger rivers. His travels, which lasted until January 1819, took him across Senegal, Guinea, and Portuguese Guinea. Though he failed to locate the source of the Niger River, his were the first European contacts with the complex and numerous peoples of that part of the interior of West Africa. Mollien got on well with the inhabitants, and his book *Voyage dans l'interieure de l'Afrique* (1820; "Journey in the African Interior") testifies to the hospitality and civility of the Africans he met.

After his return to Europe, where he was lionized, Mollien explored in the new republic of Colombia (1823), was appointed French consul to Haiti (1828), and later became consul general to Cuba (1831).

Mollien, Nicolas-François, Count (comte) (b. Feb. 28, 1758, Rouen, France—d. April 20, 1850, Paris), French statesman and one of Napoleon's chief financial advisers.

Mollien worked in the office that controlled the activities of the farmers general (private contractors who collected oppressive taxes from the peasants, often by harsh measures) from 1781, and in 1786 he drew up a contract whereby these tax collectors' payments to the Royal Treasury were increased. During the Revolution he held office for a short time in the *département* of Eure but was later imprisoned for five months. Napoleon made Mollien administrator of the sinking fund in November 1799 and its director general in July 1801. Under the empire, Mollien was minister of the public treasury from January 1806 to April 1814 and also during the Hundred Days in 1815; he reorganized its administration and introduced double-entry bookkeeping.

Nicolas-François Mollien, engraving by Philip Velyn after a drawing by Marie-Thérèse de Noireserre, 18th century
Giraudon—Art Resource

Mollien retired after the Second Restoration (July 1815) and refused the offer of the Ministry of Finance in 1819, although he did accept a peerage; he subsequently sponsored reports on financial questions in the Chamber of Peers. In 1845 he published his *Mémoires d'un ministre du Trésor public 1780–1815* (new ed., 3 vol., 1898; "Memoirs of a Minister of the Public Treasury").

mollisol, dark-coloured soil type of grasslands and forested areas that have the world's most productive agricultural soils. Mollisols are found in the wetter areas that border desert regions and are therefore geographically associated with aridisols. The ground cover in these areas yields abundant organic matter, which decomposes within the soil. Rainfall is not heavy enough to cause extensive leaching, so the content of chemical bases upon which fertility depends remains high. These conditions give rise to a soft, well-aggregated soil structure and the characteristic "mollic" horizon—a dark surface layer more than 10 inches (25 cm) thick containing at least 1 percent organic matter. In the lands where these soils occur—notably the Great Plains of North America, the pampas of Argentina, and the steppes of Eurasia—grazing and dry land farming of wheat and corn (maize) are the main forms of agriculture.

Mölln, city, Schleswig-Holstein *Land* (state), northern Germany, situated south of Lübeck, on the Elbe-Lübeck Canal, and built around two small lakes. First mentioned in 1188, it was chartered about 1220. According to legend, the prankster Till Eulenspiegel, the representative of Low German humour and the subject of both literary and musical works, died there in 1350, and his tombstone (16th century) is in the Church of St. Nicholas. The Gothic town hall and many half-timbered houses give the city a medieval character suited to the annual Eulenspiegel festival.

Industries include iron founding and the manufacture of chemicals, textiles, furniture, tobacco, and food products. The establishment there of a number of business concerns moved from East Germany led to increased harbour activity after World War II. Pop. (1989 est.) 16,430.

mollusk, also spelled MOLLUSC, any soft-bodied invertebrate animal (phylum Mollusca) usually wholly or partly enclosed in a calcium carbonate shell secreted by a soft mantle covering the body.

A brief treatment of mollusks follows. For full treatment, *see* MACROPAEDIA: Mollusks.

Mollusks constitute a diverse animal group, comprising about 75,000 species that may be found in most habitats from the deep sea to high mountains. Mollusks are thought to have evolved from a flatwormlike ancestor. Fossils of certain early marine forms date back to the Cambrian period (about 570 million to 505 million years ago). Living mollusks are generally classified into eight major groups: Tryblidia (neopilinids), Gastropoda (limpets, snails, whelks, slugs), Bivalvia (clams, mussels, oysters, scallops), Scaphopoda (tusk shells), Solenogastres (narrow-footed gliders), Cephalopoda (squid, cuttlefish, octopuses, nautiluses), Caudofoveata (mudmoles), and Placophora (chitons).

Mollusks are economically important. Many aquatic species, particularly of clams, oysters, scallops, and mussels, are edible and fished or raised commercially. Common land snails of the *Helix* species are table delicacies in Europe. Various kinds of mollusk shells and pearls from oysters are widely used to make jewelry and other decorative items. On the other hand, several forms, such as shipworm clams, cause millions of dollars worth of damage each year to wharves and wooden-hulled boats.

molly, any of several species of tropical fish of the genus *Mollienesia* (sometimes considered *Poecilia*), in the live-bearer family, Poeciliidae (order Atheriniformes). Hardy and attractive, mollies are popular aquarium fish ranging from about 5 to 13 cm (2 to 5 inches) long.

Sailfin molly (*Mollienesia latipinna*)

E.C. Symmes Jr.

Well-known species include the molly (*M. sphenops*), which is normally grayish, and the sailfin mollies (*M. latipinna* and *M. velifera*), which are shiny and bluish and are noted for the large, showy dorsal fin of the male. Hybrids are also known, including *M. formosa,* a so-called species that is always female, resulting from a cross between *M. sphenops* and *M. latipinna.* There are several colour varieties of mollies, among them the black mollies, which may belong to any of the species mentioned.

Molly Maguires, secret organization of coal miners supposedly responsible for terrorism in the anthracite coalfields of Pennsylvania and West Virginia, U.S., in the period from 1862 to 1876. The group named itself after a widow who led a group of Irish antilandlord agitators in the 1840s. When poor working conditions and employment discrimination led to acts of sabotage and terrorist assassinations by Irish-American workers in Pennsylvania 20 years later, the "Mollies" were blamed. The Ancient Order of Hibernians, a local Irish fraternal association, was thought to be a front for the terrorists, and mine owners hired James McParlan, a detective, to infiltrate the group. In a series of sensational trials in 1875–77, McParlan's testimony resulted in the conviction and hanging of 10 men for murder. The court convictions, adverse publicity, and more prosperous times effected a subsequent decline of violence in the coalfields.

Molnár, Ferenc (b. Jan. 12, 1878, Budapest—d. April 1, 1952, New York City), Hungarian playwright and novelist who is known for his plays about the contemporary salon life of Budapest and for his moving short stories.

Molnár, drawing by an unknown artist, 1932

Interfoto MTI

Molnár published his first stories at the age of 19 and achieved his first great success with the play *Az ördög* (1907; *The Devil*). Although trained for a career in law, he became instead a journalist and during World War I was a war correspondent.

A number of Molnár's plays, including *Liliom* (1909; *Liliom*), *A hattyú* (1920; *The Swan*), and *A vörös malom* (1923; *The Red Mill*), were successfully played abroad, particularly in Austria, Germany, and the United States. Some of them were made into films, but these translations and adaptations often emphasized the verbal beauty and romantic plots of his works at the expense of their finely detailed characterizations and their often bitter cynicism and biting irony. Some of Molnár's short stories, especially those collected in *Muzsika* (1908; "Music"), are masterpieces; concise and moving, they look beneath the glittering facade of society life to the problems of the poor and the underdog. Among his many novels, however, only *A Pál utcai fiúk* (1907; *The Paul Street Boys*) achieved much success. Molnár depicted the victory of evil, of egoism, and of immorality, but these elements were offset by his light, amusing touch. He spent the last years of his life in the United States.

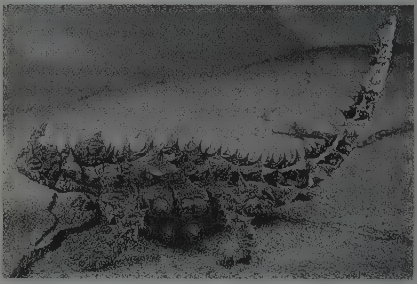
Mölndal, town in the *län* (county) of Göteborg och Bohus, southwestern Sweden, and a southeastern suburb of Göteborg. It developed as an industrial area on Mölndal River. In 1911 it became a municipality and in 1922 a town. A once-important flour-milling industry has been replaced largely by the manufacture of textiles, paper, and fats. The principal industry, however, is metalworking. Pop. (1991 est.) mun., 52,028.

Moloch, also spelled MOLECH, a deity to whom child sacrifices were made throughout the ancient Middle East. The name derives from combining the consonants of the Hebrew *melech* ("king") with the vowels of *boshet* ("shame"), the latter often being used in the Old Testament as a variant name for the popular god Baal ("Lord").

The laws given to Moses by God expressly forbade the Jews to do what was done in Egypt or in Canaan. "You shall not give any of your children to devote them by fire to Moloch, and so profane the name of your God" (Lev. 18:21). Contemporary scholars now debate whether the Hebrews did initiate their children to Moloch by fire or whether the law is a prohibition against the possibility that they might take up this custom.

Later kings Ahaz (2 Kings 16:3) and Manasseh (2 Kings 21:6), having been influenced by the Assyrians, worshiped Moloch at the hilled site of Topheth, outside the walls of Jerusalem. This site flourished under Manasseh's son King Amon but was destroyed during the reign of Josiah, the reformer. "And he defiled Topheth, which is in the valley of the sons of Hinnom, that no one might burn his son or his daughter as an offering to Moloch" (2 Kings 23:10).

moloch, also called THORNY DEVIL (*Moloch horridus*), small (20-centimetre- [8-inch-] long), squat, orange and brown lizard of the Old World family Agamidae. Like its New World iguanid counterpart, the horned toad, the moloch is entirely covered with thornlike spines, the largest projecting from the snout and over each eye.



Moloch lizard (*Moloch horridus*)

J.R. Brownlie—Bruce Coleman Ltd.

The moloch is an inhabitant of sandy deserts of Australia, and it feeds on black ants. It is a slow-moving and harmless reptile.

Molodechno, also spelled MOLODEČNO, city and centre of Molodechno *rayon* (sector), Minsk *oblast* (province), Belarus, northwest of Minsk city. The city achieved eminence after becoming a railway junction at the end of the 19th century, and from 1939 until 1960 it served as an *oblast* centre (except during World War II, when much of it was destroyed). It is a centre of diverse food and other light industries, with some machine-building and building-material industries. Pop. (1991 est.) 93,500.

Molody, Konon Trofimovich: *see* Lonsdale, Gordon Arnold.

Molokai, volcanic island, Maui and Kalawao counties, Hawaii, U.S., east of Oahu across the Kaiwi Channel and northwest of Maui across the Pailolo Channel. Its western and eastern portions comprise two tablelands, Mauna Loa reaching its peak in Puu Nana (1,381 feet [421 m]) and Kamakou (4,970 feet [1,515 m]); these are connected by a saddle (ridge) that is 400 feet (120 m) high. A smaller and much later volcano formed Kalaupapa Peninsula on the northern coast. The island (area 261 square miles [676 square km]) is 40 miles (65 km) long and of fairly even width, about 7 miles (11 km). Its northern side is an almost continuous towering cliff, reaching to an elevation of some 3,600 feet (1,100 m) and intersected by many deep valleys, including

The Hansen's Disease (leprosy) Treatment Center flanked by cliffs, Kalaupapa Peninsula, Molokai, Hawaii

Werner Stoy from Camera Hawaii

Halawa, a deep verdant gorge, 4 miles (6.4 km) long and 0.5 mile (0.8 km) wide, suited to agriculture.

Molokai's original inhabitants, once self-sufficient taro growers and fishermen, migrated to other islands at the turn of the century. The Hawaiian Homes Act of 1921 encouraged homesteading and resettlement on Molokai. Lack of water slowed development, but after 1923, with the growth of the pineapple industry, small villages grew up on the plateau. Kaunakakai, the chief village, is on the south coast and has a small harbour from which pineapple and cattle are exported. The state's Hansen's Disease (leprosy) Treatment Center occupies an isolated section of the Kalaupapa Peninsula. Pop. (1990) island, 6,587.

Molopo River, river in southern Africa. It rises east of Mafikeng (formerly Mafeking) in North-West province, South Africa, and flows generally west for about 600 miles (1,000 km) to join the Orange River near the southeastern border of Namibia. Intermittent and usually dry, the Molopo also marks part of the southern boundary between Botswana and South Africa. In its lower course the river passes through the Kalahari basin.

Molotov (city, Russia): *see* Perm.

Molotov, Vyacheslav Mikhaylovich, original name VYACHESLAV MIKHAYLOVICH SKRYABIN (b. Feb. 25 [March 9, New Style], 1890, Kukarka [now Sovetsk], Russia—d. Nov. 8, 1986, Moscow, Russia, U.S.S.R.), statesman and diplomat who was foreign minister and the major spokesman for the Soviet Union at Allied conferences during and immediately after World War II.

A member and organizer of the Bolshevik party from 1906, Molotov was twice arrested (1909, 1915) for his revolutionary activities. After the Bolsheviks seized power (1917), Molotov worked in several provincial party organizations. In 1921 he became a member and a secretary of the Central Committee as well as a candidate member of the Politburo. He staunchly supported Joseph Stalin after the death of Vladimir Ilich Lenin (1924), and in December 1926 he was promoted to full membership in the Politburo. He then assumed control of the Moscow Party Committee and purged the Moscow organization of its anti-Stalin membership (1928–30). In 1930 he was made chairman of the Council of People's Commissars (*i.e.,* prime minister of the Soviet Union), a post he held until 1941.

Molotov

EB Inc.

Shortly before the outbreak of World War II, Molotov was picked by Stalin to replace Maksim Litvinov as the Soviet commissar of foreign affairs (May 1939). In this capacity he negotiated the German-Soviet Nonaggression Pact (Molotov-Ribbentrop Pact; August 1939) with Nazi Germany. In May 1941, when Stalin himself took over as chairman of the Council of Ministers (formerly Council of People's Commissars), Molotov remained its first deputy chairman. After Germany invaded the Soviet Union (June 1941), he also served on the State Defense Committee (the special war cabinet). Molotov arranged the Soviet alliances with Great Britain and the United States and attended the Allies' conferences at Tehrān (1943), Yalta (1945), and Potsdam (1945) as well as the San Francisco Conference (1945), which created the United Nations. (It was during World War II that Molotov ordered the production of the bottles of inflammable liquid that became known as Molotov cocktails.) In his wartime dealings with the Allies and afterward, he earned a reputation for uncompromising hostility to the West.

In March 1949 Molotov gave up the post of foreign minister, but, after Stalin died (March 1953), he resumed it, holding it until his political disagreements with Nikita Khrushchev resulted in his dismissal (June 1956). He was made minister of state control in November, but, when he joined the "antiparty group" that unsuccessfully tried to depose Khrushchev in June 1957, he lost all his high party and state offices. He subsequently served as ambassador to Mongolia and as the Soviet delegate to the International Atomic Energy Agency in Vienna (1960–61). In 1962, after engaging in more criticisms of Khrushchev, he was expelled from the Communist Party. He lived thereafter in undisturbed retirement in Moscow.

Molotovsk (Russia): *see* Severodvinsk.

molt, also spelled MOULT, biological process of molting (moulting)—*i.e.,* the shedding or casting off of an outer layer or covering and the formation of its replacement. Molting, which is regulated by hormones, occurs throughout the animal kingdom. It includes the shedding and replacement of horns, hair, skin, and feathers.

The process of shedding an external skeleton for the purpose of growth or change in shape (*see* metamorphosis) is called ecdysis; it occurs in such invertebrates as arthropods, nematodes, and tardigrades.

Moltke, Adam Gottlob, Count (Lensgreve) (b. Nov. 10/11, 1710, Walkendorf, Mecklenburg [Germany]—d. Sept. 25, 1792, Bregentved, Den.), high court official who exerted a powerful influence over King Frederick V of Denmark and Norway.

Brought to Denmark by his family as a child, Moltke was a page to the future king Christian VI in 1722. In 1730 he became chamberlain to the future king Frederick V. Frederick secured for Moltke the post of court marshal in 1743, and Moltke remained in that post after Frederick V was crowned in 1746. In 1747 Frederick made Moltke a privy councillor, giving him the estate of Bregentved. In 1750 Moltke was made a count.

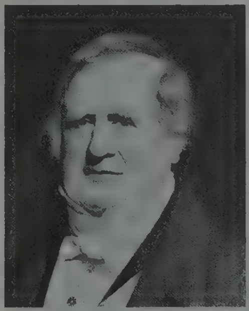
Moltke was the most influential of Frederick V's advisers. He strongly opposed liberation of the serfs. Frederick V died in his arms in 1766, and Moltke was then dismissed from his major posts by the new king, Christian VII. Moltke was recalled the following year to deal with agrarian reforms but was dismissed again in 1770, retiring then to his estate.

Adam Gottlob Moltke, oil painting by C.G. Pilo

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

Moltke, Adam Wilhelm, Count (Lensgreve) (b. Aug. 25, 1785, Einsidelsborg, Fünen, Den.—d. Feb. 15, 1864, Copenhagen), statesman and prime minister of the first government responsible to Parliament in Denmark.

The grandson of Adam Gottlob Moltke, Moltke entered public life in 1809 as the assessor of the Supreme Court. After holding other government offices, he became minister of finance in 1831 under Frederick VI and president of the *rentekammeret* (exchequer) in 1845 under Christian VIII. When the new king, Frederick VII, renounced absolute rule in March 1848, a representative government was formed with Moltke as prime minister; under his ministry the constitution of June 5, 1849, was introduced. The fact that a distinguished statesman who had served the last two absolute kings of Denmark voluntarily accepted the prime ministership gave the new government prestige.



Adam Wilhelm Moltke, detail from an oil painting by J.V. Gertner, 1846

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

Moltke at first was responsible for finance, but in 1848 he exchanged that portfolio for foreign affairs and Schleswig. He gave up these responsibilities in 1850 and resigned as prime minister in January 1852. He was a member of the Landsting (upper house; 1849–60).

Moltke, Helmuth von, in full HELMUTH KARL BERNHARD, COUNT (graf) VON MOLTKE (b. Oct. 26, 1800, Parchim, Mecklenburg [Germany]—d. April 24, 1891, Berlin, Ger.), chief of the Prussian and German General Staff (1858–88) and the architect of the victories over Denmark (1864), Austria (1866), and France (1871).

Early career. Moltke's father, a man of unstable character, belonged to the nobility of

Mecklenburg, his mother to an old family of the free city of Lübeck. The Moltkes were impoverished, and young Helmuth, whose health was not too good, had an unhappy start to life. Since his father had emigrated to Holstein (then a Danish possession) in 1805 and had taken Danish nationality, the boy completed his education with the Royal Cadet Corps in Copenhagen and joined a Danish infantry regiment. After a visit to Berlin in 1821, however, he decided to transfer to the Prussian Army, and in 1822 he obtained a commission as a second lieutenant in the Prussian Life Guards, being posted to Frankfurt an der Oder.

Helmuth von Moltke, 1871
BBC Hulton Picture Library

In October 1823 Moltke was sent to the General War College for a three-year course, but, since his health was deteriorating, he went in the summer of 1825 to Bad Salzbrunn for convalescence, during which he studied modern languages. On his return to Frankfurt in the summer of 1826 he took up writing, largely to improve his financial position, and published a novel, *Die beiden Freunde* (1827; new ed. 1957). In May 1828 he was transferred to the General Staff's Topographical Bureau in Berlin.

Continuing his literary work, Moltke published his *Darstellung der innern Verhältnisse und des gesellschaftlichen Zustandes in Polen* (1832; *Poland: An Historical Sketch,* 1885) and also accepted a publisher's offer for a translation of Edward Gibbon's *Decline and Fall of the Roman Empire;* although he completed most of it, it was never published.

Moltke was attached to the Prussian General Staff in March 1832 and promoted to the rank of first lieutenant a year later. Toward the end of 1835 he was sent to Turkey to advise Sultan Mahmud II on the modernization of the Turkish Army, and in 1836 he was authorized by Berlin to enter the Turkish service. After some work in Istanbul and travels in the Balkans, he went in 1838 to Armenia, where Turkish forces were preparing an offensive against the Egyptian invaders of Syria. The failure of the offensive, in 1839, was due largely to the Turkish commander's disregard of Moltke's advice.

Returning to Germany at the end of 1839, Moltke reentered the Prussian service. He published a selection of his letters from Turkey, *Briefe über Zustände und Begebenheiten in der Türkei,* in 1841. In April 1842 he married an English girl, Marie Burt (1825–68), stepdaughter of his sister Augusta. An essay on the considerations that should govern the choice of routes for new railways (1843) is more significant of his future than his next book, *Der russisch-türkische Feldzug in der europäischen Türkei 1828–1829* (1845; *The Russians in Bulgaria and Rumelia,* 1854).

Late in 1845 Moltke was appointed personal aide-de-camp to the invalid prince Henry of Prussia (1781–1846), who was living privately in Rome. Though this appointment ended with Prince Henry's death, it gave Moltke the opportunity to begin work on a splendid topographical map of Rome and its vicinity (published in 1852) and to write his "Wanderungen um Rom" (published in his *Wanderbuch,* 1879; *Notes of Travel,* 1880). Moreover, when the warship bringing Prince Henry's body back to Germany reached Gibraltar, Moltke left it and made his own way home across Spain, recording his impressions in his "Tagebuchblätter aus Spanien" (also published in the *Wanderbuch*).

Working again for the Prussian General Staff, Moltke started thinking about the major problems confronting Prussia: the unification of Germany and the security of a country surrounded by potential enemies yet lacking natural frontiers. He was convinced that only the army could provide a satisfactory solution to these problems, and he expressed his delight at the suppression of the revolution of 1848–49 by writing to his brother that the curtain had come down on Prussia's worst enemy—democracy.

A colonel from 1851, Moltke was in 1855 appointed personal aide-de-camp to Prince Frederick William, the future king of Prussia and German emperor (Frederick III). This post involved more travels: to Scotland and thence to England, to Russia (*Briefe aus Russland,* 1877; *Letters from Russia,* 1878), and to France. Even so, apart from the period of his Turkish service and his brief stay in Rome, Moltke's career up to 1856 had been mostly dull routine or concerned with the affairs of his princely masters rather than the profession of arms. Only in Turkey had he served with troops.

Chief of the general staff. Moltke was selected as chief of the Prussian General Staff in 1857 and confirmed in that office in September 1858. Thus began the era of the great triumvirate—Otto von Bismarck (chancellor), Moltke, and Albrecht von Roon (1803–79; minister of war from 1859)—that within 13 years was to change the map of Europe.

Moltke entered upon his new official duties at a time when a technical revolution was changing the whole conception of war. The rearmament of the German infantry with the breech-loading needle gun had been proceeding since 1848 and was almost complete. Breech-loading guns for the artillery were on the way but were not finally introduced until 1861. Much more significant, however, was the rapid development of railways.

Moltke was the first military man to appreciate the important role that railways could play in the deployment, movement, and supply of armies on a great scale. Hitherto, the movement of troops had been restricted by the paucity and seasonal unreliability of road communications, and the aim of strategy of every great commander had been to bring the strongest possible force in the best possible condition onto a small battlefield where he could survey the entire army and almost every soldier could hear him. Moltke saw that the advent of railways had changed this. Many more men and much more equipment could now be deployed much faster on vastly wider fronts. In place of battlefields of a few square miles, there would be long battlefronts of perhaps hundreds of miles. The limited flank attack by a few battalions would give place to wide turning movements by many divisions. Supplied by railways, troops would be able to keep the field in all weather throughout the year.

At the same time, Moltke appreciated that a new technique and a much more highly trained body of staff officers would be required to realize his new conception of warfare. The mounted staff officer with his necessarily confined outlook would give way to one with a much wider view, capable of compiling intricate railway-movement tables for vast numbers of men, animals, and equipment and of arranging for daily trainloads of supplies. He saw, too, that changes were necessary in another direction. Whereas, previously, commanders had kept a very tight hold on their subordinates and had been able always to give short and explicit orders, it was clear to Moltke that this system would not work in an army of perhaps millions locked in battle along a front that might extend for hundreds of miles. He therefore instituted the system of "general directives" in place of rigid "operation orders." In these directives the recipient was given a long-term task in general terms but was allowed considerable latitude and was expected to use his discretion and initiative in carrying it out. When Moltke joined the General Staff, its "chairborne" officers were held in little esteem by the "real" soldiers. He built up the new system of the Prussian General Staff, which later became the model for all armies organized on modern lines.

Some of Moltke's theories and methods were tested in practice by the Prussian forces in the short German–Danish War over Schleswig-Holstein in 1864; but a far more instructive opportunity of testing them came with the Seven Weeks' War, which Prussia, under Bismarck's guidance, launched against Austria and certain other German states in the summer of 1866. This war, for which initially Prussia deployed some 256,000 men in three armies on a front of 260 miles (nearly 420 kilometres), culminated in Prussia's overwhelming victory at Königgrätz (Sadowa). Moltke's contribution to victory was rewarded by Prussia with a donation of money that enabled him to buy an estate at Kreisau in Silesia (since World War II in the Wrocław Province of Poland), and the military result vindicated his system in the eyes of some older and hitherto recalcitrant generals. The war also served to expose deficiencies in the functioning of the system, among them ill-trained staff officers and an inadequate intelligence service. With the newly secured cooperation of his subordinates, he remedied these shortcomings before the final proving of his notions in 1870–71. He was also responsible for the official Prussian history of the Seven Weeks' War, *Der Feldzug von 1866 in Deutschland* (1867; *The Campaign of 1866 in Germany,* 1872).

Prussia's triumph of 1866 excited the envy of France, whose emperor Napoleon III was tempted to seek an increase in prestige at Prussia's expense or through intervention in German affairs. To eliminate this challenge, Bismarck envisaged war against France, and Moltke and Roon, having profited from the lessons of 1866, were able to tell him, at the end of 1869, that in their judgment the Prussian Army was capable of defeating the French and that the time seemed ripe. Consequently, Bismarck, in the next few months, provoked Napoleon III into hostilities; the Franco-German War began in July 1870, Moltke deploying some 384,000 men in three armies.

The Germans' great victory at Sedan on Sept. 2, 1870, brought the fall of the Second Empire in France and was soon followed by the proclamation, at Versailles on Jan. 18, 1871, of a new German Empire. France sued for peace in February and accepted Bismarck's terms in May 1871. Moltke, whose military machine had been far more efficient than France's, was created Graf (count) in October 1870, after Sedan, and appointed field marshal in June 1871, after the peace treaty.

Last years. Moltke was chief of the General Staff for 17 more years from 1871. For part of this time he was occupied with planning for the eventuality of Germany's having to fight a war on two fronts—against Russia in the east as well as against France again in the west. In August 1888, however, the old man at last resigned his post, not least because of his lack of sympathy with the manners and ideas of his new sovereign, the emperor William II. He had, however, already chosen his own immediate successor, Alfred von Waldersee.

Personality. On resigning office in 1888, Moltke retired to Kreisau. He died during a visit to Berlin in 1891. A tall, spare figure, he had a tanned face that usually wore an expression of grave austerity. His acute intelligence was obvious to all who met him, but, though he was a considerable linguist, he was habitually so taciturn that he was described as being "silent in seven languages" (he knew at least German, Danish, French, English, Italian, and Turkish, besides any Slavic or Iberian languages that he might have picked up). No indiscreet or unkind word is recorded as having passed his lips, and to his military colleagues he became "the Golden Man," without enemies or detractors. His married life was affectionate and happy but childless. As a writer, he is sometimes reckoned among the masters of 19th-century German prose.

(C.N.B.)

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Moltke, Helmuth (Johannes Ludwig) von (b. May 25, 1848, Gersdorff, Mecklenburg [Germany]—d. June 18, 1916, Berlin), chief of the German General Staff at the outbreak of World War I. His modification of the German attack plan in the west and his inability to retain control of his rapidly advancing armies significantly contributed to the halt of the German offensive on the Marne in September 1914 and the frustration of German efforts for a rapid, decisive victory.

Helmuth von Moltke, c. 1907
Archiv fur Kunst und Geschichte, Berlin

Moltke rose rapidly in the German army, becoming adjutant in 1882 to his uncle and namesake, who was chief of the General Staff. The personal favour of the emperors William I and William II, coupled with his great name, elevated him to offices for which he was completely unqualified. In 1903 Moltke became quartermaster general; three years later he succeeded Alfred von Schlieffen as chief of the General Staff. He thus inherited Schlieffen's plan for a war on two fronts, which envisaged only light German forces facing Russia on the east until France on the west had been defeated. In the Schlieffen plan of campaign against France, the German left (southern) wing would hold Alsace-Lorraine defensively while an overwhelmingly strong right (northern) wing would advance rapidly through Belgium and northern France, outflanking and eventually helping encircle the French armies while also capturing Paris.

As chief of staff Moltke's principal duty was to revise the Schlieffen plan to meet modern conditions. But his task was a difficult one, and when war broke out in August 1914 Moltke did not measure up to its requirements. He allowed several army commanders on the German left wing to attack into France instead of remaining on the defensive. Moreover, he reinforced these attacks with divisions taken from the crucial right wing and then sent several more much-needed divisions to the eastern front to check the Russian advance into East Prussia. The German high command lost touch with the advancing armies of the right wing, and the movements of that wing's constituent units became disjointed. These and other factors culminated not only in the right wing failing to encircle the French left but becoming itself the victim of a French and British flank attack that halted the entire German offensive at the Battle of the Marne (Sept. 6–12, 1914). Moltke's mood became more and more despairing during this time, and he finally abdicated responsibility completely. On Sept. 14, 1914, Emperor William II replaced Moltke as chief of staff, though he retained nominal command until the end of the year. A speedy victory in the west had eluded Germany's grasp, and within a few months of the Battle of the Marne the Western Front had settled down to the murderous and static trench warfare that was to persist unabated for almost three years. Moltke died a broken man less than two years later.

Molucca Sea, Indonesian LAUT MALUKU, portion of the western Pacific Ocean, bounded by the Indonesian islands of Celebes (west), Halmahera (east), and the Sula group (south). With a total surface area of 77,000 square miles (200,000 square km), the Molucca Sea merges with the Ceram Sea to the southeast, with the Banda Sea to the south, and with the open Pacific through the 150-mile- (240-kilometre-) wide Molucca Passage to the northeast. The sea's floor is subdivided into three zones, which serve to conduct deep water from the Pacific to the lesser seas. The deepest depression of the Molucca Sea is the 15,780-foot (4,810-metre) Batjan (Bacan) basin. This area of the Pacific often experiences earthquakes and crustal warping.

Moluccas, Indonesian MALUKU, Indonesian islands of the Malay Archipelago, lying between Celebes on the west, New Guinea on the east, the Arafura Sea and Timor on the south, and the Philippines, Philippine Sea, and Pacific Ocean on the north. Their combined area is about 28,767 square miles (74,505 square km). The islands constitute the Indonesian *provinsi* (province) of Maluku (*q.v.*), which is subdivided as follows: (1) Maluku Utara *kabupaten* (regency), comprising Ternate, Morotai, Bacan, Sula, and Obi islands and the northern and southern portions of Halmahera island; (2) Halmahera Tengah regency, which includes the islands of Tidore and Gebe and the central and eastern parts of Halmahera; (3) Maluku Tengah regency, which includes Ceram, Baru, Haruku, Saparua, the Ceram Sea, the Banda Sea islands, and the island of Ambon outside the *kotamadya* (municipality) of Ambon; (4) the municipality, or city, of Ambon, which is the capital of Maluku *provinsi;* and (5) Maluku Tenggara regency, embracing the Kai, Aru, and Tanimbar islands, the islands of Wetar and Barbar, and the other small islands between these.

The cloves of the northern Moluccas and the nutmeg of the central islands were traded in Asia long before Europeans heard of the Spice Islands. The Portuguese arrived in 1511, beginning many decades of conflict, first with the reigning sultans of Ternate and Tidore, later among the Spanish, English, and Dutch, with the latter eventually triumphing. The struggles for control of the region caused great losses of life during this period. The victorious Dutch earned large profits, but by the end of the 18th century, the spice trade had greatly diminished, and the Moluccas became an economic backwater. The islands were incorporated into the state of East Indonesia set up by the Dutch as they attempted to reestablish themselves in the East Indies after World War II. It was incorporated into the Republic of Indonesia in 1949. In 1950 the Christian Ambonese led the southern Moluccas in a temporary revolt against the new republic.

Earthquakes are frequent in the Moluccas, and most of the islands are mountainous. Several islands, especially Ternate and Banda, have active volcanoes. The Tanimbar and Aru island groups, however, are low and swampy. The climate of the Moluccas is tropical, with rainfall varying from 80 to 150 inches (2,000 to 3,800 mm) annually in various locations. In some areas the evergreen rain forest, formerly covering most of the islands, has been leveled and the land cultivated. There are patches of open savanna, and the coasts are often fringed with mangrove swamps. The Moluccas are a transition zone between Asian and Australian fauna and flora, and the animal life and vegetation of the islands include many locally unique species.

Because the area is a human transition zone between the west (Malays) and the east (Papuans), and because of intermarriage with Dutch, Portuguese, and Javanese, there is great diversity of population in the Moluccas. Christianity and Islām are dominant faiths in the coastal areas, but in the interior most people are animists. Except in north Halmahera, Tidore, Ternate, and Morotai, all languages used belong to the Austronesian (Malayo-Polynesian) family. Food is obtained by hunting, fishing, and collecting the starch sago. Coconuts are widely grown, and the main exports are copra, forest products, spices, and fish. Ceram island contains an oil field. Pop. (1988 est.) 1,741,800.

Moluccas (province, Indonesia): *see* Maluku.

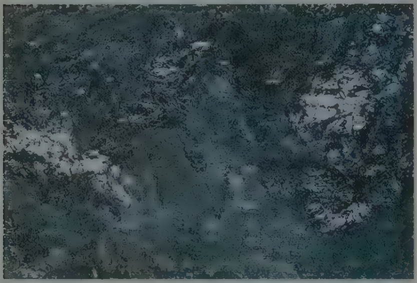
molybdate and tungstate minerals, naturally occurring inorganic compounds that are salts of molybdic acid, H_2MoO_4, and tungstic acid, H_2WO_4. Minerals in these groups often are valuable ores.

The structural unit of these minerals is a tetrahedral group formed by four oxygen atoms at the corners of a tetrahedron surrounding a molybdenum or tungsten atom. Each MoO_4 or WO_4 tetrahedron has a net charge of -2, which is neutralized by metal ions outside the tetrahedron. Unlike the silicate or borate minerals, which form chains, rings, sheets, or framework structures by sharing oxygen atoms between adjacent tetrahedra, the molybdate and tungstate minerals share none; they are similar in this respect to the phosphate, vanadate, arsenate, and chromate minerals. Because the molybdenum ion and the tungsten ion have similar radii, they may substitute for one another within the structure of any naturally occurring example; thus, they tend to form solid solution series.

Among the molybdate and tungstate minerals, only the powellite-scheelite series (calcium-bearing molybdate/tungstates) and wulfenite (lead molybdate) are noteworthy. Scheelite is a valuable tungsten ore; wulfenite is a minor ore of lead.

One other series of tungstates is important. Wolframite, another name for the hübnerite-ferberite series of manganese/iron tungstates, is perhaps the most important ore of tungsten. These minerals have a structure, unlike that of the other tungstates, based on WO_6 octahedra—*i.e.*, each tungsten atom is surrounded by six oxygen atoms arranged at the corners of an octahedron. These minerals are classed with the complex oxides and are related to the niobates and tantalates.

molybdenite, the most important mineral source of molybdenum, molybdenum disulfide (MoS_2). Molybdenite crystals have the same hexagonal symmetry as those of tungstenite (tungsten disulfide). Both have layered structures and similar physical properties; the chief difference is the higher specific gravity of tungstenite. For detailed physical properties, *see* sulfide mineral (table).



Molybdenite in serpentine from Easton, Pa., U.S.

By courtesy of the Northwestern University Geology Department; photograph, Mary A. Root

molybdenum (Mo), chemical element, silver-gray refractory metal of Group VIb of the periodic table, used to impart superior strength to steel and other alloys at high temperature.

A brief treatment of molybdenum follows. For the mining, recovery, and applications of molybdenum, *see* MACROPAEDIA: Industries, Extraction and Processing.

The Swedish chemist Carl Wilhelm Scheele had demonstrated (*c.* 1778) that the mineral *molybdaina* (now molybdenite), for a long time thought to be a lead ore or graphite, certainly contains sulfur and possibly a previously unknown metal. At Scheele's suggestion, Peter Jacob Hjelm, another Swedish chemist, successfully isolated the metal (1782) and named it molybdenum, from the Greek *molybdos,* "lead."

Molybdenum is not found free in nature. A relatively rare element, it is about as abundant as tungsten, which it resembles. Most commercial production is from ores containing the mineral molybdenite. The concentrated mineral is usually roasted in an excess of air to yield molybdenum trioxide (MoO_3), also called technical molybdic oxide. Subsequent treatment depends on the ultimate use of molybdenum. Molybdenum may be added to steel in the furnace in the form of either technical oxide or ferromolybdenum. Ferromolybdenum (containing at least 60 percent molybdenum) is produced by igniting a mixture of technical oxide and iron oxide. Molybdenum metal is produced in the form of a powder by hydrogen reduction of chemically pure molybdic oxide or ammonium molybdate, $(NH_4)_2MoO_4$. The powder is converted to massive metal by the powder-metallurgy process or by the arc-casting process.

Molybdenum-base alloys and the metal itself have useful strength at temperatures above which most other metals and alloys are molten. The major use of molybdenum, however, is as an alloying agent in the production of ferrous and nonferrous alloys, to which it uniquely contributes hot strength and corrosion resistance. It is one of the most effective elements for increasing hardenability of iron and steel, and it also contributes to the toughness of quenched and tempered steels. The high corrosion resistance needed in the stainless steels used for processing pharmaceuticals and in the chromium steels for automotive trim is uniquely enhanced by small additions of molybdenum. Metallic molybdenum has been used for such electric and electronic parts as filament supports, anodes, and grids. Rod or wire is used for heating elements in electric furnaces operating up to 1,700° C (3,092° F). Coatings of molybdenum adhere firmly to steel, iron, aluminum, and other metals and show excellent resistance to wear.

Natural molybdenum is a mixture of seven stable isotopes: molybdenum-92 (15.84 percent), molybdenum-94 (9.04 percent), molybdenum-95 (15.72 percent), molybdenum-96 (16.53 percent), molybdenum-97 (9.46 percent), molybdenum-98 (23.78 percent), and molybdenum-100 (9.13 percent). Molybdenum exhibits valences of 2 to 6 and is considered zerovalent in the carbonyl $Mo(CO)_6$. Molybdenum(VI) appears in the trioxide, the most important compound, from which most of its other compounds are prepared, and in the molybdates (containing the anion MoO_4^{2-}), used to produce pigments and dyes. Molybdenum disulfide (MoS_2), which resembles graphite, is used as a solid lubricant or as an additive to greases and oils.

Molybdenum is an essential trace element in plants; in legumes as a catalyst it assists bacteria in fixing nitrogen. Molybdenum trioxide and sodium molybdate (Na_2MoO_4) have been used as micronutrients.

atomic number	42
atomic weight	95.94
melting point	2,610° C (4,730° F)
boiling point	5,560° C (10,040° F)
specific gravity	10.2 (20° C)
valence	0, 2, 3, 4, 5, 6
electronic config.	2-8-18-13-1 or $(Kr)4d^55s^1$

Molyneux, Samuel (b. July 18, 1689, Chester, Cheshire, Eng.—d. April 13, 1728, Kew, Surrey), British astronomer and politician.

Molyneux received his B.A. (1708) and M.A. (1710) from Trinity College, Dublin. He was elected to the Royal Society in 1712. Besides pursuing a career as an astronomer, he was also active in politics, as a member of both the English parliament (1715, 1726, 1727) and the Irish parliament (1727) and as a lord of the Admiralty (1727–28).

Molyneux collaborated (1723–25) with James Bradley to improve the construction of reflecting telescopes. Molyneux worked further with Bradley in 1725, setting up a zenith-pointing telescope to try to observe stellar parallax (apparent displacement by which the distances of stars can be calculated). Although they were unsuccessful in this effort, Bradley later used the same method to discover the aberration of starlight.

MOMA: *see* Modern Art, Museum of.

Mombasa, town and chief port of Kenya, on a coralline island in a bay of the Indian Ocean. Linked to its mainland municipal territory of 100 square miles (259 square km) by causeway, bridge, and ferry, the island has an area of 5.5 square miles (14.25 square km).

Founded by Arab traders in the 11th century, Mombasa was an important port for trade across the Indian Ocean. It was visited in 1331 by the Arab traveler Ibn Baṭṭūṭah and in 1498 by the Portuguese navigator Vasco da Gama. Because of its strategic position, it was continually fought over, passing among the Arabs, Persians, Portuguese, and Turks until 1840, when the sultan of Zanzibar finally gained control. It came under British administration in 1895 and was capital of the East Africa Protectorate until 1907. Mombasa became a municipality in 1928 and assumed council status in 1959.

Mombasa has two ports, Mombasa Old Port on the island's east side, and Kilindini Harbour on the west. The old port is now used only by dhows and small craft, bringing trade from Arabia, the Persian Gulf, and India. The old city is strongly Middle Eastern, with narrow streets, high houses with carved ornamental balconies, and mosques and temples. It is the site of Fort Jesus, built by the Portuguese (1593–95) and now a museum. There are Anglican and Roman Catholic cathedrals. A Hindu temple built in 1952 has a gilded dome.

Fort Jesus, Mombasa, Kenya

Authenticated News International

Kilindini is a modern deepwater port of numerous berths in a landlocked anchorage. Mombasa serves as the market for the region's agricultural products (sisal, cotton, sugar, kapok, coconuts, fruits, and vegetables), and it exports many of these as well as the products of northeastern Tanzania and Uganda, with which it is connected by rail. Industries include shipbuilding and repair, metal and cement works, sugar processing, a fertilizer plant, and an oil refinery (1963) at Changamwe. Pop. (1984 est.) 425,600.

moment (literary criticism): *see* race, milieu, and moment.

moment of a force (physics): *see* torque.

moment of inertia (physics): *see* inertia, moment of.

momentum, product of the mass of a particle and its velocity. Isaac Newton's second law of motion states that the time rate of change of momentum is proportional to the force acting on the particle. Albert Einstein showed that the mass of a particle increases as its velocity approaches the speed of light. At the speeds treated in classical mechanics, the effect of speed on the mass can be neglected, and changes in momentum are the result of changes in velocity only.

From Newton's second law it follows that, if a constant force acts on a particle for a given time, the product of force and the time interval (the impulse) is equal to the change in the momentum. Conversely, the momentum of a particle is a measure of the time required for a constant force to bring it to rest.

The momentum of a rigid body is the sum of the momenta of each particle in the body. Being proportional to velocity, momentum has direction; consequently, when a body in plane motion rotates, the momentum of each particle has a moment about any point in the plane. The sum of these moments of momenta is called the angular momentum of the body about the point and is equal to the product of the moment of inertia of the body about the point and the angular velocity of the body. The time rate of change of the angular momentum of a body about a point is equal to the moment of the applied forces about the point.

Applied to elementary particles such as electrons, angular momentum is called spin.

momentum, conservation of, general law of physics according to which the quantity called momentum that characterizes motion never changes in an isolated collection of objects; that is, the total momentum of a system remains constant. Momentum is equal to the product of the mass of an object multiplied by its velocity and is equivalent to the force required to bring the object to a stop in a unit length of time. For any array of several objects, the total momentum is the sum of the individual momenta. There is a peculiarity, however, in that momentum is a vector, involving both the direction and the magnitude of motion, so that the momenta of objects going in opposite directions can cancel to yield an overall sum of zero.

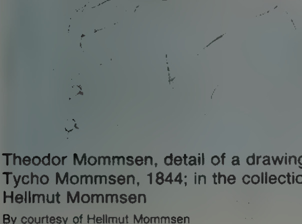
Before launch, the total momentum of a rocket and its fuel is zero. During launch, the downward momentum of the expanding exhaust gases just equals in magnitude the upward momentum of the rising rocket, so that the total momentum of the system remains constant—in this case, at zero value. In a collision of two particles, the sum of the two momenta before collision is equal to their sum after collision. What momentum one particle loses, the other gains.

The law of conservation of momentum is abundantly confirmed by experiment and can even be mathematically deduced on the reasonable presumption that space is uniform—that is, that there is nothing in the laws of nature that singles out one position in space as peculiar compared with any other.

There is a similar conservation law for angular momentum, which describes rotational motion in essentially the same way that ordinary momentum describes linear motion. Although the precise mathematical expression of this law is somewhat more involved, examples of it are numerous. All helicopters, for instance, require at least two propellers (rotors) for stabilization. The body of a helicopter would rotate in the opposite direction to conserve angular momentum if there were only a single horizontal propeller on top. In accordance with conservation of angular momentum, ice skaters spin faster as they pull their arms toward their body and more slowly as they extend them.

Angular-momentum conservation has also been thoroughly established by experiment and can be shown to follow mathematically from the reasonable presumption that space is uniform with respect to orientation—that is, that there is nothing in the laws of nature that singles out one direction in space as being peculiar compared with any other.

Mommsen, (Christian Matthias) Theodor (b. Nov. 30, 1817, Garding, Schleswig—d. Nov. 1, 1903, Charlottenburg, near Berlin), German historian and writer, famous for his masterpiece, *Römische Geschichte* ("The History of Rome"). He was awarded the Nobel Prize for Literature in 1902.



Theodor Mommsen, detail of a drawing by Tycho Mommsen, 1844; in the collection of Hellmut Mommsen

By courtesy of Hellmut Mommsen

Early years. Mommsen was the son of a Protestant minister, in Garding, Schleswig, and he grew up in Oldesloe (now Bad Oldesloe). He received his basic classical training in the senior classes of the Gymnasium (secondary school) Christianeum in Altona, then part of the Duchy of Holstein. From 1838 to 1843 he studied jurisprudence at the University of Kiel; inasmuch as the study of jurisprudence in Germany at the time was largely a study of Roman law, this had an essential influence on the direction of his future research. He owed his idea of the close interrelationship between law and history not so much to his teachers as to the writings of Friedrich Karl von Savigny, one of the founders of the historical school of jurisprudence. After he had received his master's and his doctor's degrees, a research scholarship granted by his sovereign, the king of Denmark, allowed him to spend three years—from 1844 to 1847—in Italy. During this time Italy became his second home and the Archaeological Institute in Rome one of the headquarters from which he pursued his research. By that time Mommsen had already conceived the plan for the *Corpus Inscriptionum Latinarum,* a comprehensive collection of Latin inscriptions preserved since antiquity on stone, iron, and other enduring materials, arranged according to the basic principles of philological methodology. Having been prepared for this field by the young Kiel professor Otto Jahn, he soon became a master of epigraphy—the study and interpretation of inscriptions—under the guidance of Bartolomeo Borghesi, the learned statesman of San Marino. Within the next several decades Mommsen made the corpus of Latin inscriptions into a source work that was essential in complementing the one-sidedly literary tradition and that, for the first time, made a comprehensive understanding of life in the ancient world possible.

When he returned from Italy, Mommsen found his country in a state of mounting unrest. As a native of Schleswig he was a subject of the Danish king, but he considered himself German, wanted to remain German, and looked forward to German unity. For him freedom meant not only the independence of the German states from foreign influence but also the freedom of the German citizen to adapt himself to any sort of constitution except that of despotism or a police state. A liberal, he considered the republic the ideal state, yet he was quite content with a constitutional monarchy so long as it was not a cover for some sort of pseudo-constitutional autocracy. Mommsen's political activities began with his editorship of the *Schleswig-Holsteinische Zeitung* for the provisional government established during the revolution of 1848. Yet journalism was not much to his taste; he was happy when, at the end of 1848, he was offered a professorship in civil law at the University of Leipzig. Nevertheless, he remained politically minded as long as he lived—as a thoughtful and critical observer as well as an active politician. (He was a deputy in the Prussian Landtag from 1873 to 1879 and in the German Reichstag from 1881 to 1884.) He continued to devote time and energy to politics, but it is doubtful that he thereby served his country's and his own best interests. While he was an acknowledged authority in his field of scholarship, in politics he remained a camp follower, who achieved no more than many others. Moreover, he more than once jeopardized his career by his political activities. Because of his participation in an uprising in Saxony in May 1849, he lost his professorship and almost landed in prison.

After his dismissal from his post in Leipzig, Mommsen in 1852 accepted a professorship in jurisprudence in Zürich. The grief he expressed about being an "exile" showed how deeply he felt himself to be a German. In 1854, however, he was offered a professorship in Prussia at the University of Breslau. It was at this time that he married Marie Reimer, daughter of a bookseller. Their long and happy marriage produced 16 children.

The historian and his works. During the years he spent at Leipzig, Zürich, and Breslau, Mommsen wrote the first three volumes of the *Römische Geschichte,* up to the Battle of Thapsus, 46 BC. This work embodied the new historical method applied to the history of Rome. Mommsen critically examined hitherto unquestioned traditions and rejected the attitude of the Enlightenment, which had idealized the classical age. He readily acknowledged himself to be a disciple of the historian Barthold Georg Niebuhr, who introduced rigorous criticism of sources into historiography, however much their methods of research and presentation differed and despite the fact that he went considerably beyond his great predecessor in demythologizing Roman history. In Mommsen's view it was important that the ancients should come down to earth from the Olympian heights upon which they appeared to the mass of the public. This modern style was not to everyone's taste, for, in bringing the past to life, he used the political and sociological vocabulary of the 19th century. When he speaks of the squirearchy and the cloth exerting their "malignant" influence even in ancient Rome, it is Mommsen the liberal politician speaking. Nevertheless, his *Römische Geschichte* is not a politically tendentious work but a piece of scholarship of the highest rank, which gains from its distinction of style.

The philologist is regarded as the preserver of verbal tradition, but as a philologist Mommsen was more than that: he was an artist, and he proved his artistry in his treatment of language. He disliked any incongruous mixture of prose styles and, in the *Römische Geschichte* and *Römisches Staatsrecht* ("Roman Constitutional Law"), he created two works both of which attain exemplary unity of form and content yet demonstrate two different styles. Without being a creative poet, he used the means of poetry and enjoyed exercising his poetic talent. An excellent testimony to his abilities is the *Liederbuch dreier Freunde* ("Songbook of Three Friends"), which he published in 1843 together with his brother Tycho and the writer and poet Theodor Storm. Throughout his life Goethe was his ideal not only as a poet but also as "the wisest man of the century." His perfect command of English, French, and Italian did much to make his journeys of research successful; he quoted Shakespeare in his letters almost as often as Goethe.

To many critics Mommsen's glorification of the dictator Caesar and his disparagement of Caesar's opponents, Pompey and Cicero, seem strangely inconsistent with his political liberalism. He tried to make his critics understand that he had praised Caesar only as a saviour of the decaying state; yet Mommsen's admiration for the autocrat reveals something of his own character. He himself was an autocrat in his own branch of scholarship, adopting a manner that his opponents labelled "caesarism." At the same time, however, he had an unusual need for the fellowship of like-minded men. He held personal contacts to be one of the most important elements of life; indeed, it might be said that he had a genius for friendship. Yet it was mostly a friendship with men who looked up to him. With anyone who considered himself Mommsen's equal, a friendly relationship was not likely to last long.

It was only as a member of the Prussian Academy of Sciences that Mommsen could pursue his project of publishing his collection of Latin inscriptions, and for this reason in 1858 he was offered a post in Berlin. In 1861 he also became a professor in the philosophy faculty at the university; because of his philological and historical interests he chose that faculty rather than that of law. As a teacher of Roman history and epigraphy—especially in his seminars—he trained many students who were later to make their mark in these fields. The main part of his scholarly work was taken up with the continuation of the *Corpus Inscriptionum Latinarum* (published 1863 and after). He also acted as adviser on many other great scholarly enterprises, such as the *Monumenta Germaniae Historica,* the exploration of the *limes* (Roman border fortifications in southwestern Germany), the numismatic work of the Prussian Academy, and the *Thesaurus Linguae Latinae.* Even in old age his mind was open to the new demands of scholarship, as shown by his interest in the new study of papyrology.

Mommsen's historical work was interrupted by his work on inscriptions; thus, the *Römische Geschichte* was never completed. Its first three volumes had been published in 1854–56. When, several decades later, in Berlin, Mommsen set out to complete his history, he abandoned the idea of writing the fourth volume, which was to contain the history of the emperors, because he felt that he would not be capable of writing it in the same brilliant style as his history of the republic. The fifth volume (1885) deals with the history of the Roman provinces in the first three centuries of the empire. No one but Mommsen could have depicted this period in so authoritative a manner, for no one else knew the nonliterary sources—the inscriptions and coins—as did he. The *Römische Geschichte* has been translated into English as *The History of Rome,* with the fifth volume entitled *The Provinces of the Roman Empire.*

The greatest monument to Mommsen's scholarship, the work which is of even greater significance for scholars than the *Römische Geschichte,* is *Römisches Staatsrecht* ("Roman Constitutional Law"), published in 3 volumes between 1871 and 1888. He himself said that if he were to be remembered by anything, it would be by this work. The Romans themselves never codified their constitutional law; Mommsen was the first to do it. His historical approach to classical scholarship led him to systematize the innumerable legal details upon which the Roman constitution was based and to explain this complex body of law through an understanding of its historical development. Only an individual who, like Mommsen, was grounded both in law and in the classics would be in a position to investigate the public law of the Romans, and only an individual trained to think in historical concepts could understand it.

In public law, criminal law stands side by side with constitutional law, and Mommsen's last great work, published in 1899, is *Römisches Strafrecht* ("Roman Criminal Law").

When Mommsen, who had already become a mythical figure for his contemporaries, died just four weeks before his 86th birthday, he had attained what he had always wanted. The task which he had set himself to fulfill, according to his own almost superhuman standards, he had completed. (L.F.K.W.)

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Momoyama period (Japanese history): *see* Azuchi-Momoyama period.

Mon, also spelled MUN, Burmese TALAING, people living in the eastern delta region of Myanmar (Burma) and in west-central Thailand, numbering in the late 20th century more than 1.1 million. The Mon have lived in their present area for the last 1,200 years, and it was they who gave Myanmar its writing (Pāli) and its religion (Buddhism). The Mon are believed to have spread from western China over the river lowlands from the Irrawaddy River delta south to the Chao Phraya River basin in Thailand. The Mon city of Thaton was conquered by Burmans migrating southward in 1057. The Mon state endured, however, until it was finally subjugated by the Burmans in 1757 (*see* Mon kingdom). Most Mon are bilingual, speaking Burmese as well as their own language, which is of Austroasiatic stock.

The Mon homeland occupies a coastal strip of land bordering the Gulf of Martaban and includes the Bilugyun and Kalegauk islands. The physiography of the area consists of lowlands terminated by the Taungnyo Range in the east. The Sittang River is the region's northwestern boundary, and the rivers Gyaing, Ataran, Salween, and Ye drain the area westward to the Gulf of Martaban. Rice and teak are the most important agricultural products; mangoes and durians are cultivated as well. Tea, sugar, tobacco, rubber, salt, and bamboo products are exported from Moulmein. Other cities and towns in the region include Thaton, Ye, and Martaban. Thaton, the former capital of the Mon kingdom, lost its position as a port because of silting.

A Mon village typically consists of rectangular houses with thatch roofs, granaries, and cattle sheds. Most villages have a monastery that also functions as a school, as well as pagodas, an image house where images of the Buddha are kept, and a rest house or meeting house. The family unit is nuclear rather than extended. The Mon religion of Theravāda (Hīnayāna) Buddhism is combined with belief in various spirits.

Møn, English MOEN, island, Storstrøm *amtskommune* (county commune), Denmark. The island has an area of 84 square miles (218 square km) and lies in the Baltic Sea. It is separated from southern Sjælland (Zealand) by the Ulv Strait and from Falster Island by the Grøn Strait. It is primarily flat except on the east coast, where white chalk cliffs covered with beech forests rise above 450 feet (137 m) in places. The island's fertile clay loam supports sugar beets and dairying. Of ancient settlement (there are several Stone Age burial chambers), Møn has many old churches (the oldest dating from about 1100) with notable frescoes. Stege, the principal town, was the seat of a royal fortress in the 12th century. Pop. (1994 est.) 10,352.

Môn, Ynys (Wales): *see* Anglesey, Isle of.

Mon-Khmer languages, language family included in the Austroasiatic stock. Mon-Khmer languages constitute the indigenous language family of mainland Southeast Asia. They range north to southern China, south to Malaysia, west to Assam state in India, and east to Vietnam. The most important Mon-Khmer languages, having populations greater than 100,000, are Vietnamese, Khmer, Muong, Mon, Khāsi, Khmu, and Wa.

The family consists of some 130 languages, most of which are not, or very rarely, written. Several languages are spoken by only a few hundred speakers and are in imminent danger of extinction; these include Phalok, Iduh, Thai Then, Mlabri, Aheu, Arem, Chung (Saoch), Song of Trat, Samrai, Nyah Heuny, Che' Wong, and Shompe. The family is subclassified into 13 branches: Khasian, Palaungic, Khmuic, Pakanic, Vietic, Katuic, Bahnaric, Khmeric, Pearic, Monic, Aslian, and Nicobarese. There has been reluctance in the past in accepting Vietic, which includes Vietnamese, as a branch of Mon-Khmer, but recent studies make this quite certain. Nicobarese was also thought to form a separate family in the Austroasiatic stock, but recent data from this poorly known branch confirm its inclusion in Mon-Khmer. The Chamic languages of Vietnam and Cambodia, which were included by some scholars in the Mon-Khmer family, have now been reclassified as Austronesian.

Mon kingdom, also called HANTHAWADDY KINGDOM, kingdom of the Mon people, who were powerful in Myanmar (Burma) from the 9th to the 11th and from the 13th to the 16th century and for a brief period in the mid-18th century. The Mon migrated southward from western China and settled in the Chao Phraya River basin (of southern Thailand) about the 6th century AD. Their early kingdoms, Dvaravati and Haripunjaya (*qq.v.*), had ties with the ancient Cambodian kingdom of Funan and with China and were also strongly influenced by Khmer civilization.

After the Mon moved westward into the Irrawaddy River delta of southern Myanmar in the ensuing centuries, they acquired Theravāda Buddhism, their state religion, from Ceylon and South India, and they adopted the Indian Pāli script. By 825 they had firmly established themselves in southern and southeastern Myanmar and founded the cities of Pegu and Thaton.

About the same period, southward-migrating Burmans took over lands in central Myanmar and established the kingdom of Pagan. In 1057 Pagan defeated the Mon kingdom, capturing the Mon capital of Thaton and carrying off 30,000 Mon captives to Pagan. This event was to prove culturally decisive for the Burmans because the Mon captives included many Theravāda Buddhist monks, who converted the Burmans to Theravāda Buddhism; Pāli replaced Sanskrit as the language of the sacred literature, and the Burmans adopted the Mon alphabet.

After the fall of Pagan (1287) to the invading Mongols, the Mon, under Wareru, regained their independence and captured Martaban and Pegu, thus virtually controlling their previously held territory. The next 200 years witnessed incessant warfare between the Mon and the Burmans, but the Mon managed to retain their independence until 1539, when they came under the domination of Toungoo Myanmar. In the mid-18th century the Mon rose in rebellion and reestablished their kingdom of Pegu, but it lasted only some 10 years. The Burmans triumphed permanently over the Mon when their leader Alaungpaya razed Pegu in 1757. Many of the Mon were killed, while others fled to Siam (now Thailand). The Mon are still centred in southeastern Myanmar, though their numbers are small compared to those of the ethnic Burmans.

Mon language, also called TALAING, or PEGUAN, Mon-Khmer language spoken by the Mon people of southeastern Myanmar (Lower Burma) and several Mon communities in Thailand. The oldest inscriptions, dating from the 6th century, are found in central Thailand in archaeological sites associated with the Dvaravati (*q.v.*) kingdom. Numerous Old Mon inscriptions date from the later Mon kingdoms of Thaton and Pegu. The Old Mon inscriptions found at Pagan, central Myanmar, attest to the prestige of the Mon language in medieval Myanmar society. Old Mon is written in a script originating from South India. The Mon writing system evolved gradually into its modern form and served as a basis for the Burmese writing system. The modern Mon language is now spoken primarily in southeastern Myanmar, between the towns of Moulmein and Ye. In northern, central, and western Thailand, there are also numerous Mon communities that migrated from Myanmar over the past four centuries.

Mona (Wales): *see* Anglesey, Isle of.

Mona Island, Spanish ISLA MONA, island lying west of Puerto Rico. It is in the centre of the Mona Passage about 45 miles (70 km) west of Mayagüez. About 6 miles (10 km) long, 4 miles (6.5 km) wide, and 20 square miles (52 square km) in area, the island is a limestone plateau. There is little vegetation, though there has been some reforestation. Despite the island's excellent beaches and fishing, attempts by the Puerto Rican government to promote tourism have not succeeded. Guano was collected commercially until about 1920. The island has no permanent inhabitants.

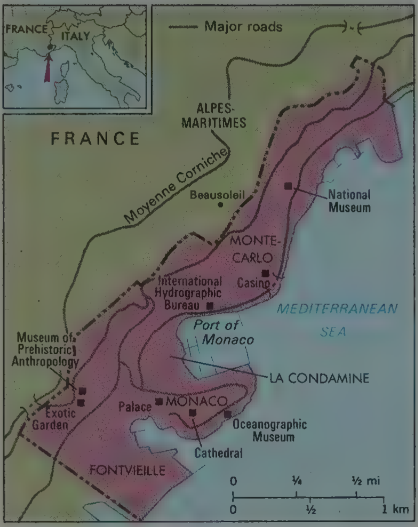
mona monkey (*Cercopithecus mona*), common West African guenon that is found in tropical rainforests. The mona monkey is a speckled reddish brown in colour, with white underparts and an oval patch of white on each side of the tail. Its face is marked by a white band across the forehead and a thin, black stripe between eye and ear. The mona monkey is lively and is one of the most widely exhibited members of the guenon (*q.v.*) group of African monkeys.

Monachi (people): *see* Mono.

Monaco, officially PRINCIPALITY OF MONACO, French PRINCIPAUTÉ DE MONACO, sovereign principality located along the Mediterranean Sea in the midst of the resort area of the Côte d'Azur (French Riviera). The city of Nice lies 9 miles (15 km) to the west, the Italian border 5 miles (8 km) to the east. Monaco's tiny territory occupies a set of densely clustered hills and a headland that looks southward over the Mediterranean. The principality has an area of only about 0.73 square mile (1.9 square km). Many unusual features, however, have made Monaco among the most luxurious tourist resorts in the world and have given it a fame far exceeding its size.

Many visitors to Monaco alternate their hours between its beaches and boating facilities, the international sports-car races, and the world-famous Place du Casino, the gambling centre in the Monte-Carlo section that made Monte-Carlo an international byword for the extravagant display and reckless dispersal of wealth. The country has a mild Mediterranean climate with annual temperatures averaging 61° F (16° C) and with only about 60 days of rainfall. Monthly average temperatures range from 50° F (10° C) in January to 75° F (24° C) in August.

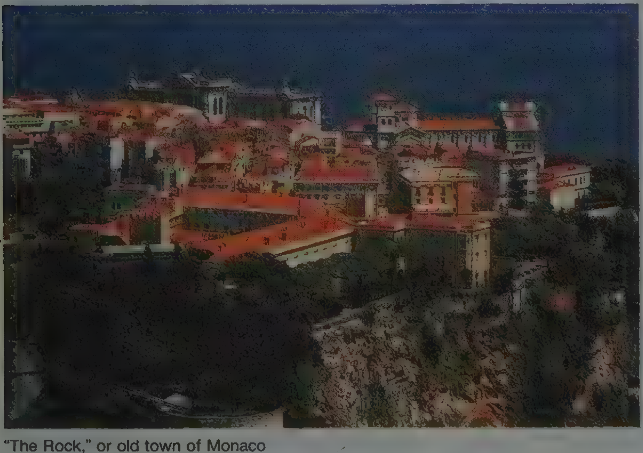
Evidences of Stone Age settlements in Monaco are preserved in the principality's Museum of Prehistoric Anthropology. In ancient times the headland was known to the Phoenicians, Greeks, Carthaginians, and Romans. In 1191 the Genoese took possession of it, and in 1297 the long reign of the Grimaldi family began. The Grimaldis allied themselves with France except for the period from 1524 to 1641, when they were under the protection of Spain. In 1793 they were dispossessed by the French Revolutionary regime, and Monaco was annexed to France. With the fall of Napoleon I, however, the Grimaldis returned; the Congress of Vienna (1815) put Monaco under the protection of Sardinia. The principality lost the neighbouring towns of Menton and Roquebrune in 1848 and finally ceded them to France under the terms of the Franco-Monegasque treaty of 1861. The treaty did restore Monaco's independence, however, and in 1865 a customs union was established between the two countries. Another treaty that was made with France, in 1918, contained a clause providing that, in the event that the Grimaldi dynasty should become extinct, Monaco would become an autonomous state under French protection.



Monaco

Monaco's refusal to impose income taxes on its residents and on international businesses that have established headquarters there led to a severe crisis with France in 1962. A compromise was reached by which French citizens with less than five years residence in Monaco were taxed at French rates and taxes were imposed on Monegasque companies doing more than 25 percent of their business outside the principality.

Monaco's constitution of 1911 provided for an elected National Council, but in 1959 Prince Rainier III suspended part of the constitution and dissolved the National Council because of a disagreement over the budget. In 1961 he appointed instead a national assembly. The aforementioned crisis of 1962 with France led him to restore the National Council and to grant a new, liberal constitution. The council comprises 18 members, elected by universal suffrage for a term of five years. Government is carried on by a minister of state (who must be a French citizen) and three state councillors acting under the authority of the prince, who is the official chief of state. Legislative power is shared by the prince and the National Council. Since 1819 the judicial system has been based on that of France; since 1962 the highest judicial authority has been the Supreme Tribunal.



"The Rock," or old town of Monaco

TSW—CLICK/Chicago

A substantial portion of the government's revenues comes from taxes on commercial transactions; additional revenue is drawn from franchises on radio, television, and the casino, from state-operated monopolies on tobacco and postage stamps, from sales taxes, and from the taxes imposed since 1962.

Monaco's chief industry is tourism, and its facilities make it one of Europe's most luxurious resorts. Once a winter attraction, it now draws summer visitors as well to its beaches and expanded mooring facilities. The social life of Monte-Carlo revolves around the Place du Casino. The casino was built in 1861, and in 1967 its operations were taken over by the principality. Banking and finance and real estate are other important components of the services sector.

A majority of Monaco's population is composed of French citizens; a smaller but significant number are Italian. Only about 15 percent of the population claims Monegasque descent. Most of the people are Roman Catholics. The official language is French.

The four sections, or *quartiers,* of Monaco are the town of Monaco, or "the Rock," a headland jutting into the sea on which the old town is located; La Condamine, the business district on the west of the bay, with its natural harbour; Monte-Carlo, including the gambling casino; and the newer zone of Fontvieille, in which various light industries have developed.

In Monaco are the Roman Catholic cathedral, the prince's Genoese and Renaissance palace, and the Oceanographic Museum of Monaco, built in 1910.

The casino itself contains a theatre designed by the 19th-century French architect Charles Garnier, which is the home of the Opera de Monte Carlo. During the 1920s many of the works of the famous Ballets Russes of Sergey Diaghilev were given their premiers there. There is also a Monte-Carlo national orchestra. The best known of the automobile events held in the principality are the Monte-Carlo Rally and the Grand Prix de Monaco. Pop. (2002 est.) 32,000.

Monaco, Lorenzo (Florentine painter): *see* Lorenzo Monaco.

Monaco, Rainier III, prince de: *see* Rainier III, prince de Monaco.

monad (from Greek *monas* "unit"), an elementary individual substance that reflects the order of the world and from which material properties are derived. The term was first used by the Pythagoreans as the name of the beginning number of a series, from which all following numbers derived. Giordano Bruno in *De monade, numero et figura liber* (1591; "On the Monad, Number, and Figure") described three fundamental types: God, souls, and atoms. The idea of monads was popularized by Gottfried Wilhelm Leibniz in *Monadologia* (1714). In Leibniz's system of metaphysics, monads are basic substances that make up the universe but lack spatial extension and hence are immaterial. Each monad is a unique, indestructible, dynamic, soullike entity whose properties are a function of its perceptions and appetites. Monads have no true causal relation with other monads, but all are perfectly synchronized with each other by God in a preestablished harmony. The objects of the material world are simply appearances of collections of monads.

Monadhliath Mountains, also called GREY HILLS, mountain range in Highland region, Scotland, between Loch Ness in the northwest and the River Spey in the southeast. The range has several summits above 3,000 ft (900 m), the highest being Carn Mairg (3,087 ft [941 m]), the haunt of eagles and wild cats. The River Findhorn, which flows northward to the North Sea, rises on the northwestern slopes of Carn Mairg.

monadnock, isolated hill of bedrock standing conspicuously above the general level of the surrounding area. Monadnocks are left as erosional remnants because of their more resistant rock composition; commonly they consist of quartzite or less jointed massive volcanic rocks. In contrast to inselbergs (island mountains), a similar tropical landform, monadnocks are formed in humid, temperate regions. They take their name from Mt. Monadnock, a solitary mass of rock (3,165 ft [965]) in Monadnock State Park, southeast of Keene, in Cheshire County, southwestern New Hampshire, U.S. A well-known example is Stone Mountain in Georgia.

Monagas, state, northeastern Venezuela, bounded northeast by the Gulf of Paria, southeast by the Orinoco River, and north and west by the states of Sucre and Anzoátegui. It has an area of 11,158 sq mi (28,900 sq km). Except for a coastal range in the north and the marshes of the Orinoco Delta, Monagas is a land of savannas and is typical Llanos (plains) country. Cattle raising is dominant, although corn (maize), coffee, cotton, rice, tobacco, wheat, and cassava are grown in the northern uplands.

The discovery of petroleum in 1928 brought profound changes to Monagas. Quiriquire, in the jungle near the state capital, Maturín (*q.v.*), was the first field opened, and it has been among the richest in the Orinoco Basin. There are more than 100 oil camps stretching over an enormous area; by the early 1970s those in Monagas accounted for about 5 percent of Venezuela's oil production. The oil of the eastern Llanos is pumped through several pipelines north to Caripito and to Puerto La Cruz, on the Caribbean, for refining and shipping. Most of the natural gas from the wells, formerly flared off, is now sent to Caracas, La Guaira, and Valencia for use in homes and industry. Pop. (1983) 406,467.

Monaghan, Irish MUINEACHÁN (Place of Thickets), one of the three counties of Ireland forming part of the historic province of Ulster. It projects northward into Northern Ireland, and has an area of 498 sq mi (1,291 sq km). Most of the northern boundary winds through cultivated lowlands except on Slieve (mountain) Beagh, a desolate upland rising to 1,221 ft (372 m). For many miles the boundary with Northern Ireland runs along the River Blackwater.

Three main regions may be distinguished: the Slieve Beagh plateau in the north; the lowland Monaghan corridor from the Erne Valley to the Lough (lake) Neagh Basin, an important route; and, to the south, the Silurian hill country rising to more than 1,000 ft. The whole landscape is dominated by drumlins, long oval mounds that give the lowland corridor a highly complicated drainage pattern. There are numerous small lakes and peat flats, the relics of former lakes and ponds. Similar drumlins and waters are found in the Silurian hill country.

Monaghan was part of an ancient kingdom of Oriel, formed in AD 330, which also included Louth and Armagh. The Anglo-Norman advance in the 13th century broke up Oriel, but Monaghan remained dominated by the MacMahons and lay outside the main area of Anglo-Norman influence. In 1589 a large area came under the English crown; in 1591 the county was divided into estates between seven MacMahons and a McKenna. Monaghan was not therefore included in the later plantation of Ulster.

The county council meets at Monaghan town, and there is a county manager. Carrickmacross, Castleblayney, Clones, and Monaghan are urban districts. Farms are small in Monaghan, averaging 30 ac (12 ha), and cultivation is intensive: more than one-eighth of the county's area is unimproved land. By tradition it is a flax-growing county, though little has been grown since World War II. Grass, which is grown for seed, is sorted at Castleblayney. Little wheat is grown, but about one-sixth of the land is used for crops and hay. On many farms, potatoes and oats are sold; and another main resource is cattle rearing and dairying. Slightly over one-quarter of the population lives in towns and villages, which are mainly market centres. Boots and shoes are made in Castleblayney and Carrickmacross; in Clones are a clothing works and a spade and shovel factory; and Monaghan has milling, bacon curing, furniture making, and linen weaving. The main economic strength of these towns lies in their retail trade and monthly fairs. Pop. (1981) 51,192.

monal, any of several Asian pheasant species. *See* pheasant.

monarch, also called MONARCH FLYCATCHER, any of about 60 bird species constituting the subfamily Monarchinae of the Old World flycatcher family Muscicapidae. The term monarch is usually reserved for members of the Australian and Asian genera *Monarcha* and *Hypothymis;* the members of about 12 other Asian and African genera of monarchines are called flycatchers, with various modifiers.

In all monarchines the bill is markedly broad-based and flat, and the feet are quite small. Males of some species are strikingly coloured. Found from Africa through Southeast Asia to northern China and Melanesia, monarchines live chiefly in warm forest, where they feed on insects, more often gleaned from foliage than taken in the air.

Most monarchs are relatively short-tailed and range from 8 to 23 centimetres (3 to 9 inches) in length. A widespread example is the black-naped monarch (*Hypothymis,* or *Monarcha, azurea*) in which the male is bright purplish blue, with a slight crest. The species occurs from India to the Philippines.

The most striking monarchines are the paradise flycatchers (*Terpsiphone,* or *Tchitrea*) found in tropical Africa and Asia, north through eastern China and Japan. About 10 species are recognized, but the taxonomy is extremely confused because of geographical and individual variation. Many have crests and eye wattles, and breeding males of some species have elongated tail feathers, which may be 40 cm (16 in.) long. The plumage colours are usually combinations of glossy black, white, and rufous brown.

monarch butterfly (*Danaus plexippus*), a familiar member of the milkweed butterfly (*q.v.*) family Danaidae (order Lepidoptera), distributed throughout the world but concentrated mainly in North, Central, and South America. The monarch's wingspan averages 90 to 100 millimetres (about 4 inches). The distinctive coloration of the reddish-brown wings, marked by black veins and a black border with two rows of spots, warns predators of the insect's bad taste. The edible viceroy butterfly (*see* brush-footed butterfly) mimics the monarch's coloration and pattern.

Female monarch butterfly (*Danaus plexippus*)
Alexander B. Klots

In North America thousands of monarchs gather in autumn, migrate southward (sometimes travelling more than 2,900 kilometres [about 1,800 miles]), overwinter (occasionally reproducing), and begin to return north in the spring. During the return journey the monarchs stop along the way, deposit eggs, and die. After hatching and maturing, the new generation continues the northward trip. The monarch caterpillar grows to a length of 45 mm (1⁴/₅ in.) and pupates as a pale-green, golden-spotted chrysalis.

Monarchianism, a Christian heresy that developed during the 2nd and 3rd centuries. It opposed the doctrine of an independent, personal subsistence of the Logos, affirmed the sole deity of God the Father, and thus represented the extreme monotheistic view. Though it regarded Christ as Redeemer, it clung to the numerical unity of the Deity. Two types of Monarchianism developed: the Dynamic (or Adoptionist) and the Modalistic (or Sabellian).

Dynamic Monarchianism held that Christ was a mere man, miraculously conceived, but constituted the Son of God simply by the infinitely high degree in which he had been filled with divine wisdom and power. This view was taught at Rome about the end of the 2nd century by Theodotus, who was excommunicated by Pope Victor, and taught somewhat later by Artemon, who was excommunicated by Pope Zephyrinus. About 260 it was again taught by Paul of Samosata. It is the belief of many modern Unitarians.

Modalistic Monarchianism took exception to the "subordinationism" of some of the Church Fathers and maintained that the names Father and Son were only different designations of the same subject, the one God, who "with reference to the relations in which He had previously stood to the world is called the Father, but in reference to His appearance in humanity is called the Son." It was taught by Praxeas, a priest from Asia Minor, in Rome *c.* 206 and was opposed by Tertullian in the tract *Adversus Praxean* (*c.* 213), an important contribution to the doctrine of the Trinity. *See also* Sabellianism; Adoptionism.

monarchy, the undivided sovereignty or rule of a single person. The term is applied to states in which the supreme authority is vested in a single person, the monarch, who is the permanent head of the state. The word has, however, outlived this original meaning and is now used, when used at all, somewhat loosely of states ruled by hereditary sovereigns, as distinct from republics with elected presidents, or for the "monarchical principle," as opposed to the republican principle.

The most conspicuous example of an elective monarchy was the Holy Roman Empire, but in Europe all monarchies were, within certain limits, originally elective. After the introduction of Christianity, the essential condition of the assumption of sovereign power was not so much kinship with the reigning family as consecration by the divine authority of the church. The purely hereditary principle was of comparatively late growth, the outcome of obvious convenience, exalted under the influence of various forces into a religious or quasi-religious dogma.

The old idea of monarchy—that of the prince as representing within the limits of his dominions the monarchy of God over all things—

culminated in the 17th century in the extreme version of the doctrine of the divine right of kings, and was defined in the famous dictum of Louis XIV: *L'état c'est moi!* ("I am the state!"). The conception of monarchy was derived through Christianity from the theocracies of the eastern Mediterranean and of Rome, though Germanic tribal concepts of kingship were also incorporated into the medieval monarchy.

The ancient Greeks knew monarchy mainly in two forms: the Homeric and the Macedonian. In the first the king was a hereditary ruler whose authority was intimately bound up with his prowess in battle. In the second he was an imperial ruler who acquired divine properties, as in Hellenistic times his conquests, like Alexander's, took him farther away from the restraints of Greek rationalism and democracy into an Oriental despotism.

Monarchy was the underlying principle of the medieval empire and also of the medieval papacy. As the unity of medieval Christendom broke up, monarchy acquired a new basis. The monarch was ideally placed to provide the centralized power needed by the new nation-states of the 16th and 17th centuries. Frequently the monarch became an absolute ruler, the only source of law, the only mainspring of administration. But in England, Tudor absolutism retained parliamentary institutions, so that when the Stuarts endeavoured to assert the divine right of kingship they were frustrated by forces that were determined to set limits to monarchical power (*see* Rights, Bill of).

On the continent of Europe monarchical absolutism in general continued to thrive in the 18th century, accommodating itself even to the first impact of the Enlightenment in the form of the "benevolent despot," of whom Frederick the Great of Prussia and Catherine the Great of Russia were notable examples. In 1789, however, the French Revolution dealt it a shattering blow. Even when, as in many countries, the institution survived or when, as in others, it was restored in the reaction after the Napoleonic Wars, it was almost always in a modified form. In Latin America republics rose on the ruins of the Spanish and Portuguese empires; Brazil was unique in retaining a monarchy down to 1889.

World War I brought ruin to those monarchs who had retained so much personal power that they could not escape blame for defeat or social injustice. Among such victims were the monarchies of Russia, Germany, and Austria-Hungary. In Spain the monarchy was overthrown in 1931 though the constitution of 1947 still called Spain "a kingdom," even while proclaiming General Francisco Franco as chief of state. King Juan Carlos I succeeded Franco as head of state in November 1975, and the constitution of December 1978 proclaimed Spain a parliamentary monarchy.

In China the Manchu dynasty had been overthrown as late as 1912. In Japan defeat produced a voluntary abandonment of the doctrine of imperial divinity; by the constitution of 1946 (adopted 1947) the emperor became merely "the symbol of the state and of the unity of the people.

In Europe monarchy survived in Britain, Norway, Sweden, Denmark, Belgium, and The Netherlands, and in Greece until a military junta there decreed the monarchy's end in 1973. Denmark was the last of the European monarchies to abandon absolutism (in 1849). All the Scandinavian monarchies were notable for their scrupulous constitutionalism and their democratic unpretentiousness. The pattern of all these limited monarchies was set by Britain, the personal prestige and longevity of Queen Victoria playing an important part.

Monarda, genus of 12 North American plants variously known as bergamot, horsemint, and bee balm, belonging to the mint family (Lamiaceae), order Lamiales. The flowers are red, rose, lavender, yellow, or white; tubular; two-lipped; and in clusters surrounded by leaflike bracts.

Oswego tea (*Monarda didyma*)
Walter Dawn

M. fistulosa, growing to 1.5 m (5 feet) tall, has a minty aroma. The more sharply scented Oswego tea (*M. didyma*), shorter and with scarlet flowers, is native in eastern North America but is widely cultivated elsewhere.

Monash, Sir John (b. June 27, 1865, West Melbourne—d. Oct. 8, 1931, Melbourne), civil engineer and soldier, best-known for his role as commander of the Australian army corps in France during World War I.

Monash attended Scotch College and Melbourne University obtaining degrees in the arts, in civil engineering, and law. Responsible for the design of a number of bridges in Melbourne and Tasmania, Monash pioneered in the use of reinforced concrete in Australia. He fought at Gallipoli as the head of an infantry brigade; posted in 1916 with his troops to France, Monash was promoted and charged to organize and train Australian troops. In 1918 he was put in command of the Australian corps.

His war experiences are recalled in *The Australian Victories in France in 1918* (1920) and *War Letters* (1933). He served as head of the State Electricity Commission of Victoria and, as such, was influential in the mining of coal deposits in Yallourn, the erection of power lines to Melbourne, and the development of the briquette industry.

Monashee Mountains, southwesternmost range of the Columbia Mountain system, in southeastern British Columbia, Canada, extending for 200 miles (320 km) north from the Washington (U.S.) boundary between the Interior Plateau (west) and the Selkirk Trench (east), in which flows the Columbia River. Originally known as the Gold Range (a name now restricted to the narrow easternmost ridge), the mountains were renamed Monashee, Gaelic for "mountain of peace," by an early prospector, David McIntyre. The Canadian Pacific Railway crosses the range south of Mount Monashee (10,650 feet [3,246 m]), which is the highest peak in the range. Gold, silver, copper, lead, and zinc are mined in the southern foothills.

monastery, local community or residence of a religious order, particularly an order of monks. *See* abbey; monasticism.

monasticism, an institutionalized religious movement whose members attempt to practice works that are above and beyond those required of both the laity and the spiritual leadership of their religions. Generally celibate and universally ascetic, the monastic individual separates himself or herself from general society either by living as a hermit or anchorite (religious recluse) or by joining a society of others who profess similar intentions. Although first applied to Christian groups, both Latin and Greek, the term monasticism is now used to denote similar, though not identical, practices in such religions as Buddhism, Hinduism, Jainism, and Taoism.

A brief treatment of monasticism follows. For full treatment, *see* MACROPAEDIA: Sacred Offices and Orders: *Monasticism.*

Christian monasticism. The earliest Christian monastic communities were founded in the deserts of Egypt. The tradition of the Desert Fathers is best-represented by the hermit St. Anthony of Egypt (*c.* 250–355?), who organized his followers into primitive monastic communities early in the 4th century. These Egyptian monks and holy women led lives of extreme asceticism, renouncing family ties, sexual relations, and possessions and practicing continual prayer. The goal of this way of life was the achievement of personal salvation or union with God through a continual spiritual battle with temptation.

Another example is that of St. Basil the Great (*c.* 329–379), who, with his sister Macrina the Younger (327–379), founded two communities on their family estate in Cappadocia, one for men and one for women. Basil espoused a less severe, though still strict, ascetic life in a cenobitic community headed by an abbess or abbot. Another characteristic of this simple rule is its prescription for service to society rather than complete withdrawal from it.

Monasticism spread quickly throughout the Byzantine Empire in the 4th through the 7th century and was established in Kiev in 1050 and in Moscow by 1354. Organized monastic life was slower to move westward into Europe. When it did arrive in the West in the 5th century, it was adopted in a modified form by Augustine of Hippo and others as a way of life for the clerics of the bishop's household and the orders of female virgins. Egyptian ascetic discipline was followed more closely by numerous individual ascetics and hermits in Gaul, where it found a focus and leader in St. Martin, bishop of Tours (*c.* 316–397). From his great monastic complex of Marmoutier, evangelists went out in every direction. In particular, Gallic monasticism took root in Ireland, where it developed a high literary culture and colonized the western isles and the Celtic fringe of north and south Britain.

The greatest legislator of Latin monasticism was St. Benedict of Nursia (*c.* 480–*c.* 547), who composed a rule for his monks at Monte Cassino in Italy. Though many of the precepts and phrases of the Rule of St. Benedict are derivative, the rule itself is a masterful document setting forth the preeminence of the cenobitic form of monasticism, the authority of the abbot, moderation of ascetic practices, and the importance of the divine office (services of prayers and hymns) scheduled throughout the day and night. Benedictine monks and nuns, as those who followed St. Benedict's rule came to be called, made three vows upon entrance into the monastery: obedience, stability within that monastery, and *conversio*, a change of habit. Traditionally understood as part of *conversio* are the vows of poverty and chastity. The rule spread gradually, ultimately supplanting other rules.

Throughout the Middle Ages monasticism played other vital roles in society: the propagation of Christianity, the development of the authority of the Roman bishop, and the conservation and augmentation of learning. In its most prosperous years monasticism was also a powerful economic and cultural force.

The most important reform movements were undertaken by Benedict of Aniane in the early 8th century, by the Benedictine community at Cluny and others in the 10th century, and by the Cistercian order in the 12th. Upon the founding of the mendicant orders (Dominicans and Franciscans) and the flowering of the universities in the 13th century, traditional monasticism began to decline in cultural importance. Since the 16th century, however, monasticism has slowly regained its original purpose, if not its predominance in society: that is, providing a way of sanctification for the earnest seeker of God. A revival of interest in monasticism in the 19th century led to the establishment of numerous Roman Catholic, Eastern Orthodox, Anglican, and some Protestant communities, as well as ecumenical groups such as the Taizé community.

Monasticism in Eastern religions. In the Eastern religions the earliest type of monk was probably the solitary or hermit. *Śramaṇas* (Sanskrit: "recluse") may already have existed before *c.* 1500 BC in some of the earliest proto-Dravidian or pre-Aryan settlements in India. In early Hindu times (*c.* 600–200 BC) there were hermits who lived in groups (ashrams) although they did not lead a strictly organized communal life. In Jainism, perhaps the first religion that can properly be said to have had an organized monastic life, monasticism seems to have evolved from the communities of ashrams. Mahāvīra, its reputed founder, organized his followers into groups of monks and nuns, who were fully professed, and laity, who ministered to their needs and kept a less rigorous rule. Later the Jains split into two sects, and one of these, the Digambaras, disallowed nuns. In Jainism self-denial and mortification assumed an extreme form. Its monks eschew the destruction of any animal life; some reject clothing altogether, and many fast to death. The strictness of their rule remains unmodified in the 20th century.

Buddhism is a preeminently monastic religion; its communities are known as the organization of the *saṅgha.* Buddhists, like the Christian Benedictines, generally observe a moderate rule, avoiding the two extremes of self-indulgence and self-immolation. Like the Jains, the Buddhists ignored caste distinctions. Originally monks and laity were closely associated, a tradition which has continued in the Theravāda Buddhist countries of Southeast Asia. The number of Buddhist nuns has never been large; indeed, the Buddha is said to have been very reluctant to allow women to form communities, but many joined them anyway. They lived apart from the monks and were always considered inferior to them. The Zen Buddhist movement attempted a return to the original austerity of early monastic communities, stressing frugality of diet, simplicity of dress, and the duty of monastics to work as well as to meditate.

Taoism has developed a few monastic communities, somewhat akin to those of the Buddhists, in which meditation can be practiced. In the 9th century AD, possibly as a result of Buddhist influence, the Hindu philosopher and theologian Śaṅkara founded four monastic communities that are still active today. According to the rule Śaṅkara laid down, there was no central head of the order, and each abbot nominated his own successor. He was enjoined to travel through his own province preaching the *Dharma* according to the Hindu Scriptures. Like the Buddhist and Jain monasteries before them, and their Christian counterparts in the Middle East and Western Europe, Hindu monastic communities became centres of learning.

Monastir (Tunisia): *see* Munastīr, al-.

Monastir (Macedonia): *see* Bitola.

monatomic gas, gas composed of particles (molecules) that consist of single atoms, such as helium or sodium vapour, and in this way different from diatomic, triatomic, or, in general, polyatomic gases. The thermodynamic behaviour of a monatomic gas in the ordinary temperature range is extremely simple because it is free from the rotational and vibrational energy components characteristic of polyatomic gases; thus its heat capacity is independent of temperature and molecular (here, atomic) weight, and its entropy (a measure of disorder) depends only on temperature and molecular weight.

monazite, phosphate mineral, cerium and lanthanum phosphate [$(Ce, La)PO_4$], that is the major commercial source of cerium. Occurring as small, brown, resinous, rather heavy crystals in granitic and gneissic rocks and their detritus (called monazite sands), monazite frequently contains 10–12 percent thorium dioxide (ThO_2) and thus represents a major commercial source of thorium as well. Monazite is mined in Brazil, Norway, Madagascar, Sri Lanka, India, and North Carolina. For detailed physical properties, *see* phosphate mineral (table).

Monboddo, James Burnett, Lord (b. October or November 1714, Monboddo, Kincardine, Scot.—d. May 26, 1799, Edinburgh), Scottish jurist and pioneer anthropologist who explored the origins of language and society and anticipated principles of Darwinian evolution.

Monboddo's main work, *Of the Origin and Progress of Language* (6 vol., 1773–92), contains a vast body of curious lore on the manners and customs of primitive peoples, relates man to the orangutan, and traces his development to a social state. Some of Monboddo's ideas and habits earned him a reputation as an eccentric: he believed, for instance, that children are born with tails, and at his dinner parties the table was strewn with roses in emulation of the Roman poet Horace. His sayings, whims, and oddities became legendary in his lifetime.

Monboddo, detail of an engraving by R. Stainier, late 18th century, after a portrait by J. Brown

BBC Hulton Picture Library

He assumed the title Lord Monboddo in 1767 when he became a judge as ordinary lord of session, in Edinburgh.

Monbuttu (people): *see* Mangbetu.

Moncalieri, hilltop town, Torino province, Piemonte (Piedmont) region, northwestern Italy; it is a southern suburb of Turin city. The 15th-century castle, built by Princess Yolanda of Savoy, was a favourite residence of the king of Sardinia and Italy, Victor Emmanuel II; Victor Emmanuel I and Victor Amadeus III died in it. The building was converted into a military academy. Also notable are the 14th-century church of Sta. Maria della Scala and an astronomical and meteorological observatory founded by the Barnabite Order. A rail junction and commercial centre, Moncalieri's industries include foundries and canneries. Pop. (1990 est.) mun., 61,338.

Moncensio (France): *see* Mont Cenis.

Monchegorsk, also spelled MONČEGORSK, town, Murmansk *oblast* (province), northwestern Russia, on the banks of Lake Imandra. The town developed through the exploitation of local copper and nickel deposits in the 1930s and was incorporated in 1937. Now it is a centre of this industry, and it also has fishery and forestry industries. Pop. (1991 est.) 72,900.

Mönchengladbach, formerly MÜNCHENGLADBACH, city, North Rhine-Westphalia *Land* (state), western Germany, west of Düsseldorf. It developed around a Benedictine monastery (founded in 972, suppressed in 1802, whence the name Mönchengladbach ["monks' Gladbach"]), and was chartered in 1336. For a brief period (1929–33) it united with Rheydt (immediately south) and Odenkirchen to form Gladbach-Rheydt. In 1975 Rheydt was incorporated into Mönchengladbach.

Historic buildings include the 13th-century Romanesque cathedral with an early Gothic choir (attributed to Gerhard von Riehl of Cologne) and a 10th-century crypt; the Baroque town hall (1663; formerly the Benedictine abbey); the Romanesque parish church in the Rheindahlen district; and a 12th-century convent church in the Neuwerk quarter. Educational institutions include the Franciscan Duns Scotus Academy (philosophy and theology), colleges of textile engineering and agriculture, and a school of economics. Mönchengladbach is known for its choral societies.

A noted textile centre, it is the site of the German Research Institute for the textile industry, and its municipal museum houses a notable collection of Coptic textiles. Its iron, machinery (especially textile machinery), and paper industries also are important. Other products include chemicals, leather, and petroleum. It is a road, rail, and air centre and has numerous parks, a botanical garden, and several sports arenas. The city is the headquarters for the North Atlantic Treaty Organization (NATO) forces in north central Europe. Pop. (1989 est.) 252,910.

Monchique Mountains, Portuguese SERRA DE MONCHIQUE, low mountain range forming the frontier between Beja and Faro districts, southern Portugal, near Cape Saint Vincent, the southwestern extremity of the Iberian Peninsula. A dissected igneous rock (syenite) massif, its highest point is La Foia (2,960 ft [902 m]). The range is famous for its wild and generally varied plant life, as well as for its spas with medicinal waters (Caldas de Monchique). Some timbering (pine, chestnut, oak) is carried on.

Monck (of Ballytrammon), Sir Charles Stanley, 4th Viscount, 1ST BARON MONCK OF BALLYTRAMMON (b. Oct. 10, 1819, Templemore, County Tipperary, Ire.—d. Nov. 29, 1894, Enniskerry, County Wicklow), first governor general of the Dominion of Canada (1866–68).

Monck was educated at Trinity College in Dublin and was called to practice in the Irish bar in 1841. On the death of his father he succeeded to the peerage of Ireland in 1849 and was elected to the House of Commons as a Liberal member from Portsmouth. He was a lord of the treasury (1855–58) and in 1861 was named governor general of British North America, serving in that post throughout the American Civil War (1861–64) and winning distinction for the deftness of his efforts to avoid British or Canadian involvement in that war. Monck was also noted for the impact that his governorship had upon the move toward Canadian federation.

His term expired just as the Dominion of Canada was being created, and Queen Victoria elevated him to the peerage of the United Kingdom as Baron Monck of Ballytrammon and extended his term in Canada so that he might be the first governor general of the new Dominion. In 1869 he was knighted (Grand Cross of the Order of St. Michael and St. George) and appointed to the privy council.

Monck, George, 1st Duke of Albemarle, Earl of Torrington, Baron Monck of Potheridge, Beauchamp and Teyes, Monck also spelled monk (b. Dec. 6, 1608, Great Potheridge, Devon, Eng.—d. Jan. 3, 1670, London), English general who fought in Ireland and Scotland during the English Civil Wars and who was the chief architect of the Restoration of the Stuart monarchy in 1660, following 11 years of republican government.

George Monck, detail of an oil painting after S. Cooper, *c.* 1660; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Scion of a well-to-do Devon family, Monck served with the Dutch against the Spaniards in the Netherlands from about 1629 to 1638, distinguished himself in suppressing a rebellion in Ireland in 1642–43, and returned to England in 1643 in order to fight for King Charles I against the Parliamentarians. Captured at Nantwich, Cheshire, in January 1644, he was imprisoned for two years in the Tower of London.

After the defeat of the king's cause in 1646, the Parliamentarians made Monck major general of an army sent to wipe out the Irish rebels. He had limited success, coming to terms with the rebels in 1649, and was forced to retire. In 1650 the Parliamentary commander Oliver Cromwell put him in charge of an infantry regiment assigned to suppress Scottish Royalists. Monck fought beside Cromwell in the important victory over the Scots at Dunbar on Sept. 3, 1650, and remained in Scotland as commander in chief to complete its subjugation.

In November 1652 Monck was appointed one of three generals at sea in the First Dutch War and played a leading part in three of the English naval victories. In 1654, after successfully executing another campaign against Royalist rebels in the Highlands of Scotland, he remained as governor at the behest of Cromwell, who had been appointed Lord Protector of the Commonwealth.

Monck at first supported Cromwell's son and successor Richard but did not oppose the overthrow of the Protectorate and the recall of the "Rump" of the Long Parliament. But when Major General John Lambert dissolved the Rump by force in October 1659, Monck refused to recognize the new military regime and, after ordering the Rump restored once again in December, led an army from Scotland against Lambert in January 1660, receiving the gratitude of the reassembled Rump Parliament.

Parliament was dissolved in March, and the newly elected Convention Parliament quickly invited Charles II to return to England as king. Charles's Declaration of Breda, calling for amnesty, liberty of conscience, and other measures, was issued at Monck's urging.

For his services in contributing to a peaceful restoration of Stuart rule, Monck was made Duke of Albemarle and a Knight of the Garter and was awarded a large annual pension. He also became master of the horse, lord lieutenant of Ireland, and captain general. He commanded the English fleet during the Second Dutch War (1665–67).

Monclova, city, east-central Coahuila *estado* ("state"), northeastern Mexico. It is situated in the eastern outliers of the Sierra Madre Oriental, at 1,923 feet (586 m) above sea level, on the Salado de los Nadadores River, north of Saltillo, the state capital. The climate is hot and dry, with great temperature ranges.

During the colonial period, Monclova served as the capital of Nueva Extremadura *provincia*. Now it is primarily an industrial centre, the site of one of Mexico's largest ironworks and steelworks, which began operation in 1944, using ore from Durango, coking coal from Sabinas, and local limestone. Silver, lead, zinc, and copper are also mined nearby. Agriculture (cereals and fibres) and livestock raising are also practiced in the area. The city is accessible by railroad and highway from Piedras Negras, on the Mexico–United States border; Saltillo; Monterrey; and San Pedro de las Colonias. It is also served by domestic airlines. Pop. (1990 prelim.) 178,023.

Moncorgé, Jean-Alexis: *see* Gabin, Jean.

Moncton, city and port, Westmorland county, southeastern New Brunswick, Canada. It lies 25 miles (40 km) from the mouth of the Petitcodiac River. Moncton is the second largest city in the province (after Saint John [101 miles southwest]).

The site, which was originally occupied by a Micmac Indian village, was settled by French Acadians after 1698. Subsequently, Pennsylvania Germans (1763) and Empire Loyalists (1784) arrived, and the place became known as The Bend. It was renamed (1855) for Lieutenant Colonel Robert Monckton, leader of a British military expedition against the French at Fort Beauséjour (26 miles southeast). The University of Moncton, founded in 1864 as St. Joseph's College and renamed in 1963, made Moncton the cultural centre of New Brunswick's Acadian population. During the 19th century, Moncton, favoured by its location at the head of a deepwater inlet, became a busy shipbuilding centre, but with the advent of steam vessels in the 1870s, this industry faded. The city's subsequent growth was linked with its position as a rail junction, port, highway hub, and air terminus. Unusual local features are Magnetic Hill (with its illusion of uphill gravitation) and a tidal bore, or wave, that rises 3–6 feet (1–2 m) twice daily and surges up the Petitcodiac River. The city's diversified industries include food processing, woodworking, lobster fisheries, and the manufacture of paperboard, farm implements, and auto parts. Inc. town, 1855; city, 1890. Pop. (1991) 57,010.

Monczer, Thomas (religious reformer): *see* Müntzer, Thomas.

Mond, Ludwig (b. March 7, 1839, Kassel, Hesse-Kassel [Germany]—d. Dec. 11, 1909, London, Eng.), German-born British chemist and industrialist who improved the Solvay alkali process and devised a process for the extraction of nickel.

The son of a wealthy Jewish family, Mond studied chemistry at Marburg and Heidelberg, entered the chemical industry, and went to England in 1862. There his method for recovering sulfur from the by-products of the Leblanc alkali process was a commercial success. In 1873 he and John Tomlinson Brunner founded the important chemical-manufacturing firm of Brunner, Mond and Company. They began on a large scale to make soda ash (sodium carbonate) by the newly developed Solvay process, a process that was significantly improved by Mond. In attempting to find ways of obtaining ammonia from coal and coke, Mond also invented a system for making a cheap producer gas that became useful for industrial heating purposes. His discovery of nickel carbonyl made possible a successful process for the extraction of nickel from its ores. Mond founded the Mond Nickel Company to link nickel mines in Canada with refining works in Wales that utilized his new discovery.

Mond became a naturalized British subject in 1880 and was elected to the Royal Society in 1891. A notable art collector, he bequeathed an important group of Italian paintings to the National Gallery, London.

Mondale, Walter F., in full walter frederick mondale (b. Jan. 5, 1928, Ceylon, Minn., U.S.), American lawyer and Democratic politician, who served as vice president of the United States (1977–81) and in 1984 was the Democratic nominee for the presidency.

Mondale was an early activist in Minnesota's Democratic–Farmer-Labor Party and worked in Hubert H. Humphrey's first campaign for the U.S. Senate in 1948. He graduated from the University of Minnesota law school in 1956 and served as attorney general of his state from 1960 until his appointment in 1964 to fill Humphrey's unexpired Senate term. Mondale, a "flexible liberal," won election to the Senate seat in 1966 and reelection in 1972. He served on the Senate Finance and Budget committees and the Committee on Labor and Public Welfare. In 1976 he was elected vice president as Jimmy Carter's running mate. The Carter-Mondale ticket was defeated in its attempt at reelection in 1980, and Mondale won the Democratic presidential nomination in 1984, choosing Geraldine A. Ferraro as his running mate. They lost the election overwhelmingly to President Ronald Reagan. Mondale afterward practiced law.

Monday, second day of the week (*q.v.*).

Monde, Le (French: "The World"), daily newspaper published in Paris, one of the most important and widely respected newspapers in the world.

The newspaper was established in 1944—as soon as the German army had quit Paris but while World War II continued—on orders of the new government of General Charles de Gaulle as a means of providing a respected voice for France. It was printed on the presses of the defunct *Le Temps,* and a prewar correspondent of that paper, Hubert Beuve-Méry, was appointed its editor and director. He insisted on, and was granted, the right to operate *Le Monde* as an independent organ, with no government or private subsidies and with the right to formulate its own editorial policies. By the end of its first year *Le Monde*'s accuracy and independence were widely noted and it had attained a circulation in excess of 150,000 copies.

From its start, *Le Monde* has covered national and world news in depth and analyzed it closely. Its writers have the freedom to present their own views, with the result that *Le Monde* reveals no unified policies or consistent ideological outlook. Its independence, which never wavered from its founding, despite early and grave financial worries, has brought it denunciation at one time or another from every part of the French political spectrum.

Mondego River, Portuguese rio mondego, largest of the exclusively Portuguese rivers, rising at 4,675 feet (1,425 m) on the northern slopes of Mount Estrela and flowing southwestward for 137 miles (220 km) to the Atlantic Ocean. It has a drainage basin of 2,615 square miles (6,772 square km). A sandbar prohibits navigation above Figueira da Foz, though small craft can sail 52 miles (84 km) upstream to Foz Dão; the river is tidal to Montemor-o-Velho (12 miles [19 km]). The Mondego and its most important tributary, the Alva, have been harnessed for the production of hydroelectric power. Rice is cultivated in the river's basin.

Mondino de' Luzzi, also called Raimondino dei Liucci, or Mundinus (b. *c.* 1270, Bologna, Italy—d. *c.* 1326, Bologna), Italian physician and anatomist whose *Anathomia Mundini* (MS. 1316; first printed in 1478) was the first European book written since classical antiquity that was entirely devoted to anatomy and was based on the dissection of human cadavers. It remained a standard text until the time of the Flemish anatomist Andreas Vesalius (1514–64).

Mondino received his medical training at the University of Bologna, and after graduation he studied and taught anatomy and surgery at that university while actively practicing medicine and surgery. Mondino was the first to reintroduce the systematic teaching of anatomy into the medical curriculum after this practice had been abandoned for many centuries. He himself performed dissections at public lectures. Mondino's *Anathomia* was written in 1316 and became the standard handbook for the dissector, going through 39 editions in all. The work followed the anatomical teachings of Galen slavishly, and its descriptions of internal organs were sometimes inaccurate, but it inaugurated a new era in the dissemination of anatomical knowledge.

Mondoñedo, city, Lugo province, *comunidad autónoma* ("autonomous community") of Galicia, northwestern Spain. It lies along the Masma River, 27 miles (43 km) north of Lugo, the provincial capital. Mondoñedo occupies a sheltered valley among the northern outliers of the Cantabrian Mountains. The city has been an episcopal see since the 12th century. The principal building is the cathedral (begun *c.* 1220), a Romanesque and Gothic structure with a facade embellished in the Baroque style. The city has several other 17th-century religious structures. The chief industries of Mondoñedo are lace making, linen weaving, and leather making. The city's St. Luke Horse Fair is an important regional fair. Mondoñedo is connected by road with Oviedo and Lugo. Pop. (1981) 6,988.

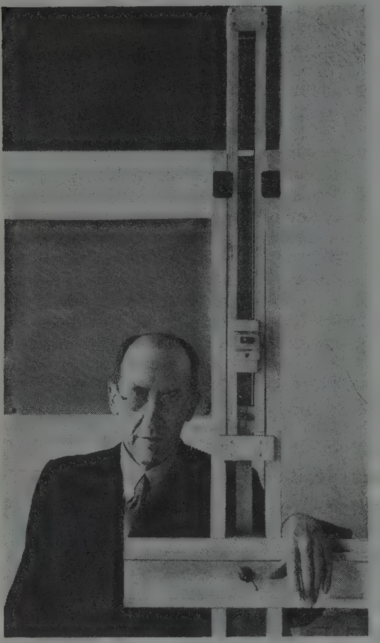
Mondovì, town, Cuneo province, Piemonte (Piedmont) region, northwestern Italy. It lies along the Ellero River, east of Cuneo, the capital city.

Founded in 1198 by refugees from the regional wars between the city-states and communes, it was independent until the 13th century, when it was subordinated to the Angevins (French counts of Anjou). Regaining its freedom in 1290, it fell to Anjou again in 1305, only to pass through numerous hands before passing to Savoy in 1396. It became a bishopric in 1388 and was the seat of a university from 1560 to 1719. Mondovì was the scene of Napoleon's victory over Austro-Sardinian forces in 1796.

Mondovì is divided into an old upper town and a largely industrial lower town. Notable landmarks include the cathedral (1743–63) and the Missione (or Gesù) Church (1678). Nearby is the Santuario di Vicoforte, a pilgrimage church begun in 1596.

Mondovì manufactures iron and steel products, ceramics, paper, plastics, and chemicals. There are marble and quartz quarries in the vicinity. Pop. (1984 est.) mun., 22,458.

Mondrian, Piet, original name Pieter Cornelis Mondriaan (b. March 7, 1872, Amersfoort, Neth.—d. Feb. 1, 1944, New York City), painter, leading exponent of the Dutch abstract-art movement known as de Stijl, whose work exerted a profound influence on 20th-century art, architecture, and graphic design. His early works followed the prevailing trend of Dutch landscape and still-life painting. After experimentation with Cubism, his mature "neoplastic" style emerged around 1920. This style was intended as a purely objective vision of reality based on the simplest harmonies of straight line, right angle, and the primary colours plus black and white.



Mondrian, photograph by Arnold Newman, 1942.

© Arnold Newman

Early life and works. Pieter was the second child of Pieter Cornelis Mondriaan, Sr., who was an amateur draftsman and headmaster of a Calvinist primary school in Amersfoort. The boy grew up in a stable yet creative environment; his father was part of the Protestant orthodox circle that formed around the conservative Calvinist politician Abraham Kuyper, and his uncle, Frits Mondriaan, belonged to The Hague school of landscape painters. Both uncle and father gave him guidance and instruction when, at the age of 14, he began to study drawing.

Mondrian was determined to become a painter, but at the insistence of his family he first obtained a degree in education; by 1892 he was qualified to teach drawing in secondary schools. That same year, instead of looking for a teaching position, he took painting lessons from a painter in a small town not far from Winterswijk, where his family then resided, and moved to Amsterdam to register at the Rijksacademie. He became a member of the art society Kunstliefde in Utrecht, where his first paintings were exhibited in 1893, and in the following year joined the two local artist societies in Amsterdam. During this period he still attended the evening courses at the academy for drawing, impressing his professors with his self-discipline and effort. In 1897 he exhibited a second time.

Up to the turn of the century, Mondrian's paintings followed the prevailing trend of art in The Netherlands: landscape and still lifes painted in subdued hues with picturesque lighting effects and subjects chosen from the meadows and polders around Amsterdam. In 1899 he was commissioned to paint a ceiling in a large private house in Amsterdam, where, in homage to the youngest son, he painted an allegory of the seasons. In 1901 he competed for the Prix de Rome, but he did not reach the final competition. During the same year, he made a short trip to Spain, but the country left no lasting impression on him. Mondrian achieved artistic reputation and a certain notoriety in 1903, when he won the Willink van Collem Prize for a still life. In that same year he visited a friend in Brabant (Belgium); the calm beauty of the landscape he discovered in the province proved to be an important influence on him. He stayed on there, and the following year became a period of self-discovery and of intense concentration on his artistic gifts; by the time he returned to Amsterdam in 1905, his art had visibly changed. The landscapes he painted of the surroundings of Amsterdam, mainly on the River Gein, show a pronounced rhythmic framework and lean more toward compositional structure than toward the usual picturesque values of light and shade; windmills, farmhouses, and series of trees were his preferred subjects at this stage of his art. But his painting still remained within the traditional boundaries of contemporary Dutch art.

Influence of Postimpressionists and Luminists. In 1907 the Quadrennial Exhibition was held in Amsterdam, featuring such painters as Kees van Dongen, Otto van Rees, and Jan Sluijters, Postimpressionists who used pure colours boldly. Their preference for colour must have impressed Mondrian considerably, for in the same year he painted "The Red Cloud," a rapidly executed sketch dominated by colour, which initiated a series of works in which Mondrian experimented with his newly discovered values of colourism. With "Woods near Oele" (1908) new values appear: a linear movement somewhat reminiscent of the Norwegian painter Edvard Munch and a colour scheme based on hues of yellow, orange, blue, violet, and red, suggestive of Expressionist paintings. With this vigorous painting of considerable size, Mondrian broke away from the national tradition of Dutch painting and took his place in the ranks of contemporary European art.

His new style was reinforced by his acquaintance with the Dutch artist Jan Toorop, who led the Luminist movement in The Netherlands and championed Divisionism, an endeavour to render light by a series of dots or short lines of primary colours, not completely mixed, so that the secondary colour is formed in the viewer's eye as he stands away from the picture. Mondrian concentrated on this use of colour and limited his palette to the primary hues: a painting such as "Windmill in Sunlight," executed mainly in yellow, red, and blue, proved his mastery in this evocation of strong, radiant sunshine. But in a painting such as "The Red Tree," also dated from the same year, 1908, Mondrian expressed his own vision of nature by creating a balance between the contrasting hues of red and blue, between the violent movement of the tree and the blue sky, thus producing a sense of equilibrium, which is his prevailing aim in his representation of nature. In 1909 Mondrian's Luminist works were exhibited in a large group show at the Stedelijk Museum in Amsterdam, which firmly established him among the Dutch avant-garde painters.

That year was important for Mondrian's career from another point of view: in May he joined the Theosophical Society, which espoused the belief that all that exists in the universe emanates from one source, that spirit and matter are inseparably united. In the following years Mondrian's new philosophy was reflected in his painting: he concentrated on large forms in nature, such as the lighthouse in Westcapelle, which he had painted before in a Divisionist technique but which he rendered now with a renewed interest in form. Subjects such as the church at Domburg and Zeeland windmill express a similar striving for monumental forms; "Evolution," a triptych of three standing human figures (1910–11), shows a surprising similarity between the human figure and architectural subjects, thus stressing the symbolic identity between man and the inanimate structures he creates. In 1910 Mondrian's Luminist works attracted considerable attention at the St. Lucas Exhibition in Amsterdam; and in 1911 he submitted one of his paintings, in which he expressed the infinitude of nature, to the Salon des Indépendants in Paris, his first bid for international recognition.

Cubist period in Paris. In that same year, in Amsterdam, Mondrian saw for the first time the early Cubist works of Pablo Picasso and Georges Braque. Mondrian was profoundly impressed, so much so that early in 1912 he moved to Paris, where he took lodgings in the Montparnasse district. Almost immediately he began to adapt the precepts of Cubism to his own use, and two versions of "Still Life with Gingerpot," done during the winter months of 1911–12, make this apparent. In the first version, the objects are rendered as recognizable forms from everyday life; in the second the same objects have been transformed into compositional structures. Mondrian's Cubist period lasted from 1912 to 1917. His compositions of trees, of facades of Parisian houses, and of scaffoldings during this period are proof of his urge to reduce individual forms to a general formula; Mondrian went beyond the trend of analytical Cubism and its tendency to break forms up into their component parts by striving for a vision of reality that surpasses the individual object. His style from 1913 onward showed the first steps toward abstraction—abstraction being understood as the attempt to strip objects of their factual connotations. On the other hand, Mondrian still kept within the boundaries of Cubism by limiting his colours to ochre, brown, and gray so as not to distract from form and by observing the Cubist scheme of composition, in which the painting gravitates toward a central focus, leaving the corners almost untouched; the result of this scheme was a series of oval compositions. In an attempt to reduce the elements of his composition even further, Mondrian avoided curved lines and diagonal accents and increasingly used only vertical and horizontal lines.

In the summer of 1914 Mondrian returned to The Netherlands to visit his father, who was seriously ill, and the outbreak of World War I prevented him from returning to Paris. He settled at Laren, where he became acquainted with Dr. M.H.J. Schoenmaekers, a Theosophical philosopher whose works on the symbolical meaning of lines and on the mathematical construction of the universe had a decisive influence on Mondrian's vision of reality. In Laren he made friends as well with S.B. Slijper, who supported him as both a patron and a friend, and with the painter Bart van der Leck, who had developed a monumental style derived from the principles of mural painting. Through van der Leck he met Theo van Doesburg, one of the avant-garde artists of this time. During these years he developed his Cubist style to its extreme limits, mainly in his painting of the church at Domburg and in a new theme, "Pier and Ocean." The ultimate version of this theme, completed in 1917 and shown at the Rijksmuseum Kröller-Müller, marks the final stage of his Cubist style: a composition of vertical and horizontal line fragments in black on a white background, concentrated into an oval shape.

De Stijl. After this painting a new and fundamental change occurred in Mondrian's work: the reduction of existing forms into a pictorial formula was replaced by a complete rejection of external subject matter. This step was taken not only by Mondrian but by the other three painters who together with Mondrian also founded the art periodical and the movement of de Stijl (the Style): Theo van Doesburg, the initiator of the group, van der Leck, and Vilmos Huszar. Their principles were the complete rejection of visually perceived reality as subject matter and the restriction of the pictorial language to its most basic elements—the straight line and the right angle (hence the use of the vertical and the horizontal line), the three primary colours—yellow, red, and blue—and the three primary noncolours—white, gray, and black. The scope of this new style, for which Mondrian coined the name neoplasticism, was to free the work of art from the momentary visual perception and from the personal temperament of the artist. The objectivity that Mondrian had sought for so long now seemed to be within reach: he could now render "a true vision of reality" in his painting.

Mondrian's first neoplastic paintings, which did not derive their composition from a fragment of reality but from an overall view of the harmony of the universe, were composed of rectangles in soft hues of primary colours painted on a white background. His compositions were based on colour and appear to expand over the borders of the canvas into space beyond the picture. In 1918 he reintroduced lines into his painting, linking the colour planes to one another and to the background by a series of black vertical and horizontal strips, thus creating rectangles of colour or noncolour. In 1918 and 1919 he executed a series of rhomboid compositions, subdivided into a pattern of regular squares differentiated by thick black lines and by soft hues of ochre, gray, and rose. In 1919 as well, he created two versions of a checkerboard composition, one in dark and one in light colours, in which the difference of the hues transforms this common pattern into a rhythmic sequence of squares, and in 1920 his neoplastic style reached its full maturity. In spite of his return to Paris in 1919, he retained his close collaboration with de Stijl.

Mature style. An exhibition of his works organized at the Stedelijk Museum in Amsterdam by friends on the occasion of his 50th birthday was a retrospective progression of his paintings; it traced the path from his beginnings in the Dutch traditional style to his abstract paintings depicting a universal harmony through the use of horizontal and vertical lines and primary colours and noncolours. He had reached his goal, but he did not stand still: from 1922 to 1938 he concentrated on achieving an ever increasing clarity and purity in his paintings.

Mondrian did not exhibit frequently: from 1922 to his arrival in the United States in 1940 he never held a one-man show. In 1930 he exhibited with the Cercle et Carré group and in 1931 with the Abstraction-Création group. In the years after 1933 his works became more austere and severe. During this period, in 1934, he met the U.S. artist Harry Holtzman and the English painter Ben Nicholson, both of whom were soon to become helpful to him. Nicholson urged him to publish his essay "Plastic Art and Pure Plastic Art" in the international publication *Circle,* of which Nicholson was co-editor, and when Mondrian decided to leave Paris in 1938, under the shadow of the invasion of Czechoslovakia by Adolf Hitler, he was welcomed in London by members of the *Circle* group. For two years he worked and lived in a London suburb, but the bombardment of the city forced him to flee to New York City in 1940, where he was welcomed by Holtzman, the art collector Peggy Guggenheim, art critic and museum director James Johnson Sweeney, and other members of the American artistic vanguard.

There, the last change in Mondrian's work occurred. Inspired by his regained freedom, New York City's pulsating life, and the new rhythms of American music, he broke away first from the austere patterns of black lines, replacing them with coloured bands, and then substituted for the continuous flow of these bands a series of small rectangles that coalesced into a rhythmic flow of colourful vertical and horizontal lines. His late masterpieces—"New York City I" and "Broadway Boogie Woogie," exhibited in 1943–44, in the first personal exhibition Mondrian had in more than two decades—express this new vivacity. Buoyed by his hope for a better future, Mondrian started his "Victory Boogie Woogie" in 1943; it remained, however, unfinished when Mondrian succumbed to pneumonia in 1944.

Objectives in art. The consistent development of Mondrian's neoplasticism was an outstanding feat in the history of modern art, and Mondrian's work foreshadowed what was later called "geometric abstraction," but his work goes beyond merely aesthetical considerations: his search for harmony through his painting has an ethical significance. Rooted in a strict puritan tradition of Dutch Calvinism, he continually strove for purity during his long career. This purity is most clearly explained by the double meaning of the Dutch word *schoon,* which means both "clean" and "beautiful." The beauty of Mondrian's work consists of its purity, a purity that points beyond a painting to show humanity the way toward a life of health and clarity. When, in 1920, Mondrian dedicated his booklet "Le Néo-plasticisme" to "future men," he tried to indicate that art can be a guide to humanity, that it can work toward eliminating casual facts of appearance and the arbitrary outlook of the individual, and thereby substitute a new harmonious view of life for the conventional tragic conception of existence. To this purpose Mondrian chose the strict and rigid language of geometry to produce first of all an extreme purity, and on another level, a Utopia of superb clarity and force. Mondrian was a pioneer in modern art, but he was a champion for humanity as well: he described the goal he set out to meet through his paintings in his 1937 essay in *Circle:* "One serves mankind by enlightening it."

(H.L.C.J./Ed.)

MAJOR WORKS. "The Red Cloud" (1907; Haags Gemeentemuseum, The Hague); "Woods near Oele" (1908; Haags Gemeentemuseum); "Windmill in Sunlight" (1908; Haags Gemeentemuseum); "The Red Tree" (1908; Haags Gemeentemuseum); "Still Life with Gingerpot" (1911–12; Haags Gemeentemuseum); "The Gray Tree" (1912; Haags Gemeentemuseum); "Oval Composition (Trees)" (1913; Stedelijk Museum, Amsterdam); "Blue Facade" (1914; Museum of Modern Art, New York City); "Composition" (1916; Solomon R. Guggenheim Museum, New York City); "Composition in Black and White" (1917; Rijksmuseum Kröller-Müller, Otterlo, Neth.); "Composition in Colour A" (1917; Rijksmuseum Kröller-Müller); "Composition III with Colour Planes" (1917; Haags Gemeentemuseum); "Composition: Colour Planes with Gray Contours" (1918; Max Bill Collection, Zürich); "Composition in Diamond Shape" (1919; Rijksmuseum Kröller-Müller); "Composition Checkerboard" (1919; Haags Gemeentemuseum); "Composition with Red, Blue and Yellow Green" (1920; Wilhelm Hack Collection, Cologne); "Composition with Red, Yellow, and Blue" (1921; Haags Gemeentemuseum); "Composition 2" (1922; Solomon R. Guggenheim Museum); "Composition 1 with Blue and Yellow" (1925; Kunsthaus, Zürich); "Composition with Yellow and Blue" (1929; Boymans-van Beuningen Museum, Rotterdam); "Fox Trot A" (1927; Yale University Art Gallery, New Haven, Conn.); "Composition with Red, Blue and Yellow" (1930; Mr. and Mrs. Armand P. Bartos Collection, New York City); "Composition with Yellow Lines" (1933; Haags Gemeentemuseum); "Vertical Composition with Blue and White" (1936; Kunstsammlung Nordrhein-Westfalen, Düsseldorf, Ger.); "Composition with Blue" (1937; Haags Gemeentemuseum); "Composition London" (1940–42; Albright-Knox Art Gallery, Buffalo); "New York City I" (1941–42; Sidney Janis Gallery, New York City); "Broadway Boogie Woogie" (1942–43; Museum of Modern Art, New York); "Victory Boogie Woogie" (1943–44; Burton Tremaine Collection, Meriden, Conn., on loan to Museum of Modern Art).

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Themes and criticism. Specific aspects of Mondrian's oeuvre and artistic goals are examined in Nancy J. Troy, *Mondrian and Neo-Plasticism in America* (1979); Kermit Swiler Champa, *Mondrian Studies* (1985); David Shapiro and Christopher Sweet, *Mondrian Flowers: Essay* (1991); Meyer Schapiro, *Mondrian: On the Humanity of Abstract Painting* (1995); and Serge Fauchereau, *Mondrian and the Neo-Plasticist Utopia* (1994).

Mone, Jean (b. *c.* 1495, Metz, Lorraine [now in France]—d. *c.* 1548, Mechelen, Flanders [now in Belgium]), French sculptor who gained fame for the work he produced in Flanders as court sculptor to Holy Roman emperor Charles V. His work helped introduce the Italian Renaissance style to Flemish sculpture.

Mone worked from 1512–13 in Aix-en-Provence on sculptures for that city's cathedral. From 1517–19 he collaborated with artist Bartolomé Ordóñez in Barcelona on a choir screen for the cathedral of San Eulalia, and he subsequently lived in Italy for a brief time. About 1522, after this exposure to contemporary, largely Italianate traditions, Mone went to Antwerp, where he became acquainted with prominent artists such as Albrecht Dürer.

During this period, Flemish art was still bound to the traditions of the late Gothic style, and no new, national style had developed as an alternative. Intrigued by the Renaissance art he saw from France and Italy, Charles V attempted to attract foreign artists to the court at Mechelen (Malines). In 1522 he appointed Mone official court sculptor, and the artist began to work on a series of commissions, mostly tombs; he would receive support from the court for the rest of his life. In the late 1520s Mone created an important tomb for Cardinal Guillaume de Cröy in the Celestine church in Heverlee (now in the Capuchin church at Enghien). This alabaster monument—featuring freestanding sculptures, pillars, and reliefs—defied the traditional Gothic form of a stiff, recumbent effigy and instead recalled Venetian wall monuments, which often presented the deceased as a more active, reclining figure. The work was also different from contemporary Flemish sculpture in its graceful, flowing ornamentation, which reflected Renaissance trends. The newness of this style to Flanders was evident in the contrast between the delicacy of Mone's monument and the heaviness of its architectural surroundings.

In 1533 the artist created one of his best-known works, the alabaster funerary monument for the church of Notre-Dame at Hal, near Brussels. This elaborate altarpiece is most notable for its arrangement of reliefs, which again display Mone's mastery of delicately carved ornamentation. He continued these explorations in an altarpiece for the church of Saint Gudule, in Brussels (1538–41). The overall composition of this monument is more elegant than anything he had created before, and its reliefs display a new sense of freedom and openness.

Mone spent the remainder of his life working in Flanders. Particularly notable are his tombs for Antoine de Lalaing and his wife, Isabeau de Culembourg, which he executed in the 1540s in the church of Saint Catherine in Hoogstraten. While the figures exemplify the rigid, recumbent pose of a Gothic sculptural effigy, Mone decorated their garments and surroundings with joyful, unfettered, classical figures and motifs, subtly ushering this most traditional form of funerary monument into a new era of Renaissance inventiveness.

Monel, any of a group of nickel-copper alloys, first developed in 1905, containing about 66 percent nickel and 31.5 percent copper, with small amounts of iron, manganese, carbon, and silicon. Stronger than pure nickel, Monel alloys are resistant to corrosion by many agents, including rapidly flowing seawater. They can be fabricated readily by hot- and cold-working, machining, and welding. Monel is a registered trademark of the International Nickel Company. *See also* cupronickel.

Monemvasía, ancient MINOA, town, Laconia *nomós* (department), southern Greece, on the southeastern coast of the Peloponnese. Monemvasía lies at the foot of a rock that stands just offshore and that is crowned by the ruins of a medieval fortress and a 14th-century Byzantine church. It is joined to the mainland by a causeway, from which it derives its modern name meaning "city of the single approach." The ruins of Epidaurus Limera are nearby.

The rock is about a mile long, and its cliffs rise to about 600 feet (183 m). During the Slav incursions into the Peloponnese it was a place of refuge for Greeks from Laconia, and it became one of the principal fortresses and commercial centres of the Levant in the European Middle Ages. Its name, in various forms (Italian: Malvasia; French: Malvoisie; English: Malvesie, or Malmsey), became familiar throughout Europe from its extensive trade in a special wine, mainly imported from the Cyclades and Crete.

moneran, any of the bacteria considered to constitute the kingdom Monera of the five-kingdom (Monera, Protista, Fungi, Plantae, and Animalia) classification of all life.

A brief treatment of the monerans follows. For full treatment, *see* MACROPÆDIA: Bacteria and Other Monerans.

In the mid-20th century, biologists recognized two vastly different cell types (prokaryote and eukaryote) and based a division of the living and extinct world on these two broad categorizations. Monerans are prokaryotes, distinct from eukaryotic organisms of the other four kingdoms in that they lack a true nucleus and other membrane-bound organelles (specialized cellular parts) of eukaryotic organisms.

Many classifications of living organisms adopted such a division and further created two superkingdoms, Prokaryota and Eukaryota. Within the Prokaryota was placed the kingdom Monera (the eubacteria, including blue-green algae, and the archaea [formerly called archaebacteria or archaeobacteria]). The Eukaryota comprise all other living organisms.

Recent advances in biochemical and electron microscopic techniques, as well as in testing that investigates the genetic relatedness among species, have redefined previously established taxonomic relationships and have fortified support for a five-kingdom classification of living organisms. In it, the prokaryotic Monera continue to comprise all the bacteria. Until the late 1970s it was generally accepted that all bacteria are closely related in evolutionary development. This concept was challenged in 1977 by C.R. Woese and coinvestigators at the University of Illinois, whose research on ribosomal RNA from a broad spectrum of living organisms established that two groups of bacteria evolved by separate pathways from a common and ancient ancestral form. This discovery has resulted in the establishment of a new terminology to identify the major distinct groups of microbes—namely, the eubacteria (the traditional or "true" bacteria) and the archaea, bacteria that diverged from other bacteria at an early stage of evolution and are distinct from the eubacteria), and eukarya (the eukaryotes). The evolutionary relationships between various members of these three groups, however, have become uncertain, as comparisons between the DNA sequences of various microbes have revealed many puzzling similarities. As a result, the precise ancestry of today's microbes is very difficult to resolve. Even traits thought to be characteristic of distinct taxonomic groups have unexpectedly been observed in other microbes.

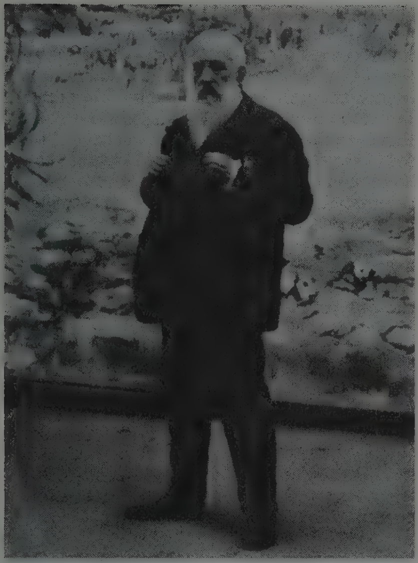
Through a microscope the archaea look much like eubacteria, but there are important differences in their chemical composition, biochemical activities, and environments. The cell walls of all eubacteria contain the chemical substance peptidoglycan, whereas the cell walls of archaeans lack this substance. Many archaeans are noted for their ability to survive unusually harsh surroundings, such as high levels of salt or acid or high temperatures. These microbes, called extremophiles, live in such places as salt flats, thermal pools, and deep-sea vents. Some are capable of a unique chemical activity—the production of methane gas from carbon dioxide and hydrogen. Methane-producing archaea live only in environments with no oxygen, such as swamp mud or the intestines of ruminants such as cattle and sheep. Collectively, this group of microorganisms exhibits tremendous diversity in the chemical changes that it brings to its environments.

Monerans are unicellular, with the exception of some blue-green algae (cyanobacteria). Cyanobacteria are sometimes placed with the other algae (*e.g.,* seaweeds), and they are studied more by botanists than by microbiologists. Blue-green algae may be either unicellular or filamentous, and they behave like true plants, photosynthesizing in a way that resembles green plants rather than bacteria. Many move by gliding, as do some bacteria and some true unicellular algae. They are often extremely abundant around hot springs or at the edges of muddy ponds, and like archaea, they are resistant to harsh environments, though blue-green algae are killed by many drugs (*e.g.,* antibiotics) used against bacteria. Perhaps they are best regarded as representing a group close to the main evolutionary line that gave rise to the eukaryotic plants.

Monerans reproduce principally by splitting in two (transverse binary fission), although some reproduce using a wide variety of mechanisms, including binary and multiple fission, budding, and fragmentation. Transfer of DNA among bacteria is known and forms the basis of recombinant DNA technology. Viruses are not monerans, but it is not known how much they are modified from ancestral forms that are assumed not to have been parasitic and that were evidently on the main line of evolution; nor is their relation to bacteria known. The principal characteristic shared by monerans and viruses is that the hereditary material is not contained within a special nuclear membrane. Such a prokaryotic condition might be postulated by evolutionists as primitive when compared with forms with a complex nucleus, as in eukaryotic organisms.

Monet, Claude, in full OSCAR-CLAUDE MONET (b. Nov. 14, 1840, Paris, France—d. Dec. 5, 1926, Giverny), painter who was the leader of the Impressionist movement in France and a major force in the history of modern art.

A brief treatment of the life and works of Claude Monet follows. For full treatment, *see* MACROPAEDIA: Monet.



Monet standing in front of one of his water-lily paintings in his studio, 1920

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During a childhood spent along the beaches of the Normandy coast, Monet expressed an interest in drawing and painting, and he established a local reputation for his artistic ability while still a teenager. He first visited Paris in 1859–60 and over the next several years studied with painters Eugène Boudin and Johan Barthold Jongkind, both of whom utilized brilliant colour and dramatic paint application in their depictions of the sea. Throughout the 1860s, Monet strove to discover the best pictorial means to convey a moment of visual perception. He worked almost exclusively out-of-doors, often by the water, and his subject became the effects of light in nature, especially the play of light upon water and the vibrant, reflected colours of sunlight. He used strong, fragmented brushstrokes to heighten the sense that his pictures captured a spontaneous moment of perception. These experiments, parallel with the work of a small circle of painters, developed into the Impressionist style.

After sojourns in London and The Netherlands, in 1872 Monet rented a house at Argenteuil, on the Seine River near Paris. By this time the Impressionist style had crystallized among other artists, such as Pierre-Auguste Renoir, Camille Pissarro, Alfred Sisley, and Frédéric Bazille, many of whom gathered around Monet in Argenteuil. In 1874 Monet helped organize the group's first show, independent of the official Salon of the French Academy, which had consistently rejected most of their work. His painting *Impression: Sunrise* (1872) earned the group the pejorative name "Impressionists" from the journalist Louis Leroy, but the artists eventually chose to adopt the name themselves, because it accurately conveyed their goal to capture visual "impressions." Throughout the 1870s Monet continued his formal explorations of the previous decade, and his work became increasingly flat, vibrant, and sketchlike. He continued to exhibit his work in Impressionist shows, but by about 1881 the group had begun to grow apart.

In the 1880s, Monet traveled extensively, mostly in France, to find inspiration for his increasingly rugged seascapes and landscapes. In 1883 the artist and his family settled in a farmhouse in Giverny. From this point on, he began to experiment with series of paintings. By repeatedly painting one single motif with different light and seasonal effects, Monet pushed his exploration of atmosphere to a new level. By the 1890s his pursuit of series, such as those of wheat stacks (1891) and the Rouen Cathedral (1894), occupied most of his time. Beginning about 1900, he made several trips to London, where he captured the River Thames, the Waterloo and Charing Cross bridges, and the Houses of Parliament at different times of day and in different weather conditions. He similarly explored the sites of Venice starting about 1908. It was in his immediate surroundings that he found his last great series: Monet constructed an elaborate water-lily garden on his estate in Giverny that would become the central artistic subject of the last 30 years of his life. Over time his paintings of water-lilies became increasingly expansive—the edges of the blossoms and pads no longer encompassed in the frames—and, radically, they verged on abstraction. Despite being nearly blind as a result of cataracts, Monet painted almost until his death in 1926. His decorative cycle of murals depicting water-lilies was posthumously installed in the Musée de l'Orangerie, set in the Tuileries Gardens in Paris.

Moneta, Ernesto Teodoro (b. Sept. 20, 1833, Milan—d. Feb. 10, 1918, Milan), Italian journalist and international activist on behalf of peace (except where Italian interests required war). He won (with Louis Renault) the Nobel Prize for Peace in 1907.

At the age of 15 he participated in the Milanese insurrection of 1848 against Austrian rule, and in 1859–60 he fought under Giuseppe Garibaldi in the victorious war of liberation. In 1861 he joined the regular Italian army and fought in the Battle of Custoza in 1866. After resigning from the army, he became editor (1867–96) of *Il Secolo,* a democratic newspaper published in Milan.

The suffering that Moneta witnessed during his military career prompted him to seek ways to abolish war, and about 1887 he founded the Società Internazionale per la Pace: Unione Lombarda ("International Society for Peace: Lombard League") to propagandize for disarmament, a league of nations, and settlement of international disputes by arbitration. In 1898 he founded a pacifist periodical, *Vita internazionale* ("International Life"). In 1906 his presidency at the International Peace Conference in Milan led to his sharing the Nobel Prize for Peace. Nevertheless, in 1911 he supported Italy's war against Turkey on the grounds of an Italian civilizing mission in Libya, and in 1915 he advocated Italian entry into World War I to combat the imperialist designs of the Central Powers.

monetarism, school of economic thought that maintains that the money supply (the total amount of money in an economy, in the form of coin, currency, and bank deposits) is the chief determinant on the demand side of short-run economic activity. American economist Milton Friedman is generally regarded as monetarism's leading exponent. Friedman and other monetarists advocate a macroeconomic theory and policy that diverge significantly from those of the formerly dominant Keynesian school. The monetarist approach became influential during the 1970s and early '80s.

Underlying the monetarist theory is the equation of exchange, which is expressed as $MV = PQ$. Here M is the supply of money, and V is the velocity of turnover of money (*i.e.,* the number of times per year that the average dollar in the money supply is spent for goods and services), while P is the average price level at which each of the goods and services is sold, and Q represents the quantity of goods and services produced.

The monetarists believe that the direction of causation is from left to right in the equation; that is, as the money supply increases with a constant and predictable V, one can expect an increase in either P or Q. An increase in Q means that P will remain relatively constant, while an increase in P will occur if there is no corresponding increase in the quantity of goods and services produced. In short, a change in the money supply directly affects and determines production, employment, and price levels. The effects of changes in the money supply, however, become manifest only after a significant period of time.

One monetarist policy conclusion is the rejection of fiscal policy in favour of a "monetary rule." In *A Monetary History of the United States 1867–1960* (1963), Friedman, in collaboration with Anna J. Schwartz, presented a thorough analysis of the U.S. money supply from the end of the Civil War to 1960. This detailed work influenced other economists to take monetarism seriously.

Friedman contended that the government should seek to promote economic stability, but only by controlling the rate of growth of the money supply. It could achieve this by following a simple rule that stipulates that the money supply be increased at a constant annual rate tied to the potential growth of gross domestic product (GDP) and expressed as a percentage (*e.g.,* an increase from 3 to 5 percent).

Monetarism thus posited that the steady, moderate growth of the money supply could in many cases ensure a steady rate of economic growth with low inflation. Monetarism's linking of economic growth with rates of increase of the money supply was proved incorrect, however, by changes in the U.S. economy during the 1980s. First, new and hybrid types of bank deposits obscured the kinds of savings that had traditionally been used by economists to calculate the money supply. Second, a decline in the rate of inflation caused people to spend less, which thereby decreased velocity (V). These changes diminished the ability to predict the effects of money growth on growth of nominal GDP.

Monetarius, Thomas (religious reformer): *see* Müntzer, Thomas.

monetary policy, measures employed by governments to influence economic activity, specifically by manipulating the supplies of money and credit and by altering rates of interest.

The usual goals of monetary policy are to achieve or maintain full employment, to achieve or maintain a high rate of economic growth, and to stabilize prices and wages. Until the early 20th century, monetary policy was thought by most experts to be of little use in influencing the economy. Inflationary trends after World War II, however, caused governments to adopt measures that reduced inflation by restricting growth in the money supply.

Monetary policy is the domain of a nation's central bank. The Federal Reserve System (commonly called the Fed) in the United States and the Bank of England of Great Britain are two of the largest such "banks" in the world. Although there are some differences between them, the fundamentals of their operations are almost identical and are useful for highlighting the various measures that can constitute monetary policy.

The Fed uses three main instruments in regulating the money supply: open-market operations, the discount rate, and reserve requirements. The first is by far the most important. By buying or selling government securities (usually bonds), the Fed—or a central bank—affects the money supply and interest rates. If, for example, the Fed buys government securities, it pays with a check drawn on itself. This action creates money in the form of additional deposits from the sale of the securities by commercial banks. By adding to the cash reserves of the commercial banks, then, the Fed enables those banks to increase their lending capacity. Consequently, the additional demand for government bonds bids up their price and thus reduces their yield (*i.e.,* interest rates). The purpose of this operation is to ease the availability of credit and to reduce interest rates, which thereby encourages businesses to invest more and consumers to spend more. The selling of government securities by the Fed achieves the opposite effect of contracting the money supply and increasing interest rates.

The second tool is the discount rate, which is the interest rate at which the Fed (or a central bank) lends to commercial banks. An increase in the discount rate reduces the amount of lending made by banks. In most countries the discount rate is used as a signal, in that a change in the discount rate will typically be followed by a similar change in the interest rates charged by commercial banks.

The third tool regards changes in reserve requirements. Commercial banks by law hold a specific percentage of their deposits and required reserves with the Fed (or a central bank). These are held either in the form of non-interest-bearing reserves or as cash. This reserve requirement acts as a brake on the lending operations of the commercial banks: by increasing or decreasing this reserve-ratio requirement, the Fed can influence the amount of money available for lending and hence the money supply. This tool is rarely used, however, because it is so blunt. The Bank of England and most other central banks also employ a number of other tools, such as "treasury directive" regulation of installment purchasing and "special deposits."

Historically, under the gold standard of currency valuation, the primary goal of monetary policy was to protect the central banks' gold reserves. When a nation's balance of payments was in deficit, an outflow of gold to other nations would result. In order to stem this drain, the central bank would raise the discount rate and then undertake open-market operations to reduce the total quantity of money in the country. This would lead to a fall in prices, income, and employment and reduce the demand for imports and thus would correct the trade imbalance. The reverse process was used to correct a balance of payments surplus.

The inflationary conditions of the late 1960s and '70s, when inflation in the Western world rose to a level three times the 1950–70 average, revived interest in monetary policy. Monetarists such as Harry G. Johnson, Milton Friedman, and Friedrich Hayek explored the links between the growth in money supply and the acceleration of inflation. They argued that tight control of money-supply growth was a far more effective way of squeezing inflation out of the system than were demand-management policies. Monetary policy is still used as a means of controlling a national economy's cyclical fluctuations.

Monett, city, Barry and Lawrence counties, southwest Missouri, U.S., in the Ozark Mountains, about 40 miles (65 km) southeast of Joplin. Settled *c.* 1837 and known first as Billings, then as Plymouth, it was renamed Monett in 1887 for an official of the St. Louis and San Francisco (Frisco) Railway.

The city developed as a railroad junction and trading centre for the surrounding berry- and tomato-growing area. The modern economy is still largely based on agriculture, and it is the site of dairy and poultry processing plants. A growing light industrial sector produces commercial doors and windows, metal castings, and playground equipment.

Monett is located in an area of numerous caves and springs popular for outdoor recreation (hunting, fishing, and canoeing); the westernmost portion of Mark Twain National Forest, containing Table Rock Lake, is about 15 miles (25 km) southeast. Roaring River State Park is 22 miles (35 km) south. Inc. 1887. Pop. (1999 est.) 7,431.

Monette, Paul (b. Oct. 16, 1945, Lawrence, Mass., U.S.—d. Feb. 10, 1995, Los Angeles, Calif.), American author and poet whose work often explored homosexual relationships and the devastating effects of the AIDS epidemic. He was best known for his autobiographies, *Borrowed Time: An AIDS Memoir* (1988) and *Becoming a Man: Half a Life Story* (1992).

After graduating from Yale University (B.A., 1967), Monette taught English at several institutions before publishing his first poetry collection, *The Carpenter at the Asylum,* in 1975. It was followed three years later by his debut novel, *Taking Care of Mrs. Carroll,* a comedy involving a homosexual couple's attempt to claim a dead woman's estate. His other prose works include *The Gold Diggers* (1979), the murder mystery *The Long Shot* (1981), and *Lightfall* (1982). Though Monette later described the novels as "glib and silly," they were praised for their believable characters and strong plotlines.

Monette's work took a more serious turn in 1985, after his companion, Roger Horwitz, died of AIDS. He began concentrating on the effects of the deadly epidemic in such novels as *Afterlife* (1990) and *Halfway Home* (1991) and in the poetry collection *Love Alone* (1988), which featured elegies for Horwitz. Monette's relationship with Horwitz also formed the basis of *Borrowed Time,* a moving account of his companion's death that was a critical and commercial success. In *Becoming a Man,* Monette described his early struggles with his sexuality and the impact of being diagnosed as HIV positive. The best-selling work was a celebration of gay life, and it earned the National Book Award. Monette's other works include the poetry collection *No Witnesses* (1981) and *Last Watch of the Night: Essays Too Personal and Otherwise* (1994). *Sanctuary,* a political fable, was published posthumously in 1997.

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money, a commodity accepted by general consent as a medium of economic exchange. It is the medium in which prices and values are expressed; it circulates from person to person and country to country, thus facilitating trade, and it is the principal measure of wealth.

A brief treatment of money follows. For full treatment, *see* MACROPAEDIA: Money.

For international statistical data on money, finance, and banking, *see* BRITANNICA BOOK OF THE YEAR.

The concept of money occupies a central place in economic theory. Money's form, shape, or substance is of relatively little significance (although convenience of handling and measurement is an important factor); its more crucial characteristic is that it is commonly accepted in payment for other goods and services. Throughout history a large number of commodities have been used as money (including seashells, beads, stone disks, and cattle), but since the 17th century the most common forms have been metal coins, paper notes, and bookkeeping entries.

In standard economic theory, money is held to have four distinct but interrelated functions: (1) to serve as a medium of exchange, a commodity universally accepted in exchange for goods and services and for the discharge of debts or contracts; (2) to act as a measure of value and a unit of account, a common yardstick that makes the operation of the price system possible and provides the basis for keeping accounts and calculating cost, profit, and loss; (3) to serve as a standard of deferred payments, the unit in which loans are made and future transactions are fixed. Without money there would be no commonly accepted basis for borrowing and lending, and the concept of credit could not play the significant role in the economy that it does; and (4) to provide a store of wealth, a convenient form in which to hold any income not immediately required for use. This asset function of money provides a reserve of ready purchasing power. Money is the only completely liquid asset (that is, one readily convertible into other goods).

Metals, especially gold and silver, have been used for money for at least 4,000 years. For perhaps 2,600 years, standardized coins have been the form in which money metals circulate. Gold and silver coins contain legally specified amounts of gold or silver and are theoretically equal in value to that quantity of the metal. Coins or uncoined bullion, however, can be an inconvenient and insecure mode for conveying large quantities of value. For large transactions, various forms of paper notes may be used to represent promises to pay in gold or silver. In the late 18th and early 19th centuries, banks began issuing such notes—banknotes—to represent convenient denominations of money. Each banknote was redeemable for gold or silver. This fiduciary money—money consisting of promises to pay in another medium—became the principal money of growing industrial economies. Eventually, for a variety of practical reasons, the circulating coinage began to be made of base metals, also taken to represent gold or silver on deposit somewhere and available on demand. Temporarily during World War I and permanently from the era of the Great Depression of the 1930s, the gold standard was abandoned by most nations, meaning that paper money was no longer convertible to gold on demand. Paper money issued on the general credit of a nation and not based on deposits of money metal is often called fiat money.

To most individuals, money consists of coins, banknotes, and the amount of readily usable deposits held in banks and other financial institutions. As far as the economy is concerned, however, the total money supply is several times as large as the sum total of individual money holdings defined in this way. This is because a very large proportion of the deposits placed with financial institutions is loaned out, thus multiplying the overall money supply several times over. In fact, the money supply of a modern financial system includes a wide range of deposits, instruments of credit, and commercial bills. In this sense the best definition of money is by what it does; if an item is accepted as payment for goods, it can be regarded as money. The concept of money supply has come to play an increasingly important role in economic policymaking, because many economists believe that it is the quantity of money within the economy that ultimately determines real price levels, the rate of economic growth, and the rate of inflation. Near money refers to assets that, although not totally liquid, can be converted into cash at short notice, such as securities, insurance policies, and some building society loans. Hot money usually refers to funds that are moved from one country to another on a short-term basis in search of some temporary advantage. Call money is short-period loans made to banks that are repayable on demand. Overnight money denotes loans made each day and automatically repaid the following morning.

money, quantity theory of: *see* quantity theory of money.

money market, a set of institutions, conventions, and practices, the aim of which is to facilitate the lending and borrowing of money on a short-term basis. The money market is, therefore, different from the capital market, which is concerned with medium- and long-term credit. The definition of money for money market purposes is not confined to bank notes but includes a range of assets that can be turned into cash at short notice, such as short-term government securities, bills of exchange, and bankers' acceptances.

A brief treatment of money markets follows. For full treatment, *see* MACROPAEDIA: Markets, Economic.

The details and the mechanism of the money market are complex and vary greatly from country to country, but in all cases the basic function, performed by middlemen providing a service for a profit, is to enable those with surplus short-term funds to lend and those with the need for short-term credit to borrow. In most countries the government plays a major role in the money market, acting both as a lender and borrower and often using its position to influence the money supply and interest rates according to its overall economic priorities (*see* monetary policy). Apart from domestic money markets, there is an international money market, which, although it utilizes many different mechanisms, provides fundamentally the same service by facilitating the borrowing, lending, and exchange of currencies between countries.

Two of the oldest and most developed money markets are those of the United States and Great Britain. In Great Britain the money market is sometimes referred to as the discount market, because one of the key institutions in short-term money transactions are the 12 banks known as discount houses. The main function of discount houses is to buy short-term credit notes and to resell them. The two most important forms of these notes are the commercial bill of exchange, which is a short-term obligation by one party to pay another, and the treasury bill, which is a similar obligation issued by the government. Discount houses borrow call money (that is, money repayable on demand) from commercial banks in order to purchase bills of exchange or treasury bills, which they may resell at a profit to commercial or clearing banks. By lending call money to the discount houses, commercial banks earn interest on reserve assets not required for immediate operations, and by buying bills, which fall due on specific dates usually up to three months, they obtain a regular supply of funds. The government borrows from the banking system by selling treasury bills to discount houses, which sell them in the same way as bills of exchange. The discount and price attached to bills depend on their maturity (the date on which they must be redeemed) and the level of interest rates.

The acceptability and price of commercial bills of exchange also depend on the reputation and standing of the issuer, although they may be guaranteed by one of the acceptance houses for a small fee based on the value of the bill. The government also acts as a lender of last resort. Thus, when commercial banks are short of cash and recall their call money from discount houses, the government, through the Bank of England, will lend to the discount houses at the official minimum lending rate, which includes a penalty component to discourage overuse.

In the United States the money market operates on similar principles, but the institutions and the mechanisms are different. One of the unique features of the U.S. money market is the large number and great variety of participants. This is due partly to a much smaller degree of concentration in the banking system, because of severe restrictions on branch banking, and to the large number of financial and non-financial concerns handling short-term funds. Much of the business in bills of exchange and other liquid financial instruments is transacted by dealers who buy and sell in basically the same way as the discount houses in Britain, using a variety of sources for finance. There is a market for a wide assortment of financial instruments including bills of exchange, government securities, securities issued by official federal agencies, clearinghouse funds (deposits at one bank loaned to another), as well as time certificates of deposit issued by commercial banks. In addition to the availability of these and other financial instruments, the Federal Reserve System provides considerable short-term credit directly to the banking system. For many smaller banking operations, the money market is not always capable of meeting their needs for short-term funds quickly enough to cope with the inevitable peaks and troughs of their business. In situations like this, banks (as long as they are members of the Federal Reserve System) can obtain funding through their own Federal Reserve Bank at the non-penalty discount rate of interest. In addition, banks can acquire immediate funding through the Federal Reserve System at variable rates of interest known as the federal funds rate. The Federal Reserve System also participates on its own accord in the daily market, acting to smooth fluctuations in money supply and distribution and in interest rates.

money order, order on the issuer to pay a certain sum of money upon demand to the person named in the money order. Money orders provide a means of safe, fast, and convenient transmission of small sums of money. They are issued by sovereign governments (usually postal authorities), banks, and other qualified institutions to buyers who pay the issuer the face amount of the money order plus a service charge. Because of the unquestionable ability of the issuer to exchange the money order for cash upon demand, money orders are a generally accepted means of payment. The American Express Company, which began issuing money orders in 1882, is the largest nonbank issuer; its money orders are used throughout the world.

money supply, also called MONEY STOCK, the liquid assets held by individuals and banks. The money supply includes coin, currency, and demand deposits (checking accounts). Some economists consider time and savings deposits to be part of the money supply because such deposits can be managed by governmental action and are involved in aggregate economic activity. These deposits are nearly as liquid as currency and demand deposits. Other economists believe that deposits in mutual savings banks, savings and loan associations, and credit unions should be counted as part of the money supply.

The Federal Reserve Board and the Bank of England regulate the money supply to stabilize the economies of the United States and the United Kingdom, respectively. The Federal Reserve Board, for example, can buy or sell government securities, thereby expanding or contracting the money supply (*see* monetary policy).

The Federal Reserve uses three different measures, known as monetary aggregates, to monitor the money supply. The first, M1, represents money that is typically used for payments, including currency, travelers' checks, and all checking deposits. The second, M2, comprises M1 plus various types of savings and deposit accounts typically held by households, such as money market accounts, money market mutual fund balances, retirement accounts, and overnight repurchase agreements. The third measure, M3, encompasses M2 along with the larger accounts, typically held by institutions, to include large time deposits, institutionally held money market funds, and term repurchase agreements.

The total quantity of money available for investments and transactions—the money supply—is represented by the combination of M1, M2, and M3.

Measures of the money supply have been used to guide monetary policy. Indeed, the economic school of thought known as monetarism maintains that the money supply is the chief determinant of economic activity. Monetarists have posited that the steady, moderate growth of the money supply could in many cases assure a steady rate of economic growth with low inflation.

moneywort (plant): *see* creeping Jenny.

Monfalcone, town, Gorizia province, Friuli-Venezia Giulia region, northeastern Italy, near the Gulf of Trieste. A busy industrial centre, Monfalcone is known for its shipyards and also has chemical factories, oil refineries, ironworks, and steelworks. It was rebuilt after heavy damage in World War I. Pop. (1993 est.) mun., 27,050.

Monforte de Lemos, city, Lugo province, in the autonomous community (region) of Galicia, northwestern Spain. The city grew up around the 10th-century Benedictine Abbey of San Vicente del Pino (now a hospital) and became the capital of the county of Lemos in the 12th century. Dominating Monforte is the medieval keep of the counts, built on the site of a Roman camp. The chapel of the old Jesuit college has paintings by El Greco, Andrea del Sarto, and Hugo van der Goes. Monforte is a railroad junction and livestock-trading centre, with iron mines nearby. Pop. (1991) 20,318.

Mongbandi (people): *see* Ngbandi.

Monge, Gaspard, COMTE (count) DE PÉLUSE (b. May 10, 1746, Beaune, Fr.—d. July 28, 1818, Paris), French mathematician who invented descriptive geometry and pioneered the development of analytical geometry, both of which have since become part of projective geometry. He was a prominent figure during the French Revolution, helping to establish the metric system and the École Polytechnique. He was made a count in 1808 by Napoleon I.

Life. Monge was educated at the college of the Oratorians at Beaune and at their college at Lyon, where for a time at age 16 he was a physics teacher. During a vacation visit to Beaune in 1762, he made a large-scale plan of the town, devising methods of observation and constructing the necessary surveying instruments. Impressed with the plan, a military officer recommended him to the commandant of the aristocratic École Militaire de Mézières, where he was accepted but as a draftsman only; because his father was an itinerant ped-

Monge, detail of an oil painting by Jean Naigeon, 1811; in the Musée des Beaux-Arts de Beaune, France

By courtesy of the Musée des Beaux-Arts de Beaune, France

dler, he could not be admitted to the commission program.

A further opportunity to display his skill as a draftsman occurred when he was required to compute from data the proper locations of gun emplacements for a proposed fortress. At that time such an operation could be performed only by a long arithmetic process, but Monge, substituting for this a geometrical method, obtained the result so quickly that the commandant at first refused to receive it. On careful examination, Monge's plan was considered of sufficient value that it was guarded as a military secret until 1795, when he was finally allowed to describe it in his lectures. Continuing his researches at Mézières, Monge developed his general method of applying geometry to problems of construction; this subject later became known as descriptive geometry.

Between 1768 and 1783 Monge taught physics and mathematics at Mézières; in 1777 he married the widow Madame Horbou, and in 1780 he was appointed to a chair of hydraulics, held concurrently, at the Louvre in Paris. The same year he was elected an associate of the Académie des Sciences. In a paper discussing the problem of earthworks in 1781, "Sur la théorie des déblais et des remblais" ("On the Theory of Excavation and Emplacements"), he used calculus to determine the curvature of a surface. His memoir stated the ordinary differential equation of curvature and established the general theory.

Leaving Mézières permanently about 1783, Monge became increasingly active in public affairs in Paris. Between 1783 and about 1789 he was an examiner of naval cadets; he served on the committee of weights and measures that established the metric system in 1791; from 1792 to 1793 he was minister for the Navy and colonies and had occasion to welcome the young artillery officer who became the emperor Napoleon; and in 1795 he participated in the founding of the Institut National de France. Although at times during the Revolution his position was precarious, Monge continued to be influential. When an appeal was made to scientists to assist in producing materials for national defense, he supervised foundry operation and wrote factory handbooks, *Description de l'art de fabriquer les canons* (*The Art of Manufacturing Cannon*) and *Avis aux ouvriers en fer sur la fabrication de l'acier* (*Advice to Iron Workers in Steel Production*). In 1794–95 he taught at the short-lived École Normale, where he was given permission for the first time to lecture on the principles of descriptive geometry he had developed at Mézières.

Particularly important for mathematics was his substantial role in the founding in 1795 of the École Polytechnique, originally for training engineers; he was an administrator and an esteemed teacher of descriptive, analytical, and differential geometry. Since no texts were available, his lectures were edited and published for student use. Among them were two important texts in 1799: in his *Géométrie descriptive* (*Descriptive Geometry*), based on his lectures at the École Normale, he developed his descriptive method for representing a solid in three-dimensional space on a two-dimensional plane, by drawing the projections—known as plans, elevations, and traces—of the solid on a sheet of paper; his text *Feuilles d'analyse appliquée à la géométrie* ("Analysis Applied to Geometry") established the algebraic methods of three-dimensional geometry. Engineering design was revolutionized by his new procedures. Moreover, mathematics education was significantly advanced by his successful texts and popular lectures.

In 1796 Monge officially met Napoleon and henceforth became his confidant and one of his closest friends. Napoleon sent him on a commission to Italy to choose the paintings and statues that were taken to help finance his military campaigns; many of these works of art went to the Louvre. From 1798 to 1801 he accompanied Napoleon to Egypt and in Cairo helped to establish in 1798 the Institut d'Égypt, the cultural organization that was patterned after the Institut de France.

With the fall from power of Napoleon in 1814, the Bourbons deprived Monge, as a Bonapartist, of all his honours and excluded him in 1816 from the list of members of the reconstituted Institut.

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Monghyr, also spelled MUNGIR, town, administrative headquarters of Monghyr district, Bihār state, northeastern India, on the Ganges River. Monghyr is said to have been founded by the Guptas (4th century AD) and contains a fort that houses the tomb of the Muslim saint Shāh Mushk Nafā (died 1497). In 1763 Mīr Qasīm, nawab of Bengal, made Monghyr his capital and built an arsenal and several palaces. It was constituted a municipality in 1864.

With major rail, road, and ferry steamer connections, it is an important grain market. Industries include the manufacture of firearms and swords and ebony work. The town contains one of the largest cigarette factories in India. To the southeast is the pilgrimage site and thermal springs of Sītākund.

Monghyr district (3,061 sq mi [7,928 sq km]) consists of alluvial plains stretching south of the Ganges River. In the far south are the forested Kharagpur hills, rising to 1,607 ft (490 m) at Ambinath, and parts of the Choṭa Nāgpur Plateau. Rice, corn (maize), wheat, gram, and oilseeds are the chief crops; mica, slate, and limestone deposits are worked. Jamālpur and Simaltala are important rail and commercial centres. Pop. (1981) town, 129,260; district, 3,315,427.

Mongibello (volcano, Sicily): *see* Etna (Mount).

Monginevro, Colle del (France): *see* Montgenèvre Pass.

Möngke, also spelled MANGU (b. 1208, Mongolia—d. 1259, Szechwan, China), grandson of Genghis Khan and heir to the great Mongol empire.

Elected great khan in 1251, he was the last man who held this title to base his capital at Karakorum, in central Mongolia. Under his rule the city achieved an unprecedented splendour, and the Mongol Empire continued to expand at a rapid rate. Its territory became so large and diverse that Möngke was the last great khan capable of exerting real authority over all the Mongol conquests.

In the West, Möngke's armies, led by his brother Hülegü (*c.* 1217–65), launched an attack on Iran, crushing the last resistance there by the end of 1256. The Mongols then advanced on Iraq, taking the capital at Baghdad in 1258. From there they moved into Syria in 1259, took Damascus and Aleppo, and reached the shores of the Mediterranean Sea.

In the East, Möngke's armies, under the command of his other brother, the famous Kublai (1215–94), outflanked the Chinese in the south and captured the Thai kingdom of Nan-chao, located in present-day Yunnan Province in China. They then brought much of present-day Vietnam under their suzerainty. Meanwhile the main Mongol forces began to advance against China proper. In 1257 Möngke took personal charge of his armies within China. Disease, however, ravaged his ranks, and Möngke died in the field. He was succeeded by his brother Kublai, who completed the conquest of China. A strict man, Möngke tried to preserve the old Mongol way of life. His contemporaries judged him to be a benevolent ruler.

Mongkut, also called PHRACHOMKLAO, posthumous name RAMA IV (b. Oct. 18, 1804, Bangkok—d. Oct. 15, 1868, Bangkok), king of Siam (1851–68) who opened his country to Western influence and initiated reforms and modern development.

Mongkut was the 43rd child of King Rama II, but as the first son to be born of a queen he was favoured to succeed to the throne. When his father died in 1824, however, Mongkut was barely 20, and the royal accession council instead chose his older and more experienced half brother to reign as King Phranangklao (Rama III). To hold aloof from politics, Mongkut chose to become a Buddhist monk. A few years later he encountered a particularly pious monk who inspired Mongkut to turn to the strict discipline and teachings of early Buddhism. He became an accomplished scholar and abbot of a Bangkok monastery, which he made a centre of intellectual discourse that gradually came to involve American and French Christian missionaries and the study of Western languages and science. Mongkut also was able to travel in the countryside as no previous Thai king had done. The reformed Buddhism that Mongkut developed gradually grew into the Thammayut order, which to the present day is at the intellectual centre of Thai Buddhism. Mongkut's friends in the 1840s included many leading princes and nobles who similarly were excited by the West. Convinced of the necessity of accommodation with the West, they took the lead in managing the succession of Mongkut to the throne when King Rama III died in 1851. The leader of that group, Somdet Chao Phraya Si Suriyawong, became Mongkut's effective prime minister, and together the two successfully concluded treaties with Great Britain, the United States, and other powers beginning in 1855 that fully opened Siam to Western commerce. Thai concessions staved off Western imperial pressure for another generation and brought rapid economic development, but Siam had to concede extraterritoriality and limits on her taxing and tariff policies. To win recognition as an equal among the world's rulers, Mongkut corresponded with them, even offering to send elephants to U.S. Pres. James Buchanan to assist in the development of the United States. His shrewd foreign policy balanced Britain and France against each other to ensure Siam's survival. His tolerance and open-mindedness proved far more effective in dealing with Western imperialists than the xenophobia and isolationism of some of his neighbouring rulers. For a time the royal household employed an English governess, Anna Leonowens (*q.v.*), whose published reminiscences made Mongkut the model for the king in a 20th-century musical comedy, *The King and I*.

In his own reign Mongkut was unable to achieve fundamental internal reforms, but he took pains to ensure the liberal education of his sons, who in the next generation would begin the modernization of Siam.

Mongo, any of several peoples living in the African equatorial forest, south of the main Congo River bend and north of the Kasai and Sankuru rivers in Zaire. They include such ethnic groups as the Bokote, Ekonda, Bolia, Sengele, Ntomba, Ndengese, Songomeno, Mbole, Bongandu, Boyela, Nkutu, and Tetela-Kusu. They speak dialects of a common language, Mongo or Nkundo, a member of the Benue-Congo branch of the Niger-Congo languages. Many groups are disappearing because of falling birth rate.

The Mongo traditionally cultivated cassava and bananas but also relied on wild-plant gathering, fishing, and hunting. Descent was patrilineal, and communities were grouped in lineages stemming from a single ancestor. Lineage elders were invested with authority that derived partly from religious sources. Only among some southern groups did there exist a true chieftainship, based upon divine right.

Mongo religion placed strong emphasis on ancestor worship and on beliefs in nature spirits responsible for fertility, as well as on magic, sorcery, and witchcraft. Witch-finding cults were prominent, and divination played an important role in them. Mongo art was mainly oral, and their talking-drum literature and songs showed a rich artistic content.

Mongol, a member of an Asiatic ethnographic group of closely related tribal peoples who live on the Mongolian Plateau and share a common language and nomadic tradition. Their homeland is now divided into the independent nation of Mongolia (Outer Mongolia) and the Inner Mongolia Autonomous Region of China.

A brief treatment of the Mongols follows. For full treatment, *see* MACROPAEDIA: Mongolia.

Mongols form the bulk of the population of independent Mongolia; they constitute about one-sixth of the population in China's Inner Mongolia Autonomous Region; and there are enclaves of Mongols in the Chinese regions and provinces of Sinkiang, Tsinghai, Tibet, and Manchuria (Liaoning, Kirin, and Heilungkiang), as well as in Russia's Siberia. All of these populations speak dialects of the Mongol languages.

Present-day Mongol peoples include the Khalkha (*q.v.*), who constitute almost four-fifths of the population of independent Mongolia; the descendants of the Oyrat, or western Mongols, who include the Dorbet (or Derbet), Olöt, Torgut, and Buzawa (*see* Kalmyk; Oyrat) and live in southwestern Russia, western China, and independent Mongolia; the Chahar, Urat, Karchin, and Ordos Mongols of the Inner Mongolian region of China; the Bargut and Daghur Mongols of Manchuria; the Monguors of the Chinese province of Kansu; and the Buryat of Russia, who are concentrated in Buryatia and in an autonomous district in the vicinity of Lake Baikal.

With a few exceptions, the Mongols' social structure, economy, culture, and language showed very little change over many centuries. They were basically nomadic pastoralists who were superb horsemen and traveled with their flocks of sheep, goats, cattle, and horses over the immense grasslands of the steppes of Central Asia. Traditional Mongol society was based on the family, the clan, and the tribe, with clan names derived from those of common male ancestors. As clans merged, the tribal name was taken from that of the strongest clan. In the tribe, weaker clans retained their own headmen and livestock but were subordinate to the strongest clan. In periods of tribal unity, khans (Mongol monarchs) assigned commanders to territories from which troops and revenues were gathered. Mongol history alternated between periods of tribal conflict and tribal consolidation.

Among the tribes that held power in Mongolia were the Hsiung-nu, a confederated empire that warred with the young Chinese state for centuries before dissolving in AD 48. The Khitan ruled in Manchuria and North China, where they established the Liao dynasty (907–1125) and formed an alliance with a little-known tribal confederacy known as All the Mongols. After the fall of the Liao, the Tatars—a Mongol people but not members of the league—appeared as allies of the Juchen, the Khitan's successors.

During this time Genghis Khan (1162–1227) came to power within the All the Mongols league and was proclaimed khan in 1206. He skillfully gained control over the Mongols outside the league. Between 1207 and 1227 he undertook military campaigns that extended Mongol domains as far west as European Russia and as far east as northern China, taking Peking in 1215. He died on campaign against the Hsi Hsia in northwest China. By this time the Mongol empire stretched over an immense swath of Asia between the Caspian Sea (west) and the China Sea (east), Siberia (north) and the Pamirs, Tibet, and central China (south). The amazing military achievements of the Mongols under Genghis Khan and his successors were largely due to their armies of mounted archers, who possessed great speed and mobility.

After Genghis Khan's death the Mongol empire passed to his four sons, with overall leadership going to Ögödei. Jochi received the west extending to Russia; Chagatai obtained northern Iran and southern Sinkiang; Ögödei inherited northern Sinkiang and western Mongolia; and Tolui was awarded eastern Mongolia. Ögödei dominated his brothers and undertook further conquests. In the west, the Golden Horde under Jochi's successor, Batu, controlled Russia and terrorized eastern Europe; in the east advances were made into China. With Ögödei's death in 1241, the branches fell into war and intrigue among one another for leadership. Tolui's son Möngke became great khan in 1248 and continued an expansionist policy. Möngke's brother Kublai (1215–94) became great khan in 1260, and Mongol power reached its zenith during his rule. The Mongols destroyed the Southern Sung dynasty and reunified China under the Yüan, or Mongol, dynasty (1206–1368).

Mongol khans relied on their subjects and on foreigners to administer their empire. Over time, power shifted from the Mongols to their bureaucrats, and this, added to the continual feuding among the different khanates, led to the empire's decline. In 1367 the Mongols lost China to the native Mings. In the same period, the Il-Khans of Persia were overthrown and the western Golden Horde was defeated by a Muscovy-led alliance in 1380. Soon the empire was reduced to the Mongol homeland and scattered khanates. Eventually Ming incursions into Mongolia effectively ended Mongol unity.

In the 15th and 16th centuries, supremacy passed from tribe to tribe. Military gains were made but never held, and politically all that was achieved was a loose confederation. First were the western Mongolian Oyrats, who penetrated into Tibet and Sinkiang, where the Ming were weak. Next the Ordos in the Huang Ho (Yellow River) region challenged the Oyrat and warred successfully against the Mings. Finally power came to the Chahars in the north, but tribal defections and the rise of the Manchus led to the end of the confederation under Ligdan Khan (1603–34). This period also saw the widespread introduction of Tibetan Buddhism into Mongolia as a means of unifying the people.

The Manchus finally conquered Mongolia in two stages that led to its division into Inner Mongolia and Outer Mongolia. In invading China, the Manchus employed the eastern Mongolian Khalkhas, and by 1691 the Manchus officially occupied southern and eastern Mongolia, which became Inner Mongolia. Though the western Mongolian Oyrats attempted to unite the Mongols under their leadership against the Manchus, the Khalkhas joined the Manchus in a savage campaign that resulted in the conquest of Outer Mongolia in 1759 and in the near-extermination of the Oyrat. The Manchu victory ended Mongol tribal warfare. It also caused the dispersal of many tribes into neighbouring regions and the division of Mongolia into two political units.

Under Manchu rule there was stagnation. Chinese colonists controlled the trade and barter systems, cultivated the pastures of Inner Mongolia, and in Inner Mongolia outnumbered the Mongolian natives. Cultural differences developed between the two regions, with Inner Mongolia becoming more nearly Chinese in character and population.

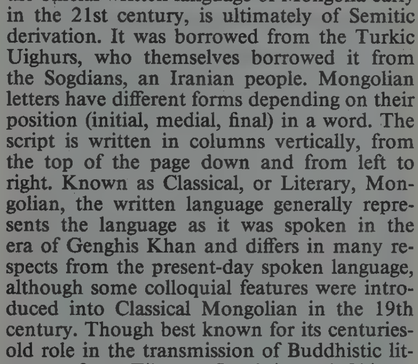
By the 20th century there was widespread dissatisfaction in both Mongolias, compounded by Russian and Japanese intrigue in the region. After the 1911 Chinese Revolution, Outer Mongolia declared its independence, but the situation was unsettled until 1921, when a Mongol-Russian force captured Ulaanbaatar and formed the Mongolian People's Republic from Outer Mongolia. Efforts to unite Inner and Outer Mongolia failed, and Inner Mongolia remained a part of China, while Outer Mongolia (now Mongolia) maintained its independence, though it was a client state of the Soviet Union until the early 1990s.

Mongol DYNASTY: *see* Yüan dynasty.

Mongol language, principal member of the Mongolian language group (a branch of the Altaic family), spoken by some 7 million people in Mongolia and in the autonomous regions of Inner Mongolia and Sinkiang and the provinces of Tsinghai and Kansu in China. The Khalkha dialect constitutes the basis for the official language of Mongolia. The other dialects, the number and grouping of which are controversial, are spoken predominantly in China. With the closely related Buryat language, Mongol forms the eastern group of Mongolian languages.

The traditional Mongolian script, used in China and scheduled to be reintroduced as the official written language of Mongolia early in the 21st century, is ultimately of Semitic derivation. It was borrowed from the Turkic Uighurs, who themselves borrowed it from the Sogdians, an Iranian people. Mongolian letters have different forms depending on their position (initial, medial, final) in a word. The script is written in columns vertically, from the top of the page down and from left to right. Known as Classical, or Literary, Mongolian, the written language generally represents the language as it was spoken in the era of Genghis Khan and differs in many respects from the present-day spoken language, although some colloquial features were introduced into Classical Mongolian in the 19th century. Though best known for its centuries-old role in the transmission of Buddhistic literature from Tibetan, Sanskrit, and Chinese sources, Classical Mongolian has proved remarkably durable and equal to the task of a modern national language.

Mongolia, Mongolian MONGOL ULS, also called OUTER MONGOLIA, landlocked country that is located between Russia to the north and China to the south, in north-central Asia. It is Asia's seventh largest country in area but one of its smallest in population. Lying



Mongolia

between latitudes 42° and 52° N and longitudes 87° and 120° E, its shape is an elongated oval, measuring 1,486 miles (2,392 km) from west to east and, at its maximum, 782 miles (1,259 km) from north to south. The capital is Ulaanbaatar. Area 604,800 square miles (1,566,500 square km). Pop. (2002 est.) 2,457,000.

A brief treatment of Mongolia follows. For full treatment, *see* MACROPAEDIA: Mongolia. For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. A rolling steppe covers about four-fifths of the country and provides fine pastures. The Mongols have engaged in pastoral nomadism for centuries. Mongolia, the average elevation of which is about 5,200 feet (1,580 m) above sea level, can be divided into three major topographic zones: fingerlike mountain ranges that thrust into the northern and western areas from Siberia; the intermontane basins between them; and the enormous plateau and desert region in the south and east.

There are three major mountain belts in the north. The Altai contains the longest ranges and the highest mountains, with glaciers among them, and is subdivided into the Mongolian Altai and Gobi Altai ranges. It extends from the northwestern tip of the country southeastward for about 1,000 miles (1,600 km), reaching heights of between 11,000 and 14,000 feet (3,350 and 4,250 m). The second major system is the Hangayn (Khangai) Mountains, also trending northwest to southeast, with peaks above 12,000 feet (3,650 m); it forms a massif near the centre of the country. The third mountain block, the Hentiyn (Khentei) range, located northeast of Ulaanbaatar and trending southwest to northeast, is smaller and lower, reaching heights of only 6,000 to 8,000 feet (1,800 to 2,400 m).

The Great Lakes region, a scenic basin complex in the northwest, has more than 300 lakes; the Khorgo region, farther north on the northern flanks of the Hangayn Mountains, has numerous lakes of volcanic origin; and the Lake Hövsgöl region, noted for its huge subterranean caves, is near the north-central border. About one-third of the country is occupied by the treeless, semiarid Gobi—a stony desert with sands covering only a small percentage of its terrain.

The Selenge (Selenga) River, with its main tributary, the Orhon, is the major river; it drains the north-central part of the country. The Hovd (Kobdo) River, rising from the glaciers of the Mongolian Altai Mountains, drains the northwestern part of the country. Generally, the rivers offer considerable hydroelectric potential as well as occasional flood danger. Lake Uvs is a saline lake with an area of nearly 1,300 square miles (3,370 square km); Lake Hövsgöl is the principal freshwater lake (1,010 square miles [2,620 square km]) and the deepest (exceeding 800 feet [240 m]). Mongolia is subject to frequent seismic activity, which occasionally results in extremely destructive earthquakes.

Mongolia's marked continental climate is characterized by very low rainfall and by wide and frequent temperature variations. Winters are cold, sunny, dry, and almost snowless, and summers are warm and short; mean winter temperatures range from −15° to 0° F (−26° to −18° C) and mean summer temperatures from 63° to 73° F (17° to 23° C). Annual precipitation (three-fourths of which occurs during July and August) varies between 14 inches (350 mm) in the mountainous north to less than 4 inches (100 mm) in the Gobi. A remarkable feature of the climate is the number of clear, sunny days, averaging between 220 and 260 each year.

Flora of the Mongolian north includes Siberian larch, cedar, pine, birch, and spruce; the northern forests harbour lynx, maral (Asiatic red deer), elk, snow leopard, wild boar, and sable. In the steppe grasslands of the intermontane basins and the river valleys are marmot and Mongolian gazelle. In the semidesert region there are wild camels, wild sheep, wild horses, and the Gobi bear.

Mongolia's most important natural resource is its pastureland. It is also rich in mineral resources, including extensive deposits of coal, iron ore, tin, copper, zinc, molybdenum, phosphorite, tungsten (wolfram), gold, fluorite (fluorspar), and semiprecious stones.

The people. Almost four-fifths of the populace are Khalkha-speaking Mongols. The remainder consists of other Mongols, Kazakhs, Russians, and some Chinese. Khalkha Mongolian is the official language; Turkic languages, Russian, and Chinese are also spoken.

Lamaistic Buddhism traditionally has been the predominant religion. It was severely suppressed during the communist years but enjoyed a resurgence after 1990.

Mongolia's population has a high rate of natural increase, and between 1952 and 1984 the population more than doubled. This rate, though high by world standards, is considered low by government planners, and population-policy programs launched in 1978 seek to increase an already high birth rate and to lower the death rate. Despite the country's relatively high mortality rates, life expectancy is a moderate 63 years for men and 65 for women. People are encouraged by the government to migrate from rural to urban areas, and about three-fifths of the total population is now urban. Ulaanbaatar and Darhan, northwest of Ulaanbaatar, are the largest urban centres.

The economy. Until 1990 Mongolia had a socialist centrally planned economy on the Soviet model. Thereafter, democratic reforms (including a new constitution in 1992) began the country's difficult conversion to a market economy. The process of conversion has produced inflation, rising unemployment, shortages of basic goods, and food rationing.

Agriculture has traditionally employed as much as one-half of the workforce but only produces about one-fourth of the gross domestic product (GDP). Livestock raising accounts for about 70 percent of the total value of agricultural production. About two-thirds of the animals are sheep; goats, cattle, horses, and camels are also raised.

Less than 1 percent of the land is farmed; wheat is the leading crop. Forests cover nearly one-tenth of the country, and the roundwood harvested is used both in industry and as fuel.

Coal is mined throughout the country; the two main coal-mining districts are Nalayh, just southeast of Ulaanbaatar, and Sharïn Gol, southeast of Darhan. Copper and molybdenum are mined at the large Erdenet mining complex southwest of Darhan. Minerals account for more than two-fifths of Mongolia's exports.

Industries and mining account for more than one-fourth of the GDP and employ almost one-fifth of the workforce. Because manufacturing is undeveloped, many capital and consumer goods must be imported. Most of Mongolia's industries are concentrated in Ulaanbaatar. Principal manufactured products are processed foods, articles of clothing and footwear, and lumber and wood products. Electricity is generated from domestic and imported fuels.

In addition to minerals, other raw materials and food products and consumer goods make up Mongolia's exports. Machinery and transport equipment, fuels, minerals, and metals; consumer goods, and food products are imported. Russia is the country's major trading partner.

Roads connecting Ulaanbaatar and Darhan are paved; dirt roads predominate in the countryside. Ulaanbaatar is linked by railway to Moscow and Peking and has an international airport.

Government and social conditions. The constitution adopted in 1992 proclaims Mongolia to be an independent sovereign republic. Legislative authority is vested in the unicameral State Great Hural, whose members are popularly elected for a four-year term. The president, who is also popularly elected for a term of four years, is head of state. The prime minister is head of government; he is appointed by the president in consultation with the majority party in the State Great Hural. The Supreme Court is the highest court.

Until 1990 the communist Mongolian People's Revolutionary Party (MPRP) was the only legal political party; it was reorganized in 1992. Other parties include the Mongolian National Democratic Party and the Mongolian Social-Democratic Party.

The welfare system in Mongolia has provided compensation for sickness, maternity, and disability and provides pensions for the old and disabled. Medical treatment is free, and the state maintains a network of sanatoriums; health facilities and medical personnel have been increasing in number. It is reported that diseases such as smallpox, typhus, cholera, and diphtheria have been eliminated and that the incidence of infectious disease has been reduced.

Education is free, and most children receive 8 to 10 years of schooling. There are boarding schools for children of nomadic herdsmen. The National University of Mongolia was established in 1942.

Radio and television services, important because of the great distances in the country, utilize satellite relays.

Cultural life. Cultural life in Mongolia is an amalgam of centuries-old traditions and a growing modern element. The most famous celebration of traditional ways is the annual Naadam festival of the Three Games of Men (wrestling, archery, and horse racing), beginning each year on July 11, National Day.

Mongolia's traditional literature includes heroic epics, legends, tales, *yurol* (the poetry of good wishes), and *magtaal* (the poetry of praise). In the performing arts, state companies present both Mongolian and classical drama, opera, and ballet.

History. In Neolithic times Mongolia was the home of small groups of hunters, reindeer breeders, and nomads. During the 3rd century BC it became the centre of the Hsiung-nu empire. During the 4th–10th century AD, Orhon Turks were prominent in Mongolia, and the Uighur of eastern Turkistan formed an empire in the north during AD 745–840 that was ended by an invasion of the Kyrgyz peoples. In the 13th century Genghis Khan (Temüjin) united the Mongol tribes, defeated the Tatars, and successively conquered Central Asia, the Persian Gulf region, and the southern Caucasus, all of which became part of the Mongol empire. Genghis' successor, Ögödei (reigned 1229–41), attacked and overcame the Chin (Juchen) dynasty of China in 1234.

The establishment of the Yüan, or Mongol, dynasty in China (1279–1368) was accomplished by the great Kublai Khan (reigned 1259–94), a grandson of Genghis. For several centuries after 1368 the Mongols were confined to their original homeland in the steppes, their energies mostly absorbed by internal rivalries. The last great Mongol leader was Ligdan Khan (reigned 1604–34), who united many Mongol tribes to defend their homeland against the rising power of the Manchu. After Ligdan's death, the Mongols were subdued by the Manchu and became part of the Ch'ing (Manchu) dynasty of China.

A Mongolian national consciousness emerged in the mid-19th century, and, after the fall of the Manchu dynasty in 1912, Mongol princes, supported by tsarist Russia, declared the independence of Mongolia from China. When the tsarist regime fell in 1917, Mongolia reverted to Chinese control, but in 1920, during the Russian Civil War, it was invaded by a White Russian force of 5,000 men. Damdiny Sühbaatar, supported by the Bolshevik administration in Moscow, organized a force that, with the help of Red Army troops, defeated the White Russians and drove off the Chinese in 1921. The Mongolian People's Republic was officially proclaimed on Nov. 26, 1924. Close political, economic, cultural, and ideological ties with the Soviet Union continued thereafter. In the 1960s and '70s Mongolia's relations with China worsened as Sino-Soviet relations deteriorated; but tensions between the two countries eased in the 1980s and diplomatic relations were reestablished in 1986.

Mongolia joined in the democratic revolutions that swept eastern Europe and the Soviet Union in 1990–91. The country subsequently underwent major political and economic reforms.

Mongolia, Inner: *see* Inner Mongolia.

Mongolia, Outer: *see* Mongolia.

Mongolian languages, one of three subfamilies of the Altaic language family. The Mongolian languages are spoken in Mongolia and adjacent parts of east-central Asia. Their subclassification is controversial, and no one scheme has won universal approval. The central Mongolian languages are usually divided into a western group, consisting of the closely related Oyrat (spoken in Mongolia and in the Sinkiang region of China) and Kalmyk (Russia), and an eastern group, consisting of the closely related Buryat (Russia) and Mongol (Mongolia and China) languages. Outlying languages—Moghol (spoken in Afghanistan), Daghur (Inner Mongolia, China), Yellow Uighur (Kansu province, China), and the related groups of Monguor (Tu), Tung-hsiang, and Bao'an (Bonan), which are spoken on the border between the provinces of Kansu and Tsinghai—exhibit archaic features. All of the central, but none of the outlying, languages have written forms.

Mongolian languages are characterized by palatal harmony, in which all of the vowels in a word are formed in either the front or the back of the mouth. Other characteristics are agglutinative word structure, in which a large number of affixes may be added to the root, each affix having a distinct meaning or grammatical function; a relatively large number of grammatical cases in the noun; double cases (*e.g.,* Classical Mongolian *ger-t-eče* 'from within the house'); a very rich verbal morphology; and almost no grammatical irregularity. The languages are exclusively suffixal and postpositioning, lacking prefixes and prepositions. Word order is subject–object–verb (SOV), with modifiers such as adjectives preceding what they modify and specifiers such as quantifiers following the specified.

Mongolian literature, literature written in any of the Mongolian languages of east-central Asia.

Traditionally, *üliger*s, orally transmitted epic stories in verse, have constituted the bulk of native literary expression. These highly stylized stories relate the adventures of legendary and historical heroes (including Genghis Khan). The frequent villain is the many-headed monster, the *manggus,* whom the hero always defeats. The verses of these epics alliterate in couplets or quatrains. Much phraseology is repeated from story to story, epic to epic.

Historical chronicles represent another important form of indigenous literature, the earliest being the *Secret History of the Mongols,* an imperial chronicle dealing with the life and times of Genghis Khan and his successors, written probably in AD 1240. Many of these chronicles begin with the creation of the world from primordial elements, and many attempt to link the Indian and Tibetan rulers into the house of Genghis Khan. Such are the *Altan tobchi* ("The Golden Button"), composed in the 17th century and giving a world history down to Ligdan (reigned 1604–34), last of the great Mongol khans. Another is *Altan tobchi* of about 100 years later.

Mongolian literature was profoundly influenced by the introduction of Buddhism about the end of the 16th century, evoking translations of Buddhist sacred writings and related works. A Buddhist canonical collection, the *Kanjur* (drawn from the *Tipiṭaka*), was translated and printed in 1635 in 108 volumes; the *Tanjur,* containing canonical commentary and noncanonical works in its 225 volumes, followed in 1741. Many Buddhist stories and fables from India were also transmitted.

In the 18th and 19th centuries, Chinese traders brought from China many Mongolian translations of Chinese novels of enchantment and romance, including the *San-kuo yen-i* ("Romance of the Three Kingdoms") and others. A great Mongol novelist and poet of the mid-19th century was Injannashi, his most famous work being *Köke-sudar* ("The Blue History"), a fictionalized Mongolian history.

The outstanding Mongolian writers of the 20th century were D. Natsagdorj, B. Rinchin, S. Byannemeh, and Ts. Damdinsuren (Damdinsürüng).

Mongolian People's Republic: *see* Mongolia.

Mongolian Plateau, extensive northeastern highland region of the great plateau of Central Asia, covering an area of approximately 1,000,000 square miles (2,600,000 square km) in east-central Asia. It is divided politically and geographically by the Gobi (desert) into the independent state of Mongolia (also called Outer Mongolia) in the north and Inner Mongolia, China, in the south. Surrounding the plateau and bordering it are the Altai, Tannu-Ola (Tagnïn), and Sayan mountains to the northwest, the Hentiyn Mountains to the north, the Greater Khingan Range to the east, the Nan Mountains to the south, and the Tarim and Dzungarian basins of the Uighur Autonomous Region of Sinkiang in China to the west. This high tableland, which is also regarded sometimes as a large interior drainage basin between the bordering mountain ranges, is drained by the Dzavhan, Selenga (Selenge), and Kerulen rivers. The plateau, which includes the Gobi together with areas of dry short-grass steppe, ranges in elevation from 3,000 to 5,000 feet (915 to 1,525 m) above sea level. The highest point is Mönh Hayrhan Peak (14,311 feet [4,362 m]) in the Mongolian Altai Mountains. The dry continental climate is characterized by an annual rainfall of about 8 inches (200 mm), and the mean temperatures of the warmest and coldest months vary over an enormous range. At Ulaanbaatar, for example, the average January temperature is −15° F (−26° C), whereas the average July temperature is 63° F (17° C).

Sheepherding near Ulaanbaatar, on the Mongolian Plateau, Mongolia

© Wolfgang Kaehler—Corbis

The part of the plateau in independent (Outer) Mongolia is inhabited mostly by Mongolians, together with a minority of Kazaks and other peoples. The Han (Chinese), who are mostly agriculturists, constitute about four-fifths of the population of Inner Mongolia. Traditionally the people have been nomadic and chiefly engaged in raising sheep and goats, but extensive livestock farms were developed in the 20th century. Although the harsh climate restricts agriculture, wheat, oats, and other grains and vegetables are grown on the plateau.

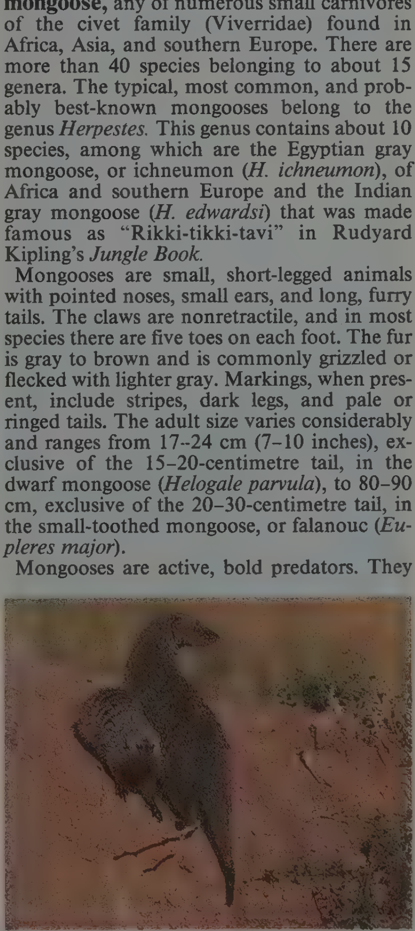
Coal is mined near Saynshand in Mongolia, and coal and iron ore are mined in the vicinity of Pao-t'ou in Inner Mongolia. Copper, molybdenum, fluorite, uranium, gold, and silver are other important minerals. The Trans-Mongolian Railway (completed 1955) links the capital of Mongolia, Ulaanbaatar, near the northern edge of the plateau, with Ulan-Ude in the republic of Buryatia in Russia and with Erh-lien-hao-t'e (northwest of Peking [Beijing]) in China. Although roads cross the region, the plateau remains relatively isolated and economically underdeveloped.

mongolism (chromosomal disorder): *see* Down syndrome.

mongoose, any of numerous small carnivores of the civet family (Viverridae) found in Africa, Asia, and southern Europe. There are more than 40 species belonging to about 15 genera. The typical, most common, and probably best-known mongooses belong to the genus *Herpestes.* This genus contains about 10 species, among which are the Egyptian gray mongoose, or ichneumon (*H. ichneumon*), of Africa and southern Europe and the Indian gray mongoose (*H. edwardsi*) that was made famous as "Rikki-tikki-tavi" in Rudyard Kipling's *Jungle Book.*

Mongooses are small, short-legged animals with pointed noses, small ears, and long, furry tails. The claws are nonretractile, and in most species there are five toes on each foot. The fur is gray to brown and is commonly grizzled or flecked with lighter gray. Markings, when present, include stripes, dark legs, and pale or ringed tails. The adult size varies considerably and ranges from 17–24 cm (7–10 inches), exclusive of the 15–20-centimetre tail, in the dwarf mongoose (*Helogale parvula*), to 80–90 cm, exclusive of the 20–30-centimetre tail, in the small-toothed mongoose, or falanouc (*Eupleres major*).

Mongooses are active, bold predators. They



Banded mongooses (*Mungos mungo*)

© Gregory G. Dimijian, M.D./Photo Researchers live in burrows and feed on small mammals, birds, reptiles, eggs, and occasionally fruit. Most species are diurnal and land dwelling, although the water mongoose (*Atilax paludinosus*) and a few others are semi-aquatic. Some mongooses live alone or in pairs, and others, such as the banded (*Mungos mungo*) and dwarf mongooses, live in large groups. Litters contain two to four young.

A number of mongooses, including those of the genus *Herpestes*, will attack and kill poisonous snakes. They depend on speed and agility, darting at the head of the snake and cracking the skull with a powerful bite. They are not immune to venom, as popularly believed, nor do they seek and eat an herbal remedy if bitten.

One species of mongoose, probably the spotted mongoose (*Herpestes auropunctatus*), was introduced into Hawaii and the West Indies to control rodents and snakes. The results were disastrous, because the mongooses severely damaged the populations of the native fauna. Because of the potential destructiveness of the animals, importation of mongooses of any species into the United States is strictly regulated.

Vernacular names for certain mongooses include cusimanse (kusimanse) for *Crossarchus* and meerkat (mierkat) for *Mungos, Cynictis* (the yellow mongoose), and others.

Mongu, town, western Zambia, East Africa. Site of the Lozi royal village, it lies in the geographical centre and in the most populated area of the province at the edge of the Zambezi River floodplain. A main road east connects it to Lusaka, the capital (385 mi [620 km] east). The town also has an airfield. A thermal power station at Mongu supplies electricity to the area. Pop. (1990) 29,302.

Monier, Joseph (b. 1823, France—d. 1906, Paris), French gardener, one of the principal inventors of reinforced concrete.

Monier, a commercial gardener, experimented with iron-wire reinforcement for his cement and concrete tubs and basins. He patented the idea in 1867 and exhibited his invention the same year at the Paris Exposition. It soon occurred to him, as it did to François Hennebique, to extend its application to other engineering structures, such as railway ties (sleepers), to pipes, and to floors, arches, and bridges. He was not the first to conceive the combination of metal wires or rods embedded in concrete, but, despite his lack of technical training, he showed a remarkable intuitive grasp of the new material.

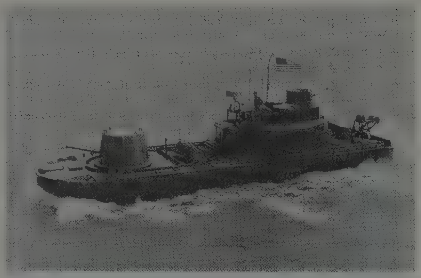
In Monier's patented designs the basic principle of reinforced-concrete structural members was clearly established: the concrete slab or girder took most of the compressive forces, and the embedded metal wire took most of the tensile forces. The two elements acted as a unit; and although it was many years before the theoretical basis for the new material could be laid, structural applications multiplied rapidly, especially in Europe.

moniliasis (disease): *see* candidiasis.

Moñino y Redondo, José: *see* Floridablanca, José Moñino y Redondo, conde de.

monism (philosophy): *see* pluralism and monism.

monitor, ironclad warship originally designed for use in shallow harbours and rivers to blockade the Confederate states in the American Civil War (1861–65).



Monitor, a landing craft used by U.S. Navy river task groups

By courtesy of the U.S. Navy

Built by the Swedish engineer John Ericsson for the U.S. Navy, the original vessel of this type was named "Monitor." Remarkably engineered, it contained over 40 inventions entitled to basic patents. Essential features of its design included its minimal exposure above the waterline (making it hard to hit) and its protection from enemy fire—five inches of armour plate in the hull and one inch in the deck. The need to aim the guns when the ship could not be manoeuvred, as in a harbour, led to the development of the revolving turret. Swivelled by steam power, the turret of "Monitor" contained two 11-inch (280-millimetre) cannons; its turret box was covered with 8 inches of armour.

On March 9, 1862, "Monitor" engaged the Confederate ironclad "Virginia" (originally named "Merrimack") in a dramatic, though inconclusive, battle that attracted international attention and resulted in construction of many similar vessels for the U.S. Navy. The original "Monitor," however, was never seaworthy. En route from New York to Chesapeake Bay for the famous battle, it almost sank twice. Putting to sea again in December 1862, it went down off Cape Hatteras with a loss of 4 officers and 12 men.

Many improved monitors were built during the American Civil War and used by the U.S. Navy with mixed results. Though quite effective against other vessels and, hence, valuable in maintaining the blockade, monitors were not very effective in attacking fortified harbours.

For many years the U.S. Navy retained monitors of the Civil War type. In the 1890s, six were built with two turrets each. Four monitors commissioned in 1902 and 1903, each carrying two 12-inch (305-millimetre) guns, were the last U.S. Navy monitors. After being used as submarine tenders in World War I, they were scrapped in 1922.

The British Navy also adopted monitors. In 1915 and 1916 large monitors mounting 15- and 18-inch guns were built for use along the Belgian coast, in the Dardanelles, in the Suez Canal, and in the Adriatic Sea. For World War II the British Navy built monitors mounting two 15-inch guns. The Russian and Romanian navies used small, shallow-draft monitors as river gunboats.

Monitor and Merrimack, Battle of (March 9, 1862), also called BATTLE OF HAMPTON ROADS, in the U.S. Civil War, naval engagement at Hampton Roads, Va., a harbour at the mouth of the James River, notable as history's first duel between ironclad warships and the beginning of a new era of naval warfare.

The Northern-built "Merrimack," a conventional steam frigate, had been salvaged by the Confederates from the Norfolk navy yard and rechristened the "Virginia." With her upper hull cut away and armoured with iron, this 263-foot (80.2-metre) masterpiece of improvisation resembled, according to one contemporary source, "a floating barn roof." Commanded by Commo. Franklin Buchanan, and supported by several other Confederate vessels, the "Virginia" virtually decimated a Union fleet of wooden warships off Newport News, Va., on March 8th—destroying the sloop "Cumberland" and the 50-gun frigate "Congress," while the frigate "Minnesota" ran aground.

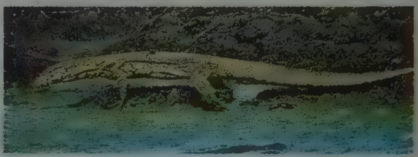
The Union ironclad "Monitor," under the command of Lieut. John Worden, arrived the same night. This 172-ft "Yankee Cheese Box on a raft," with its water-level decks and armoured revolving gun turret, represented an entirely new concept of naval design. Thus the stage was set for the dramatic naval battle of March 9, with crowds of Union and Confederate supporters watching from the decks of nearby vessels and the shores on either side. Soon after 8:00 AM the "Virginia" opened fire on the "Minnesota," and the "Monitor" appeared. They passed back and forth on opposite courses. Both crews lacked training; firing was ineffective. The "Monitor" could fire only once in seven or eight minutes but was faster and more manoeuvrable than her larger opponent. After additional action and reloading, the "Monitor's" pilothouse was hit, driving iron splinters into Worden's eyes. The ship sheered into shallow water, and the "Virginia," concluding that the enemy was disabled, turned again to attack the "Minnesota." But her officers reported low ammunition, a leak in the bow, and difficulty in keeping up steam. At about 12:30 PM the "Virginia" headed for its navy yard; the battle was over.

The "Virginia's" spectacular success on March 8 had not only marked an end to the day of wooden navies but had also thrilled the South and raised the false hope that the Union blockade might be broken. The subsequent battle between the two ironclads was generally interpreted as a victory for the "Monitor," however, and produced feelings of combined relief and exultation in the North. While the battle was indecisive, it is difficult to exaggerate the profound effect on morale that was produced in both regions.

On May 9, 1862, following the Confederate evacuation of Norfolk, the "Virginia" was destroyed by its crew. The "Monitor"—with 16 crewmen—was lost during a gale off Cape Hatteras, N.C., on Dec. 31, 1862.

monitor lizard (*Varanus*), any lizard of the single genus of the family Varanidae. About thirty species are recognized. Most have an elongated head and neck, a relatively heavy body, a long tail, and well-developed legs. All occur in the Old World tropics and subtropics.

The smallest monitor achieves a full length of 20 centimetres (8 inches); several species grow to great size and length. These include the Komodo dragon (*Varanus komodoensis*), the largest of all lizards, which grows to a length of 3 metres (10 feet); the two-banded, or water, monitor (*V. salvator*), which grows to 2.7 m and occurs in Southeast Asia; and the perenty (*V. giganteus*), which grows to 2.4 m and is found in central Australia.



Nile monitor (*Varanus niloticus*)

E.G. Neal—Bruce Coleman Ltd.

The so-called earless monitor (*Lanthanotus borneensis*), a rare and little-known lizard native to Borneo, is the only species of the family Lanthanotidae. It grows to a length of 40 cm (16 in.).

monitorial system, also called LANCASTERIAN SYSTEM, teaching method in which the older or better scholars teach the younger or weaker pupils. In the system, as first formulated by the English educator Joseph Lancaster, the superior students learned their lessons from the adult teacher in charge of the school and then transmitted their knowledge to the inferior students. It was used in many parts of Europe during the 19th century, particularly in France and Great Britain. The proliferation of the monitorial system was due largely to its economy (it reduced the number of adult teachers needed) and efficiency (it avoided wasting the time of children who waited for the attention of the principal teacher). Parents of the monitors, however, objected to the learning time their children were losing even though many of the monitors were paid a small weekly sum. It was found that some training of the monitors was necessary, and in Great Britain about 1840 the movement began that replaced monitors with "pupil-teachers"—*i.e.,* boys and girls who, at the age of 13, were apprenticed for a period of five years, during which they learned the art of teaching while continuing their education under the head teacher of an elementary school. Some such programs developed into training colleges, in which professional and academic education could be continued after the apprenticeship was completed.

Monk, George: *see* Monck, George.

Monk, Meredith, in full MEREDITH JANE MONK (b. Nov. 20, 1942, Lima, Peru), American performance artist, a pioneer in the avant-garde, whose work skillfully integrated diverse performance disciplines and media.

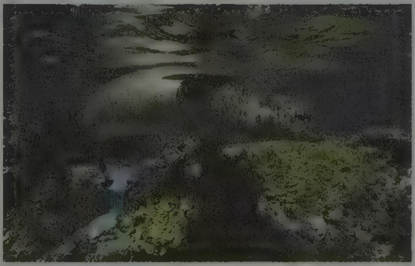
Monk studied piano and eurhythmics from an early age. She earned a B.A. in 1964 from Sarah Lawrence College, Bronxville, N.Y. From the beginning of her career, Monk was interested in singing, filmmaking, choreography, and acting. All these elements are incorporated into her vast body of work, which she termed "composite theater." Monk made her debut as a performance artist in 1964, and in 1968 she organized the House, a group devoted to interdisciplinary approaches to the arts. Monk's experimental nature could be seen in her approach to "singing." Her vocal music rarely contained recognizable text, as she strove for a sound both primordial and futuristic by using extended vocal techniques—from conventionally sung notes over a four-octave range to a wide variety of nonstandard performance sounds reminiscent of whining, hiccuping, laughing, and animal-like noises.

In 1973 she performed Education of the Girlchild, a work without dialogue that explored movement and stasis; she revived it in 1979 and again in 1991. In 1978 Monk founded the vocal ensemble bearing her name and with which she toured worldwide. In addition to live performances, she and her ensemble made numerous recordings. She also created a feature-length film, *Book of Days* (1989), and a multimedia opera, *Atlas,* which premiered in 1991. In 1985 she was honoured with an Obie Award (her third) for sustained achievement.

Monk, Thelonious, in full THELONIOUS SPHERE MONK (b. Oct. 10, 1917, Rocky Mount, N.C., U.S.—d. Feb. 17, 1982, Englewood, N.J.), American pianist and composer who was an early creator of modern jazz.

As the pianist in the band at Minton's Play House, a nightclub in New York City, in the early 1940s, Monk had great influence on the other musicians who later developed the bebop movement. For much of his career Monk performed and recorded with small groups. His playing was percussive and sparse, often being described as "angular," and he used complex and dissonant harmonies and unusual intervals and rhythms. Monk's music was known for its humorous, almost playful, quality. He was also one of the most prolific composers in the history of jazz. Many of his compositions, which were generally written in the 12-bar blues or the 32-bar ballad form, became jazz standards. Among his best-known works are "Well, You Needn't," "I Mean You," "Straight, No Chaser," "Criss-Cross," "Mysterioso," "Epistrophy," "Blue Monk," and "'Round Midnight." He influenced the flavour of much modern jazz, notably the work of George Russell, Randy Weston, and Cecil Taylor.

monk seal, any of three little-known tropical or subtropical seals of the genus *Monachus,* family Phocidae. Characterized by V-shaped hind flippers, monk seals are brown or black as pups, and dark gray or brown above, paler or whitish below as adults. They feed on fish, cephalopods, and crustaceans. Adults are 2–3 m (6.6–10 feet) long and weigh 225–275 kg (500–610 pounds).



Hawaiian, or Laysan, monk seal (*Monachus schauinslandi*)
© Bill Curtsinger

Monk seals have been hunted extensively for fur, oil, and meat, and all three species are listed as endangered in the *Red Data Book.* The Caribbean, or West Indian, monk seal (*M. tropicalis*) was thought to be extinct by the early 1970s. The surviving species, both in danger of extinction, are the Mediterranean monk seal (*M. monachus*) and the Hawaiian, or Laysan, monk seal (*M. schauinslandi*), both of which are threatened by human disturbance of their coastal habitats.

monkey, in general, any member of the mammalian order Primates, with the exception of the tree shrews, the lemurs and their allies, the gibbons and apes, and humans.

Monkeys are arranged into two main groups: those of the Old World tropics, the catarrhines, with two families, Cercopithecidae (monkeys with cheek pouches) and Colobidae (leaf monkeys); and those of the New World tropics, the platyrrhines, also with two families, Callitrichidae (marmoset) and Cebidae.

Monkeys live in tropical forests, where they move about by using all four limbs. Except for the largest, such as the baboon and drills, monkeys are predominantly arboreal, leaping from limb to limb in their travels among the trees. On the ground they walk in plantigrade fashion (the entire sole of the foot touching the ground); but they are capable of sitting upright and sometimes standing erect, and consequently their hands are freed for many manipulative tasks. Most have a short, relatively flat face without great prominence of the muzzle (excepting the baboons and drills). The hands and feet are prehensile, with, typically, five digits on each, the first (thumb and big toe) being divergent from the others.

Except for the night-roaming durukuli of tropical America, monkeys are active during the day, moving frequently in bands in search of vegetation, birds' eggs, smaller animals, or insects to eat. Monkeys are highly social animals and are often organized in clans headed by an old male; these clans are rigidly defined in such species as howlers and baboons.

As in all primates the brain is comparatively large. This feature, combined with the freeing of the hands and a well-developed vision, allows monkeys a great latitude of activity. Among the smaller New World forms are the alert marmosets, often plumed and colourfully arrayed; the inquisitive squirrel and woolly monkeys; and the capuchins, or organ grinder's monkeys. The Old World monkeys include many that are popular in zoos, especially the beautifully coloured African guenons (monadiana, white-nosed, green, vervet, and grivet monkeys), long-maned guerezas, mangabeys, and the chiefly Asiatic macaques. The macaques include the Barbary ape of the Rock of Gibraltar and the rhesus monkey of India, which has been used considerably in medical research. The graceful Asiatic langurs include the hanuman, or sacred monkey, of India.

New World monkeys, or platyrrhines, have broad noses, with a wide septum separating the outwardly directed nostrils; each side in both jaws has three premolar teeth. Platyrrhines lack a bony ear passage, and the arrangement of some cranial bones differs from that in Old World monkeys. Usually long-tailed, a few have prehensile tails with specialized naked skin on the under surface. Old World monkeys, or catarrhines, have narrow noses and a thin septum, the nostrils being directed downward. Only two premolar teeth are present above and below on each side of each jaw, but the skull has a bony auditory passage. In none of the catarrhines is the tail prehensile; it may be long, short, or lacking. All Old World monkeys have hard patches of naked skin on the buttocks (ischial callosities). In this they differ from the New World monkeys and from the great apes.

After sexual maturity, males are at all times potent and nonpregnant females are under regularly monthly menstrual cycles. Gestation varies from four and a half months in marmosets to nearly seven months in some Old World monkeys. A single young (occasionally twins) is produced and is nursed by the mother.

Monkey, title of an English translation of the classic comic Chinese novel, *Hsi-yu chi* (*q.v.*).

monkey flower, any of herbaceous or, rarely, shrubby plants of the genus *Mimulus* (family Scrophulariaceae). The approximately 100 species are distributed worldwide but are particularly common in western North America.

The plants have opposite, undivided leaves and solitary flowers with a two-lipped open corolla (fused petals). The herbaceous species typically grow most abundantly in wet areas, usually near running water.

monkey pot, any shrub or tree of the genus *Lecythis,* of the family Lecythidaceae, particularly *L. ollaria* of Brazil and *L. zabucajo*

Monkey pot (*Lecythis zabucajo*)
W.H. Hodge

of northeastern South America. The name is also applied to the woody fruit of these plants, so called because it is potlike in shape and suitable in size for a monkey to use.

The nuts of most *Lecythis* species are edible. Those of *L. zabucajo,* which resemble Brazil nuts, are particularly tasty. The fruit of *L. ollaria* contains seeds that are the source of an oil used in soaps. The wood of several species is also used in buildings, cabinetwork, tool handles, and other articles.

monkey puzzle tree, also called CHILE PINE (species *Araucaria araucana*), an evergreen ornamental and timber conifer of the family Araucariaceae, native to the Andes mountains of South America. The monkey puzzle tree may grow to a height of 45 m (150 feet), with a diameter of 1.5 m. The rigid, overlapping, needle-pointed leaves are spirally arranged on stiff branches, which form a tangled, prickly network that discourages animals from attempting to climb the tree.

Monkey puzzle tree (*Araucaria araucana*)
Ernest Manewal—Shostal

monkey terrier (dog): *see* affenpinscher.

monkfish (genus *Squatina*), any of 10 to 12 species of shark that constitute a single genus (family Squatinidae, order Squatiniformes) and characterized by flattened heads and bodies, with winglike pectoral and pelvic fins that make them resemble rays. The tail bears two dorsal fins and a well-developed caudal fin. The upper surface of the head features the eyes, behind each of which is a prominent spiracle. Five gill slits occur in front of the pectoral fins. The monkfish ranges up to 2.5 m (6.25 feet) in length.

Monkfish are found in tropical and warm temperate waters of the continental shelf worldwide. One species that is often caught for food in European and Mediterranean waters is the angelfish or angel shark (*Squatina squatina*).

Monklands, district, Strathclyde region, southwestern Scotland, created by the reorganization of 1975 from part of the former county of Lanark. Situated immediately east of Glasgow, the district covers an area of 61 square miles (158 square km) including agricultural land devoted largely to dairy cattle, pigs, and poultry in the north; the industrial burgh of Coatbridge, the seat of the district authority contiguous with the city of Glasgow to the west; and the burgh of Airdrie. Early industrial development was based on local coal and iron ore. Coatbridge remains an industrial town, producing tin plate, tubes, and wire rope, but Airdrie has now become a residential community for people who work in Glasgow. Pop. (1989 est.) 104,700.

monk's pepper tree: *see* chaste tree.

monkshood, also called WOLFSBANE, or ACONITE (genus *Aconitum*), any of 100 or more species of showy, poisonous, perennial herbs of the buttercup family (Ranunculaceae). They occur in the North Temperate Zone, usually in partial shade and in rich soil. The roots are thick or tuberous and the leaves have fingerlike lobes. The hood-shaped flowers, borne mostly in spikelike clusters, are usually purple or blue, sometimes yellow or white. There are five sepals and two to five petals.

A few species are cultivated in gardens, including *A. henryi, A. fischeri,* and *A. uncinatum.* All species contain the powerful poison aconitine. The common monkshood, or friar's cap (*A. napellus*), native to mountain slopes in Europe and east to the Himalayas, has been the most important source of this drug, which in ancient times was administered to criminals and has been used in minute amounts for reducing fever or treating neuralgia and for other medicinal purposes.

Monlam Chenmo (in Tibetan Buddhism): *see* Smon-lam chen-mo.

Monluc, Blaise de Lasseran-Massencôme, Seigneur de, Monluc also spelled MONTLUC (b. *c.* 1500, Armagnac, Fr.—d. Aug. 26, 1577, Condom), soldier, a marshal of France from 1574, known for his great military skill and for his *Commentaires,* an autobiography that contained his reflections on the art of war.

The eldest son of an impoverished branch of the great family of Montesquiou, Monluc was brought up as a page at the court of Lorraine. He fought in northern Italy in 1521–22 and was with King Francis I of France at his defeat at Pavia in 1525. As lieutenant of a company he played a brilliant part in the relief of Marseille from the Holy Roman emperor Charles V's siege in 1536, and in Italy he was chiefly responsible for the great victory at Ceresole in 1544. After a period as *maître de camp* ("master of the camp") in the fighting in northeastern France against the English, he became governor of Moncalieri in Piedmont in 1548 and remained in Italy for the next 10 years.

Monluc, engraving
H. Roger-Viollet

When the French Wars of Religion began in 1562, Monluc was a partisan of the Roman Catholic house of Guise. His victory at Vergt (Oct. 9, 1562) broke the Huguenot power in Guyenne, and he later became a powerful force within the league of Roman Catholic nobles in the southwest. Huguenot propaganda gave him a reputation for barbarity that he did not deserve.

In his *Commentaires* (1592; Eng. trans., 1674), he records his successes with frankness, but he does not conceal his mistakes. Militarily he stood for the use of mobile infantry (notably harquebusiers) against cavalry.

Monmouth, city, seat (1836) of Warren county, western Illinois, U.S. Established in 1831, it was named to commemorate the American Revolutionary War battle fought at Monmouth, N.J. (June 28, 1778). Its economy has an agricultural base: livestock, corn (maize), processed meats, and pet foods, with some light manufacturing, chiefly pottery. Monmouth College was founded in 1853. Wyatt Earp, the well-known gunfighter, was born in Monmouth. Inc. village, 1836; city, 1852. Pop. (1990) 9,489.

Monmouth, district, Gwent county, Wales, extending from the River Usk valley in the west to the River Wye valley in the east and including both the plain of Gwent in the south and part of the mountainous Brecon Beacons National Park in the north. It borders the Bristol Channel to the south and the districts of Blaenau Gwent, Torfaen, and Newport to the west; Brecknock to the north; the English districts of South Herefordshire and Forest of Dean to the east. Created in 1974, Monmouth district covers an area of 321 square miles (831 square km).

Constituting the southern end of the Welsh Marches (border country), the region has long been of strategic value as a gateway between England and South Wales. The Normans recognized the importance of the river crossing on the Wye in the area and began construction of Chepstow Castle (in Chepstow) shortly after their landing at Hastings in 1066. The district is primarily agricultural, with dairying important in the Usk valley and on the coastal fringe, while sheep are raised on the uplands. Administrative offices for the district are located in Pontypool, in neighbouring Torfaen district. Abergavenny is a market town with some light engineering and printing. The town of Usk, on the River Usk, is noted for angling. The district has excellent motorway and railway connections with London, the Midlands, and other parts of South Wales. Pop. (1991 prelim.) 75,000.

Monmouth, Welsh TREFYNWY, town, Monmouth district, Gwent county, Wales, at the confluence of the Rivers Wye and Monnow. The town of Monmouth, granted its first royal charter in 1256, became important as the market for a rich agricultural region. Historical features include remains of an 11th-century Benedictine priory, a 13th-century gateway on Monnow Bridge, a boys' school founded in 1614, the 17th-century Wye Bridge, and the Shire Hall (1724). On nearby Kymin Hill a Naval Temple was built (1800) to honour 18th-century admirals. Lord Nelson had many associations with Monmouth, and the town's Nelson Museum houses a fine collection of his relics. Pop. (1981) 7,503.

Monmouth, James Scott, Duke of, DUKE OF BUCCLEUCH, EARL OF DONCASTER, EARL OF DALKEITH, BARON SCOTT OF TINDALE, LORD SCOTT OF WHITCHESTER AND ESKDALE, byname (until 1663) JAMES FITZROY, or CROFTS (b. April 9, 1649, Rotterdam, Neth.—d. July 15, 1685, London, Eng.), claimant to the English throne who led an unsuccessful rebellion against King James II in 1685. Although the strikingly handsome Monmouth had the outward bearing of an ideal monarch, he lacked the intelligence and resolution needed for a determined struggle for power.

Monmouth was the illegitimate son of King Charles II and Lucy Walter. Banished from England because she claimed to be the king's wife, Lucy settled with young James in Paris. In 1662 James was brought to England and installed at court as a favourite of the king, who on Feb. 14, 1663, created him Duke of Monmouth, Earl of Doncaster, and Baron Scott of Tindale and made him a Knight of the Garter. On April 20, Monmouth was married to the wealthy Scottish heiress Anne Scott, Countess of Buccleuch; they were created Duke and Duchess of Buccleuch, and he took the surname of Scott. Even at this early date some Englishmen viewed him as a possible successor to Charles. Since Monmouth was a Protestant, his political opportunities increased when Charles's brother and acknowledged heir, James, Duke of York, converted to Roman Catholicism about 1668.

Monmouth was made captain of the king's guard in 1668 and admitted to the privy council in 1670. During the Anglo-Dutch War of 1672–74, he commanded English troops on the European continent. He became captain general of all the armed forces in England in 1678, and on June 22, 1679, he triumphed over the Scottish Presbyterian rebels at Bothwell Bridge, Lanark. Meanwhile, the succession to the throne had become a burning issue in England, where antipapal hysteria had been aroused by rumours that the Catholics were plotting to seize power. Charles blocked all parliamentary attempts to exclude James from the royal inheritance, and in September 1679 he banished Monmouth from the kingdom. Nevertheless, the duke quickly returned in defiance of his father and set about building up a following. In this crisis Monmouth was championed for the succession by Anthony Ashley Cooper, Earl of Shaftesbury, the leader of the anti-Catholic Whigs in Parliament. In 1682–83 Monmouth became involved in the Whig conspiracy against Charles and James, known as the Rye House Plot. Although pardoned for his part in this enterprise, he was banished from court and took refuge in the Netherlands early in 1684.

Duke of Monmouth, oil painting after W. Wissing, *c.* 1683; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Upon the death of Charles II on Feb. 6, 1685, the Duke of York acceded to power as James II. Monmouth landed at Lyme Regis, Dorset, with 82 followers in June and quickly raised over 4,000 men, but he was unable to rally the gentry to his rebellion. On July 6 his army of peasantry was totally defeated on the plain of Sedgemoor, Somerset. He fled but was soon captured and beheaded.

Monmouth Court House, Battle of (June 28, 1778), indecisive battle in the U.S. War of Independence, fought at Monmouth, N.J.

Having evacuated Philadelphia, the British under Sir Henry Clinton were marching through New Jersey to Sandy Hook. After a 40 hours' halt at Monmouth Court House, the army moved out, leaving a small covering force. In order to strike a vigorous blow at the retreating enemy, American general George Washington ordered Charles Lee, commanding the advance guard, to attack the British rear. When Lee attempted to surround the small force at the courthouse, he was surprised by the arrival of Lord Cornwallis' rear guard, which Clinton had ordered back to resist the attackers. Rather than risk fighting a delaying action on difficult terrain, Lee ordered a retreat but was tardy giving Washington notice. When Washington arrived, he was therefore surprised and indignant to find his Continental forces retreating in much disorder. He immediately rallied the troops and checked the British advances. Cornwallis fell back and withdrew undetected at night, joining the main British army on safe ground. Washington did not follow.

Having about equal forces, both sides claimed to have won victory, but the British claim seems more valid since Clinton was able to complete his march without molestation. Washington presently marched to the Hudson River to join the Continental Army there, while Clinton's forces returned to New York.

Monmouthshire, Welsh SIR FYNWY, county of southeastern Wales. The present county of Monmouthshire borders England to the east, the River Severn estuary to the south, the county boroughs of Newport, Torfaen, and Blaenau Gwent to the west, and the county of Powys to the north. The heart of the county is the plain of Gwent, in the basin of the River Usk, which adjoins the undulating coastal plain along the Severn estuary.

The historic county's position as a border district shaped its past. Monmouthshire was thickly forested in ancient times and was only sparsely settled until conquered by the Romans about AD 75. The Romans built a legionary fortress at Caerleon (Isca Silurum) and a town at Caerwent (Venta Silurum). After the Romans abandoned the area in the late 4th century, the Britons—ancestors of the Welsh—resisted the Anglo-Saxon invaders, but the area periodically fell under Anglo-Saxon control until the Welsh established the kingdom of Gwent. Gwent was conquered by the Anglo-Saxon king Harold II in 1065 and almost immediately thereafter came under the rule of the conquering Normans. The Normans ruled the area as one of the marcher lordships. These landed estates in eastern Wales and western England were independent of the English crown's direct legal control, which gave rise to much lawlessness in the region. In 1536 Henry VIII of England placed the area under English administration, thereby stripping the declining marcher lordships of their power, and created the shire (county) of Monmouth.

The ruins of many of the small medieval castles belonging to the marcher lords still adorn the countryside. Monmouthshire's notable architecture also includes the ruined Cistercian abbey at Tintern and an Augustinian priory at Llanthony.

Monmouthshire is mainly agricultural, but there is a growing light industrial and commercial sector. The Usk river valley and the coastal fringe are important for dairying. The Severn rail tunnel, the Severn cable-stayed bridge (completed 1996), and the Severn suspension bridge connect Monmouthshire and the rest of Wales to southern England. Administrative offices for the county are in neighbouring Cwmbrân. Area present county, 329 square miles (851 square km). Pop. (1998 est.) present county, 86,300.

Monn, Matthias Georg, also called GEORG MATTHIAS MONN, original name JOHANN GEORG MONN, Monn also spelled MANN (b. April 9, 1717, Vienna, Austria—d. Oct. 3, 1750, Vienna), Austrian composer and organist whose compositions mark a transition from the Baroque to the Classical period in music. Monn changed his original name to avoid confusion with his younger brother Johann Christoph Monn (1726–82), who was a pianist and composer.

Little is known about Matthias Monn's early life, but he was a choirboy at the monastery of Klostenburg at the age of 14 or 15, and by 1738 he was organist of Vienna's new St. Charles Church. Although highly respected in Vienna, Monn never became widely known in the rest of Europe, and none of his compositions, which included 21 symphonies and a *missa solemnis,* was performed during his lifetime. One of his symphonies, completed in 1740, is the first known to be composed in four movements using a minuet as the third movement. All the others were in the then-conventional three movements. Monn's clear development sections and complete recapitulations brought to symphonic composition a form previously used only in the sonata.

Monnet, Jean (b. Nov. 9, 1888, Cognac, Fr.—d. March 16, 1979, Houjarray), French political economist and diplomat who, after World War II, initiated comprehensive economic planning in western Europe. He developed a successful plan to rebuild and modernize France's crumbled economy.

During World War I Monnet was the French representative on the Inter-Allied Maritime Commission, and after the war he was deputy secretary-general of the League of Nations (1919–23). After reorganizing his family's brandy business, he became the European partner of a New York investment bank in 1925.

Monnet, 1939
H. Roger-Viollet—Harlingue

At the start of World War II he was made chairman of the Franco-British Economic Coordination Committee. In June 1940 it was he who suggested a Franco-British union to Winston Churchill. After the Franco-German armistice he left for Washington, D.C., and in 1943 he was sent to Algiers to work with the Free French administration there.

After the liberation of France, Monnet headed a government committee to prepare a comprehensive plan for the reconstruction and modernization of the French economy. On Jan. 11, 1947, the Monnet Plan was adopted by the French government, and Monnet himself was appointed commissioner-general of the National Planning Board. In May 1950 he and Robert Schuman, then the French foreign minister, proposed the establishment of a common European market for coal and steel by countries willing to delegate their powers over these industries to an independent authority. Six countries—France, West Germany, Italy, Belgium, The Netherlands, and Luxembourg—signed the treaty in 1951 that set up the European Coal and Steel Community (ECSC). From 1952 to 1955 Monnet served as the first president of the ECSC's High Authority. The ECSC inspired the creation of the European Economic Community, or Common Market, in 1957.

In 1955 Monnet organized the Action Committee for the United States of Europe and served as its president from 1956 to 1975. In 1976 the heads of the nine Common Market governments named Monnet a Citizen of Europe. In the same year, he published his *Mémoires* (*Memoirs,* 1978).

Monnier, Henri (Bonaventure) (b. June 8, 1805, Paris, Fr.—d. Jan. 3, 1877, Paris), French cartoonist and writer whose satires of the bourgeoisie became internationally known.

Monnier studied art with A.-L. Girodet-Trioson and Antoine-Jean, Baron Gros, and was influenced by the work of Honoré Daumier. By 1828 he had established himself as an illustrator and in the 1830s began his satirical writings.

Monnier, obsessed with the pettiness and mediocrity of middle-class life, created the characters Monsieur and Madame Joseph Prudhomme as ideal representatives of the complacent French bourgeoisie. He used them to attack the pretensions and follies of his era in cartoons, stage comedies, and novels. He even portrayed Prudhomme on the stage himself and dressed the part in private life.

Mono, also called MONACHI, either of two Indian groups of central California, U.S., that speak a language belonging to the Numic group of the Uto-Aztecan family and are related to Northern Paiute (*see* Paiute). The Western Mono, who reside in the pine belt of the Sierra Nevada, have a culture similar to that of the nearby Yokuts (*q.v.*). The eastern branch of the Mono—along with the Indians of Owens Valley across the crest, locally called Paiute—are more similar to their neighbours of the Great Basin.

The two divisions historically traded with each other, the Eastern Mono giving salt, piñon nuts, baskets, and poison in return for acorn flour, baskets, and canes for arrows.

Their traditional social organization was simple, consisting of small villages or permanent hamlets of up to 50 or 75 people, organized in patrilineal families and ranging over vaguely defined hunting areas. Although the power of the chief was far from absolute, his consent was required for all major religious or warlike undertakings; his greatest responsibilities were the settlement of disputes and the sanctioning of punishment.

Mono River, river rising near the Benin border, northeast of Sokodé, Togo. It flows 250 miles (400 km) in a meandering course to empty into the Bight of Benin near Ouidah, Benin. For the lower part of its course it forms the border between Togo and Benin. At its mouth it is linked through a channel with Lake Togo, a lagoon south of Akoumapé. The natural vegetation of the undulating clay tableland that the Mono drains has been replaced largely by cultivated areas of corn (maize), cassava, yams, rice, and cotton. Navigation is possible near the river's mouth.

monochord, also spelled MANICHORD, musical instrument consisting of a single string stretched over a calibrated sound box and having a movable bridge. The string was held in place over the properly positioned bridge with one hand and plucked with a plectrum held in the other.

The monochord was used in Greece by the 6th century BC as a scientific instrument for measuring musical intervals. Knowledge of the instrument was transmitted to medieval theorists by the 5th-century-AD philosopher Boethius; the first treatises on it date from the 10th century. By the 11th century it was used as a purely musical instrument. It was eventually modified by the addition of keys that at first marked off sounding lengths on the single string. Several strings were later used, and the instrument evolved into the clavichord by the late 14th century. The name monochord was often applied to the clavichord and later to the trumpet marine (a bowed, single-stringed instrument) and to one-stringed zithers of Southeast Asia. Monochords continued to be used as scientific and teaching tools and, as late as the 18th century, served as organ tuners' aids.

VNICA CHORDA QVA SONI CVIVSLIBET CONSONANTIÆ SIMVL AVDIRI POSSVNT

Man playing a monochord, woodcut from *Musica theorica* by Lodovico Fogliani, Venice, 1529; in the Biblioteca Nazionale Marciana, Venice

By courtesy of the Biblioteca Nazionale Marciana, Venice

monoclinic system, one of the structural categories to which crystalline solids can be assigned. Crystals in this system are referred to three axes of unequal lengths—say, *a, b,* and *c*—of which *a* is perpendicular to *b* and *c,* but *b* and *c* are not perpendicular to each other. If the atoms or atom groups in the solid are represented by points and the points are connected, the resulting lattice will consist of an orderly stacking of blocks, or unit cells. The monoclinic unit cell is distinguished by a single axis, called an axis of 2-fold symmetry, about which the cell can be rotated by 180° without changing its appearance. More solids belong to the monoclinic system than to any other. Beta-sulfur, gypsum, borax, orthoclase, kaolin, muscovite, clinoamphibole, clinopyroxene, jadeite, azurite, and spodumene crystallize in the monoclinic system.

monoclonal antibody, type of antibody produced by genetic-engineering techniques for use in medicine. *See* antibody.

monocotyledon, byname MONOCOT, any plant of the class Liliopsida (Monocotyledoneae), the smaller of the two great groups (the larger of which is the Magnoliopsida, or dicotyledons) of flowering plants, or angiosperms. There are approximately 50,000 species of monocots. Lilies, orchids, palms, irises, and grasses are monocots. Most of them are distinguished by the presence of only one seed leaf, or cotyledon, in the embryo contained in the seed.

Yellow flag (*Iris pseudocorus*), a representative monocotyledonous plant

A to Z Botanical Collection

Monocots most often have flower parts (sepals, petals, stamens, and so on) based on a plan of three or multiples thereof. The leaves are parallel-veined in most, either from the base or from a stout central midrib. In the stem the water- and food-conducting vessels are usually arranged in scattered bundles. About 10 percent of all monocots are woody; some, such as palms and bamboos, show a continual increase in stem diameter as a result of cell enlargement or the production of cells from internal cells (rather than from a cambium layer as in the dicots).

Most monocots are herbaceous. Taproots are uncommon; fibrous roots predominate. Stem branching is uncommon. The microscopic pores (stomates) in the leaf surfaces are usually arranged in parallel rows. The pollen grains of monocots have one germinal furrow, or pore, the monocolpate condition.

Monod, Adolphe-Théodore, in full ADOLPHE-LOUIS-FRÉDÉRIC-THÉODORE MONOD (b. Jan. 21, 1802, Copenhagen, Den.—d. April 6, 1856, Paris, France), Reformed pastor and theologian, considered the foremost Protestant preacher in 19th-century France.

Adolphe-Théodore Monod, lithograph by Étienne Rey

J.P. Ziolo

Born into a Swiss bourgeois family that was noted for successive generations of ministers and preachers, Monod studied theology at Geneva from 1820 to 1824. Following a personal religious crisis, Monod began to emphasize Reformed theological doctrines that he felt had long been neglected, such as the certainty of damnation for those who did not accept biblical truths in seeking salvation. He served as minister at the Reformed church of Naples (1826) before transferring to Lyons, where he was soon dismissed for his insistence on older, traditional Reformed theology, which was not emphasized by his more liberal contemporaries.

Monod consequently founded the Free Evangelical church at Lyon, in 1833, but he left for Montauban three years later to become professor in a seminary of the French Reformed church. In 1847 he succeeded his brother Frédéric as minister at the church of the Oratoire, Paris. Among his writings are *Sermons* (1844), *Saint Paul* (1851), and *Explication de l'épître aux Ephésiens* (1866; "Explication of the Letter to the Ephesians").

Monod, Gabriel (-Jean-Jacques) (b. March 7, 1844, Ingouville, France—d. April 10, 1912, Versailles), historian who helped introduce German historical methodology to France. One of the most scholarly and stimulating teachers of history, he also greatly improved the seminar system.

Monod studied at the universities of Göttingen and Berlin, where he was influenced by Georg Waitz, an exponent of the historical techniques of the renowned German historiographer Leopold von Ranke. Returning to France in 1868, Monod gave lectures on history at L'École des Hautes Études, Paris. After the Franco-Prussian War (1870) he published his own experiences in it as *Allemands et Français* (1871; "The Germans and the French"). Shortly thereafter, he founded the *Revue Historique.*

Named lecturer at the École Normale Supérieure in Paris (1880), Monod was subsequently elected to the Academy of Moral and Political Sciences and professor at the Collège de France, receiving many honours for his outstanding teaching. Among Monod's other studies are the *Études critiques sur les sources de l'histoire de France* (1898) and *Bibliographie de l'histoire de France* (1888), a bibliographic treatment of France in the Middle Ages.

Monod, Jacques (Lucien) (b. Feb. 9, 1910, Paris, France—d. May 31, 1976, Cannes), biochemist who, with François Jacob, did much to elucidate the way in which genes regulate cell metabolism by directing the biosynthesis of enzymes.

In 1961 the two men proposed the existence of a messenger ribonucleic acid (mRNA), a substance whose base sequence is complementary to that of deoxyribonucleic acid (DNA) in the cell. They postulated that the messenger carries the "information" encoded in the base sequence to ribosomes, the sites of protein synthesis; here the base sequence of the messenger RNA is translated into the amino acid sequence of a proteinaceous enzyme (biological catalyst).

In advancing the concept of gene complexes that they called operons, Jacob and Monod postulated the existence of a class of genes that regulate the function of other genes by affecting the synthesis of messenger RNA. For this work, which has been proven generally correct for bacteria, the two men (with André Lwoff) received the Nobel Prize for Physiology or Medicine in 1965.

Monod's book-length essay *Le Hasard et la nécessité* (1970; *Chance and Necessity*) expressed his view that the origin of life and the process of evolution are the result of chance.

monody, style of accompanied solo song in which a melody is accompanied by simple, often expressive, harmonies. It came to the fore about 1600, particularly in Italy, as a response to the contrapuntal style (based on the combination of simultaneous melodic lines) of 16th-century vocal genres such as the madrigal and motet. Ostensibly in an attempt to emulate ancient Greek music, renewed emphasis was placed on proper articulation as well as expressive interpretation of often highly emotional texts, a goal that could be achieved only by abandoning counterpoint and replacing it by simply accompanied recitative.

This new monodic style, pioneered by the Florentine Camerata and other humanistic circles in Italy, quickly grew into the dramatic *stile rappresentativo* of early opera as well as the *concertato* style that revolutionized sacred music shortly after 1600. In both instances the dense textures of 16th-century polyphony yielded to the polarization of treble parts and the ubiquitous basso continuo, or figured bass, played by an instrumentalist or instrumentalists to whom was confided the free execution of the accompaniment in accordance with the harmonic dictates of figures written above the bass part. Giulio Caccini's *Le nuove musiche* (1602; *The New Music*), a collection of solo songs with continuo accompaniment, exemplifies early monody, as do many virtually contemporaneous solo compositions of Claudio Monteverdi. The use of the word monody to designate an unaccompanied melodic line, properly called monophony, is confusing, its long tradition, especially in Great Britain, notwithstanding.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

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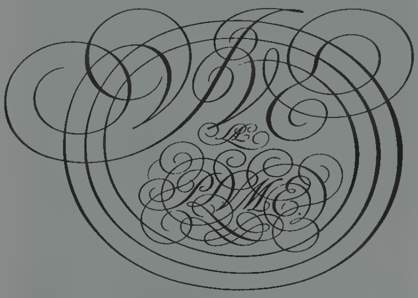
monogamy, the custom that allows a person to be legally married to only one spouse at one time. Appearing in two general forms, monogamy may imply a lifelong contract between two individuals that may be broken only under penalty—as prevails in the Roman Catholic and Hindu prescriptions for marriage—or it may imply that persons are required to be monogamous but may change spouses repeatedly, a practice sometimes called serial monogamy.

monogram, originally a cipher consisting of a single letter, later a design or mark consisting of two or more letters intertwined. The letters thus interlaced may be either all the letters of a name or the initial letters of the given names and surname of a person for use upon note paper, seals, or elsewhere. Many of the early Greek and Roman coins bear the monograms of rulers or towns.

The most famous of all monograms, known as the sacred monogram, is formed by the conjunction of the first two Greek letters of ΧΡΙΣΤΟΣ, meaning Christ, and most usually takes the form ☧, sometimes with the α (alpha) and ω (omega) of the Apocalypse on each side of it. The interlaced I.H.S., also called the sacred monogram, is an abbreviation of the Latin phrase Iesus Hominum Salvator ("Jesus, Saviour of Mankind"). This monogram apparently possesses no great antiquity and is said to have been the creation of St. Bernard of Siena in the mid-15th century.

The Middle Ages were extremely prolific in the invention of ciphers for ecclesiastical, artistic, and commercial use. Monograms or ciphers often were used by the early printers as devices and are of importance in fixing the identity of early printed books. Similar devices have been used by painters, engravers, and ceramicists. Medieval merchants, in lieu of heraldic emblems, frequently employed "merchants' marks," monograms consisting of the owner's initials and a private device. These nearly always contained a cross, either as a protection against storms or other catastrophes or as a Christian mark to distinguish their goods.

Related devices are the colophons used for identification by publishers and printers, the hallmarks of goldsmiths and silversmiths, and the logos adapted by corporations, all usually in a traditional abstract or typographic design.



Monogram by George Bickham, from *Universal Penman,* 1743

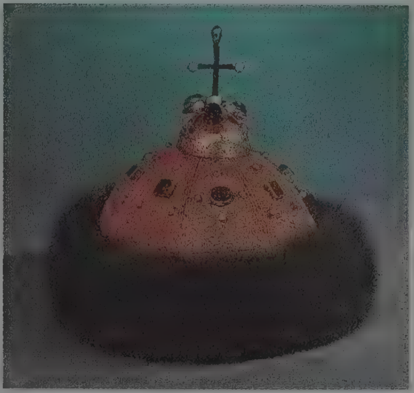
Courtesy of the Newberry Library, Chicago

Monograptus, extinct genus of graptolites (small, aquatic colonial animals related to primitive chordates) found as fossils in Silurian marine rocks (formed 438 to 408 million years ago). The most common Silurian graptolite genus, *Monograptus* is characterized by a single branch, or stipe, in which distinctive features of the structure occur. *Monograptus* descended from the genus *Diplograptus,* a two-branched form. Several forms or species are known and are useful for correlating Silurian rocks in widely separated areas and for further subdividing Silurian time.

monologue, in literature and drama, an extended speech by one person. The term has several closely related meanings. A dramatic monologue (*q.v.*) is any speech of some duration addressed by a character to a second person. A soliloquy (*q.v.*) is a type of monologue in which a character directly addresses an audience or speaks his thoughts aloud while alone or while the other actors keep silent. In fictional literature, an interior monologue (*q.v.*) is a type of monologue that exhibits the thoughts, feelings, and associations passing through a character's mind.

Monomakh's Cap, oldest of the Russian crowns kept in the Kremlin, Moscow. It is a gold skullcap composed of eight sectors elaborately ornamented with a scrolled overlay of gold filigree and bordered with fur.

The cap appears to be Oriental work of the late 13th or early 14th century, but in the 15th century a legend sprang up to the effect that the cap had been given by the Byzantine emperor Constantine Monomachus to Vladimir Monomakh, prince of Kiev, in the 12th century. The finial decoration on the top, the jewels on the sides, and the characteristic broad fur border are later additions, probably dating from the 16th century.



Monomakh's Cap, gold with jewels and fur, 13th–14th century; in the Kremlin, Moscow

Novosti Press Agency

monomer, a molecule of any of a class of compounds, mostly organic, that can react with other molecules of the same or other compound to form very large molecules, or polymers. The essential feature of a monomer is polyfunctionality, the capacity to form chemical bonds to at least two other monomer molecules. Bifunctional monomers can form only linear, chainlike polymers, but monomers of higher functionality yield cross-linked, network polymeric products.

Addition reactions are characteristic of monomers that contain either a double bond between two atoms or a ring of from three to seven atoms; examples include styrene, caprolactam (which forms nylon-6), and butadiene and acrylonitrile (which copolymerize to form the synthetic rubber Buna N). Condensation polymerizations are typical of monomers containing two or more reactive atomic groupings; *e.g.,* a compound that is both an alcohol and an acid can undergo repetitive ester formation involving the alcohol group of each molecule with the acid group of the next, to form a long-chain polyester. Similarly, hexamethylenediamine, which contains two amine groups, condenses with adipic acid, which contains two acid groups, to form the polymer nylon-6,6.

Monongahela, Battle of the (July 9, 1755), in the last French and Indian War, thorough defeat of General Edward Braddock's British army by a smaller force of French and Indians of several tribes led by Captain Daniel de Beaujeu and, after his death, by Captain Jean Dumas. After a slow march from Fort Cumberland in northwest Maryland toward Fort Duquesne (modern Pittsburgh), Pa., the British party met the French and their Indian allies, whose style of fighting won the battle and kept Fort Duquesne in French possession. Unused to fighting except in formations appropriate to European warfare, the British regulars were routed. Of the 1,459 British troops actively engaged, almost 1,000 were killed or wounded. The survivors included George Washington, then a civilian aide-de-camp to Braddock. When Braddock died from battle wounds on July 13, Colonel Thomas Dunbar assumed command of the British remnant and withdrew to Fort Cumberland.

Monongahela River, river formed by the confluence of the Tygart and West Fork rivers in Marion county, W.Va., U.S. It flows 128 miles (206 km) in a northerly direction past Morgantown into Pennsylvania, past Brownsville and Charleroi, joining the Allegheny River at Pittsburgh to become a major headwater of the Ohio River. In its upper reaches the river has a swift current and furnishes hydroelectric power to several cities. The Monongahela, made navigable by means of locks for 106 miles (170 km), is a major barge route, carrying coal, coke, iron, and steel.

mononuclear phagocyte system: *see* reticuloendothelial system.

mononucleosis, formally INFECTIOUS MONONUCLEOSIS, or GLANDULAR FEVER, common infection in humans, believed to be caused by the Epstein-Barr (EB) virus. The disease occurs predominantly in persons from 10 to 35 years old, but it is known to appear at any age. Infection of young children usually causes little or no illness, although it does confer immunity.

Infectious mononucleosis is transmitted primarily by oral contact with exchange of saliva, hence its popular name, "the kissing disease." The incubation period is thought to be about 30 to 40 days. The most common symptoms are malaise and sore throat. Enlargement of the lymph nodes in all parts of the body is frequent; those in the neck are most often affected. Fever is usual. In some cases the only signs of the disease are fever and generalized discomfort; in these cases, the diagnosis is made by study of the blood. The throat is often red; a membrane, white to dark gray in colour and resembling that of diphtheria, may be present; ulceration of the pharynx occurs occasionally. There is a petechial rash on the soft palate in many cases.

In about two-thirds of patients, the spleen is enlarged; death has occurred in rare cases from rupture of this organ. A rash consisting of multiple small hemorrhages or resembling that of measles or scarlet fever sometimes appears. Pneumonia is present in about 2 percent of the cases. Involvement of the liver, as shown by chemical tests, is almost universally present; severe disease of the liver with jaundice is rare. Encephalitis, meningitis, or peripheral neuritis occurs uncommonly; death has followed the encephalitis. The heart is rarely affected. Swelling of the upper eyelids is a common finding. In rare cases the urine may contain blood.

Infectious mononucleosis usually lasts for about 7 to 14 days. In some instances it may persist for several weeks, especially when the liver or nervous system is affected. Relapse occurs uncommonly, and second attacks are probably very rare. There is no specific therapy. Antibiotics are of value only for the secondary bacterial infections of the throat that occur in some cases.

monophony, musical texture made up of a single unaccompanied melodic line. It is a basic element of virtually all musical cultures. Byzantine and Gregorian chants (the music of the medieval Eastern and Western churches, respectively) constitute the oldest written examples of monophonic repertory. In the later Middle Ages in Europe, the primarily secular songs of Provençal troubadours, French trouvères, and German minnesingers and meistersingers kept the tradition alive, although their performances often featured improvised accompaniment.

Monophony is not to be confused with monody, a term reserved specifically for the accompanied solo song of the early 17th century, the so-called second practice initiated by the Florentine Camerata and perfected by the composer Claudio Monteverdi in a conscious effort to break with the vocal polyphony of the Renaissance era. Ironically, it was sacred polyphony in its highest manifestations (as by Giovanni Pierluigi da Palestrina) that modeled itself aesthetically upon the monophony of the Roman Catholic church with its continuous melodic rhythmic flow untainted by metrical intrusions of secular derivation.

monophysite, in Christianity, one who believed that Jesus Christ's nature remains altogether divine and not human even though he has taken on an earthly and human body with its cycle of birth, life, and death. Monophysite doctrine thus asserted that in the Person of Jesus Christ there was only one (divine) nature rather than two natures, divine and human, as asserted at the Council of Chalcedon in 451. In the development of the doctrine of the Person of Christ during the 4th, 5th, and 6th centuries, several divergent traditions had arisen. Chalcedon adopted a decree declaring that Christ was to be "acknowledged in two natures, without being mixed, transmuted, divided, or separated." This formulation was directed in part against the Nestorian doctrine—that the two natures in Christ had remained separate and that they were in effect two Persons—and in part against the theologically unsophisticated position of the monk Eutyches, who had been condemned in 448 for teaching that, after the Incarnation, Christ had only one nature and that, therefore, the humanity of the incarnate Christ was not of the same substance as that of other men. Political and ecclesiastical rivalries as well as theology played a role in the decision of Chalcedon to depose and excommunicate the patriarch of Alexandria, Dioscorus (d. 454). The church that supported Dioscorus and insisted that his teaching was consistent with the orthodox doctrine of St. Cyril of Alexandria was labeled monophysite.

The label also was attached to various theologians and groups, although some who were called monophysite, notably Severus of Antioch (d. 538), repudiated the terminology of Chalcedon as self-contradictory. Most modern scholars agree that Severus as well as Dioscorus probably diverged from what was defined as orthodoxy more in their emphasis upon the intimacy of the union between God and man in Christ than in any denial that the humanity of Christ and that of mankind are consubstantial.

In modern times, those churches usually classified as monophysite (the Armenian Apostolic, Coptic Orthodox, Ethiopian Orthodox, and Syrian Orthodox) are generally accepted by Roman Catholic, Eastern Orthodox, and Protestant Christendom as essentially orthodox in their doctrine of the Person of Jesus Christ.

monoplacophoran (class Tryblidia), any of a group of primitive marine mollusks characterized by a single, cap-shaped shell and bilateral symmetry. The term Tryblidia is preferred over Monoplacophoran and Galeroconcha, because both latter terms are taken to include several fossil groups of uncertain relationships.

In 1952 several live monoplacophorans were dredged from a depth of 3,570 m (about 11,700 feet) off the coast of Costa Rica. Until then it was thought that they had become extinct 400,000,000 years ago. Existing monoplacophorans are represented by fewer than 10 species, including *Neopilina galatheae, N. ewingi,* and *N. valeronis.* They have been found to depths of about 5,800 m off the coasts of Central and South America.

Monoplacophorans are unusual because of the combination of primitive characteristics that they possess. In addition to the single, cap-shaped shell, they have paired multiple organs, reflecting at least partial segmentation (metamerism). The gill structure and the type of metamerism suggest a much closer affinity of the mollusks with the annelid worms than was previously believed to exist; these features may also associate the mollusks more closely with the arthropods (*e.g.,* insects, crustaceans).

monoplane, type of aircraft with a single pair of wings. The monoplane design has been nearly universally adopted over multiplane configurations because airflow interference between adjacent wings reduces efficiency. The first monoplane was constructed by the Romanian inventor Trajan Vuia in 1906, but it failed to fly. Louis Blériot of France built the first operative monoplane in 1907 and flew it across the English Channel two years later. Monoplane design proved itself conclusively during World War II, and since then the craft has completely supplanted the biplane except for special purposes. *Compare* biplane.

Monopleura, genus of extinct and unusual bivalves (clams) found as fossils in Cretaceous rocks (144 to 66.4 million years old) and representative of a group of aberrant clams known as the pachyodonts. The thick, triangular shell in *Monopleura* is capped by a much smaller dome-shaped shell. In some of the pachyodonts, there were open passageways through the shell that allowed for the passage of fluids. *Monopleura* and other pachyodonts were sedentary in habit; the animal apparently grew upright with the pointed end anchored in the substrate.

Consult the INDEX *first*

monopolistic competition, market situation in which there may be many independent buyers and many independent sellers but in which competition is imperfect because of product differentiation, geographical fragmentation of the market, or some similar condition. The theory was developed almost simultaneously by the American economist Edward Hastings Chamberlin in his *Theory of Monopolistic Competition* (1933) and by the British economist Joan Robinson in her *Economics of Imperfect Competition* (1933).

The theory encompassed a variety of market phenomena including product differentiation, a situation in which each seller carries goods that have some unique properties in the view of the consumer (brand names, special ingredients, accompanying customer services, etc.) so that the seller may be considered to have a partial monopoly. Also analyzed were oligopoly, which is characterized by an industry composed of a small number of large firms; discriminating monopoly, in which a given item is sold at different prices to different customers; and monopsony, in which there is a single (monopolistic) buyer. Because the bulk of business in developed capitalist economies is conducted under conditions of product differentiation or oligopoly, the enthusiasm with which the analysis was received was understandable. Unfortunately, the theory involved difficult problems that prevented its integration into the body of economic analysis.

monopoly, the exclusive possession of a market by a supplier of a product or a service for which there is no substitute. In this situation, the supplier is able to determine the price of his product without fear of competition from other sources of his or substitute products. It is generally assumed that he will choose a price that maximizes profits.

A brief treatment of monopoly follows. For full treatment, *see* MACROPAEDIA: Economic Theory.

Monopoly as defined above is better termed absolute monopoly and is the opposite of perfect competition. Perfect competition exists when there are large numbers of sellers and buyers of a homogeneous commodity. Each seller accounts for a relatively small share of the market; he cannot, therefore, influence the market price by varying his output, and he cannot increase his price above the market price because buyers would shift to other producers. Although the concepts of absolute monopoly and perfect competition are useful for the purpose of illustrating economic principles, they seldom if ever occur in reality, where actual conditions range between the extremes of near monopoly and nearly perfect competition. In common usage the term monopoly is often employed to signify a state in which the degree of competition is restricted (but still present), whereas competition is used to denote a state in which competition is less restricted (but still not perfect). The precise dividing line between monopoly and competition used in this way is a question of definition. One generally accepted definition of monopoly is that embodied in British antimonopoly legislation, according to which a monopoly exists if at least one-third of the supply of a particular product or service is controlled by one enterprise or by several enterprises acting in concert with a view to restricting competition. Another name for a market in which a small number of sellers may each substantially affect prices and one another's behaviour is oligopoly. Oligopolists often tend to act in concert or, when permitted by law, to form cartels with formal agreements on prices and supplies.

The arguments in favour of monopolies are largely concerned with efficiencies of scale in production, as for example the arguments that in large-scale, integrated operations, efficiency is raised and production costs are reduced; that by avoiding wasteful competition, monopolies can rationalize activities and eliminate excess capacity; that by providing a degree of future certainty, monopoly makes possible meaningful long-term planning and rational investment and development decisions. Against these are the arguments that, because of its power over the marketplace, the monopoly is likely to exploit the consumer by restricting production and variety and by charging higher prices in order to extract excess profits; and that, in fact, the lack of competition may well work against efficiency and lower production costs, with the result that the factors of production are not used in the most economical manner.

It has been one of the principles of free-enterprise economic philosophies that monopolies are, as a general rule, undesirable and need to be strictly controlled. This is not to say that the advantages of monopolistic supply in certain specific areas have not been recognized; it is rather a case of ensuring that monopolies are restricted to these areas and, at the same time, taking the necessary steps to prevent them from exploiting the consumer. A case in point is the natural-gas industry. It is clear that a situation in which individual consumers could obtain their gas supply from competing companies, through competing pipelines and distribution systems, would be a highly wasteful form of competition. The idea of a single supplier, therefore, makes sense in economic terms. In order to prevent the consumer from being exploited, the monopoly's ability to control prices and supply needs to be restricted. This has generally been the view taken of firms operating as "public utilities" or in technical fields that invite a "natural monopoly."

Accordingly, most free-enterprise economic systems have an elaborate framework of laws and regulations aimed at controlling monopoly. The oldest and probably the most vigorous monopoly control legislation is represented in the U.S. antitrust laws. Consisting primarily of the Sherman and Clayton antitrust acts and the Celler-Kefauver Act, they are aimed at preventing agreements among suppliers, the effect of which would be to limit competition, and at preventing mergers between and acquisitions by and of firms, the result of which would be to lessen competition or to create a monopoly. The legislation provides for stiff civil and criminal penalties, and most administrations have tended to enforce the laws vigorously. In areas where monopoly is countenanced, such as in public utilities, a considerable degree of public control is exercised to ensure that monopoly power is not abused. In the United States, any agreement or act that limits competition is regarded as undesirable, but in Great Britain and other west European countries such acts are accepted if they can be demonstrated to be in, or not to be against, the public interest. In general terms, the degree of monopoly tends to be relatively small in the United States; it is considerably more pronounced in Britain, France, and other parts of Europe, where among operating monopolies are a large number of state-owned enterprises.

Monopoly, real-estate board game for two to eight players, in which the player's goal is to remain financially solvent while forcing his opponents into bankruptcy by buying and developing pieces of property.

Each side of the square board is divided into 10 small rectangles representing specific properties, railroads, utilities, a jail, and various other places and events. At the start of the game, each player is given a fixed amount of play money; the players then move around the board according to the throw of a pair of dice. If a player lands on an unowned property, he may buy it; if he lands on a property owned by another player, he must pay rent to that player. Certain nonproperty squares require the player landing on them to draw a card that may be favourable or unfavourable. If a player acquires a monopoly—that is, all of a particular group of properties—he may purchase improvements for those properties; improvements add substantially to a property's rental fee. A player continues to travel around the board until he is bankrupt, at which point he is eliminated from the game. The last player remaining on the board is the winner.

Monopoly, which is the best-selling privately patented board game in history, originated in the United States. It has become popular in many other parts of the world. In the original North American sets, the properties were named for streets in Atlantic City, N.J. Sets marketed in other countries may be modified to represent a local city; for example, London streets are used in the British version.

monoprint (printmaking): *see* monotype.

monopsony, in economic theory, market situation in which there is only one buyer. An example of pure monopsony is a firm that is the only buyer of labour in an isolated town. Such a firm is able to pay lower wages than it would under competition. Although cases of pure monopsony are rare, monopsonistic elements are found wherever there are many sellers and few purchasers.

monorail, railway that runs on a single rail. This rail may be located either above or beneath the railway cars. In systems that employ an overhead rail, the cars are supported by wheeled axles that run on the overhead rail. The system is gyroscopically stabilized. In those systems that use an undercarriage rail, the cars are stabilized by guide wheels or gyroscopically.

Experimental but not revolutionary in concept, monorail systems were first introduced in the early 20th century. In most cases, the system is propelled by conventional electric traction motors. Tokyo has a commercial monorail running from midcity to its Haneda airport, and a public transit monorail line operates in Seattle. Disneyland amusement park in California, U.S., also has a monorail.

The Greater London Council concluded in a study of potential monorail systems for London that they offered no advantages over the usual rail systems. Critics maintain that monorails involve greater cost, unsightliness, passenger inconvenience, low speed, and inefficient switching of cars.

Seattle Center Monorail in downtown Seattle, Wash.

By courtesy of the Seattle Center, Washington

monosaccharide, also called SIMPLE SUGAR, any of the basic compounds that serve as the building blocks of carbohydrates. Monosaccharides are polyhydroxy aldehydes or ketones; that is, they are molecules with more than one hydroxyl group ($-OH$), and a carbonyl group ($C{=}O$) either at the terminal carbon atom (aldose) or at the second carbon atom (ketose). The carbonyl group combines in aqueous solution with one hydroxyl group to form a cyclic compound (hemi-acetal or hemi-ketal). Monosaccharides are classified by the number of carbon atoms in the molecule; trioses have three, tetroses four, pentoses five, hexoses six, and heptoses seven. Most contain five or six. The most important pentoses include xylose, found combined as xylan in woody materials; arabinose from coniferous trees; ribose, a component of ribonucleic acids and several vitamins; and deoxyribose, a component of deoxyribonucleic acid. Among the most important aldohexoses are glucose, mannose, and galactose; fructose is a ketohexose.

Several derivatives of monosaccharides are important. Ascorbic acid (vitamin C) is derived from glucose. Important sugar alcohols (alditols), formed by the reduction of (*i.e.,* addition of hydrogen to) a monosaccharide, include sorbitol (glucitol) from glucose and mannitol from mannose; both are used as sweetening agents. Glycosides derived from monosaccharides are widespread in nature, especially in plants. Amino sugars (*i.e.,* sugars in which one or two hydroxyl groups are replaced with an amino group, $-NH_2$) occur as components of glycolipids and in the chitin of arthropods.

monosodium glutamate (MSG), also called MONOSODIUM L-GLUTAMATE, or SODIUM GLUTAMATE, white crystalline substance, a sodium salt of the amino acid glutamic acid, that is used to intensify the natural flavour of certain foods. MSG was first identified as a flavour enhancer in 1908 by Kikunae Ikeda of Japan, who found that soup stocks made from seaweed contained high levels of the substance. His discovery led to the commercial production of MSG from seaweed; it is now produced using a bacterial fermentation process with starch or molasses as carbon sources and ammonium salts as nitrogen sources. MSG is an important ingredient in the cuisines of

China and Japan. The substance is naturally present at high levels in tomatoes and Parmesan cheese.

MSG elicits a unique taste, known as *umami,* that is different from the four basic tastes (bitter, salty, sour, sweet). MSG does not enhance the basic tastes, but it does enhance the complex flavours of meat, poultry, seafood, and vegetables. It is used commercially in broths, soups, canned and frozen vegetables, flavouring and spice blends, gravies, meats, poultry, sauces, and in other combinations. It is also used to enhance the taste of tobacco and has been used medically to treat hepatic coma.

There have been reports that, when ingested in large amounts, monosodium glutamate may produce such physical reactions as burning sensations, facial tightness or pressure, and a tingling sensation in some individuals. This hypersensitive reaction, first reported in 1968, is commonly called "Chinese restaurant syndrome" because cooks in some Chinese restaurants may use MSG extravagantly. Subsequent studies have shown no conclusive link between the syndrome and the consumption of normal levels of MSG, however.

monotheism, belief in the existence of one god, or in the oneness of God. As such, monotheism is distinguished from polytheism, the belief in the existence of many gods, and from atheism, or the belief that there is no god. Monotheism characterizes the traditions of Judaism, Christianity, and Islām, and elements of the belief are discernible in numerous other religions.

A brief treatment of monotheism follows. For full treatment, *see* MACROPAEDIA: Religious and Spiritual Belief, Systems of.

In the three great monotheistic religions, the essence and character of God are believed to be unique and fundamentally different from those of gods found in other religions. God is viewed as the creator of the world and of humanity. Moreover, he has not abandoned his creation but continues to lead it through his power and wisdom. God has created not only the natural world but also the ethical order to which humanity ought to conform. God is holy and is the source of the highest good. He is supreme and unique in both his being and his worth. Such a monotheistic belief system results in the rejection of all other belief systems as false religions, and this rejection partly explains the exceptionally aggressive or intolerant stance of monotheistic religions throughout history.

Evidence in the Hebrew scripture indicates that the Israelites practiced monolatry (*i.e.*, the worship of one god without denying the existence of other gods). However, Israel's enthusiastic confession of Yahweh as the one God and its rejection of other gods make it more appropriate to label the religion of Israel as monotheistic, and thus also the hellenistic and rabbinic Judaism that developed from it.

The Islāmic interpretation of monotheism is more literal and uncompromising than that of any other religion. Allāh is confessed as being one, eternal, unbegotten, unequaled, and beyond partnership of any kind.

The trinitarian creed of Christianity, on the other hand, sets it apart from the two other classical monotheistic religions. Although the Bible of Christians includes no assertions about God that are specifically trinitarian, it does invoke the name of the Father, Son, and Holy Spirit in triadic liturgical formulas. The early church, in reflecting upon the reality of God as related to Jesus, developed a theological language about the Trinity, speaking of three Persons that are one in substance.

Historians of religion have given much attention to the reform of Egyptian religion as effected by the pharaoh Akhenaton (Amenophis IV) in the 14th century BC. It is generally agreed that Akhenaton's theology, if not full monotheistic, in any case strongly tended toward monotheism.

Monothelite, any of the 7th-century Christians who, while otherwise orthodox, maintained that Christ had only one will. The Monothelites were attempting to resolve the question of the unity of Christ's person on the basis of the firmly established doctrine of the two natures, divine and human, in the person of Christ.

The controversy originated in the attempts by the Byzantine emperor Heraclius to win back for the church and empire the excommunicated and persecuted Monophysites, or Eutychians, of Egypt and Syria, who taught that Christ had only one nature. In Armenia in 622, Heraclius first suggested to the head of the Severian Monophysites that the divine and human natures in Christ, while quite distinct in his one person, had but one will (*thelēma*) and one operation (*energeia*). Sergius, patriarch of Constantinople, was a strong upholder of the doctrine and was the emperor's adviser on the question. In 638 Heraclius issued the *Ekthesis* ("Statement of Faith"), which formulated the position. This led to such intense controversy that Heraclius' successor, Constans II, issued an edict in 648 forbidding all discussion of the question. This secured silence, despite the protest of the Western church at the Lateran Council of 649.

When Constantine IV became emperor in 668, the controversy was revived, and the new emperor summoned a general council, which met at Constantinople in 680. It was preceded in the same year by a synod under Pope Agatho at Rome. According to Agatho, the will is a property of the nature, so that, as there are two natures, there are two wills; but the human will determines itself ever conformably to the divine and almighty will. The third Council of Constantinople condemned Monothelitism and asserted two wills and two operations in the person of Christ.

monotreme, a member of the mammalian order Monotremata, an order of primitive, egg-laying mammals that includes the platypus and two species of spiny anteaters. These are, in fact, the only monotremes still in existence and the only surviving members of the subclass Prototheria.

A brief treatment of monotremes follows. For full treatment, *see* MACROPAEDIA: Mammals.

Although they resemble reptiles in that they lay eggs, the monotremes are true mammals. They possess such distinctively mammalian characteristics as mammary glands, hair, a large brain, and a complete diaphragm. They range in body length from about 30 to 80 cm (12 to 32 inches) and weigh from about 1 to 10 kg (2 to 22 pounds). The three living monotremes are the platypus (*Ornithorhynchus anatinus*), one of the most remarkable of all mammals with its ducklike "bill," webbed feet, and a flattened beaverlike tail, and the echidnas, or spiny anteaters (*Tachyglossus aculeatus* and *Zaglossus bruijni*), which have sharp-pointed spines and tubelike noses. The platypus is found in eastern Australia; *Tachyglossus,* the short-nosed echidna, is found throughout Australia and in New Guinea, while *Zaglossus,* the long-nosed echidna, is found only in New Guinea.

The amphibious platypus digs winding burrows 5 to 10 m (15 to 30 feet) long in the banks of the streams and lakes where it lives. It feeds mainly on insect larvae, small crayfish, tadpoles, and other aquatic animals. It has few natural enemies.

The echidnas are generally solitary. *Tachyglossus* is seldom encountered by humans, although it is one of the most widely distributed animals in Australia. It lives in forests, scrubland, and deserts. When threatened, these anteaters have a remarkable ability to dig vertically into the ground and cover themselves with dirt. They also can draw in their appendages and erect their spines for defense. *Zaglossus* lives in the cloud-covered humid forests of New Guinea. Little is known of monotreme social behaviour.

One of the most remarkable features of the monotremes is that they lay eggs. In the breeding season the female platypus usually lays two leathery-shelled eggs. The period from mating to egg laying is probably about 12 to 14 days, and the incubation period is an additional 12 days. The mother has no teats; the young suck the milk through the mother's skin as it is exuded from the mammary glands. In the echidna the period between copulation and egg laying is at least 16 days; the incubation period is about 10 days. In the breeding season the female develops an abdominal pouch into which the egg is apparently laid directly. One egg is usually laid at a time. After hatching, the young echidna lives for a short period in the pouch, but it continues to suckle for some time even after it leaves the pouch. Like the platypus, the echidna has no teats, and the young get milk through the skin.

The monotremes have no living relatives. Little is known of their ancestry; the earliest fossil monotremes found in Australia are only about 2,000,000 years old and differ little from contemporary species. Most authorities believe that the order Monotremata originated from a line of mammallike reptiles different from that which gave rise to the other mammals.

Monotype (trademark), in commercial printing, typesetting machine patented by Tolbert Lanston in 1885 that produces type in individual characters, unlike Linotype, which sets type an entire line at a time. A Monotype machine consists of a 120-key keyboard, a caster, and a replaceable matrix case divided into quadrants, each holding one complete type font. Using shift keys, the operator can select characters from any quadrant and can mix typefaces among the four fonts without changing cases. The operator types out characters and spacing to produce a paper ribbon perforated to indicate characters and spacing. The ribbon is placed on the caster, which "reads" the perforations and automatically casts the individual characters in succession.

Like the Linotype, Monotype has been almost completely superseded by photocomposition (*q.v.*). Monotype was more versatile than Linotype and better suited to complicated copy, such as mathematical equations and chemical formulas. Special symbols were easily incorporated into the cases that held type fonts. Because it was slower and more expensive to operate than Linotype, it was rarely used for setting solid text copy.

monotype, also called MONOPRINT, in art printmaking, a technique that generally yields only one good impression from each prepared plate. Monotypes are prized because of their unique textural qualities. They are made by drawing on glass or a plate of smooth metal or stone with a greasy substance such as printer's ink or oil paint. Then the drawing is pressed by hand onto a sheet of absorbent paper or is printed on an etching press. The pigment remaining on the plate is usually insufficient to make another print unless the original design is reinforced. Further, any subsequent prints will invariably differ from the first one, because variations in repainting and printing are inevitable. Since each is unique and hand executed, monotypes cannot be considered a technique of multiple replication. But, because they are prints on paper, they are usually classed with printmaking media.

One of the earliest artists to explore the technique was Giovanni Benedetto Castiglione (*c.* 1610–65), who made monotypes from copper etching plates. In the 19th century, the En-

"Woman Reading," monotype by Edgar Degas; in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., Rosenwald Collection

glish poet and artist William Blake and the French artist Edgar Degas experimented with the technique.

Monrad, Ditlev Gothard (b. Nov. 24, 1811, Copenhagen—d. March 28, 1887, Nyköping, Den.), clergyman, politician, a leader of the mid-19th-century Danish political reform movement and a member of several post-1848 governments.

Suffering a crisis of faith while still a theology student, Monrad eventually recovered his faith, at the same time committing himself to political liberalism. As a Lutheran minister, he took part in the reform movement of the 1830s and 1840s, calling for a limitation on the monarchy as well as for a parliamentary government. With Orla Lehmann he presided over the National Liberal Party, which was founded in the 1840s, and he headed the government formed after the March 1848 demonstrations had forced the King to call for a constitution to limit his own regime. Monrad served as minister of culture from March to November 1848.

Unable to support wholeheartedly his party's policy of annexing the duchy of Schleswig by means of the 1848–50 Schleswig War, Monrad resigned. Henceforth, he endeavoured to achieve the widest possible democratic participation in the constitutional assembly of 1848–49. Named a bishop in 1848, he was a member of Parliament from 1849 to 1865 and again joined a National Liberal government in 1859, serving as minister of culture and interior minister. Becoming prime minister in 1863, he led Denmark into the disastrous Danish–German War (1864). Generally blamed for Denmark's defeat, he was dismissed in July 1864. After several years in New Zealand he returned to Denmark, serving once more in Parliament from 1882 to 1886, in opposition to the right-wing government of J.B.S. Estrup.

Monrad, Marcus Jakob (b. Jan. 19, 1816, Nøtterøy, Nor.—d. Dec. 31, 1897, Kristiania), 19th-century Norway's foremost philosopher, who was also a conservative champion of Swedish–Norwegian union.

A proponent of the idealistic interpretation of the philosophy of Hegel, Monrad vigorously opposed Left Hegelianism and the materialistic, revolutionary interpretation of that philosophy, as well as other liberal and radical trends. In 1851 he began a long career as a professor of philosophy at the university in Christiania (afterward Kristiania, now Oslo).

Monrad supplemented his lectures and such books as *Tankeretninger i den nyere tid* (1874; "Thought Trends of the New Time") and *Aesthetik* (1889–90) with attacks in the daily press against the attempts of the Norwegian Parliament to gain greater control of the royally appointed government and to loosen the ties uniting it with Sweden. In 1882 Monrad responded to the political progress of the liberals by calling, in an anonymous newspaper article, for a coup d'etat to restore the conservative regime and the supremacy of the king of Sweden and Norway.

Monreale, town and archiepiscopal see, Palermo province, northwestern Sicily, Italy, on the slope of Monte (mount) Caputo overlooking the valley of the Conca d'Oro (Golden Shell), just inland from Palermo. The town grew up around an important Benedictine monastery, chartered in 1174 and richly endowed by its founder, King William II of Sicily. Its abbot held episcopal and, after 1183, archiepiscopal rights. Little now remains of the monastic buildings except the splendid cloister (with 216 marble columns) adjacent to the cathedral. The cathedral (1174–89) is one of the richest and most beautiful churches in Italy, combining Norman, Byzantine, Italian, and Saracen styles. Particularly notable is the interior mosaic decoration, one of the largest in existence. It was created in less than 10 years by a group of craftsmen trained in Byzantium. The subjects of the mosaics include an Old Testament cycle, the miracles of Christ, the life of Christ, and the lives of SS. Peter and Paul. Near Monreale, in the village of San Martino delle Scale, is the famous Benedictine abbey of S. Martino, founded by Pope St. Gregory I the Great in the 6th century, restored in 1346, and extended in 1770. Its church dates from the 16th century.

Monreale, Sicily, with Monte Caputo in the background

SCALA—Art Resource/EB Inc.

Monreale is a market centre for the citrus fruit and olives of the Conca d'Oro. Pop. (1981 prelim.) mun., 24,054.

Monro family, a family of three Scottish physicians—father, son, and grandson—who lifted Edinburgh University to international prominence as a centre of medical teaching in the 18th and 19th centuries. The Monros, all named Alexander and differentiated as *primus, secundus,* and *tertius,* held the chair of anatomy at Edinburgh for 126 years (1720–1846) without interruption. They exerted a great influence on medicine by contributing to the education of physicians and surgeons throughout the world besides making important additions to scientific knowledge.

Alexander *primus* (b. Sept. 8, 1697, London—d. July 10, 1767, Edinburgh) was the son of an army surgeon who later moved to Edinburgh, where Alexander received the M.D. degree. He then studied in Paris and Leiden before returning in the fall of 1719 to Edinburgh. There he was appointed professor of anatomy and surgery, beginning his lectures in the winter of 1720. He was not formally inducted into the professorship, however, until 1725. Alexander *primus* came to be known as an interesting lecturer who never used notes. In his lifetime he published two books and 53 separate papers; his writings were collected in one volume as *Works* (1781) by Alexander *secundus.* His anatomical preparations were outstanding. Though not a surgeon, he was greatly interested in surgery and advanced many new ideas in surgical instruments and dressings. Of his eight children, four of whom died when young, Donald (1727–1802) and Alexander *secundus* entered medicine. Alexander *primus* resigned his professorship in 1764.

Alexander *secundus* (b. May 22, 1733, Edinburgh—d. Oct. 2, 1817, Edinburgh) was only in his second year of medical study at Edinburgh in 1753 when he began giving the evening lectures for his father. On July 12, 1755, he was appointed coadjutor to his father. In that same year he received his M.D. degree and then continued his education in London, Paris, Leiden, and Berlin for two years before returning to Edinburgh, where he was appointed professor in 1758. Alexander *secundus* lectured from 1759 to 1807, being assisted by his son from 1800 to 1807. Of the three Monros, Alexander *secundus* is judged the greatest teacher and anatomist. His classes were well attended by students from all over the world, and his researches covered pathology and physiology as well as anatomy.

Alexander *tertius* (b. Nov. 5, 1773, Edinburgh—d. March 10, 1859, Craiglockheart, near Edinburgh) received the M.D. degree from Edinburgh in 1797. He then studied in London and Paris, returned to Edinburgh in 1800, and in that year was appointed conjointly with his father. Alexander *tertius* gave the entire course beginning in 1808 because of his father's illness and became sole professor in 1817. He resigned in 1846. Alexander *tertius* did not rank with his father or grandfather as a teacher or scientific investigator, choosing largely to make use of the notes handed down to him. None of his works was of permanent value.

Monroe, city, seat of Ouachita parish, northeastern Louisiana, U.S., on the Ouachita River. It was founded in 1785, when a group of French pioneers from southern Louisiana under Jean-Baptiste Filhiol, a Frenchman in the Spanish service, established Ft. Miro as a trading post on a land grant obtained from King Charles X of Spain. It was renamed in 1819 to honour the arrival of "James Monroe," the first steamboat to ascend the river. Monroe, along with West Monroe, across the Ouachita, is a focus of manufacturing and commerce for the surrounding rural parishes, which raise cattle. The nearby large Monroe gas field supports chemical and carbon-black industries. The city is the seat of Northeast Louisiana State University (1931). Inc. 1820. Pop. (1990) city, 54,909; Monroe MSA, 142,191.

Monroe, city, seat (1817) of Monroe county, southeastern Michigan, U.S., on the Raisin River, at its mouth on Lake Erie, between Detroit (northeast) and Toledo, Ohio (12 mi [19 km]) southwest. Founded by French Canadians in the 1780s, it was called Frenchtown until 1817, when it was renamed for Pres. James Monroe. It was the scene of the Raisin River Massacre (Jan. 23, 1813) of Gen. James Winchester's U.S. troops by Indians allied with England, and in 1835 it figured prominently in the Toledo War (a bloodless boundary dispute between Ohio and Michigan). Economic factors include shipping activities and diversified manufactures, notably paper products and automobile parts. Monroe was once the home of Lieutenant Colonel George A. Custer, and his mementos are in the Monroe County Historical Museum. Monroe County Community College opened in 1964. Inc. village, 1827; city, 1837. Pop. (1994 est.) 23,417.

Monroe, Bill, byname of WILLIAM SMITH MONROE (b. Sept. 13, 1911, Rosine, Ky., U.S.—d. Sept. 9, 1996, Springfield, near Nashville, Tenn.), American singer, songwriter, and mandolin player who invented the bluegrass style of country music.

Monroe began to play professionally in 1927 in a band led by his older brothers Birch and Charlie. In 1930 they moved to Indiana, and in 1932 they joined a barn-dance touring show; their reputation grew, and, since Birch did not like to travel, Bill and Charlie maintained the act as a duet, touring widely from Nebraska to South Carolina. In 1936 they made their first recordings on the RCA Victor label, and they recorded 60 songs for Victor over the next two years. In 1938 Bill and Charlie decided to form separate bands. Bill's band, the Blue Grass Boys, auditioned for the Grand Ole Opry on radio station WSM in Nashville, Tenn., and became regular performers on that program.

Monroe's bluegrass sound emerged fully in 1945, when banjoist Earl Scruggs and guitarist Lester Flatt joined his band. The Blue Grass Boys established the classic makeup of a bluegrass group—mandolin, fiddle, guitar, banjo, and upright bass—and bequeathed the band's name to the genre itself. Bluegrass was characterized by acoustic instruments; a driving syncopated rhythm; tight, complex harmonies; and the use of higher keys—B-flat, B, and E rather than the customary G, C, and D. The band played traditional folk songs and Monroe's own compositions, the most famous of which was "Blue Moon of Kentucky." Monroe's own high, mournful tenor and breakneck-tempo mandolin playing set the standard for other bluegrass performers.

The Blue Grass Boys enjoyed wide popularity, and Scruggs and Flatt quit in 1948 in order to form their own influential bluegrass band. Soon other bands playing this style of music began to appear, many of them led by former members of Monroe's band such as Sonny Osborne, Carter Stanley, Don Reno, Jimmy Martin, and Mac Wiseman. Bluegrass was promoted at numerous annual festivals, such as the one founded by Monroe in 1967 at Bean Blossom, Ind. He continued to perform until shortly before his death.

Monroe, Harriet (b. Dec. 23, 1860, Chicago, Ill., U.S.—d. Sept. 26, 1936, Arequipa, Peru), American founder and longtime editor of *Poetry* magazine, which, in the first decade of its existence, became the principal organ for modern poetry of the English-speaking world.

Educated at the Visitation Convent, Washington, D.C., Monroe worked on various Chicago newspapers as an art and drama critic while privately writing verse and verse plays in the genteel tradition of the time. Her "Columbian Ode" (1892) was recited at the dedication of Chicago's World's Columbian Exposition, and her "Cantata," celebrating Chicago's history, was sung at the dedication of the Auditorium Building (1889), designed by the pioneer modern architect Louis Sullivan. Her ambition to found a review devoted exclusively to poetry was achieved by securing the backing of wealthy Chicago patrons and by inviting contributions from a wide range of contemporary poets.

The first issue of *Poetry: A Magazine of Verse* appeared in October 1912. Because its inception also coincided with the Midwestern cultural ferment later known as the Chicago Renaissance, the magazine is often thought of as the vehicle for the raw, original, locally coloured poetry of Carl Sandburg, Edgar Lee Masters, Vachel Lindsay, and Sherwood Anderson, but it also presented new formalistic movements in verse. The poet and critic Ezra Pound was its foreign correspondent. Imagism, Impressionism, and *vers libre* were expounded in its pages. "The Love Song of J. Alfred Prufrock" by the then unknown T.S. Eliot appeared in *Poetry* (1915), as did the experimental poems of Wallace Stevens, Marianne Moore, D.H. Lawrence, and William Carlos Williams. *Poetry* survived the withering of the Chicago Renaissance and two world wars to remain a highly respected journal, which Monroe edited until her sudden death while traveling in South America. Her open-minded editorial policy and her awareness of the importance of the poetic revolution of the early years of the century made her a major influence in the development of modern poetry. Her autobiography, *A Poet's Life: Seventy Years in a Changing World,* was published posthumously in 1938.

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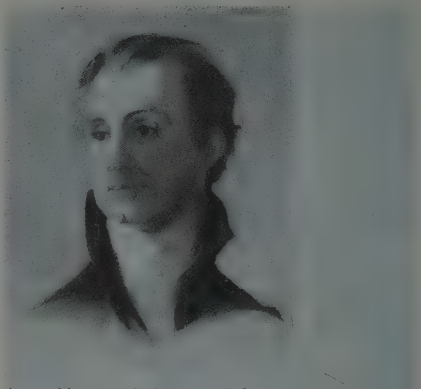
Monroe, James (b. April 28, 1758, Westmoreland county, Va. [U.S.]—d. July 4, 1831, New York, N.Y., U.S.), fifth president of the United States (1817–25), who issued an important contribution to U.S. foreign policy in the Monroe Doctrine, a warning to European nations against intervening in the Western Hemisphere. The period of his administration has been called the Era of Good Feeling.

Early life and career. Monroe's father was of Scottish, and his mother of Welsh descent. At the age of 16 he entered the College of William and Mary but in 1776 left to fight in the U.S. War of Independence. In 1780 he began the study of law under Thomas Jefferson, then governor of Virginia, and between the two men there developed an intimacy and a sympathy that had a powerful influence upon Monroe's later career.

Monroe was elected to the Virginia House of Delegates in 1782 and was chosen a member of the governor's council. From 1783 to 1786 he served in the Congress under the Articles of Confederation, the first constitution of the new nation. During his term he vigorously insisted on the right of the United States to navigate the Mississippi River, then controlled by the Spanish, and attempted, in 1785, to secure for the weak Congress the power to regulate commerce and thus remove one of the great defects in the existing central government. In 1786 he married Elizabeth Kortright of New York, by whom he had two daughters. Retiring from Congress, he began practicing law at Fredericksburg, Va., and was chosen a member of the Virginia House of Delegates in 1787 and (1788) a member of the state convention at which Virginia ratified the new federal Constitution. In 1790 he was elected to the U.S. Senate, where he vigorously opposed President George Washington's administration; nevertheless, in 1794 Washington nominated him as minister to France.

Minister to France. It was the hope of the administration that Monroe's well-known French sympathies would secure for him a favourable reception and that his appointment would also conciliate France's friends in the United States. His warm reception in France and his enthusiastic republicanism displeased the Federalists (the party of Alexander Hamilton, which encouraged close ties to England) at home; he did nothing, moreover, to reconcile the French to the Jay Treaty, which regulated commerce and navigation between the United States and Great Britain during the French Revolutionary Wars.



James Monroe, oil sketch by E.O. Sully, 1836, after a contemporary portrait by Thomas Sully; in Independence National Historical Park, Philadelphia

By courtesy of the Independence National Historical Park Collection, Philadelphia

Without real justification, the French regarded the treaty as a violation of the French-American treaty of commerce and amity of 1778 and as a possible cause for war. Monroe led the French government to believe that the Jay Treaty would never be ratified by the United States, that the administration of George Washington would be overthrown as a result of the obnoxious treaty, and that better things might be expected after the election in 1796 of a new president, perhaps Thomas Jefferson. Washington, though he did not know of this intrigue, sensed that Monroe was unable to represent his government properly and, late in 1796, recalled him.

Monroe returned to America in the spring of 1797 and in the following December published a defense of his course in a pamphlet of 500 pages entitled *A View of the Conduct of the Executive, in the Foreign Affairs of the United States.* Washington seems never to have forgiven Monroe for this stratagem, though Monroe's opinion of Washington and Jay underwent a change in his later years. In 1799 Monroe was chosen governor of Virginia and was twice reelected, serving until 1802.

Louisiana Purchase. At this time there was much uneasiness in the United States when Spain restored Louisiana to France by the Treaty of San Ildefonso in October 1800 (confirmed March 1801). The Spanish district administrator's subsequent withdrawal of the United States' "right of deposit" at New Orleans greatly increased this feeling and led to much talk of war. Resolved upon peaceful measures, President Jefferson in January 1803 appointed Monroe envoy extraordinary and minister plenipotentiary to France to aid Robert R. Livingston, the resident minister, in purchasing the territory at the mouth of the Mississippi—including the island of New Orleans—authorizing him at the same time to cooperate with Charles Pinckney, the minister at Madrid, in securing from Spain the cession of East and West Florida. On April 18 Monroe was further commissioned as the regular minister to Great Britain.

Monroe joined Livingston in Paris on April 12, after the latter's negotiations were well under way, and the two ministers, on finding Napoleon willing to dispose of the entire province of Louisiana, decided to exceed their instructions and effect its purchase. Accordingly, on May 2 (antedated to April 30) they signed a treaty and two conventions whereby France sold Louisiana to the United States. The fact that Monroe signed the treaty along with Livingston did not hurt his political career at home, but he is not entitled to much credit for the diplomatic achievement.

In July 1803 Monroe left Paris and entered upon his duties in London, and in the autumn of 1804 he proceeded to Madrid to assist Pinckney in his efforts to define the Louisiana boundaries and acquire the Floridas. After negotiating until May 1805 without success, Monroe returned to London and resumed his negotiations concerning the impressment of American seamen and the seizure of American vessels. As the British ministry was reluctant to discuss these vexing questions, little progress was made, and in May 1806 Jefferson ordered William Pinkney of Maryland to assist Monroe.

The result of the deliberations was a treaty signed on Dec. 31, 1806, which contained no provision against impressments and provided no indemnity for the seizure of goods and vessels. Accompanying its signature was a British reservation maintaining freedom of action to retaliate against imminent French maritime decrees. In passing over these matters Monroe and Pinkney had disregarded their instructions, and Jefferson was so displeased with the treaty that he returned it to England for revision.

Monroe returned to the United States in December 1807 and was elected to the Virginia House of Delegates in the spring of 1810. In the following winter he was again chosen governor, serving from January to November 1811, and resigning to become secretary of state under James Madison, a position he held until March 1817. The direction of foreign affairs in the troubled period immediately preceding and during the War of 1812, with Great Britain, thus fell upon him. On Sept. 27, 1814, after the capture of Washington, D.C., by the British, he was appointed secretary of war and discharged the duties of this office, in addition to those of the Department of State, until March 1815.

Presidency. In 1816 Monroe was elected president of the United States. In 1820 he was reelected, receiving all the electoral votes but one. The chief events of his calm and prosperous administration, which has been called the Era of Good Feeling, were the Seminole War (1817–18); the acquisition of the Floridas from Spain (1819–21); the Missouri Compromise (1820), by which the first conflict over slavery under the Constitution was peacefully adjusted; recognition of the new Latin-American states, former Spanish colonies, in Central and South America (1822); and—most intimately connected with Monroe's name—the enunciation, in the presidential message of Dec. 2, 1823, of the Monroe Doctrine, which has profoundly influenced the foreign policy of the United States.

Not until 1852 did the phrase Monroe Doctrine come into use. The "principles of President Monroe," as the message was referred to in Congress, consisted of three openly proclaimed dicta: no further European colonization in the New World, abstention of the United States from the political affairs of Europe, and nonintervention of Europe in the governments of the American hemisphere. In the diplomatic correspondence preceding the proclamation of these principles in the President's message was a fourth dictum not publicly associated with the doctrine until 1869: the United States opposed the transfer of any existing European colonies from one European sovereign to another.

It is generally concluded that Secretary of State John Quincy Adams was the sole author of the noncolonization principle of the doctrine; the principle of abstention from European wars and politics was common to all the fathers of American independence, inherited and expressed by the younger Adams all his professional life; in Cabinet meetings, Adams also urged the dictum of nonintervention in the affairs of the nations of the Western Hemisphere. But Adams had no idea of proclaiming these dicta to the world. Monroe took responsibility for embodying them in a presidential message that he drafted himself. Modern historical judgment considers the Monroe Doctrine to be appropriately named.

On the expiration of his second term Monroe retired to his home at Oak Hill, Va. In 1826 he became a regent of the University of Virginia and in 1829 was a member of the convention called to amend the state constitution. Having neglected his private affairs and incurred large expenditures during his missions to Europe, he was compelled to ask Congress to reimburse him for his expenses in the public service. In 1826 Congress finally authorized the payment to him of $30,000 and after his death appropriated a small amount for the purchase of his papers from his heirs. He died in New York City in 1831, while visiting his daughter. In 1858, the centennial year of his birth, his remains were reinterred with impressive ceremonies at Richmond, Va.

Thomas Jefferson, James Madison, John Quincy Adams, and many other prominent statesmen of Monroe's time all spoke loudly in his praise, but he suffers by comparison with the greater men of his time. Possessing none of their brilliance, he had, nevertheless, to use the words of John Quincy Adams, "a mind . . . sound in its ultimate judgments, and firm in its final conclusions." (S.F.Be.)

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Monroe, Marilyn, original name NORMA JEAN MORTENSON, also called NORMA JEAN BAKER (b. June 1, 1926, Los Angeles—d. Aug. 5, 1962, Los Angeles), blonde sex symbol and U.S. comedienne who starred in commercially successful motion pictures during the 1950s. Publicized during her career as a beautiful but unintelligent blonde, she later acquired the tragic public image of a sensitive and insecure woman destroyed by the pressures of Hollywood.

Marilyn Monroe
Brown Brothers

She spent her childhood in orphanages and foster homes and became a photographer's model. Her photograph in the nude on a calendar led to her film debut in *Scudda-Hoo! Scudda-Hay!* (1948), which was followed by other minor roles until she won recognition for bit parts in *The Asphalt Jungle* (1950) and *All About Eve* (1950). Her starring roles were as a sex symbol in the comedies *Gentlemen Prefer Blondes* (1953), *How to Marry a Millionaire* (1953), and *The Seven Year Itch* (1955). Anxious to earn recognition for her acting ability as well as her personal charm, she studied at the Actors Studio in New York under Lee Strasberg and then returned to Hollywood to star in more serious films: *Bus Stop* (1956), *The Prince and the Showgirl* (1957) with Laurence Olivier, *Some Like It Hot* (1959), and finally *The Misfits* (1961).

Monroe's widely publicized private life included marriages to the baseball star Joe DiMaggio (nine months during 1954) and to the Pulitzer Prize-winning playwright Arthur Miller (1956–61). Her early death from an overdose of sleeping pills caused worldwide shock.

Monroe Doctrine (Dec. 2, 1823), cornerstone of U.S foreign policy enunciated by Pres. James Monroe in his annual message to Congress. Declaring that the Old World and New World had different systems and must remain distinct spheres, Monroe made four basic points: (1) The United States would not interfere in the internal affairs of or the wars between European powers; (2) the United States recognized and would not interfere with existing colonies and dependencies in the Western Hemisphere; (3) the Western Hemisphere was closed to future colonization; and (4) any attempt by a European power to oppress or control any nation in the Western Hemisphere would be viewed as a hostile act against the United States.

The doctrine was an outgrowth of concern in both England and the United States that the continental powers would attempt to restore Spain's colonies, many of which were newly independent nations. England wanted commerce with these nations, markets which would be closed were Spain to recolonize them. As a consequence, George Canning, the British foreign minister, suggested a joint U.S.-British declaration forbidding future colonization in Latin America. Monroe was initially favourable to the idea, and former presidents Jefferson and Madison concurred. But Secretary of State John Quincy Adams argued that the U.S. should issue a statement of American policy exclusively, and his view ultimately prevailed.

The Monroe Doctrine, in asserting unilateral U.S. protection over the entire Western Hemisphere, was a foreign policy that could not have been sustained militarily in 1823. Monroe and Adams were well aware of the need for the British fleet to deter potential aggressors in Latin America. Because the United States was not a major power at the time and because the continental powers apparently had no serious intentions of recolonizing Latin America, Monroe's policy statement (it was not known as the "Monroe Doctrine" for nearly 30 years) was largely ignored outside the United States.

The U.S. did not invoke it nor oppose British occupation of the Falkland Islands in 1833 or subsequent British encroachments in Latin America. In 1845 and again in 1848, however, Pres. James K. Polk reiterated Monroe's principles in warning Britain and Spain not to establish footholds in Oregon, California, or Mexico's Yucatan peninsula. At the conclusion of the Civil War, the U.S. massed troops on the Rio Grande in support of a demand that France withdraw its puppet kingdom from Mexico. In 1867—in part due to U.S. pressure—France withdrew.

After 1870 interpretation of the Monroe Doctrine became increasingly broad. As the United States emerged as a world power, the Monroe Doctrine came to define a recognized sphere of influence. President Theodore Roosevelt added the Roosevelt Corollary to the Monroe Doctrine in 1904; it stated that, in cases of flagrant and chronic wrongdoing by a Latin American nation, the United States could intervene in the internal affairs of that nation. Roosevelt's assertion of hemispheric police power was designed to preclude violation of the Monroe Doctrine by European countries seeking redress of grievances against unruly or mismanaged Latin American states.

From the presidency of Theodore Roosevelt to that of Franklin Roosevelt, the United States frequently intervened in Latin America, especially in the Caribbean. Since the 1930s, the United States has attempted to formulate its Latin American foreign policy in consultation with the individual nations of the hemisphere and with the Organization of American States. Yet the United States continues to exercise a proprietary role at times of apparent threat to its national security, and the Western Hemisphere remains a predominantly U.S. sphere of influence.

Monroeville, borough (municipality), Allegheny county, southwestern Pennsylvania, U.S., on the Pennsylvania Turnpike, 13 miles (21 km) east of Pittsburgh. In the 19th century it was widely known as a Pittsburgh-Philadelphia stagecoach stop, and its subsequent growth resulted from its location as a transportation hub. Formerly Patton Township, it became a borough in 1951 and was renamed for its first postmaster, Joel Monroe (appointed 1851). Monroeville is noted for company research facilities and has planned industrial development. The National Science Foundation maintains a supercomputing centre there. The Boyce campus of the Community College of Allegheny County (1966) is in the borough. Pop. (2000) 29,349.

Monrovia, capital, largest city, and chief Atlantic port of Liberia, on Bushrod Island and Cape Mesurado. It was founded during the administration of U.S. President James Monroe (for whom it was named) by the American Colonization Society as a settlement for freed American slaves. The first town (1822) was on Providence Island at the mouth of the Mesurado River. The population is composed of descendants of settlers from North America, most of whom arrived between 1830 and 1871, and of substantial numbers of immigrants from the interior.

The Temple of Justice in Monrovia, Liberia
Carol Goldstein—Keystone

Bushrod Island contains the artificial harbour and free port of Monrovia, the only such port in West Africa. As the national centre of commerce and transportation, it attracted petroleum, paint, tuna, pharmaceutical, and cement enterprises. Prominent buildings have included the Capitol (1958), the Executive Mansion (1964), the City Hall, and the Temple of Justice. Many of these and other buildings, however, were severely damaged or destroyed during the fierce, multisided civil war beginning in 1990.

Monrovia is the nation's educational centre, with the University of Liberia (founded by act of legislature in 1851, opened 1862, given university status 1951, established a medical school 1968), the modern Monrovia Consolidated School System complex in the Sinkor district, and several church secondary schools. Medical facilities include the John F. Kennedy Memorial Hospital, a government and two church hospitals, and several private clinics.

The Monrovia Conference of 1961 served to launch the Organization of African Unity. Pop. (1999 est.) 479,000.

Mons (French), Flemish BERGEN, capital of Hainaut *province,* southwestern Belgium, set on a knoll between the Trouille and Haine rivers, at the junction of the Nimy-Blaton Canal and the Canal du Centre. The Nimy-Blaton Canal replaces that of Mono Condé, built by Napoleon, which has been filled and now serves as a vehicle route to France. Peopled since prehistoric times, Mons originated as a Roman camp (Castrilocus) in the 3rd century; it grew around an abbey founded (*c.* 650) by St. Waudru, or Waltrudis, daughter of the Count of Hainaut. During the 9th century, turreted ramparts encircled the small town. Recognized by Charlemagne as the capital of Hainaut (804), it prospered as a cloth-weaving centre between the 14th and the 16th century. Mons, a stronghold and frontier town, was well fortified. The most extensive defenses were built by the distinguished French military engineer Sébastien Le Prestre de Vauban. It was repeatedly attacked and occupied by Dutch, Spanish, French, and English forces in the 16th–18th-century wars and was ruled by the French, Spanish, Dutch, and Austrians prior to 1830. The city was the site of the first battle between the British and the Germans in 1914, ending in the British "Retreat from Mons." The city endured German aerial bombardment during 1940.

Mons, Belg., with the Church of St. Waudru (centre)
Thill—Club Iris

Mons is a city of schools. Among them are the State University Centre at Mons, the Polytechnic Faculty, the Academy of Beaux Arts, the Higher Institute of Architecture, and the Royal Conservatory of Music. Though not itself an industrial city, Mons has, through two successive mergers, extended its sphere to include several industrial zones. To the southwest is Jemappes, where metallurgical industry is dominant, and there are railway works at Cuesmes. In the northwest, at Ghlin, there are diversified industries, including chemical, glass, and tire works, and breweries. At Obourg and Harmignies in the east, cement is made. The forces of the North Atlantic Treaty Organization's European command—Supreme Headquarters Allied Powers Europe (SHAPE)—have been nearby on the Casteau Plateau since 1967.

Notable landmarks include the collegiate Church of St. Waudru (1450–1621) with fine stained glass and reliquaries, the town hall (1459–67), the only Baroque-style belfry in Belgium with its 47-bell carillon, and several museums. Pop. (2000 est.) 90,935.

Mons Lactarius, Battle of (553), decisive engagement fought near Naples, Italy, in which the Byzantine general Narses defeated the Goths. This battle ended the threat of the last king of the Ostrogoths, Teïas, who, after leading his warriors through a valley near Mount Vesuvius and then retreating to Mons Lactarius (Italian Monte Lettere, a mountain in the St. Angelo range), attacked the Roman army. Teïas was slain while in the process of changing shields; his army was allowed to retire peaceably outside the Roman frontiers on the condition that they would never again invade the empire.

Narses, a eunuch who rose to the position of grand chamberlain during the reign of Justinian I, is credited with the restoration of imperial control to Italy.

Monsanto Company, leading producer of chemical, agricultural, and biochemical products. It is based in St. Louis, Mo.

The Monsanto Chemical Works was founded in 1901 by John F. Queeny (1859–1933), a purchasing agent for a wholesale drug company, to manufacture the synthetic sweetener saccharin, then produced only in Germany. Queeny invested $1,500 of his own money and borrowed another $3,500 from a local Epsom salts manufacturer to start up the plant that he named Monsanto after his wife's maiden name. The firm was up to full-scale saccharin production in 1902, added caffeine and vanillin to its product line over the next few years, and in 1905 began turning a profit. Sales reached $1,000,000 in 1915.

With the rest of the American chemical industry, Monsanto expanded during World War I and flourished under the protection of the high U.S. tariffs of the 1920s. Queeny passed control of the company to his son, Edgar M. Queeny (1897–1968), in 1928. Edgar Queeny transformed Monsanto into an industrial giant before he retired in 1960. The company was incorporated as the Monsanto Chemical Company in 1933. Its production of styrene, a component of synthetic rubber, was vital to the war effort during World War II. Reflecting its diverse product offerings, the company changed its name to Monsanto Company in 1964. In 1985 Monsanto purchased pharmaceutical firm G.D. Seale & Co., maker of the NutraSweet artificial sweetener. Monsanto sold its sweeteners businesses, including NutraSweet, in 2000.

In the 1990s Monsanto's acquisition of Calgene Inc., DEKALB Genetics, and other biotechnology firms made it a leader in the development and production of genetically modified crop seeds. It began commercial production of BST (posilac bovine somatotropin), a synthetic supplement for dairy cows, in 1994. Monsanto merged with global pharmaceutical company Pharmacia & Upjohn in March 2000, but in August 2002 Monsanto's nonpharmaceutical segments were spun off by Pharmacia Corporation, and Monsanto became a publicly traded company.

Monsarrat, Nicholas, in full NICHOLAS JOHN TURNEY MONSARRAT (b. March 22, 1910, Liverpool, Eng.—d. Aug. 8, 1979, London), popular English novelist whose best-known work, *The Cruel Sea,* vividly captured life aboard a small ship in wartime.

Monsarrat took a bachelor's degree in law at Trinity College, Cambridge, and then spent two years in a solicitor's office. His first book, *Think of Tomorrow,* appeared in 1934, but he had not fully established his reputation when World War II broke out. From 1940 to 1946 he served with the Royal Navy, chiefly on the dangerous Atlantic convoy runs. He afterward put his experiences aboard ship to brilliant account, first in *H.M. Corvette* (1942) and then in *The Cruel Sea* (1951). The latter novel became a huge best-seller. His later work included *The Story of Esther Costello* (1953), *The Tribe That Lost Its Head* (1956), and *Smith and Jones* (1963), which was based on the 1951 Guy Burgess and Donald Maclean spy defection to the Soviet Union. *Life is a Four-Letter Word* (2nd ed., 1966, 1970; abridged as *Breaking In, Breaking Out,* 1971) is an autobiography to 1956. His last novel, *The Master Mariner; Running Proud* (1979), was the first book of a two-part novel to have covered the British Navy from 1588 to 1788.

monseigneur, former French title, appearing without an adjoining proper name, used to refer to or address the dauphin, or grand dauphin, heir apparent to the crown. Monseigneur was first applied to Louis XIV's son Louis de France (d. 1711) and grandson Louis, duc de Bourgogne (d. 1712); later to Louis XV's son Louis de France (d. 1765); and finally to Louis XVI's son Louis (d. 1789). More generally, monseigneur was used as a title preceding the titles of dukes and other peers, marshals of France, ministers of state, councillors of state, and presidents of sovereign courts.

monsieur, abbreviation M, the French equivalent both of "sir" (in addressing a man directly) and of "mister," or "Mr." Etymologically it means "my lord" (*mon sieur*).

As an honorific title in the French royal court, it came to be used to refer to or address the eldest living brother of the king. The title Monsieur, without an adjoining proper name, was most notably first applied to Henry III's brother, François, duc d'Alençon, who by the Peace of Chastenoy (1576), popularly called the "Peace of Monsieur," became the duc d'Anjou. The title was afterward assumed successively by Gaston, duc d'Orléans (brother of Louis XIII); Philippe, duc d'Orléans (brother of Louis XIV); Louis, comte de Provence (brother of Louis XVI; later himself King Louis XVIII); and Charles, comte d'Artois (brother of Louis XVIII; later himself King Charles X).

monsignor, Italian MONSIGNORE, a title of honour in the Roman Catholic Church, borne by persons of ecclesiastic rank and implying a distinction bestowed by the pope, either in conjunction with an office or merely titular. All those who bear the title of monsignor belong to the "papal family" and are entitled to be present in the Cappella Pontificia (when the pope celebrates solemn mass) and to participate in all public religious and social celebrations, wearing the robes corresponding to their respective offices. The ecclesiastics who have a right to the title of monsignor are (1) patriarchs, archbishops, and bishops, who are addressed as "most reverend monsignor," (2) apostolic protonotaries and domestic prelates, who are addressed as "right reverend monsignor," and (3) private chamberlains, who are addressed as "very reverend monsignor" and lose their honorific title at the death of the pope.

Monson, Sir William (b. 1568, Lincolnshire, Eng.—d. February 1643, Kinnersley, Surrey), English naval officer best-known for his *Naval Tracts.*

He entered Balliol College, Oxford, in 1581 but four years later ran away to sea; however, he took his degree in 1594. In the Spanish Armada campaign he served as a volunteer in the *Charles* pinnace and afterward accompanied George Clifford, 3rd earl of Cumberland, on three voyages to the West Indies. In 1596 he was flag captain to the earl of Essex at the capture of Cadiz, and in 1602 he was vice admiral of the last fleet to be sent against Spain, when the great carrack *St. Valentine* was taken. From 1604 to 1616 he was Admiral of the Narrow Seas, being chiefly engaged against pirates. He was dismissed partly for accepting bribes from Spain and partly because of his supposed connection with the murder of Sir Thomas Overbury. Monson's last service at sea was in command of the ship-money fleet of 1635.

During his retirement he composed his *Naval Tracts,* which were first printed in abbreviated form in 1682, then in full in 1704, a definitive edition in five volumes being edited by M. Oppenheim for the Navy Records Society in 1902–14. It is to these writings that Monson owes his fame, since, besides being the first account by a naval officer of a war in which he himself served, they provide a valuable commentary on the Elizabethan war with Spain and conditions at sea during that period.

monsoon, any of a type of major wind system that seasonally reverses its direction—*e.g.,* one that blows for approximately six months from the northeast and six months from the southwest. The most prominent examples of such seasonal winds occur in southern Asia and in Africa. Monsoonal tendencies also are apparent along the Gulf Coast of the United States and in central Europe, as well as in various other areas.

A brief treatment of monsoons follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

The primary cause of monsoons lies in the difference of the annual temperature trends over land and sea, though other factors may be involved as well. Seasonal changes in temperature are large over land but small over ocean waters. A monsoon blows from cold toward warm regions: from sea toward land in summer and from land toward sea in winter. Atmospheric pressure is high in cold regions and low in warm ones, permitting the movement of air to occur.

At the poleward limit of a monsoon system, the winds shift sharply. In India, for example, the monsoon blows from the southwest in July–August, while north of India the winds are from the east. Over northern Australia the monsoon comes from the northwest in January–February, and at the southern limit the winds again become easterly.

Most summer monsoons have a dominant westerly component and a strong tendency to ascend and produce copious amounts of rain (because of the condensation of water vapour in the rising air). The intensity and duration, however, are not uniform from year to year. Winter monsoons, by contrast, have a dominant easterly component and a strong tendency to diverge, subside, and cause drought.

Monsoon Current, also called MONSOON DRIFT, surface current of the northern Indian Ocean. Unlike the Atlantic and Pacific, both of which have strong currents circulating clockwise north of the Equator, the northern Indian Ocean has surface currents that change with the seasonal monsoon. During the northeast monsoon (November–March), the Indian North Equatorial Current (or Northeast Monsoon Drift) flows southwest and west, crossing the Equator. Between this westerly current and the westerly current maintained south of the Equator by the southeast trade winds, a strong Equatorial Countercurrent flows east at about latitude 10° S. From April to October, the southwest monsoon sets in. Joining with the southeast trades, which at this time cross the Equator and veer to the southwest, it reverses the flow of the current, pushing the Southwest Monsoon Drift eastward and sending branches north into the Arabian Sea and Bay of Bengal. The movement of the Indian South Equatorial Current is particularly strong off the Somali coast and southeastern Arabia, where upwelling lowers the surface temperature of the water near shore. The Equatorial Countercurrent is not in evidence at that time of year.

monsoon forest, also called DRY FOREST, or TROPICAL DECIDUOUS FOREST, open woodland in tropical areas that have a long dry season followed by a season of heavy rainfall. The trees in a monsoon forest usually shed their leaves during the dry season and come into leaf at the start of the rainy season. Many lianas (woody vines) and herbaceous epiphytes (air plants, such as orchids) are present. Monsoon forests are especially well developed in Southeast Asia and are typified by tall teak trees and thickets of bamboo.

monster, in biology, embryo, newborn animal, or young plant that is grossly deformed. The defects may be genetic (*i.e.,* inherited) or result from such influences as drugs, X rays, or diseases that act through the mother in early pregnancy.

Two main types of monster are recognized: those with defective or excessive growth of body parts and those with partial or complete doubling of the body on one of its axes. The repetition or absence of single body parts such as fingers or toes are frequent anomalies in man and other mammals. In addition to monsters with rudimentary limbs, others may be born with incomplete or underdeveloped extremities, as for example the seallike limbs of newborns in western Europe during the early 1960s who were victims of the drug thalidomide. A rare type of monster, but one that has always attracted special interest, has the lower extremities more or less united, as in the mythical figures of mermaids or sirens. Such monsters may have a single foot or have limbs fused throughout their length with no separate feet. The absence of the brain at birth, or an abnormally small or abnormally large brain and head are frequent congenital defects in humans. Cyclopean monsters with a single median eye rarely occur in humans or other mammals; less striking but more frequent anomalies are the absence of eyes or the presence of abnormally small eyes. Individuals who are born partially or wholly doubled but are joined together are known as Siamese twins. The doubling can be selective, with some body parts doubled and others single in any of many combinations. Unequal double monsters consist of two parts, one of which is usually well formed while the other is small, vestigial, or abnormal, and which occurs as a "parasite" upon the more normal partner.

Atypical plant growth or bacterial infestations can result in malformations such as galls, tumours, witches'-brooms (twig bunching), and fasciation (union of parts). In a common deformity of tobacco plants called frenching, there is a cessation of terminal bud and stem growth. When this happens, the buds in the axils of the leaves develop and unusually large numbers of leaves (as many as 300) appear on a plant. The leaves are characteristically sword- or string-shaped, and the plant takes on the appearance of a rosette. A number of diseases can produce gigantism in the sepals and calyxes of certain plants; these structures form huge bladderlike enlargements that may be 10 times or more the normal size. Plant organs may also arise in unusual places as a result of infection. Both genetic and environmental factors are involved in the malformations of plants. Among the latter are bacteria, fungi, mites, and insects, as well as cold, heat, pollutants, and radiation.

The investigation of gross abnormalities, the subject matter of teratology (*q.v.*), can often illuminate the normal course of development of organisms.

Monstera, genus of popular ornamental foliage plants of the order Arales (*q.v.*).

monstrance, also called OSTENSORIUM, in the Roman Catholic church and some other churches, a vessel in which the eucharistic host is carried in processions and is exposed during certain devotional ceremonies. Both names are derived from Latin words (*monstrare* and *ostendere*) that mean "to show." First used in France and Germany in the 14th century, when popular devotion to the Blessed Sacrament developed, monstrances were modeled after pyxes or reliquaries, sacred vessels for transporting the host or relics. The host was shown in a glass cylinder mounted on a base and surmounted by some sort of metal crown. In the 16th century the monstrance took its present shape: a circular pane of glass set in a cross or surrounded with metal rays. The host is placed in a holder called a lunette, which fits into an opening behind the glass.

Gold monstrance, German, *c.* 1600; in the Residenzmuseum, Munich

By courtesy of the Bayerische Verwaltung der Staatlichen Schlosser, Garten und Seen, Munchen

Monstrelet, Enguerrand de (b. *c.* 1390—d. July 1453), member of a noble family of Picardy, remembered for his chronicle of the final stages of the Hundred Years' War. His chronicle is valuable because of the many authentic documents used and the credibly accurate speeches it records.

Monstrelet was in the service of John of Luxembourg, who besieged Compiègne before Joan of Arc's capture; though he did not see Joan captured, he witnessed her later interview with the duke of Burgundy. Monstrelet's chronicle, in two books, continues that of Jean Froissart and covers the years 1400–44.

Mont, also spelled MONTU, MONTHU, or MENTU, in ancient Egyptian religion, god of the 4th Upper Egyptian *nome* (province), whose original capital of Hermonthis (modern Armant) was replaced by Thebes during the 11th dynasty (2081–1939 BC). Mont was a god of war. In addition to falcons, a bull was his sacred animal; from the 30th dynasty (380–343 BC), this bull, the Buchis bull, received an elaborate cult. Mont was represented as a man with a falcon's head, wearing a crown of two plumes with a double uraeus (rearing cobra) on his forehead. He had important temple complexes at Karnak in Thebes and at Hermonthis, Al-Ṭūd, and Al-Mādamūd.

Mont-aux-Sources, mountain plateau and plateau summit, in the Drakensberg range, at the juncture of KwaZulu/Natal and Free State provinces in South Africa and by Lesotho. Explored in 1836 by two French missionaries, the summit was named Mont-aux-Sources ("Mountain of Sources") because it was a watershed of the Orange (south), Vaal (north), Tugela (east), and other rivers. A basalt plateau, it lies at an elevation of about 10,000 feet (3,050 m) and is mostly within Lesotho. The plateau ascends eastward to a summit of 10,823 feet (3,299 m) at the Lesotho–KwaZulu/Natal border. That summit and other nearby peaks of the plateau's edge form massive, steep cliffs overlooking KwaZulu/Natal at the western edge of South Africa's Royal Natal National Park.

Mont Blanc (France): *see* Blanc, Mont.

Mont Blanc Tunnel, major Alpine automotive tunnel connecting France and Italy. It is 7.3 miles (11.7 km) long and is driven under the highest mountain in Europe. The tunnel is notable for its solution of a difficult ventilation problem and for being the first large rock tunnel to be excavated full-face—*i.e.,* with the entire diameter of the tunnel bore drilled and blasted. Otherwise it was conventionally driven from two headings, the Italian and French crews beginning work in 1958 and 1959, respectively, and meeting in August 1962. Many difficulties, including an avalanche that swept the Italian camp, were overcome, and when the tunnel opened in 1965, it was the longest vehicular tunnel in the world. Of great economic importance, it provides a significantly shortened year-round automotive route between the two countries. In March 1999, however, a truck caught fire in the tunnel, causing a two-day conflagration that killed 39 people and caused extensive damage. The tunnel did not reopen until March 2002.

Mont-de-Marsan, town, capital of Landes *département,* Aquitaine *région,* southwestern France, south of Bordeaux. It is situated at the confluence of the Douze and the Midour rivers where they form the Midouze. Mont-de-Marsan lies in the Petites Landes district, on the southeastern border of the vast Landes forest. It is an administrative centre and market town and has a racecourse and several museums. Its proximity to the Pyrenees is reflected in its bull ring and yearly flamenco festival.

Mont-de-Marsan was founded in 1141 by Pierre, viscount de Marsan, as his capital. After being involved in the Wars of Religion in the late 16th century, it passed to the French crown. A military air base is just north of the town. Industries include wood products and food processing. Pop. (1999) 29,489.

Mont-Saint-Michel, rocky islet and famous sanctuary in Manche *département,* Basse-Normandie *région,* off the coast of Normandy, France. It lies north of Rennes. Around its base are medieval walls and towers above which rise the clustered buildings of the village with the ancient abbey crowning the mount. One of the more popular tourist attractions in France, Mont-Saint-Michel was designated a UNESCO World Heritage site in 1979.

Mont-Saint-Michel is almost circular (about 3,000 feet [900 m] in circumference) and consists of a granite outcrop rising sharply (to 256 feet [78 m]) out of Mont-Saint-Michel Bay (between Brittany and Normandy). Most of the time it is surrounded by vast sand banks and becomes an island only when the tides are very high. Before the building of the 3,000-foot (915-metre) causeway connecting it to land, it was particularly difficult to reach because of quicksands and very fast-rising tides.

The island was originally called Mont-Tombe but became known as Mont-Saint-Michel in the 8th century, when St. Aubert, bishop of Avranches, built an oratory there after having a vision of the archangel St. Michael. It rapidly became a pilgrimage centre, and in 966 a Benedictine abbey was built there. In 1203 it was partly burned when King Philip II of France tried to capture the mount. He compensated the monks by paying for the construction of the monastery known as La Merveille ("The Wonder").

The island, which was fortified in 1256, resisted sieges during the Hundred Years' War (1337–1453) and the French Wars of Religion (1562–98). The monastery declined in the 18th century, and it was dissolved during the French Revolution (1787–99). It became a state prison under Napoleon I (reigned 1804–1814/15) and remained a prison until 1863; in 1874 it was classified as a historic monument and restored.

The abbey church that towers over the island has an imposing 11th- and 12th-century Romanesque nave and an elegant choir in Flamboyant Gothic style (built 1450–1521). The tower and spire, crowned by a statue of St. Michael, were added in the 19th century. The church is built over three crypts, the oldest dating probably from Carolingian times (8th–10th century). The exterior walls of the Gothic monastery building La Merveille (built by 1228) combine the powerful characteristics of a military fortress and the simplicity of a religious building. The most striking

Mont-Saint-Michel, France

By courtesy of the Commissariat General au Tourisme, France; photograph, Delvert sections are the refectory, with its high, narrow windows, and the magnificent cloister, with its fine sculptures. There is a panoramic view of the bay from the medieval walls (13th–15th century) on the southern and eastern sides of the mount. The houses bordering the narrow streets winding up to the abbey, mainly hotels or tourist shops, date back in some cases to the 15th century. Pop. (1982) 65.

Mont Sainte-Anne, provincial park, Quebec, Canada, located 25 miles (40 km) east of Quebec overlooking the northern shore of the St. Lawrence River.

Mont Sainte-Anne is geologically part of the Laurentian Mountains—themselves forming part of the Canadian Shield, one of the oldest mountain regions in the world. The summit of the mountain is flattened and reaches an elevation of 2,675 feet (815 m). Noted for its skiing facilities, Mont Sainte-Anne has been the site of World Cup ski events since 1971.

Montacute FAMILY: *see* Montagu Family.

Montacute, Thomas de: *see* Salisbury, Thomas de Montagu, 4th Earl of.

Montafon Valley, German MONTAFONTAL, upper valley of the Ill River, in *Bundesland* ("federal state") Vorarlberg, western Austria, extending about 15 miles (25 km) southeast from Bludenz between the Rhätikon Mountains and the Fervall Gruppe (mountains). Settled since Celtic times (4th century BC), its inhabitants were generally isolated until the coming of the Walsers (emigrants from the Swiss canton of Wallis [Valais] in the Upper Rhône River valley) in the 14th and 15th centuries. The Walsers were responsible for the name Montafon, probably meaning either "mountain beyond" or "mountain gorge." Traditionally an area of cattle breeding and dairy farming, the valley has, since World War II, become the focus of Vorarlberg's hydroelectric-power production (at Parthenen and Rodund) and a popular resort area.

montage, in motion pictures, the editing technique of assembling separate pieces of thematically related film and putting them together into a sequence. With montage, portions of motion pictures can be carefully built up piece by piece by the director, film editor, and visual and sound technicians, who cut and fit each part with the others.

Visual montage may combine shots to tell a story chronologically or may juxtapose images to produce an impression or to illustrate an association of ideas. An example of the latter occurs in *Strike* (1924), by the Russian director Sergey Eisenstein, when the scene of workers being cut down by cavalry is followed by a shot of cattle being slaughtered.

Montage may also be applied to the combination of sounds for artistic expression. Dialogue, music, and sound effects may be combined in complex patterns, as in Alfred Hitchcock's *Blackmail* (1929), in which the word knife is repeated in the thoughts of a frightened girl who believes she has committed murder.

Montage technique developed early in cinema, primarily through the work of the American directors Edwin S. Porter (1870–1941) and D.W. Griffith (1875–1948). It is, however, most commonly associated with the Russian editing techniques, particularly as introduced to American audiences through the montage sequences of Slavko Verkapich in films in the 1930s. *See also* photomontage.

Montagna, Bartolommeo, Bartolommeo also spelled BARTOLOMEO (b. *c.* 1450, Brescia, Republic of Venice [Italy]—d. Oct. 11, 1523, Vicenza), early Renaissance Italian painter, the most eminent master of the school of Vicenza.

Montagna may have been a pupil of Andrea Mantegna, by whom he was greatly influenced, but he more probably studied at Venice (where he was living in 1469) under the influence of Antonio Vivarini and Gentile Bellini.

His most important work is probably the great altarpiece for San Michele at Vicenza (1499). The geometric stateliness of the composition reveals a deep knowledge of the work of Antonello da Messina. Montagna's late portraits, remarkable for their psychological incisiveness, show the influence of Lorenzo Lotto. Montagna founded a school of painting at Vicenza, which influenced, among others, Francesco da Ponte, the father of Jacopo Bassano.

"Madonna with Child and SS. Sebastian and Rocco," oil on wood by Bartolommeo Montagna, 1487; in the Accademia Carrara, Bergamo, Italy

M. Mandel/M. Grimoldi

His son, Benedetto Montagna (1481–1558), imitated the style of his father in his paintings and was also a distinguished engraver.

Montagnais and Naskapi, two nomadic Indian peoples of northeastern North America, speaking almost identical Algonquian dialects and enjoying similar cultures, differing chiefly in their adaptions to different environments. The Montagnais, traditionally occupying a large forested area paralleling the northern shores of the Gulf of St. Lawrence, lived in birch-bark wigwams and subsisted on moose, salmon, eel, and seal. The Naskapi, living farther north on the vast Labrador plateau of grasslands and tundra, hunted caribou for both food and skins to cover their wigwams; fish and small game supplemented the Naskapi diet. The name Montagnais is French, meaning "mountaineers"; Naskapi is an Indian name meaning "rude, uncivilized people," in apparent reference to their remote frontier life.

Montagnais dressed in robe, breechcloth, leggings, and moccasins, much like their southern neighbours—and ancient enemies—the Iroquois and Micmac. Naskapi wore tailored clothing similar to that of the coastal Eskimo, their only traditional foes. For both groups, canoes furnished transportation in summer, and sleds and snowshoes were used in winter; dog traction has been a fairly recent borrowing from the Eskimo. Religious belief centred on manitou, or supernatural power; much importance was attached to various nature and animal spirits, both evil and benevolent.

No tribal organization existed; the people were grouped into small bands of related families, often shifting in composition with the rise and fall of successful leaders. The southern bands had fur-trapping and hunting territories, at least partly imposed by the European fur trade. The northern Naskapi territories were larger and more loosely defined. Most Montagnais and Naskapi continue to rove in bands, spending the winter hunting and trapping in the interior and coming in summer to the coastal trading stations, but the use of firearms for almost three centuries has decimated the game supply and made life harder. The influence of modern Western industrial culture also has accelerated changes in their cultural patterns.

Montagnana, town, Padova *provincia,* Veneto *regione,* northern Italy, located about 45 miles (72 km) north of Bologna and about 23 miles (37 km) southwest of Padua.

Montagnana is best known for its outstanding medieval town walls, including 24 polygonal towers and 4 gates, 2 of which are fortified and look much like castles. The town also has a Gothic Duomo (1431–1502), with one of its portals attributed to Andrea Sansovino. Michele Sanmicheli designed the Palazzo del Municipio (1550, restored in the 17th century) and Andrea Palladio the Palazzo Pisani (1565). The 15th-century Church of San Francesco is also notable.

Outside the medieval town walls of Montagnana, Italy

Dal Pra/M. Grimoldi

Manufacturing provides the economic base for the modern town. Pop. (1989 est.) mun., 9,703.

Montagnana, Antonio (fl. 1730–50), Italian singer noted for his powerful bass voice and for his roles in many of George Frideric Handel's operas.

Little is known of Montagnana's early life. He performed in Rome and Turin in the early 1730s. Between 1731 and 1733 he was a member of the King's Theatre company in London, under Handel's direction, and Handel composed several parts specifically for Montagnana's voice. In the summer of 1733 he joined the Opera of the Nobility. He stayed with that company through its four London seasons, singing altogether some 15 roles at Lincoln's Inn Fields and the King's Theatre. His voice had lost some of its remarkable power and range by the late 1730s. From 1740 to about 1750 Montagnana was contracted to the royal chapel in Madrid and sang mainly at the palace of Buen Retiro. Thereafter he gave up performance.

Montagnana, Domenico (b. *c.* 1687, Lendinara [Italy]—d. March 7, 1750, Venice), Italian instrument maker noted for his violins and especially for his cellos.

In Venice from about 1699, Montagnana is believed to have been the pupil and assistant of Matteo Goffriller and to have opened his own instrument-making shop about 1711. After some years he began to establish a reputation for superior instruments, and he was prolific after about 1720. He may have been commissioned by four conservatories to supply their stringed instruments.

Many of the instruments he created are extant, and his cellos remain highly valued by contemporary musicians.

Montagnard (French: "Highlander," or "Mountain Man"), any member of the hill-dwelling peoples of the Indochinese Peninsula. In Vietnam the Montagnards include speakers of Mon-Khmer languages such as the Bahnar, Mnong, and Sedang and speakers of Austronesian (Malayo-Polynesian) languages such as the Jarai, Roglai, and Rade (Rhade). They mostly grow rice, using shifting cultivation. Montagnard houses are usually raised above the ground on piling. Religious beliefs involve many spirits associated with nature or ancestors, and they maintain shamans and sorcerers to intercede with them. Among the Jarai, Mnong, Roglai, and Rade, descent is traced through the mother. The typical household is a longhouse inhabited by the women of a maternal line with their husbands and children.

Montagnard family in their homes in the central highlands of Vietnam

A. Rakoczy—Shostal

The Montagnards long have sought to preserve their cultural identities. During the Vietnam War they sided with the South Vietnamese and Americans against the North. They have fought for autonomy within Vietnam since the country was reunited in 1975.

Montagnard (French: "Mountain Man"), any of the radical deputies in the National Convention during the French Revolution. Noted for their democratic outlook, the Montagnards controlled the government during the climax of the Revolution in 1793–94. They were so called because as deputies they sat on the higher benches of the assembly. Collectively they were also called Le Montagne ("The Mountain").

The Montagnards emerged as the opponents of the more moderate Girondins in the National Convention in the fall of 1792. Composed of deputies elected from Paris and other cities, the Montagnards depended on the support of the petty bourgeoisie and the sansculottes (Parisian lower classes) and were closely associated with the Jacobin Club of Paris. After the overthrow of the Girondins by the popular insurrections of May 31 to June 2, 1793, the Montagnards dominated the convention, and they composed the majority of the Committee of Public Safety, which in effect ruled France in 1793–94. With the Thermidorian reaction of 1794–95, many of the Montagnards were either executed or purged from the convention, where they were reduced to a minority group called the *crête* (the "crest") and ceased to be influential.

Montagu FAMILY, also spelled MONTAGUE, or MONTACUTE, family name of the later medieval English earls of Salisbury, who were descended from Drogo of Montaigu, given in Domesday Book (1086) as one of the chief landholders in Somerset. The family first became prominent in the 14th century, notably by the achievements of William de Montagu, who helped King Edward III throw off the tutelage of his mother, Queen Isabella, and her lover, Roger Mortimer, Earl of March; William was created Earl of Salisbury in 1337. His descendants fought with distinction in the Hundred Years' War. Thomas de Montacute (d. 1428), Earl of Salisbury, left only a daughter, Alice; she married Richard Neville (who became earl in her right), and their son Richard, Earl of Warwick, was called "the kingmaker" for his dominant role in the Wars of the Roses.

Montagu, Ashley, in full MONTAGUE FRANCIS ASHLEY MONTAGU (b. June 28, 1905, London, Eng.—d. Nov. 26, 1999, Princeton, N.J., U.S.), British-American anthropologist noted for his works popularizing anthropology and science.

Montagu studied at the University of London and the University of Florence and received his Ph.D. from Columbia University, New York City, in 1937. He lectured and taught at a number of schools, including Rutgers, The State University of New Jersey, where he chaired the department of anthropology from 1949 to 1955. He is best known as the author of UNESCO's "Statement on Race" in 1950. He published this and subsequent versions as *Statement on Race* (1951; rev. ed., 1972). Montagu wrote on such varied topics as human evolution, culture, and child care, and his many books include *Man's Most Dangerous Myth: The Fallacy of Race* (1942; 5th rev. ed., 1974), *The Natural Superiority of Women* (1953; new and rev. ed., 1991), *Touching: The Human Significance of the Skin* (1971; 3rd ed., 1986), *The Nature of Human Aggression* (1976), and *Growing Young* (1981; 2nd ed., 1989).

Montagu, Charles: *see* Halifax, Charles Montagu, 1st Earl of.

Montagu, Edward: *see* Manchester, Edward Montagu, 2nd Earl of; Sandwich, Edward Montagu, 1st Earl of.

Montagu, Edwin Samuel (b. Feb. 6, 1879, London, Eng.—d. Nov. 15, 1924, London), British politician who helped introduce the Government of India Act of 1919, a legislative measure that marked a decisive stage in India's constitutional development.

Montagu entered Parliament as a Liberal in 1906 and became secretary to Herbert Henry Asquith, prime minister of Great Britain from 1908 to 1916 and leader of the Liberal Party. As parliamentary undersecretary to the India Office from 1910 to 1914, Montagu had the task of explaining Indian matters to the House of Commons. During the first years of World War I, he held a number of minor posts, entering the cabinet in 1915 as chancellor of the duchy of Lancaster. As financial secretary to the Treasury, he helped to popularize the first war loans and to set up voluntary war-savings organizations. He became secretary of state for India in 1917 and began work on a declaration of British policy to provide for "progressive realization of responsible government" in India.

As head of a delegation to the Indian provinces in the winter of 1917–18, he collaborated with the Indian viceroy, Lord Chelmsford, in preparing the Montagu-Chelmsford Report on the Indian government and administration. Its main recommendations were embodied in the Government of India Act of 1919, by which, for the first time, control over some aspects of provincial government passed to Indian ministers responsible to an Indian electorate. Differences of opinion over Prime Minister Lloyd George's policy toward Turkey forced him to resign in 1922.

Montagu, Elizabeth, *née* ROBINSON (b. Oct. 2, 1720, York, Eng.—d. Aug. 25, 1800, London), one of the first Bluestockings (*q.v.*), a group of English women who organized conversation evenings to find a more worthy pastime than card playing. She made her house in London's Mayfair the social centre of intellectual society, regularly entertaining such luminaries as Lord Lyttelton, Horace Walpole, Samuel Johnson, and Sir Joshua Reynolds (who painted her portrait).

Elizabeth Montagu, engraving by Francesco Bartolozzi, 1792, after a painting by Sir Joshua Reynolds

The Mansell Collection

In 1760 she contributed to Lyttleton's *Dialogues of the Dead,* and in 1769 she published an *Essay on the Writings and Genius of Shakespear.* Her husband died in 1775, leaving her a large fortune and sizable estates.

Montagu, John: *see* Sandwich, John Montagu, 4th Earl of.

Montagu, John Neville, marquess of: *see* Northumberland, John Neville, Earl of.

Montagu, Lady Mary Wortley, *née* PIERREPONT (baptized May 26, 1689, London, Eng.—d. Aug. 21, 1762, London), the most colourful Englishwoman of her time and a brilliant and versatile writer.

Her literary genius, like her personality, had many facets. She is principally remembered as a prolific letter writer in almost every epistolary style; she was also a distinguished minor poet, always competent, sometimes glittering and genuinely eloquent. She is further remembered as an essayist, feminist, traveler, and eccentric. Her beauty was marred by a severe attack of smallpox while

Lady Mary Wortley Montagu, detail of an oil painting by Sir Godfrey Kneller, 1715; in a private collection

By courtesy of the Marquess of Bute

she was still a young woman, and she later pioneered in England the practice of inoculation against the disease, having noticed the effectiveness of this precaution during a stay in Turkey.

The daughter of the 5th earl of Kingston and Lady Mary Fielding (a cousin of the novelist Henry Fielding), she eloped with Edward Wortley Montagu, a Whig member of Parliament, rather than accept a marriage that had been arranged by her father. In 1714 the Whigs came to power, and Edward Wortley Montagu was in 1716 appointed ambassador to Turkey, taking up residence with his wife in Constantinople (now Istanbul). After his recall in 1718, they bought a house in Twickenham, west of London. For reasons not wholly clear, Lady Mary's relationship with her husband was by this time formal and impersonal.

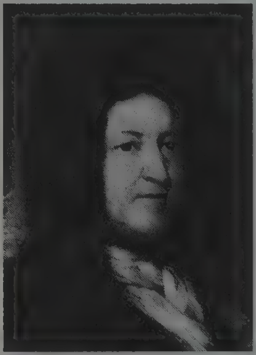
At Twickenham Lady Mary embarked upon a period of intense literary activity. She had earlier written a set of six "town eclogues" that were witty adaptations of the Roman poet Virgil. In these, she was helped by her friends John Gay and Alexander Pope (who later turned against her, satirizing her in *The Dunciad* and elsewhere, to which attacks Lady Mary replied with spirit, though she quickly abandoned poetic warfare). Among the works that she then composed was an anonymous and lively attack on the satirist Jonathan Swift (1734), a play, *Simplicity* (written *c.* 1735), adapted from the French of Pierre Marivaux, and a series of crisp essays dealing obliquely with politics and directly with feminism and the moral cynicism of her time.

In 1736 Lady Mary became infatuated with Francesco Algarotti, an Italian writer on the arts and sciences who had come to London to further his career, and she proposed that they live together in Italy. She set out in 1739, pretending to her husband and friends that she was traveling to the continent for reasons of health. Algarotti, however, did not join her, for he had been summoned to Berlin by Frederick II the Great, from whom he could expect greater rewards; and, when at length they met in Turin (1741), it proved a disagreeable experience. In 1742 she settled in the papal state of Avignon, France, where she lived until 1746. She then returned to Italy with the young Count Ugo Palazzi, with whom she lived for the next 10 years in the Venetian province of Brescia. Her letters from there to her daughter Mary, the countess of Bute, contain descriptions of her essentially simple life. In 1756 she moved to Venice and, after her husband's death in 1761, began planning her return to England. She set out in September of that year and was reunited with her daughter. Discontented in London, she would have returned to Italy; but she was seriously ill with cancer and died only seven months after her homecoming.

Lady Mary's literary reputation chiefly rests on 52 superb Turkish embassy letters, which she wrote after her return as the ambassador's wife in Constantinople, using her actual letters and journals as source material. The letters were published in 1763 from an unauthorized copy and were acclaimed throughout Europe. Later editions of her letters, sanctioned by her family, added selections from her personal letters together with most of her poetry. *The Complete Letters of Lady Mary Wortley Montagu,* 3 vol. (ed. Robert Halsband, 1965–67), was the first full edition of Lady Mary's letters.

Montagu, Ralph Montagu, 1st duke of, MARQUESS OF MONTHERMER, also called (1684–89) 3RD BARON MONTAGU OF BOUGHTON, or (1689–1705) EARL OF MONTAGU, VISCOUNT MONTHERMER (baptized Dec. 24, 1638, London, Eng.—d. March 9, 1709, London), courtier of Charles II who became a duke under Queen Anne, after a career that prompted Jonathan Swift's opinion that he was "as arrant a knave as any in his time."

Montagu's gallantry to women reputedly secured him early appointments at the court. He was ambassador to France in 1666 and 1669, but his purchase of the mastership of the wardrobe in 1671 strained his resources, which were replenished in 1673 by his marriage to Elizabeth Wriothesley (d. 1690), the wealthy widow of the earl of Northumberland. Montagu became a privy councillor in 1672. In 1676, again ambassador in France, he had simultaneous affairs with the duchess of Cleveland and her cloistered daughter, the countess of Sussex. Denounced to King Charles II by the outraged mother (who claimed that Montagu had disparaged the king), Montagu was dismissed from his posts in 1678, when he returned to England without leave in order to defend himself. In revenge he precipitated the impeachment of the earl of Danby (whose secret negotiations with Louis XIV of France he revealed to the House of Commons), causing the dissolution of Parliament. A political crisis ensued, which was soon enveloped in the Popish Plot (an alleged conspiracy to massacre Protestants, murder the king, and burn London).


1st duke of Montagu, detail of a painting attributed to J.B. Closterman; in the collection of the duke of Buccleuch and Queensberry

By courtesy of the duke of Buccleuch and Queensberry, K.T., G.C.V.O.

He succeeded his father as Baron Montagu of Boughton in 1684. In 1689 William III made him earl of Montagu and privy councillor. In 1692 he married Elizabeth Cavendish, wealthy widow of the 2nd duke of Albemarle. Allegedly mad, she had sworn to marry only a crowned head, so Montagu wooed her disguised as the emperor of China. In 1705 he became duke of Montagu.

However shabby his public and private morals, Montagu at least had good taste in architecture. He built Montagu House, in Bloomsbury, London, in 1675–80 to the designs of Robert Hooke; it contained some of Antonio Verrio's finest frescoes. Bought by the government in 1753 to hold the national collection of antiquities, it became the nucleus of the British Museum and Library.

Montaigne, Michel de, in full MICHEL EYQUEM DE MONTAIGNE (b. Feb. 28, 1533, Château de Montaigne, near Bordeaux, France—d. Sept. 13, 1592, Château de Montaigne), French writer whose *Essais* (*Essays*) established a new literary form. He was a skeptical student of himself and of humanity during the fanatical French religious wars of the later 16th century, and he spoke out for a human-centred morality.

A brief treatment of Michel de Montaigne follows. For full treatment, *see* MACROPAEDIA: Montaigne.

Born into a family of the minor nobility, Montaigne was carefully tutored in the family chateau at Montaigne and received an excellent classical education. At age six he was sent to the College of Guyenne at Bordeaux, and he went on to study law at the University of Toulouse (1546–50). In 1557 he became *conseiller* at the *parlement* (high court) of Bordeaux. There he met another lawyer, Étienne de La Boétie, and formed a friendship that became the outstanding emotional event of his life. La Boétie's death in 1563 greatly affected Montaigne, who probably embarked on his writing career six years later in order to fill the emptiness left by the loss of his friend.

When his father died in 1568, Montaigne inherited his title and the family chateau. In 1570 he resigned his judicial office, and in the following year he retired to Montaigne to devote himself to reading, writing, and meditation. He began to write the *Essais* in 1572; the first two books were published in 1580 and consist respectively of 57 and 37 chapters of varying length. The edition of 1588 contains a third book, and the edition of 1595 contains further additions. Montaigne traveled through Germany and Italy in 1580–81 and described his trip in the posthumously published *Journal du voyage*. From 1581 to 1585 he served as mayor of Bordeaux. He continued to work on the *Essais* until his death.

Montaigne is essentially famous for one book, the *Essais,* which gave the word essay its modern meaning and created it as a literary genre. The *Essais* themselves are a series of 107 chapters on various subjects. After the earliest ones, which are mere strings of anecdotes drawn from classical authors and Renaissance compilers, Montaigne displays an openness of mind and a receptivity to the most audacious ideas, and he begins probing to the roots of accepted customs and values. Thus, for example, the essay "Of Cannibals" compares European civilization with the newly discovered societies of the Americas to the disadvantage of the former and ends with an implied justification of political and economic equality. In other essays Montaigne subjects the cumbersome processes of the law to keen scrutiny: cruel punishments, torture, and the persecution of witches are condemned by his persuasive and reasonable irony, and tolerance is conveyed as a positive ideal by the exposure of the absurdities of intolerance. Montaigne was a practicing Roman Catholic, but no dogma was secure from the play of his mind, and to his skepticism can be traced many of the ideas that were to transform European thought in the 17th and 18th centuries. He never presents his ideas systematically, however, and uses a concrete vocabulary, flexible syntax, and rich verbal associations rather than formal logic to develop and illustrate his thoughts. Above all, the *Essais* offer a physical, emotional, and intellectual portrait of a singularly rich personality in a manner never before accomplished.

Montale, Eugenio (b. Oct. 12, 1896, Genoa, Italy—d. Sept. 12, 1981, Milan), Italian poet, prose writer, editor, and translator who won the Nobel Prize for Literature in 1975.

As a young man, Montale trained as an opera singer. He was drafted to serve in World War I, and, when the war was over, he resumed his music studies. Increasingly he became involved in literary activity. He was cofounder in 1922 of *Primo tempo* ("First Time"), a literary journal; worked for the publisher Bemporad (1927–28); served as director of the Gabinetto Vieusseux Library in Florence (1929–38); was a freelance translator and poetry critic for *La fiera letteraria* (1938–48; "The Literary Fair"); and in 1948 became literary editor and later music editor for the Milan daily newspaper *Corriere della Sera* ("Evening Courier").

Montale's first book of poems, *Ossi di seppia* (1925; "Cuttlefish Bones"), expressed the pessimism of the postwar period. In this book he used the symbols of the desolate and rocky Ligurian coast to express his feelings. A tragic vision of the world as a dry, barren, hostile wilderness not unlike T.S. Eliot's *The Waste Land* inspired Montale's best early poems.

The works that followed *Ossi di seppia* included *La casa dei doganieri e altre poesie* (1932; "The House of the Customs Officer and Other Poems"), *Le occasioni* (1939; "The Occasions"), and *Finisterre* (1943; "Land's End"), which critics found progressively more introverted and obscure. Later works, beginning with *La bufera e altro* (1956; *The Storm, and Other Poems*), were written with increasing skill and a personal warmth that his earlier works had lacked. Other collections of poems include *Satura* (1962), *Accordi e pastelli* (1962; "Harmony and Pastels"), *Il colpevole* (1966; "The Guilty One"), and *Xenia* (1966), the last work a gentle and evocative series of love poems in memory of his wife, who died in 1963. *Diario del '71 e del '72* was published in 1973. Montale published three volumes of collected *Poesie* in 1948, 1949, and 1957.

Montale

By courtesy of the Italian Foreign Office, Rome

Montale was considered in the 1930s and '40s to be a Hermetic poet; along with Giuseppe Ungaretti and Salvatore Quasimodo, he was influenced by French Symbolists such as Stéphane Mallarmé, Arthur Rimbaud, and Paul Valéry and sought to convey experiences through the emotional suggestiveness of words and a symbolism of purely subjective meaning. In his later poetry, however, Montale often expressed his thoughts in more direct and simple language. He won many literary prizes and much critical acclaim, and much of his poetry has been translated.

In 1999 a volume of Montale's work entitled *Collected Poems: 1920–1954*, translated by Jonathan Galassi, was published; in addition to its English translations it offers helpful annotations, a chronology, and an essay on the poet.

Montale also rendered into Italian the poetry of William Shakespeare, T.S. Eliot, and Gerard Manley Hopkins, as well as prose works by Herman Melville, Eugene O'Neill, and other writers. His newspaper stories and sketches were published in *La farfalla di Dinard* (1956; *The Butterfly of Dinard*).

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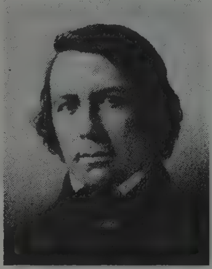
Montalembert, Charles, Count (comte) **de,** in full CHARLES-FORBES-RENÉ, COUNT DE MONTALEMBERT (b. April 15, 1810, London, Eng.—d. March 13, 1870, Paris, France), orator, politician, and historian who was a leader in the struggle against absolutism in church and state in France during the 19th century.

Born in London during the exile of his father, Marc-René, Count de Montalembert (the son of Marc-René de Montalembert), he later accompanied him on ambassadorial tours to Sweden and Germany. He began his political career with the newspaper *L'Avenir* ("The Future"), founded by the priest Félicité Lamennais in 1830, and the associated General Agency for the Defense of Religious Liberty. He helped found a Roman Catholic school in 1831, opposing the state monopoly that excluded the religious orders from teaching. The school was closed by the police and proceedings were brought against the teachers. Montalembert, who had inherited his father's title, was able to claim the right of trial by peers. His defense was eloquent and only the minimum penalty was imposed. This affair helped make him leader of the liberal Roman Catholics during the July Monarchy (1830–48). He was a member of the House of Peers from 1835 to 1848.

The Catholics were not united, however, and bishops with strong Gallican leanings caused Lamennais and his group to suspend publication of *L'Avenir* in 1831. They decided to go to Pope Gregory XVI in Rome to plead their case, but the pope's decision went against them (Encyclical *Mirari vos,* 1832). Montalembert then began to write for *L'Univers Religieux,* founded by the abbé Jacques-Paul Migne in 1833, and assumed a commanding position in French Catholic journalism.

Acting as deputy for the Doubs after the 1848 Revolution, Montalembert swung the Catholic party strongly behind Louis-Napoléon, an act which he later called "the great mistake in my life." He voted for restriction of freedom of the press during the Paris riots of June 1849 because he feared that the riots heralded socialism and mob rule. He was alienated from the regime of Louis-Napoléon by the stern and dictatorial measures used after the coup d'état in 1851. He then tried to use the French Academy, to which he was elected in 1851, and the review *Le Correspondant* (revived to oppose *L'Univers,* which had turned against him) as rallying points for liberal views against the Second Empire. His insistence that the Catholic church should encourage religious and civil liberties brought him into conflict with Rome, particularly after his proclamation of "a free church in a free state" at the congress of Belgian Catholics at Malines in 1863. Yet he was disappointed by the church whose cause he had championed and felt it was being given over, like his own country, to the absolutists.



Charles, Count de Montalembert; detail of a lithograph by Patout, 19th century

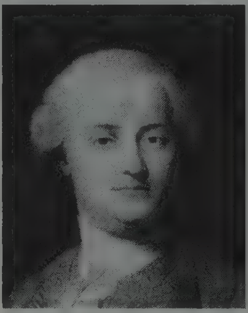
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

He then wrote *Les Moines d'Occident* (1863–77; "Monks of the West"), a study of the growth of Western monasticism; *Des Intérêts Catholiques au XIX*^{e} *siècle* (1852; "The Catholic Interest in the Nineteenth Century"); and *De L'Avenir politique de l'Angleterre* (1856; "The Political Future of England").

Montalembert, Marc-René, Marquis de (b. July 16, 1714, Angoulême, France—d. March 29, 1800, Paris), French general and military engineer who replaced the complex star-shaped fortresses sponsored by Sébastien de Vauban with a simplified polygonal structure that became the standard European fortification system of the early 19th century.

Montalembert entered the French army in 1732 and served in the War of the Polish Succession (1733–38), the War of the Austrian Succession (1740–48), and the Seven Years' War (1756–63). He began to elaborate his ideas on the design of fortifications during the early 1750s.

Viewing fortresses as nothing more than immense permanent batteries designed to pour overwhelming fire on attacking armies, Montalembert simplified the intricate geometric designs of Vauban and relied on simple polygonal structures, often with detached peripheral forts instead of projecting bastions. The fortifications at Anklam, Stralsund, Aix-en-Provence, and Île d'Oléron were among his most prominent creations; but the conservative French engineer corps of the ancien régime resisted his innovations and refused him permission to publish his theories. Finally, in 1776–78 the first edition of his *La Fortification perpendiculaire* ("Perpendicular Fortification") appeared. He emigrated for a time after the French Revolution of 1789 but returned to France and became a consultant to Lazare Carnot, the renowned military engineer and Revolutionary leader. Thereafter, Montalembert's system was widely copied and soon prevailed throughout Europe.



Marc-René, Marquis de Montalembert, detail of an oil painting by an unknown French artist; 18th century

Giraudon—Art Resource

Montalvo, Juan (b. April 13, 1832, Ambato, Ecuador—d. Jan. 17, 1889, Paris, France), Ecuadorean essayist, often called one of the finest writers of Spanish-American prose of the 19th century.

After a brief period during which he served in his country's foreign service, Montalvo spent most of his life in exile, writing powerful essays attacking a succession of Ecuador's dictators. He was distinguished as a liberal thinker and a moralist and became famous for his *Siete tratados* (1882; "Seven Treatises"), which offered moral standards for the educated person. Montalvo's *Capítulos que se le olvidaron a Cervantes* (1895; "Chapters That Were Omitted by Cervantes") was published posthumously and is considered one of the finest imitations of Cervantes' famous novel, *Don Quixote.*

Montana, formerly MIKHAYLOVGRAD, also spelled MIHAILOVGRAD, MIHAJLOVGRAD, or MIKHAILOVGRAD, town, northwestern Bulgaria. It lies along the Ogosta River in a fertile agricultural region noted for its grains, fruits, vines, market-garden produce, and livestock breeding. Relatively new housing estates as well as industry are evident in the town. In the region are forests and game reserves in which deer, pheasant, and rabbit are hunted. There was a Roman settlement called Montanensia on the site; later the town was called Golyama Kutlovitsa and Ferdinand (1891–1945). After World War II the town was named after Khristo Mikhaylov, local leader of an unsuccessful communist uprising in 1923. The town was renamed Montana in 1993, after communist rule had ended in Bulgaria. Pop. (2001) 49,368.

Montana, constituent state of the United States of America, situated in the northern mountain region of the western United States. It is bounded on the north by the Canadian provinces of British Columbia, Alberta, and Saskatchewan, on the east by North and South Dakota, on the south by Wyoming, and on the southwest and west by Idaho. The state capital is Helena.

A brief treatment of Montana follows. For full treatment, *see* MACROPAEDIA: United States of America: *Montana.*

Montana was originally peopled by Cheyenne, Nez Percé, Blackfoot, Crow, Assiniboin, Flathead, Kutenai, Pend d'Oreille, Kalispel, and Atsina (Gros Ventre) Indians, who lived largely by hunting and gathering. Most of Montana became part of the United States through the Louisiana Purchase of 1803. The western part, lying in the Rocky Mountains in Oregon Country, was disputed until 1846, when Britain relinquished its claim to the area. The Lewis and Clark Expedition explored Montana in 1804–06, and fur trappers and traders soon followed. Saint Mary's Mission, established in 1841 by Roman Catholic missionaries, was the first settlement to become a permanent town (Stevensville). Gold was discovered in the early 1860s, and cattle and sheep grazing were introduced later in that decade, leading to protracted and bitter battles with the Indians, who opposed incursion on their hunting grounds and decimation of the buffalo. Though George Armstrong Custer and his men were defeated and slain at the Little Bighorn in 1876 and the Nez Percé under Chief Joseph won a battle in the Big Hole Basin in 1877, the Indians ceased fighting in 1877 and were placed on reservations. In 1889 Montana became the 41st state.

Montana straddles two physiographic regions: the Great Plains to the east, characterized by a generally treeless, rolling terrain broken by buttes, tree-bordered streams, and small, isolated mountain ranges; and the northern Rocky Mountains to the west, characterized by heavily forested ranges and the Continental Divide. Montana's drainage is unique among the states because its rivers flow into three of the continent's primary watersheds: the Pacific, the Gulf of Mexico, and Hudson Bay.

The climate of Montana is dry continental, with January average temperatures of only 18° F (−8° C) and July averages of 65° F (18° C). Humidity is generally low, as is average precipitation—about 18 inches (460 mm) in the west and 13 inches (330 mm) in the east. Destructive hailstorms sometimes occur in July and August.

Indians constitute the state's only large racial minority group, and nearly two-thirds of them live on reservations. In the early years of the 20th century, families from northern Europe settled on homesteads and immigrants from across Europe came to work in the mines. Their descendants have been well assimilated. Roman Catholics predominate, but the number of Mormons has been growing. The main urban centres developed from mining camps, trading centres, and railroad division points, but the state still has only a few large cities. Moreover, since 1970 the state's rural population has grown at a faster rate than its urban population. Overall Montana experienced rapid growth in the 1970s, but its growth declined to less than half the national average in the 1980s.

The largest single source of income is agriculture. Livestock accounts for about half of cash income, and crops, especially barley, wheat, sugar beets, and oats, for the remainder. Coal, petroleum, and natural gas are the most valuable natural resources, followed by copper, phosphates, vermiculite, bentonite, sand and gravel, and gypsum. There are more than 14,000,000 acres (5,600,000 hectares) of commercial forest, and a significant portion of the work force is employed in the lumbering industry. Manufacturing activities are related to the processing of natural resources.

Montana is heavily dependent on automobile transportation, and the state has a well-developed network of highways. Only a few cities have urban bus lines.

Cultural life centres on the numerous colleges and universities and two state agencies, the Montana Institute of the Arts and the Montana Arts Council. Local Indian celebrations are open to all, and rodeos are popular. The C.M. Russell Museum in Great Falls specializes in the works of the cowboy artist Charles Marion Russell. The Museum of the Plains Indians is in Browning. Area 147,046 square miles (380,847 square km). Pop. (2000) 902,195.

Montand, Yves, original name IVO LIVI (b. Oct. 13, 1921, Monsummano Alto, Italy—d. Nov. 9, 1991, Senlis, Fr.), French stage and film actor and popular cabaret singer.

Though considered by many to be the quintessence of worldly Gallic charm, Montand was actually born in Italy to Jewish peasants who fled to Marseille when he was two years of age to escape the Fascist regime of Benito Mussolini. At 18, he was singing in music halls, supplementing his income by working as a longshoreman.

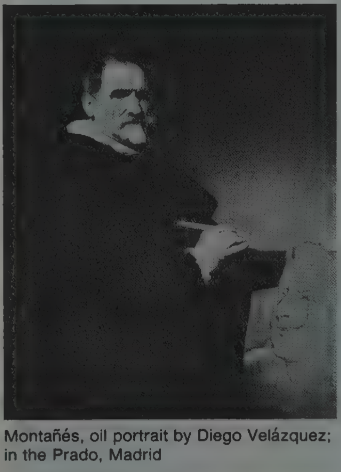
In Paris, as the protégé of famous chanteuse Edith Piaf, he appeared in the 1945 motion picture *Étoile sans lumière* (*Star Without Light*). He married actress Simone Signoret in 1951. His role in *La Salaire de la peur* (1953; *Wages of Fear*) brought him international fame. His autobiography, *Du Soleil plein la tête* (*Sunshine Fills my Mind*), was published in 1955, before he gave his most acclaimed performances in *La Guerre est finie* (1966; *The War is Over*) and two films by director Costa-Gavras: *Z* (1968) and *L'Aveu* (1970; *The Confession*). His performances in Claude Berri's film adaptations of two novels by Marcel Pagnol—*Jean de Florette* (1986) and its sequel, *Manon des Sources* (1986; *Manon of the Spring*)—were also highly acclaimed.

montane forest, type of coniferous forest (*q.v.*) dominated by pine, fir, and spruce trees.

montane rain forest: *see* cloud forest.

Montañés, Juan (de) Martínez (b. March 16, 1568, Alcalá la Real, Jaén, Spain—d. June 18, 1649, Seville), Spanish sculptor who was instrumental in the transition from Mannerism to the Baroque. His work influenced not only the sculptors and altarmakers of Spain and Latin America but also the Spanish painters of his century.

After studying in Granada under Pablo de Rojas (1579–82), Montañés went to Seville in 1587 and established a studio that lasted until his death. He became known as the "Dios de la Madera" ("God of Wood Carving") and had 50 years of enormous output and influence. He is remembered for his wood altars and altar figures covered with polished gold and paint in various colours. They are marked by an admirable aristocratic dignity, realistic yet idealized. He set the style throughout Spain and Latin America with such works as the statues of Christ on the cross, looking at the beholder; of the child Christ; and of the Immaculate Conception (all at the Seville Cathedral). The church in Santiponce, near Seville, contains his finest altar (1610–13); his largest work is at San Miguel in Jérez de la Frontera (1617–45).


Montañés, oil portrait by Diego Velázquez; in the Prado, Madrid

By courtesy of the Museo del Prado, Madrid

Montanism, also called CATAPHRYGIAN HERESY, or NEW PROPHECY, a heretical movement founded by the prophet Montanus that arose in the Christian church in Phrygia, Asia Minor, in the 2nd century. Subsequently it flourished in the West, principally in Carthage under the leadership of Tertullian in the 3rd century. It had almost died out in the 5th and 6th centuries, although some evidence indicates that it survived into the 9th century.

The Montanist writings have perished, except for brief references preserved by ecclesiastical writers. The chief sources for the history of the movement are Eusebius' *Historia ecclesiastica* (*Ecclesiastical History*), the writings of Tertullian and Epiphanius, and inscriptions, particularly those in central Phrygia.

According to the known history, Montanus, a recent Christian convert, appeared at Ardabau, a small village in Phrygia, about 156. He fell into a trance and began to "prophesy under the influence of the Spirit." He was soon joined by two young women, Prisca, or Priscilla, and Maximilla, who also began to prophesy. The movement spread throughout Asia Minor. Inscriptions have indicated that a number of towns were almost completely converted to Montanism. After the first enthusiasm had waned, however, the followers of Montanus were found predominantly in the rural districts.

The essential principle of Montanism was that the Paraclete, the Spirit of truth, whom Jesus had promised in the Gospel According to John, was manifesting himself to the world through Montanus and the prophets and prophetesses associated with him. This did not seem at first to deny the doctrines of the church or to attack the authority of the bishops. Prophecy from the earliest days had been held in honour, and the church acknowledged the charismatic gift of some prophets.

It soon became clear, however, that the Montanist prophecy was new. True prophets did not, as Montanus did, deliberately induce a kind of ecstatic intensity and a state of passivity and then maintain that the words they spoke were the voice of the Spirit. It also became clear that the claim of Montanus to have the final revelation of the Holy Spirit implied that something could be added to the teaching of Christ and the Apostles and that, therefore, the church had to accept a fuller revelation.

Another important aspect of Montanism was the expectation of the Second Coming of Christ, which was believed to be imminent. This belief was not confined to Montanists, but with them it took a special form that gave their activities the character of a popular revival. They believed the heavenly Jerusalem was soon to descend on the Earth in a plain between the two villages of Pepuza and Tymion in Phrygia. The prophets and many followers went there, and many Christian communities were almost abandoned.

In addition to prophetic enthusiasm, Montanism taught a legalistic moral rigorism. The time of fasting was lengthened, followers were forbidden to flee from martyrdom, marriage was discouraged, and second marriages were prohibited.

When it became obvious that the Montanist doctrine was an attack on the Catholic faith, the bishops of Asia Minor gathered in synods and finally excommunicated the Montanists, probably *c.* 177. Montanism then became a separate sect with its seat of government at Pepuza. It maintained the ordinary Christian ministry but imposed on it higher orders of patriarchs and associates who were probably successors of the first Montanist prophets. It continued in the East until severe legislation against Montanism by Emperor Justinian I (reigned 527–565) essentially destroyed it, but some remnants evidently survived into the 9th century.

The earliest record of any knowledge of Montanism in the West dates from 177, and 25 years later there was a group of Montanists in Rome. It was in Carthage in Africa, however, that the sect became important. There, its most illustrious convert was Tertullian, who became interested in Montanism *c.* 206 and finally left the Catholic Church in 212–213. He primarily supported the moral rigorism of the movement against what he considered the moral laxity of the Catholic bishops. Montanism declined in the West early in the 5th century.

Montanus (fl. 2nd century), founder of Montanism (*q.v.*), a heretical movement of Christianity in Asia Minor and North Africa from the 2nd to the 9th centuries. The prophetic movement at first expected an imminent transformation of the world but later evolved into heretical sectarianism claiming a new revelation.

Little is known about Montanus. Before his conversion to Christianity, he apparently was a priest of the Oriental ecstatic cult of Cybele, the mother goddess of fertility. According to the 4th-century church historian Eusebius of Caesarea, Montanus *c.* 172–173 entered into an ecstatic state and began prophesying in the region of Phrygia, now in central Turkey.

Montanus became the leader of a group of *illuminati* ("the enlightened"), including the prophetesses Priscilla (or Prisca) and Maximilla. The members exhibited the frenzied nature of their religious experience by enraptured seizures and utterances of strange languages that the disciples regarded as oracles of the Holy Spirit.

Convinced that the end of the world was at hand, Montanus laid down a rigoristic morality to purify Christians and detach them from their material desires. Official criticism of Montanus and his movement consequently emphasized the new prophecy's unorthodox ecstatic expression and his neglect of the bishops' divinely appointed rule.

Fragments of Montanist prophecies preserved by Eusebius of Caesarea are contained in the series *Patrologia Graeca,* J.-P. Migne, ed., (vol. 19–20, 1866).

Montauban, town, capital of Tarn-et-Garonne *département,* Midi-Pyrénées region, southwestern France, located about 30 mi (50 km) by road north of Toulouse. Built at the confluence of the Tarn and its tributary the Tescou, the town has spread over a wide area. The early 14th-century Pont-Vieux still bridges the Tarn. Next to it on the right bank stands the 17th-century episcopal palace that, in the mid-19th century, became the Musée Ingres, housing 4,000 drawings and several paintings of the 18th–19th-century French painter Jean-Auguste-Dominique Ingres, born at Montauban in 1780, as well as other contemporary works. The "Vow of Louis XIII," by Ingres, hangs in the cathedral. The church of Saint-Jacques, a fortified church dating from the 14th and 15th centuries, dominates the town. Montauban, deriving its name from the Latin Mons Albanus, was founded by the counts of Toulouse in the 12th century and was a principal bastion of Protestantism in southwest France during the 16th and 17th centuries. It is an agricultural market and an industrial town (electrical, aeronautical, and lighting equipment, furniture, and food processing, especially dairy goods). Pop. (1982) 36,122.

Montauk, a confederacy of Algonkian-speaking Indian tribes who lived on the eastern and central parts of what is now Long Island, N.Y.; they included the Shinnecock, Manhasset, Massapequa, Montauk proper, Patchogue, and Rockaway. Like other Algonkian tribes of this area, the Montauk depended largely on the cultivation of corn (maize) by women for their subsistence, supplemented by hunting and fishing. They were semi-sedentary, moving seasonally between fixed sites as food resources required.

The Montauk were dominated by the Pequot until the destruction of that tribe in 1637; the Narraganset then attacked the Montauk. Disease cost the Montauk most of their number, and about 1659 the estimated 500 remaining members of the tribe sought refuge with the whites at Easthampton. By 1788 only 162 Montauk remained; most of these joined a band of remnants of various Algonkian tribes near Marshall, N.Y. A few mixed-blood descendants remain on Long Island, where they are officially called the Shinnecock Indians.

Montausier, Charles de Saint-Maure, duc de (duke of) (b. Oct. 6, 1610—d. Nov. 17, 1690, Paris), French army officer, man of letters and chief tutor of King Louis XIV's eldest son, the dauphin Louis.

Reared a Huguenot, he succeeded his brother Hector as marquis de Montausier in 1635. He distinguished himself in the defense of the north Italian fortress of Casale in 1630–31, and from 1634 to 1639 he served on the German front. It was Montausier who sent to Julie d'Angennes the *Guirlande de Julie* ("Garland for Julie"), a well-known collection of poems by himself and others. Promoted to the rank of lieutenant general in 1644, he converted to Roman Catholicism and then married Julie d'Angennes (July 1645). His wife was governess of Louis XIV's children from 1661 until 1664, when Montausier was created a duc. On returning from the campaign against the Spanish in Franche-Comté in 1668, he was appointed governor (chief tutor) of the dauphin Louis. He brought to his new duties all his devout austerity, which was supposedly derided by Molière in his play *Le Misanthrope.* Montausier compiled the famous "Delphin" edition of classical texts for his pupil's use. His duties as governor ended in 1679.

Montbéliard, town, Doubs *département,* Franche-Comté region, eastern France, between the Vosges and the Jura mountains, 11 mi (17 km) from the Swiss frontier. In a highly industrialized area at the confluence of the Allaine and Luzine rivers, it lies north of the Canal du Rhône au Rhin and of a loop in the Doubs River.

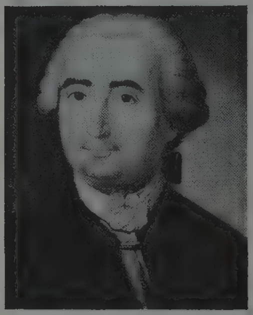
The town is known to have been in existence in the 8th century. The lordship of Montbéliard became a countship in the 12th century, after which Montbéliard came into the possession of the dukes of Württemberg, who administered it from the end of the 14th century until the French Revolution at the end of the 18th century.

Montbéliard's industry consists primarily of automobile manufacture, the Peugeot company employing more than two-thirds of the economically active. The château of the counts of Montbéliard, on a rocky promontory dominating the town, has towers dating from the 15th and 16th centuries; it houses a museum of natural history and (in an 18th-century extension) an art museum. Pop. (1982) 31,174.

Montblanch, Martín, duque de (duke of): *see* Martin *under* Martin (Spain: Aragon).

Montcalm (de Saint-Véran), Louis-Joseph de Montcalm-Grozon, marquis de (b. Feb. 28, 1712, Château de Candiac, Fr.—d. Sept. 14, 1759, Quebec), general who served as commander in chief of French forces in Canada (1756–59) during the Seven Years' War, a worldwide struggle between Great Britain and France for colonial possessions.

Montcalm joined the army as an ensign at the age of 12. His first war experience came in 1733 against the Austrians in the War of the Polish Succession (1733–38).


Montcalm, detail of oil painting by an unknown artist; in the Speaker's Chambers, Federal Houses of Parliament, Ottawa

National Film Board of Canada Phototheque

In the War of the Austrian Succession (1740–48) he distinguished himself during the defense of Prague (1742), and he was made colonel of his regiment at Auxerre in 1743. He again distinguished himself at the Battle of Piacenza (1746), where he received five sabre wounds and was taken prisoner. He was later exchanged. In 1747 he was raised to the rank of brigadier, with command of a cavalry regiment by the end of the war.

Montcalm had inherited his father's titles and property in 1735. He now spent a few years with his family at Candiac. In 1756 he was placed in command of the French regular troops in North America, with the rank of major general; but his commission did not include authority over the greater part of military resources in Canada. He clashed with the governor general of the colony, the Marquis de Vaudreuil, and their animosity handicapped efficient military operations. Montcalm had early success as tactical commander against the British. In 1756 he forced the surrender of the British post at Oswego, thus restoring to France undisputed control of Lake Ontario. In 1757 he turned southward and captured Ft. William Henry, with its 2,500-man garrison; the victory was marred, however, by the slaughter of many English prisoners by the Indian allies of the French.

Montcalm's greatest feat was at Ticonderoga (July 8, 1758), when, with about 3,800 men, he repulsed an attack by 15,000 British forces under Gen. James Abercrombie. British casualties amounted to 2,000, compared with 372 for the French. The victory was largely a result of Abercrombie's incompetence; nevertheless, Montcalm was promoted to lieutenant general and given authority over Vaudreuil in all military affairs.

In 1759 the British sent Gen. James Wolfe's 8,500-man army against Quebec. Montcalm, with 1,500 men, took up a defensive position on the banks of the Montmorency River and refused to be drawn into combat for two months. Wolfe finally effected a landing near Quebec by scaling the Plains (Heights) of Abraham, and Montcalm was forced to meet the British forces (September 13), which were victorious. After fighting with conspicuous gallantry, Montcalm was mortally wounded while trying to rally his shattered army.

Montclair, town, Essex county, New Jersey, U.S., just northwest of Newark, on the east slope of Watchung Mountain, whose heights command a fine view of New York City and its harbour. Settled in 1666 as part of Newark Township, the site was detached in 1812 as part of Bloomfield. It was separately incorporated as the township of Montclair (French: Clear Mountain View) in 1868, when Bloomfield refused to coorperate in building a rail line to New York City. A residential suburban community, it includes Upper Montclair. Montclair is noted for an art museum that houses works of the late-19th-century landscape painter George Inness, a former resident. In the town and described as the smallest park in the world is a 6-sq-ft (0.6-sq-m) green, with a boulder bearing a plaque commemorating George Washington's visit to the area during the American Revolution. The Crane House, a Federal mansion (1796), contains a working 18th-century kitchen and rooms with period furnishings. Montclair State College was established in 1908. Eagle Rock Reservation is nearby to the west. Pop. (1990) 37,729.

Montcorbier, François de (French poet): *see* Villon, François.

Montdory, also spelled MONDORY, original name GUILLAUME DES GILBERTS (b. March 13, 1594, Thiers, Fr.—d. Nov. 10, 1653, Thiers), first outstanding French actor, whose presentations of the works of Corneille were especially notable.

Montdory began his theatrical career in 1612 in a troupe led by Valleran Le-Comte, a company specializing in the tragicomedies of Alexandre Hardy. A member of the company of the Prince of Orange in 1622, Montdory gained a foothold in Paris in 1629, when he, with his associate Charles Le Noir, established a playhouse in one of the indoor tennis courts. Immediate success came with the performance of Pierre Corneille's first play, *Mélite*. After opening the Théâtre du Marais (another converted tennis court) in 1634, Montdory, who had produced all the earlier plays of Corneille, in 1636 staged *Le Cid*, playing the part of Rodrigue in Corneille's masterpiece. In contrast with his predecessors, Montdory never acted in farce. Among the principal tragic parts that he created were Masinisse in Jean Mairet's *Sophonisbe*, Brutus in Georges de Scudéry's *La Mort de César* (*The Death of Caesar*), and Jason in Corneille's *Médée* (*Medea*). As an actor he was a great conveyor of passions, employing very little stylization. In 1637, while playing Hérode in *Marianne* by Tristan l'Hermite, he suffered a stroke that paralyzed him and had to retire.

Monte, Giovanni Maria Ciocchi del (pope): *see* Julius III.

Monte, Philippe de (b. 1521, Mechelen, Neth.—d. July 4, 1603, Prague), one of the most active composers of the Netherlandish, or Flemish, school that dominated Renaissance music; he is known for his sacred music and for his madrigals.

After an early period spent in Naples, he visited England in 1554–55 with the choir of Philip II of Spain and there befriended the 13-year-old William Byrd. He returned to Italy and in 1568 became court musical director to the Habsburg emperors. A prolific composer with a fluent but non-experimental technique, he excelled in subtle contrasts of register and voice-grouping. His 38 masses and 319 motets stand comparison with the works of Palestrina. He was also one of the last Netherlandish masters of the Italian madrigal, publishing more than 1,200 in 42 books.

Monte Albán, site of ruins of an ancient centre of Zapotec and Mixtec culture, located in what is now Oaxaca state, Mexico. The initial construction at the site has been placed at *c.* the 8th century BC. It contains great plazas, truncated pyramids, a court for playing the ball game *tlachtli,* underground passageways, and about 170 tombs, the most elaborate yet uncovered in the Americas. The site is located on high ground, probably chosen for its defensibility. The great plaza atop the highest hill is flanked by four platforms; two temples stand on the platform to the south.

During the first two phases of Monte Albán culture, temples and other structures were built with dressed stone. Zapotec occupation of the site may be dated with certainty by about the 1st century BC. The beginning of the third and most flourishing phase of Monte Albán corresponds to the Classic Period (AD 300–900). The influence of the Teotihuacán architectural style is quite evident; the zenith of the period was reached *c.* AD 500. During the ensuing fourth period, about which little is known, Monte Albán lost its political preeminence, and its structures began to decay. In the final phase, which lasted up to the Spanish conquest in the 16th century, the Mixtec inhabited the site; they reused some of the old Zapotec tombs, and the two cultures became fused.

Monte Bello Islands, Australian coral islands in the Indian Ocean off the northwest coast of Western Australia, 60 mi (100 km) west of the Dampier Archipelago. The largest of the uninhabited group are North West, Trimouille, South East, and Hermite. Comparatively flat and sandy, they are indented by coves lined with mangroves. In 1622 the English ship "Tryal" was wrecked on one of the reefs. Nicolas Baudin charted their waters (1801–02) and named them in honour of the French duke of Montebello (Jean Lannes). They were used for the 1952 and 1956 British atomic explosions, and Japanese and Australian fishermen were barred from the area because of radiation.

Monte-Carlo, resort, one of the four *quartiers* (sections) of Monaco. It is situated on an escarpment at the base of the Maritime Alps along the French Riviera, on the Mediterranean, just northeast of Nice, Fr. In 1856 Prince Charles III of Monaco granted a charter allowing a joint stock company to build a casino. The casino opened in 1861, and five years later the district around it was declared by the Prince to be Monte-Carlo. To revitalize the principality's economy, Monte-Carlo was transformed into a luxuriously beautiful playground for the world's rich. The casino includes an opera house (1878). The International Sporting Club (1932) is nearby. The gambling tables are open only to visitors to Monaco. The casino operating company, which was taken over by the government in 1967, contributes less than 5 percent of the annual state budget. High-rise hotels and apartment buildings have replaced many of Monte-Carlo's picturesque villas. Pop. (1982) 13,154.

Monte-Carlo

Shostal—EB Inc.

Monte Censio (France): *see* Mont Cenis.

Monte Rosa, rounded, snow-covered massif of the Pennine Alps (*q.v.*) lying on the frontier between Switzerland and Italy, rising southeast of Zermatt, Switz. Ten summits in this huge mountain mass are distinguished by name. Four of them (Nordend, Zumsteinspitze, Signalkuppe [Punta Gnifetti], and Parrotspitze) lie on the frontier; five lower peaks are on the Italian slope. The 10th, Dufourspitze (*q.v.*; 15,203 ft [4,634 m]), is the highest peak of the mass and of Switzerland, rising on a buttress west of the frontier ridge. Gorner and several other glaciers on the north slope meet near Zermatt at the head of the Mattervisp River Valley. A laboratory for nuclear research has been established on the Italian slope. The name Monte Rosa is derived from an Aostian patois word *roëse,* meaning "glacier."

Summits of the Monte Rosa viewed from Switzerland

Sven Samelius

Monte San Giuliano (Sicily): *see* Erice.

Monte Sant'Angelo, town, Foggia province, Puglia (Apulia) region, east central Italy, on the southern slope of the Promontorio del Gargano, the "spur" of Italy, northeast of

Foggia. The town grew up around the famous Santuario di S. Michele (Sanctuary of St. Michael), founded *c.* 490 over a cave in which the archangel Michael is said to have appeared to St. Laurentius Maioranus, archbishop of Sipontum. The bronze doors were made in Constantinople in 1076, and the octagonal campanile dates from 1273. Also of interest are the ruined Norman–Aragonese castle and the 12th-century Tomba di Rotari, probably a baptistery. A pilgrimage centre, especially in the Middle Ages, the town depends for its economy upon services to tourists and pilgrims, agriculture (cereals, olive oil, wine), cattle breeding, and wool industries. Pop. (1981 prelim.) mun., 16,500.

Montebello, Jean Lannes, duc de (duke of): *see* Lannes, Jean.

montebrasite, phosphate mineral similar to amblygonite (*q.v.*).

Montecatini Terme, town and mineral spa, Pistoia province, Toscana (Tuscany) region, north central Italy, in the Valdinievole, at an altitude of 89 ft (27 m), just southwest of Pistoia. Known since the 14th century for its warm saline springs, it acquired importance when Leopold II (1747–92), grand duke of Tuscany, built the first public baths. Unified under government sponsorship, its hot springs have made it Italy's foremost spa. There are about 250 hotels, and the saline waters are also exported. Transportation facilities include railway and bus services and the airports of Pisa and Florence. Pop. (1981 prelim.) mun., 21,505.

Mineral spring, Montecatini Terme, Italy

Marzari—SCALA from Art Resource/EB Inc.

Montéclair, Michel (Pinolet) de (baptized Dec. 4, 1667, Andelot, Fr.—d. Sept. 27, 1737, Saint-Denis, near Paris), principal French composer of operatic and instrumental works in the period between Jean-Baptiste Lully and Jean-Philippe Rameau.

Montéclair was a chorister at Langres and later entered noble service. Settling in Paris in 1700, he played double bass at the Paris Opéra from 1707 to 1737 and was, in fact, one of the earliest players of that instrument in its modern form. His first opera-ballet, *Les Fêtes de l'été,* was produced in 1716. His best known opera, or *tragédie-lyrique, Jephté* (1732), was banned by the Archbishop of Paris because of its biblical subject. It has a grandeur reminiscent of Lully and is known to have influenced Rameau. Other works include *Cantates françaises et italiennes* (1709–17), a requiem, chamber music, and songs.

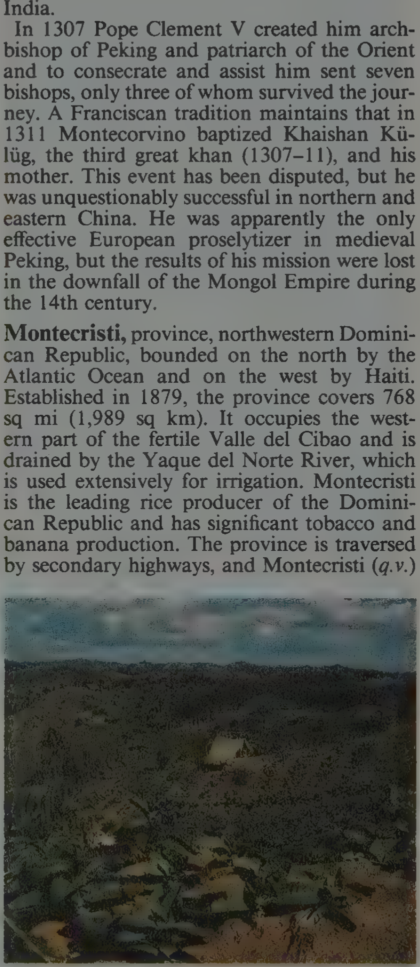
Montéclair's three theoretical and pedagogic treatises contain valuable information on contemporary ornamentation and performance practices.

Montecorvino, Giovanni da (b. 1247, Montecorvino, Sicily—d. 1328, Peking), Italian Franciscan missionary who founded the earliest Roman Catholic missions in India and China and became the first archbishop of Peking.

In 1272 Montecorvino was commissioned by the Byzantine emperor Michael VIII Palaeologus as an emissary to Pope Gregory X to negotiate the reunion of Greek and Roman churches. He began his missionary work in Armenia and Persia *c.* 1280. In 1289 Pope Nicholas IV sent him as emissary to the Il-Khan of Persia. From Tabriz, then the chief city of western Asia, Montecorvino moved down to the Madras region of India, from which he wrote (1292/93) the earliest noteworthy Western account of that region of the Indian seaboard known historically as the Coromandel Coast. In 1294 he entered Khanbaliq (Peking). His letters of 1305 and 1306 describe the progress of the Roman mission in the Far East—including opposition by the Nestorian Christians—and allude to the Roman Catholic community he had founded in India.

In 1307 Pope Clement V created him archbishop of Peking and patriarch of the Orient and to consecrate and assist him sent seven bishops, only three of whom survived the journey. A Franciscan tradition maintains that in 1311 Montecorvino baptized Khaishan Külüg, the third great khan (1307–11), and his mother. This event has been disputed, but he was unquestionably successful in northern and eastern China. He was apparently the only effective European proselytizer in medieval Peking, but the results of his mission were lost in the downfall of the Mongol Empire during the 14th century.

Montecristi, province, northwestern Dominican Republic, bounded on the north by the Atlantic Ocean and on the west by Haiti. Established in 1879, the province covers 768 sq mi (1,989 sq km). It occupies the western part of the fertile Valle del Cibao and is drained by the Yaque del Norte River, which is used extensively for irrigation. Montecristi is the leading rice producer of the Dominican Republic and has significant tobacco and banana production. The province is traversed by secondary highways, and Montecristi (*q.v.*) city, the provincial capital, is the terminus of a paved highway from Santo Domingo. Pop. (1981) 83,407.



Valle del Cibao, Montecristi, Dominican Republic

Carl Frank

Montecristi, in full SAN FERNANDO DE MONTECRISTI, city, capital of Montecristi province, northwestern Dominican Republic, in the coastal lowlands near the mouth of the Río Yaque del Norte. Founded in 1506, Montecristi was destroyed in 1606 for trading illegally with pirates; it was not reconstructed until 1756. It is now an important commercial and transportation centre, trading mainly in the rice, cotton, coffee, bananas, and goats from the western portion of the fertile Valle del Cibao. Hides and skins constitute the principal exports handled at the adjacent harbour. Montecristi is the terminus of a paved highway from Santo Domingo and has an airfield. Pop. (1981) 9,265.

Montecristo Island, Italian ISOLA DI MONTECRISTO, Latin OGLASA, member of the Arcipelago Toscano, in the Tyrrhenian Sea, between the Italian mainland and Corsica, south of the island of Elba. Part of Livorno province, the islet is mountainous, rising to 2,116 ft (645 m), with an area of 6 sq mi (16 sq km). It is a hunting preserve owned by the state and contains the ruins of a 13th-century monastery that was abandoned in 1553 after having been destroyed by pirates. The island was made famous by the novel *The Count of Monte Cristo* (1844) by Alexandre Dumas *père.*

Montecuccoli, Raimondo (b. Feb. 21, 1609, Castle Montecuccolo, near Modena, Duchy of Modena—d. Oct. 16, 1680, Linz, Austria), field marshal and military reformer, a master of the warfare based on fortifications and manoeuvre, who led Austrian armies to victory against enemies of the House of Habsburg for half a century.

Montecuccoli, portrait by an unknown artist, 1670; in the Heeresgeschichtliches Museum, Vienna

By courtesy of the Heeresgeschichtliches Museum, Vienna

Montecuccoli entered the Austrian Army in 1625, during the early part of the Thirty Years' War (1618–48), and distinguished himself against King Gustavus II Adolphus of Sweden at Breitenfeld (1631) and Lützen (1632). In action again at Nördlingen (1634) and Wittstock (1636), he was a Swedish prisoner from 1639 to 1642, using that time to complete his education and to study the art of war. His strategic and tactical writings were begun then. Returning to the field in 1642, he campaigned for his native Modena in the War of Castro (1642–44), between the papacy and its opponents, and against the Hungarian rebel György Rákóczy I in 1645. Back in Germany, his skillful retreat in Bavaria in the face of a combined French–Swedish onslaught led to his promotion to general.

The Peace of Westphalia (1648) enabled Montecuccoli to return to writing and to carry out a number of diplomatic missions for the Holy Roman emperor Ferdinand III. Promoted field marshal, he drove the Swedes from Germany, Denmark, and Pomerania (1658–60) and foiled the Turkish offensives against Austria between 1661 and 1664, winning a decisive victory at St. Gotthard on the Raab (Aug. 1, 1664), for which he was hailed as the saviour of Christendom. He then received rapid promotions. Named generalissimo of all imperial armies in 1664, he became president of the Hofkriegsrat (supreme imperial war council) in 1668. As head of that body, he sponsored a number of reforms, among them the introduction of a lighter musket, the reduction of the number of infantry pikemen balanced by a corresponding increase in soldiers armed with firearms, and the elevation of grenadiers into an elite force.

Already an old man, Montecuccoli was recalled to lead the imperial armies against France in 1672, defeating Marshal Henri de Turenne repeatedly during the next three years. Age and ill health finally forced his retirement in 1675.

Unequalled as a master of 17th-century warfare, Montecuccoli excelled in the art of fortification and siege, march and countermarch, and cutting his enemy's lines of communications. In advocating standing armies, he clearly foresaw future trends in the military field. His most important work, *Dell'arte militare* (1792; "The Military Art"), has been reprinted numerous times.

Montefeltro FAMILY, noble family of Urbino, a city in the Italian Marches, southeast of Florence, that rose to become a ruling dynasty and produced several outstanding political and military leaders from the 13th to the 16th century. Descendants of an older noble family, they took their name from the ancient town of Mons Feretri, later San Leo, where they first rose to prominence.

By 1234 the family ruled Urbino. During the remainder of the 13th and early 14th centuries the family was prominent on the Ghibelline (imperial) side in the struggle between emperor and pope. Guido da Montefeltro, mentioned in Dante's *Inferno,* fought against the Guelf (papal) party in Romagna and Tuscany before submitting to Pope Boniface VIII in 1295; he died a Franciscan monk in 1298. His son Federigo sustained the Ghibelline cause in north central Italy and ruled Urbino until 1322, when he was killed in an insurrection. His son Nolfo temporarily recovered Urbino but in the end lost it to the papal party.

Nolfo's grandson Antonio (died 1403) recovered the family power once more (1377) and even extended it to neighbouring towns, making peace with the pope, who named him vicar, a title he successfully passed on to his son Guidantonio (died 1443). The latter's marriage to a daughter of the papal-related Colonna family cemented the new alliance, and papal support assisted the Montefeltri in resisting the Malatesta family, lords of Rimini. Guidantonio's illegitimate son Federico (1422–82) became an outstanding military leader, captaining the papal army against the Malateste and his own against the pope, and suppressing a revolt in Volterra as a mercenary in the pay of Lorenzo de' Medici. He spent his war profits on monumental building, on a library, and on art. Pope Sixtus IV made him duke of Urbino in 1474. Federico's son Guidobaldo was the last ruling Montefeltro; dispossessed by Cesare Borgia in 1502, he recovered his state, but being without heirs adopted his nephew Francesco Maria della Rovere, into whose family Urbino then passed. His court, a notable centre of culture, is commemorated in Baldassare Castiglione's *Il cortegiano* (1528).

Montefiore, Claude Joseph Goldsmid (b. June 6, 1858, London—d. July 9, 1938, London), Jewish theologian and Reform leader; the first modern Jew to write an important commentary on the Synoptic Gospels (Matthew, Luke, and Mark).

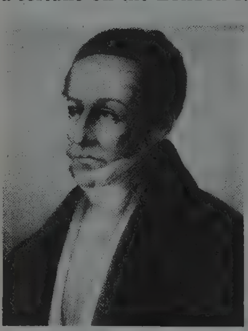
Montefiore enrolled in a Reform seminary in Berlin with the intention of becoming a rabbi but abandoned this idea and returned to England. He retained, however, his belief in Reform Judaism (*q.v.;* called Liberal in England). Throughout his life Montefiore was a Liberal leader, helping to found the Jewish Religious Union (in 1902) and serving as president of the World Union for Progressive Judaism from 1926 until his death.

He first gained fame through the Hibbert Lectures, delivered in 1892 at Oxford, on "The Origin and Growth of Religion as Illustrated by the Religion of the Ancient Hebrews." In 1909 he published *The Synoptic Gospels* and the following year delivered the Benjamin Jowett lectures at Oxford on "Some Elements of the Religious Teaching of Jesus According to the Synoptic Gospels." More than any other Jewish scholar up to his time, Montefiore paid full tribute to Jesus' power as a prophet. He stated, unlike other Jewish scholars, that Jesus' ethics are valuable precisely because they are almost beyond the grasp of humanity. He wrote that, although Jews can profit from reading the New Testament, true Judaism is found in the Old Testament, a statement that refutes the charge that Montefiore flirted with Christianity.

When he was nearly 80 Montefiore collaborated with the Orthodox scholar, H. Loewe, in editing *A Rabbinic Anthology.* This work is doubly remarkable because Reform Jews deny the authority of the Talmud, the rabbinical compendium of law, lore, and commentary. In the *Anthology,* Montefiore attempts to dispel the notion that Christianity developed a completely new and valuable ethic in contradistinction to the teachings of the rabbis, which many Christians had long held to be crude and primitive. Noted as a philanthropist as well as a great scholar, he helped found and edit the *Jewish Quarterly Review.* He was a grandnephew of Sir Moses Montefiore.

Montefiore, Sir Moses (Haim), BARONET (b. Oct. 24, 1784, Livorno, Italy—d. July 28, 1885, near Ramsgate, Kent, Eng.), outstanding Jewish philanthropist.

Scion of an old Italian Jewish merchant family, Montefiore was taken to England as an infant. As a young man he accumulated such a fortune on the London stock exchange that he was able to retire in 1824. He subsequently helped found the Alliance Assurance Company, the Imperial Continental Gas Association (which pioneered gas lighting for homes), and the Provincial Bank of Ireland.


Sir Moses Montefiore, detail of a lithograph after a portrait by A. Brasch, mid-19th century
By courtesy of the Zionist Archives and Library

In 1837 he was elected sheriff of London, the second Jew so honoured, and in 1847 he became high sheriff of Kent. Knighted in 1837, he became a baronet in 1846.

An Orthodox Sefardic Jew (a Jew of Portuguese-Spanish descent), Montefiore is best remembered as a philanthropist and zealous fighter for the rights of oppressed Jews all over the world. Besides visiting such countries as Italy, Russia, and Romania on behalf of his co-religionists, he also made seven journeys to Palestine. During his first pilgrimage to Jerusalem in 1827 he established a friendship with Muḥammad ʿAlī Pasha, sultan of Egypt. In 1840 Montefiore utilized this relationship when he helped secure the release of a number of Damascan Jews (Damascus was then part of ʿAlī's domain) who had been falsely accused of using Christian blood for religious rites. That year he also persuaded the Turkish sultan to extend to Jews the maximum privileges enjoyed by aliens, privileges he persuaded a later sultan to reaffirm in 1863. In Russia he convinced Tsar Nicholas I to rescind a decree of 1844 that had ordered all Jews to withdraw from the western frontier areas of Russia. In addition he performed a great many private acts of charity, and he contributed a fortune to establish hospitals and charitable institutions in Palestine.

Montefiore made a final pilgrimage to the Holy Land in 1875 and retired thereafter to his house, East Cliff Lodge, where he maintained a centre of religious observance and theological research. Though married, he died without issue, and the baronetcy became extinct.

Articles are alphabetized word by word, not letter by letter

Montego Bay, chief city of the Parish of St. James and second largest city in Jamaica, 85 mi (137 km) northwest of Kingston. It lies on the site of an Arawak village visited by Columbus in 1494. Its original Spanish name, Bahía de Manteca (Butter Bay), probably recalls its early function as a lard ("hog's butter") centre. The Spanish, ousted by the British after 150 years, destroyed most of the original buildings.

Montego Bay is now a crowded, modernized tourist resort stretching 20 mi along the coast. It is a commercial centre and port, with a large export trade in fruit and other produce. It has an international airport and is noted for its white sand beaches, especially Doctor's Cave on the north shore. Buildings include the cruciform St. James Church (1775); the Town Hall (1804–08); and the Cage (dating from the early 1800s), a former runaway slave detention point and now a dispensary. Seven miles to the east is the infamous Rose Hall Great House, said to be haunted by a former mistress, the "White Witch," who tortured and murdered slaves and lovers. Pop. (1982 prelim.) 59,614.

Monteiro Lobato, José Bento (b. April 18, 1882, Taubaté, Braz.—d. July 4, 1948, São Paulo), writer and publisher, forerunner of the Modernist movement in Brazilian literature.

Originally a lawyer and coffee planter in the interior of São Paulo state, Monteiro Lobato wrote an unpretentious letter to a São Paulo newspaper, describing the droughts and brushfires in the interior. The editor asked for more articles and Lobato replied with the sketches and short stories, later collected in his book *Urupês* (1918; "Mushrooms"). In these he introduced the character Jeca Tatu ("Joe Armadillo"), who became the symbol of the Brazilian backlander. "Poor Jeca Tatu," Lobato comments. "You are so handsome in novels and so ugly in real life! You don't talk; you don't sing; you don't love."

A man of action, Monteiro Lobato moved to São Paulo, founded the literary review *Revista do Brasil* and a publishing house, and gathered around him a circle of new literary talents. Critical and rebellious, he was in and out of prison and exile many times. He also wrote children's books enjoyed equally well by adults.

Montélimar, town, Drôme *département,* Rhône-Alpes region, southeastern France, near the confluence of the Roubion and Rhône rivers, southwest of Valence. It was called Acunum by the Romans, and Mons Adhemaris or Monteil d'Adhémar (after the local Adhémar [Aimar] family) in medieval times. Part of it was a papal possession from 1340 to 1447. The town was captured by the Huguenots in 1587. Monuments include the

Tour de Narbonne (a 14th-century fortress) and the Château des Papes (now a prison). An agricultural centre, it also has light industry, especially textiles. Pop. (1990) 31,386.

Montelius, Oscar, in full GUSTAV OSCAR AUGUSTIN MONTELIUS (b. Sept. 9, 1843, Stockholm, Sweden—d. Nov. 4, 1921, Stockholm), Swedish archaeologist who sought to establish foundations for prehistoric chronology, especially that of the Bronze Age in the British Isles and Europe northward to Scandinavia.

Montelius was attached to the Museum of National Antiquities, Stockholm, from 1863. He was appointed professor in 1888 and served as the museum's director from 1907 to 1913. Still controversial is his theory, the "Swedish typology," suggesting that material culture and biological life develop through essentially the same kind of evolutionary process. His main works include *Om tidsbestämming inom Bronsåldern* (1885; "On Determining the Periods Within the Bronze Age"), *The Civilization of Sweden in Heathen Times* (1888), and *Die älteren Kulturperioden in Orient und in Europa* (1903–23; "The Older Cultural Periods in the Orient and Europe").

Montemayor, Jorge de, Montemayor also spelled MONTEMOR (b. *c.* 1520, Montemoro-Velho, Coimbra, Port.—d. Feb. 26, 1561, Turin, duchy of Savoy [Italy]), Portuguese-born author of romances and poetry who wrote the first Spanish pastoral novel.

Montemayor probably came to Spain in 1543 with Philip II's first wife, Mary, as a musician. He later entered the household of Joan, daughter-in-law of John III of Portugal, and he accompanied Philip II to England in 1544. He was murdered in the Piedmont. His most famous literary work, the pastoral novel *Diana* (1559), was inspired in part by Jacopo Sannazzaro's pastoral romance *Arcadia. Diana* went through many editions, was widely translated, and started a literary fashion in the Renaissance that spread also to France, the Low Countries, and Germany. In England, William Shakespeare used Bartholomew Young's translation of it as a source for his play *The Two Gentlemen of Verona.*

Montemezzi, Italo (b. May 31, 1875, Vigasio, Italy—d. May 15, 1952, Vigasio), Italian opera and symphonic composer whose masterpiece was the opera *L'amore dei tre re* (1913; *The Love of Three Kings*).

After study at the Milan Conservatory, Montemezzi established himself as an operatic composer with *Giovanni Gallurese* (1905). *L'amore dei tre re,* based on a play by Sem Benelli, obtained its atmosphere of brooding tragedy from a fusion of Italian melody with elements of French Impressionism derived from Claude Debussy's *Pelléas et Mélisande.* It became a standard work of 20th-century opera. *La Nave* (1918), with a libretto based on writings by Gabriele d'Annunzio, was less successful. Montemezzi's symphonic works include *Paolo e Virginia* (1929) and *Italia mia!* (1944), which was inspired by Italy's defeat in World War II. In 1939 Montemezzi emigrated to California, returning after the war to his birthplace.

Montenegro, Serbo-Croatian CRNA GORA, constituent republic (with Serbia) of the Federal Republic of Yugoslavia, at the southern end of the Dinaric Alps. It is bounded by the Adriatic Sea and Croatia (southwest), Bosnia and Herzegovina (northwest), Serbia (northeast), and Albania (southeast). The capital is Podgorica (formerly Titograd).

A brief treatment of Montenegro follows. For full treatment, *see* MACROPAEDIA: Balkan States.

Physical and human geography. The republic's name—both Montenegro (from Venetian Italian) and Crna Gora—denote "Black Mountain," in reference to Mount Lovćen (5,738 feet [1,749 m]), its historical centre near the Adriatic Sea and stronghold in the centuries of struggle with the Turks. Alone of the Balkan states, Montenegro was never subjugated. The old Montenegro, in the southwest, is mainly a karst region of arid hills, with some cultivable areas—*e.g.,* around Cetinje, the former capital, and in the Zeta valley. The eastern districts, which include part of the Dinaric Alps (Mount Durmitor, 8,274 feet [2,522 m]), are more fertile and have large forests and grassy uplands. The drainage system of Montenegro flows in two opposite directions; the Piva, Tara, and Lim rivers follow northerly courses, the Morača and Zeta rivers southerly ones.

The climate is severe in the higher regions and comparatively mild in the valleys. The mean annual temperature is about 58° F (14° C). Snow lies for most of the year on many heights, and in some of the darker gorges it is never thawed. Cetinje receives an annual precipitation exceeding 150 inches (3,810 mm). Precipitation occurs year-round but is heaviest in autumn.

Montenegro has a relatively small population and is nowhere densely populated. The majority of the people are Montenegrin, and there are sizable Muslim and Albanian minorities. The Montenegrin people are closely akin to the Serbs and, like the Serbs, speak Serbo-Croatian, write Serbo-Croatian with the Cyrillic alphabet, and are followers of the Eastern Orthodox church. The traditional society was composed of extended families that were patrilineally related. It was a decentralized society in which loyalty to the extended family was most important, and blood feuds and warring among families were prevalent. Remnants of this traditional society persist to the present day.

Montenegro is economically not well developed, and it receives large amounts of federal economic assistance. The per capita income for Montenegro is low. The republic's economy has historically depended on cereal-grain farming and on the raising of stock, mostly sheep and goats transferred between summer and winter grazing areas. After 1945 the Yugoslav government devoted considerable sums to the production of electrical power and to the iron and steel and nonferrous-metal industries. Other enterprises process agricultural products. Bauxite is mined near Nikšić.

History. Under the Roman Empire Montenegro formed part of the Roman province of Illyria. Settled by Slavs in the 7th century, Montenegro was formed as the independent province of Zeta and incorporated in the Serbian empire in the late 12th century. It retained its independence following the Turkish defeat of the Serbians at Kosovo Polje in 1389. After 1516 the people were ruled by *vladike,* prince-bishops of the Orthodox church. The Montenegrins often fought the Turks and Albanians and after 1711 began an alliance with Russia.

The settlement at the Congress of Berlin (1878) doubled the size of Montenegro and recognized its independence, but, because of Albanian resistance, agreement on the southern frontier was not reached until 1880. Montenegro eventually acquired all of the plain of Podgorica and 25 miles (40 km) of coast with the little ports of Bar (Antivari) and Ulcinj (Dulcigno). Nicholas I, who ruled from 1860 to 1918, proclaimed himself king of Montenegro in 1910. In the Balkan Wars of 1912–13, Serbia and Montenegro cooperated against Turkey, with Nicholas firing the first shot of the war. As a result of the war Montenegro was extended to the north and east, giving it a common frontier with Serbia.

Montenegro supported Serbia during World War I. When the Austro-Hungarian forces were withdrawn early in November 1918, their place was taken by Serbian troops and irregular bands. Under this new control a "national assembly" met at Podgorica and on November 26 resolved that Nicholas was dethroned and Montenegro absorbed into Serbia. With Serbia, it became part of the Kingdom of Serbs, Croats, and Slovenes (from 1929 known as Yugoslavia).

In April 1941 Italian troops occupied parts of Montenegro, but rebellion broke out in the same month, and Montenegro was the scene of almost continuous fighting until late in 1944, by which time the communist Partisans, with British arms and equipment, controlled most of it. Montenegrin communists had formed some of the toughest elements in Josip Broz Tito's Partisan forces and provided many of his most vigorous officers and leaders. Not surprisingly, the federal constitution of the new Yugoslavia (1946) made Montenegro one of the six nominally autonomous federated units. When socialist Yugoslavia disintegrated in 1991, Montenegro was the only republic that chose to remain with Serbia in the new truncated federation. Area 5,333 square miles (13,812 square km). Pop. (1993 est.) 626,000.

Monteregian Hills, French COLLINES MONTÉRÉGIENNES, series of eight butte-type mountains in the St. Lawrence River valley, in Montréal, Montérégie, and Estrie regions, southeastern Quebec province, Canada. The hills extend eastward for about 50 miles (80 km) from Île de Montréal to the Appalachian Highlands. Formed of igneous rock, the hills are characterized by high crests on their northeast sides and gradual slopes on the southwest. The name, derived from the Latin Mons Regius ("Royal Mountain"), was first applied by Jacques Cartier, the French explorer, in 1535.

Best known is Mont-Royal, on Île de Montréal, which actually consists of three peaks—Mont-Royal (763 feet [233 m]), Westmount, and Côte-des-Neiges. Extending into Montérégie and Estrie are the mountains of Saint-Bruno, Saint-Hilaire (Beloeil), Saint-Grégoire (Johnson), Brome, Rougemont, Yamaska, and Shefford.

Monterey, city, Monterey county, California, U.S. It lies on a peninsula at the southern end of Monterey Bay, about 85 miles (135 km) south of San Francisco. The bay was explored in 1602 by Sebastián Vizcaíno, who named it in honour of the Count de Monte Rey, viceroy of Mexico. In 1770 Gaspar de Portolá established a presidio (military post) at the site and Junípero Serra founded the Mission San Carlos Borroméo, which was moved to Carmel in 1771. Named the capital of Alta California in 1775, Monterey was fortified and became a port of entry and centre of Spanish culture. Under Mexico, Monterey remained the capital of a vast area including all of present-day California and the American Southwest. Commodore John Drake Sloat raised the American flag over the town's presidio in 1846 during the Mexican War. The first constitutional convention in California met at Colton Hall in 1849.

Monterey was once a leading fishing and whaling port, but its economic mainstays are now tourism and nearby military establishments, especially Fort Ord. The U.S. Defense Language Institute is in the old presidio. The city is the site of Monterey Peninsula College (1947), the Monterey Institute of International Studies (1955), and the Monterey Conference Center (a major complex opened in 1977). The Old Customhouse (1827) and the First (California) Theatre (1844) are preserved as units of Monterey State Historic Park. Monterey formed the background for several of John Steinbeck's novels, among them *Tortilla Flat* (1935) and *Cannery Row* (1945). It has also been the site of the historic Monterey Jazz Festival. Inc. 1889. Pop. (1992 est.) city, 32,030; Salinas MSA, 368,875.

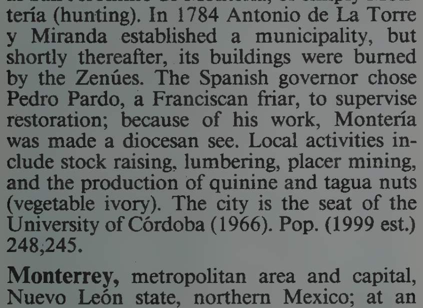
Monterey Canyon, largest and deepest submarine canyon off the Pacific coast of North America. The canyon has three tributaries at its upper reaches in Monterey Bay, Calif.: minor Soquel Canyon to the north, the main Monterey Canyon head aligned east–west off Moss Landing, and Carmel Canyon to the south. Carmel Canyon, the principal tributary, trends north-northwest to join the main valley at an axial depth of 6,000 ft (1,800 m). The canyon is approximately 50 mi (80 km) long. Below its junction with Carmel Canyon it trends sinously southwestward and westward down to an axial depth of 9,600 ft, where the feature passes into a fan valley of low relief. The walls increase in height from the head down the canyon to a maximum of about 6,312 ft at an axial depth of about 6,670 ft; thus, the canyon is comparable in size to the Grand Canyon on land.

Monterey Jack, mild, smooth cow's-milk cheese produced mainly in California; it originated in Monterey County but is now made elsewhere in California, notably Sonoma County (where it is known as Sonoma Jack), and in Wisconsin. Generally aged about six weeks, occasionally three months, Jack cheese is pale ivory in colour, quite bland in flavour, and smooth and semisoft in texture with small irregular holes. It is sometimes flavoured with spices, pimientoes, or jalapeño peppers. Dry Jack is a rarer, aged version, a deep yellow-gold cheese similar in texture and flavour to well-aged cheddar.

Montería, capital of Córdoba department, northwestern Colombia, and an inland port on the Río Sinú. In 1744 a Spanish conquistador, Juan de Torrezar Díaz Pimienta, claimed a Zenúe Indian village, which he called San Jerónimo de Buenavista. Used as a hunter's rendezvous, the settlement came to be known as San Jerónimo de Montería, or simply Montería (hunting). In 1784 Antonio de La Torre y Miranda established a municipality, but shortly thereafter, its buildings were burned by the Zenúes. The Spanish governor chose Pedro Pardo, a Franciscan friar, to supervise restoration; because of his work, Montería was made a diocesan see. Local activities include stock raising, lumbering, placer mining, and the production of quinine and tagua nuts (vegetable ivory). The city is the seat of the University of Córdoba (1966). Pop. (1999 est.) 248,245.

Monterrey, metropolitan area and capital, Nuevo León state, northern Mexico; at an altitude of 1,765 ft (538 m) and partly surrounded by mountains, it is on the floodplain of the eastward-flowing Río Santa Catarina.

It was founded in 1579, but floods, hostile Indians, its distance from Mexico City, and lack of metals kept it small and unimportant until the late 19th century. Rail connections with Laredo, Texas, opened in 1882, and state legislation favourable to capital investment was passed, leading to large-scale smelting and heavy-industrial enterprises. Further growth was stimulated by the building of the Inter-American Highway, beginning in 1930, which led to the development of Monterrey into Mexico's third largest city and one of the most energetic and up-to-date industrial complexes in the hemisphere.



Cathedral on the Plaza Hidalgo, Monterrey, Mex.

Martin Vanderwall—De Wys Inc.

In addition to its heavy industries, fabricating plants, and ore-processing units, Monterrey has hundreds of light industries, producing such items as beer, cigarettes, pottery, glass, and textiles. On a semiarid piedmont north and east of the city there is considerable irrigated agriculture. Local rivers provide hydroelectric power, but for both irrigation and electricity, Monterrey is the chief Mexican beneficiary of the great Falcón Dam, on the Lower Rio Grande (Río Bravo del Norte). The city is the site of Monterrey Institute of Technology and Higher Education (1943), Nuevo León University (1933), Labastida University (1947), the Regiomontane University (1957), and the University of Monterrey (1969). It is on main highways, railroads, and air routes between Laredo, to the north, and Mexico City, to the south. Pop. (1775) 258; (1880) 29,000; (1930) 132,571; (2000 prelim.) metropolitan area, 3,273,332.

Montes Claros, city, northern Minas Gerais state, Brazil, near the Rio Verde Grande in the Serra do Espinhaço, at 2,093 ft (638 m) above sea level. It was made a seat of a municipality in 1831 and attained city rank in 1857. Livestock raising is the area's principal source of income, supplemented by the cultivation of cassava, corn (maize), *feijão* (beans), cotton, sugarcane, and other crops. The city, a trade and manufacturing centre, has a furniture and a textile factory. A teachers' university was founded there in 1962. The city is accessible by railway and highway from Belo Horizonte, the state capital, 219 mi (352 km) south. Montes Claros has a commercial airport. Pop. (2000 prelim.) 288,534.

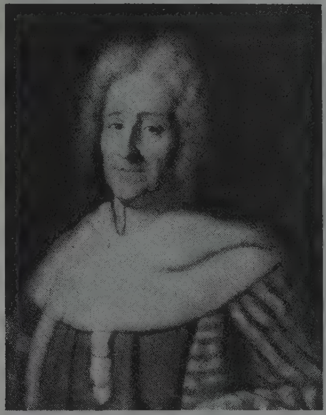
Montespan, Françoise-Athénaïs de Rochechouart, marquise de (marchioness of) (b. Oct. 5, 1641, Tonnay-Charente, Fr.—d. May 27/28, 1707, Bourbon-l'Archambault), mistress of Louis XIV of France for 13 years.

Daughter of the Marquis (from 1650 Duc) de Mortemart, she was married in 1663 to the Marquis de Montespan, by whom she had two children. She was appointed lady-in-waiting to the queen of France, Marie-Thérèse of Austria, in 1664, and became the King's mistress in 1667. A girl whom she bore to the King in 1669 died in 1672, but she had six other children by him who were later legitimated. They were Louis-Auguste (1670–1736), duc du Maine; Louis-César (1672–83), comte de Vexin; Louise-Françoise (1673–1743), known first as Mlle de Nantes, then as the duchesse de Bourbon; Louise-Marie (1676–81), known as Mlle de Tours; Françoise-Marie (1677–1749), known first as the second Mlle de Blois, finally as the duchesse d'Orléans; and Louis-Alexandre (1678–1737), comte de Toulouse. The Marquis de Montespan, who displayed his resentment, was exiled to Guyenne in 1668 and judicially separated from his wife in 1674 (he died in 1701).

When the Affair of the Poisons came to light in 1679, Mme de Montespan was alleged to have been from 1667 a customer of the witch La Voisin. Notwithstanding this affair, Mme de Montespan long remained at court, though the King transferred his affections to Mme de Maintenon. Finally, however, in 1691 she withdrew to the convent of Saint-Joseph (in Paris), of which she eventually became the superior.

Montesquieu, Charles-Louis de Secondat, baron de La Brède et de (b. Jan. 18, 1689, Château La Brède, near Bordeaux, Fr.—d. Feb. 10, 1755, Paris), French political philosopher whose major work, *The Spirit of Laws,* was a major contribution to political theory.

Early life and career. His father, Jacques de Secondat, belonged to an old military family of modest wealth that had been ennobled in the 16th century for services to the crown, while his mother, Marie-Françoise de Pesnel, was a pious lady of partial English extraction. She brought to her husband a great increase in wealth in the valuable wine-producing property of La Brède. When she died in 1696, the barony of La Brède passed to Charles-Louis, who was her eldest child, then aged seven. Educated first at home and then in the village, he was sent away to school in 1700. The school was the Collège de Juilly, close to Paris and in the diocese of Meaux. It was much patronized by the prominent families of Bordeaux, and the priests of the Oratory, to whom it belonged, provided a sound education on enlightened and modern lines.



Montesquieu, detail of an oil painting dated 1718; in the Académie Nationale des Sciences, Belles-Lettres et Arts de Bordeaux, Fr.

By courtesy of the Academie Nationale des Sciences, Belles-Lettres et Arts de Bordeaux, France; photograph, Studio Denis

Charles-Louis left Juilly in 1705, continued his studies at the faculty of law at the University of Bordeaux, was graduated, and became an advocate in 1708; soon after he appears to have moved to Paris in order to obtain practical experience in law. He was called back to Bordeaux by the death of his father in 1713. Two years later he married Jeanne de Lartigue, a wealthy Protestant, who brought him a respectable dowry of 100,000 livres and in due course presented him with two daughters and a son, Jean-Baptiste. Charles-Louis admired and exploited his wife's business skill and readily left her in charge of the property on his visits to Paris. But he does not appear to have been either faithful or greatly devoted to her. In 1716 his uncle, Jean-Baptiste, baron de Montesquieu, died and left to his nephew his estates, with the barony of Montesquieu, near Agen, and the office of deputy president in the Parlement of Bordeaux. His position was one of some dignity. It carried a stipend but was no sinecure.

The young Montesquieu, at 27, was now socially and financially secure. He settled down to exercise his judicial function (engaging to this end in the minute study of Roman law), to administer his property, and to advance his knowledge of the sciences—especially of geology, biology, and physics—which he studied in the newly formed academy of Bordeaux.

In 1721 he surprised all but a few close friends by publishing his *Lettres persanes* (*Persian Letters,* 1722), in which he gave a brilliant satirical portrait of French and particularly Parisian civilization, supposedly seen through the eyes of two Persian travellers. This exceedingly successful work mocks the reign of Louis XIV, which had only recently ended; pokes fun at all social classes; discusses, in its allegorical story of the Troglodytes, the theories of Thomas Hobbes relating to the state of nature. It also makes an original, if naive, contribution to the new science of demography; continually compares Islām and Christianity; reflects the controversy about the papal bull *Unigenitus,* which was directed against the dissident Catholic group known as the Jansenists; satirizes Roman Catholic doctrine; and is infused throughout with a new spirit of vigorous, disrespectful, and iconoclastic criticism. The work's anonymity was soon penetrated, and Montesquieu became famous. The new ideas fermenting in Paris had received their most scintillating expression.

Montesquieu now sought to reinforce his literary achievement with social success. Going to Paris in 1722, he was assisted in entering court circles by the Duke of Berwick, the exiled Stuart prince whom he had known when Berwick was military governor at Bordeaux. The tone of life at court was set by the rakish regent, the Duc d'Orléans, and Montesquieu did not disdain its dissipations. It was during this period that he made the acquaintance of the English politician Viscount Bolingbroke, whose political views were later to be reflected in Montesquieu's analysis of the English constitution.

In Paris his interest in the routine activities of the Parlement in Bordeaux, however, had dwindled. He resented seeing that his intellectual inferiors were more successful than he in court. His office was marketable, and in 1726 he sold it, a move that served both to reestablish his fortunes, depleted by life in the capital, and to assist him, by lending colour to his claim to be resident in Paris, in his attempt to enter the Académie Française. A vacancy there arose in October 1727. Montesquieu had powerful supporters, with Madame de Lambert's salon firmly pressing his claims, and he was elected, taking his seat on Jan. 24, 1728.

This official recognition of his talent might have caused him to remain in Paris to enjoy it. On the contrary, though older than most noblemen starting on the grand tour, he resolved to complete his education by foreign travel. Leaving his wife at La Brède with full powers over the estate, he set off for Vienna in April 1728, with Lord Waldegrave, nephew of Berwick and lately British ambassador in Paris, as travelling companion. He wrote an account of his travels as interesting as any other of the 18th century. In Vienna he met the soldier and statesman Prince Eugene of Savoy and discussed French politics with him. He made a surprising detour into Hungary to examine the mines. He entered Italy, and, after tasting the pleasures of Venice, proceeded to visit most of the other cities. Conscientiously examining the galleries of Florence, notebook in hand, he developed his aesthetic sense. In Rome he heard the French minister Cardinal Polignac and read his unpublished Latin poem *Anti-Lucretius.* In Naples he skeptically witnessed the liquefaction of the blood of the city's patron saint. From Italy he moved through Germany to Holland and thence (at the end of October 1729), in the company of the statesman and wit Lord Chesterfield, to England, where he remained until the spring of 1731.

Montesquieu had a wide circle of acquaintances in England. He was presented at court, and he was received by the Prince of Wales, at whose request he later made an anthology of French songs. He became a close friend of the dukes of Richmond and Montagu. He was elected a Fellow of the Royal Society. He attended parliamentary debates and read the political journals of the day. He became a Freemason. He bought extensively for his library. His stay in England was one of the most formative periods of his life.

Major works. During his travels Montesquieu did not avoid the social pleasures that he had sought in Paris, but his serious ambitions were strengthened. He thought for a time of a diplomatic career but on his return to France decided to devote himself to literature. He hastened to La Brède and remained there, working for two years. Apart from a tiny but controversial treatise on *La Monarchie universelle,* printed in 1734 but at once withdrawn (so that only his own copy is extant), he was occupied with an essay on the English constitution (not published until 1748, when it became part of his major work) and with his *Considérations sur les causes de la grandeur des Romains et de leur décadence* (1734; *Reflections on the Causes of the Grandeur and Declension of the Romans,* 1734). He had thought of publishing the two together, thus following an English tradition, for, as Voltaire said, the English delighted in comparing themselves with the Romans.

Montesquieu's literary ambitions were far from exhausted. He had for some time been meditating the project of a major work on law and politics. After the publication of the *Considérations,* he rested for a short time and then, undismayed by failing eyesight, applied himself to this new and immense task. He undertook an extensive program of reading in law, history, economics, geography, and political theory, filling with his notes a large number of volumes, of which only one survives, *Geographica, tome II.* He employed a succession of secretaries, sometimes as many as six simultaneously, using them as readers and as amanuenses, but not as précis writers. An effort of this magnitude was entirely foreign to what was publicly known of his character, for he was generally looked on as brilliant, rapid, and superficial. He did not seek to disabuse the world at large. Only a small number of friends knew what he was engaged in. He worked much at La Brède, devoting himself also to the administration of his estates and to the maintenance of his privileges as a landed proprietor. But he continued to visit Paris and to enjoy its social life. He kept there a second library and also made use of the Bibliothèque du Roi. He attended the Académie, visited the salons, and enjoyed meeting Italian and English visitors. At the same time he persistently, unostentatiously pressed on with the preparation of the book that he knew would be a masterpiece. By 1740 its main lines were established and a great part of it was written. By 1743 the text was virtually complete, and he began the first of two thorough and detailed revisions, which occupied him until December 1746. The actual preparation for the press was at hand. A Geneva publisher, J. Barrillot, was selected, further corrections were made, several new chapters were written and in November 1748 the work appeared under the title *De l'esprit des loix, ou du rapport que les loix doivent avoir avec la constitution de chaque gouvernement, les moeurs, le climat, la religion, le commerce, etc.* (*The Spirit of Laws,* 1750). It consisted of two quarto volumes, comprising 31 books in 1,086 pages.

L'Esprit des lois is one of the great works in the history of political theory and in the history of jurisprudence. Its author had acquainted himself with all previous schools of thought but identified himself with none. Of the multiplicity of subjects treated by Montesquieu, none remained unadorned. His treatment of three was particularly memorable.

The first of these is his classification of governments, a subject that was de rigueur for a political theorist. Abandoning the classical divisions of his predecessors into monarchy, aristocracy, and democracy, Montesquieu produced his own analysis and assigned to each form of government an animating principle: the republic, based on virtue; the monarchy, based on honour; and despotism, based on fear. His definitions show that this classification rests not on the location of political power but on the government's manner of conducting policy; it involves a historical and not a narrow descriptive approach.

The second of his most noted arguments, the theory of the separation of powers, is treated differently. Dividing political authority into the legislative, executive, and judicial powers, he asserted that, in the state that most effectively promotes liberty, these three powers must be confided to different individuals or bodies, acting independently. His model of such a state was England, which he saw from the point of view of the Tory opposition to the Whig leader, Robert Walpole, as expressed in Bolingbroke's polemical writings. The chapter in which he expressed this doctrine—book xi, chapter 6, the most famous of the entire book—had lain in his drawers, save for revision or correction, since it was penned in 1734. It at once became perhaps the most important piece of political writing of the 18th century. Though its accuracy has in more recent times been disputed, in its own century it was admired and held authoritative, even in England; it inspired the Declaration of the Rights of Man and the Constitution of the United States.

The third of Montesquieu's most celebrated doctrines is that of the political influence of climate. Basing himself on doctrines met in his reading, on the experience of his travels, and on experiments—admittedly somewhat naive—conducted at Bordeaux, he stressed the effect of climate, primarily thinking of heat and cold, on the physical frame of the individual, and, as a consequence, on the intellectual outlook of society. This influence, he claims, is not, save in primitive societies, insuperable. It is the legislator's duty to counteract it. Montesquieu took care (as his critics have not always realized) to insist that climate is but one of many factors in an assembly of secondary causes that he called the "general spirit." The other factors (laws, religion, and maxims of government being the most important) are of a nonphysical nature, and their influence, compared with that of climate, grows as civilization advances.

Society for Montesquieu must be considered as a whole. Religion itself is a social phenomenon, whether considered as a cause or as an effect, and the utility or harmfulness of any faith can be discussed in complete independence of the truth of its doctrines. Here and elsewhere, undogmatic observation was Montesquieu's preferred method. Sometimes the reader is beguiled by this into the belief that Montesquieu maintains that whatever exists, though it may indeed stand in need of improvement, cannot be wholly bad. Although with a bold parenthesis or a rapid summing-up the reader is reminded that for Montesquieu certain things are intrinsically evil: despotism, slavery, intolerance. Though he never attempted an enumeration of the rights of man and would probably have disapproved of such an attempt, he maintained a firm belief in human dignity.

In the final books of *L'Esprit des lois,* added at the last moment and imperfectly assimilated to the rest, he addressed himself to the history of law, seeking to explain the division of France into the two zones of written and customary law, and made his contribution to the much discussed controversy about the origins of the French aristocracy. Here he displays not only prudence and common sense, but also a real scholarly capacity, which he had not shown before, for the philological handling of textual evidence.

After the book was published, praise came to Montesquieu from the most varied headquarters. The Scottish philosopher David Hume wrote from London that the work would win the admiration of all the ages; an Italian friend spoke of reading it in an ecstasy of admiration; the Swiss scientist Charles Bonnet said that Montesquieu had discovered the laws of the intellectual world as Newton had those of the physical world. The philosophers of the Enlightenment accepted him as one of their own, as indeed he was. The work was controversial, however, and a variety of denunciatory articles amd pamphlets appeared. Attacks made in the Sorbonne and in the general assembly of the French clergy were deflected, but in Rome, in spite of the intervention of the French ambassador and of several liberal-minded high ecclesiastics and notwithstanding the favourable disposition of the Pope himself, Montesquieu's enemies were successful, and the work was placed on the *Index Librorum Prohibitorum* in 1751. This, though it dismayed Montesquieu, was but a momentary setback. He had already published his *Défense de L'Esprit des lois* (1750). Subtle and good-humoured, but forceful and incisive, this was the most brilliantly written of all his works. His fame was now worldwide.

Last years. Renown lay lightly on his shoulders. His affability and modesty are commented on by all who met him. He was a faithful friend, kind and helpful to young and unestablished men of letters, witty, though absent-minded, in society. It was to be expected that the editors of the *Encyclopédie* should wish to have his collaboration, and d'Alembert asked him to write on democracy and despotism. Montesquieu declined, saying that he had already had his say on those themes but would like to write on taste. The resultant *Essai sur le goût* (*Essay on Taste*), first drafted about 25 years earlier, was his last work. (R.Sh./Ed.)

MAJOR WORKS. *Lettres persanes* (1721; *Persian Letters, Translated [from the French of Montesquieu] by Mr. Ozell,* 2 vol., 1722); *De la monarchie universelle en Europe* (1734); *Considérations sur les causes de la grandeur des Romains et de leur décadence* (1734; *Reflections on the Causes of the Grandeur and Declension of the Romans. by the author of the Persian Letters, etc.,* 1734); *De l'esprit des loix, ou du rapport que les loix doivent avoir avec la constitution de chaque gouvernement, les moeurs, le climat, la religion, le commerce, etc.* (1748; *The Spirit of Laws, Translated* [*by Thomas Nugent*] *. . . with Corrections and Additions Communicated by the Author,* 2 vol., 1750; *The Spirit of Laws, by C. de Secondat, Baron de Montesquieu, translated by Thomas Nugent, revised by J.V. Pritchard, including On the Origin of Inequality, On Political Economy, The Social Contract, by Jean Jacques Rousseau,* trans. by G.D.H. Cole, 1952); *Défense de L'Esprit des loix à laquelle on a joint quelques éclaircissements* (1750).

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Montessori, Maria (b. Aug. 31, 1870, Chiaravalle, near Ancona, Italy—d. May 6, 1952, Noordwijk aan Zee, Neth.), Italian educator and originator of the educational system that bears her name. The Montessori system is based on belief in the child's creative potential, his drive to learn, and his right to be treated as an individual.

Maria Montessori
Publifoto

After graduating in medicine from the University of Rome in 1894—the first woman in Italy to do so—Montessori was appointed assistant doctor at the psychiatric clinic of the University of Rome, where she became interested in the educational problems of mentally retarded children. Between 1899 and 1901 she served as director of the State Orthophrenic School of Rome, where her methods proved extremely successful. From 1896 to 1906 she held a chair in hygiene at a women's college in Rome, and from 1900 to 1907 she lectured in pedagogy at the University of Rome, holding a chair in anthropology from 1904 to 1908. During these years she continued her studies of philosophy, psychology, and education.

In 1907 Montessori opened the first Casa dei Bambini ("Children's House"), a school for young children from the San Lorenzo slum district of Rome, applying her methods now to children of normal intelligence. Her successes led to the opening of other Montessori schools, and for the next 40 years she travelled throughout Europe, India, and the United States lecturing, writing, and establishing teacher-training programs. In 1922 she was appointed government inspector of schools in Italy, but left the country in 1934 because of the Fascist rule. After periods in Spain and Ceylon (now Sri Lanka), she settled in The Netherlands.

Montessori scorned conventional classrooms, where "children, like butterflies mounted on pins, are fastened each to his place." She sought, instead, to teach children by supplying concrete materials and organizing situations conducive to learning with these materials.

She discovered that certain simple materials aroused in young children an interest and attention not previously thought possible. These materials included beads arranged in graduated-number units for premathematics instruction; small slabs of wood designed to train the eye in left-to-right reading movements; and graduated series of cylinders for small-muscle training. Children between three and six years old would work spontaneously with these materials, indifferent to distraction, for from a quarter of an hour to an hour. At the end of such a period, they would not seem tired, as after an enforced effort, but refreshed and calm. Undisciplined children became settled through such voluntary work. The materials used were designed specifically to encourage individual rather than cooperative effort. Group activity occurred in connection with shared housekeeping chores.

A large measure of individual initiative and self-direction characterized the Montessori philosophy, and self-education was the keynote of the plan. The teacher provided and demonstrated the special "didactic apparatus" but remained in the background, leaving the child to handle it for himself. In the Montessori system biological and mental growth are linked. "Periods of sensitivity," corresponding to certain ages, exist when a child's interest and mental capacity are best suited to the acquisition of certain specialized knowledge.

Montessori's methods are set forth in such books as *Il metodo della pedagogia scientifica* (1909; *The Montessori Method,* 1912), *The Advanced Montessori Method* (1917–18), *The Secret of Childhood* (1936), *Education for a New World* (1946), *To Educate the Human Potential* (1948), and *La mente assorbente* (1949; *The Absorbent Mind,* 1949). E. Mortimer Standing's biography, *Maria Montessori, Her Life and Work* (1957), discusses the principles of the Montessori method.

Montet, Pierre (b. June 27, 1885, Villefranche-sur-Saône, Fr.—d. June 19, 1966, Paris), French Egyptologist who conducted major excavations of the New Empire (*c.* 1567–*c.* 525 BC) capital at Tanis, in the Nile Delta, discovering, in particular, funerary treasures from the 21st and 22nd dynasties.

Professor of Egyptology at the University of Strasbourg (1919–48) and at the Collège de France, Paris (1948–56), from 1921 to 1924 he directed his first major excavation at Byblos (modern Jubayl, Lebanon), one of the oldest continuously inhabited towns in the world. There he uncovered what was then believed to be the earliest alphabetical writing and published his researches in *Byblos et l'Égypte* (1928).

Active at Tanis from 1929 to 1951, he made his important tomb discoveries in 1939, 1940, and 1946. Excavations yielded exceptionally rich examples of metalwork showing a Syrian influence, including a silver coffin and a gold mask. He published *La Nécropole royale de Tanis,* 3 vol. (1947–60; "The Royal Cemetery at Tanis"). His many writings include (in translation): *Everyday Life in the Days of Ramesses the Great* (1958) and *Eternal Egypt* (1964).

Monteux, Pierre (b. April 4, 1875, Paris—d. July 1, 1964, Hancock, Maine, U.S.), one of the leading conductors of the 20th century, acclaimed for his interpretations ranging from Beethoven to contemporary composers such as Stravinsky and Arthur Honegger.

He studied at the Paris Conservatoire and later was a professional viola player. As conductor (1911–14) for Diaghilev's Ballets Russes in Paris, he led the world premieres of Stravinsky's *The Rite of Spring* (1913) and Ravel's *Daphnis et Chloé.* After World War I (in which he served in the French Army), he conducted at the Metropolitan Opera (1917–19) and directed the Boston Symphony (1919–24). He founded and directed the Paris Symphony (1929–38) and then returned to the U.S. to take over the newly reorganized San Francisco Symphony (1936–52). In 1941 he established an annual summer school for student conductors at Hancock, Maine. From 1960 he was permanent conductor of the London Symphony.

As a conductor Monteux was equally admired in ballet, opera, and symphonic music. His interpretations were considered elegant and refined.

Monteverdi, Claudio (baptized May 15, 1567, Cremona, Duchy of Milan—d. Nov. 29, 1643, Venice), Italian composer of the late Renaissance, the most important developer of the then new genre, the opera. He also did much to bring a "modern" secular spirit into church music.

Early career. Monteverdi, the son of a barber-surgeon and chemist, studied with the director of music at Cremona cathedral, Marcantonio Ingegneri, a well-known musician who wrote church music and madrigals of some distinction in an up-to-date though not revolutionary style of the 1570s. Monteverdi was obviously a precocious pupil, since he published several books of religious and secular music in his teens, all of them containing competent pieces in a manner not far from that of his master. The culmination of this early period occurred in two madrigal books published by one of the most famous of Venetian printers in 1587 and 1590. They are full of excellent, attractive works, somewhat more modern in approach than Ingegneri's, perhaps the result of studying the madrigals of Luca Marenzio (1553–99), the greatest Italian madrigalist of the time, and others. As yet, however, Monteverdi's aim appeared to be to charm rather than to express passion; it is exemplified at its best in such a madrigal as the well-known setting of the poem "Behold the Murmuring Sea" by Torquato Tasso.

The Gonzaga court. It is not known exactly when Monteverdi left his home town, but he entered the employ of the Duke of Mantua in about 1590 as a string player. He immediately came into contact with some of the finest musicians, both performers and composers, of the time. Most influential on him seems to have been the Flemish composer Giaches de Wert, a modernist who, although no longer a young man, was still in the middle of an avant-garde movement in the 1590s. The crux of his style was that music must exactly match the mood of the verse and that the natural declamation of the words must be carefully followed. Since he chose the highly concentrated, emotional lyric poetry of Tasso and Tasso's rival Battista Guarini, Wert's music also became highly emotional, if unmelodious and difficult to sing. It had an immediate effect on Monteverdi, whose next book of madrigals, published in his first year at Mantua, shows the influence of the new movement on him, though his understanding was imperfect. It represented a complete change of direction for him. The melody is angular, the harmony increasingly dissonant, the mood tense to the point of neurosis. Guarini is the favoured poet, and every nuance of the verse is expressed, even at the expense of musical balance.

The new style and ambience seems to have upset his productivity. Although he went on composing, he published little for the next 11 years. In 1595 he accompanied his employer on an expedition to Hungary and four years later to Flanders. In about 1599 he married a singer, Claudia Cattaneo, by whom he had three children, one of whom died in infancy. When the post of *maestro di cappella,* or director of music, to the Duke became vacant on the death of Wert in 1596, Monteverdi was embittered at being passed over, but in 1602 he achieved the position, at the age of 35. He published two more books of madrigals in 1603 and 1605, both of which contain masterpieces. The avant-garde manner was now better assimilated into his idiom. While his aim was still to follow the meaning of the verse in great detail, he solved the purely musical problems of thematic development and proportion. Although the dissonances became more severe and the melody sometimes still more angular, the total effect was more varied in emotion and less neurotic. If Guarini's eroticism stimulated a sensual musical style, Monteverdi often gave his mature madrigals a lightness and humour, seeing the essence of a poem rather than its detail.

Monteverdi, oil painting by Bernardo Strozzi; in the Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria

By courtesy of the Museum Ferdinandeum, Innsbruck, Austria

It was the advanced musical means, especially the use of intense and prolonged dissonance, that provoked attacks by the conservatives on Monteverdi, who became a figurehead of the avant-garde group. The attacks by a Bolognese theorist, Giovanni Maria Artusi, in a series of pamphlets, made Monteverdi the most famous composer of the age and provoked him to reply with an important aesthetic statement of his view on the nature of his art. He disclaimed the role of revolutionary, saying that he that he was only the follower of a tradition that had been developing for the last 50 years or more. This tradition sought to create a union of the arts, especially of words and music, so that he should not be judged simply as a composer using conventional musical devices. Moreover, the artwork must be powerful enough to "move the whole man," and this again might mean the abandonment of certain conventions. On the other hand, he declared his faith in another and older tradition, in which music was itself supreme, and which was, in effect, represented by the pure polyphony of such composers as Josquin des Prez and Palestrina. Thus, there were two "practices," as he called them; and this view, which became immensely influential, was to prove the basis of the preservation of an old style in certain types of church music, as opposed to a modern style in opera and cantatas, a dichotomy that can be found well into the 19th century.

If the madrigals of this time gave him a reputation well outside northern Italy, it was his first opera, *Orfeo,* performed in 1607, that finally established him as a composer of large-scale music rather than of exquisite miniature works. Monteverdi may have attended some of the performances of the earliest operas, those composed by the Florentine composers Jacopo Peri and Giulio Caccini, and he certainly had written some stage music in previous years. In *Orfeo* he showed that he had a much broader conception of the new genre than did his predecessors. He combined the opulence of dramatic entertainments of the late Renaissance with the straightforwardness of a simple pastoral tale told in recitative, which was the ideal of the Florentines. His recitative is more flexible and expressive than theirs, based on the declamatory melody of his madrigals rather than on their theories about heightened speech. Above all, he had a greater gift for dramatic unity, shaping whole acts into musical units, rather than assembling them from small sections. He also showed a sense of matching the climaxes in the drama by musical climaxes, using dissonance, the singer's virtuosity, or instrumental sonorities to create the sense of heightened emotion.

A few months after the production of *Orfeo,* Monteverdi suffered the loss of his wife, seemingly after a long illness. He retired in a state of deep depression to his father's home at Cremona, but he was summoned back to Mantua almost immediately to compose a new opera as part of the celebrations on the occasion of the marriage of the heir to the duchy, Francesco Gonzaga, to Margaret of Savoy. Monteverdi returned unwillingly and was promptly submerged in a massive amount of work. He composed not only an opera but also a ballet and music for an intermezzo to a play. Further disaster occurred when the opera, *L'Arianna,* was in rehearsal, for the prima donna, a young girl who had been living in Monteverdi's home, possibly as a pupil of his wife, died of smallpox. Nevertheless, the part was re-cast, and the opera was finally produced in May 1608. It was an enormous success. The score has been lost, except for the famous "Lamento," which survives in various versions and is the first great operatic *scena* (*i.e.,* a scene of especially dramatic effect, usually with arias).

After this enormous effort, Monteverdi returned again to Cremona in a condition of collapse, which seems to have lasted for a long time. He was ordered back to Mantua in November 1608 but refused to go. He eventually returned, but thereafter he hated the Gonzaga court, which he maintained had undervalued and underpaid him, though he gained a raise in pay and a small pension for his success with *L'Arianna.* He does not, however, appear to have been uncreative, though the music he wrote in the next year or so reflects his depression. He arranged the "Lamento" as a five-voiced madrigal and wrote a madrigalian threnody on the death of his prima donna. The sestina, published later in the sixth book of madrigals, represents the peak of dissonant, agonized music in this style. In a more vigorous vein, he wrote some church music, which he published in 1610 in a volume containing a mass in the old style and music for Vespers on feasts of the Blessed Virgin Mary. The mass was a remarkable achievement, a deliberate attempt to show that the polyphonic idiom was still possible when everywhere it was dying. Still more remarkable is the Vespers music, a virtual compendium of all the kinds of modern church music possible at the time—grand psalm settings in the Venetian manner, virtuoso music for solo singers, instrumental music used for interludes in the service, even an attempt to use up-to-date operatic music to set the expressive, emotional words of the Magnificat. Yet, though this music is as "advanced" as possible, Monteverdi makes it an extension of the old tradition by using plainsong tunes—ancient unaccompanied liturgical chants—as the thematic material for the psalms and Magnificats. Above all, this is music of the Counter-Reformation; using all means, traditional and new, secular and religious, it is designed to impress the listener with the power of the Catholic Church and its Maker.

Three decades in Venice. When the *maestro di cappella*—that is, the director of music—of St. Mark's in Venice died, Monteverdi was invited to take his place, after an audition of some of his music in the basilica. He finally took up his appointment in the autumn of 1613.

He was appointed largely because the musical establishment of St. Mark's was in need of an experienced director after some years of decline. The last of the native Venetian composers of any distinction, Giovanni Gabrieli, had recently died. Although Monteverdi had not been primarily a church musician, he took his duties extremely seriously and within a few years completely revitalized the music in the basilica. He hired new assistants (including two future composers of note, Francesco Cavalli and Alessandro Grandi), wrote much church music, and insisted on daily choral services. He also took an active part in music making elsewhere in the city, directing the music on several occasions for the fraternity of S. Rocco, an influential philanthropic brotherhood, on the annual festival of its patron saint.

His letters in those early years in Venice reveal a complete change in his state of mind from what it was in Mantua. He felt fulfilled and honoured, well (and regularly) paid, and he seems to have been reasonably prolific. He kept up his links with Mantua, largely because there was little chance of producing opera in Venice, while opportunities came quite regularly from the Gonzaga court. In his correspondence, a philosophy of dramatic music emerges that was not only to mold Monteverdi's later work but also to influence the history of opera in general. The older type of opera had developed, on the one hand, from the Renaissance intermezzo—a short, static musical treatment, often allegorical and with scenery, of a subject from the play with which it was given, emphasizing the wishes of the gods; and, on the other hand, from the pastoral, with its highly artificial characterizations of shepherds and shepherdesses. Monteverdi, however, was increasingly concerned with the expression of human emotions and the creation of recognizable human beings, with their changes of mind and mood. Thus, he wished to develop a greater variety of musical means, and in his seventh book of madrigals (1619) he experimented with many new devices. Most were borrowed from the current practices of his younger contemporaries, but all were endowed with greater power. There are the conversational "musical letters," deliberately written in a severe recitative melody in an attempt to match the words. The ballet *Tirsi e Clori,* written for Mantua in 1616, shows, on the contrary, a complete acceptance of the simple tunefulness of the modern aria.

His attempt to create a practical philosophy of music went on throughout the 1620s, leading to still further stylistic innovations. Following ideas derived from Plato, he divided the emotions into three basic kinds: those of love, war, and calmness. Each of these could be expressed by differing rhythms and harmonies. A further ingredient in his theories was a frank acceptance of realism—the imitating of the sounds of nature in various ways. All these ideas are to be found in his dramatic cantata, *The Combat of Tancredi and Clorinda* (1624), a setting of a section of Tasso's "Gerusalemme Liberata." In this work, the rapid reiteration of single notes in strict rhythms and the use of pizzicato—plucking strings—to express the clashing of swords show important steps forward in the idiomatic use of stringed instruments.

These trends were continued in a comic opera, *Licoris Who Feigned Madness,* probably intended for the celebrations of the accession of Duke Vincenzo II of Mantua in 1627. The score has been lost, but a sizable correspondence survives. At this time, Monteverdi suffered more anxiety since his elder son, Massimiliano, was imprisoned in Bologna, where he was a medical student, for reading books banned by the Inquisition. It took some months before he was finally cleared of the charge. In the same year, 1628, Monteverdi also fulfilled a commission to write music for the intermezzi to Tasso's *L'Aminta* and for a tournament given in Parma in celebration of the marriage of Duke Odoardo Farnese to Margherita de' Medici.

Monteverdi and his family seemed to have emerged unscathed from the plague that broke out in 1630, and Monteverdi himself took holy orders during this period. He wrote a grand mass for the thanksgiving service in St. Mark's when the epidemic was officially declared over in November 1631. The "Gloria" from it still survives and shows him applying some of the theories concerning the diversity of mood suggested by the words. Both this and some other church music probably written about this time, however, show a calm and majestic approach rather than the passion of his earlier years. A book of lighthearted songs and duets published in the following year is much the same. There is also a detached quality about much of the music in the final collection of his madrigals assembled by Monteverdi himself in 1638. A vast retrospective anthology of music dating from 1608 onward, it sets out to display Monteverdi's theories, as its title, *Madrigals of War and Love,* denotes.

Though this collection, put together when Monteverdi was more than 70 years old, might seem the end of his career, chance played a part in inspiring him to an Indian summer of astonishing productivity: the first public opera houses opened in Venice in 1637. As the one indigenous composer with any real experience in the genre, he naturally was involved with them almost from the beginning. *L'Arianna* was revived again, and no fewer than four new operas were composed within about three years. Only two of them have survived in score—*The Return of Ulysses to His Country* and *The Coronation of Poppea*—and both are masterpieces. Although they still retain some elements of the Renaissance intermezzo and pastoral, they can be fairly described as the first modern operas. Their interest lies in revealing the development of human beings in realistic situations. There are main plots and subplots, allowing for a great range of characters—the nobility, their servants, the evil, the misguided, the innocent, the good. The music expresses their emotions with astonishing accuracy. Monteverdi shows how the philosophy of music evolved during his early years in Venice could be put to use, using all the means available to a composer of the time, the fashionable arietta (*i.e.,* a short aria), duets, and ensembles, and how they could be combined with the expressive and less fashionable recitative of the early part of the century. The emphasis is always on the drama: the musical units are rarely self-contained but are usually woven into a continual pattern, so that the music remains a means rather than an end. There is also a sense of looking toward the grand climax of the drama, which inspires a grand *scena* for one of the main singers, Ulisse, Nero, or Poppea. At the same time, there are enough memorable melodies for the opera to seem musically attractive.

With these works Monteverdi proved himself to be one of the greatest musical dramatists of all time. That he was held in the highest esteem by his Venetian employers is shown by their gifts of money in these last years and by their granting him leave to travel to his native city in the last few months of his life. The Venetian public showed its esteem at his funeral, when after his death following a short illness, he was buried in the Church of the Frari, where a monument to him remains.

(D.M.Ar./Ed.)

MAJOR WORKS. *Secular.* Operas: Seven operas of which three survive: *La favola d'Orfeo* (1607); *Il ritorno d'Ulisse in patria* (1641); *L'incoronazione di Poppea* (1642). Also surviving, the "Lamento" from *L'Arianna.* Other dramatic works: *Il ballo delle ingrate* (1608), *Tirsi e Clori* (1616), and *La vittoria d'Amore* (1641, music lost), three ballets; *Il combattimento di Tancredi e Clorinda* (1624), a secular oratorio. Madrigal collections: *Canzonette a tre voci, libro primo* (1584); seven books of madrigals (1587–1619); *Madrigali guerrieri et amorosi . . .* (1638), eighth book of madrigals; *Madrigali e canzonette . . .* (1651), ninth book of madrigals, published posthumously; *Scherzi musicali* (1607, 1632).

Sacred. Collections: *Sacrae cantiunculae tribus vocibus* (1582); *Madrigali spirituali a quattro voci* (1583); *Sanctissimi Viriginis Missa senis vocibus ad ecclesiarum choros ac Vesperae . . .* (1610), which includes *Missa da capella a sei voci . . .* and *Vespro della Beata Vergine . . .; Selva morale e spirituale* (1640); *Messa a quattro voci et Salmi, a una, due, tre, quattro, cinque, sei, sette & otto voci . . .* (1650, published posthumously).

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Montevideo, department, southern Uruguay, bounded south by the Río de la Plata. The smallest (205 sq mi [530 sq km]), most densely populated, and most important of Uruguay's departments, it contains Montevideo (*q.v.*), the national capital. Truck gardens, vineyards, dairy and poultry farms, and commercial flower gardens send products to the capital. The capital's growth has urbanized and industrialized the department. New resorts have developed on the Atlantic shores. Pop. (1996) 1,378,705.

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Montevideo, principal city and capital of Uruguay and of the department of Montevideo. It lies on the north shore of the Río de la Plata Estuary.

Montevideo was founded in 1726 by Bruno Mauricio de Zabala, governor of Buenos Aires, to counteract the Portuguese advance into the area from Brazil. During its early years, Montevideo was mostly a Spanish garrison town. Trade expanded toward the end of the colonial period, and Montevideo's merchants played an important part in securing Uruguayan independence. From 1807 to 1830 Montevideo was alternately occupied by British, Spanish, Argentine, Portuguese, and Brazilian forces, and its trade and population declined. Independence, which came in 1830, did not bring stability. Uruguay was the scene of complicated interaction of local, Argentine, and Brazilian influences that culminated in the nine-year siege of Montevideo by a combined Argentine–Uruguayan army from 1843 to 1851. Montevideo's defenders were assisted by French and English forces that blockaded Buenos Aires. The result, surprisingly, was that Montevideo flourished during the siege and became the major port of the Río de la Plata.

The port of Montevideo handles most of Uruguay's foreign trade. The chief exports are wool, meat, and hides. Numerous establishments in the capital process wool, and refrigerated packing plants are equipped to prepare meats. Textile, shoe, soap, match, and clothing factories are located throughout the city. Wines and dairy products also are produced. Uruguay's well-known state enterprises, the ANCAP (Administración Nacional de Combustibles, Alcohol y Portland) oil refineries and cementworks, railway shops, and electric-power system are concentrated in Montevideo.

The port is the hub of the city's international transport. It is also served by the airport at Carrasco. Four railroads converge on the city, and roads lead to other principal cities.

Higher education in Uruguay is available only in the capital. The Universidad de la República was founded in 1849. The Universidad del Trabajo del Uruguay (1878) provides vocational training through industrial and night schools.

Montevideo has had theatres since the Casa de Comedias opened in 1795, followed by the Teatro San Felipe. The Teatro Solís, still in existence, was opened in 1856. The city also houses the Museo Histórico Nacional (1900), the Museo Nacional de Historia Natural (1837), the Museo Nacional de Bellas Artes (1911), and the Biblioteca Nacional del Uruguay (1816). In addition to Batlle y Ordóñez Park, site of the football stadium, recreational facilities include many other parks, as well as a line of beaches extending east to Punta del Este, on the Atlantic Ocean. Pop. (1996) 1,378,705.

Montez, Lola, original name MARIE DOLORES ELIZA ROSANNA GILBERT (b. 1818, Limerick, Ire.—d. Jan. 17, 1861, New York City), Irish adventuress and "Spanish" dancer who achieved international notoriety through her liaison with King Louis I of Bavaria.

After five months' study, Montez made a disastrous debut as a dancer in London in 1843; her striking beauty, however, brought additional dancing engagements. Late in 1846 she danced in Munich, where Louis I became infatuated with her. As his mistress and countess of Landsfeld, she influenced him toward liberal and anti-Jesuit policies.

Lola Montez, *c.* 1855

BBC Hulton Picture Library

Both radical and clericalist factions were incensed at her power, and riotous demonstrations in 1847 forced her to flee in 1848; the furor she created helped bring about the King's abdication that same year. Montez danced in America and Australia, then returned to America to lecture on fashion and feminine beauty. One of her three marriages was terminated by the death of her husband, the other two ended in divorce.

Montezuma II, also spelled MOCTEZUMA (b. 1466—d. *c.* June 30, 1520, Tenochtitlán, near modern Mexico City), ninth Aztec emperor of Mexico, famous for his dramatic confrontation with the Spanish conquistador Hernán Cortés.

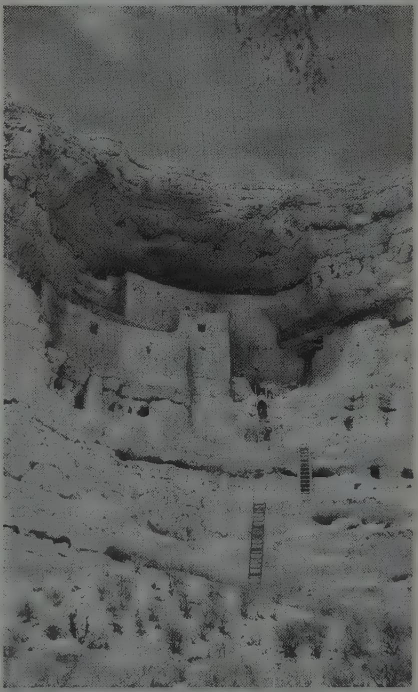
In 1502 Montezuma succeeded his uncle Ahuitzotl as the leader of an empire that had reached its greatest extent, stretching to what is now Honduras and Nicaragua, but that was weakened by the resentment of the subject tribes to the increasing demands for tribute and victims for the religious sacrifices. Although Montezuma was commander of the army and organized extensive expeditions of conquest, he was also profoundly influenced by his belief in the god, Huitzilopochtli. Through astrologers, the god instilled in the Emperor a kind of fatalism in the face of an uncertain future.

The Aztecs feared and expected the return of Quetzalcóatl, the white, bearded god who would rule over the empire. Instead, the white, bearded Cortés arrived; he was aware of this fear and used it to his advantage in his expedition across Mexico. Montezuma tried to buy off Cortés, but the Spaniard made alliances with those subject tribes who hated Aztec rule. Welcomed into the capital city of Tenochtitlán by Montezuma, Cortés realized it was a trap and, instead, made the Emperor his prisoner, knowing that the Aztecs would not attack as long as he held Montezuma captive. Montezuma's submission to the Spaniards, however, had eroded the respect of his people. According to Spanish accounts, he attempted to speak to his subjects and was assailed with stones and arrows, suffering wounds from which he died three days later. The Aztecs, however, believed the Spaniards had murdered their emperor, and Cortés' force was nearly destroyed as it tried to sneak out of Tenochtitlán at night.

Montezuma II, manuscript illumination, 16th century; in the collection of the Instituto Nacional de Antropología e Historia, Mexico City

By courtesy of the Instituto Nacional de Antropologia e Historia, Mexico City

Montezuma Castle National Monument, national monument in central Arizona, U.S. It lies in the Verde River Valley immediately northeast of Camp Verde. Established in 1906, its area is 842 ac (341 ha) and comprises one of the best preserved pre-Columbian Pueblo Indian cliff dwellings in the U.S. The "castle" is a 5-story, 20-room adobe brick structure, dating from *c.* AD 1100, built into a cavity in the limestone cliff face about 80 ft (24 m) above the valley floor. It is almost wholly intact and is reached by a series of ladders. It has no connection with the Aztec emperor whose name it bears but was named by early settlers who believed it was built by Aztec refugees from Mexico. To the northeast is Montezuma Well, a large sinkhole rimmed with communal dwellings.



Montezuma Castle National Monument, Arizona

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Montfaucon, Bernard de (b. 1655, Soulage, near Brioude, Fr.—d. 1741, Paris), pioneer in the study of Greek paleography and archaeology and distinguished patristic scholar.

He joined the Benedictine Congregation of Saint-Maur in 1676 and in 1687 was sent to Paris to edit the works of the Church Fathers. His major publications in this field were editions of Athanasius, 3 vol. (1698) and John Chrysostom, 13 vol. (1718–38). As a student of manuscripts in Paris and Italy, he carried the Maurist preoccupation with original sources into a new field. His *Palæographia græca, sive de ortu et progressu litterarum græcarum* ("Greek palaeography, or the origin and progress of Greek literature") was published in 1708. As a student of antiquities he based his conclusions on the evidence of monuments; he might be said to be one of the founders of modern archaeology. He wrote the 15-volume *L'Antiquité expliquée et représentée en figures* (1719; *Antiquity Explained and Represented in Diagrams,* 1721–25).

Montferrat, Italian MONFERRATO, historic area of northwestern Italy covering most of the modern province of Alessandria in the Piedmont region. During the Middle Ages, Montferrat was an independent march (or marquessate). Its local autonomy ended when the Gongazas of Mantua were recognized as its rulers in 1536. In 1708 Montferrat was annexed by the House of Savoy, rulers of neighbouring Piedmont, who had long contested for it.

Montfort FAMILY, family associated with an ancient lordship in the Île-de-France (Montfort-l'Amaury); this lordship first became famous in French and English history because of its association with members of the family, which held it in the 13th century; it was transmitted to a junior branch of the Capetian house of Dreux, which furnished dukes of Brittany in the 14th–15th century.

Montfort-l'Amaury took its name from Amaury, or Amalric (d. *c.* 1053), the builder of the castle there, whose father had been invested with the lordship by Hugh Capet. Amaury's grandson Simon (d. 1181 or later) married Amicia, ultimately the heiress of the English earldom of Leicester, and it was through their son, the crusader Simon de Montfort (*q.v.*), that the family first attained real prominence. By his wife Alice de Montmorency he left four sons: Amaury de Montfort (*see* below), who succeeded to Montfort-l'Amaury and to his father's titles in Languedoc; Simon de Montfort (*q.v.*), who became earl of Leicester and played a major role in English affairs; Guy de Bigorre (d. 1220); and Robert (d. 1226).

Amaury de Montfort (d. 1241), defeated in war, lost all his rights in Languedoc to King Louis VIII (1229) and was compensated with the office of constable of France (1231). Captured by the Muslims in the Holy Land (1239), he was released in 1241 but died at Otranto in Apulia on his way home.

Guy (d. 1228), who was with his brother at Zara and in Syria, also took a large part in the Albigensian crusade, receiving the fiefs of Rabastens and St. Antonin. He ceded his rights in Languedoc to the French crown in 1226.

John de Montfort (d. 1249), Amaury's son and successor, left only a daughter, Beatrice

(d. 1312), who was married in 1259 to Count Robert IV of Dreux. Their daughter Yolande (d. 1322) was married first, in 1285, to Alexander III of Scotland and second, in 1294, to Arthur II of Brittany, to whom she brought the Montfort lands. Their son John de Montfort (d. 1345), whose elder brothers accorded him only the Montfort title, contested the duchy of Brittany with Charles of Blois; and his son was recognized duke of Brittany, as John IV, by the Treaty of Guérande (1365). Thenceforward he and his descendants John V (*q.v.;* d. 1442), Francis I (d. 1450), Peter II (d. 1457), Arthur III (*q.v.;* d. 1458), and Francis II (*q.v.;* d. 1488) constituted the House of Montfort as dukes of Brittany. But Francis II left only an heiress, Anne of Brittany (*q.v.;* d. 1514). Her marriages to Charles VIII and Louis XII of France were followed by the marriage of Claude (her daughter by Louis) to King Francis I; this union secured the Montfort possessions to the French crown.

Montfort, Saint Louis-Marie Grignion de (b. Jan. 31, 1673, Montfort-sur-Meu, Fr.—d. April 28, 1716, St. Laurent-sur-Sèvre; canonized 1947; feast day April 28), French priest who promoted the devotion to the Virgin Mary and who founded the religious congregations of the Daughters of Wisdom and the Company of Mary (Montfort Fathers).

Ordained priest in 1700 at Paris, Montfort went to the French town of Nantes as a rural preacher and then to Poitiers, where he reorganized a hospital for the poor and began the Daughters of Wisdom, a congregation dedicated to the care of needy children and the sick. In 1705 he founded the Montfort Fathers to continue his mission and retreat work and to spread devotion to Mary. Named apostolic missionary for France (1706) by Pope Clement XI, he spent the rest of his life preaching parish missions in western France.

Montfort is well known for his *True Devotion to the Blessed Virgin,* which teaches that devotion to Mary is the best means of attaining union with Christ. The discovery in 1842 of *True Devotion* gave the Montfort Fathers considerable impetus: in 1853 they were raised to the status of a pontifical congregation, and Montfort's beatification in 1888 reinforced the congregation's international expansion. Cruikshank's *Blessed Louis Marie Grignion de Montfort and His Devotion* (2 vol.) appeared in 1892, followed by E.C. Bolger's *Life* (1952).

Montfort, Simon de (b. 1165?—d. June 25, 1218, Toulouse, Fr.), French leader of the Albigensian Crusade declared by Pope Innocent III against the Cathari, an unorthodox religious group in southern France.

In 1190 Montfort married Alice de Montmorency (died 1221). During the Fourth Crusade (1202–04) he participated in the siege of Zara and later fought in Syria. Beginning in 1209 he led the fight against the Cathari (better known as Albigenses after the town of Albi) in a crusade that quickly became a war of conquest by the northern French against the nobility of the south. Having conquered Béziers and Carcassonne, he was chosen to govern those lands. When most of the crusaders departed after the 40-day term they had promised to serve, he was left with large territories still to conquer. After he had won the important Battle of Muret in 1213, the lands of Raymond VI, count of Toulouse, were adjudged to Montfort by the fourth Lateran Council (1215) because of Raymond's failure to root out heretics. He now styled himself count of Toulouse, viscount of Béziers and Carcassonne, and duke of Narbonne, but Raymond did not accept defeat. He occupied Toulouse in September 1217. Montfort was killed while besieging the city. His son Amaury (died 1241) soon abandoned the crusade and ceded the Montfort lands in southern France to King Louis VIII.

Montfort, Simon de, EARL OF LEICESTER (b. *c.* 1208, Montfort, Ile-de-France, Fr.—d. Aug. 4, 1265, Evesham, Worcestershire, Eng.), leader of the baronial revolt against King Henry III and ruler of England for less than a year.

Simon de Montfort, wholly French by birth and education, was the son of Simon de Montfort l'Amaury, leader of the crusade against the heretical Albigenses. On coming of age, he renounced to his eldest brother, Amaury, his claims on the family lands in return for the sole right to revive the Montfort claim to the English earldom of Leicester. This claim derived from his father's mother, Amicia, sister of Robert IV (died 1204), the last Beaumont earl of Leicester, whose lands had been divided between Amicia and her younger sister Margaret, countess of Winchester. King John had recognized Simon's father as earl (*c.* 1205) but had deprived him as a French subject (1207), and the Montfort claim had then lapsed.

Simon de Montfort, seal, 1258; in the British Museum (Additional Charter 11296)

By courtesy of the trustees of the British Museum

Simon came to England in 1229 and, helped by his cousin Ranulf, earl of Chester, the tenant of the confiscated estates, obtained the honour of Leicester and did homage to Henry III in 1231, though he was not formally styled earl of Leicester until April 1239. He speedily became one of Henry's favourites, receiving an annual fee of 500 marks to compensate for the divided inheritance and exercising the hereditary stewardship at the coronation of Queen Eleanor (Eleanor of Provence; 1236). Henry arranged for his sister Eleanor to marry Simon on Jan. 7, 1238, thus breaking Eleanor's earlier vow of chastity and offending the English noblemen, who were not consulted. Henry's brother, Richard, earl of Cornwall, led an angry baronial protest, and Henry, alarmed, turned against Simon and Eleanor, driving them from England (August 1239). Simon went on crusade (1240–42) with Richard, with whom he was now reconciled, and won great prestige among the lords of the Latin Kingdom of Jerusalem, who asked their absentee king, the emperor Frederick II, to appoint Simon as his viceroy there. Returning to England, Simon joined Henry's disastrous invasion of France (1242), winning distinction by covering Henry's escape after his defeat at Saintes. Reconciled with Henry, and accepting an unfavourable settlement of Countess Eleanor's dower claims, Simon now made Kenilworth Castle (a royal grant) his headquarters. He cultivated the friendship of the radical reformer Robert Grosseteste, bishop of Lincoln, and took Robert's friend, the Oxford Franciscan Adam de Marisco, as spiritual director. Although regarded as a king's man, Simon was one of the committee of 12 appointed to handle the acute crisis of 1244 between Henry and his angry barons. He also took part in many important embassies to the French, papal, and imperial courts, and as a result he won many influential friends.

In 1248 Henry asked Simon to pacify the English-held Duchy of Gascony, in southwestern France. Simon, eager to join Louis IX's crusade, accepted reluctantly, stipulating for full powers as regent for seven years, without fear of recall and with full refund of expenses incurred. Treating the Gascon nobles as faithless rebels outside the law, he ruthlessly crushed the revolt and restored order; the Gascons appealed to Henry, accusing Simon of illegal procedure and oppression and threatening to renew their revolt. The matter was complicated by Simon's personal contest with Gaston de Béarn, the leading rebel. Henry, frightened, recalled Simon for trial on the rebels' charges; the English magnates acquitted him (1252), and he returned to Gascony to suppress the renewed revolt, but Henry now terminated his lieutenancy. Simon, accepting a partial financial settlement, withdrew to France, though Henry had to implore his help in his own campaign against the rebels in 1253. Such was Simon's international reputation that when Louis IX's mother, Blanche of Castile, died (November 1252) while Louis was still on crusade, the French magnates invited Simon to succeed her as regent.

Henry's behaviour over Gascony, though not wholly unjustified, convinced Simon that Henry was unfit to rule, and the King's disastrous undertaking, at Pope Innocent IV's behest, to conquer Sicily for his son Edmund, strengthened this conviction. Discussions with Grosseteste, Marisco, and other Franciscan intellectuals had fired Simon's mind with visions of a new order in both church and state, and he joined the other leading English barons in forcing upon Henry the revolutionary Provisions of Oxford (June 1258). The reformers began well, but by October 1259 divisions appeared between the conservative wing, led by Richard de Clare, earl of Gloucester, that sought only to limit abuses of royal power, and the radical element, led by Simon, that sought to bind the entire baronage to observe the reforms forced upon the King and his officers. Simon exacerbated the quarrel by his arrogant vehemence and put himself in the wrong by attempting to use Henry's subordination to secure settlement of his own and his wife's justifiable personal claims on Henry. Henry, allying with the Gloucester faction, shattered baronial unity early in 1260, and Simon emerged leading the extremist defenders of the reforms. By October 1261 Henry had isolated Simon, who went abroad; but the King's annulment of the Provisions, after he had received papal absolution from his oath to observe them, revived general disaffection (1262), and Simon returned (April 1263) to lead a rebellion that restored the Provisions (July 1263). But baronial unity had vanished, and, despite passionate support from the lesser barons, the county knights, the men of London and the Cinque Ports, and many clergy, Simon was forced to accept arbitration by Louis IX (December 1263). By the Mise of Amiens (January 1264) Louis totally annulled the Provisions and all consequent reforms: Simon rejected the award and after unsuccessfully attempting direct negotiations, defeated Henry at Lewes (May 14, 1264), capturing Henry and his son, the lord Edward.

Simon then governed England by military dictatorship, striving unsuccessfully for a legal basis of consent, both by negotiations with Henry's supporters and by calling representatives of both shires and boroughs to Parliament (1265) to counterbalance his lack of baronial support. But his monopolization of power alienated his chief ally, the young Gilbert de Clare, earl of Gloucester, who joined the royalist Marcher lords and secured Lord

Edward's escape at Hereford (May 1265). By rapid and skillful maneuvering, Edward isolated Simon behind the Severn, destroyed at Kenilworth (August 1) the large army coming to his rescue, and trapped Simon's little force at Evesham (Aug. 4, 1265), slaying Simon and most of his followers.

The most outstanding English personality of his day, Simon is remembered as an early advocate of a limited monarchy, ruling through elected councillors and responsible officials, and of parliaments including county knights and burgesses as well as the great nobles. (R.F.Tr.)

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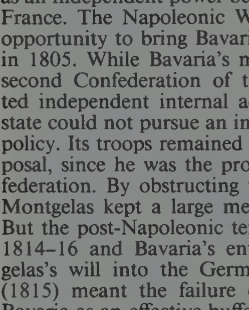
Montgelas de Garnerin, Maximilian Joseph, Graf von (count of) (b. Sept. 10, 1759, Munich—d. June 14, 1838, Munich), German statesman who developed of modern Bavaria.

The son of a Savoyard nobleman, Montgelas entered the service of Charles II Augustus, duke of Zweibrücken, and was from 1795 closely attached to the latter's successor, Maximilian IV Joseph, who, on becoming elector of Bavaria in 1799, installed him as prime minister. Montgelas wanted to establish Bavaria as an independent power between Austria and France. The Napoleonic Wars gave him the opportunity to bring Bavaria to France's side in 1805. While Bavaria's membership in the second Confederation of the Rhine permitted independent internal administration, the state could not pursue an independent foreign policy. Its troops remained at Napoleon's disposal, since he was the protector of the confederation. By obstructing the confederation, Montgelas kept a large measure of freedom. But the post-Napoleonic territorial treaties of 1814–16 and Bavaria's entry against Montgelas's will into the German Confederation (1815) meant the failure of his project for Bavaria as an effective buffer state.

Montgelas was finance minister from 1803 to 1817. As minister of the interior also from 1807, he produced in 1808 a written constitution for Bavaria. This constitution established the Council of State as the supreme court of appeal for all citizens, abolished serfdom and the nobility's exemption from taxes, and proclaimed the principle of equality before the law. It also envisaged representative assemblies. In practice, however, it was never wholly applied. Montgelas considered Bavaria not yet ready for representative assemblies: his ideal was a bureaucracy controlled by law. In 1817 he was dismissed from office and took no further part in politics.


Montgelas de Garnerin, detail from an engraving by E.C. Hess, 1816

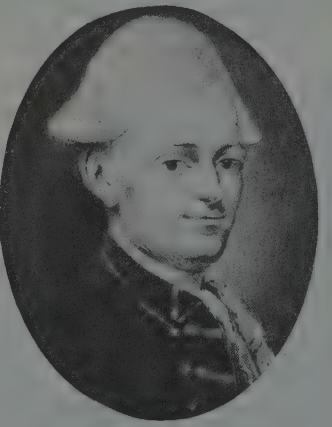
By courtesy of the Staatliche Graphische Sammlung, Munich

Montgenèvre Pass, French COL DE MONTGENÈVRE, Italian COLLE DEL MONGINEVRO, pass (6,083 ft [1,854 m]) in the Cottian Alps of the Hautes-Alpes *département,* southeastern France, near the Italian border. Lying 5 mi (8 km) east-northeast of Briançon, Fr., the pass links the river valleys of Dora Riparia, Italy, and Durance, Fr.

Opened in 77 BC by the Roman general Gnaeus Pompeius Magnus (Pompey the Great), the pass became the principal route over the Alps into Gallia Comata (Tres Galliae), a Roman province of Gaul. Napoleon built a road across the pass between 1802 and 1807. Until the Treaty of Paris in 1947, Montgenèvre was located on the Italian–French border. The village of Montgenèvre, just west of the pass, is a centre for winter sports.

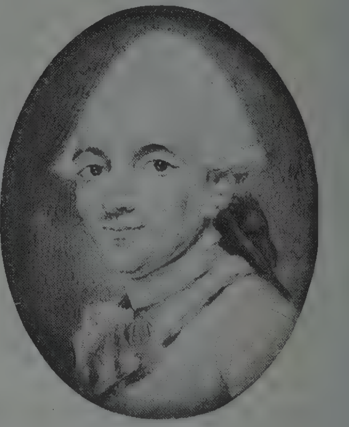
Montgolfier, Joseph-Michel and Jacques-Étienne (respectively b. Aug. 26, 1740, Annonay, Fr.—d. June 26, 1810, Balaruc-les-Bains; b. Jan. 6, 1745, Annonay—d. Aug. 2, 1799, enroute from Lyon to Annonay), French brothers who were pioneer developers of the hot-air balloon and who conducted the first untethered flights. Modifications and improvements of the basic Montgolfier design were incorporated in the construction of larger balloons that, in later years, opened the way to exploration of the upper atmosphere.

Joseph and Étienne were 2 of the 16 children of Pierre Montgolfier, whose prosperous paper factories in the small town of Vidalon, near Annonay, in southern France, ensured the financial support of their balloon experiments. While carrying on their father's paper business, they maintained their interest in scientific experimentation.


Joseph-Michel Montgolfier, miniature on ivory, late 18th century; in the Musée Carnavalet, Paris

By courtesy of the Musee Carnavalet, Paris; photograph, © Jacques Buchholz

In 1782 they discovered that heated air, when collected inside a large lightweight paper or fabric bag, caused the bag to rise into the air. The Montgolfiers made the first public demonstration of this discovery on June 4, 1783, at the marketplace in Annonay. They filled their balloon with heated air by burning straw and wool under the opening at the bottom of the bag. The balloon rose into the air about 3,000 feet (1,000 metres), remained there some 10 minutes, and then settled to the ground more than a mile and a half from where it rose. The Montgolfiers traveled to Paris and then to Versailles, where they repeated the experiment with a larger balloon on Sept. 19, 1783, sending a sheep, a rooster, and a duck aloft as passengers. The balloon floated for about 8 minutes and landed safely about 2 miles (3.2 kilometres) from the launch site. On Nov. 21, 1783, the first manned untethered flight took place in a Montgolfier balloon with Pilatre de Rozier and François Laurent, marquis d'Arlandes, as passengers. The balloon sailed over Paris for 5.5 miles (9 kilometres) in about 25 minutes.


Jacques-Étienne Montgolfier, miniature on ivory, late 18th century; in the Musée Carnavalet, Paris

By courtesy of the Musee Carnavalet, Paris; photograph, © Jacques Buchholz

The two brothers were honoured by the French Académie des Sciences. They published books on aeronautics and continued their scientific careers. Joseph invented a calorimeter and the hydraulic ram, and Étienne developed a process for manufacturing vellum.

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Montgomerie, Alexander (b. 1556?—d. *c.* 1611), Scottish poet, one of the last of the *makaris* (poets writing in Lowland Scots in the 16th century).

Montgomerie enjoyed the favour of James VI and was awarded a pension in 1583. In 1597 Montgomerie's pro-Catholic political intrigues brought about his disgrace when he was implicated in a plot to establish a Spanish garrison at the mouth of the Firth of Clyde.

Montgomerie's contemporary reputation was high, and during the 17th and 18th centuries his best known poem, "The Cherrie and the Slaye," was reprinted many times. This poem, first printed in 1597 and later enlarged, is an allegory in the medieval manner, fresh in its descriptions but conventional in its May-morning setting. The poet's dilemma—whether to struggle toward the noble cherry tree on the crag or to be content with the sloe bush at his feet—leads to an intricate and tedious debate with such figures as Danger, Dreid, Reason, Curage, and Dispaire. The poem was printed by Allan Ramsay in *The Ever Green* (1724), and its long stanza was revived by Robert Burns in "The Jolly Beggars." Montgomerie's other poems include the scurrilously invective "The Flytting betwixt Montgomerie and Polwart" (1621); some versions of the Psalms; and a large number of sonnets, lyrics, and songs, the best of which reveal a fluent and radiant talent for love poetry.

Montgomery (Pakistan): *see* Sāhīwāl.

Montgomery, capital of the state of Alabama, U.S., and seat of Montgomery County. The locality, on a sharp bend on the Alabama River, was inhabited by prehistoric American

State Capitol, Montgomery, Ala.
By courtesy of the Alabama Bureau of Publicity and Information

Indian mound builders and later was the site of villages visited by Spanish explorer Hernando de Soto in 1540. About 1717 the French built Fort Toulouse on the river a short distance north of the present site of Montgomery. The city was founded and chartered in 1819 with the consolidation of two settlements and named for General Richard Montgomery, who had been killed during the American Revolution. It was made the state capital in 1846. In February 1861, just before the start of the American Civil War, Montgomery became the first capital of the Confederacy, though the capital was moved to Richmond, Va., later that year. Montgomery was captured by Union troops in 1865.

After its recovery from the war, Montgomery developed as an important centre and market for cotton, livestock, yellow pine, and hardwood. Services, especially government and health care, now form a major part of the city's economy. Livestock and dairying are also important. Industry includes poultry and beef processing and the manufacture of water heaters, wood products, plastics, textiles, and aircraft parts.

The adjacent Maxwell Air Force Base and its Gunter Annex have added much to the civic and commercial life of the city. Maxwell is the headquarters of Air University. Montgomery itself is the seat of Auburn University Montgomery (1967), Troy State University Montgomery (1957), Faulkner University (1942), Huntingdon College (1854; Methodist), and Alabama State University (moved from Marion in 1887).

The capitol building is where Alabama voted to secede from the Union on Jan. 11, 1861, and the Confederate States of America was organized there on Feb. 4, 1861. Other important buildings are the First White House of the Confederacy, where Jefferson Davis resided, and the Alabama Department of Archives and History, which contains a historical museum and genealogical facilities. Other attractions include the Montgomery Museum of Fine Arts and the F. Scott and Zelda Fitzgerald Museum, dedicated to the author and his wife, who once lived in the city. The Alabama Shakespeare Festival runs throughout most of the year.

Montgomery was the scene of important civil-rights activity in the late 1950s and the '60s. Led by Martin Luther King, Jr., then a Montgomery minister, African Americans organized a peaceful boycott of the city's public buses in December 1955; a year later segregation on buses was prohibited by court order. A drive to register black voters in 1965, centred at Selma, was countered with violence, which resulted in a protest march on Montgomery, led by King. The route of the march was designated the Selma-to-Montgomery National Historic Trail in 1996. The Civil Rights Memorial in downtown Montgomery honours those who died during the civil-rights movement. Pop. (2000) city, 190,350; Montgomery MSA, 333,055.

Montgomery, Welsh TREFALDWYN, town, Powys county, historic county of Montgomeryshire, Wales. In the 11th century the Norman Roger de Montgomery, 1st Earl of Shrewsbury, built his castle at Hendomen, northwest of the present town, and a small village developed under its walls. In 1223 the English king Henry III built another castle at new Montgomery, the present town, to which a royal charter was granted in 1227. This castle was dismantled by the Parliamentary army in 1644 during the English Civil Wars. The town has a parish church (St. Nicholas) dating from about 1227, with two 15th-century roods, screens, and stalls. Montgomery has remained important locally as a market for sheep and cattle, but as a regional centre it has been largely superseded by Welshpool 8 miles (13 km) north. Pop. (1981) 1,035.

Montgomery (of Alamein, of Hindhead), Bernard Law Montgomery, 1st Viscount, byname MONTY (b. Nov. 17, 1887, London, Eng.—d. March 24, 1976, near Alton, Hampshire), British field marshal, one of the principal Allied commanders in World War II.

Of Ulster stock, Montgomery was educated at St. Paul's School, London, and the Royal Military Academy (Sandhurst). He distinguished himself during World War I and remained in the army, acquiring a reputation as an efficient and tough leader. Early in World War II he led a division in France, and after the evacuation of Allied troops at Dunkirk he commanded the southeastern section of England in anticipation of a German invasion.

In August 1942, Winston Churchill appointed him commander of the British 8th Army in North Africa, which had recently been defeated and pushed back to Egypt by Rommel. Restoring morale and building up a superiority in men and matériel, a procedure he was to follow throughout his career, Montgomery contained the German offensive and forced Rommel to retreat from Egypt after the Battle of el-Alamein (November 1942). Montgomery then pursued the German armies across North Africa to their final surrender in Tunisia in May 1943. He shared major responsibility in the successful Allied invasion of Sicily (July 1943) and led his 8th Army steadily up the east coast of Italy until called to lead the Allied invasion of France in 1944. He was first knighted (K.C.B.) in 1942.

Under the command of General Dwight D. Eisenhower, with whom he was to have numerous personal conflicts, Montgomery conducted the Normandy invasion (June 6, 1944). Promoted to the rank of field marshal, he led the British and Canadian 21st Army group to victory across northern France, Belgium, The Netherlands, and northern Germany, finally receiving the surrender of the German northern armies on May 4, 1945.

Following World War II, Montgomery was made a knight of the garter and was created a viscount in 1946. He commanded the British Army of the Rhine and served as chief of the imperial general staff (1946–48). He became chairman of the permanent defense organization of the Western European Union (1948–51) and then deputy commander of the North Atlantic Treaty Organization, Supreme Headquarters, Allied Powers in Europe (1951–58). Among a number of theoretical and historical treatises on warfare, he wrote his *Memoirs* (1958) and *The Path to Leadership* (1961).

1st Viscount Montgomery
British Crown Copyright

Montgomery was always a cautious, thorough strategist, often to the point of overpreparing his moves and exasperating the patience of fellow Allied commanders. He insisted on the complete readiness of both men and matériel before any attempted strike, a policy that yielded steady, if slow, successes and ensured his popularity with his troops.

Montgomery, James (b. Nov. 4, 1771, Irvine, Ayrshire, Scot.—d. April 30, 1854, Sheffield, Yorkshire, Eng.), Scottish poet and journalist best remembered for his hymns and versified renderings of the Psalms, which are among the finest in English, uniting fervour and insight in simple verse. The son of a Moravian minister, Montgomery was first a shop assistant, then a journalist. He wrote some 22 books of verse. In 1835, through the agency of Sir Robert Peel, then prime minister, he was given a pension.

James Montgomery, detail of an engraving, 1855
BBC Hulton Picture Library

Montgomery, Lucy Maud (b. Nov. 30, 1874, Clifton, P.E.I., Can.—d. April 24, 1942, Toronto), Canadian regional romantic novelist, best known for *Anne of Green Gables* (1908), a sentimentalized but often charming story of a spirited, unconventional orphan girl who finds a home with an elderly couple. The book drew on the author's own girlhood experiences and on the rural life and traditions of Prince Edward Island. Earlier a journalist and schoolteacher, she achieved international success with both adults and children after the publication of *Anne.* Six sequels, carrying Anne from girlhood to motherhood, were less successful.

Montgomery Ward & Co., American retail merchandising company founded in Chicago in 1872 by Aaron Montgomery Ward (1844–1913). The company's headquarters were located in Chicago throughout its long history.

Ward started the company in 1872 with the aim of buying large quantities of merchandise wholesale and then selling it directly to farmers in rural areas without retail intermediaries. Such an operation would provide goods to farmers at low prices but still yield Ward acceptable profits. To accomplish this, Ward began distributing the world's first mail-order catalog (at first, a single sheet listing goods and prices) and backed up his sales with a money-back guarantee. Both the company's sales and the number of items in its catalog grew quickly from the mid-1870s on. Ward's two partners in the original mail-order venture withdrew during the Panic of 1873, and he brought in his brother-in-law George Robinson Thorne (1837–1918). In 1889 they converted their partnership into a corporation, privately held, and enjoyed good sales—until a new competitor, Sears, Roebuck & Co. (founded 1893), began outdistancing Montgomery Ward & Co. in advertising, merchandising, and sales.

Wards opened its first retail stores in 1926; by 1930 there were 556 of them across the country, and retail sales exceeded catalog sales. In 1968 Montgomery Ward & Co. merged with Container Corporation of America; the resultant holding company was named Marcor, Inc., which in 1974 was bought by the Mobil Oil Corporation. In 1985 Montgomery Ward & Co. ended its 113-year mail-order catalog business to concentrate on retail operations. In its efforts to free itself from Mobil's ownership and again become an independent corporation in 1988, the company instead set the stage for another corporate buyout and was purchased by a subsidiary of General Electric. In the 1990s the company faced stiff competition from new discount retailers such as Target and Wal-Mart and filed for bankruptcy in 1997. Despite attempts to modernize its stores, Montgomery Ward & Co. continued to suffer losses and announced on Dec. 28, 2000, that it would be going out of business and closing all stores throughout the United States.

Montgomeryshire, Welsh SIR DREFALDWYN, historic county of north-central Wales, along the English border. Montgomeryshire is an area of wooded hills and valleys encircled by higher mountains, including Long Mountain in the east, Clifaesty Hill in the south, Plynlimon in the west, and the Berwyn mountains in the north. It extends to the Dovey estuary in the far west. Montgomeryshire lies entirely within the present county of Powys.

In prehistoric times the eastern part of Montgomeryshire was the site of important trade routes running east–west along the course of the Severn, and consequently many hill forts dating from the Iron Age can be found in that area. The Roman occupation of the region was similarly centred in the east and was military in nature. Offa's Dyke, the earthwork built in the 8th century by the Mercian kings to demarcate their kingdom from Wales to the west, runs north–south along the eastern border of Montgomeryshire. The area became the Welsh province of Powys in the 8th century AD. Powys was invaded by the Normans about 1090, and it fell to Roger de Montgomery in 1093. In the eastern part of Powys a string of Norman castles were built, including Powis Castle near Welshpool and one at Montgomery. The area was under the rule of the Marcher lordships (local rulers in Wales who were partly independent of the English crown) until 1536, when King Henry VIII created the county of Montgomeryshire and thus brought the area fully under the administration of the crown. From the 15th century the county was known for its manufacture of wool flannels and for its lead mining. The huge Powis Castle mansion, located outside Welshpool, is one of the best-known castles in Wales.

month, a measure of time corresponding or nearly corresponding to the length of time required by the Moon to revolve once around the Earth.

The synodic month, or complete cycle of phases of the Moon as seen from Earth, averages 29.530588 mean solar days in length (*i.e.,* 29 days 12 hours 44 minutes 3 seconds); because of perturbations in the Moon's orbit, the lengths of all astronomical months vary slightly. The sidereal month is the time needed for the Moon to return to the same place against the background of the stars, 27.321661 days (*i.e.,* 27 days 7 hours 43 minutes 12 seconds); the difference between synodic and sidereal lengths is due to the orbital movement of the Earth–Moon system around the Sun. The tropical month, 27.321582 days (*i.e.,* 27 days 7 hours 43 minutes 5 seconds), only 7 seconds shorter than the sidereal month, is the time between passages of the Moon through the same celestial longitude. The draconic, or nodical, month of 27.212220 days (*i.e.,* 27 days 5 hours 5 minutes 35.8 seconds) is the time between the Moon's passages through the same node, or intersection of its orbit with the ecliptic, the apparent pathway of the Sun.

As a calendrical period, the month is derived from the lunation—*i.e.,* the time elapsing between successive new moons (or other phases of the moon). A total of 12 lunations amounts to 354 days and is, roughly, a year. A period of 12 lunations was therefore used by some primitive peoples to make their calendrical year. As is obvious, the lunar-based year (and a calendar derived from it) cannot be accurately correlated with a solar-based year, and the month's continued use in the Gregorian calendar of modern times is merely a recognition of its convenience as a calendar division (*see* Table).

Months of the year

January	31 days; from Roman republican calendar month Januarius, named for Janus, god of doorways and beginnings.
February	28 days usually, 29 in leap year; from Roman republican calendar month Februarius, named for Februa, the festival of purification held on the 15th.
March	31 days; from Roman republican calendar month Martius, named for the god Mars.
April	30 days; from Roman republican calendar month Aprilis. The Romans considered the month sacred to the goddess Venus, and its name may derive from that of her Greek equivalent, Aphrodite. Another etymology connects the name April with the Latin *aperire,* "to open," in reference to the unfolding of buds and blossoms at this season, spring in the Northern Hemisphere.
May	31 days; from Roman republican calendar month Maius, probably named for the goddess Maia.
June	30 days; from Roman republican calendar month Junius, probably named for the goddess Juno.
July	31 days; from Roman republican calendar month Julius (formerly Quintilis), named for Julius Caesar in 44 BC.
August	31 days; from Roman republican calendar month Augustus (formerly Sextilis), named for the emperor Augustus in 8 BC.
September	30 days; seventh month of early Roman republican calendar, from Latin *septem,* "seven."
October	31 days; eighth month of early Roman republican calendar, from Latin *octo,* "eight."
November	30 days; ninth month of early Roman republican calendar, from Latin *nove,* "nine."
December	31 days; tenth month of early Roman republican calendar, from Latin *decem,* "ten."

Montherlant, Henry (-Marie-Joseph-Millon) de (b. April 21, 1896, Paris, Fr.—d. Sept. 21, 1972, Paris), French novelist and dramatist whose stylistically concise works reflect his own egocentric and autocratic personality.

Montherlant was born into a noble Roman Catholic family of Catalan origin. His early works were inspired by his personal experiences: *La Relève du matin* (1920) evokes the intense inner life of his Catholic schooldays; and *Le Songe* (1922; *The Dream*), a semiautobiographical war novel, contrasts masculine courage and self-sacrifice with feminine sentimentality. *Les Bestiaires* (1926; *The Bullfighters*), a novel about bullfighting, records his feverish search for the peacetime equivalents of the physical excitement, heroism, and comradeship he had found at the front during his two years of service in World War I.

Montherlant's major work of fiction is a cycle of four novels that became a *succès de scandale.* The tetralogy consists of *Les Jeunes Filles* and *Pitié pour les femmes* (both 1936; "The Girls" and "Pity for Women"), *Le Démon du bien* (1937; "The Demon of Good"), and *Les Lépreuses* (1939; "The Lepers"). (An English two-volume translation of the tetralogy was entitled *The Girls: A Tetralogy of Novels.*) This sardonic and misogynistic work describes the relationship between a libertine novelist and his adoring women victims. It exalts the pleasures of the body and of artistic creation while scornfully rejecting feminine possessiveness and sentiment. A similar arrogantly virile outlook marks Montherlant's one other novel of importance, *L'Histoire d'Amour de la Rose de Sable* (1954; *Desert Love*).

After 1942 Montherlant turned to the theatre with the historical drama *La Reine morte.* The summits of his dramatic production are *Malatesta* (1946), set in the Italian Renaissance; *Le Maître de Santiago* (1947), set in the Spanish Golden Age; *Port-Royal* (1954), a Jansenist drama set in a French convent at the end of the 17th century; *La Ville dont le prince est un enfant* (1951), set in a French Catholic college of the mid-1930s; and *La Guerre civile* (1965), set in Caesar's Rome. All are dramas of character whose protagonists strive to hold to their high, sometimes perilously inflated, ideals of themselves. Montherlant was elected to the French Academy in 1960. Fearing blindness, he died by his own hand.

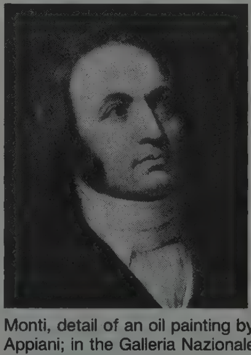
Monthermer, Ralph Montagu, Marquess of, also called (1689–1705) VISCOUNT MONTHERMER: *see* Montagu, Ralph Montagu, 1st Duke of.

Monti, Vincenzo (b. Feb. 19, 1754, Alfonsine, near Ravenna [Italy]—d. Oct. 13, 1828, Milan), Italian Neoclassical poet, author of many occasional works but remembered chiefly for his fine translation of the *Iliad.*

Originally a student of law and medicine at the University of Ferrara, Monti joined the Arcadian Academy, a Neoclassical group, in 1775, and three years later he went to Rome, where as secretary to Cardinal Braschi (1781–97), the pope's nephew, he was equivalent to court poet to Pius VI.

Monti adopted with enthusiasm every political change of his time. Works from his papal period are lavish in their praise of the pope. A poem about a French Republican official who was killed by a Roman mob, *In morte di Ugo Bassville* (1793; *The Penance of Hugo*), usually known as *Bassvilliana,* also praises the pope and warns of the dangers of the French Revolution. Then Napoleon invaded Italy, and his successes converted Monti, who moved to Milan, turned on the papacy, sang the praises of the conqueror, and repudiated his earlier works. Napoleon appointed him professor of poetry at the University of Pavia. When Napoleon fell and the Austrians returned, Monti became enthusiastically pro-Austrian.

Monti also wrote love poetry, three tragedies,



Monti, detail of an oil painting by A. Appiani; in the Galleria Nazionale d'Arte Moderna, Rome

Anderson—Alinari from Art Resource/EB Inc.

some works about language, and a translation from Voltaire. Of his topical works the finest is "Al signor di Montgolfier," a beautifully written description of a historic balloon ascension in 1783. But his masterpiece, written in fine blank verse, is his *Iliade* (1810), which remains one of the achievements of the Neoclassical age.

Monticelli, Adolphe (-Joseph-Thomas) (b. Oct. 14, 1824, Marseille, France—d. June 29, 1886, Marseille), French painter whose finest works are his dreamlike scenes of courtly revels, derived from Antoine Watteau. Using thick daubs of paint, applied to achieve a swirling effect, he created a poetic, visionary expression with radiant lights and deep shadows. His work was much admired by Vincent van Gogh and had a greater impact on 20th-century art than on that of the 19th century.

"Maldorme Cove," painting by Adolphe Monticelli, *c.* 1874; in the Musée des Beaux-Arts, Lyon
J. Camponogara

Monticelli studied under Paul Delaroche at Paris (1846–48); but his real teachers were the great masters in the Louvre—Rembrandt, the Venetians, and especially Watteau. Returning to Marseille, he developed his characteristic style about 1860 and returned to Paris (1863–70), where he received a commission from Napoleon III for the Palace of the Tuileries. The Franco-German War of 1870 obliged him to leave Paris, and he returned on foot to Marseille, where his life became one of toil and poverty. In his later years he also painted circus scenes, portraits, floral studies, and landscapes.

Though his courtly revels, with their quality of Romantic fantasy, attracted imitators, his art was generally unappreciated in its day. One of the best examples of his work is the "Serenade" (Louvre, Paris).

monticellite, grayish silicate mineral in the olivine family, calcium and magnesium silicate ($CaMgSiO_4$), that occurs as small crystals or grains in metamorphosed siliceous dolomites, in contact skarn zones (of contact-metamorphic rock rich in iron), and, more rarely, in igneous rocks such as periodotite or nephelinite. For detailed physical properties, *see* olivine (table).

Minerals in which manganese and iron replace magnesium in the crystal structure are called glaucochroite and kirschsteinite, respectively; these minerals have physical properties similar to monticellite and vary only slightly from their ideal compositions. Glaucochroite has been reported in ore deposits at Franklin, N.J., in the United States; kirschsteinite occurs in slags.

Monticello, the home of Thomas Jefferson, located in south-central Virginia, U.S., about 2 miles (3 km) southeast of Charlottesville. Constructed between 1768 and 1809, it is one of the finest examples of the early Classical Revival style in America.

Unlike most great mansions of the period, which were built in lowlands, Monticello is set atop an 867-foot (264-metre) mountain; the name means "Little Mountain" in Italian. The leveling of the mountaintop was begun in 1768, and Jefferson began designing the house in the same year. He took the floor plan of the house from an English pattern book; the facade was influenced by the designs of the 16th-century Italian architect Andrea Palladio. Construction began in 1769 or 1770 and continued, with interruptions, for more than a decade. The original house consisted of a central two-story portico with a wing on either side. The kitchen, laundry, servants' quarters, and other service buildings were concealed beneath two long L-shaped terraces, extending from each side of the house along the slope of the mountain; the terraces were connected to the basement of the main house by an underground passage. This structure was retained through the house's subsequent alterations.

Monticello was largely finished when Jefferson left for France in 1784. During his five years there his ideas about architecture changed dramatically; he was influenced by the work of contemporary Neoclassical architects and by ancient Roman buildings.

Jefferson began drawing up plans for altering and enlarging Monticello in 1793, and work began in 1796. Much of the original house was torn down. The final structure, completed in 1809, is a three-story brick and frame building with 35 rooms, 12 of them in the basement; each room is a different shape. There are two main entrances: the east portico, which provides access to the public portions of the house; and the west portico, the private entrance, which opens on the estate's extensive gardens. The windows on the second story start at floor level and are joined with the first-story windows in a single frame; this gives the impression that there is only a single story. A central octagonal dome, modeled on that of the Hôtel de Salm in Paris, dominates the structure; below it, a continuous balustrade runs around the edge of the roof.

Jefferson filled the house with ingenious devices. A dial on the ceiling of the east portico supplies a reading from a weather vane on the roof; above the east entrance is a large clock with two faces, visible from the inside and outside. The fireplace in the dining room conceals a dumbwaiter that communicates with the wine cellar. Jefferson's arrangements for lighting and ventilation were equally inventive, and he designed many of the pieces of furniture himself.

Upon Jefferson's death in 1826, his daughter Martha inherited Monticello, but she was unable to maintain it; she sold the property to Uriah Levy in 1836. Levy bequeathed it to the people of the United States, but his heirs contested the will. Monticello remained in possession of the Levy family until 1923, when it was purchased by the Thomas Jefferson Memorial Foundation, which restored the house and grounds and brought back many of the original furnishings.

Montini, Giovanni Battista: *see* Paul VI *under* Paul (papacy).

Montluc, Blaise de Lasseran-Massencôme, Seigneur de (lord of): *see* Monluc, Blaise de Lasseran-Massencôme, Seigneur de.

Montluçon, town, Allier *département,* Auvergne *région,* central France, northwest of Clermont-Ferrand. It is located on the Cher River a little below the point where it emerges from the gorges of its upper course. The old town, on a hill dominated by a château, is surrounded by new districts that have spread to both banks of the Cher. The town expanded rapidly after the construction of the Berry Canal in 1830 and the opening of coal mines in the region, and again, after 1920.

The winding streets of the old town have a number of 15th- to 16th-century wooden houses. The town's two old churches are both partly Romanesque. The château of the dukes of Bourbon (15th and 16th centuries) now houses a museum; a former Ursuline convent contains the municipal library.

Montluçon is an industrial, commercial, and administrative centre, with metallurgical works, plastics, tire, electrical, and chemical factories. The Paris-Clermont-Ferrand motorway passes nearby. Pop. (1990) 46,660.

Montmorency, BARONS AND DUKES OF, titled nobility of a great French family, the Montmorencys, tracing back to the 10th century, grouped below chronologically and indicated by the symbol •.

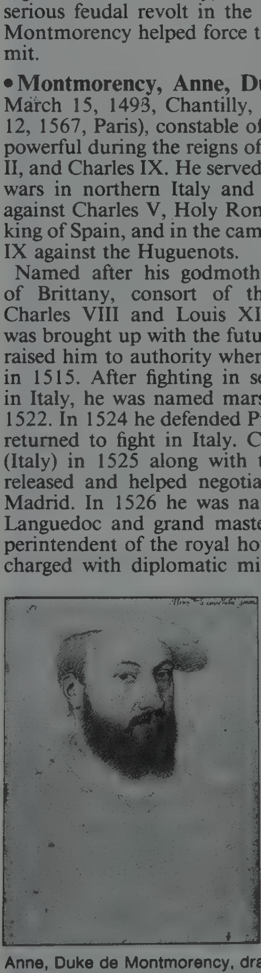
• **Montmorency, Mathieu II, Baron de** (b. *c.* 1174—d. Nov. 24, 1230), French noble prominent in the service of three kings.

Montmorency first fought under Philip II against the English in Normandy from 1202 to 1214. In 1215 he joined the crusade against the Albigensian heretics in southern France. On his return he was made constable of France in 1218, an office he strengthened by adding to its duties the command of the army.

Montmorency also served under Louis VIII in his war against the English in southwest France in 1224. The army he commanded conquered large territories, including Limousin, Périgord, and La Rochelle. When Louis turned his attention to the Albigenses in 1226, Montmorency again followed him. Shortly before his death Louis asked Montmorency to protect his young son, the future Louis IX. Montmorency was faithful to his promise. When Blanche of Castile, regent during her son's minority, was threatened by a serious feudal revolt in the years after 1226, Montmorency helped force the nobles to submit.

• **Montmorency, Anne, Duke** (duc) **de** (b. March 15, 1493, Chantilly, France—d. Nov. 12, 1567, Paris), constable of France who was powerful during the reigns of Francis I, Henry II, and Charles IX. He served in the numerous wars in northern Italy and southern France against Charles V, Holy Roman emperor and king of Spain, and in the campaigns of Charles IX against the Huguenots.

Named after his godmother, Queen Anne of Brittany, consort of the French kings Charles VIII and Louis XII, Montmorency was brought up with the future Francis I, who raised him to authority when he became king in 1515. After fighting in several campaigns in Italy, he was named marshal of France in 1522. In 1524 he defended Provence and then returned to fight in Italy. Captured at Pavia (Italy) in 1525 along with the king, he was released and helped negotiate the Treaty of Madrid. In 1526 he was named governor of Languedoc and grand master of France (superintendent of the royal household). He was charged with diplomatic missions and even-



Anne, Duke de Montmorency, drawing by the school of Clouet, c. 1560; in the Musée Condé, Chantilly, France
By courtesy of the Bibliotheque Nationale, Paris

tually became the king's principal minister, controlling war, the royal household, public works, and foreign affairs. His many extant letters reveal his prodigious ministerial energy; he was also irascible and a ruthless authoritarian. In 1527 he succeeded in bringing England into the League of Cognac against the Holy Roman emperor Charles V, but in 1529 he helped negotiate the Peace of Cambrai between France and the emperor. In 1536 Montmorency again took up arms against Charles V, first in Provence, where he compelled Charles to withdraw by means of a "scorched earth" strategy, then in northern Italy. Peace was negotiated in 1538, and he was named constable of France. In 1541, however, political mistakes and court intrigues forced him into retirement.

Recalled to court on Henry II's accession (1547), Montmorency savagely crushed a revolt against the salt tax at Bordeaux (1548). He was created a duke and a peer of France in 1551. Captured by the Spanish in 1557, he was released upon the conclusion of the Treaty of Cateau-Cambrésis between France and Spain (1559).

When Charles IX became king in 1560, Montmorency returned to power. At first he supported the Huguenots but soon allied himself with the Duke de Guise and the Marshal de Saint-André in the campaigns conducted against them under Charles IX. He was victorious at the Battle of Dreux but was captured. Released in 1563, he commanded the army that took Le Havre from the English that year. When war with the Huguenots broke out again in 1567, Montmorency was wounded at the Battle of Saint-Denis, just outside Paris, and died two days later. Two of his five sons by Madeleine of Savoy succeeded him as duke.

• **Montmorency, François, Duke** (duc) **de** (b. 1530—d. May 5, 1579, Écouen, Fr.), eldest son of Anne de Montmorency and a leader of the Roman Catholic moderates during the French Wars of Religion.

Montmorency fought in Piedmont (1551), defended Thérouanne (1553), and was appointed lieutenant general of the Île-de-France (1556). In 1557 he visited Rome to obtain a papal dispensation releasing him from his betrothal to Jeanne de Piennes so that he could marry Diane de France (*q.v.*). He succeeded his father as Duke de Montmorency in 1567. Having been a close friend of the Huguenot leader, his cousin the Admiral de Coligny (son of Anne's sister Louise), he became a leader of the moderate Catholic party of the Politiques and was imprisoned in the Bastille in May 1574, but he was released before the "Peace of Monsieur" (1576).

• **Montmorency, Henri I, Duke** (duc) **de,** also called SIEUR (sire) DE DAMVILLE (b. 1534, Chantilly, Fr.—d. April 1, 1614, Agde), brother of François de Montmorency and a leader of the moderate Roman Catholic party of the Politiques during the French Wars of Religion.

Under the title of Sieur de Damville, by which he is usually remembered, Montmorency fought in various theatres of war and became governor of Languedoc (1563) and marshal of France (1566). As a leader of the Politiques he administered Languedoc independently of the royal government and of Paris. In 1593 he acknowledged Henry IV as king and, in December, was rewarded with the office of constable. He was allegedly illiterate.

• **Montmorency, Henri II, Duke** (duc) **de** (b. 1595—d. Oct. 30, 1632, Toulouse, Fr.), a rebel against the leadership of Cardinal de Richelieu; he was executed as a traitor, thus ending the peerage duchy of Montmorency.

The son of Henri de Montmorency by his second wife, Louise de Budos, Henri was appointed to succeed his father as governor of Languedoc in 1608 and became grand admiral in 1612. Duke de Montmorency from 1614, he campaigned against the Huguenots in 1620 and took part in the sieges of Montauban and Montpellier. In 1625 the fleet which he commanded recaptured the islands of Ré and Oléron, and in 1628 he fought against Henri de Rohan in Languedoc. In 1629–30 he served as lieutenant general in Piedmont, defeating the Spaniards at Avigliana. Marshal of France from December 1630, he joined the faction of Gaston, Duke d'Orléans, and tried to raise Languedoc against Cardinal de Richelieu. After he was defeated in battle at Castelnaudary (Sept. 1, 1632) and taken prisoner, he was tried before the Parlement of Toulouse and, despite the pleas of several prominent persons, was executed as a traitor.

Henri II's beautiful sister Charlotte de Montmorency (1594–1650) had been married in 1609 to Henry II de Bourbon, Prince de Condé, who had to send her abroad to escape King Henry IV's passionate attentions. Later she courageously upheld her children's cause during the civil war of the Fronde.

Montmorency, Filips van: *see* Hoorne, Filips van Montmorency, Graaf van.

Montmorency-Bouteville, François-Henri de: *see* Luxembourg, François-Henri de Montmorency-Bouteville, duc de.

Montmorency et Angoulême, Diane de France, Duchess de: *see* Diane de France.

Montmorency Falls, French CHUTE MONTMORENCY, waterfall at the mouth of the Montmorency River in Québec region, southern Quebec province, Canada, about 7 miles (11 km) northeast of Quebec city. The waterfall makes a spectacular plunge 275 feet (84 m) into the St. Lawrence River. A hydroelectric installation at the falls provides power for the region around Quebec city.

montmorillonite, any of a group of clay minerals and their chemical varieties that swell in water and possess high cation-exchange capacities. The theoretical formula for montmorillonite (*i.e.,* without structural substitutions) is $(OH)_4Si_8Al_4O_{20} \cdot nH_2O$.

The montmorillonite minerals are composed of hydrous aluminum silicates in the form of extremely small particles. They take up water between their layers, causing swelling, and change the interlayer spacing according to the mineral variety. In addition to being involved in inorganic exchange reactions, they react with and absorb some organic liquids, such as amines, glycols, glycerols, and other polyhydric alcohols. For detailed physical properties, *see* clay mineral (table). These minerals are used as bleaching earths for clarifying water, juices, and liquors and for removing colour from mineral and vegetable oils; they are also used as catalyst supports and absorbents in petroleum refining. Montmorillonites are the principal constituents of bentonite and fuller's earth. Montmorillonite-saponite originally denoted fuller's earth, and the term later was applied to the montmorillonite mineral and certain clay deposits that are apparently bentonite and to a greenish variety of halloysite. Montmorillonites are common in clays, shales, soils, Mesozoic and Cenozoic sediments, and nonmicaceous recent marine sediments. They usually occur in areas of poor drainage.

Montonero, member of an Argentinian left-wing Peronist group known for violent urban terrorist actions such as political kidnappings and assassinations.

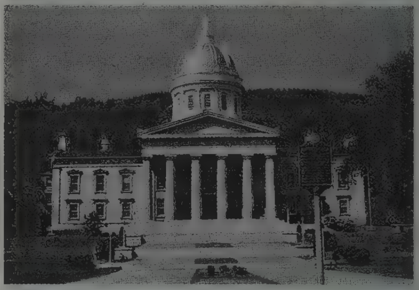
Founded as a militant fighting division by General Juan Perón before his exile to Paraguay in 1955, the Montoneros remained active during his 18-year absence. When Perón returned to Argentina in 1973, he condemned the Montoneros, who in response formed a revolutionary left wing and resorted to political violence on a large scale. From Perón's return until his widow's overthrow in 1976, the Montoneros and other terrorist groups such as the unaligned "People's Revolutionary Army" staged an unprecedented series of kidnappings and assassinations in Argentina. The military government and right-wing terrorists brutally suppressed the Montoneros in the late 1970s.

Composed of young men and women, primarily of the middle class, the Montoneros were dedicated to the overthrow of the government in Argentina. They funded themselves through bank robberies and the large ransoms paid to them for the release of their kidnap victims.

Montoya, Carlos (b. Dec. 13, 1903, Madrid, Spain—d. March 3, 1993, Wainscott, N.Y., U.S.), Spanish-born American flamenco guitarist and the first to present that style as serious music to concert audiences.

Primarily self-taught, the young Montoya learned by playing for singers and dancers at the *cafes cantantes* in Madrid, notably for La Teresina and La Argentina. He later toured with La Argentina as her accompanist. Montoya began to give flamenco guitar recitals in 1948; thereafter he toured frequently throughout the world. He was the first flamenco guitarist to perform as a soloist with major orchestras, and he appeared often on television. Montoya's compositions include a suite for guitar and orchestra that contains improvised flamenco material, *Suite flamenca* (1966), and many solo guitar pieces.

Montpelier, city, capital of Vermont, U.S., and seat of Washington county (1811). It lies along the upper Winooski River, just northwest of Barre, and it commands the main pass through the Green Mountains near the centre of the state. Named for Montpellier, France, the town (township) was chartered in 1781 by proprietors from Massachusetts and western Vermont. The first permanent dwelling was built there in 1787. Montpelier established a town meeting in 1791 and was named the state capital in 1805. It defeated several attempts by Burlington and other towns to succeed it as state capital, especially in 1857 when fire left the statehouse a mere shell. The present state capitol (the third constructed on the site; completed in 1859) is built of Vermont granite. Within the portico is a marble statue representing Ethan Allen, a hero of the American Revolutionary War.



State capitol, Montpelier, Vt.

By courtesy of the Agency of Development and Community Affairs, State of Vermont

Aside from the business of state government, the city's economy is based on insurance, the carving of granite monuments, printing, light manufacturing, and the nearby ski areas. A campus of Norwich University/Vermont College is in Montpelier. Inc. village, 1828; city, 1895. Pop. (2000) 8,035.

Montpellier, city, capital of Hérault *département* and of the Languedoc-Roussillon *région,* southern France, located 7 miles (12 km) from the Mediterranean coast. An old university city, Montpellier is the chief administrative and commercial centre of the Languedoc-

Roussillon region. Situated in a fertile plain, the city has grown up around its old quarters, contained within boulevards on the site of the former city walls. It is famed for the terraced 17th- and 18th-century Promenade du Peyrou, which offers views of the Mediterranean and of the city's elegant mansions. The Botanical Gardens, founded by Henry IV in 1593, are the oldest in France. The F.-X. Fabre Museum contains one of the richest French collections of paintings in existence. The 14th-century Gothic cathedral has been heavily restored.

A trading station for spice imports in the 10th century, Montpellier acquired a charter in 1141. Its school of medicine became important during the 12th century and the faculty of medicine was founded in 1221. The city's school of law dates from 1160. The University of Montpellier itself was founded in 1220 and confirmed by a bull of Pope Nicholas IV in 1289. Louis XIV (ruled 1643–1715) made Montpellier the administrative capital of the Languedoc region, famous for its wines. The modern city is a tourist centre and the seat of the International Vine and Wine Fair. Its industries include food processing, metallurgy, electronics, pharmaceuticals, and textile weaving. Pop. (1999) 225,392.

Montpellier I, II, and III, Universities of, French UNIVERSITÉS DE MONTPELLIER I, II, ET III, autonomous, state-financed universities in Montpellier, France, founded in 1970 under France's Orientation Act of 1968, providing for reform of higher education.

They replaced the former University of Montpellier, founded in 1220. In the 13th century Montpellier was one of the great *studia* of Europe and maintained its high rank until the mid-14th century. Though founded as a centre of Roman Catholic learning, the university soon came under Jewish and Arabic influence and began to emphasize the secular studies of law and medicine. Placentius, a noted medieval jurist, is thought to have founded in 1160 the school that became Montpellier's law school. The medical school was world renowned during the medieval period, and Gui de Chauliac developed the scientific method of surgery at Montpellier.

Montpellier was suppressed by the Revolution of 1789 and reconstituted as a university in 1896. Today, the three constituent universities are state-financed and academically autonomous.

Montpellier faience, French tin-glazed earthenware made at factories in the city of Montpellier, France, from the end of the 16th century into the 19th century. Its heyday was between 1570 and 1750. Much of the output consisted of drug jars (Montpellier was one of the oldest medical schools in Europe), but its wares from the beginning showed a certain individuality. Among the better decorations were much-copied naturalistic bouquets on a white or yellow background, instead of the traditional stylized flower arrangements.

Faience écuelle attributed to Montpellier, *c.* 1750; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Montpensier, Anne-Marie-Louise d'Orléans, Duchess (duchesse) **de,** byname LA GRANDE MADEMOISELLE (b. May 29, 1627, Paris, France—d. April 5, 1693, Paris), princess of the royal house of France, prominent during the Fronde and the minority of Louis XIV. She was known as Mademoiselle because her father, Gaston de France, Duke d'Orléans and uncle of Louis XIV, had the designation of Monsieur. From her mother, Marie de Bourbon-Montpensier, she inherited a huge fortune, including Eu and Dombes as well as Montpensier.

Tall and with a noble bearing, Montpensier set her heart on an exalted marriage, but the government would neither promise her the future Louis XIV in 1638 nor make a premature peace with the Habsburg powers in time for her to marry the Holy Roman emperor Ferdinand III in 1647. In 1651, during the first exile of the cardinal and statesman Jules Mazarin, Montpensier pulled her father along the path of collaboration with Louis II de Bourbon, Prince de Condé, in the revolts known as the Fronde.

In the third war of the Fronde, which Condé launched against the royal government, she took command of the troops that occupied Orléans on March 27, 1652, against token opposition. She saved Condé's army from annihilation in the Battle of the Faubourg Saint-Antoine (July 2, 1652) by ordering the cannon of the Bastille to be fired against the royal troops. On Louis XIV's return to Paris (October 1652), Montpensier went into exile until 1657. She was again exiled from court from 1662 to 1664 for refusing to marry Afonso VI of Portugal.

To everyone's amazement, Louis XIV, on Dec. 15, 1670, consented to Montpensier's plea for permission to marry a low-ranking gentleman, the Count de Lauzun, a captain in the king's bodyguard. Louis then retracted under pressure from outraged advisers and had Lauzun imprisoned. Montpensier finally obtained Lauzun's release in 1680 and, in return, ceded much of her estate to Louis's illegitimate son Louis-Auguste, Duke du Maine. She and Lauzun were married secretly in 1681 or 1682 but were unhappy together and separated in 1684. Montpensier's *Mémoires* cover her life to 1688. She also left two short novels and literary "portraits."

Montreal, French MONTRÉAL, city, seat of Montréal region, Quebec province, southeastern Canada. It is the second most populous metropolitan area in Canada and one of its major seaports. Montreal occupies about one-third of Île de Montréal (Montreal Island), the largest island of the Hochelaga Archipelago, situated near the confluence of the Ottawa and St. Lawrence rivers.

A brief treatment of Montreal follows. For full treatment, *see* MACROPAEDIA: Montreal.

Montreal is built around and upon the slope of a mountain, named Mont-Royal by Jacques Cartier in 1535–36. The metropolitan area of the present city includes Montreal and other islands, as well as both shores of the St. Lawrence. It is the most important seaport on the St. Lawrence River and Seaway, which connects the city with both the Atlantic Ocean to the east and the Great Lakes to the west. The area's climate is characterized by cold winters, with heavy snowfall from November through April, and mild summers.

The corporate headquarters of most of the largest Canadian banks, railroad lines, and insurance companies are located in Montreal. It is also the home of the International Civil Aviation Organization. The city's industries include traditional activities such as soapmaking, brewing and distilling, and wood and leather fabrication; several other industries, such as petroleum refining, have been introduced. Both English and French are spoken throughout the city, which is the chief centre of French-Canadian industry and culture.

Although historical Montreal (known as Vieux Montréal, or Old Montreal) has been preserved, the city has changed significantly since the late 1950s. Evidence of its modernization includes an underground network of shops, restaurants, and theatres. The city is a major cultural centre, with the Place des Arts—a complex of theatre and concert halls built in 1960—and several museums, galleries, public libraries, and multilingual bookstores.

Montreal is also one of the major centres of higher education in Canada. McGill University (1821) and Concordia University (formed in 1974 by the merger of Sir George Williams University, founded 1929, and Loyola College, founded 1899) offer mainly English-language instruction, while the University of Montreal (1878) and the University of Quebec at Montreal (1969) serve French-speaking students. The city is served by a network of highways, bus, subway, and rail lines. Airports include Montreal International (also called Dorval) and Mirabel International.

Area city, 61 square miles (158 square km); metropolitan area, 1,087 square miles (2,814 square km). Pop. (1996) city, 1,016,376; metropolitan area, 3,326,510.

Montreal Aquarium, French AQUARIUM DE MONTRÉAL, municipally owned aquarium located on St.-Helen's Island, Montreal, Can. It was built in 1966 for Expo 67, an international exhibition that was held in the city. The aquarium complex consists of two large buildings, one of which contains exhibits of marine and freshwater fishes and invertebrates. The other building is exclusively for marine mammals. The aquarium's fish collection is composed of approximately 2,000 specimens of more than 250 species. This diversity permits a wide range of specialty exhibits featuring various types of aquatic habitats. There is also a major coral reef display with appropriate fishes and invertebrates, as well as a unique penguin display consisting of a circular pool surrounded by glass plates that permit an underwater view of the swimming birds. (The interior of the tank simulates an ice and rock coastline of Antarctica.) The aquarium sponsors educational programs for students and is used for scientific research.

Montreal Botanical Garden, French JARDIN BOTANIQUE DE MONTRÉAL, botanical garden in Montreal founded in 1936 by Frère Marie-Victorin, one of the greatest of Canadian botanists. It has approximately 20,000 plant species under cultivation and maintains a herbarium consisting of nearly 100,000 reference specimens. Of the garden's many greenhouses, 9 are for public display and 23 for service functions and research collections. Its significant collections and special gardens contain commercially important plants, medicinal herbs, alpine plants, woodland plants, ferns, bonsai, cacti and other succulents, begonias, aroids, bromeliads, gesneriads, and orchids. Other notable features include water gardens, a rock garden arranged by geographic region, a collection of cultivated perennial herbaceous plants for home gardeners, and an arboretum. The Botanical Institute of the University of Montreal uses some of the garden's facilities, and, together, the two institutions form an important botanical research centre. The garden publishes the serial *Mémoires du Jardin Botanique de Montréal.*

Montreal group, coterie of poets who precipitated a renaissance of Canadian poetry during the 1920s and '30s by advocating a break with the traditional picturesque landscape poetry that had dominated Canadian poetry since the late 19th century. They encouraged an emulation of the realistic themes, metaphysical complexity, and techniques of the U.S. and British poets Ezra Pound, T.S. Eliot, and W.H. Auden that resulted in an Expressionist poetry reflective of the values of an urban civilization. Based in Montreal, then Canada's most cosmopolitan city, the group included A.M. Klein; A.J.M. Smith, whose *Book of Canadian Poetry* (1943) and other anthologies contributed greatly to the raising of literary standards in Canada; Leo Kennedy; and Francis Reginald Scott; as well as two kindred spirits from Toronto, E.J. Pratt and Robert Finch. First brought together at McGill University in Montreal, these poets founded the *Canadian Mercury* (1928–29), a literary organ for young writers, and subsequently founded, edited, and wrote for a number of other influential journals—*e.g.,* the *McGill Fortnightly Review* and *Canadian Forum.*

Montreal Museum of Fine Arts, French MUSÉE DES BEAUX-ARTS DE MONTRÉAL, in Montreal, Canadian art museum with outstanding collections of paintings, graphics, furniture, textiles, sculpture, and the decorative and fine arts. One of North America's finest collections of Inuit prints and carvings and Northwest Coast Indian art is preserved there; there is also an important collection of prints and drawings. The museum was established in 1847 as the Montreal Society of Artists; it became the Art Association of Montreal in 1860 and assumed its present name in 1948–49. It moved into a neoclassical building designed by Edward and W.S. Maxwell in 1912. A new wing opened in 1976.

Montréal-Nord, city, Montréal region, southern Quebec province, Canada, on the south shore of the Rivière des Prairies, north of Montreal city. A large residential and industrial suburb, Montréal-Nord grew rapidly after World War II. In 1959 it joined the newly established Montreal Metropolitan Corporation. Inc. town, 1915; city, 1959. Pop. (1996) 81,581.

Montreuil, officially MONTREUIL-SOUS-BOIS, town, Seine-Saint-Denis *département,* Paris *région,* an eastern industrial suburb of Paris, situated on a plateau 400 feet (120 m) high. Located 1 mile (1.6 km) from the city limits of the capital, it is connected to Paris by the Métro (subway). A centre for processing hides and skins, Montreuil also manufactures cookies (biscuits), textiles, and porcelain and produces chemicals for tanning. Peach trees, for which the locality was once famous, still grow there. In the centre of the old town, the Church of Saint-Pierre-Saint-Paul has a 12th-century choir. A wooded park on the edge of the plateau contains a museum of history. Pop. (1999) 90,674.

Montreux, town, comprising three resort communities (Le Châtelard-Montreux, Les Planches-Montreux, and Veytaux-Montreux; merged 1962) in Vaud canton, western Switzerland, extending 4 miles (6 km) along the eastern shore of Lake Geneva (Lac Léman). Its natural setting below mountains protecting it from northerly and easterly winds has made Montreux the lake's most fashionable health resort. The nearby 13th-century Château de Chillon, made famous by Lord Byron's poem "Prisoner of Chillon," is one of Switzerland's best-known pieces of architecture. Montreux is on railway lines from Geneva and France to Italy via the Simplon Tunnel and is also a terminus of mountain railways. The tourist trade is important, while the villages of Caux, Chernex, Glion, Chamby, and Les Avants on terraces above Montreux depend mainly on agriculture and viticulture. Pop. (1998 est.) 21,476.

Montrose, royal burgh (town) and North Sea port, council area and historic county of Angus, Scotland, situated at the mouth of the River South Esk. Montrose received its first charter from David I of Scotland (reigned 1124–53) and was designated a royal burgh in 1352. It was there in 1296 that King Edward I of England accepted the surrender of Scotland from the Scottish king John de Balliol. Montrose prospered as a market town and fishing port and by the 18th century had developed into a popular spa. The production of goods and services for the North Sea oil industry is economically important. The town, no longer a spa, is still a popular holiday resort. Pop. (1991) 11,440.

Montrose, city, seat (1883) of Montrose county, western Colorado, U.S., in the Uncompahgre River valley at an elevation of 5,820 feet (1,774 m). After the land was opened for settlement in 1881, a railway depot was established on the site. The town that grew up around it was named by an early citizen, who was inspired by the 19th-century Scottish Romantic writer Sir Walter Scott's *Legend of Montrose.* By 1900 major canal projects irrigated land for farming, and later lumbering and mining (carnotite ores yielding uranium, vanadium, and radium) became important. In 1910 water diverted from the Gunnison River through the Gunnison Tunnel, 6 miles (9.7 km) long, increased irrigation facilities. The city is now a busy trading centre, with food- and wood-processing industries. The area is part of the Upper Colorado River Storage Project. The Ute Indian Museum is nearby, and Montrose is a tourist base for Black Canyon of the Gunnison National Park, Curecanti National Recreation Area, and the Uncompahgre and Gunnison national forests. Inc. town, 1882; city, 1906. Pop. (2000) 12,344.

Montrose, James Graham, 5th Earl and 1st Marquess of, EARL OF KINCARDINE, LORD GRAHAM AND MUGDOCK (b. 1612—d. May 21, 1650, Edinburgh, Scot.), Scottish general who won a series of spectacular victories in Scotland for King Charles I of Great Britain during the English Civil Wars.

Marquess of Montrose, portrait miniature after a painting by W. Dobson; in the Wallace Collection, London

By courtesy of the trustees of the Wallace Collection, London

Montrose inherited the earldom of Montrose from his father in 1626 and was educated at St. Andrews University. In 1637 Montrose signed a covenant promising to defend Scotland's Presbyterian religion against attempts by Charles I to impose Anglican forms of worship. Still, Montrose was essentially a Royalist, and, as such, he became the bitter enemy of Archibald Campbell, 8th Earl (later 1st Marquess) of Argyll, leader of Scotland's powerful anti-Royalist party. Montrose served in the Covenanter army that invaded and occupied part of northern England in August 1640, but he lost his political struggle with Argyll and was imprisoned by Argyll in Edinburgh from June to November 1641.

In 1644, when the Covenanters invaded England to fight for Parliament against the king, Charles appointed Montrose lieutenant general in Scotland; three months later he was made Marquess of Montrose (and Earl of Kincardine). Making his way to the Scottish Highlands in August 1644, Montrose raised an army of Highlanders and Irishmen, and within a year his tactical brilliance had brought him victories in major battles: at Tippermuir (Tibbermore), Aberdeen, Inverlochy, Auldearn, Alford, and Kilsyth. Charles then made him lieutenant governor and captain general of Scotland.

But after the king's decisive defeat at Naseby in June 1645, Montrose's army melted away, and the small force remaining was routed at Philiphaugh in September. Montrose fled to the European continent in 1646 but, with the exiled Charles II's blessing, returned to Scotland with about 1,200 men in March 1650. After a defeat at Carbisdale on April 27, he was surrendered by Neil MacLeod of Assynt, with whom he had sought protection. He was hanged in the marketplace of Edinburgh in May. To the last he protested that he was a real Covenanter as well as a loyal subject.

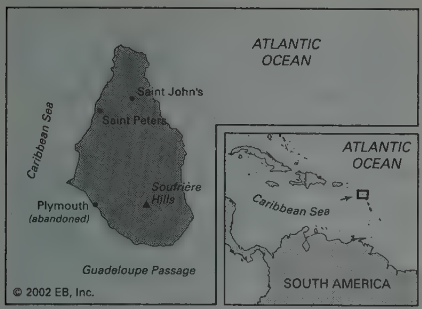
After the Restoration of Charles II in 1660, Montrose's son James was confirmed in the inheritance of the Montrose titles. (The marquessate became a dukedom in 1707.)

Montrouge, formally LE GRAND-MONTROUGE, town, Hauts-de-Seine *département,* Paris *région,* southern suburb of Paris, in north-central France. The area, recorded as Mons Rubicus (Latin: "Red Mountain"; from the local reddish soil) in ancient charters, was divided in 1860—Le Petit Montrouge was absorbed into the 14th *arrondissement* (administrative division) of Paris, and the remainder formed the *commune* of Montrouge. It has printing establishments and manufactures surgical instruments and perfume. A women's teachers' college is located there. Pop. (1999) 37,733.

Montserrat, mountain, northwestern Barcelona *provincia,* in the *comunidad autónoma* ("autonomous community") of Catalonia, Spain, lying just west of the Llobregat River and northwest of Barcelona city. Known to the Romans as Mons Serratus ("Saw-toothed Mountain") and to the Catalans as Montsagrat ("Sacred Mountain"), it is famous for its unusual appearance, its Benedictine monastery of Santa María de Montserrat, and the ancient wooden statue of the Virgin and Child, supposedly carved by St. Luke, brought to Spain by St. Peter, and hidden in a cave during the Moorish occupation. Found in 880, it has since been venerated there by numerous pilgrims, who attribute many miracles to the intercession of the Virgin Mary.

Jagged, barren pinnacles of reddish sandstone and conglomerate, formed by erosion, rise from the mountain's huge base, and it is cloven by ravines; the monastery stands on the edge of the widest of these, the Malo valley, at 2,400 feet (730 m). Remains indicate that the mountain was inhabited in prehistoric times. Christian hermits of Santa María were residing on Montserrat when in 888 the Benedictine monastery of Ripoll was granted jurisdiction over them. From the 11th to the early 15th century, a regular priory flourished there and obtained independence as an abbey in 1410, which status it has held almost continuously ever since. The present basilica was begun in 1560 and the monastery in 1755, though these were extensively rebuilt after destruction by French troops in 1812.

Montserrat, British dependency and island within the Lesser Antilles chain in the eastern Caribbean Sea. It lies 27 miles (43 km) southwest of Antigua and is 11 miles (18 km) long and 7 miles (11 km) wide. The de facto capital is St. John's, in the northern part of the island. Plymouth, on the southwestern coast, was the capital until 1997, when it was devastated by volcanic eruptions. Area 40 square



Montserrat

miles (103 square km). Pop. (1999 est.) 3,500.

A brief treatment of Montserrat follows. For information about the regional aspects of Montserrat, *see* MACROPAEDIA: West Indies.

The land. The island is divided into three highland areas. The Silver Hills, in the north, and the Centre Hills are forested at higher elevations but have secondary scrub on their gentler lower contours. Chances Peak, at 3,000 feet (915 m) in the Soufrière Hills, was once the highest point on the island. Beginning in July 1995, volcanic domes in the Soufrière Hills alternately grew and collapsed in a series of eruptions, killing 19 people in June 1997 and subsequently destroying forests, farms, and villages, particularly in the southern and southwestern parts of the island. Many of the domes rose higher than 3,300 feet (1,000 m) before collapsing.

The climate is mild and exhibits little seasonal variation. Average temperatures range from 70° F (21° C) to 86° F (30° C). The warmest period is from June to November. Annual precipitation averages about 57 inches (1,448 mm). The island is often in the path of hurricanes. A series of major earthquakes and hurricanes occurred between 1890 and 1936, and a hurricane in 1989 was particularly devastating.

The people. The population is largely of black African ancestry. The official language is English, but most Montserratians also speak a Creole similar to that of Jamaica. The main religious denominations are Anglican, Methodist, and Roman Catholic; Seventh-day Adventists and Pentecostals are of increasing importance. Until the mid-1990s Montserrat's population was relatively stable because of emigration and a low birth rate. Plymouth and its environs were the main centres of settlement. During the volcano crisis more than two-thirds of Montserratians departed for Britain, neighbouring Antigua, and other parts of the Caribbean region. Renewed eruptions have discouraged resettlement, and access to the southern two-thirds of the island has been restricted.

The economy. Volcanic activity caused a virtual economic collapse when Plymouth, the main commercial centre, was abandoned. Montserrat has since relied on British aid to rebuild infrastructure and provide services. The main sources of employment are now public services and construction. The eruptions damaged most of the island's farms, but some vegetables are still grown.

Montserrat's airport was closed because of eruptions in 1997. Since then the island has been linked with Antigua via a ferry terminal at Little Bay, in the northwestern part of the island, as well as by helicopter service.

Administration and social conditions. Montserrat is a self-governing overseas territory within the Commonwealth. The British monarch is the head of state. The constitution, promulgated on Jan. 1, 1960, provides for a governor appointed by the British monarch, an Executive Council, and a Legislative Council. The governor heads the Executive Council and appoints as chief minister the leading member of the Legislative Council.

Education is free and compulsory for children aged 5–14. Nearly all Montserratians are literate. The leading causes of death are diabetes, heart diseases, and cancers. A hospital and branch of the University of the West Indies have been relocated to the north.

Cultural life. Montserratian society is a mixture of African, Irish, and British traditions. Until the late 20th century, folk songs often accompanied *jumbie* ("spirit") dances, which often took place following Christian rituals such as baptisms or in times of crisis. Folk music has declined partly because of imported musical styles. Carnival, known locally as Festival, is celebrated between Boxing Day (December 26) and Jump-up Day (January 1).

History. The original inhabitants of Montserrat began arriving in the Lesser Antilles about 3000 BC. The island was sighted in November 1493 by Christopher Columbus, who named it for the abbey of Montserrat in Spain. It was colonized in 1632 by Irish Catholics from St. Kitts. More Irish immigrants subsequently arrived from Virginia. Plantations were set up to grow tobacco and indigo, followed eventually by cotton and sugar. The French captured the island in 1664 and again in 1667, but it was restored to England in 1668 by the Treaty of Breda. French forces sacked the island in 1712 and captured it for the last time in 1782, but the Treaty of Versailles (1783) returned it to Britain.

African slaves were probably first brought to Montserrat in large numbers in the 1660s. Their population grew to some 1,000 in 1678 and 7,000 in 1810, when they greatly outnumbered the European settlers. The plantation system declined after slavery was abolished in 1834 and the world market for sugar declined. The Montserrat Company, formed in 1857 under Joseph Sturge, bought abandoned estates, encouraged lime cultivation, and sold plots to settlers. As a result, much of Montserrat is still owned by smallholders.

Between 1871 and 1956 Montserrat was part of the (British) Federal Colony of the Leeward Islands. The first elections held under universal suffrage took place in 1952. On July 1, 1956, Montserrat became a colony in its own right.

In the general election of 1978 the People's Liberation Movement (PLM) won all seven seats to the Legislative Council. The party retained its control in 1983, but the opposition gained strength in the 1987 election. The PLM favoured independence after first achieving greater economic self-sufficiency. However, many others opposed independence. In the election of 1991 the newly formed National Progressive Party took over the government, but in 1996, in the midst of the volcano crisis, it won only one legislative seat. A weak coalition was then formed, headed by Bertrand Osborne, who resigned in 1997 amid criticism of his handling of the volcano crisis. He was replaced by David Brandt. The British government was also criticized for the way it managed the crisis, although it helped to evacuate and relocate the population. Volcanic activity continued into the early 21st century.

Montt, Manuel (b. Sept. 8, 1809, Petorca, Chile—d. Sept. 20, 1880, Santiago), president of Chile, an enlightened despot who throughout his two terms (1851–61) angered liberals and conservatives alike yet accomplished many constructive reforms.

After studying law at the National Institute, where he also served as rector (1835–40), Montt was elected to the Chilean Congress in 1840. He served as minister of the interior and minister of justice under President Manuel Bulnes (1841–51).

In 1851 Montt won the presidency, but the liberals thought his election was fraudulent and instigated an armed revolt, which was quickly subdued. Montt represented the conservative oligarchy and was authoritarian and inflexible in his beliefs, but he also worked for the economic and social progress of his nation. He angered the conservatives when he asserted the state's right of patronage in Chile's Roman Catholic church and when he supported removing restrictions on the sale or bequeathing of landed estates. In addition, his administration advanced commerce and banking, promoted public education and immigration, and colonized the area south of the Bío-Bío River.

Manuel Montt, engraving
By courtesy of the Library of Congress, Washington, D.C.

Near the end of his term, when Montt indicated a preference for Antonio Varas, his minister of the interior, to be his successor, liberals again staged an armed uprising. Montt subdued the revolt but pacified the liberals by shifting his support to José Joaquín Pérez, a moderate. On giving up the presidency in 1861, Montt became president of the Supreme Court, a post he held until his death.

Montt, Pedro (b. 1846, Santiago, Chile—d. Aug. 16, 1910, Bremen, Ger.), Chilean president (1906–10), whose conservative government furthered railroad and manufacturing activities but ignored pressing social and labour problems.

The son of the former Chilean president Manuel Montt, Pedro Montt graduated in law from the National Institute in 1870. He was elected to the Chamber of Deputies in 1876 and became its president in 1885. Montt held two posts in the cabinet of President José Balmaceda, but he later (1891) took an active part in the revolution that overthrew Balmaceda. He then went to the United States, first as an agent of the revolutionary junta and later (after U.S. recognition) as minister from Chile.

Unsuccessful in his first bid for the presidency (1901), Montt was elected by a large majority in 1906 as the candidate of the National Union ticket. His first action was to call out the army to suppress large-scale strikes (1907). His administration supported the construction of a railway that ran the length of the country and stimulated the production of nitrates and copper. It did little, however, to improve the living conditions of the people. In 1910 Montt left Chile for medical treatment in Germany, where he died.

Montu (Egyptian god): *see* Mont.

Montúfar y Rivera Maestre, Lorenzo (b. March 11, 1823, Guatemala City [now in Guatemala]—d. 1898), Central American statesman, diplomat, and historian whose liberal political activities often resulted in his exile.

Receiving degrees in philosophy and law from the University of Guatemala in 1846, Montúfar began his career as a professor of civil law. He vigorously opposed the dictatorship of Rafael Carrera and was frequently exiled for his political opinions. While in exile in El Salvador, he was elected to the Guatemalan

Congress, which proscribed Carrera, but on the dictator's return Montúfar was forced to flee to Costa Rica. Much later in his life he wrote the monumental *Reseña Historica de Centro America,* 17 vol. (1878–88; "Historical Outline of Central America"), which covers much of the Carrera era.

In exile in Costa Rica, Montúfar assumed a career as a lawyer, magistrate, and publisher. As Costa Rica's foreign minister he helped to organize the Central American defense against the U.S. adventurer William Walker, who in 1855–62 sought control of Nicaragua. Montúfar traveled extensively in Latin America, the United States, and Europe. As one of the leading advocates of Central American unity, he repeatedly urged that the distintegrated Federation of Republics be reestablished. He held numerous government posts and negotiated treaties that settled some of the many Central American boundary disputes. In 1891 he was unsuccessful in his bid for the presidency of Guatemala.

Monumenta Germaniae Historica (Latin: "Historical Monuments of the Germans"), voluminous, comprehensive, and critically edited collection of sources pertaining to German history from about AD 500 to 1500. The work was begun by German scholars in the early 19th century as a result of rising nationalistic feeling, and it gave impetus to similar endeavours by historians in other European countries. The most important antecedent of the *Monumenta Germaniae Historica* was the *Monarchia romani imperii,* a collection of documents on German medieval history compiled by Melchior Goldast (d. 1635). The initiator of the *Monumenta Germaniae Historica* was Karl Freiherr vom Stein (d. 1831), leading early 19th-century German statesman and reformer, who, after retiring from politics in 1816, exercised his patriotic energies in stirring up interest in German history. He founded, at Frankfurt am Main in 1819, the Gesellschaft für Deutschlands Ältere Geschichtskunde (Society for Earlier German Historiography). The success of his project was in large measure due to the scholarly capability and energy of Georg Heinrich Pertz (d. 1876), whom Stein enlisted as editor and put in charge of the work in 1823. Under Pertz's half century of editorship and collaboration with leading German scholars, 20 volumes of sources were published; 100 more were to follow, the last of which was issued in 1925. The documents in the *Monumenta Germaniae Historica* are classified according to the following categories: *scriptores, leges, diplomata, epistolae,* and *antiquitates.* The work was a seminal undertaking that set a high standard of scholarship for later generations of historians producing similar collections.

Monumentum Ancyranum, inscription engraved soon after AD 14 on the walls of the temple of Rome and Augustus at Ancyra (modern Ankara, Tur.), giving the Latin text and official Greek paraphrase of the official account of the reign of the ancient Roman emperor Augustus. This official account is known as the "Res Gestae Devi Augusti." The *res gestae* ("achievements") were composed by Augustus himself, who directed in his will that they should be engraved in bronze on two pillars in front of his mausoleum in Rome. The original columns are missing, but copies were made in many temples across the empire. Besides the one in Ancyra, fragments also exist at Apollonia in Pisidia and at nearby Antioch.

The inscription recounts his early career, magistracies, and other honours; the public benefactions he had made from his private means; and his warlike and diplomatic achievements. It ends with his claim to have restored to Rome the republic, a form of government that actually ended with his accession in 27 BC. A summary of his benefactions was added after his death. This valuable inscription gives a picture of how Augustus wished to be remembered.

Monywa, town, central Myanmar (Burma). It is situated on the left bank of the Chindwin River, about 60 miles (97 km) west of Mandalay. During World War II, the town was a Japanese communications centre and was captured by the British in 1945. In October of 1952, the Triple Alliance Pact was signed near Monywa, demarcating zones throughout Myanmar in which various ethnic and political groups, including the Karen, Shan, Kachin, and communists, would have power. Monywa is situated in the dry zone above the confluence of the Mu and Chindwin rivers; paddy rice, sesame, millet, peas, wheat, and cotton are cultivated in the surrounding area. Monywa's manufactures include textiles and wood and bamboo products. Copper is mined near Monywa, and a copper refinery has operated in Salingyi since 1976. A hospital was built in Monywa in 1972. Paved roads and a railway line run through the town. Pop. (1983) 106,873.

Monza, Latin MODICIA, city, Milano *provincia,* Lombardia (Lombardy) *regione,* northern Italy. It lies along the Lambro River, just northeast of Milan. The ancient Modicia, it was a village until the 6th century AD, when the Lombard queen Theodelinda established a residence and a monastery there. During the period of the communes, Monza was sometimes independent, sometimes subject to Milan. The Visconti family built a castle there in 1325. The town withstood many sieges and was repeatedly plundered, notably by the troops of Charles V. King Umberto I of Italy was assassinated at Monza on July 29, 1900; an expiatory chapel was dedicated in 1910.

Monza is known for its cathedral, founded in 595 by Theodelinda and enlarged in the 13th century. The cathedral's green-and-white marble facade was erected in 1390–96 by Matteo da Campione, and the campanile dates from 1592 to 1606. Within the cathedral church is the iron crown (Corona Ferrea) of Lombardy, supposedly formed from one of the nails used at Christ's crucifixion and used after 1311 for the coronation of the Holy Roman emperors and of Napoleon at Milan in 1805. The church's rich treasury also contains the relics of Theodelinda and other crosses and reliquaries of the Lombard and Gothic periods. Also notable are the Church of Santa Maria in Strada (1357) with a terra-cotta facade of 1393; the 13th-century communal palace, Arengario; and the Villa Reale (royal palace; 1777–80), used for art exhibitions.

Monza is a busy industrial centre manufacturing felt hats and carpets, textiles, machinery, furniture, glass, paint, and plastics. It is the site of the famous Autodromo (automobile-racing track), which, because of its elliptical shape and concrete banked curves, is claimed to be the fastest in the world. Pop. (1990 est.) mun., 123,073.

Monzaemon, Chikamatsu: *see* Chikamatsu Monzaemon.

monzonite, intrusive igneous rock that contains abundant and approximately equal amounts of plagioclase and potash feldspar; it also contains subordinate amounts of biotite and hornblende, and sometimes minor quantities of ortho-pyroxene. Quartz, nepheline, and olivine, which are occasionally present, produce quartz, nepheline, and olivene monzonites. In the type region of Monzoni, Italy, in the Italian Tirol, these minerals rarely occur as major constituents; moreover, in Monzoni the plagioclase is often calcium-rich (labradorite) and commonly shows prominent zoning. Rocks similar to those of the type area have been described from Norway (akerite), Montana (yogoite, shonkinite), Sakhalin Island off the Pacific coast of Russia, and other localities throughout the world. Monzonite is not a rare rock type, but it generally occurs in rather small, heterogeneous masses associated with (and perhaps gradational to) diorites, pyroxenites, or gabbros.

mood, also called MODE, in grammar, a category that reflects the speaker's view of the ontological character of an event. This character may be, for example, real or unreal, certain or possible, wished or demanded. Mood is often marked by special verb forms, or inflections, but it is sometimes expressed by a single word or a phrase.

Three moods frequently distinguished grammatically in languages are the indicative, the imperative, and the subjunctive. The indicative is generally used for factual or neutral situations, as in English "John did his work" and Spanish *Juan hizo su trabajo.* The imperative conveys commands or requests, for example, "Do your work." The mood is indicated by the absence of a subject. In addition to having an absent subject, Spanish uses an imperative verbal form, as in *Haga su trabajo.* The functions of the subjunctive mood vary widely across languages. Some notions often expressed by the subjunctive are doubt, possibility, necessity, desire, and future time. The English subjunctive is fairly limited in its use. Usually, only in formal styles do we find sentences like "It is necessary that he be ready on time." More often, subjunctive meanings are expressed by modal auxiliary verbs, such as "can," "must," or "may," as in "He must be ready on time." Other moods sometimes grammaticalized in languages include conditional, hortative (urging), dubitative (doubting), optative (wishing), hypothetical, and potential.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

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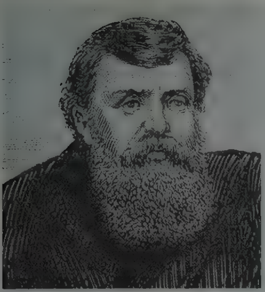
mood, in logic, the classification of categorical syllogisms according to the quantity (universal or particular) and quality (affirmative or negative) of their constituent propositions. There are four forms of propositions: *A* (universal affirmative), *E* (universal negative), *I* (particular affirmative), and *O* (particular negative). Because each syllogism has three propositions and each proposition may take four different forms, there are 64 different patterns (moods) of syllogisms. Twenty-four of the 64 possible moods are valid, though only 19 were traditionally accepted as valid. Various mnemonic terms are employed to label these moods. The vowels of these terms represent the forms of propositions in the syllogism. For example, "Felapton" is the mnemonic term to signify the mood in which the major premise (the premise containing the predicate of the conclusion) of the syllogism is an *E* proposition, the minor premise (the premise containing the subject of the conclusion) is an *A,* and the conclusion is an *O.*

Moodie, Susanna Strickland (b. Dec. 6, 1803, Bungay, Suffolk, Eng.—d. April 8, 1885, Toronto, Ont., Can.), English-born Canadian pioneer who wrote realistic, insightful, often humorous accounts of life in the wilderness. Her most important work is *Roughing It in the Bush; or, Life in Canada* (1852), a book of instruction for future pioneers based on her own experiences. She emigrated to the Upper Canadian wilderness in 1832 with her husband, a British army officer, and her sister, Catherine Parr Strickland Traill (*q.v.*), who was also an author. Moodie's initial distaste for the hardships of "roughing it" gradually changed to an earnest commitment to Canada's future.

Moody, Dwight L(yman) (b. Feb. 5, 1837, East Northfield, Mass., U.S.—d. Dec. 22,


Dwight L. Moody, detail from a drawing by Charles Stanley Reinhart; in *Harper's Weekly,* March 1876

By courtesy of the Library of Congress, Washington, D.C.

1899, Northfield, Mass.), prominent American evangelist who set the pattern for later evangelism in large cities.

Moody left his mother's farm at 17 to work in Boston and there was converted from Unitarianism to fundamentalist evangelicalism. In 1856 he moved to Chicago and prospered as a shoe salesman but in 1860 gave up business for missionary work. He worked with the Young Men's Christian Association (YMCA; 1861–73), was president of the Chicago YMCA, founded the Moody Church, and engaged in slum mission work.

In 1870 he met Ira D. Sankey, a hymn writer, and with him became noted for contributing to the growth of the "gospel hymn." They made extended evangelical tours in Great Britain (1873–75, 1881–84). Moody shunned divisive sectarian doctrines, deplored "higher criticism" of the Bible, the Social Gospel movement, and the theory of evolution. Instead he colourfully and intensely preached "the old-fashioned gospel," emphasizing a literal interpretation of the Bible and looking toward the premillennial Second Coming.

Moody's mass revivals were financed by prominent businessmen who believed he would alleviate the hardships of the poor. Moody himself ardently supported various charities but felt that social problems could be solved only by the divine regeneration of individuals. As well as conducting revivals, he directed annual Bible conferences at Northfield, Mass., where he founded a seminary for girls in 1879. In 1889 he founded the Chicago Bible Institute (now the Moody Bible Institute).

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Moody, Helen Wills: *see* Wills, Helen.

Moody, William, in full WILLIAM HENRY MOODY (b. Dec. 23, 1853, Newbury, Mass., U.S.—d. July 2, 1917, Haverhill, Mass.), U.S. attorney general (1904–06) and justice of the U.S. Supreme Court (1906–10).

Moody began practicing law at Haverhill, Mass., in 1878 and became active in local Republican Party affairs. He served as city solicitor (1880–90) and district attorney for eastern Massachusetts (1890–95). He first gained national attention as prosecutor in the sensational murder trial (1893) of Lizzie Borden.

Elected to the U.S. House of Representatives in 1895, he served until 1902, when President Theodore Roosevelt appointed him secretary of the navy and, in 1904, U.S. attorney general. During his two years in the latter post, Moody moved to break up the giant monopolies, notably in the meat-packing industry, through vigorous enforcement of the antitrust laws. In 1906 he was appointed to the Supreme Court by Roosevelt (who had first offered the seat to William Howard Taft). Illness limited Moody's effectiveness on the bench and forced him to resign after only four years.

Moody, William Vaughn (b. July 8, 1869, Spencer, Ind., U.S.—d. Oct. 17, 1910, Colorado Springs, Colo.), American poet and playwright whose mystical and dignified work was considered a sign of unfulfilled promise upon his early death.

After he graduated from Harvard University (1893), Moody was an instructor of English at Harvard and then at the University of Chicago. Though he was considered an inspiring teacher, Moody disliked his job; he spent several years of his university association working elsewhere on the Cambridge edition of the works of John Milton. The publication in 1902 of a textbook that he coauthored enabled Moody to pursue the writing career that he preferred.

Moody's early poems, such as "Good Friday Night" (1898), are thought to be beautiful and noble, as are his poetic plays, including *The Masque of Judgment* (1900) and *The Fire-Bringer* (1904), from an uncompleted trilogy on the unity of God and man. He abruptly changed his style with his most popular work, *The Great Divide* (1906), a prose play about conflict between eastern U.S. puritanism and the individualism of the western frontier. Although Moody tended to overembellish, this new phase of his career marked him as one of the most promising writers of his day. He died soon after this turning point, at age 41, of a brain tumour.

Moon (Estonia): *see* Muhu.

moon, any natural satellite orbiting a major planet. *See* satellite.

Moon, sole natural satellite of the Earth. It revolves around the planet from west to east at a mean distance of about 384,400 km (239,900 miles).

A brief treatment of the Moon follows. For full treatment, *see* MACROPAEDIA: Solar System.

The Moon is less than one-third the size of the Earth, having a diameter of only about 3,476 km (2,160 miles) at its equator. It is only 1/81.3 as massive as the Earth and has a density of roughly 3.34 grams per cubic centimetre, as opposed to 5.52 for the terrestrial body. The Moon shines by reflected sunlight, but its albedo—*i.e.,* the fraction of light received that is reflected—is only 0.073.

The Moon rotates about its own axis in about 29½ days, which is virtually identical to the time it takes to complete its orbit around the Earth. As a result, the Moon always presents nearly the same face to the Earth. The rate of actual rotation is uniform, but the arc through which the Moon moves from day to day varies somewhat. Accordingly, the face that the Moon turns to the Earth is subject to a corresponding variation, the lunar globe (as seen by a terrestrial observer) slightly oscillating in a period nearly equal to that of revolution. This apparent oscillation is called optical libration, and its amount is commonly between 6° and 7°.

The surface of the Moon has been a subject of continuous telescopic study from the time of Galileo's first observation in 1609. In his *Almagestum novum* (1651) the Italian Jesuit astronomer Giovanni B. Riccioli designated the dark areas on the Moon as seas, with such fanciful names as Mare Imbrium ("Sea of Showers") and Mare Nectaris ("Sea of Nectar"). This nomenclature continues to be used even though it is now known that the Moon is completely devoid of surface water. During the centuries that followed the publication of these early works, more detailed maps and eventually photographs were produced. By 1959 the side of the Moon facing away from the Earth had been photographed by a Soviet space probe. By the late 1960s the U.S. Lunar Orbiter missions had yielded closeup photographs of the entire lunar surface, including both the visible and far sides.

The dominant process affecting the Moon's surface has been impact. The surface is covered by a regolith layer consisting of fine-grained rock fragments created by micrometeorite bombardment that has pulverized the surface materials. The most striking formations on the Moon are its craters. These features, which measure up to about 200 km (320 miles) or more in diameter, are scattered over the surface in great profusion and often overlap one another. Most of the large craters were produced by meteorites hitting the lunar surface at high velocity. Many of the smaller ones—those measuring less than 1 km (0.6 mile) across—could have been formed by explosive volcanic activity, however. Many craters have a surrounding ring; such a structure is sometimes quite low, though a typical one may be about 1,500 m (4,920 feet) above the surrounding landscape. In many cases, there is a central peak or several peaks within a crater. The darker areas of the Moon, known as maria (*see* mare), have relatively few craters. They are thought to be huge lava flows that spread over an area after most of the craters had already been formed. Another notable type of topographic feature is the rille, a deep trench that may extend several hundred kilometres. Rilles tend to occur in parallel groups just within mountain ranges or hills bordering maria or larger craters.

Various theories for the Moon's origin have been proposed. At the end of the 19th century the English astronomer Sir George H. Darwin advanced a hypothesis that attracted considerable attention for decades. On the basis of the mathematical theory of solar tides, Darwin suggested that the Moon had been originally part of the Earth but was broken away by tidal action and receded from the planet. In 1930 Sir Harold Jeffreys cogently demonstrated that such a process was highly improbable. Another popular theory of lunar genesis that arose during the 1950s postulated that the Moon formed elsewhere in the solar system and was then later captured by the Earth. The basic assumptions on which this idea was grounded have since been found to be physically implausible and so the theory was dismissed. The coaccretion hypothesis suggested that the Earth and Moon formed at the same time from a primordial cloud; this theory cannot account for the large angular momentum of the Earth-Moon system as it revolves around the Sun, however.

Today, most investigators favour an explanation known as the giant-impact hypothesis. According to this theory, a Mars-sized body struck the proto-Earth early in the history of the solar system. As a result, a cloud of fragments was ejected into orbit around the Earth, and these later accreted into the Moon. Prior to the collision, both bodies had differentiated into a metallic core and a silicate-rich mantle, so that the ejected matter (*i.e.,* the proto-Moon) was predominantly silicates while the metallic cores coalesced in the Earth.

Moon, Sun Myung (b. Jan. 6, 1920, Kwangju Sangsa Ri, P'yŏngan-puk province, Korea [now in North Korea]), Korean evangelist who in 1954 founded the Holy Spirit Association for the Unification of World Christianity, better known as the Unification Church.

In his book *The Divine Principle* (1952), which is the basic scripture of the church, Moon wrote that at the age of 16 he had a vision of Christ in which he was told to carry out Christ's unfinished task. Moon believed that God chose him to save mankind from Satanism, and he regarded Communists as Satan's representatives in the world.

Moon began to preach his doctrines in Korea in 1946. Two years later he was excommunicated by the Presbyterian Church, and shortly thereafter he was imprisoned by the North Korean authorities for reasons that are not entirely clear. In 1950 he escaped—or was released—and fled to South Korea, where he founded what was to become the Unification Church. He built his Korean and Japanese enterprises, which included factories that produced armaments, paint, machinery, and ginseng tea, into a multimillion-dollar empire, and in the early 1970s he began full-scale missionary operations in the United States. As young people were drawn into the movement, Moon incurred widespread hostility from the parents of followers, who believed that their children had been unfairly indoctrinated. Other controversies also mounted over the movement's fund-raising techniques, as well as over immigration issues and tax manipulation.

Moon and his wife were addressed as Father and Mother by disciples, popularly called Moonies, for whom the two epitomize God's ideal family. In 1973 the Moons moved their headquarters to Tarrytown, N.Y., operating from there an international network of businesses. In 1981 the Unification Church's bid for U.S. tax-exempt status as a religious organization was denied when an appellate court ruled that the church's primary purpose was political rather than religious. In 1982 Moon was convicted of tax evasion, sentenced to 18 months in prison, and fined $25,000; he went to prison in 1984.

moon bear: *see* Asiatic black bear.

moon cactus (plant genus): *see* night-blooming cereus.

Moon exploration, scientific study of the Moon conducted with unmanned and manned spacecraft. As the Moon is the closest celestial body to the Earth, it became the focus of early space exploration for both U.S. and Soviet scientists. On Sept. 12, 1959, the Soviet Union launched Luna 2, the first space probe to hit the Moon. A second unmanned probe, Luna 3, sent up on October 4 of the same year, photographed much of the Moon's far side from a distance of 4,300 miles (6,880 kilometres). From 1964 to 1968 the United States launched three series of lunar probes that collected a wealth of information and opened the way for the Apollo manned Moon landings. Three Ranger spacecraft, in 1964 and 1965, returned more than 17,000 pictures of the Moon before crash-landing into it. During the next two years five Lunar Orbiters circled the Moon and sent back nearly 2,000 high-resolution photographs of about 98 percent of the lunar surface. At about the same time, five Surveyor probes made soft landings on the Moon. They not only transmitted approximately 80,000 closeup photographs of the lunar terrain but also returned environmental data, including information about surface properties.

Man's firsthand exploration of the Moon began on July 20, 1969, when the Apollo 11 landing craft carried astronauts Neil A. Armstrong and Edwin E. Aldrin to a desolate lunar plain known as the Sea of Tranquillity. U.S. astronauts made five other expeditions to the Moon from November 1969 to December 1972. In exploring various regions and landforms of the Moon, they took thousands of photographs, collected numerous samples of lunar rock and soil, and performed a wide array of scientific experiments, several of which were designed to reveal more about the Moon's internal structure.

Although the Soviet Union never landed a manned spacecraft on the Moon, it placed robot vehicles (*e.g.,* Lunikhod rover) on the lunar surface in 1970 and again in 1972. It also succeeded in recovering samples of lunar soil on other missions of that time. Whereas the United States turned its attention to interplanetary exploration with the completion of the Apollo Moon-landing program in 1972, the Soviet Union continued launching unmanned lunar probes until 1974.

moon guitar (musical instrument): *see* yüeh-ch'in.

Moon type, system of written letters invented in 1845 by William Moon of Brighton, East Sussex, to enable blind people to read. Moon type partly retains the outlines of letters in the Latin alphabet. Easily learned by those who have become blind late in life, it is the only writing system for the blind based on the Latin alphabet that is still in use in the English-speaking world (although it has been largely superseded by Braille).

moon worship, adoration or veneration of the moon, a deity in the moon, or a personification or symbol of the moon. The sacredness of the moon has been connected with the basic rhythms of life and the universe. A widespread phenomenon, appearing in various eras and cultures, moon worship has engendered a rich symbolism and mythology.

The moon is viewed in terms of the rhythmic life of the cosmos and is believed to govern all vital change. The cyclical process of disappearance and appearance of the moon is the basis of the widespread association of the moon with the land of the dead, the place to which souls ascend after death, and the power of rebirth. The lunar governance of this cycle likewise leads to association of the moon and fate.

The mythology of the moon emphasizes especially those periods when it disappears—the three days of darkness in the lunar cycle and eclipses. Both are usually interpreted as the result of battles between some monster who devours or slays the moon and who subsequently regurgitates or revives it. The interregnum is interpreted as an evil period necessitating strict taboos against beginning any new or creative period (*e.g.,* planting or sexual intercourse). In some areas loud noises are part of a ritual activity designed to scare off the moon's assailant.

Lunar deities, gods and goddesses who personify the moon and its cycles, are comparatively rare. In primitive hunting cultures the moon is frequently regarded as male and, particularly in regard to women, is understood as a preeminently evil or dangerous figure. In agricultural traditions the moon is usually regarded as female and is the benevolent ruler of the cyclical vegetative process.

Mooney, James (b. Feb. 10, 1861, Richmond, Ind., U.S.—d. Dec. 22, 1921, Washington, D.C.), early U.S. ethnographer of American Indians, especially those of the southeastern United States. His investigations of the history, heraldry, and culture of the Cherokee and Kiowa included the deciphering of the Kiowa calendar and the discovery of an ancient ritual of the North Carolina Cherokee recorded in the native script. His most acclaimed work was *The Siouan Tribes of the East* (1894).

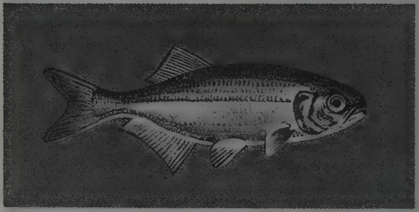
Mooney was largely self-taught. He had set out on an independent private expedition to Brazil when Maj. J.W. Powell, whom he stopped to ask for advice, persuaded him to take a position at the Smithsonian Institution's Bureau of American Ethnography. He remained with the bureau for the rest of his career.

Mooney, Tom, byname of THOMAS JOSEPH MOONEY (b. Dec. 8, 1882, Chicago, Ill., U.S.—d. March 6, 1942, San Francisco), U.S. Socialist union organizer and activist convicted of murder in connection with a 1916 San Francisco bomb explosion.

Mooney was a coal miner's son who became an apprentice iron moulder at the age of 14 and a member of the iron moulders' union not long after. He became committed to Socialist politics after several trips to Europe, joined the Industrial Workers of the World (IWW), and helped to publish *Revolt*, a Socialist newspaper. During 1913–14 in California he and Warren Knox Billings, a young drifter from New York, were involved in a long, violent strike of electrical workers against the Pacific Gas and Electrical Company. Billings was arrested for carrying dynamite and briefly imprisoned; Mooney was arrested on similar charges but acquitted.

In 1916 Mooney, his wife Rena Ellen Mooney (*née* Hermann), Billings, and several others were all indicted and convicted for the bombing of the Preparedness Day Parade in San Francisco, which killed 10 people and injured 40 others. The death sentence passed on Mooney set off protests and agitations that lasted two decades and that led, first, to the commutation of the sentence to life imprisonment and, then, to a pardon by the governor of California in 1939. (He was officially pardoned in 1961). A report on the Mooney-Billings case prepared in 1931 by the National Commission on Law Observance and Enforcement cast serious doubt on the evidence that led to Mooney's conviction.

mooneye, also called TOOTHED HERRING, North American freshwater fish of the family Hiodontidae. The mooneye is a spirited catch but is not greatly valued as food. Mooneyes are herring-like in appearance, with sharp teeth, large eyes, and deeply forked tail fins. Those of the species *Hiodon tergisus* are bright silvery fish and may be about 42.5 centimetres (17 inches) long. The goldeye, *H.* (sometimes called *Amphiodon*) *alosoides*, is blue-backed, silvery, and grows to about 25 cm; the southern mooneye (*H. selenops*) is a silvery fish growing to about 30 cm.



Mooneye (*Hiodon tergisus*)

Painting by Richard Ellis

moonfish, any of several fishes of the order Perciformes, such as *Vomer setapinnis* of the family Carangidae, and *Mene maculata,* the sole member of the family Menidae.

The carangid moonfish is thin, with an extremely deep body, a slender tail base, a forked tail, and slim, sickle-shaped pectoral fins. It is silver or golden in colour and grows to about 30 centimetres (12 inches). It inhabits the western Atlantic Ocean and, when young, is distinguished by long, threadlike rays extending from its dorsal and pelvic fins. Related species, also deep-bodied and called moonfish, are the Pacific *Vomer declivifrons* and the lookdown (*Selene vomer*) of the Atlantic and Pacific.

The moonfish of the family Menidae is allied to the carangids. It is a thin Indo-Pacific fish with a very deep, sharp-edged chest, a long anal fin, a forked tail, and an extended, long ray in each pelvic fin. It is silvery with darker spots and grows to about 20 centimetres.

Other fishes sometimes called moonfish include the opah, the platy, and the fingerfish (*qq.v.*).

Moonie, settlement, southeastern Queensland, Australia. Located in a sheep-grazing district, Moonie is the site of the nation's first

(1964) commercially developed oil field. The oil, discovered in 1961, is piped 190 mi (305 km) east to Brisbane. There is a second small field at Alton, 60 mi southwest. Moonie lies at the intersection of the Moonie and Newell highways.

moonrat, Asian mammal, a species of gymnure (*q.v.*).

moonseed, either of two species of woody vines constituting the genus *Menispermum* of the family Menispermaceae. They occur in East Asia, eastern North America, and Mexico. Canada moonseed, or yellow parilla (*M. canadense*), with oval to round leaves, somewhat lobed, and greenish-white flowers, bears black, grapelike fruit with crescent-shaped seed on female plants. *M. dauricum,* similar to the former species, is from eastern Asia.

Canada moonseed (*Menispermum canadense*)
Richard Parker

moonstone, gem-quality feldspar mineral, a mixed sodium and potassium aluminosilicate, $(K,Na)AlSi_3O_8$, that shows a silvery or bluish iridescence. Nearly all commercial moonstones come from Dumbara District, Sri Lanka, where they occur in gem gravels and in acid granulites and pegmatites.

The term moonstone also has been applied to the plagioclase feldspars peristerite and labradorite, which also exhibit iridescence.

Moor, in English usage, a Moroccan or, formerly, a member of the Muslim population of Spain, of mixed Arab, Spanish, and Berber origins, who created the Arab Andalusian civilization and subsequently settled as refugees in North Africa between the 11th and 17th centuries. By extension (corresponding to the Spanish *moro*), the term occasionally denotes any Muslim, as in the case of the Moors of Sri Lanka (Ceylon) or of the Philippines.

The word derives from the Latin *Mauri,* first used by the Romans to denote the inhabitants of the Roman province of Mauretania, comprising the western portion of modern Algeria and the northeastern portion of modern Morocco. Modern Mauritanians are also sometimes referred to as Moors (as with the French *maure*); the Islāmic Republic of Mauritania, however, lies in the large Saharan area between Morocco and the republics of Senegal and Mali.

moor, tract of open country that may be either dry with heather and associated vegetation or wet with an acid peat vegetation. If wet, a moor is generally synonymous with bog (*q.v.*).

Moore, Alfred (b. May 21, 1755, New Hanover County, N.C., U.S.—d. October 15, 1810, Bladen County, N.C.), associate justice of the U.S. Supreme Court (1800–04).

Moore's father, Maurice Moore (1735–77), and uncle, James Moore (1737–77), were both prominent in the early American Revolutionary cause. Moore himself was admitted to the bar in 1775 but spent the next two years as a military officer in the Revolution. He took part in the defense of Charlestown (later Charleston), S.C., in 1776. Upon his return to North Carolina in 1777, he resumed management of his family's plantation but headed a local militia that harried the British. In 1782 he entered politics, gaining prominence as attorney general of North Carolina but resigning in 1791 after the legislature forced him to divide his duties with the newly created office of solicitor general. He served a term in the state legislature and returned to private practice. His reputation continued to grow, and he was elected a judge of the state Superior Court in 1798. The following year Pres. John Adams appointed him to the U.S. Supreme Court to replace James Iredell.

Moore's only opinion, *Bas* v. *Tingy* (1800), in which the court held that a "limited, partial war" existed with France, was welcomed by Federalists but criticized by Republicans. Moore retired in 1804 because of ill health.

Moore, Archie, byname of ARCHIBALD LEE WRIGHT (b. Dec. 13, 1913, Benoit, Miss., U.S.—d. Dec. 9, 1998, San Diego, Calif.), American boxer, world light-heavyweight champion from Dec. 17, 1952, when he defeated Joey Maxim in 15 rounds in St. Louis, Mo., until 1962, when he lost recognition as champion for failing to meet Harold Johnson, the leading 175-pound challenger.

A professional boxer from the 1930s, Moore for many years was avoided by middleweight and light-heavyweight champions who considered him too formidable. In attempts to win the heavyweight title, he was knocked out by Rocky Marciano in 1955 and by Floyd Patterson in 1956. From 1936 to 1963 Moore had 229 bouts, winning 194, 141 by knockouts. A colourful and popular champion, he called himself "the Old Mongoose" and encouraged controversy about his age.

Moore became a film actor, receiving critical praise for his portrayal of the slave Jim in *The Adventures of Huckleberry Finn* (1959). His autobiography, *The Archie Moore Story,* appeared in 1960. Later in his life he turned to youth work, while still occasionally training or coaching boxers into the 1990s.

Moore, Brian (b. Aug. 25, 1921, Belfast, N. Ire.—d. Jan. 10, 1999, Malibu, Calif., U.S.), Irish novelist who immigrated to Canada and is best known for his first novel, *The Lonely Passion of Judith Hearne* (1955).

Moore arrived in Canada in 1948 and was a writer for the *Montreal Gazette* from 1952. The novel *Judith Hearne* deals with an aging spinster whose crumbling pretensions to past and future gentility are gradually dissolved in alcoholism. His next novel, *The Feast of Lupercal* (1957), concerns a bachelor schoolteacher's sexual maladjustment. *The Luck of Ginger Coffey* (1960) portrays a middle-aged Irish failure who immigrates to Canada to charm his way to fortune; and *The Emperor of Ice Cream* (1965) deals with a rebellious and grandiose adolescent boy who is shocked into manhood by the bombing of Belfast in World War II.

Among Moore's other novels are *The Doctor's Wife* (1976) and *The Magician's Wife* (1998). He also wrote the screenplay for Alfred Hitchcock's *Torn Curtain* (1966).

Moore, Carl Richard (b. Dec. 5, 1892, Brighton, near Springfield, Mo., U.S.—d. Oct. 16, 1955, Chicago), American zoologist noted for his research on animal reproductive organs and internal secretions.

Moore attended Drury College at Springfield, Mo., where he earned his B.S. and M.S. degrees. He went to the University of Chicago to pursue his Ph.D. (1916), spending his summers at the Marine Biology Laboratories at Woods Hole, Mass. Moore taught at Chicago after earning his doctorate, eventually becoming professor of zoology (1928) and, later, chairman of the department.

Moore systematically studied the gonads and associated ducts and glands of vertebrates. Collaborating with T.F. Gallagher and F.C. Koch at the University of Chicago, he became the first to isolate testicular secretion containing the male sex hormones androsterone and testosterone; the former primarily influences the growth and development of the male reproductive system, whereas the latter is responsible for inducing and maintaining secondary male sex characteristics. This discovery (*c.* 1929) paved the way for research into the chemical makeup of such androgens and their production.

Moore, Clement Clarke (b. July 15, 1779, New York City—d. July 10, 1863, Newport, R.I., U.S.), American teacher and scholar of Hebrew, now chiefly remembered for the ballad that begins, "'Twas the night before Christmas...."

The son of the Rev. Benjamin Moore, a president of Columbia College (later University), young Moore was educated there and had a lifelong interest in church matters. He was professor of Oriental and Greek literature at the General Theological Seminary (1821–50).

He is said to have composed "A Visit from St. Nicholas" to amuse his children on Christmas 1822, but, unknown to him, a house guest copied it and gave it to the press. It was first published anonymously in the Troy (N.Y.) *Sentinel,* Dec. 23, 1823. Later scholarship, however, cast doubts on his authorship; evidence suggests that Henry Livingston, Jr., may have written the poem.

Moore, Douglas Stuart (b. Aug. 10, 1893, Cutchogue, N.Y., U.S.—d. July 25, 1969, Greenport, N.Y.), American composer best known for his folk operas dealing with American themes, the most successful being *The Ballad of Baby Doe* (1956). He studied composition with Horatio Parker at Yale and with Vincent d'Indy and Nadia Boulanger in Paris. From 1926 to 1962 he was on the faculty of Columbia University.

Moore's operas are generally concerned with American rural or pioneer life, and his songs and instrumental pieces often draw on folk genres. His orchestral works, such as *Pageant of P.T. Barnum* (1926), are usually programmatic. His operas include *The Devil and Daniel Webster* (1939), *Giants in the Earth* (1951; awarded the Pulitzer Prize), and *Carrie Nation* (1966).

Moore, Ely (b. July 4, 1798, near Belvidere, N.J., U.S.—d. Jan. 27, 1860, Lecompton, Kansas Territory), American journalist and politician who represented the interests of labour in the U.S. Congress.

Although he studied medicine, Moore abandoned his practice after a few years to become a printer and newspaper editor. Elected in 1833 the first president of New York City's federation of craft unions, he also edited the new group's official newspaper, the *National Trades' Union*. The following year Moore was elected chairman of a national convention of trades unions. With the backing of that group (called the National Trades' Union) and of Tammany Hall, Moore in 1834 won a seat in Congress as a Democrat. Reelected in 1836, Moore helped generate Congressional support for the 10-hour workday.

Moore later resumed his publishing career, retiring to his New Jersey birthplace to become editor and publisher of the *Warren Journal*. But in 1850 he left the East and immigrated to Kansas. There he became the U.S. Indian agent for the Miami and several other tribes. In 1855 he was made registrar of the U.S. land office at Lecompton, Kan.

Moore, G(eorge) E(dward) (b. Nov. 4, 1873, London—d. Oct. 24, 1958, Cambridge, Cambridgeshire, Eng.), influential British Realist philosopher and professor whose systematic approach to ethical problems and remarkably meticulous approach to philosophy made him an outstanding modern British thinker.

G.E. Moore, detail of a pencil drawing by Sir William Orpen; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Elected to a fellowship at Trinity College, Cambridge, in 1898, Moore remained there until 1904, during which time he published several journal articles, including "The Nature of Judgment" (1899) and "The Refutation of Idealism" (1903), as well as his major ethical work, *Principia Ethica* (1903). These writings were important in helping to undermine the influence of Hegel and Kant on British philosophy. After residence in Edinburgh and London, he returned to Cambridge in 1911 to become a lecturer in moral science. From 1925 to 1939 he was professor of philosophy there, and from 1921 to 1947 he was editor of the philosophical journal *Mind.*

Though Moore grew up in a climate of evangelical religiosity, he eventually became an agnostic. A friend of Bertrand Russell, who first directed him to the study of philosophy, he was also a leading figure in the Bloomsbury group, a coterie that included the economist John Keynes and the writers Virginia Woolf and E.M. Forster. Because of his view that "the good" is knowable by direct apprehension, he became known as an "ethical intuitionist." He claimed that other efforts to decide what is "good," such as analyses of the concepts of approval or desire, which are not themselves of an ethical nature, partake of a fallacy that he termed the "naturalistic fallacy."

Moore was also preoccupied with such problems as the nature of sense perception and the existence of other minds and material things. He was not as skeptical as those philosophers who held that we lack sufficient data to prove that objects exist outside our own minds, but he did believe that proper philosophical proofs had not yet been devised to overcome such objections.

Although few of Moore's theories achieved general acceptance, his unique approaches to certain problems and his intellectual rigour helped change the texture of philosophical discussion in England. His other major writings include *Philosophical Studies* (1922) and *Some Main Problems of Philosophy* (1953); posthumous publications were *Philosophical Papers* (1959) and the *Commonplace Book, 1919–1953* (1962).

Further information may be found in *The Philosophy of G.E. Moore,* ed. by P.A. Schilpp (1952), and A.P. White's *G.E. Moore: A Critical Exposition* (1958).

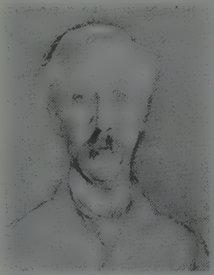
Moore, George (Augustus) (b. Feb. 24, 1852, Ballyglass, County Mayo, Ire.—d. Jan. 21, 1933, London), Irish novelist and man of letters. Considered an innovator in fiction in his day, he no longer seems as important as he once did.

When he was 18, Moore, who came from a family of Irish landholders, left Ireland for Paris to become a painter. Moore's *Reminiscences of the Impressionist Painters* (1906) vividly described the Café Nouvelle-Athénes and the circle of Impressionist painters who frequented it. Moore was particularly friendly with Édouard Manet, who sketched three portraits of him. Another account of the years in Paris, in which he introduced the younger generation in England to his version of fin de siècle decadence, was his first autobiography, *Confessions of a Young Man* (1888).

Deciding that he had no talent for painting, he returned to London in 1882 to write. His first novels, *A Modern Lover* (1883) and *A Mummer's Wife* (1885), introduced a new note of French Naturalism into the English scene, and he later adopted the realistic techniques of Gustave Flaubert and Honoré de Balzac. *Esther Waters* (1894), his best novel, is a story of hardship and humiliation illumined by the novelist's compassion. It was an immediate success, and he followed it with works in a similar vein: *Evelyn Innes* (1898) and *Sister Teresa* (1901).

In 1901 Moore moved to Dublin, partly because of his loathing for the South African War, partly because of the Irish literary renaissance spearheaded by his friend, the poet William Butler Yeats. In Dublin he contributed notably to the planning of the Abbey Theatre. He also produced a volume of fine short stories reminiscent of Ivan Turgenev, *The Untilled Field* (1903), and a short, poetic novel, *The Lake* (1905). The real fruits of his life in Ireland, however, came with the trilogy *Hail and Farewell* (*Ave,* 1911; *Salve,* 1912; *Vale,* 1914). Discursive, affectionate, and satirical by turns, it reads like a sustained monologue that is both a carefully studied piece of self-revelation and an acute (though not always reliable) portrait gallery of his Irish acquaintance, which included Yeats, Æ, and Lady Gregory. Above all it is a perfectly modulated display of the comic spirit.

The increasing narrowness of the Irish mind, politics, and clericalism had sent Moore back to England in 1911. After *Hail and Farewell* he made another literary departure: aiming at epic effect he produced *The Brook Kerith* (1916), an elaborate and stylish retelling of the Gospel story that is surprisingly effective despite some dull patches. He continued his attempts to find a prose style worthy of epic theme in *Héloïse and Abélard* (1921). His other works included *A Story-Teller's Holiday* (1918), a blend of autobiography, anecdote, Irish legend, and satire; *Conversations in Ebury Street* (1924), autobiography; *The Pastoral Loves of Daphnis and Chloe* (1924); and *Ulick and Soracha* (1926), an Irish legendary romance.



George Moore, detail of a drawing by Sir William Rothenstein, 1896; in the National Gallery of Ireland, Dublin

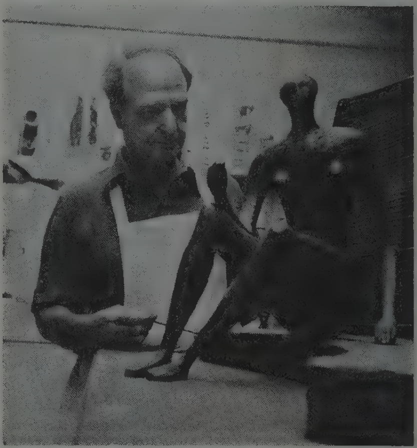
By courtesy of the National Gallery of Ireland, Dublin

Moore, George Foot (b. Oct. 15, 1851, West Chester, Pa., U.S.—d. May 16, 1931, Cambridge, Mass.), American Old Testament scholar, theologian and Orientalist, whose knowledge and understanding of the rabbinical source literature was extraordinary among Christians.

Graduated from Yale College in 1872 and from Union Theological Seminary in 1877, in 1878 Moore was ordained in the Presbyterian ministry and until 1883 was pastor of the Putnam Presbyterian Church, Zanesville, Ohio. He was Hitchcock professor of the Hebrew language and literature at Andover Theological Seminary, 1883–1902. In 1902 he became professor of theology and in 1904 professor of the history of religion at Harvard University.

Moore's chief critical work dealt both with the Hexateuch (the first six books of the Old Testament) and, more particularly, the Book of Judges. He was also the author of *The Literature of the Old Testament* (1913), *History of Religions,* 2 vol. (1913–19), *Metempsychosis* (1914) and, perhaps his greatest work, *Judaism in the First Centuries of the Christian Era,* 3 vol. (1927–30). He was a leading figure in the establishment of the *Harvard Theological Review* in 1908, serving as editor (1908–14, 1921–31).

Moore, Henry (b. July 30, 1898, Castleford, Yorkshire, Eng.—d. Aug. 31, 1986, Much Hadham, Hertfordshire, Eng.), English sculptor whose organically shaped, abstract, bronze and stone figures constitute the major 20th-century manifestation of the humanist tradition in sculpture. Much of his work is monumental, and he was particularly well known for a series of reclining nudes. Among his major commissions were sculptures for UNESCO headquarters in Paris (1957–58), for the Lincoln Center in New York City (1963–65), and for the East Building of the National Gallery of Art, Washington, D.C. (1978).



Henry Moore in his studio, mid-1960s

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Background and education. Moore was born at a small coal-mining town near Leeds in the north of England. He was the seventh child of Raymond Spencer Moore, a Lincolnshire man of Irish ancestry, and his wife, Mary Baker, who came from Staffordshire, in the English Midlands. Moore's father was a coal miner, a self-educated man, a Socialist, and a trade unionist.

Moore won a scholarship to the Castleford Grammar School, where he studied from 1909 to 1915. He was helped and much encouraged by the art instructor Alice Gostick. Already ambitious to become a sculptor, the young Moore acceded to his father's wish that he should first train to be a schoolteacher. For several months he did practice teaching, but because of World War I further training had to be postponed, and in February 1917 Moore joined the British Army. He was sent to France in the summer of 1917 and later in the year was transferred to the Cambrai section, where, after an intensive bombardment, Moore suffered from the effects of gas shells. He collapsed and was sent back to England for two months' hospital treatment. After further convalescence he made a complete recovery. In September 1919 he was given a rehabilitation grant, to which he was entitled as a former serviceman, and he went to the Leeds School of Art, where he studied for two years. In his first year at Leeds, Moore spent most of his time studying drawing. Although he wanted to study sculpture, no teacher was appointed until his second year; and Moore was his first pupil. He was soon joined by a young student from nearby Wakefield, Barbara Hepworth, who also was to become a major sculptor.

Moore's intellectual horizons slowly began to broaden, and he was excited by the modern paintings that he saw in the private collection of the vice-chancellor of the University of Leeds, Sir Michael Sadler. At the end of his second year at Leeds School of Art, Moore passed the sculpture examination and was awarded a Royal Exhibition scholarship to study at the Royal College of Art. In September 1921 he moved to London and began three years of advanced study in sculpture; he took his diploma at the Royal College after two years and spent a third doing postgraduate work. Moore found a good friend and lifetime supporter in the director of the Royal College, William Rothenstein, who was not unsympathetic to modern artistic tendencies, although he remained a conservative himself.

Instruction at the Royal College of Art was less important to Moore than the opportunity of private study in the museums of London—particularly in the British Museum, with its wide-ranging collection of ancient sculpture. There was also close at hand the fine collection of Auguste Rodin sculpture at the Victoria and Albert Museum, but Moore was already reacting against the European sculptural tradition and turning instead to primitive and archaic art. He was discovering for himself the strange power and unusual beauty of Egyptian, Etruscan, and, later, Pre-Columbian and African sculpture.

Travel and further artistic influences. Upon graduating from the Royal College in 1924, Moore was appointed a part-time instructor in sculpture for a seven-year term. His exceptional gifts and potential stature were already recognized by those who knew him best. He was also awarded a traveling scholarship and spent the first six months of 1925 in France and Italy. Back in England, Moore began work in 1926 on the first of his reclining women. He was also carving in stone: half-length female figures, mother and child groups, masks and heads. Though certain works show his awareness of the Romanian sculptor Constantin Brancusi and the Cubist sculptors, the most important influence on Moore's work at this time was that of ancient Mexican stone carving. In the Trocadero Museum in Paris he had been impressed by a plaster cast of a Chac Mool—a Mayan limestone sculpture of the rain spirit, depicted as a male reclining figure with knees drawn up together, staring head at a right angle to the body, and hands holding on the stomach a flat dish for sacrifices. Moore became fascinated with this sculpture, which seemed to him to have qualities of power, sensitivity, three-dimensional depth, and originality of form that no other stone sculpture possessed. Disdainful of conventional standards of the beautiful, seeking a way of imbuing his own work with such qualities, he changed the Mexican male figure into a female one, the better to express a more human, more earthy, more rhythmic image of his own.

In 1928 Moore was given his first one-man exhibition, at the Warren Gallery in London, and he began his first public commission, a relief carving of the "North Wind" on the new headquarters building for the London Transport Board. In 1929 he married Irina Radetzky, of Russian-Austrian parentage, who was a painting student at the Royal College of Art. The young couple moved into a large studio in Hampstead, one of the northern suburbs of London. Moore now began a close association with a group of young artists who in 1933 formed Unit One, a deliberate attempt to make the indifferent English public aware of the international modern movement in art and architecture. The driving spirit behind Unit One was the painter Paul Nash, but the leading members were Barbara Hepworth and her painter husband, Ben Nicholson. Another friend and advocate was the poet and critic Herbert Read, who wrote the first monograph on Moore in 1934.

Achievements in the 1930s. Around this circle of friends the most advanced artistic activity in England in the early 1930s was centred. They were all interested in abstract art at a time when this was considered the ultimate in artistic extremism. In his own work from 1931 onward, Moore moved tentatively away from the human figure to experiment with abstract shapes and, more individually, to combine abstract shapes with references to the figure. In 1931 Moore had the first of many one-man exhibitions in the Leicester Galleries in London. His work was enthusiastically introduced by sculptor Jacob Epstein, but it aroused violent criticism in the press and made Moore a notorious figure. He was urged to resign his position at the Royal College of Art, and, when his contract expired in 1932, he left to start a sculpture department at the Chelsea School of Art.

Throughout the 1930s Moore displayed in his work not the slightest inclination to please the public. He was very interested in Pablo Picasso's drawings and paintings of the late 1920s, which have strong sculptural implications, and felt free to distort and break up the forms of the body in a much more radical way than before. Sometimes he seemed to leave the human figure behind altogether. The pages of his sketchbooks of this period show him full of ideas for abstract sculptures that make use of organic and natural forms rather than pure geometrical shapes. He was collecting pebbles, rocks, shells, and bones; making drawings of them; and studying them to find what he called "nature's principles of form and rhythm," which he sought to apply to his own sculpture. In particular, this meant opening up the carvings with concavities and even with holes pierced right through the forms—a practice that the public initially found shocking and abhorrent when the sculpture retained a strong suggestion of the human figure.

Changes wrought by World War II. When the war broke out, the Chelsea School was evacuated from London, and Moore stopped teaching. At first he worked mostly in his cottage in Kent, until its propinquity to the Channel coast, where invasion was hourly expected, forced a return to London. The Moores eventually took a house at Perry Green, Much Hadham, in Hertfordshire, which became their permanent home. There, in tranquil countryside about 20 miles north of London, he slowly added studios and extra rooms to an ancient farmhouse.

Shortage of materials in the early years of the war forced Moore to concentrate on small sculptures and then exclusively on drawing. Seeing the people of London sheltering at night in the stations of the London Underground in September 1940 led him to begin his shelter drawings. Moore would spend the night observing and making small sketch notes; then, in the next days at the studio, he would work his ideas up into large coloured drawings that expressed in permanent form the resigned but indomitable spirit of Londoners during the bombing of their city. He also visited the colliery in Castleford, Yorkshire, where his father had worked, and made drawings of the coal miners at work, which have a strength and dignity similar to the shelter drawings. Later drawings included a series on Stonehenge, an elephant's skull, and sheep.

In 1943 Moore accepted a public commission to create a "Madonna and Child" for the church of St. Matthew in Northampton. The possibility of reviving the great tradition of religious art appealed to him, and he tried to give his figures for Northampton "an austerity and a nobility, and some touch of grandeur (even hieratic aloofness) which is missing in the everyday 'Mother and Child' idea."

Another commission, for a family group, followed in 1944, and the result was a dramatic change in Moore's style, away from the experimentation of the 1930s and toward a more naturalistic approach that had an immediate popular appeal. Moore had made dozens of studies in clay and terra-cotta when working on the "Madonna and Child" and family-group commissions, and these were cast in bronze and issued in editions of seven to nine copies each. In this way, Moore's work became available to museums and collectors all over the world.

This humanistic work was the basis of Moore's international reputation, which dates from the large retrospective exhibition held in 1946 at the Museum of Modern Art in New York City. On this occasion Moore visited the United States for the first time. American collectors began to buy his work, and henceforward he was freed of financial worries and able to work on the scale he felt his sculpture demanded. In Europe, too, Moore's reputation as an outstanding sculptor was confirmed when he won the sculpture prize at the 1948 Venice Biennale. In Britain, Moore fulfilled several commissions that extended the range and scale of his work: family groups for the new towns of Stevenage, Hertfordshire, in 1948, and Harlow, Essex, in 1954–55; "Three Draped Standing Figures" in stone (1947–48) for Battersea Park, London; a "Madonna" for St. Peter's Church in Claydon, Suffolk, in 1949; and a large "Reclining Figure" for the 1951 Festival of Britain. The death of his mother, in 1944, and the birth of his only child, Mary, in 1946, made the theme of the family—particularly the mother-and-child relationship—a more personal one which Moore treated in several major works in the late 1940s and '50s.

Later years. Critics who had begun to think by 1950 that Moore, the revolutionary sculptor, had been tamed, were to be proved wrong by the appearance in that year of the bronze standing figures, with their harsh and angular pierced forms and distinct feeling of menace. When, in the summer of 1953, Moore was ill, his work began to turn inward, showing a willingness to experiment and to follow private concerns. A large marble carving he made in 1957–58 for the headquarters of UNESCO in Paris belongs to a long series of reclining female figures, but the brick sculpture relief made in 1955 for the Bouwcentrum in Rotterdam reintroduces biomorphic forms into his work, and this leads to the series of freestanding totemic upright figures made in 1955–56. Moore also varied his subject matter in the 1950s with such works as the "King and Queen" of 1952–53, and the two warriors, the "Warrior with Shield" of 1953–54 and the "Falling Warrior" of 1956–57—rare examples of Moore's use of the male figure. All three works owe something to Moore's visit to Greece in 1951, when he saw Athens, Mycenae, and Delphi for the first time. Most of his sculpture since the war was in bronze, though he had not altogether stopped carving in wood and stone. Furthermore, even when the sculptures were cast in bronze, they were not modeled in clay but built up initially in plaster over a wire and wood armature. Moore always liked to work like a carver, cutting and scraping and chiseling the surfaces with a carver's tools.

From the time of his 60th birthday in 1958, Moore seemed to be less concerned with his public role as a modern sculptor and more inclined to pursue his private interests. It is true that he continued to accept commissions, most notably those for the Lincoln Center (New York City) in 1963–65 and for the University of Chicago in 1964; but in both of these instances, unlike earlier commissions, Moore made no attempt to provide a sculpture peculiarly appropriate for the site: he used the commission to work out on a larger scale than would otherwise have been possible an idea that had long occupied his imagination. Thus, the Lincoln Center sculpture is the largest of a series of multipart reclining female figures in which Moore makes use of symbolic correspondences between the body and such elements of landscape as cliffs, caves, and hillsides and between the body and organic forms, particularly human and animal bones. Although the University of Chicago's "Atom Piece," with its mushroom-cloud formation at the top, commemorates the splitting of the atom, the sculpture is also closely related to other large abstract sculptures of the 1960s: the "Knife-Edge Two-Piece" of 1962, the "Locking Piece" of 1963–64, the "Three-way Piece No. 1: Points" of 1964, and the "Three-Piece Sculpture No. 3: Vertebrae" of 1968—all of them quite massive objects that have lost their obvious human connotation as a consequence of their enormous size. Some of the abstract sculptures from the mid-1960s were executed in marble rather than in bronze. Beginning in 1965, Moore maintained a summer cottage at Forte dei Marmi, Italy, near the Carrara stone quarries, and, with the assistance of Italian workers, began to create stone carvings again.

In his final years he established an unostentatious way of living, and two or three young sculptors helped him with the more laborious and time-consuming activities entailed in sculpting. (Al.Bo./Ed.)

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Moore, Sir John (b. Nov. 13, 1761, Glasgow, Lanarkshire, Scot.—d. Jan. 16, 1809, La Coruña, Spain), British lieutenant general who led a famous retreat to La Coruña (December 1808–January 1809) during the Napoleonic Peninsular War. His actions became celebrated, criticized by some and praised by others (including the Duke of Wellington).

The son of a physician and the stepson of the Duke of Argyll, Moore obtained a seat in Parliament (1784–90) and a command in the British army upon the outbreak of war with France (1793). He served in Corsica, the West Indies, Ireland, the Netherlands, and Egypt. He was knighted in 1804. While commanding a corps at Shorncliffe Camp, Kent (1803–06), Moore earned a reputation as one of the greatest trainers of infantrymen in military history. He then served in the Mediterranean command and in Sweden.

Sent to Portugal in 1808, he succeeded to the command of the British army in September with instructions to assist in the expulsion of the French from Spain. He soon determined that the Spanish forces were beaten and that a retreat to Portugal was prudent. Nevertheless, urged on, he moved north from Salamanca to attack Marshal Nicolas Soult's French corps on the Carrión River, west of Burgos. Learning that Napoleon had cut off his route of withdrawal into Portugal, he led his forces over 250 miles (400 km) of snowclad country to his shipping at La Coruña. In the Battle of La Coruña (Jan. 16, 1809), Moore died of his wounds after the French had been repulsed. "I hope my country will do me justice," he said. These hopes were not fulfilled; he was widely excoriated for retreating. But, in fact, he had secured a strategic victory; the French conquest of Spain was delayed for a year, and Napoleon never again personally intervened in the Spanish theatre.

Charles Wolfe's elegiac poem "The Burial of Sir John Moore" appeared in 1817.

Moore, John Bassett (b. Dec. 3, 1860, Smyrna, Del., U.S.—d. Nov. 12, 1947, New York, N.Y.), American legal scholar known for his exhaustive codification of international law. His advice on matters pertaining to international adjudication was frequently sought by the U.S. government.

Admitted to the Delaware bar in 1883, Moore in 1885 joined the U.S. Department of State, where he served until 1891. He then joined the faculty of Columbia University, retiring in 1924 as Hamilton Fish professor of international law and diplomacy. From 1912 to 1938 he was a member of the Permanent Court of Arbitration, The Hague. Among Moore's studies in international law is the monumental *Digest of International Law,* 8 vol. (1906). Between 1929 and 1933 he edited the eight-volume compendium of *International Adjudications, Ancient and Modern.*

Moore, Marianne, in full MARIANNE CRAIG MOORE (b. Nov. 15, 1887, St. Louis, Mo., U.S.—d. Feb. 5, 1972, New York, N.Y.), American poet whose work distilled moral and intellectual insights from the close and accurate observation of objective detail. A disciplined craftsman, she won the admiration of fellow poets throughout her long career. The poet and critic T.S. Eliot called her one of the few producers of durable poetry in her time.

Moore graduated from Bryn Mawr College in Pennsylvania in 1909 as a biology major and then studied commercial subjects and taught them at the U.S. Indian School in Carlisle, Pa. From 1921 to 1925 she was an assistant in the New York Public Library system. In 1925—already well known as one of the leading new poets—she became acting editor of *The Dial,* an influential American journal of literature and arts, and remained there until it was discontinued in 1929.

In 1921 her first book, *Poems,* was published in London by the Egoist Press. Her first American volume, *Observations* (1924), won the Dial Award. These initial volumes already exhibited her conciseness and her creation of a mosaic of juxtaposed images leading unerringly to a conclusion that, at its best, is both surprising and inevitable. They contain some of her best-known poems, including "To a Steam Roller," "The Fish," "When I Buy Pictures," "Peter," "The Labors of Hercules," and "Poetry." The last named is the source of her often-quoted admonition that poets should present imaginary gardens with real toads in them.

After 1919, living in Brooklyn, N.Y., she devoted herself to poetry and criticism, contributing to many journals in the United States and England and publishing several books of verse. *Collected Poems* appeared in 1951. She also wrote a translation of *The Fables of La Fontaine* (1954); a volume of critical papers, *Predilections* (1955); and *Idiosyncrasy and Technique: Two Lectures* (1958).

Marianne Moore, 1957
Imogen Cunningham

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Moore, Mike, byname of MICHAEL KENNETH MOORE (b. Jan. 28, 1949, Whakatane, N.Z.), leader of the New Zealand Labour Party who was prime minister from Sept. 4 to Oct. 27, 1990.

Educated at Bay of Islands College and Dilworth School, Moore held various jobs, including that of social worker and printer, before entering Parliament in 1972. From 1984 to 1990 he held various ministries in the Labour government, including those dealing with international trade, tourism, and publicity, and from January to October 1990 he was minister of foreign affairs. When Prime Minister Geoffrey Palmer resigned in September 1990, Moore won the post, but his term as head of government lasted only eight weeks, until the general elections of October 27 resulted in the ouster of the Labour Party and the installation of the National Party.

Moore, Nicholas (b. Nov. 16, 1918, Cambridge, Cambridgeshire, Eng.), one of the "New Apocalypse" English poets of the 1940s who reacted against the preoccupation with social and political issues of the 1930s by turning toward romanticism.

The son of G.E. Moore, classicist and Cambridge philosopher, young Moore published an important literary review, *Seven* (1938–40), while a Cambridge undergraduate and was a conscientious objector during World War II. Most of his verse was published in the war years: *The Island and the Cattle* and *A Wish in Season* (both 1941), *The Cabaret, the Dancer, the Gentleman* (1942), and *The Glass Tower* (1944). *Recollections of the Gala: Selected Poems, 1943–1948* appeared in 1950. After editing poetry magazines in London, he became a horticulturist and wrote little until an illness in 1963 provided the leisure for it. *Resolution and Identity* appeared in a limited edition in 1970. *Spleen* (1975) presented 30 variations on a poem by Charles Baudelaire.

Moore, Raymond Cecil (b. Feb. 20, 1892, Roslyn, Wash., U.S.—d. April 16, 1974, Lawrence, Kan.), American paleontologist known for his work on Paleozoic crinoids, bryozoans, and corals (invertebrate organisms existing 570 to 245 million years ago).

Moore was a member of the U.S. Geological Survey from 1913 until 1949, and he became a professor at the University of Kansas (Lawrence) in 1919. He was the organizer and editor of the work *Treatise on Invertebrate Paleontology* (1953), the contributors to which included 150 of the world's specialists in the field. He wrote *Historical Geology* (1933), *Introduction to Historical Geology* (1949), and, with others, *Invertebrate Fossils* (1952). His later, shorter publications dealt primarily with fossil crinoids.

Moore, Stanford (b. Sept. 4, 1913, Chicago, Ill., U.S.—d. Aug. 23, 1982, New York, N.Y.), American biochemist, who, with Christian B. Anfinsen and William H. Stein, received the 1972 Nobel Prize for Chemistry for their research on the molecular structures of proteins.

Moore received his Ph.D. degree from the University of Wisconsin in 1938 and joined the staff of the Rockefeller Institute for Medical Research (now Rockefeller University) in New York City in 1939, attaining the rank of professor in 1952. He is best known for his applications of the technique of chromatography to the analysis of amino acids and peptides obtained from proteins and biological fluids and for the use of those analyses in determining the structure of the enzyme ribonuclease.

Moore, Thomas (b. May 28, 1779, Dublin, Ire.—d. Feb. 25, 1852, Wiltshire, Eng.), Irish poet, satirist, composer, and musician. He was a close friend of Lord Byron and Percy Bysshe Shelley.

The son of a wine merchant, Moore graduated from Trinity College, Dublin, in 1799 and then studied law in London. His major poetic work, *Irish Melodies* (1807–34), earned him an income of £500 annually for a quarter of a century. It contained such still familiar titles as "The Last Rose of Summer" and "Oft in the Stilly Night." The *Melodies,* a group of 130 poems set to the music of Moore and of Sir John Stevenson and performed for London's aristocracy, aroused sympathy and support for the Irish nationalists, among whom Moore was a popular hero.

Lalla Rookh (1817), a narrative poem set (on Byron's advice) in an atmosphere of Oriental splendour, gave Moore a reputation among his contemporaries rivaling that of Byron and Sir Walter Scott. It was perhaps the most translated poem of its time, and it earned what was till then the highest price paid by an English publisher for a poem (£3,000). Moore's many satirical works, such as *The Fudge Family in Paris* (1818), portray the politics and manners of the Regency period.

In 1824 Moore became a participant in one of the most celebrated episodes of the Romantic period. He was the recipient of Byron's memoirs, but he and the publisher John Murray burned them, presumably to protect Byron. Moore later brought out the *Letters and Journals of Lord Byron* (1830), in which he included a life of the poet.

Thomas Moore, detail of an oil painting by Sir Martin Archer Shee, 1818; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Moorea, volcanic island, second largest of the Îles du Vent (Windward Group) of the Society Islands, in French Polynesia, central South Pacific. The island lies 12 miles (20 km) northwest of Tahiti. It has an area of 51 square miles (132 square km). It is triangular, rugged, and mountainous (highest peak Mount Tohivea, 3,960 feet [1,207 m]), with many streams and fertile soils. The chief village, Afareaitu, lies on the east coast overlooked by Mount Muaputa (2,723 feet [830 m]). Cook (Paopao) Bay and Papetoai (Oponu) Bay, divided by Mount Rotui, are on the north coast; Haapiti town is on the west. It was on Moorea, in the early 19th century, that the Reverend Henry Nott of the London Missionary Society, companion of King Pomare II, translated the Bible into Tahitian. The island's chief crops are vanilla, copra, and coffee. Some villages on the eastern coast were the models for the Tahitian villages in Herman Melville's novel *Omoo* (1847). The island is now a favoured tourist location. Pop. (1988) 8,801.

Mount Rotui, separating Cook (Paopao) and Papetoai (Oponu) bays, on the north coast of Moorea, Society Islands, French Polynesia

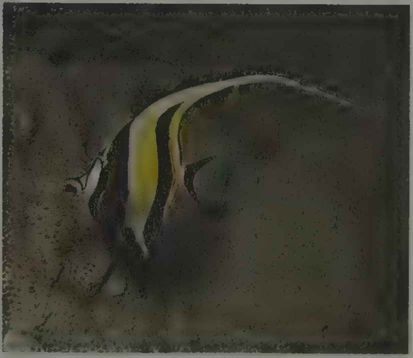
Werner Stoy—Camera Hawaii

Moore's Creek Bridge, Battle of (Feb. 27, 1776), in the U.S. War of Independence, battle in which North Carolina Revolutionaries defeated a force of North Carolina Loyalists, in part thwarting a British invasion of the southern colonies. General Donald McDonald, who had amassed some 1,600 Scottish Highlanders and North Carolina Regulators, marched toward Wilmington, N.C., to join British troops coming by sea from Boston and England. A rebel militia, about 1,000 strong, under Colonels Alexander Lillington and Richard Caswell, was assembled and positioned at Moore's Creek Bridge, 18 miles (29 km) northwest of Wilmington. The Loyalists attacked the rebel force at the bridge but were quickly defeated. The rebels, of whom only one was killed and one wounded, captured or killed more than half of the Loyalist forces and seized arms, supplies, and £15,000 sterling.

Moorhead, city, seat (1872) of Clay county, western Minnesota, U.S. It lies along the Red River across from Fargo, N.D., in a mixed-farming area. Founded with the coming of the railroad in 1871, it was a natural transportation hub, with overland road and rail traffic meeting the barges and, later, steamboats on the river. Known first as Burbank, it was renamed for William G. Moorhead, a director of the Northern Pacific Railway. Moorhead State University (1887) and Concordia College (1891) are there. The city's agriculture-based economy depends chiefly on sugar-beet refining, dairying, and potato processing. The manufacture of farm equipment and fiberglass boats is important. Inc. village, 1875; city, 1881. Pop. (1991 est.) city, 32,715; (1990) Fargo-Moorhead MSA, 153,296.

moorhen, bird species also called common gallinule. *See* gallinule.

Moorish idol (*Zanclus canescens*), deep-bodied, tropical and subtropical reef fish, commonly placed alone in the family Zanclidae (order Perciformes). The Moorish idol is a striking-looking fish—thin, deeper than it is long, and with a protruding, beaklike mouth and a dorsal fin greatly extended in front. An Indo-Pacific fish, relatively common and found in shallow water, it is about 18 cm (7 inches) long and is boldly patterned with three vertical black stripes on a yellowish body.



Moorish idol (*Zanclus canescens*)

Douglas Faulkner

Moorish Science Temple of America, religious sect founded by Timothy Drew in Newark, N.J., in 1913. He was believed by his followers to have been ordained Prophet Noble Drew Ali by Allāh. A Holy Koran, the sacred text, was created out of his study of Oriental philosophy. The prophet's central teaching was that all blacks were of Moorish, and thus Muslim, origins. He advocated a "return" to Islām as the only means of redemption from racial oppression. Rigorous obedience to all laws was required, and certain foods were forbidden. Many of the sect's formal practices were derived from Muslim observance, and, in fact, the group was a forerunner of the Black Muslim movement (*see* Islam, Nation of). Drew died mysteriously during a period of internal strife, and the cult lost its impetus.

Moorish style (furniture): *see* Turkish style.

moorwort (shrub): *see* bog rosemary.

moose (*Alces alces*), largest member of the deer family, Cervidae (order Artiodactyla). The name moose is common in North America; the same animal is generally called elk in Europe. Moose are heavy, long-legged, short-necked ruminants, standing 1.5–2 m (5–6.5 feet) tall at the shoulder and weighing to approximately 820 kg (1,800 pounds). The back slopes downward to the hips, the tail is short, and the muzzle is somewhat inflated and pendulous. A fleshy dewlap (the bell) hangs from the throat. The brown coat is coarse and shaggy, becoming grizzled with age. The enormous antlers in the males (bulls) are characteristically palmate with projecting tines. As in other members of the deer family, the antlers are shed and regrown annually. As they develop they are covered with a protective skin, called velvet, which is later rubbed off. (*See also* deer.)

Bull moose (*Alces alces*) in velvet

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Moose inhabit the northern parts of North America and Eurasia. They prefer being near water and often wade into forest-edged lakes and streams to feed on submerged aquatic plants. They also eat a variety of grasses, herbs, and bark. Usually solitary, moose in North America often assemble in small bands in winter and tramp the snow firm in a small area to form a "moose yard." Their normal gait is a stiff-legged, shuffling walk that enables them to cover ground with surprising speed. They sometimes trot but seldom run. Moose are usually shy, but they tend to be unpredictable and belligerent. During the breeding season, in autumn, the males will fight fiercely for mates. One to three ungainly young are born after gestation of about eight months. The female cares for the calf until the birth of another is imminent.

Moose generally are hunted both for trophies—their huge antlers and head—as well as for their flesh, which is beeflike but somewhat dry and with strong-tasting fat. The pressure of unrestricted hunting substantially reduced the numbers of moose and virtually eliminated them from the southern parts of their range, especially in the United States. They are now generally protected by law, both in North America and in Europe, and hunting is closely controlled.

Moose Factory, unincorporated locality, Cochrane district, northeastern Ontario, Canada. It is located on Moose Factory Island, in the estuary of the Moose River, at the southern end of James Bay, 200 miles (320 km) north-northeast of Timmins. Originally established as a Hudson's Bay Company fur-trading post by Charles Bayly in 1673, it was captured by the French in 1686 and later destroyed. Since it was reestablished in 1730, the post has been in continuous operation, and the predominantly Cree Indian population is still dependent upon trapping as a livelihood. Moose Factory is the site of an Anglican mission and school (1850) and a large hospital constructed in the early 1950s. The Ontario Northland Railway serves the community from its northern terminus at nearby Moosonee. Pop. (1981) 1,452.

Moose Jaw, city, south-central Saskatchewan, Canada. It lies along the Moose Jaw River (a tributary of the Qu'Appelle River) and the Trans-Canada Highway, 44 miles (71 km) west of Regina. Its name is possibly derived from an Indian source suggesting that the contours of the river resemble the jawbone of a moose. Founded in 1882 with the arrival of the main line of the Canadian Pacific Railway, the settlement grew as a rail terminus and distribution centre for a large wheat-growing area.

The city is now one of the most industrialized in Saskatchewan, with major oil refineries, a sheet steel mill, flour-milling operations, large grain-storage facilities, extensive stockyards, and a slaughterhouse. Other industries include meat-packing, dairying, wine making, lumber and woolen milling, and garment making. Moose Jaw is the site of an air force training base, a community college, a provincial technical institute, a wild animal park, and the Western Development (transportation) Museum. The city's annual (May) International Band Festival is one of the biggest events of its kind. Buffalo Pound Provincial Park is a few miles northeast. Inc. town, 1884; city, 1903. Pop. (1991) city, 33,593; metropolitan area, 36,552.

Moose River, river, northeastern Ontario, Canada. Arising at the confluence of its two major headstreams, the Mattagami, 260 miles (420 km) long, and the Missinaibi, 265 miles long, it flows northeastward for more than 60 miles (100 km) to James Bay. Though short in length, the Moose, along with its headstreams and tributaries, including the Abitibi River (340 miles), drains most of northeastern Ontario.

Economic activities in the river's watershed include mining and pulp- and paper-milling operations powered by hydroelectric plants on the Abitibi and Mattagami rivers. The Ontario Northland Railway parallels the Abitibi valley and terminates at Moosonee, opposite the historic island of Moose Factory in the river's mouth. Tidewater Provincial Park includes several islands near Moose Factory. Kapuskasing, Iroquois Falls, and Timmins are the chief towns in the river's basin.

Moosehead Lake, lake, located in west-central Maine, U.S. Moosehead is the largest of the state's many lakes, and its waters cover an area of 120 square miles (310 square km). Lying at an elevation of 1,023 feet (312 m), the lake is dotted with numerous islands, the largest of which is Sugar Island. The lake is the source of the Kennebec River. Moosehead's irregularly shaped shoreline shelters numerous fishing and recreation coves; Greenville, on its southern end, is a busy resort. The lake, when viewed from Mount Kineo on its east-central shore, supposedly resembles the head of a moose or a crouching moose.

Moosonee, unincorporated locality, Cochrane district, northeastern Ontario, Canada. It is located on the left bank of the Moose River, near its mouth on James Bay, opposite Moose Factory (originally an important fur-trading post).

The community became the northern terminus of the Ontario Northland Railway in 1932. Train service links Moosonee, the province's only saltwater port, with Cochrane, 155 miles (250 km) south. A meteorological station and a Roman Catholic bishopric are located at Moosonee. The locality has become popular with tourists and sportsmen, with many of the local Cree Indians employed as guides. Hannah Bay, noted for its goose hunting, is 30 miles (50 km) east. Pop. (1991) 1,213.

mopoke, also called MOREPORK, in Australia, two bird species known elsewhere as the tawny frogmouth (*see* frogmouth); the Australian boobook owl is also sometimes called mopoke.

Mopti, town, eastern Mali, located at the confluence of the Niger and Bani rivers. Originally a small fishing village, Mopti has become an important commercial town and the centre of Mali's fishing and livestock industries. The town is located on three islands and is one of the most densely populated areas in Mali. Major crops grown in the surrounding area are rice, millet, onions, cassava, and peanuts (groundnuts). Livestock raising and fishing are also significant. The major population groups in the locality are the Dogon, Fulani, Bambara, Bozo, Bwa, Songhai, and Tukulor. Pop. (1987 prelim.) town, 73,979.

Moquegua, *departamento* (formed 1857) of southern Peru, stretching inland from the Pacific Ocean. Agriculture is the principal economic activity. Extensive vineyards and olive orchards are found in irrigated areas on the arid coast and lower mountain slopes. Alfalfa is grown for the llamas, alpacas, and other livestock pastured in the Andes Mountains of the north, where Indians practice subsistence agriculture. The capital city of Moquegua (*q.v.*) is the major urban centre. With the growth of the fish-meal and copper industries, the seaport of Ilo has undergone rapid development. The Pan-American Highway crosses the coastal area, but few roads penetrate the mountainous areas. Area 6,105 square miles (15,813 square km). Pop. (1991 est.) 132,400.

Moquegua, capital of Mariscal Nieto *provincia* and Moquegua *departamento,* southern Peru. It lies along the Moquegua River at 4,626 feet (1,410 m) above sea level. Founded in 1626 as Villa de Santa Catalina del Guadalcázar del Valle de Moquegua (Town of Saint Catherine of Guadalcázar of Moquegua Valley), it was granted city status in 1823. It serves as a processing and agricultural centre for the surrounding area. Olives, grapes, and cotton are principal crops, and cotton ginning, wine making, liquor distilling, and olive-oil processing are among the city's industries. Located on the Pan-American Highway, Moquegua is connected by rail to its seaport at Ilo, 37 miles (60 km) south, and can be reached by air. Pop. (1990 est.) city, 31,500.

Mor, Anthonis (Dutch painter): *see* More, Sir Anthony.

Moraceae, the mulberry family of the nettle order (Urticales), with about 40 genera and some 1,000 species of deciduous or evergreen trees and shrubs, distributed mostly in tropical and subtropical regions. Plants of the family contain a milky latex and have alternate or opposite leaves and small, petalless male or female flowers. The fruits of many species are multiple because fruits from different flowers become joined together.

Some genera produce edible fruits, such as the mulberry (*Morus*), fig (*Ficus carica*), breadfruit and jackfruit (*Artocarpus*), and affon, or African breadfruit (*Treculia*). Others, such as *Antiaris, Ficus, Castilla,* and *Musanga,* are important for their timber and latex. The latex of the upas tree (*Antiaris toxicaria*) of Java is used as an arrow poison; the latex of the cow tree (*Brosimum utile*) of tropical America is sweet and nutritious. The largest genus in the mulberry family, *Ficus* (*q.v.*), contains the banyan and the India rubber tree. The bark of the paper mulberry (*Broussonetia*) has been used for the manufacture of cloth and paper products. Among the ornamentals in the family are paper mulberry and Osage orange (*q.v.*).

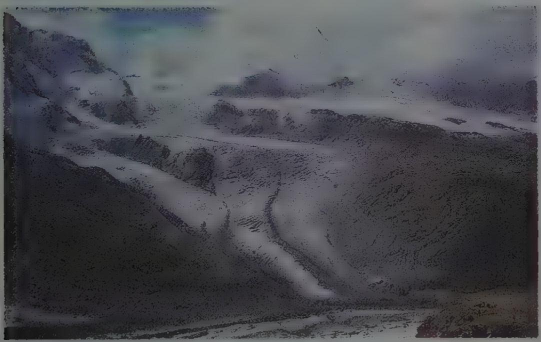
Morādābād, city, administrative headquarters of Morādābād district, Uttar Pradesh state, northern India, on a ridge along the Rāmganga River. Morādābād was founded in 1625 by Rustam Khān (a Mughal general), who built the fort north of the city as well as the Jāmiʿ Masjid, a large mosque. Located at a major road and rail junction, it is a trade centre for agricultural products. Industries include cotton milling and weaving, metalworking, electroplating, and printing.

Morādābād district, 2,288 sq mi (5,946 sq km) in area, consists of a level plain bounded by the Ganges River (west) and drained by the Rāmganga. Grains, cotton, and sugarcane are grown. Sugar milling and cotton weaving are the principal industries. Morādābād, Sambhal, Amroha, and Chandausi are the major urban areas. Pop. (1981) town, 330,051; metropolitan area, 345,350; district, 3,149,406.

moraine, accumulation of rock debris (till) carried or deposited by a glacier. The material, which ranges in size from blocks or boulders (usually faceted or striated) to sand and clay, is unstratified when dropped by the glacier and shows no sorting or bedding. Several kinds of moraines are recognized:

A ground moraine consists of an irregular blanket of till deposited under a glacier. Composed mainly of clay and sand, it is the most widespread deposit of continental glaciers. Although seldom more than 5 metres (15 feet) thick, it may attain a thickness of 20 m.

A terminal, or end, moraine consists of a ridgelike accumulation of glacial debris pushed forward by the leading glacial snout and dumped at the outermost edge of any given ice advance. It curves convexly down the valley and may extend up the sides as lateral moraines. It may appear as a belt of hilly ground with knobs and kettles.



Medial moraine of Gornergletscher (Gorner Glacier) in the Pennine Alps near Zermatt, Switz.

Jerome Wyckoff

A lateral moraine consists of debris derived by erosion and avalanche from the valley wall onto the edge of a glacier and ultimately deposited as an elongate ridge when the glacier recedes.

A medial moraine consists of a long, narrow line or zone of debris formed when lateral moraines join at the intersection of two ice streams; the resultant moraine is in the middle of the combined glacier. It is deposited as a ridge, roughly parallel to the direction of ice movement.

A recessional moraine consists of a secondary terminal moraine deposited during a temporary glacial standstill. Such deposits reveal the history of glacial retreats along the valley; in some instances 10 or more recessional moraines are present in a given valley, and the ages of growing trees or other sources of dates provide a chronology of glacial movements.

Morais, Vinícius de, Morais also spelled MORAES (b. Oct. 19, 1913, Rio de Janeiro—d. July 9, 1980, Rio de Janeiro), Brazilian poet and lyricist whose best known song was "A Garota de Ipanema" ("The Girl From Ipanema"), which he cowrote with the composer Antonio Carlos Jobim.

The author of numerous volumes of lyrical poetry, Vinícius began his literary career as an adherent of the Brazilian Modernism in vogue around 1930. A period of studying English literature at the University of Oxford and residence in the United States as vice-consul of Brazil in Los Angeles (1947–50) broadened the scope of his verse, which was further enriched by his interest in theatre and the film industry. The result was a gradual movement away from poetic experimentation and toward an increasingly prosaic treatment of everyday themes with the sensuous lyricism that became his hallmark.

In the 1960s Morais joined with younger musicians in forming the bossa nova style, incorporating elements of Brazilian samba and international jazz. His later years involved intense musical collaboration and a prolific outpouring of popular song lyrics. His theatrical libretto *Orfeu da Conceição* (1956) formed the basis of the prizewinning film *Orfeu negro* (1958; *Black Orpheus*).

moral philosophy: *see* ethics.

Moral Re-Armament (MRA), also called BUCHMANISM, or OXFORD GROUP, a modern, nondenominational revivalistic movement founded by U.S. churchman Frank N.D. Buchman (1878–1961). It sought to deepen the spiritual life of individuals and encouraged participants to continue as members of their own churches. Primarily a Protestant movement, it was criticized by some Roman Catholic authorities and praised by others.

In 1922 Buchman resigned his position as lecturer in personal evangelism at the Hartford Seminary Foundation at Hartford, Conn., to "live by faith" and launch a worldwide evangelistic campaign based on God's guidance, moral absolutes, and the "life-changing" of individuals through personal work. He shifted operations to Princeton University, where he generated controversy by organizing student discussions that included public confessions on sexual matters; he left the university, as requested by the authorities, in the mid-1920s, though an investigatory committee later cleared him of any wrongdoing. He won influential support at the University of Oxford in England, and the movement gradually became known as the Oxford Group (not to be confused with the Oxford Movement).

The movement held a series of increasingly successful conferences, which were often attended by thousands of people to whom it advanced its views, in England, The Netherlands, the United States, South Africa, and other countries. In 1938 the name of the movement was changed to Moral Re-Armament, and other steps were taken as part of a general attempt to widen its appeal to include all faiths. Buchman hoped that the world would avoid war if individuals experienced a moral and spiritual awakening.

In its peak years after World War II, MRA sent "task forces" to all corners of the free world to carry on its program, in part through plays emphasizing cooperation, honesty, and mutual respect between opposing groups. It had headquarters and training centres at Mt. Kisco, N.Y., U.S.; Mackinac Island, Mich., U.S.; Caux, Switz.; and Odawara, Japan. MRA always showed much interest in converting the influential and the rich and steadfastly opposed Communism. Its theology was simple and conservative. It featured surrender to Jesus Christ and sharing with others whose lives have been changed in pursuit of four moral absolutes: purity, unselfishness, honesty, and love. The influence of the movement declined after the deaths of Buchman (1961) and his successor, Peter Howard (1965).

moral theology, also called CHRISTIAN ETHICS, Christian theological discipline concerned with identifying and elucidating the principles that determine the quality of human behaviour in the light of Christian revelation. It is distinguished from the philosophical discipline of ethics, which relies upon the authority of reason and which can only call upon rational sanctions for moral failure. Moral theology appeals to the authority of revelation, specifically as found in the preaching and activity of Jesus Christ.

The moral teaching in Christian communities has varied in the different eras, regions, and confessional traditions in which Christianity has been professed. The Roman Catholic tradition has been inclined to emphasize the mediating role of ecclesiastical institutions in its approach to the moral authority of revelation. Protestant churches have often put great emphasis on the direct, or immediate, moral responsibility of the individual before God. The influence of the spiritual director for the moral welfare of the individual Christian has been a significant aspect of Eastern Christianity.

Moral theology has at times seemed to have been restricted in its scope to a consideration of those thoughts, works, and actions that are viewed as offensive to God and spiritually harmful to human beings—that is, an enumeration of sins. It was thus seen as a negative complement of ascetical and mystical theology, which both presuppose a more positive orientation of the individual toward God. Many moral theologians, however, have believed that it is more faithful to the spirit of the New Testament and of early theology not to separate moral teaching from the religious anthropology that is implicit in the message of the Gospels. This approach has been reflected in the traditional Eastern Christian emphasis on the divinization of man through his association with Jesus Christ and in the Protestant concern with the moral power of justification. Medieval and post-Reformation Roman Catholic moral theology tended to separate moral teaching from dogmatic theology.

The significance of the relation of moral teaching to divine revelation lies in the problem of determining the nature of the particular "highest good" that characterizes any ethical system. Without such a determination of the nature of this good, one could easily have the impression that morality is simply obedience to a set of rules or laws the observance of which has been labeled, more or less arbitrarily, good. In the light of revelation, sin is seen as a deterioration of the fundamental disposition of a person toward God, rather than as a breaking of rules or laws. Virtue is viewed as the habitual capacity of a person to respond freely and consciously to situations in a manner that reflects and intensifies his conformity to Jesus Christ.

The diverse approaches to moral theology through the centuries have varied greatly in their recourse to logical reasoning and in the degree of their acceptance of general moral principles that are considered universally applicable. A recent tendency challenging the validity of such general principles is called situation ethics. Contemporary moral theology must confront problems resulting from modern technology, such as the moral issues related to the use of sophisticated instruments of warfare, individual responsibility in large corporate institutions, the demands of social justice, and developments in the biological sciences.

Morales, Cristóbal de (b. 1500?, Seville, Spain—d. between Sept. 4 and Oct. 7, 1553, Marchena?), composer who, together with Tomás Luis de Victoria and Francisco Guerrero, is recognized as one of the three most important Spanish composers of the 16th century.

His first post was as *maestro de capilla* at the cathedral at Ávila (1526–29). After a short stay at Plasencia he joined the papal choir in Rome (1535), where he remained for 10 years, during which time he published several collections of his compositions. His work and travels with the papal choir greatly advanced his fame. His health seems to have suffered during this period, and he returned to Spain in 1545, where he was appointed *maestro de capilla* at Toledo Cathedral the same year. He left after two years, and, after a period at Marchena in the service of the Duke of Arcos, he was appointed *maestro de capilla* at Málaga in 1551.

Morales' reputation continued to grow after his death. His works were published widely during his lifetime and quickly found their way to cathedrals as far away as Cuzco in Peru. The earliest printed polyphony prepared for use in the New World was Morales' 1544 book of masses, now part of the cathedral treasure of Pueblo, Mex.

Of his 21 masses, 16 were published in Rome in 1544, under Morales' personal supervision. Morales was the first Spanish composer to write magnificats in all eight ecclesiastical modes. They were unquestionably the most popular of his works in the 16th century and were widely reprinted. Of his many motets, the two best known are *Lamentabatur Jacob* and *Emendemus in melius,* both in five parts. His motet *Jubilate Deo omnis terra* (in six parts), commissioned by Pope Paul III to mark the peace treaty between Charles V and Francis I, was later parodied by Tomás Luis de Victoria in his mass *Gaudeamus,* and Francisco Guerrero based his mass *Sancta et immaculata* on the same motet. No less a figure than Giovanni Palestrina parodied a Morales motet for his mass *O sacrum convivium.*

Morales, Luis de, byname EL DIVINO (Spanish: "The Divine") (b. *c.* 1509, Badajoz, Spain—d. May 9, 1586, Badajoz), painter who was the first Spanish artist of pronounced national character, considered to be the greatest native Mannerist painter of Spain. He is remembered for his emotional religious paintings, which earned him his sobriquet and greatly appealed to the Spanish populace.

Morales may have studied with the Flemish painter Hernando Sturmio in Badajoz. He worked in Badajoz from 1546, leaving on occasional commissions but making his home there all his life. Summoned by King Philip II of Spain to help in the decoration of El Escorial, he painted a "Christ Carrying the Cross" that did not please the king and was removed to the Church of San Jerónimo, Madrid.

Morales always worked on panels, often depicting such subjects as "Ecce Homo," "Pietà," and "The Virgin and Child." Perhaps the best known of these panels are 20 on the life of Christ, painted for the Church of Arroyo del Puerco (1563–68). All of his paintings are marked by their Leonardesque composition, detailed execution, and anguished asceticism. He remains an artist remarkably representative of his period and nation.

"The Virgin and Child," panel by Luis de Morales; in the National Gallery, London

By courtesy of the National Gallery, London; photograph, A.C. Cooper

morality play, in the theatre, one of three main kinds of vernacular drama of the European Middle Ages (with the mystery play and the miracle play). A morality play is an allegory in which the characters are abstractions. The action centres on a hero, such as Mankind, whose inherent weaknesses are assaulted by such personified diabolic forces as the Seven Deadly Sins but who may choose redemption and enlist the aid of such figures as the Four Daughters of God (Mercy, Justice, Temperance, and Truth).

These plays were a step in the transition from liturgical to professional secular drama, combining elements of each. They were performed by quasi-professional groups of actors who relied on public support; thus the plays were usually short, their serious themes tempered by elements of farce. In the Dutch play *Het Esbatement den Appelboom* ("The Miraculous Apple Tree"), for example, a pious couple, Staunch Goodfellow and Steadfast Faith, are rewarded when God creates for them an everbearing apple tree with the property that whoever touches it without permission becomes stuck fast. This leads to predictable and humorous consequences.

The most famous of the French morality plays is Nicolas de la Chesnaye's *Condemnation des banquets* (1507), which argues for moderation by showing the bad end that awaits a company of unrepentant revelers, including Gluttony and Watering Mouth. Among the oldest of morality plays surviving in English is *The Castle of Perseverance* (*c.* 1425), about the battle for the soul of Humanum Genus. A plan for the staging of one performance has survived that depicts an outdoor theatre-in-the-round with the castle of the title at the centre. Of all morality plays, the one that is considered the greatest, and that is still performed, is *Everyman* (*q.v.*).

Moran, George, byname BUGS MORAN (b. 1893, Minnesota, U.S.—d. Feb. 25, 1957, U.S. Penitentiary, Leavenworth, Kan.), Chicago gangster and bootlegger of the Prohibition era.

A childhood friend and, later, right-hand man of Dion O'Bannion, Moran and Earl "Hymie" Weiss inherited O'Bannion's gang in Chicago when the chief was killed in 1924. Moran became sole leader after Weiss was killed in late 1926. For the next three years Moran's gang and Al Capone's were locked in bloody warfare, climaxed in 1929 by the St. Valentine's Day Massacre (*q.v.*), in which several members of Moran's mob were slaughtered. His power reduced, he drifted into petty crimes, ending his days in prison for bank robberies (Ohio Penitentiary, 1946–56; Leavenworth federal penitentiary, 1957). He died of lung cancer.

Moranbah, new town, east-central Queensland, Australia. It lies about 120 miles (190 km) southwest of Mackay and 490 miles (790 km) northwest of the state capital, Brisbane. It is named after the parish of Moranbah, which itself was named after a local pastoral property, Morambah, which in turn probably took its name from Aboriginal sources. The town of Moranbah was founded in 1969 as the residential and service centre for the Goonyella and Peak Downs coal mines. Moranbah also has factories producing explosives and concrete blocks. The town expanded considerably in the early 1980s because of the development of an export market for coal from the nearby Riverside mine. Pop. (1986) 6,883.

Morand, Paul (b. March 13, 1888, Paris, France—d. July 24, 1976, Paris), French diplomat and novelist.

Morand joined the diplomatic service in 1912, serving as attaché in London, Rome, Madrid, and Siam (Thailand). In his early fiction, *Ouvert la nuit* (1922; *Open All Night*), *Fermé la nuit* (1923; *Closed All Night*), and *Lewis et Irène* (1924; *Lewis and Irene*), he borrowed the cinematic techniques of rapid scene changing and transported the reader back and forth from one capital to another, capturing with posterlike brilliance the feverish atmosphere of the 1920s. Later he wrote several collections of short stories and such novels as *L'Homme pressé* (1941; "The Harried Man"), *Le Flagellant de Seville* (1951; "The Flagellant of Seville"), *Hécate et ses chiens* (1955; "Hecate and Her Dogs"), and *Tais-toi* (1965; "Be Quiet"). He also wrote a few biographies, most notably *Ci-gît Sophie Dorothée de Celle* (1968; *The Captive Princess: Sophia Dorothea of Celle*). A world traveler, he wrote excellent impressionistic accounts of cities in the Orient, Africa, and North and South America.

During World War II Morand continued to serve as a diplomat, but, because of his collaboration with the Vichy government, he was dismissed in 1945, and his candidacy for the French Academy was opposed in 1959. He was admitted, however, in 1968.

Morandi, Giorgio (b. July 20, 1890, Bologna, Italy—d. June 18, 1964, Bologna), Italian painter and etcher whose simple, geometric still lifes of bottles, jars, and boxes were an important contribution to the development of formalism in 20th-century art.

"Still Life," oil on canvas by Giorgio Morandi, 1953; in the Phillips Collection, Washington, D.C.

By courtesy of the Phillips Collection, Washington, D.C.

Morandi cannot be closely identified with a particular school of painting. He first exhibited in 1914 in Bologna with the Futurist painters, and in 1918–19 he was associated with Giorgio De Chirico and Carlo Carrà, leaders of the Metaphysical school. He developed a contemplative approach to art that, directed by a highly refined formal sensibility, gave his quiet landscapes and disarmingly simple still-life compositions a characteristic delicacy of tone and extraordinary subtlety of design. His gentle, lyrical colours are subdued and limited to clay-toned whites, drab greens, and umber browns, with occasional highlights of terracotta. Morandi's paintings of bottles and jars convey a mood of contemplative repose reminiscent of the work of Piero della Francesca, an Italian Renaissance artist he admired.

As instructor of etching at the Academy of Fine Arts in Bologna from 1930 to 1956, Morandi had a profound influence on succeeding Italian graphic artists.

Morant, Sir Robert Laurie (b. April 7, 1863, London, Eng.—d. March 13, 1920, London), British civil servant, closely associated with the development of educational and health services in his country.

Educated at Winchester and New College, Oxford, Morant went in November 1886 to Siam (now Thailand) as tutor to the royal family and prepared for King Chulalongkorn an educational plan for the whole country. He returned to England in August 1894 and, after some experience with social and educational work in the East End of London, joined the Education Department in 1895 as assistant director of special inquiries and reports. As private secretary to successive ministers, he was largely responsible for preparing Arthur Balfour's Education Act of 1902. In April 1903 he became permanent secretary to the Board of Education. In 1907 he was created Knight Commander of the Bath.

Appointed chairman of the National Health Insurance Commission, Morant left the Board of Education and created the organization that brought the National Insurance Act of 1911 into operation. Increasingly absorbed in the plan to merge his health insurance work into a wider national health organization, he became secretary to the Ministry of Health on its formation in 1919; he died the next year.

Morante, Elsa (b. Aug. 18, 1918, Rome, Italy—d. Nov. 25, 1985, Rome), Italian novelist, short-story writer, and poet who was known for the epic and mythical quality of her works, which usually centre upon the struggles of the young in coming to terms with the world of adulthood.

Morante early exhibited literary talent, and, although her formal education remained incomplete, her marriage to the novelist Alberto Moravia brought her for a time into association with the leading Italian writers of the day. Her first novel, *Menzogna e sortilegio* (1948; *House of Liars*), recounts the complex history of a southern Italian family through the memory and imagination of a young woman. Morante's next novel, *L'isola di Arturo* (1957; *Arturo's Island*), examines a boy's growth from childhood dreams to the painful disillusions of adulthood; the work is notable for its delicate lyricism, mingling realistic detail with an air of unreality.

The novel *La storia* (1974; *History: A Novel*) met with mixed critical reaction but commercial success. Set in Rome between 1941 and 1947, it depicts the arduous life of a simple, half-Jewish elementary school teacher and her son, born of a rape by a German soldier. The story reaffirms the author's passionately held ideology, which denies any possibility of humane politics and apparently excludes any final hope for humanity.

Morante also published a volume of short stories, *Lo scialle andaluso* (1963; "The Andalusian Shawl"); a volume of essays, *Il gioco secreto* (1941; "The Secret Game"); and two collections of poetry, *Alibi* (1958) and *Il mondo salvato dai ragazzini* (1968; "The World Saved by Little Children").

Morat, Battle of (June 22, 1476), battle in Switzerland that constituted a major victory for the Swiss Confederation in its war of 1474–76 against Burgundy. The battle took place just outside the town of Morat (or Murten), which is located beside the lake of the same name and lies west of Bern and east of Lake Neuchâtel.

The Swiss had been drawn into war as allies of the Holy Roman emperor Frederick III and the French king Louis XI, who were opposed to the Burgundian duke Charles the Bold. Bern, which was a member state of the Swiss Confederation, hoped to make territorial gains at Charles's expense. Toward the end of 1475, both Frederick and Louis suspended hostilities against Charles, who thus became free to concentrate his forces against the Swiss. After suffering a humiliating defeat at Grandson (March 2, 1476), Charles returned to the attack in the summer with 25,000 men and was besieging Morat, on his way toward Bern from Lausanne, when the Bernese, with late reinforcements from the other confederates, came forward to challenge him. The compact formations of the Swiss prevailed over the Burgundian army, of which more than one-third was annihilated.

Morata (Papua New Guinea): *see* Goodenough Island.

Moratín, Leandro Fernández de: *see* Fernández de Moratín, Leandro.

Morava River, German MARCH, tributary of the Danube rising in eastern Czech Republic; in its lower course, the river divides the Czech Republic from Slovakia and then Slovakia from Austria. It gives its name to Moravia, an ancient region that covers most of the river's drainage basin, which is 15,000 square miles (38,900 square km) in area. Its western tributaries drain from the Bohemian-Moravian Highlands; the eastern tributaries, of which the Bečva is the most significant, drain from the westernmost ranges of the Carpathians. The Morava River rises on the southern slope of Králický Sněžník in the Nízký and Hrubý Jeseník mountains and follows a 227-mile (365-kilometre) course south to enter the Danube River just above Bratislava, Slovakia. The river valley has been important historically as one of Europe's natural corridors. A low pass in the north between the Bečva and Oder rivers—the Moravian Gate—connects the Danube countries with the Silesian Plain and the Central Plain of Poland.

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Morava River, Serbo-Croatian VELIKA MORAVA, river in Serbia, Yugoslavia, formed by the confluence of the South (Južna) Morava and West (Zapadna) Morava rivers. It follows a 137-mile (221-kilometre) course, mainly northerly, to enter the Danube River near Smederevo. North of Lapovo the Morava opens into the wide, meandering Pomoravlje valley, a fertile agricultural region. The total area of the Morava River basin is 14,457 square miles (37,444 square km), corresponding almost to the political definition of Serbia.

The West Morava originates in southern Serbia and Macedonia on the west-facing slope of Golija Mountain. Three hydroelectric stations are located along its 185-mile (298-kilometre) course. The South Morava is 198 miles (319 km) long from its source at the union of the Binačka Morava and Moravica rivers. Lake Vlasina on the Vlasina, a tributary, provides water for four hydroelectric stations. The Nišava, another tributary, rises in western Bulgaria; its valley provides an important transportation route from Belgrade via Sofia to Turkey. The Morava and the South Morava together are a vital part of the Morava-Vardar (Axiós) corridor, a main road and rail route in Yugoslavia.

Moravia, traditional region in central Europe that served as the centre of a major medieval kingdom, known as Great Moravia, before it was incorporated into the kingdom of Bohemia in the 11th century. In the 20th century Moravia became part of the modern state of Czechoslovakia and subsequently of the Czech Republic. The region is bounded by Bohemia on the west and northwest, by Silesia on the northeast, by Slovakia on the east, and by Lower Austria on the south.

Moravia was inhabited from the 4th century BC by Celtic and then Germanic tribes. In the 6th and 7th centuries the Avars dominated the area, which was settled by Slavic tribes by the late 8th century. The Slavs, who took the name Moravians from the Morava River, developed a political community that emerged under Prince Mojmír I (reigned 830–846) as a united kingdom that included a part of western Slovakia. Mojmír's successors, Rostislav (reigned 846–870) and his nephew Svatopluk (reigned 870–894), extended their territory to include all of Bohemia, the southern part of modern Poland, and the western part of modern Hungary, thereby creating the state of Great Moravia. Rostislav also invited the Byzantine missionaries Cyril and Methodius (who arrived in 863) to spread Christianity in Bohemia and Moravia on the basis of their Slavonic translation of the chief liturgical texts. After Svatopluk died (894), however, Great Moravia disintegrated and was finally destroyed by a Magyar attack in 906.

The territories of Great Moravia were then contested by Poland, Hungary, and Bohemia. In 1029 Moravia (*i.e.*, the western portion of Great Moravia) was incorporated as a distinct province into the Bohemian kingdom, and thereafter it generally remained closely attached to Bohemia. In 1526 Moravia, with Bohemia and Silesia, was claimed through inheritance by Ferdinand of Austria, the future Holy Roman emperor Ferdinand I, and thus came under the rule of the Habsburgs.

Unlike Bohemia, Moravia accepted the hereditary right of the Austrian Habsburgs to rule over it and therefore suffered less in the religious and civil struggles that followed. Religious toleration resulted in a flowering of Protestantism in Moravia under Ferdinand and his son Maximilian II, and there was generally less friction between Slavs and Germans there than there was in Bohemia, partly because the Moravian Slavs were more backward and therefore were slower to make nationalist demands. Their language was the same as that of the Bohemian Slavs, or Czechs, but they were not directly involved in Bohemia's struggle with the Habsburg dynasty. Administratively detached from Bohemia, the margraviate of Moravia was merged late in the 18th century with what remained of Austrian Silesia, and, following the Revolution of 1848, the Habsburgs made Moravia a separate Austrian crown land.

In 1918 that crown land became a province of the new state of Czechoslovakia, and, although it was annexed by Germany just before the outbreak of World War II, it was restored to the reconstituted state of Czechoslovakia after the war. On Jan. 1, 1949, however, the Czechoslovak government dissolved Moravia into a number of smaller administrative units. In 1960 another administrative reorganization created the South Moravian (Jihomoravský) and North Moravian (Severomoravský) regions (*see* Jihomoravský; Severomoravský) on the territory formerly known as Moravia-Silesia. These lands were included in the Czech Socialist Republic when it was administratively created in 1968 within federal Czechoslovakia, and they remained part of the Czech Republic when the latter became an independent nation in 1993.

Moravia, Alberto, pseudonym of ALBERTO PINCHERLE (b. Nov. 28, 1907, Rome, Italy—d. Sept. 26, 1990, Rome), Italian journalist, short-story writer, and novelist known for his fictional portrayals of social alienation and loveless sexuality. He was a major figure in 20th-century Italian literature.

Moravia, 1969
Horst Tappe—EB Inc.

Moravia contracted tuberculosis of the bone (a form of osteomyelitis usually caused by *Mycobacterium tuberculosis*) at the age of 8, but, during several years in which he was confined to bed and two years in sanatoriums, he studied French, German, and English; read Giovanni Boccaccio, Ludovico Ariosto, William Shakespeare, and Molière; and began to write. Moravia was a journalist for a time in Turin and a foreign correspondent in London. His first novel, *Gli indifferenti* (1929; *Time of Indifference*), is a scathingly realistic study of the moral corruption of a middle-class mother and two of her children. It became a sensation. Some of his more important novels are *Agostino* (1944; *Two Adolescents*); *La Romana* (1947; *The Woman of Rome*); *La disubbidienza* (1948; *Disobedience*); and *Il conformista* (1951; *The Conformist*), all on themes of isolation and alienation. *La ciociara* (1957; *Two Women*) tells of an adaptation to post-World War II Italian life. *La noia* (1960; *The Empty Canvas*) is the story of a painter unable to find meaning either in love or work. Many of Moravia's books were made into motion pictures.

His books of short stories include *Racconti romani* (1954; *Roman Tales*) and *Nuovi racconti romani* (1959; *More Roman Tales*). *Racconti di Alberto Moravia* (1968) is a collection of earlier stories. Later short-story collections include *Il paradiso* (1970; "Paradise") and *Boh* (1976; *The Voice of the Sea and Other Stories*).

Most of Moravia's works deal with emotional aridity, isolation, and existential frustration and express the futility of either sexual promiscuity or conjugal love as an escape. Critics have praised the author's stark, unadorned style, his psychological penetration, his narrative skill, and his ability to create authentic characters and realistic dialogue.

Moravia's views on literature and realism are expressed in a stimulating book of essays, *L'uomo come fine* (1963; *Man as an End*), and his autobiography, *Alberto Moravia's Life,* was published in 1990. He was married for a time to the novelist Elsa Morante.

Moravian church, a Protestant denomination founded in the 18th century but tracing its origin to the Unitas Fratrum (*q.v.;* "Unity of Brethren") of the 15th-century Hussite movement in Bohemia and Moravia.

History. During the 16th and 17th centuries the Bohemian Brethren movement survived suppression by the Counter-Reformation and proscription by the Peace of Westphalia (1648) through the efforts of a so-called hidden seed of loyal adherents. In the meantime Protestantism in general had lost some of the vitality of its beginning. Revival came in the form of German Pietism in the late 17th century, increasing the unrest among the underground Protestants in nearby Moravia and Bohemia. Flight to Protestant portions of Germany became widespread, and Pietism had a profound influence upon many of the nobility. Thus it was that the young Count Nikolaus Ludwig von Zinzendorf became the agent through whom the "hidden seed" was restored.

A group of families adhering to the tradition of the Bohemian Brethren fled Moravia in 1722 and settled on the count's estate in Saxony, where they founded Herrnhut. The village almost immediately attracted a growing stream of exiles from Bohemia and Moravia, as well as Pietists from Germany and beyond. The community worshiped and partook of the sacraments in the Lutheran parish church of the adjacent village of Berthelsdorf. There were also many extra-church services in an assembly hall in Herrnhut.

The count, a devout Lutheran, tried to keep the refugees within the state church. His aversion to what seemed like sectarianism was overcome when he realized that he was confronted with a remnant of a church older than his own. Reluctantly he helped them to revive their own tradition, though the ultimate development was twofold. Herrnhut became the mother community of what came to be called the Moravian church. It also became the centre for a network of societies on the established Pietist pattern, working for the nurture of spiritual life within the state churches, mostly Lutheran, but also including some Reformed churches. This latter phase of Moravianism on the European continent came to be known as the "diaspora" and its members far outnumbered those who belonged to the Moravian church as a denomination.

A remarkably unifying experience of fellowship at a special Communion service on Aug. 13, 1727, dispelled dissension from the community and created lasting evangelical zeal. Herrnhut within a few years became the centre of a worldwide program of Christian outreach. The first diaspora evangelists began their itinerations in 1727, and the first foreign missionaries left Herrnhut to work among black slaves in the West Indies in 1732. Within two decades missions to Greenland, Suriname, South Africa, Algiers, and among the North American Indians followed. This concern for missions characterized the church thereafter.

In 1735 David Nitschmann was consecrated the first bishop of the Renewed Moravian Church. With Nitschmann the Moravians restored their own ministry and soon thereafter the three orders of bishop, presbyter, and deacon.

Herrnhut developed a unique type of community in which civic and church life were integrated into a theocratic society, a prototype for about 20 such settlements in Europe, the British Isles, and America. Christian nurture through fellowship groups, daily worship featuring both singing and instrumental music, boarding schools, and concentration on foreign missions and diaspora evangelism characterized these exclusive Moravian villages. They supported themselves and their projects by thriving handicraft industries.

In the British Isles. Moravians came to London in 1734 en route to mission work in the American colonies and made contacts that led to the formation of the Fetter Lane Society in 1738, the forerunner of churches in England, Wales, and Ireland. John Wesley came to know the Moravians on board ship en route to Georgia in 1735–36, and upon his return home two years later both he and his brother Charles affiliated with the Moravians. They worked together until 1740, after which Methodism and Moravianism went their separate ways. The former, better suited to the English temperament, became a mass movement; while the latter, after the peak of the revival had passed, became one of the small denominations of the British Isles, with about 40 congregations and fewer than 5,000 members.

In North America. The first Moravian venture in the Americas was a mission among black slaves in the West Indies (1732); however, their mission motive and uncertain status in Europe eventually brought them to Georgia in 1735. Zinzendorf saw in America an opportunity to evangelize the Indians and a haven from possible suppression at home. Unsuccessful in Georgia, the group went to Pennsylvania in 1740 and founded Nazareth and Bethlehem. The prospect of organizing the many German settlers of Lutheran and Reformed background, not to mention sectarian bodies, into a union church was an additional factor in Zinzendorf's interest in Pennsylvania. He spent 14 months in America (1741–43) and set up a program patterned after that of Europe. His plan of church union failed, but he did succeed in establishing the Moravian church in the New World.

Both in Europe and America some Moravian churches were closed settlements and some churches were in communities with other denominations. For about a century only church members lived in Bethlehem, Nazareth, and Lititz in Pennsylvania and in Salem (present-day Winston-Salem) in North Carolina. Moravians from Bethlehem founded the first of the North Carolina churches in 1753. From these centres radiated a program of missions and evangelism among Indians, neighbouring European settlers, and primitive peoples overseas. Many children from outside the church, especially after the American Revolution, were educated in Moravian boarding schools. Diaspora rather than denominational outlook, European control, and closed communities kept the church small. Extensive growth did not come until the mid-19th century when a reorganization of the international body gave the Americans more autonomy. Immigrants from Germany and Norway accounted for much of the growth in the North, while in North Carolina church extension came largely from native population increase.

The Moravian Church in America was divided into northern and southern provinces for administrative convenience by 1771. In the late 20th century, the provinces shared a common board of foreign missions, a common theological seminary, and a free exchange of ministers. Salem College in Winston-Salem and Moravian College in Bethlehem were two of the church-related schools. Another U.S. Moravian group, the Unity of the Brethren, had close relations with the Moravian church and cooperated in missions overseas.

Organization, doctrine, and worship. Each regional administrative unit of the worldwide Moravian church is self-governing through its provincial synod with administration by a provincial elders' conference. All are linked by a general synod of elected representatives, meeting every 10 years, which is authoritative in all matters of doctrine and constitution common to the whole church. The power to ordain in the Moravian church is reserved for the bishops, but the episcopal office does not in itself have an administrative function. In practice, however, bishops more often than not are elected to administrative office.

The Moravian church adheres to its original principle of the Bible as the only rule of faith and practice. It subscribes to both the Apostles' and Nicene creeds but does not have a distinctive creed of its own, believing that in the various confessions of the main bodies of Protestantism the chief articles of the Christian faith are already set forth. Its litany used at the Easter sunrise service is generally accepted as summarizing its main beliefs. Worship is liturgical and follows the traditional church year. Communion is observed about six times a year and in some areas monthly. German chorales figure prominently in the hymns used. Strongly Christocentric, the Moravian church places emphasis upon the sufferings of Christ during Holy Week preceding Easter.

Moravian Karst, Czech MORAVSKÝ KRAS, karst in eastern Czech Republic. It is a limestone area containing a labyrinth of swallow holes, underground passages and lakes, caverns, and calcareous formations. One of several small, disconnected karst areas, it is situated north of Brno, along the eastern bank of the Svitava River, and eastward along the latter's underground tributaries, the Punkva and the Říčka. In area the karst extends for about 20 miles (32 km) north-south and 6–9 miles (10–15 km) east-west.

Moraviantown, Battle of (War of 1812): *see* Thames, Battle of the.

Moray, formerly called ELGINSHIRE, council area and historic county of northeastern Scotland, extending inland from the southern shore of the Moray Firth. The council area and the historic county occupy somewhat different areas. Most of the historic county of Moray lies within the council area, but the southern portion of the county, including Grantown-on-Spey, is part of the Highland council area. The Moray council area, however, also contains most of the historic county of Banffshire.

The council area's coast along the Moray Firth on the north is lined with beaches and sand dunes. The Rivers Spey and Findhorn issue from the hills and peat moors in the south and cross a fertile coastal plain to reach the Moray Firth. On Moray's southern boundary the massif of the Cairngorm Mountains rises to nearly 4,000 feet (1,220 metres).

The Picts occupied the area until the 9th century AD, when Kenneth MacAlpin united their lands with those of the Scots, and the Pictish lands acquired the name of Moray. Covering a much wider area than the historic county, Moray was one of the seven traditional provinces of ancient Scotland, and it contributed two kings, Macbeth and Lulach (both 11th-century), to Scotland. The ancient province ceased to exist in the 12th century, but the town of Elgin became the site of the episcopal see of Moray in 1224. Robert I (the Bruce) of Scotland elevated the county to an earldom and bestowed it upon his nephew, Thomas Randolph, in 1312. Many villages were ravaged during the English Civil Wars of the mid-17th century. Moray was little affected by the Industrial Revolution of the 19th century, except that the arrival of railways promoted tourism and stimulated the local fishing industry. The county's chief antiquities are the remains of the cathedral at Elgin, Kinloss Abbey (1150), and Pluscarden Priory (1230).

The Moray council area consists mainly of forests and agricultural land. Crops include cereals, potatoes, and hay. Beef cattle are bred on the plain, and sheep graze the hills. Lossiemouth and Buckie are active fishing ports. The main manufacturing sectors are food processing (including fish processing), shipbuilding, and the production of equipment for the North Sea oil industry. Salmon fishing, coastal resorts, and picturesque towns and countryside combine to make tourism an important part of the local economy. Elgin is the council area's largest town and commercial and adminstrative centre. Area council area, 856 square miles (2,218 square km). Pop. (1999 est.) council area, 85,210.

moray, any of 80 or more species of eels of the family Muraenidae. Moray eels occur in all tropical and subtropical seas, where they live in shallow water among reefs and rocks and hide in crevices. They differ from other eels in having small rounded gill openings and in generally lacking pectoral fins. Their skin is thick, smooth, and scaleless, while the mouth is wide and the jaws are equipped with strong, sharp teeth, which enable them to seize and hold their prey but also to inflict serious wounds on their enemies, including humans. They are apt to attack humans only when disturbed, but then they can be quite vicious.

Moray eels are usually vividly marked or coloured. They generally do not exceed a length of about 1.5 m (5 feet), but one species, *Thyrsoidea macrurus* of the Pacific, is known to grow about 3.5 m (11.5 feet) long. One species of moray, *Muraena helena,* found in the Mediterranean, was a great delicacy of the ancient Romans and was cultivated by them in seaside ponds.

Green moray (*Gymnothorax funebris*)
Carleton Ray—Photo Researchers

Moray, EARLS OF, also spelled MURRAY, titled Scottish nobility of several creations, notably in the families Randolph and Stewart (or Stuart), grouped below chronologically and indicated by the symbol •.

•Moray, Thomas Randolph, 1st Earl of (d. July 20, 1332, Musselburgh, Midlothian, Scot.), nephew of King Robert I the Bruce of Scotland and a leading military commander in Robert's successful struggle to gain independence from English rule; later he was regent for Robert's young son and successor, David II (reigned 1329–71).

Randolph was the son of one of Robert's sisters. When Robert revolted against the English and claimed the Scottish throne (1306), Randolph joined the insurgency, but he was soon thereafter taken prisoner at the Battle of Methven. He did homage to King Edward I of England and fought in the English army against Robert until captured by the Scottish commander Sir James Douglas in 1308. Submitting to Robert, Randolph quickly became a trusted commander and adviser. Robert made him Earl of Moray in 1312. By a brilliant tactical maneuver Moray captured Edinburgh Castle from the English in March 1314, and three months later he distinguished himself in the spectacular Scottish victory over Edward II of England at Bannockburn.

With Douglas, Moray took Berwick-upon-Tweed from the English (1318), ravaged northern England (1319), and defeated an English army at Byland, Yorkshire (1322). In 1323 he persuaded Pope John XXII to recognize Robert's right to the Scottish throne. Five years later he played a major role in negotiating the treaty by which England recognized Robert as king of Scots. Robert died in June 1329, and Randolph was regent for David II until his death.

•Moray, James Stewart, 1st Earl of, EARL OF MAR, LORD ABERNETHY (b. *c.* 1531—d. Jan. 21, 1570, Linlithgow, West Lothian, Scot.), half brother of Mary Stuart, Queen of Scots, who became regent of Scotland after her abdication.

The illegitimate son of King James V and Lady Margaret Douglas, Stewart led the Protestant lords in their conflict with Mary Stuart's mother, Mary of Lorraine, the queen regent. When Mary Stuart assumed control of the government upon the death of her mother in 1560, however, he supported her, despite her Roman Catholicism. In 1562 she made him Earl of Moray and Earl of Mar, but he lost her favour by supporting the Calvinist reformer John Knox and by opposing the queen's marriage (July 1565) to Henry Stewart, Lord Darnley. From August to October 1565, Moray attempted to arouse Edinburgh citizens against Mary's authority. She personally led the force that drove him and his supporters across the border. The outlawed Moray fled to England but was pardoned and allowed to return to Scotland the following year. When Mary abdicated in 1567, Moray was appointed regent for her year-old son, King James VI. He suppressed her final effort to regain power when he routed her forces at Langside on May 13, 1568, and she, in turn, fled to England. A substantial portion of the nobility continued to maintain Mary's right to rule, however, and Moray had difficulty putting into practice his vigorously Protestant and pro-English policies. In January 1570 he was assassinated by James Hamilton of Bothwellhaugh, who favoured Mary, while riding through Linlithgow.

James Stewart, 1st Earl of Moray, detail of a portrait by Hans Eworth, 1561; in the Darnaway Castle Collection, Moray
By courtesy of the Darnaway Castle Collection

•Moray, James Stewart, 2nd Earl of, LORD DOUNE, byname THE BONNY EARL OF MORAY (d. Feb. 7, 1592, Fife, Scot.), son-in-law of the regent James Stewart, the 1st earl. He became earl in 1580 when he married the 1st earl's daughter Elizabeth, at the behest of King James VI.

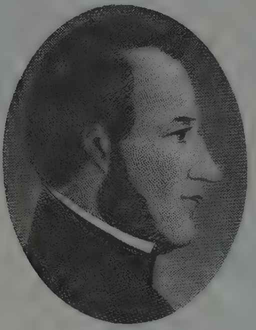
A faithful Protestant, Moray was made commissioner to act against the Spanish Armada (1588) and commissioner to act against the Jesuits (1589–90). Because he was a friend and cousin-german of the 5th Earl of Bothwell, then a hunted man, and perhaps because of some intimacy with the queen, Moray aroused suspicion in the king, who at last gave George Gorden, 6th Earl of Huntly, Moray's blood enemy, a warrant to apprehend him. Moray thereupon repaired to Donibristle, the house of his mother on the Fifeshire coast, and was there besieged by the followers of Huntly. Huntly set fire to the house; Moray escaped to the seashore in darkness and was chased, found, and slashed to death. The event became the subject of a popular ballad, "The Bonnie Earl of Moray." Moray was succeeded by his elder son, James, the 3rd earl (d. 1624).

Moray Firth, triangular-shaped inlet of the North Sea in northeastern Scotland. It extends for a distance of 16 miles (29 km) at its widest point, from Tarbat Ness on its northern shore to Burghead on its southern shore. The firth's inner reaches are divided by a peninsula known as the Black Isle into two smaller inlets, Cromarty Firth and the Firth of Inverness. The city of Inverness lies at the head of the latter firth, while Nairn is the principal town along the Moray Firth proper.

Morazán, Francisco (b. Oct. 3, 1792, Tegucigalpa, Honduras—d. Sept. 15, 1842, San

José, Costa Rica), president of the United Provinces of Central America (1830–40) who was the outstanding military and political hero of Central America from 1827 until his death.

Self-educated, Morazán began his political career in his native Honduras. In 1827, at age 35, he led the Liberal Party's forces in a revolt against Manuel José Arce, first president of the United Provinces (established in 1823). The Liberal forces defeated the Conservative Army in 1829) at Guatemala City, the capital, and in 1830 Morazán was elected president. He introduced many reforms designed to limit the power of the Roman Catholic church, but his administration aroused the anger of Conservatives and he had to devote most of his energy to putting down revolts.



Francisco Morazán, detail of an engraving by A. Demarest

By courtesy of the Library of Congress, Washington, D.C.

By 1839, the end of Morazán's second term, most of the member states had deserted the federation. A Conservative-backed rebel army under Rafael Carrera defeated Morazán at Guatemala City in March 1840, and he went into exile. In 1842 he returned to attempt the restoration of the federation. He attacked and defeated the forces of the Costa Rican dictator Braulio Carillo, but when he tried to follow up this triumph, his forces were quickly routed. Betrayed and captured, Morazán was executed by a firing squad.

Morbihan, *département,* Bretagne *région,* northwestern France, created from a part of western Brittany. It takes its name from the practically landlocked Morbihan (Breton: "Little Sea") Gulf and covers the south coast of the Breton peninsula bordering the Atlantic Ocean. The ancient towns of Auray and Vannes (*q.v.*), the capital, are situated on estuaries opening southward onto the gulf. West of the gulf, the coast juts out to the Quiberon Peninsula, then, turning northwestward, passes the mouth of the three estuaries on which Lorient, a naval port, is situated, and extends to the estuary of the Leita River, which divides Morbihan from Finistère *département.* East of the gulf, the coast, indented by estuaries and creeks, extends to the mouth of the Vilaine River and to the border of Loire-Atlantique *département.* Belle-Île-en-Mer, south of Quiberon, and other small islands are included in Morbihan.

The highest point is in the Montagnes Noires (970 feet [296 m]), a range that forms the northwestern boundary. The main ranges of hills and the central plateau of the Landes de Lanvaux heath run west to east, parallel to the coast, across nearly the entire *département.* Rivers in the west, including the Scorff and the Blavet, flow southward, but the main streams in the east, such as the Oust and the Arz, flow eastward to join the Vilaine. The climate is predominantly oceanic, with frequent and abundant rain at all seasons. Agriculture and fishing are the principal activities, and oysters are cultivated in the gulf. Light industries have been established at Vannes, submarines are built at Lorient, and there is some canning in the harbour towns of Port-Louis, Étel, Quiberon, and Groix. The tourist industry is active along the entire length of the coast.

Morbihan has more prehistoric stone monuments than any other *département* of France, with several thousand megaliths in the Carnac-Locmariaquer area west of the Morbihan Gulf. Breton is still spoken in the west, and traditional folklore remains very much alive. The medieval towns and villages are major tourist attractions. The *département* is divided into the *arrondissements* of Vannes, Lorient, and Pontivy. It is in the educational division of Rennes. Area 2,634 square miles (6,823 square km). Pop. (1993 est.) 629,300.

Mordano, Dino Grandi, Count (conte) **di:** *see* Grandi, Dino.

mordant dye, colorant that can be bound to a material for which it otherwise has little or no affinity by the addition of a mordant, a chemical that combines with the dye and the fibre. As the principal modern mordants are dichromates and chromium complexes, mordant dye usually means chrome dye. Most mordant dyes yield different colours with different mordants. Mordant dyes can be used with wool, wool blends, silk, cotton, and certain modified-cellulose fibres.

mordenite, hydrated sodium, potassium, and calcium aluminosilicate mineral $(Na_2,K_2,Ca)Al_2Si_{10}O_{24} \cdot 7H_2O$, in the zeolite family. It is one of the most abundant zeolites in altered volcanic deposits, and it commonly occurs as white, glassy needles filling veins and cavities in igneous rocks. It is also found in marine sediments, as in the Ural Mountains and in dikes where water has attacked and altered volcanic glasses, as on the Isle of Arran in Scotland. Mordenite's molecular structure is a framework containing chains of five-membered rings of linked silicate and aluminate tetrahedra (four oxygen atoms arranged at the points of a triangular pyramid about a central silicon or aluminum atom). Its high ratio of silicon to aluminum atoms makes it more resistant to attack by acids than most other zeolites. For detailed physical properties, *see* zeolite (table).

Mordvin, also called MORDVINIAN, member of a people speaking a Finno-Ugric language of the Uralic language family and living mainly in Mordvinia republic and other parts of the middle Volga River region of Russia. Under the Soviet government the Mordvins were given some autonomy in 1928, and a Mordvinian autonomous republic, which lasted from 1934 to 1991, had its capital at Saransk. The Mordvin numbered about 740,000 in the late 20th century, with about a third living in Mordvinia and the remainder outside of their traditional homeland. They are divided into two dialect groups, the Moksha and Erzya.

Traditionally agricultural, the Mordvin are noted as master beekeepers. The old national costume still may be seen, especially among the women, whose profusely embroidered skirts, large earrings, and numerous necklaces distinguish them from Russians. Many modern Mordvin cannot speak their mother tongues, but a considerable Cyrillic literature of Mordvin songs and legends exists, some recounting the feats of their king Tushtyan, a contemporary of Ivan IV the Terrible. Mordvin religion consists of a Christian veneer over more traditional beliefs. The practice of pretending to kidnap brides in the face of mock resistance has been reported to persist.

Mordvin language, member of the Finno-Ugric group of the Uralic language family, spoken in Mordvinia and neighbouring areas. The third largest Uralic language in number of speakers, ranking after Hungarian and Finnish, it has two major dialects: Erzya, spoken in the eastern portion of Mordvinia and the surrounding territory; and Moksha, spoken in the west. Although both dialects are currently written and have official status, the Mordvin lack a common name for their language. Mordvin is most closely related to the Mari language, with which it makes up the Volga-Finnic subgroup of the Finnic languages of Finno-Ugric.

Mordvinia, republic in Russia, situated in the middle Volga River basin. The capital is Saransk (*q.v.*).

Mordvinia occupies a gently rolling plain crossed by the broad, shallow, often swampy valley of the Moksha River in the west and the Sura, a direct tributary of the Volga, in the east. The climate is markedly continental. The average January temperature is 10° F (−12° C), but cold air from the north can drop the temperature to −40° F (−40° C). The average in July is 68° F (20° C). Annual rainfall (summer maximum) ranges from 20 inches (500 mm) in the west to 16 inches in the east; it is extremely variable, however, and periods of drought occur. Most of the original vegetation, including mixed forests (oak, lime, maple, ash, and birch) and wooded steppe, has been cleared for agriculture. Soils are usually of the leached or degraded chernozem (black earth) or gray forest type, with belts of floodplain meadows along the rivers.

The Mordvin, representing almost one-third of the republic's population, are of Finno-Ugric origin and related to the nearby Mari and Udmurts. They are composed of two groups distinguished by language differences: the Erzya Mordvin and the Moksha Mordvin. Russians, who now constitute more than three-fifths of the population, penetrated the area as early as the 12th century, but it was not until the overthrow of the Kazan khanate, or empire, in the late 16th and 17th centuries that the area came under Russian control. In 1930 Mordvinia was made an autonomous *oblast* (province), and from 1934 to 1991 it was an autonomous republic of the Soviet Union. The chief cities are Saransk, Ardatov, Ruzayevka, and Kovylkino.

Mainly agricultural, Mordvinia plants much of its cropped area in grains—winter rye, spring wheat, oats, millet, buckwheat, and corn (maize) for silage. Hemp, *makhorka* (tobacco), and vegetables are also grown. Draft horses are bred, beekeeping is widespread, and some raising of sheep, goats, cattle, and pigs is carried on. Industrial activity includes timber working, tannin extraction, metalworking, light manufacturing, food and textile processing, cement making, and the production of paper, wooden crates, and prefabricated housing materials. Machine-building enterprises produce instruments and heavy engineering, electrical, and chemical equipment. Peat is dug to supply the Saransk peat-burning electric-power station. Natural gas from the Saratov–Nizhny Novgorod pipeline that passes through Saransk is the basis of a developing chemical industry. The Moscow-Ryazan-Samara trunk railway crosses the republic from west to east, while lines from Nizhny Novgorod and Kazan to Penza traverse it from north to south. Highways link Saransk with Nizhny Novgorod, Ulyanovsk (formerly Simbirsk), and Penza. Area 10,100 square miles (26,200 square km). Pop. (1995 est.) 959,000.

More, Sir Anthony, original name ANTOON, or ANTHONIUS, MOR, also called ANTONIO MORO (b. *c.* 1520, Utrecht, bishopric of Utrecht [now in The Netherlands]—d. sometime between April 17, 1576, and May 12, 1577, Antwerp [now in Belgium]), Dutch portrait painter.

More studied his art under Jan van Scorel, and, after making a professional visit to Italy, he began to paint portraits in the style of Hans Holbein. His rise to eminence was rapid. In 1552 he was invited to Madrid by the emperor Charles V. In 1554 he was in London painting the portrait of Queen Mary for her bridegroom, Philip II of Spain. This picture (at the Prado in Madrid) is his masterpiece. For it an annual salary and, supposedly, the honour of knighthood were conferred upon him.

More, Hannah (b. Feb. 2, 1745, Stapleton, Gloucestershire, Eng.—d. Sept. 7, 1833, Bristol, Gloucestershire), English religious writer, best known as a writer of popular tracts and as an educator of the poor.

As a young woman with literary aspirations, More made the first of her visits to London in 1773–74. She was welcomed into a circle of Bluestocking wits and was befriended by Sir Joshua Reynolds, Dr. Johnson, and Edmund Burke and, particularly, by David Garrick, who produced her plays *The Inflexible Captive* (1775) and *Percy* (1777). After Garrick's death in 1779 she forsook writing for the stage, and her strong piety and Christian attitudes, already intense, became more marked.

Through her friendship with the abolitionist philanthropist William Wilberforce, she was drawn to the Evangelicals. From her cottage in Somerset, she began to admonish society in a series of treatises beginning with *Thoughts on the Importance of the Manners of the Great to General Society* (1788). In the climate of alarm over the French Revolution, her fresh and forceful defense of traditional values met with strong approval.

Hannah More, detail of an oil painting by Sir Henry Raeburn; in the Louvre, Paris

Cliche Musees Nationaux

Her *Village Politics* (1792; under the pseudonym of Will Chip), written to counteract Thomas Paine's *Rights of Man,* was so successful that it led to the production of a series of "Cheap Repository Tracts." Produced at the rate of three a month for three years with the help of her sisters and friends, the tracts sold for a penny each, 2,000,000 being circulated in a single year. They advised the poor in ingeniously homely language to cultivate the virtues of sobriety and industry and to trust in God and in the kindness of the gentry.

Like most of her educated contemporaries, More believed that society was static and that civilization depended upon a large body of the poor, for whom the best education was one that reconciled them to their fate. Hence she established clubs for women and schools for children, in which the latter were taught the Bible, catechism, and skills thought to befit their station. She persevered in her efforts in spite of much opposition and abuse from country neighbours, who thought that even the most limited education of the poor would destroy their interest in farming, and from the clergy, who accused her of Methodism.

Her final popular success as a writer was her didactic novel *Coelebs in Search of a Wife* (1808). The feminist movement in the second half of the 20th century revived interest in her *Strictures on the Modern System of Female Education*, 2 vol. (1799; edited by Gina Luria, 1974).

More, Henry (b. 1614, Grantham, Lincolnshire, Eng.—d. Sept. 1, 1687, Cambridge, Cambridgeshire), English poet and philosopher of religion who was perhaps the best known of the group of thinkers known as the Cambridge Platonists.

Henry More, engraving by D. Loggan, 1679

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Though reared a Calvinist, More became an Anglican as a youth. At Christ's College, Cambridge, he encountered such Platonists as Edward Fowler and John Worthington. In 1639 he was elected to a fellowship at Cambridge.

More gradually abandoned his admiration for the thought of the French philosopher René Descartes, which separated mind and matter, and he came to hold that Cartesian philosophy must inevitably lead to some form of mechanical naturalism and to atheism. In their correspondence of 1648–49, published as *The Immortality of the Soule* (1659), and in his major metaphysical work, *Enchiridion Metaphysicum* (1671), More argued against Descartes's indentification of matter with extension. To deny that spirit exists in extension as well as thought, More maintained, was to reduce it to a nonentity that could exert no influence on the processes of the world. Not only individual minds but God must be extended: indeed, infinite space reveals certain of the attributes of deity. The latter concept may have influenced Sir Isaac Newton in his ideas about space. In a similar fashion, More sought to refute the claim of Thomas Hobbes that theism is impossible because the human mind cannot know an immaterial substance.

More's early poetry was written in a style akin to that of Edmund Spenser and treated metaphysical subjects. His religious views, most fully expressed in *An Explanation of the Grand Mystery of Godliness* (1660) and *Divine Dialogues* (1668), centred on his idea of reconciling Christian Platonism with 17th-century science. His ethical writings include *Enchiridion Ethicum* (1667); his work *An Antidote against Atheism* (1652) is curiously devoted, in large part, to witch and ghost stories. His poetry is published in Alexander Balloch Grosart's *Complete Poems of Henry More* (1878). Excerpts from his philosophical writings appear in Flora Isabel MacKinnon's *Philosophical Writings of Henry More* (1925).

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More, Paul Elmer (b. Dec. 12, 1864, St. Louis, Mo., U.S.—d. March 9, 1937, Princeton, N.J.), American scholar and conservative critic, one of the leading exponents of the New Humanism in literary criticism.

More was educated at Washington University, St. Louis, Mo., and at Harvard, where he met Irving Babbitt and where, from 1894 to 1895, he was assistant in Sanskrit. In 1895–97 he was associate in Sanskrit and classical literature at Bryn Mawr College, Bryn Mawr, Pa. He served as literary editor of *The Independent* (1901–03) and the *New York Evening Post* (1903–09) and as editor of *The Nation* (1909–14). More, like his associate and fellow leader of the New Humanists, Babbitt, was an uncompromising advocate of traditional critical standards and classical restraint in a time that saw the emergence of such naturalist writers as Theodore Dreiser and Sinclair Lewis, whose novels dealt with social issues. As a consequence he drew considerable critical fire, in particular from H.L. Mencken, who led the attack on More, Babbitt, and their disciple, Norman Foerster.

More's best known work is his *Shelburne Essays,* 11 vol. (1904–21), a collection of articles and reviews, most of which had appeared in *The Nation* and other periodicals. Also notable among More's writings are *Platonism* (1917); *The Religion of Plato* (1921); *Hellenistic Philosophies* (1923); *New Shelburne Essays* (1928–36); and his biography and last published work, *Pages from an Oxford Diary* (1937). His monumental *Greek Tradition,* 5 vol. (1924–31), is generally thought to be his finest work.

More, Sir Thomas, also called SAINT THOMAS MORE (b. Feb. 7, 1477, London, Eng.—d. July 6, 1535, London; canonized May 19, 1935; feast day June 22), humanist and statesman, chancellor of England (1529–32), who was beheaded for refusing to accept King Henry VIII as head of the Church of England. He is recognized as a saint by the Roman Catholic church.

Sir Thomas More, oil painting by Hans Holbein the Younger, 1527; in the Frick Collection, New York City

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Early life and career. Thomas—the eldest son of John More, a lawyer who was later knighted and made a judge of the King's Bench—was educated at one of London's best schools, St. Anthony's in Threadneedle Street, and in the household of John Morton, archbishop of Canterbury and chancellor of England. The future cardinal, a shrewd judge of character, predicted that the bright and winsome page would prove a "marvellous man." His interest sent the boy to the University of Oxford, where More seems to have spent two years, mastering Latin and undergoing a thorough drilling in formal logic.

About 1494 his father brought More back to London to study the common law. In February 1496 he was admitted to Lincoln's Inn, one of the four legal societies preparing for admission to the bar. In 1501 More became an "utter barrister," a full member of the profession. Thanks to his boundless curiosity and a prodigious capacity for work, he managed, along with the law, to keep up his literary pursuits. He read avidly from Holy Scripture, the Church Fathers, and the classics and tried his hand at all literary genres.

Although bowing to his father's decision that he should become a lawyer, More was prepared to be disowned rather than disobey God's will. To test his vocation to the priesthood, he resided for about four years in the Carthusian monastery adjoining Lincoln's Inn and shared as much of the monks' way of life as was practicable. Although attracted especially to the Franciscan order, More decided that he would best serve God and his fellowmen as a lay Christian. More, however, never discarded the habits of early rising, prolonged prayer, fasting, and wearing the hair shirt. God remained the centre of his life.

In late 1504 or early 1505, More married Joan Colt, the eldest daughter of an Essex gentleman farmer. She was a competent hostess for non-English visitors, such as the Dutch Humanist Desiderius Erasmus, who was given permanent rooms in the Old Barge on the Thames side in Bucklersbury in the City of London, More's home for the first two decades of his married life. Erasmus wrote his *Praise of Folly* while staying there.

The important negotiations More conducted in 1509 on behalf of a number of London companies with the representative of the Antwerp merchants confirmed his competence in trade matters and his gifts as an interpreter and spokesman. From September 1510 to July 1518, when he resigned to be fully in the king's service, More was one of the two undersheriffs of London, "the pack-horses of the City government." He endeared himself to the Londoners—as an impartial judge, a disinterested consultant, and "the general patron of the poor."

More's domestic idyll came to a brutal end in the summer of 1511 with the death, perhaps in childbirth, of his wife. He was left a widower with four children, and within weeks of his first wife's death, he married Alice Middleton, the widow of a London mercer. She was several years his senior and had a daughter of her own; she did not bear More any children.

More's *History of King Richard III,* written in Latin and in English between about 1513 and 1518, is the first masterpiece of English historiography. Though never finished, it influenced succeeding historians. William Shakespeare is indebted to More for his portrait of the tyrant.

The "Utopia." In May 1515 More was appointed to a delegation to revise an Anglo-Flemish commercial treaty. The conference was held at Brugge, with long intervals that More used to visit other Belgian cities. He began in the Low Countries and completed after his return to London his *Utopia,* which was published at Louvain in December 1516. The book was an immediate success with the audience for which More wrote it: the Humanists and an elite group of public officials.

Utopia is a Greek name of More's coining, from *ou-topos* ("no place"); a pun on *eu-topos* ("good place") is suggested in a prefatory poem. More's *Utopia* describes a pagan and communist city-state in which the institutions and policies are entirely governed by reason. The order and dignity of such a state provided a notable contrast with the unreasonable polity of Christian Europe, divided by self-interest and greed for power and riches, which More described in book i, written in England in 1516. The description of Utopia is put in the mouth of a mysterious traveler, Raphael Hythloday, in support of his argument that communism is the only cure against egoism in private and public life. Through dialogue More speaks in favour of the mitigation of evil rather than its cure, human nature being fallible. Among the topics discussed by More in *Utopia* were penology, state-controlled education, religious pluralism, divorce, euthanasia, and women's rights. The resulting demonstration of his learning, invention, and wit established his reputation as one of the foremost Humanists. Soon translated into most European languages, *Utopia* became the ancestor of a new literary genre, the Utopian romance.

Career as king's servant. On May 1, 1517, a mob of London apprentices attacked foreign merchants in the city. More's role in quenching this Evil-Mayday riot inspired a scene, attributed to Shakespeare, in *Sir Thomas More,* a composite Elizabethan play. More's success in the thorny negotiations with the French at Calais and Boulogne (September to December 1517) over suits born of the recent war made it harder for him to dodge royal service. That year he became a member of the king's council and from October was known as master of requests. He resigned his City office in 1518. While yielding to pressure, he embraced the chance of furthering peace and reform. The lord chancellor, Thomas Wolsey, now looked ready to implement some of the political ideas of the Christian Humanists.

Between 1515 and 1520 More campaigned spiritedly for Erasmus' religious and cultural program—Greek studies as the key to a theology renewed by a return to the Bible and the Church Fathers—in poems commending Erasmus' New Testament. More's Latin poems were published in 1518 under one cover between his *Utopia* and Erasmus' *Epigrammata;* they are extremely varied in metre and matter, their main topics being government, women, and death.

Erasmus offered his London friend as a model for the intelligentsia of Europe in letters to the German Humanist Ulrich von Hutten (1519); the Paris scholar Germain de Brie (1520), with whom More had just engaged in a polemic; and Guillaume Budé, whom More had met in June 1520 at the Field of Cloth of Gold, the meeting ground, near Calais, between Henry VIII and Francis I. According to Erasmus, simplicity was More's mark in food and dress. He shrank from nothing that imparted an innocent pleasure, even of a bodily kind. He had a speaker's voice and a memory that served him well for extempore rejoinders. "Born for friendship," he could extract delight from the dullest people or things. His family affections were warm yet unobtrusive. He gave freely and gladly, expecting no thanks. Amid his intense professional activity, he found hours for prayer and for supervising his domestic school. Most of his charges were girls, to whom he provided the most refined classical and Christian education.

In 1520 and 1521 More took part in talks, at Calais and Brugge, with the emperor Charles V and with the Hansa merchants. In 1521 he was made undertreasurer and knighted. His daughter Margaret married William Roper, a lawyer. For Henry VIII's *Defense of the Seven Sacraments,* More acted as "a sorter out and placer of the principal matters." When Martin Luther hit back, More vindicated the king in a learned, though scurrilous, *Responsio ad Lutherum* (1523). In addition to his routine duties at the Exchequer, More served throughout these years as "Henry's intellectual courtier," secretary, and confidant. He welcomed foreign envoys, delivered official speeches, drafted treaties, read the dispatches exchanged between the king and Wolsey, and answered in the king's name. Often he rode posthaste between the cardinal's headquarters at Westminster and Henry's various hunting residences. In April 1523 More was elected speaker of the House of Commons; while loyally striving to secure the government's ends, he made a plea for truer freedom of speech in Parliament. The universities—Oxford in 1524, Cambridge in 1525—made him their high steward.

By 1524 More had moved to Chelsea. The Great House he built there bore the stamp of his philosophy, its gallery, chapel, and library all geared toward studious and prayerful seclusion. In 1525 he was promoted to chancellor of the duchy of Lancaster, which put a large portion of northern England under his judiciary and administrative control.

On More's return from an embassy to France in the summer of 1527, Henry VIII "laid the Bible open before him" as proof that his marriage to Catherine of Aragon, who had failed to produce a male heir, was void, even incestuous, because of her previous marriage to Henry's late brother. More tried in vain to share the king's scruples, but long study confirmed his view that Catherine was the king's true wife. After being commissioned in March 1528 by Bishop Tunstall of London to read all heretical writings in the English language in order to refute them for the sake of the unlearned, he published seven books of polemics between 1529 and 1533—the first and best being *A Dialogue Concerning Heresies.*

Years as chancellor of England. Together with Tunstall, More attended the congress of Cambrai at which peace was made between France and the Holy Roman Empire in 1529. Though the Treaty of Cambrai represented a rebuff to England and, more particularly, a devastating reverse for Cardinal Wolsey's policies, More managed to secure the inclusion of his country in the treaty and the settlement of mutual debts. When Wolsey fell from power, having failed in his foreign policy and in his efforts to procure the annulment of the king's marriage to Catherine, More succeeded him as lord chancellor on Oct. 26, 1529.

On Nov. 3, 1529, More opened the Parliament that was later to forge the legal instruments for his death. As the king's mouthpiece, More indicted Wolsey in his opening speech and, in 1531, proclaimed the opinions of universities favourable to the divorce; but he did not sign the letter of 1530 in which England's nobles and prelates, including Wolsey, pressured the pope to declare the first marriage void, and he tried to resign in 1531, when the clergy acknowledged the king as their supreme head, albeit with the clause "as far as the law of Christ allows."

More's longest book, *The Confutation of Tyndale's Answer,* in two volumes (1532 and 1533), centres on "what the church is." To the stress of stooping for hours over his manuscript More ascribed the sharp pain in his chest, perhaps angina, which he invoked when begging Henry to free him from the yoke of office. This was on May 16, 1532, the day when the governing body (synod) of the church in England delivered to the crown the document by which they promised never to legislate or so much as convene without royal assent, thus placing a layperson at the head of the spiritual order.

More meanwhile continued his campaign for the old faith, defending England's antiheresy laws and his own handling of heretics, both as magistrate and as writer, in two books of 1533: the *Apology* and the *Debellacyon.* He also laughs away the accusation of greed levelled by William Tyndale, translator of parts of the first printed English Bible. More's poverty was so notorious that the hierarchy collected £5,000 to recoup his polemical costs, but he refused this grant lest it be construed as a bribe.

Indictment, trial, and execution. More's refusal to attend the coronation of Anne Boleyn, whom Henry married after his divorce from Catherine in 1533, marked him out for vengeance. Several charges of accepting bribes recoiled on the heads of his accusers. In February 1534 More was included in a bill of attainder for alleged complicity with Elizabeth Barton, who had uttered prophecies against Henry's divorce, but he produced a letter in which he had warned the nun against meddling in affairs of state. He was summoned to appear before royal commissioners on April 13 to assent under oath to the Act of Succession, which declared the king's marriage with Catherine void and that with Anne valid. This More was willing to do, acknowledging that Anne was in fact anointed queen. But he refused the oath as then administered because it entailed a repudiation of papal supremacy. On April 17, 1534, he was imprisoned in the Tower. More welcomed prison life. But for his family responsibilities, he would have chosen for himself "as strait a room and straiter too," as he said to his daughter Margaret, who after some time took the oath and was then allowed to visit him. In prison, More wrote *A Dialogue of Comfort against Tribulation,* a masterpiece of Christian wisdom and of literature.

His trial took place on July 1, 1535. Richard Rich, the solicitor general, a creature of Thomas Cromwell, the unacknowledged head of the government, testified that the prisoner had, in his presence, denied the king's title as supreme head of the Church of England. Despite More's scathing denial of this perjured evidence, the jury's unanimous verdict was "guilty." Before the sentence was pronounced, More spoke "in discharge of his conscience." The unity of the church was the main motive of his martyrdom. His second objection was that "no temporal man may be head of the spirituality." Henry's marriage to Anne Boleyn, to which he also referred as the cause for which they "sought his blood," had been the occasion for the assaults on the church: among his judges were the new queen's father, brother, and uncle.

More was sentenced to the traitor's death—"to be drawn, hanged, and quartered"—which the king changed to beheading. During five days of suspense, More prepared his soul to meet "the great spouse" and wrote a beautiful prayer and several letters of farewell. He walked to the scaffold on Tower Hill. "See me safe up," he said to the lieutenant, "and for my coming down let me shift for myself." He told the onlookers to witness that he was dying "in the faith and for the faith of the Catholic Church, the king's good servant and God's first." He altered the ritual by blindfolding himself, playing "a part of his own" even on this awful stage.

The news of More's death shocked Europe. Erasmus mourned the man he had so often praised, "whose soul was more pure than any snow, whose genius was such that England never had and never again will have its like." The official image of More as a traitor did not gain credence even in Protestant lands.

Assessment. Though the triumph of Anglicanism brought about a certain eclipse of Thomas More, the publication of the state papers restored a fuller and truer picture of More, preparing public opinion for his beatification (1886). He was canonized by Pius XI in May 1935. Though the man is greater than the writer, and though nothing in his life "became him like the leaving of it," his "golden little book" *Utopia* has earned him greater fame than the crown of martyrdom or the million words of his English works.

Erasmus' phrase describing More as *omnium horarum homo* was rendered later as "a man for all seasons" and was given currency by Robert Bolt's play *A Man for All Seasons* (1960). Monuments to him have been placed in Westminster Hall, the Tower of London, and the Chelsea Embankment, all in London. In the words of the English Catholic apologist G.K. Chesterton, More "may come to be counted the greatest Englishman, or at least the greatest historical character in English History." (G.P.Ma.)

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Studies of his life and works include R.W. Chambers, *Thomas More* (1935, reissued 1976), although it has been criticized for toning down the starkness of More's asceticism, the radicalism of his Utopian vision, his hatred of schism and heresy, and the dogmatic motives of his martyrdom; E.E. Reynolds, *The Field Is Won: The Life and Death of Saint Thomas More* (1968, reissued as *The Life and Death of St. Thomas More,* 1978); R.S. Sylvester and G.P. Marc'hadour (eds.), *Essential Articles for the Study of Sir Thomas More* (1977); J.A. Guy, *The Public Career of Sir Thomas More* (1980), emphasizing More's role as government administrator; Alistair Fox, *Thomas More: History and Providence* (1982); Anthony Kenny, *Thomas More* (1983); George M. Logan, *The Meaning of More's Utopia* (1983); Ruth Norrington, *In the Shadow of a Saint: Lady Alice More* (1983); Richard Marius, *Thomas More* (1984); Louis L. Martz, *Thomas More: The Search for the Inner Man* (1990); and Dominic Baker-Smith, *More's Utopia* (1991).

Møre og Romsdal, *fylke* (county), western Norway. The county faces the Norwegian Sea. It includes the Stadlandet (peninsula) in the south and extends northward to Trondheim Fjord. The county seat is Molde. The bleak Dovre Mountains embrace an inland corner of its terrain that is characterized by a fjord-indented coastline, rugged peaks, deep valleys, and many offshore islands. About half of the inhabitants live on the islands. The county comprises three regions: Sunnmøre (South Møre) in the south, around the port of Ålesund; Rom Valley, in the centre, with many scenic waterfalls and the port of Åndalsnes; and Nordmøre (North Møre), in the north around the fishing port of Kristiansund. The country's economy is based on the coastal fisheries, tourism, and scattered farming; there is extensive small-scale manufacturing around the larger towns. Area 5,832 square miles (15,104 square km). Pop. (1995 est.) 240,215.

Morea, Despotate of, autonomous Byzantine principality located on the Greek Peloponnese (Morea). It was established in the mid-14th century by the Byzantine emperor John VI Cantacuzenus (reigned 1347–54) as an appanage for his son Manuel. Manuel Cantacuzenus consolidated his territory against the claims of Latins (western Europeans) and the inroads of Turks, but after his death (1380) the Palaeologians seized Byzantine territory in the Morea from Manuel's heirs. Theodore I Palaeologus (reigned 1383–1407), son of Byzantine emperor John V Palaeologus, ruled in the Morea from his capital at Mistra (modern Mistras, Greece). He consolidated Byzantine rule by recognizing Turkish suzerainty and settling Albanians in the territory to bring new blood and workers into the despotate, which, under his successor, became a bastion of Byzantine strength in the midst of a crumbling empire.

Mistra, near the site of ancient Sparta, was the residence of the despots. Their tombs were located there, and an important cultural centre grew up within the castle walls. Educated Greeks, scholars, and artists flocked there in the 14th century.

By the mid-15th century the Despotate of Morea had incorporated the remaining Latin possessions on the Peloponnese. But the Turks destroyed the Hexamilion wall built across the Isthmus of Corinth to protect southern Greece and overran the despotate in 1460 to incorporate it into the Ottoman Empire.

Moréas, Jean, pseudonym of YÁNNIS PAPADIAMANTÓPOULOS (b. April 15, 1856, Athens, Greece—d. March 31, 1910, Paris, France), Greek-born poet who played a leading part in the French Symbolist movement.

Early inspired by a French governess who instilled in him a passion for French poetry, Moréas moved to Paris in 1879, becoming a familiar figure in the literary circles frequenting the cafés and in the literary pages of newspapers and reviews. He published two manifestos, one in *XIXe Siècle* (Aug. 11, 1885) and one in the literary supplement of *Le Figaro* (Sept. 18, 1886), that helped establish the name Symbolism for the movement that was growing out of and replacing Decadence. In 1886 he founded the periodical *Le Symbolist.*

Before Moréas immigrated to France, he published one volume of verse, *Tourterelles et vipères* (1878; "Turtledoves and Vipers"), in Greek and French. His first wholly French volumes, *Les Syrtes* (1884) and *Les Cantilènes* (1886), were firmly embedded in the Decadent and Symbolist aesthetics. In the preface to *Le Pèlerin passioné* (1891; "The Passionate Pilgrim"), however, Moréas began to foresake Symbolism; there he called for a return to the spirit of classicism. Moréas founded the *école romane* ("Roman school") and, with his disciples Raymond de la Tailhède, Maurice du Plessys, Ernest Raynaud, and Charles Maurras, reverted to classical forms and subject matter; free verse was abandoned and classical sources of inspiration were used. *Énone au clair visage* (1893) and *Eriphyle* (1894) are representative of Moréas' work during this period; along with other poems, they were later collected as *Poèmes et sylves, 1886–1896* (1907; "Poems and Forests"). Moréas wrote a verse play, *Iphigénie à Aulide* (1903), which was closely inspired by Euripides and which met with considerable success when presented in the *théâtre antique* of Orange and subsequently on the stage of the Odéon in Paris. In Moréas' last work, *Les Stances* (1899–1920; "The Stanzas"), his intellectual development is chronicled with a vigorous yet melancholy classicism.

Moréas

Harlingue—H. Roger-Viollet

Moreau, Gustave (b. April 6, 1826, Paris, France—d. April 18, 1898, Paris), French Symbolist painter known for his erotic paintings of mythological and religious subjects.

The only influence that really affected Moreau's development was that of his master, Théodore Chassériau (1819–56), an eclectic painter whose depictions of enigmatic sea goddesses deeply impressed his student. In the Salon of 1853 he exhibited "Scene from the Song of Songs" and the "Death of Darius," both conspicuously under the influence of Chassériau.

"The Apparition (Dance of Salome)," oil painting by Gustave Moreau, *c.* 1876; in the Fogg Art Museum, Harvard University, Cambridge, Mass.

By courtesy of the Fogg Art Museum, Harvard University, Grenville L. Winthrop Bequest

Moreau's "Oedipus and the Sphinx" (1864; Metropolitan Museum of Art, New York City) and his "The Apparition (Dance of Salome)" (*c.* 1876; Fogg Art Museum, Cambridge, Mass.) and "Dance of Salome" (*c.* 1876; Musée Gustave Moreau, Paris) show his work becoming increasingly concerned with exotic eroticism and violence, and his richly crowded canvases made greater use of dramatic lighting to heighten his brilliant, jewel-like colours. His last work, "Jupiter and Sémélé" (1896; Musée Gustave Moreau), is the culmination of such tendencies. Moreau's art has often been described as decadent. He made a number of technical experiments, including scraping his canvases; and his nonfigurative paintings, done in a loose manner with thick impasto, have led him to be called a herald of Abstract Expressionism.

Moreau succeeded Elie Delaunay as professor at the École des Beaux-Arts, and his teaching was highly popular. He was a very influential teacher of some of the artists of the Fauve movement, including Matisse and Rouault. At his death, Moreau left to the state his house and about 8,000 works, which now form the Musée Gustave Moreau in Paris.

Moreau, Jeanne (b. Jan. 23, 1928, Paris), actress best known for her multifaceted performances in French New Wave films of the 1950s and '60s.

Moreau studied at the Conservatoire Nationale d'Art Dramatique and became at 20 years of age the youngest member of the Comédie-Française. *Le Dernier Amour* (1949; *The Last Love*) marked her film debut, but *Ascenseur pour l'échafaud* (1957; "Elevator to the Scaffold"; released as *Frantic*, 1961) and *Les Amants* (1958; *The Lovers*) brought her international fame as the embodiment of feminine mystery.

Her performances as alienated modern women in *Moderato cantabile* (1960) and *La notte* (1961; *The Night*) and as the volatile, enigmatic Catherine of *Jules et Jim* (1961) established her as a remarkable actress and compelling screen presence. Notable later films included *Le Procès* (1962; *The Trial*), *Le Journal d'une femme de chambre* (1964; *Diary of a Chambermaid*), *Campanadas a Medianoche* (1966; *Falstaff,* or *Chimes at Midnight*), and *Nathalie Granger* (1972). She also turned to directing, most notably with *L'Adolescente* (1979; "The Adolescent"), which starred Simone Signoret.

Moreau, (Jean-) Victor (-Marie) (b. Feb. 14, 1763, Morlaix, Fr.—d. Sept. 2, 1813, Lahn, Bohemia), leading French general of the French Revolutionary Wars (1792–99); he later became a bitter opponent of Napoleon Bonaparte's regime.

The son of a lawyer, Moreau studied law at Rennes, where, in 1788, he led a student riot in protest against King Louis XVI's attempts to restrict the authority of the Parlements (high courts of justice). Moreau welcomed the outbreak of the Revolution in the following year and immediately organized a unit of the national guard at Rennes. Elected lieutenant colonel of a battalion of volunteers in 1791, he joined Gen. Charles-François du Périer Dumouriez's Army of the North after France went to war with Austria and Prussia in 1792. Appointed general of a division in April 1794, Moreau helped Gen. Charles Pichegru conquer the Austrian Netherlands, and in March 1795 he replaced Pichegru as commander of the Army of the North.

On March 14, 1796, Moreau was given command of the armies of the Rhine and Moselle. He crossed the Rhine into Germany on June 24 and advanced toward Munich. Confronted with overwhelming opposition, he made a brilliant tactical retreat through the Black Forest, arriving in Alsace in the autumn. In April 1797 he discovered documents indicating that his friend Pichegru had been conspiring with the French émigrés (nobles in exile). He delayed in presenting this evidence to the republican government in Paris, and, as a result, he was relieved of his command on September 9, five days after the royalists had been expelled from the government (and Pichegru arrested) in a coup d'état.

Nevertheless, Moreau was made commander of the Army of Italy in April 1799. Returning to Paris in October, he played a minor role in the military coup d'etat of 18 Brumaire (Nov. 9, 1799) that brought Bonaparte to power. Bonaparte rewarded him with the command of the Army of the Rhine and troops in the Helvetic Republic, and on Dec. 3, 1800, Moreau decisively defeated the Austrians at Hohenlinden. The victory forced Austria to sue for peace, but it also aroused Bonaparte's jealousy. The dictator's wife, Joséphine, made no attempt to hide her contempt for Moreau, and, as a result, Moreau renewed his relations with Pichegru, who was plotting to overthrow Bonaparte's regime. On Feb. 5, 1804, Moreau was arrested. Banished by Bonaparte, he emigrated to the United States. Moreau returned to Europe in 1813 on the invitation of French royalists and joined the allied forces arrayed against France. Wounded at the Battle of Dresden on August 26–27, he died several weeks later.

Victor Moreau, engraving by Antoine Cardon, 1802

H. Roger-Viollet

Moreau River, river, formed by the confluence of several headstreams in Butte and Harding counties, northwestern South Dakota, U.S. It flows about 290 mi (470 km) east through the Cheyenne River Indian Reservation, where it receives several north-bank tributaries (including Thunder Butte and Little Moreau), to the Missouri River south of Mobridge. The lower Moreau Basin was inundated by the Oahe Dam, a major flood-control unit of the Missouri River Basin project. The river was named for an early French trader.

Morecambe Bay, bay of the Irish Sea deeply indenting the west coast of England, lying south of Solway Firth, and bounded on the north by the county of Cumbria, England, and on the south by Lancashire. The towns of Barrow-in-Furness and Morecambe and Heysham are situated to the north and south of the entry to the bay. Much of the Lake District massif, lying to the north, drains into the bay.

Moree, town, northern New South Wales, Australia, on the Gwydir River, in the Western Slopes district. Originating in 1848 as a livestock station, it became a village in 1852, a town in 1862, and a municipality in 1890. Its name comes from an Aboriginal word for "rising sun," "long spring," or "water hole." At the junction of the Gwydir and Newell highways, with regular air and rail service to Sydney (319 mi [513 km] southeast), Moree serves an area of pastoralism and grain farming. It is also known as a health spa, based on artesian mineral water drawn from a bore 3,000 ft (900 m) deep made in 1895. Broadwater Creek, a local stream, is a rare phenomenon; flowing into the Gwydir River during times of high water, it reverses itself at low water to flow into the Mehi River. Flooding is an occasional problem. A major satellite telecommunications station is located near Moree. Pop. (1981) 10,459.

Morehead City, seaport resort, Carteret county, western North Carolina, U.S., on Bogue Sound (there receiving the Newport River) and on the Atlantic Intracoastal Waterway, 32 mi (51 km) south-southeast of New Bern. In 1853, John Motley Morehead, governor of North Carolina (1841–45), purchased land on the site (then called Shepherd's Point), the projected terminus of the Atlantic and North Carolina Railroad, which he believed had great potential for an Atlantic seaport. The railroad arrived in 1858, and the town was incorporated in 1861; it was captured by Union troops the next year. Morehead City is now the state's only deepwater port north of Wilmington, with one of the world's largest tobacco terminals and accommodation facilities for ocean-going and sport- and commercial-fishing craft. It has become a popular resort with a large summer cottage population and is highly favoured by Gulf Stream fishermen. Beaufort, just across the Intracoastal Waterway, is a colonial fishing village, and Atlantic Beach, Fort Macon, and Theodore Roosevelt Natural Area State parks are on Bogue Banks offshore. The Croatan National Forest is a few miles northwest. Pop. (1990) 6,046.

Morehouse, Comet, comet named after Daniel Walter Morehouse, a U.S. astronomer. It was observed in 1908 and was remarkable for variations in the form and structure of its tail. This on several occasions appeared to break into fragments and to be completely separated from the head. Also, its tail became visible at twice the Earth's distance from the Sun (2 astronomical units), whereas most comets start to produce a visible tail only at about 1.5 astronomical units from the Sun.

Morel (poet): *see* Deschamps, Eustache.

Morel, Benedict Augustin (b. Nov. 22, 1809, Vienna—d. March 30, 1873, Saint-Yon, Fr.), Austrian-born French psychologist who introduced the term dementia praecox to refer to a mental and emotional deterioration beginning at the time of puberty. The disorder was renamed schizophrenia in 1908 by the Swiss psychologist Eugen Bleuler.

A friend of the physiologist Claude Bernard and an admirer of Charles Darwin's work on evolution, Morel sought explanations for mental illness in heredity, although he later came to believe that external agents such as alcohol and drugs could also affect the course of mental deterioration. At the Mareville Asylum near Nancy, Fr., he studied the mentally retarded, searching their family histories and examining such influences as poverty and early physical illnesses. Morel saw mental deficiency as the end stage of a process of mental degeneration that included mental illness. He articulated his theory of mental illness in *Traité des maladies mentales* (1860; "A Treatise on Mental Illness"), in which he coined the term *demence-precoce* to refer to mental degeneration.

Morelia, city, capital of Michoacán state, west central Mexico. It lies between the Chiquito and Grande rivers, at the southern extreme of the central plateau, at an altitude of 6,368 ft (1,941 m). Originally known as Valladolid, the city was founded in 1541. The site was already inhabited by Tarascan Indians, and people of Indian descent still predominate. In the colonial period the city had the reputation of being an intellectual and art centre, stimulated by the Colegio San Nicolás (founded in 1540 in Pátzcuaro and moved to Morelia in 1580), thought to be the oldest institution of higher learning in Mexico. The Baroque cathedral, completed in 1744, is an outstanding example of Spanish Renaissance church architecture, and the colonial governor's palace is also an imposing structure. The 3-mi (5-km) aqueduct, carried on arches, was built in 1785 as a famine-relief project. During the Mexican wars for independence, the city served briefly as the base of operations for the revolutionary leader Miguel Hidalgo y Costilla. In 1828 the city was renamed in honour of José María Morelos y Pavón, a locally born leader of the independence movement. Since 1582, when it replaced Pátzcuaro as the capital of Michoacán, Morelia has served as a commercial and processing centre for an extensive agricultural region that yields principally corn (maize), beans, fruit, sugarcane, and cattle. The Michoacan University of San Nicolás of Hidalgo (1957), which includes the original college, and the University of Michoacán (1939) are located in Morelia. The city has rail, highway, and air connections with all major Mexican urban centres. Pop. (2000 prelim.) 549,404.

Cathedral and plaza gardens, Morelia, Mex.
Carl Frank—Photo Researchers

Morelles (board game): *see* Nine Men's Morris.

Morellet, André (b. March 7, 1727, Lyon—d. Jan. 12, 1819, Paris), French economist and miscellaneous writer, an associate of the Philosophes and a contributor to the *Encyclopédie.*

Educated by the Jesuits in Lyon and at the Sorbonne, Morellet took holy orders, but his designation of abbé was the chief thing clerical about him. A frequenter of the salon of Mme Geoffrin (of whom he wrote an *Éloge*), he had a ready and biting wit, and Voltaire called him "L'Abbé Mord-les" (the Abbé Bite-Them). As an economist he expounded the views of Anne-Robert-Jacques Turgot. In 1785 he was elected to the Académie Française and preserved its archives during the Terror, which he fearlessly condemned in several pamphlets. His *Mélanges de littérature et de philosophie du XVIII^e^ siècle,* containing selections from his previous works, appeared in 1818, and his valuable, elegantly written *Mémoires sur le XVIII^e^ siècle et la Révolution* was published in 1821.

Morelli, Giovanni (b. Feb. 25, 1816, Verona, Kingdom of Lombardy and Venetia—d. Feb. 28, 1891, Milan), Italian patriot and art critic whose methods of direct study became basic for subsequent art criticism.

Morelli studied at Munich University, where he acquired so great a command of German as to write his principal works in that language. He studied medicine but never practiced; and he took part in the Revolution of 1848, after which he devoted much of his time to politics. In 1861, although a Protestant, he was elected deputy for Bergamo in the first free Italian Parliament. Later, he became alarmed by increasingly democratic tendencies and in 1870 resigned his seat, but he was made a senator in 1873.

His principal achievement was to secure the passing of an act (named after him) prohibiting the sale of works of art from public or religious institutions and the appointment of a commission to nationalize and conserve all major works that could be regarded as public property, thus undoubtedly saving many masterpieces for Italy.

His *Italian Masters in German Galleries* (1880; Eng. trans., 1883) marks an epoch in 19th-century art criticism. The so-called Morellian method was followed in this and his *Critical Studies.* Essentially 19th century in its scientific rigorousness, its apparently simple thesis is that the evidence presented by the pictures themselves is superior to all other evidence. The crux of the method was that all painters, however great, tend to fall back on a formula for rendering such details as the ear or the fingernails, and that these minor details were therefore the most characteristic parts of a picture and the surest guide to attribution. Both Morelli himself and his principal follower, Bernard Berenson, corrected hundreds of false attributions; but the limitations of his method did not pass unnoticed at the time.

Morelos, inland state, central Mexico. It is bordered by the Federal District on the north and by the states of Puebla on the east and southeast, Guerrero on the south and southwest, and México on the west. Its 1,911-sq-mi (4,950-sq-km) territory lies on the southern slope of the central Mexican Plateau, its surface roughly broken by mountain ranges. The valleys thus formed give Morelos a variety of climates and vegetation types. It is drained by the Río Amacuzac, a northern tributary of the Mescala, or Balsas. The state is named after José María Morelos y Pavón, one of the heroes of Mexico's war for independence. Morelos was also the birthplace of Emiliano Zapata, a leader of one of the revolutionary factions of the Mexican Revolution. Zapata conducted many of his military campaigns against the central government in Morelos.

Morelos is one of the most flourishing agricultural states of Mexico, producing sugarcane, rice, corn (maize), wheat, fruits, and vegetables. Although the state is supposed to have several of the minerals found in that part of Mexico (silver, mercury, iron, lead, gold, petroleum, and coal), its mining industries have not been developed. Railways and a superhighway cross the state, linking Cuernavaca, the state capital, with Mexico City and Acapulco. The population includes a large percentage of Indians and mestizos. Pop. (1980) 947,000.

Morelos (y Pavón), José María (b. Sept. 30, 1765, Valladolid, Mex.—d. Dec. 22, 1815, San Cristóbal), revolutionary priest who assumed leadership of the Mexican independence movement after Miguel Hidalgo's 1810 rebellion and subsequent execution.

Morelos, detail of a portrait by an unknown artist, 19th century
By courtesy of the Instituto Nacional de Antropologia e Historia, Mexico City

Born in poverty, Morelos worked as a muleteer and cowhand until at the age of 25 he began study for the priesthood at the Colegio de San Nicolás in Valladolid. He held several obscure curacies serving mostly Indians and mestizos. Early in 1811 he joined Miguel Hidalgo's insurrection and, after Hidalgo's death (July 31), took command of the movement in southern Mexico. Between 1812 and 1815 he controlled most of Mexico southwest of Mexico City, holding at one time or another Acapulco, Oaxaca, Tehuacán, and Cuatla. Lacking manpower to consolidate control over all the region after his victories, he turned increasingly to guerrilla tactics.

Morelos called the Congress of Chilpancingo in 1813 to form a government and draft a constitution. In November the congress declared Mexico's independence, and in October 1814, at Apatzingán, it promulgated an egalitarian constitution. The congress was safe, however, only so long as it moved from place to place under the protection of Morelos' nomadic army. Finally, royalist forces caught up with the insurgents, but Morelos fought a rearguard action allowing most of the revolutionary government to escape. He was captured, however, and, after being defrocked, was shot as a traitor.

Morena, also called PECH MORENA, town, administrative headquarters of Morena district, Madhya Pradesh state, central India. An agricultural trade centre, it is connected by rail and national highway with Gwalior and Āgra. Oilseed milling and cotton weaving are the chief industries. The town has three colleges affiliated with Jiwaji University.

Morena district (4,473 sq mi [11,586 sq km]), constituted in 1948, comprises the former Sheopur and Tonwarghar princely states. In the lower Chambal Basin, it consists of an alluvial tract in the north, cut by numerous ravines, and a forested area toward the south. Wheat and oilseeds are the main crops; building stone is quarried. The district has a cement factory, and Sheopur (*q.v.*) is an important trade centre. Pop. (1991) town, 147,124; district, 1,707,619.

Morena, Sierra, mountain range, central Spain, forming the southern edge of the Meseta Central and stretching for about 200 mi (320 km) from the Sierra de Alcaraz (5,896 feet [1,797 m]) in the east to the Portuguese border in the west. It includes many minor ranges that run transversely: *e.g.,* the Sierras Madrona, Sur de Alcudia, and de Aracena. The Sierra Morena forms the main watershed between the Guadiana and Guadalquivir rivers and is mostly wild, desolate country thickly covered with dense evergreen bushes and shrubs. Its great breadth has long made it a formidable barrier in the history of Spain. Silver, lead, and copper are mined in the Linares region, mercury at Almadén, and copper at Ríotinto and at Tharsis in the Sierra de Aracena. The chief communication route between Madrid and Seville runs through Córdoba, the Despeñaperros Pass, and La Mancha.

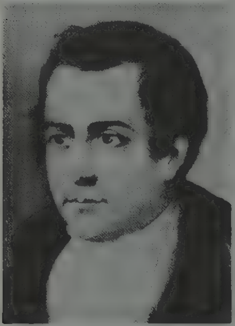
Moreno, *partido* (county) on the western periphery of Gran (Greater) Buenos Aires, Argentina. The settlement of Moreno was founded by Amancio Alcorta in 1860. Five years later the *partido* was established. In 1864 the western railroad from Buenos Aires was extended through Moreno toward Luján.

The present-day *partido* covers 69 square miles (180 square km) and is bordered by the *partidos* of General Sarmiento (northeast), Morón and Merlo (southeast), General Rodriguez (southwest), and Pilar (northwest). The Reconquista River forms its boundary on the southeast and southwest. Besides the *cabecera* (principal built-up area) of Mariano Moreno, the major localities within the *partido* are Francisco Alvarez, Paso del Rey, and La Reja.

Moreno experienced rapid population growth in the 1960s and '70s, but its population density is still less than most other *partidos* around Buenos Aires. The western railroad crosses the *partido,* serving Mariano Moreno *cabecera* as well as the other localities. Pop. (1999 est.) *partido,* 398,023.

Moreno, Mariano (b. Sept. 3, 1778, Buenos Aires, viceroyalty of the Rió de la Plata [now in Argentina]—d. 1811, at sea), patriot who was the intellectual and political leader of Argentina's movement for independence.

After practicing law in Buenos Aires and holding several posts in the Spanish colonial bureaucracy, Moreno came to public attention in September 1809 with his tract *Representación de los hacendados* ("Landowners' Petition"). His argument attacking the restrictive Spanish Navigation Acts and urging that Argentines be free to trade with other nations induced concessions by the viceroy two months later.



Moreno, portrait by an unknown artist; in the National Historical Museum, Buenos Aires

By courtesy of the Archivo General de la Nacion, Buenos Aires

In May 1810 a provisional junta replaced the Spanish officials in Buenos Aires, and Moreno became its secretary of military and political affairs. His ability and energy soon made him the leader of the junta. Among the decisions in which he was prominent were those to exile the viceroy and to take aggressive action to extend the revolution from Buenos Aires into the provinces. He also founded the national library and established and edited the government newspaper, *La Gaceta de Buenos Aires.* Moreno led in advocating complete separation from Spain, a course too radical for some members of the junta. (Independence was not declared until 1816.) Conservative opposition to him grew and finally forced his resignation at the end of 1810. He accepted a diplomatic mission to Brazil and Great Britain but died at sea on his way to London.

morepork, also called MOPOKE, in Australia, a bird species known elsewhere as the tawny frogmouth (*see* frogmouth); the Australian boobook owl is also sometimes called morepork.

Moresgue dance: *see* Morris dance.

Moreto (y Cabaña), Agustín (baptized April 9, 1618, Madrid, Spain—d. Oct. 26/27, 1669, Toledo), Spanish dramatist whose plays were extremely popular in his time and who was considered the equal of his great near-contemporary Lope de Vega. His reputation has steadily diminished over the years, and he is now considered a highly competent but unoriginal writer.

The son of Italian parents, Moreto studied law at the University of Alcalá and then returned to Madrid. He wrote plays with remarkable ease, turning out more than 100 dramas that brought him great popular success. He took minor orders in 1642 and entered a monastery in 1659.

Moreto's output falls into four groups: religious plays dealing with the lives of saints; historical plays; comedies of intrigue, in which the plot is more important than the characterization; and comedies of character. Gifted with a sense for stagecraft, he made old stories come alive on stage. His masterpiece, *El desdén con el desdén* ("Contempt with Contempt"), based on parts of four plays of Lope de Vega, is marked, as are all his best plays, by its elegance and faithfulness to real life.

Moreton Bay, shallow inlet of the Pacific Ocean, indenting southeastern Queensland, Australia. Sheltered on the north by Bribie Island and on the east and south by Moreton and Stradbroke islands, the bay measures 65 by 20 miles (105 by 32 km). It is filled with numerous shoals, and some low islands lie to the south. In 1770 the British navigator Captain James Cook sailed through South Passage between the main offshore islands leading to the bay, which he named after James Douglas, 14th Earl of Morton. The name, misspelled, was also originally applied to the mainland area that eventually became Queensland. The bay, explored in 1823 by John Oxley, was the site of the state's first settlement, a penal colony established in 1824 at Redcliffe. Receiving the Brisbane River, the bay is the gateway to the port of Brisbane, with the primary shipping channel passing between Bribie and Moreton. Its waters yield game and commercial fish.

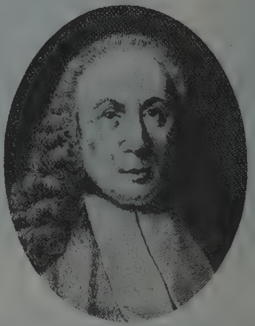
Moreton Bay pine, also called HOOP PINE, or COLONIAL PINE (species *Araucaria cunninghamii*), a large evergreen timber conifer of the family Araucariaceae, native to the coastal rain forests of northern New South Wales to northern Queensland in eastern Australia and the Arfak Mountains of western New Guinea. The tree reaches a height of about 60 m (200 feet); its branches are horizontal and bear dense tufts of branchlets near the tips. The leaves are dagger-shaped or triangular.

Moreton Island, island lying across Moreton Bay from Brisbane, off the southeast coast of Queensland, Australia. It is about 25 miles (40 km) long by 5 miles (8 km) wide and has an area of 66 square miles (171 square km). The island's sand dunes, originally wind-formed but now fixed by vegetation, may be the world's loftiest, rising to 912 feet (278 m) at Mount Tempest. In 1770 Captain James Cook, the British navigator, visited the island, which he thought to be a peninsula, and named its northwest extremity Cape Moreton. The British navigator who surveyed the entire coast of Australia, Matthew Flinders, determined its insular characteristics in 1799. Site of the state's first lighthouse in 1857, Moreton also had a short-lived whaling station at Tangalooma in 1952. A ferry links the island to Brisbane. Pop. (1981) 549.

Consult the INDEX *first*

Morgagni, Giovanni Battista (b. Feb. 25, 1682, Forlì, Italy—d. Dec. 5, 1771, Padua), Italian anatomist and pathologist whose works helped make anatomy an exact science.

After graduating in 1701 at Bologna with degrees in philosophy and medicine, Morgagni acted as prosector to A.M. Valsalva, whom he assisted in preparing the latter's celebrated *De Aure Humana* (1704; *Anatomy and Diseases of the Ear*). Morgagni then succeeded Valsalva in his position as anatomical demonstrator, but after a time he gave up that post and spent several years in Padua, where in 1710 he became professor of medicine. In 1715 he was promoted to the chair of anatomy.



Morgagni, engraving by Giovanni Volpato

Archiv fur Kunst und Geschichte, Berlin

Morgagni's *Adversaria Anatomica* (1706–19) established his reputation as an accurate anatomist and helped make pathological anatomy an exact science. It was not until 1761, however, that Morgagni published his greatest work, *De Sedibus et Causis Morborum per Anatomen Indagatis* (*The Seats and Causes of Diseases Investigated by Anatomy*), which marked him as a founder of morbid anatomy. The work treats the morbid conditions of the entire body and contains records of 640 dissections. Although he was the first to demonstrate the necessity of basing diagnosis, prognosis, and treatment on a comprehensive knowledge of anatomical conditions, Morgagni made no attempt to exalt pathological anatomy into a science disconnected from clinical medicine and remote from practical needs.

Morgan, breed of horse that was once the most famous and widely disseminated in the United States. The Morgan declined in popularity, and for a while breeding was supervised by the government. The breed was founded by a horse known as Justin Morgan, after his owner. Though the horse died in 1821, his individual stamp still persists. He stood approximately 14 hands (56 inches, or 142 cm) high and was a compact, active, and virile horse whose pedigree was probably a blend of Thoroughbred and Arabian, with some other elements as well. The modern Morgans average about 14.1 to 15.2 hands (57 to 61 inches, or 145 to 155 cm) in height and from 900 to 1,100 pounds (400 to 500 kg) in weight.

Morgan
Paul Quinn

They are stylish and attractive, with smooth lines, small ears, expressive eyes, and a nicely crested neck. They are all-purpose horses, though they lean toward the riding-horse type more than formerly. The *American Morgan Horse Register* was first published in 1894 by Colonel Battell of Middlebury, Vermont, who traced Justin Morgan's descendants and encouraged Morgan breeding. The Morgan Horse Club, later succeeded by the American Morgan Horse Association, was organized in 1909 and took over the *Register*.

Morgan LE FAY, fairy enchantress of Arthurian legend and romance.

Geoffrey of Monmouth's *Vita Merlini* (*c.* 1150) named her as the ruler of Avalon, a marvelous island where King Arthur was to be healed of his wounds, and it described her as skilled in the arts of healing and of changing shape. In Chrétien de Troyes's romance of *Erec* (*c.* 1165), she first appeared as King Arthur's sister. In 12th- and 13th-century elaborations of Arthurian legend, two themes, of healing and of hostility (owing to unrequited love), were developed: in the early 13th-century Vulgate cycle, for example, she was responsible for stirring up trouble between Arthur and his queen, Guinevere, yet finally appeared as a beneficent figure conveying Arthur to Avalon. Her magic powers were explained as learned from books and from the enchanter Merlin. Although later versions of the legend placed Arthur's death in a Christian context, traditions of a living Arthur being tended by Morgan le Fay (until the time should come for him to return to his kingdom) survived in some 13th- and 14th-century texts, many of them associated with Sicily—perhaps taken there by Norman conquerors—where the term Fata Morgana is still used to designate a mirage sometimes seen in the Strait of Messina.

Morgan, C(onwy) Lloyd (b. Feb. 6, 1852, London—d. March 6, 1936, Hastings, Sussex, Eng.), British zoologist and psychologist, sometimes called the founder of comparative, or animal, psychology.

Educated at the School of Mines with the intention of earning a living as a mining engineer, Morgan was diverted into biology by a chance meeting with Thomas Huxley, who urged him to become one of his students at the Royal College of Science. After a tour of North and South America as a tutor, Morgan did study with Huxley. After then teaching physical sciences at the Diocesan College at Rondebosch, S.Af. (1878–84), Morgan accepted the chair of geology and zoology at University College, Bristol, where he remained for the rest of his professional career. He became principal of the college in 1887 and vice chancellor of the university in 1910 but returned to teaching (1911–19) as professor of psychology and ethics.

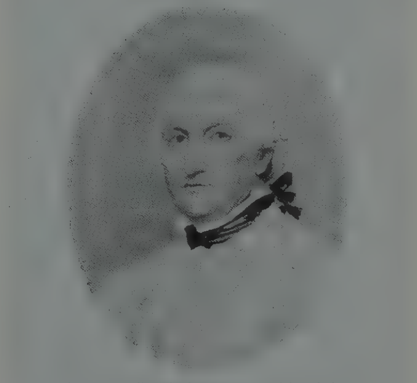
In his studies of animal psychology over the years, Morgan attempted to describe animal behaviour in objective terms and without anthropomorphisms. He studied animal behaviour for its own sake, without regard to the mental evolution of man, and applied what has come to be called the principle of parsimony: in Morgan's words (*An Introduction to Comparative Psychology,* 1894), "In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale."

In later years, especially after retirement from Bristol, Morgan turned more to metaphysical or philosophical questions, as reflected especially in *Emergent Evolution* (1923) and *Life, Mind and Spirit* (1926).

Morgan, Daniel (b. 1736, Hunterdon County, N.J. [U.S.]—d. July 6, 1802, Winchester, Va., U.S.), general in the U.S. War of Independence (1775–83) who won an important victory against the British at the Battle of Cowpens (Jan. 17, 1781).

After moving to Virginia in 1753, Morgan was commissioned a captain of Virginia riflemen at the outbreak of the Revolution. During the following winter, he accompanied General Benedict Arnold to Canada, and in the assault on Quebec (December 31) he and his riflemen penetrated well into the city, where he was hemmed in and forced to surrender. Late in 1776 he was released, and in September 1777 he joined General Horatio Gates and took part in both Battles of Saratoga (N.Y.) that fall.

Partly because of ill health, Morgan resigned from the army in 1779, but after the disastrous American defeat at the Battle of Camden, S.C. (1780), he agreed to join Gates at Hillsborough, N.C., where he took command of a corps and was made brigadier general. Aiming at slowing Lord Cornwallis' advance in the South, Morgan gradually retired northward and then turned suddenly to confront the British troops at Cowpens, where he won a brilliant and unexpected victory over a larger force under Colonel Banastre Tarleton.



Daniel Morgan, oil painting on wood by John Trumbull, 1792; in the Yale University Art Gallery
By courtesy of the Yale University Art Gallery

In 1794 Morgan led Virginia militiamen into western Pennsylvania to help suppress the Whiskey Rebellion. He was a Federalist representative in Congress from 1797 to 1799.

Morgan, Sir Henry (b. 1635, Llanrhymney, Glamorgan, Wales—d. Aug. 25, 1688, probably Lawrencefield, Jam.), Welsh buccaneer, most famous of the adventurers who plundered Spain's Caribbean colonies during the late 17th century. Operating with the unofficial support of the English government, he undermined Spanish authority in the West Indies.

Morgan's origins and early career are obscure. He was probably a member of the expedition that in 1655 seized Jamaica from the Spanish and converted it into an English colony. He may have participated in an expedition against Cuba in 1662; and during the second Anglo-Dutch War (1665–67), he was second in command of the buccaneers operating against Dutch colonies in the Caribbean.

Selected commander of the buccaneers in 1668, Morgan quickly captured Puerto Príncipe (now Camagüey), Cuba, and—in an extraordinarily daring move—stormed and sacked the well-fortified city of Portobelo on the Isthmus of Panama. In 1669 he made a successful raid on wealthy Spanish settlements around Lake Maracaibo on the coast of Venezuela. Finally, in August 1670 Morgan, with 36 ships and nearly 2,000 buccaneers, set out to capture Panamá, one of the chief cities of Spain's American empire. Crossing the Isthmus of Panama, he defeated a large Spanish force (Jan. 18, 1671) and entered the city, which burned to the ground while his men were looting it. On the return journey he deserted his followers and absconded with most of the booty.

Henry Morgan, detail of an engraving by an unknown artist
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Because Morgan's raid on Panamá had taken place after the conclusion of a peace between England and Spain, he was arrested and transported to London (April 1672). Nevertheless, relations with Spain quickly deteriorated, and in 1674 King Charles II knighted Morgan and sent him out again as deputy governor of Jamaica, where he lived as a wealthy and respected planter until his death.

An exaggerated account of Morgan's exploits, written by one of his crew, created his popular reputation as a bloodthirsty pirate.

Morgan, John (b. June 10, 1735, Philadelphia—d. Oct. 15, 1789, Philadelphia), pioneer of American medical education, surgeon general of the Continental armies during the U.S. War of Independence, and founder of the United States' first medical school.

Morgan studied at the University of Edinburgh (M.D., 1763), at Paris, and in Italy. Returning to the colonies in 1765, he founded their first medical school at the College of Philadelphia (now the University of Pennsylvania) and there was appointed North America's first professor of medicine. His policies of requiring a liberal education for medical students and the separation of medicine, surgery, and pharmacology into distinct disciplines, outlined in his *Discourse upon the Institution of Medical Schools in America* (1765), met with widespread opposition from colonial physicians and failed to gain acceptance.

Upon the start of the American Revolution, Morgan became an ardent patriot and was appointed "Director-General to the Military Hospitals and Physician-in-Chief to the American Army" by the Continental Congress in 1775. Morgan tried to bring the nearly autonomous regimental surgeons under general army control, but Congress would not reorganize the system. A faction headed by William Shippen sought to oust him from office, and in 1777 Morgan was held responsible for the high mortality rate in the army and was dismissed from his post by Congress.

Two years later Morgan was absolved of all wrongdoing both by George Washington and by the Congress, but he never recovered from his disgrace and died an impoverished recluse 10 years later. One of the first American physicians to adopt the English physician Edward Jenner's method of inoculation against smallpox, Morgan also wrote *A Recommendation of Inoculation* (1776).

Morgan, John Hunt (b. June 1, 1825, Huntsville, Ala., U.S.—d. Sept. 4, 1864, Greenville, Tenn.) Confederate guerrilla leader of "Morgan's Raiders," best-known for his July 1863 attacks in Indiana and Ohio—the farthest north a Confederate force penetrated during the American Civil War.

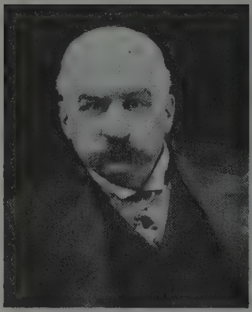
In 1830 Morgan's parents moved from Alabama to a farm near Lexington, Ky. He received a public-school education in Lexington. In 1846 he enlisted in the army and saw action at Buena Vista during the Mexican War.

In the 1850s Morgan concentrated on his prosperous hemp-manufacturing business. In September 1861 he joined the Confederate army as a scout, but by early 1862 he held the rank of captain and had a cavalry squadron under his command. He then launched lightninglike raids on Union supply lines in Kentucky and Tennessee, avoiding open combat whenever possible. Swift movement, interruption of enemy telegraphic communications, destruction of Union transportation facilities, and the dismounting of horse soldiers for combat characterized Morgan's cavalry methods. By April 1862 he had been promoted to colonel, and before the end of the year he was a brigadier general in command of a cavalry division.

Morgan began a new series of raids in spring 1863 and was authorized to raid Kentucky with 2,000 men in June and July. But Morgan went beyond his authorization and on July 8 crossed the Ohio River into Indiana. Hotly pursued by Union troops and local forces, Morgan and his men were unable to inflict much damage and suffered heavy casualties. The raid succeeded only in taking Union pressure off General Braxton Bragg's army and prolonging Confederate control of eastern Tennessee.

On July 19 most of Morgan's men surrendered, but Morgan rode on until surrounded and captured near New Lisbon, Ohio, on July 26. Four months later, he escaped from the Ohio State Penitentiary, and by spring 1864 he was back in command of a Confederate army (the Department of Southwest Virginia). He began raiding Kentucky once again and then decided to attack Union forces at Knoxville, Tenn. But on Sept. 4, 1864, he was surprised by a Federal force at Greenville and killed while trying to join his men.

Morgan, John Pierpont, byname J.P. MORGAN (b. April 17, 1837, Hartford, Conn., U.S.—d. March 31, 1913, Rome), American financier and industrial organizer, one of the world's foremost financial figures during the two pre-World War I decades. He reorganized several major railroads and consolidated the United States Steel, International Harvester, and General Electric corporations.



John Pierpont Morgan, 1902

By courtesy of the Library of Congress, Washington, D.C.

The son of a successful financier, Junius Spencer Morgan (1813–90), John Pierpont was educated in Boston and at the University of Göttingen. He began his career in 1857 as an accountant with the New York banking firm of Duncan, Sherman and Company, which was the American representative of the London firm George Peabody and Company. In 1861 Morgan became the agent for his father's banking company in New York City. During 1864–71 he was a member of the firm of Dabney, Morgan and Company, and in 1871 he became a partner in the New York City firm of Drexel, Morgan and Company, which soon became the predominant source of U.S. government financing. This firm was reorganized as J.P. Morgan and Company in 1895, and, largely through Morgan's ability, it became one of the most powerful banking houses in the world.

Because of his links with the Peabody firm, Morgan had intimate and highly useful connections with the London financial world, and during the 1870s he was thereby able to provide the rapidly growing industrial corporations of the United States with much-needed capital from British bankers. He began reorganizing railroads in 1885, when he arranged an agreement between two of the largest railroads in the country, the New York Central Railroad and the Pennsylvania Railroad, that minimized a potentially destructive rate war and rail-line competition between them. In 1886 he reorganized two more major railroads with the aim of stabilizing their financial base. In the course of these corporate restructurings, Morgan became a member of the board of directors of these and other railroads, thereby amassing great influence on them. Between 1885 and 1888 he extended his influence to lines based in Pennsylvania and Ohio, and after the financial panic of 1893 he was called upon to rehabilitate a large number of the leading rail lines in the country, including the Southern Railroad, the Erie Railroad, and the Northern Pacific. He helped to achieve railroad rate stability and discouraged overly chaotic competition in the East. By gaining control of much of the stock of the railroads that he reorganized, he became one of the world's most powerful railroad magnates, controlling about 5,000 miles (8,000 km) of American railroads by 1902.

During the depression that followed the panic of 1893, Morgan formed a syndicate that resupplied the U.S. government's depleted gold reserve with $62,000,000 in gold in order to relieve a Treasury crisis. Three years later he began financing a series of giant industrial consolidations that were to reshape the corporate structure of the American manufacturing sector. His first venture, in 1891, was to arrange the merger of Edison General Electric and Thomson-Houston Electric Company to form General Electric, which became the dominant electrical-equipment manufacturing firm in the United States. Having financed the creation of the Federal Steel Company in 1898, Morgan in 1901 joined in merging it with the giant Carnegie Steel Company and other steel companies to form United States Steel Corporation, which was the world's first billion-dollar corporation. In 1902 Morgan brought together several of the leading agricultural-equipment manufacturers to form the International Harvester Company. In that same year he organized, with less subsequent success, the International Merchant Marine, an amalgamation of a majority of the transatlantic shipping lines.

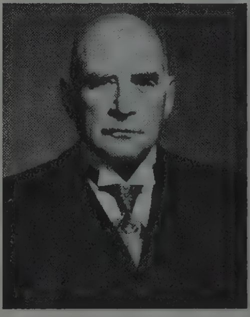
Morgan successfully led the American financial community's attempt to avert a general financial collapse following the stock market panic of 1907. He headed a group of bankers who took in large government deposits and decided how the money was to be used for purposes of financial relief, thereby preserving the solvency of many major banks and corporations. Having ceased to undertake large industrial reorganizations, Morgan thereafter concentrated on amassing control of various banks and insurance companies. Through a system of interlocking memberships on the boards of companies he had reorganized or influenced, Morgan and his banking house achieved a top-heavy concentration of control over some of the nation's leading corporations and financial institutions. This earned Morgan the occasional distrust of the federal government and the enmity of reformers and muckrakers throughout the country, but he remained the dominant figure in American capitalism until his death in 1913.

Morgan was one of the greatest art and book collectors of his day, and he donated many works of art to the Metropolitan Museum of Art in New York City. His book collection and the building that housed them in New York City became a public reference library in 1924.

Morgan, John Pierpont, Jr. (b. Sept. 7, 1867, Irvington, N.Y., U.S.—d. March 13, 1943, Boca Grande, Fla.), American banker and financier, the head of the Morgan investment banking house after the death of his father, John Pierpont Morgan, Sr.

He graduated from Harvard University in 1889 and became a member of his father's banking firm, J.P. Morgan and Company, in 1892, working in the firm's London branch for eight years. He succeeded his father as head of the firm in 1913 upon the latter's death, becoming heir to an estate of more than $50,000,000.

Morgan had developed a deep affection for England during his stay there. As a consequence, during the first three years of World War I, he became the sole purchasing agent in the United States for the British and French governments, buying about $3,000,000,000 worth of military and other supplies from American firms on behalf of those countries. To finance the Franco-British requirements for credits in the United States, he organized more than 2,000 banks to underwrite a total of more than $1,500,000,000 in Allied bonds. After the end of the war his firm floated loans totaling more than $10,000,000,000 for European reconstruction work. Though not the dominant, masterful personality his father had been, J.P. Morgan, Jr., was still the most important American financier of his day.



John Pierpont Morgan, Jr.

By courtesy of the Morgan Guaranty Trust Co.

During the stock market crash of October 1929, Morgan and several other major bankers pooled their funds and tried to stem the decline of stock prices, but to no avail. In

1933 the Banking Act of that year compelled his firm to separate its investment banking activities from its commercial (deposit) banking activities. Accordingly, Morgan, Stanley and Company became a new investment banking firm, while Morgan himself remained head of J.P. Morgan and Company, which thenceforth became strictly a commercial banking firm.

Morgan, Julia (b. Jan. 26, 1872, San Francisco—d. Feb. 2, 1957, San Francisco), one of the most prolific and important woman architects ever to work in the United States.

Born into a prosperous family, Morgan graduated from the University of California at Berkeley with a degree in engineering in 1894 and then studied architecture privately under the local architect Bernard Maybeck, who encouraged her aspirations. Going to Paris in 1896, she became in 1898 the first woman to be enrolled in the architecture section of the École des Beaux-Arts. She graduated from the École in 1902 and then returned to California, where she became the first woman in the state to be granted an architect's license.

Morgan then commenced 40 years of architectural work that resulted in a total of about 800 buildings, most of them in California and particularly in San Francisco. She opened her own architectural office in 1904, and the devastation of the San Francisco earthquake of 1906 provided her with the opportunity to design hundreds of homes and many churches, office buildings, and educational buildings in the Bay area. After World War I she began work in earnest for the publishing magnate William Randolph Hearst, who in 1919 commissioned her to build a castle that came to be known as La Casa Grande, on La Cuesta Encantada ("The Enchanted Hill") at his family ranch at San Simeon, Calif., and commissioned several other residences from her as well. Morgan worked on San Simeon for 21 years and built it into one of the most lavish and ostentatious private residences in the world, and one that successfully incorporated much of Hearst's grandiose collection of foreign antiques, works of art, and sections of architectural decoration.

Morgan was an eclectic architect who worked in a variety of styles. She was notable for her meticulous craftsmanship, her creation of fine interior spaces, and her ability to deliver outstanding buildings with limited funds available.

Morgan, Lewis Henry (b. Nov. 21, 1818, near Aurora, N.Y., U.S.—d. Dec. 17, 1881, Rochester, N.Y.), American ethnologist and a principal founder of scientific anthropology, known especially for establishing the study of kinship systems and for his comprehensive theory of social evolution.

An attorney by profession, Morgan practiced law at Rochester (1844–62) and served in the New York State Assembly (1861–68) and Senate (1868–69). In the early 1840s he developed a deep interest in American Indians and over his lifetime championed the Indians' struggle against white oppression. While making an exhaustive survey of the history, social organization, and material culture of the Iroquois Indians, he was adopted by the Seneca tribe (1846), the object of his particular interest. Results of his observations appeared in *The League of the Ho-dé-no-sau-nee, or Iroquois* (1851).

About 1856 Morgan's interest turned to the Seneca way of designating relatives, which differed markedly from Anglo-American convention. Upon discovering virtually identical designations among the Ojibwa of northern Michigan, he conjectured that if the system were also to be found in Asia, the Asiatic origin of the American Indians might be shown. He thereupon embarked on a series of far-flung investigations of the kinship terms used by the people of many other cultures. He gathered his results in his influential pioneer elaboration of kinship, *Systems of Consanguinity and Affinity of the Human Family* (1871). This work inaugurated the modern anthropological study of kinship systems as the basic organizing principle in most pre-urban societies.

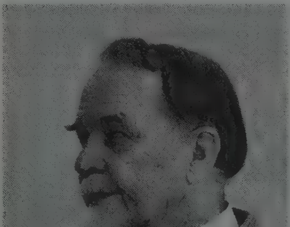
Morgan's kinship study led him to develop his theory of cultural evolution, which was set forth in *Ancient Society, or Researches in the Lines of Human Progress from Savagery through Barbarism to Civilization* (1877). This was the first major scientific account of the origin and evolution of civilization, with illustrations of developmental stages drawn from various cultures. Morgan posited that advances in social organization arose primarily from changes in food production. Society had progressed from a hunting-and-gathering stage (which he denoted by the term "savagery") to a stage of settled agriculture ("barbarism") and then on to an urban society possessing a more advanced agriculture ("civilization"). Morgan's historical sequence has come to be regarded as correct in its fundamental aspects. His theory that human social life advanced from an initial stage of promiscuity through various forms of family life that culminated in monogamy has long been held obsolete, however.

Morgan's emphasis on the importance of technological change and other purely material factors in cultural and social evolution attracted the attention of Karl Marx and Friedrich Engels. That *Ancient Society* came to be regarded by Marxists as a classic was largely the result of the importance that Marx and Engels attached to it, because Morgan's own social allegiance was to the industrial and commercial middle class and its achievements. For a number of years Morgan remained the dean of American anthropology. Among his other works is *The Indian Journals, 1859–1862* (1959).

Morgan, Thomas Hunt (b. Sept. 25, 1866, Lexington, Ky., U.S.—d. Dec. 4, 1945, Pasadena, Calif.), American zoologist and geneticist, famous for his experimental research with the fruit fly (*Drosophila*) by which he established the chromosome theory of heredity. He showed that genes are linked in a series on chromosomes and are responsible for identifiable, hereditary traits. For this work he received the Nobel Prize for Physiology or Medicine in 1933.

Early life. Morgan's father, Charlton Hunt Morgan, was a U.S. consul, and his uncle, John Hunt Morgan, had been a Confederate army general.

Early in life, Morgan showed an interest in natural history. In 1886 he received the B.S. degree from the State College of Kentucky (later the University of Kentucky) in zoology and then entered Johns Hopkins University for graduate work in biology. At Hopkins, Morgan studied under the morphologist and embryologist William Keith Brooks. After being awarded the Ph.D. in 1890, Morgan remained there a year before accepting a teaching post at Bryn Mawr College.



Thomas Hunt Morgan

By courtesy of the California Institute of Technology, Pasadena

Experiments in embryology. During the period 1893–1910, Morgan applied experimental techniques to fundamental problems of embryology. In order to identify causally related events during development, he analyzed such problems as the formation of embryos from separated blastomeres (early embryonic cells) and fertilization in nucleated and non-nucleated egg fragments. As examples of the effects of physical factors, he analyzed the way in which the spatial orientation of eggs affects their future development and the action of salt concentration on the development of fertilized and unfertilized eggs. In 1904 he married one of his graduate students at Bryn Mawr, Lillian V. Sampson, a cytologist and embryologist of considerable skill. The same year, he accepted an invitation to assume the professorship of experimental zoology at Columbia University, where, during the next 24 years, he conducted most of his important research in heredity.

Like most embryologists and many biologists at the turn of the century, Morgan found the Darwinian theory of evolution lacking in plausibility. It was difficult to conceive of the development of complex adaptations simply by an accumulation of slight chance variations. Moreover, Darwin had provided no mechanism of heredity to account for the origin or transmission of variations, except his early and hypothetical theory of pangenesis. Although Morgan believed that evolution itself was a fact, the mechanism of natural selection proposed by Darwin seemed incomplete because it could not be put to an experimental test.

Morgan had quite different objections to the Mendelian and chromosome theories. Both theories attempted to explain biological phenomena by postulating units or material entities in the cell that somehow control developmental events. To Morgan this was too reminiscent of the preformation theory—the idea that the fully formed adult is present in the egg or sperm—that had dominated embryology in the 18th and early 19th centuries. Although Morgan admitted that the chromosomes might have something to do with heredity, he argued in 1909 and 1910 that no single chromosome could carry specific hereditary traits. He also claimed that Mendelian theory was purely hypothetical: although it could account for and even predict breeding results, it could not describe the true processes of heredity. That each pair of chromosomes separates, with the individual chromosomes then going into different sperm or egg cells in exactly the same manner as Mendelian factors, did not seem to be sufficient proof to Morgan for claiming that the two processes had anything to do with each other.

The work on Drosophila. Morgan apparently began breeding *Drosophila* in 1908. In 1909 he observed a small but discrete variation known as white-eye in a single male fly in one of his culture bottles. Aroused by curiosity, he bred the fly with normal (red-eyed) females. All of the offspring (F_1) were red-eyed. Brother–sister matings among the F_1 generation produced a second generation (F_2) with some white-eyed flies, all of which were males. To explain this curious phenomenon, Morgan developed the hypothesis of sex-limited—today called sex-linked—characters, which he postulated were part of the X-chromosome of females. Other genetic variations arose in Morgan's stock, many of which were also found to be sex-linked. Because all the sex-linked characters were usually inherited together, Morgan became convinced that the X-chromosome carried a number of discrete hereditary units, or factors. He adopted the term gene, which was introduced by the Danish botanist Wilhelm Johannsen in 1909, and concluded that genes were possibly arranged in a linear fashion on chromosomes. Much to his credit, Morgan rejected his skepticism about both the Mendelian and chromosome theories when he saw from two independent lines of evidence—breeding experiments and cytology—that one could be treated in terms of the other.

In collaboration with A.H. Sturtevant, C.B. Bridges, and H.J. Muller, who were graduates at Columbia, Morgan quickly developed the *Drosophila* work into a large-scale theory of heredity. Particularly important in this work was the demonstration that each Mendelian gene could be assigned a specific position along a linear chromosome "map." Further cytological work showed that these map positions could be identified with precise chromosome regions, thus providing definitive proof that Mendel's factors had a physical basis in chromosome structure. A summary and presentation of the early phases of this work was published by Morgan, Sturtevant, Bridges, and Muller in 1915 as the influential book *The Mechanism of Mendelian Heredity.* To varying degrees Morgan also accepted the Darwinian theory by 1916.

In 1928 Morgan was invited to organize the division of biology of the California Institute of Technology. He was also instrumental in establishing the Marine Laboratory on Corona del Mar as an integral part of Caltech's biology training program. In subsequent years, Morgan and his coworkers, including a number of postdoctoral and graduate students, continued to elaborate on the many features of the chromosome theory of heredity. Toward the end of his stay at Columbia and more so after moving to California, Morgan himself slipped away from the technical *Drosophila* work and began to return to his earlier interest in experimental embryology. Although aware of the theoretical links between genetics and development, he found it difficult at that time to draw the connection explicitly and to support it with experimental evidence.

In 1924 Morgan received the Darwin Medal; in 1933 he was awarded the Nobel Prize for Medicine or Physiology for his discovery of "hereditary transmission mechanisms in *Drosophila*"; and in 1939 he was awarded the Copley Medal by the Royal Society of London, of which he was a foreign member. In 1927–31 he served as president of the National Academy of Sciences; in 1930 of the American Association for the Advancement of Science; and in 1932 of the Sixth International Congress of Genetics. He remained on the faculty at Caltech until his death.

(G.E.Al./Ed.)

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Among Morgan's most important books are those dealing with (1) evolution: *Evolution and Adaptation* (1903), in which he strongly criticizes Darwinian theory; and *A Critique of the Theory of Evolution,* 2nd ed. (1925), a more favourable view of the selection process; (2) heredity: *Heredity and Sex* (1913), his first major exposition of the Mendelian system in relation to *Drosophila;* and with A.H. Sturtevant, H.J. Muller, and C.B. Bridges, *The Mechanism of Mendelian Heredity* (1915); and *The Theory of the Gene* (1926); the latter two works firmly established the Mendelian theory as it applied to heredity in all multicellular (and many unicellular) organisms; and (3) embryology: *The Development of the Frog's Egg: An Introduction to Experimental Embryology* (1897), a detailed outline of the developmental stages of frogs' eggs; *Experimental Embryology* (1927), Morgan's statement on the value of experimentation in embryology; and *Embryology and Genetics* (1934), an attempt to relate the theory of the gene to the problem of embryological differentiation and development.

Morgan, William (b. *c.* 1545, Caernarvon, Caernarvonshire, Wales—d. Sept. 10, 1604, St. Asaph, Flintshire), Anglican bishop of the Reformation whose translation of the Bible into Welsh helped standardize the literary language of his country.

Ordained in 1568, Morgan became a parish priest at Llanrhaeadr ym Mochnant, Denbighshire, 10 years later and was appointed bishop of Llandaff in 1595 and of St. Asaph in 1601. His translation of the Old Testament and the Apocrypha, published in 1588, was meant to complete the work of the Welsh writer William Salesbury, whose translation of the New Testament and *The Book of Common Prayer* had appeared in 1567. Morgan also revised Salesbury's translation of the New Testament.

The influence of Morgan's translation upon Welsh literature cannot be overestimated. With few models of Welsh prose to follow, Morgan adapted in his translation the diction and style of earlier Welsh works of poetry, ballads in particular. His adaptation was further affirmed by the Welsh bishop John Davies, who published a revised version of Morgan's translation of the Bible in 1620. The literary Welsh thus established was subsequently taught to the Welsh public for more than 200 years; Davies' revision of Morgan's Bible remained in use in Wales into the 20th century.

Morgan, William Wilson (b. Jan. 3, 1906, Bethesda, Tenn., U.S.—d. June 21, 1994, Williams Bay, Wis.), American astronomer who, in 1951, provided the first evidence that the Milky Way Galaxy has spiral arms.

Morgan studied at the University of Chicago (Ph.D., 1931) and then became an instructor at the Yerkes Observatory of the University of Chicago. He taught at that university from 1947 until his retirement in 1974, and he was director of the Yerkes and McDonald Observatories from 1960 to 1963.

Morgan was an astronomical morphologist who devoted his career to studying and classifying stars and galaxies. His first significant contribution was a correlation of the spectra of stars with their distances from the Earth, published as the *Atlas of Stellar Spectra* (1943). After discovering the spiral structure of the Milky Way Galaxy, he focused on problems of star brightness, devising a system of classifying star magnitude and colour, discovering "flash" variable stars (stars that have quickly changing luminosity), and establishing the UBV (ultraviolet-blue-visual) magnitudes system for photometry. In 1956 Morgan began to study and classify galaxies, grouping them by stellar qualities, stellar population, and form.

Morgan and Company, in full J.P. MORGAN AND COMPANY, INC., American bank holding company operating mainly through its major subsidiary, Morgan Guaranty Trust Company of New York. It is headquartered in New York City.

The corporation was formed in 1968 to acquire control of Morgan Guaranty Trust Company, a general commercial bank and trust company established in 1959 in the merger of J.P. Morgan and Company, Inc. (established 1895), and Guaranty Trust Company of New York (1864). The corporation formally acquired this bank in 1969.

Most banking is conducted through Morgan Guaranty and includes a full range of domestic commercial banking services, international banking, and trust services. The bank also provides correspondent banking for a number of other banks in the United States. It is involved in the foreign currency spot and forward markets and has interests in banks and firms in several foreign countries. The bank also is a dealer and agent in U.S. government securities, underwrites tax-exempt securities, and is involved in domestic and international money markets.

The corporation has nonbank subsidiaries in the fields of fixed-rate loans, real-estate financing (including financing of low-income and community-enterprise housing), corporate and personal trusts, equipment leasing, and real-property leasing.

Morgan City, port on the Gulf Intracoastal Waterway, in St. Mary parish, southern Louisiana, U.S. It lies along Berwick Bay (bridged to Berwick) of the Atchafalaya River (there widened into Six Mile Lake), 53 miles (85 km) south of Baton Rouge. Founded in 1850, it was incorporated (1860) as Brashear City but was renamed in 1876 to honour Charles Morgan, president of the New Orleans, Opelousas and Great Western Railroad, which established its western terminus there. During the American Civil War, the city was a strategic point as the locale for forts and gunboats.

Morgan City is a headquarters for offshore oil drilling and is the base of a large shrimp fleet. Its manufactures include chemicals, machinery, and metal and seafood products. Nearby waterways, forests, and rice fields provide excellent hunting for small game and ducks. Pop. (1990) 14,531.

morganatic marriage, legally valid marriage between a male member of a sovereign, princely, or noble house and a woman of lesser birth or rank, with the provision that she shall not thereby accede to his rank and that the children of the marriage shall not succeed to their father's hereditary dignities, fiefs, and entailed property.

The name is derived from the medieval Latin *matrimonium ad morganaticum,* variously interpreted as meaning "marriage on the morning gift" (from German *Morgengabe*), with the implication that this morning gift, or dowry, was all that the bride could expect; or "restricted marriage" (Gothic *maurjan,* "restrain"); or simply "morning marriage," celebrated quietly at an early hour.

Essentially a German institution, it was adopted by some dynasties outside Germany but not by those of France or England. The practice ensues from the German notion of *Ebenbürtigkeit,* or *Gleichbürtigkeit* (evenness or equality of birth), which in the European Middle Ages had a widespread application in German law. It required that parties to many sorts of transaction be of the same standing or estate, but it could not be an impediment to marriage in the law of the church.

morganite, gem-quality beryl (*q.v.*) coloured pink or rose-lilac by the presence of cesium. It is often found with peach, orange, or pinkish yellow beryl (also called morganite); these colours transform to pink or purplish upon high-temperature heat treatment. Morganite crystals often show colour banding: blue near the base, through nearly colourless in the centre, to peach or pink at the terminations. This colour change is probably caused by differences in the composition of the solution from which the crystal grew. Morganite is commonly found as squat, tabular crystals in lithia pegmatites, as in southern California and New England.

Morgannwg, English GLAMORGAN, historic region and former county, southern Wales. The region, forming a quarter circle between the Taff and Neath rivers, consists of a northern, barren, upland moor, interspersed with narrow river valleys and a southern section, comprising an undulating plain known as the Vale of Glamorgan and extending into the Gower Peninsula. The earliest traces of people within the region are human remains from the Paleolithic Period that were discovered in the caves on the southern coast of the Gower Peninsula. At the time of the Roman invasion the area was inhabited by the Silures, whose conquest by the Romans began about AD 75. The Romans later built roads throughout the region to link their military forts. Important centres of Celtic Christianity in the region in the 6th century include Llandaff, associated with St. Dubricius of Dyfrig and St. Teilo, and the great monastic settlements of Llancarfan, Llandough, and Llantwit Major.

The region derives its Welsh and later English names from *Gwlad Morgan,* meaning "The Land of Morgan," after a 10th-century Welsh prince. The Norman conquest was not effected in Morgannwg until the end of the 11th century and then by Robert FitzHamon, Earl of Gloucester, who began the building of Cardiff Castle on a ruined fort. Morgannwg became a lordship of the Welsh Marches (border country under authorship of the English Crown), with its centre at the castle. Attacks from Welsh nationalists, with local or even wider support, characterize the turbulent history of medieval Morgannwg. The building of Caerphilly Castle, one of the many castles in the region, was begun in 1271 to counter a threat to English rule of the lordship of Morgannwg supported by Llywelyn ap Gruffydd, the only Welsh ruler to be officially recognized by the English as prince of Wales. Its importance declined a few years later, however, with the loss of Welsh independence in 1283. In the early 15th century, Welsh forces led by Owen Glendower ravaged the region.

By the Act of Union (1536) the county of Glamorgan was created by the addition to an older county of the lordship of Gower and Kilvey, west of the River Neath. Toward the mid-18th century, coal, which underlies almost the whole surface of the uplands that soon would be known as the South Wales coalfield, began to be worked on a large scale. The prosperity of the region quickly came to depend on coal mining, and Glamorgan became the most industrialized county of Wales, with nearly half the principality's total population concentrated in the county. In 1974, Glamorgan county was divided into the three separate counties of Mid Glamorgan, South Glamorgan, and West Glamorgan (*qq.v.*).

Morganton, city, seat of Burke county, west-central North Carolina, U.S. It lies 50 miles (80 km) east-northeast of Asheville, on the Catawba River. It is a manufacturing city, producing mainly furniture, textiles, shoes, chemicals, electronics, and clothing. In 1893 the county drew a group of Waldenses, religious refugees from the French-Italian Alps, whose descendants, in mid-August, hold an annual festival in nearby Valdese. Inc. 1784. Pop. (1990) city, 15,085; Hickory-Morganton MSA, 221,700.

Morgantown, city, northern West Virginia, U.S., seat (1782) of Monongalia county, on the Monongahela River, 70 miles (113 km) south of Pittsburgh, Pa. The first settlement (1758), near the Scioto-Monongahela Trail, fell to an Indian raid. Zackquill Morgan, son of West Virginia's first permanent settler, Morgan Morgan, founded a new community in 1766. The first steamboat arrived in 1826, and since then a large river traffic has developed; coal (mined since 1833) is shipped from the Scott's Run bituminous field. Limestone is quarried nearby, and a variety of goods are manufactured, including glass, plumbing supplies, and chemicals. West Virginia University (chartered as an agricultural college in 1867) is in the city and maintains experimental farms and forests nearby. The Morgantown Research Center, 4 miles (6.4 km) northwest, is maintained by the U.S. Bureau of Mines. The Cheat River is dammed northeast of Morgantown to form Cheat Lake, site of Mont Chateau State Park. Coopers Rock State Forest is nearby. Inc. town, 1786; city, 1905. Pop. (1990) 25,879.

The Creative Arts Center of West Virginia University, Morgantown, W.Va.

Milt and Joan Mann—CAMERAMANN INTERNATIONAL

Morgarten, Battle of (Nov. 15, 1315), the first great military success of the Swiss Confederation in its struggle against the Austrian Habsburgs. When the men of Schwyz, a member state of the confederation, raided the neighbouring Abbey of Einsiedeln early in 1314, the Habsburg duke Leopold I of Austria, who claimed jurisdiction in the area, raised an army of knights for an invasion of Schwyz from Zug by way of the Morgarten Pass alongside Lake Egeri (Ägerisee). The men of Schwyz, however, and some confederates from Uri caught the Austrians before they were out of the pass, killed more than 1,500 of them outright, drove others in the lake, and put the rest to flight. The victory ensured the survival of the confederation, which was formally renewed less than a month later (Pact of Brunnen, Dec. 9, 1315). Because of the prestige won by Schwyz in the battle, the confederation as a whole became known by forms of this name (*e.g.,* Schweiz [German], Suisse [French], Svizzera [Italian], or Switzerland).

The Battle of Morgarten, 1315, illumination from Diebold Schilling's chronicle of Bern, 1484; in the Bürgerbibliothek, Bern

By courtesy of the Burgerbibliothek, Bern

Morgenstern, Christian (b. May 6, 1871, Munich, Ger.—d. March 31, 1914, Meran, South Tirol, Austria-Hungary [now Merano, Italy]), German poet and humorist whose work ranged from the mystical and personally lyrical to nonsense verse.

Morgenstern had studied law at the universities of Breslau and Berlin when in 1893 he was diagnosed as having pulmonary tuberculosis, from which he ultimately died. He left school to travel and lived for a time in Norway, where he translated Henrik Ibsen's verse dramas with the collaboration of the author and also translated plays by such other Scandinavian playwrights as B.M. Bjørnson, Knut Hamsun, and August Strindberg. Morgenstern removed to Switzerland for his health, marrying Margarete Gosebruch there in 1908, and from 1910 lived in the South Tirol.

Morgenstern's serious poetry, written first under the influence of Friedrich Nietzsche, includes *In Phantas Schloss* (1895; "In Phanta's Palace"), in which cosmic, mythological, and philosophical concepts are playfully combined; *Ich und die Welt* (1898; "I and the World"); *Ein Sommer* (1900; "One Summer"), which was written in Norway and celebrates physical beauty; and *Einkehr* (1910; "Introspection") and *Wir fanden einen Pfad* (1914; "We Found a Path"), poems written under the influence of Buddhism and the anthroposophist Rudolf Steiner.

Morgenstern's international reputation came from his nonsense verse, in which he invented words, distorted meanings of common words by putting them into strange contexts, and dislocated sentence structure, but always with a rational, satiric point. Volumes of nonsense verse include *Galgenlieder* (1905; "Gallows Songs"); *Palmström* (1910), named for an absurd character; and three volumes published posthumously: *Palma Kunkel* (1916), *Der Gingganz* (1919), and *Die Schallmühle* (1928; "The Noise Mill"), all collected in *Alle Galgenlieder* (1932).

Morgenstern, Oskar (b. Jan. 24, 1902, Görlitz, Ger.—d. July 26, 1977, Princeton, N.J., U.S.), German-born American economist.

Morgenstern taught at the University of Vienna (1929–38) and at Princeton University (1938–70) and New York University (1970–77). With John von Neumann he wrote *Theory of Games and Economic Behavior* (1944), applying Neumann's theory of games of strategy (published 1928) to competitive business. Among his other books are *On the Accuracy of Economic Observations* (1950), *Prolegomena to a Theory of Organization* (1951), and *Predictability of Stock Market Prices* (1970; with C.W.J. Granger).

Morgenthau, Hans J., in full HANS JOACHIM MORGENTHAU (b. Feb. 17, 1904, Coburg, Ger.—d. July 19, 1980, New York, N.Y., U.S.), German-born American political scientist and historian noted as a leading analyst of the role of power in international politics.

Educated at the universities of Berlin, Frankfurt, and Munich, Morgenthau did postgraduate work at the Graduate Institute for International Studies at Geneva. He was admitted to the bar in 1927 and served as acting president of the Labour Law Court in Frankfurt. In 1932 he went to Geneva to teach public law for a year, but because of Adolf Hitler's rise to power in Germany in 1933, he stayed on until 1935. In 1935–36 he taught in Madrid, and then in 1937 he took up residence in the United States (naturalized 1943), serving on the faculties of Brooklyn (N.Y.) College (1937–39), the University of Kansas City, Mo. (1939–43), the University of Chicago (1943–71), the City College of the City University of New York (1968–74), and the New School for Social Research (1974–80).

In 1948 Morgenthau published *Politics Among Nations,* a highly regarded study that presented a modern realist approach to international politics. Central to Morgenthau's theory was the concept of power as the dominant goal in international politics and the definition of national interest in terms of power. He called for recognition of the nature and limits of power and for the use of traditional methods of diplomacy, including compromise.

A contributor to numerous scholarly periodicals and journals of opinion, Morgenthau was also the author of *Scientific Man vs. Power Politics* (1946), *In Defense of the National Interest* (1951), *Dilemmas of Politics* (1958), *The Purpose of American Politics* (1960), *Politics in the Twentieth Century,* 3 vol. (1962), and *Truth and Power* (1970).

Morgenthau, Henry, Jr. (b. May 11, 1891, New York, N.Y., U.S.—d. Feb. 6, 1967, Poughkeepsie, N.Y.), U.S. secretary of the treasury who, during his 12 years in office (1934–45) under President Franklin D. Roosevelt, supervised without scandal the spending of $370,000,000,000—three times more money than had passed through the hands of his 50 predecessors combined.

Henry Morgenthau, Jr.

By courtesy of the Library of Congress, Washington, D.C.

The editor of a farm journal, *American Agriculturist,* from 1922 to 1933, Morgenthau became a close friend of Roosevelt, whose Hyde Park estate was near Morgenthau's farm in Dutchess county, New York. During Roosevelt's governorship of New York (1929–33), Morgenthau served as state conservation commissioner and as chairman of the governor's agricultural advisory committee.

As head of the treasury, Morgenthau was frequently torn between his intense loyalty to the president and his conservative conviction that a balanced budget was essential to the national welfare. In the end loyalty prevailed, and he threw himself wholeheartedly into the task of financing the ambitious New Deal domestic program and the nation's enormous responsibilities in World War II. He was the author of the Morgenthau Plan, which aimed at crippling German industrial potential after the war but was never put into effect.

Morgenthau resigned shortly after Roosevelt's death (April 1945). After retirement, he devoted himself to his farm, to philanthropic interests, and to foreign travel.

Morghāb River, also spelled MURGAB, Dari DARYĀ-YE MORGHĀB, river rising in northwestern Afghanistan in a basin bounded on the north by the Torkestān Mountains and on the south by the Safīd Mountain Range. The river flows generally west and then north, passing through the town of Bālā Morghāb, just beyond which it forms the border between Afghanistan and Turkmenistan for 10 miles (16 km). It then continues into Turkmenistan and is joined by its only important tributary, the Kushk, at Tashkepri. Dams control irrigation water at Tashkepri and Iolotan. A railroad branch follows the river from Tashkepri to Mary (formerly Merv), where it joins the Transcaspian Railway. North of Mary the river disappears into the Karakum Desert after a course of some 600 miles (970 km).

Morhange, Charles-Henri-Valentin: *see* Alkan, Valentin.

Mōri FAMILY, a clan that dominated the strategic western Honshu region of south-central Japan from early in the 16th century to the middle of the 19th century.

After the Tokugawa family had reconstituted Japan's central government in 1603, the head of the Mōri family became the daimyo, or feudal lord, of Chōshū, the *han* (fief) that encompassed most of the western Honshu region. Although the Tokugawa tolerated the existence of the Mōri in Chōshū, the two clans remained hostile toward each other. Chōshū warriors played the leading role in the overthrow of the Tokugawa government in 1867, after which Chōshū men dominated the new government until the end of World War II.

The Mōri family first achieved prominence in the early 16th century when some vassals of the Ōuchi family, then the dominant power in west Honshu and probably the most powerful warriors in all Japan, revolted against the Ōuchi's autocratic rule. Under the leadership of Mōri Motonari (1497–1571), his family, though not directly involved in the uprising, was able to profit by the revolt, and in 1557 he became the new overlord of west Honshu.

Motonari's grandson, Mōri Terumoto (1553–1625), became the major opponent of Oda Nobunaga when that great warrior made his bid to reunify Japan. After Oda was assassinated in 1582 Terumoto made peace with Oda's successor, Toyotomi Hideyoshi, whose trusted general he became. Before Hideyoshi died in 1598, he named Terumoto as one of the five regents who were to govern the country for his infant son, Hideyori. When fighting erupted among the regents, Terumoto sided against Tokugawa Ieyasu, the eventual victor. Because Terumoto's resistance had been minimal, the Mōri family was permitted to retain almost half of its Chōshū domain.

Nevertheless, throughout the Tokugawa period (1603–1867) the Mōri family indoctrinated their warriors with hatred of the Tokugawa family and respect for the emperor, whose power the Tokugawa usurped. When Chōshū warriors led the fight to overthrow the Tokugawa in 1867, they did so under the banner of restoring power to the emperor.

Mori Arinori (b. Aug. 23, 1847, Kagoshima, Satsuma province, Japan—d. Feb. 12, 1889, Tokyo), one of the most influential and iconoclastic proponents of Western ideas in Japan during the late 19th century.

Mori early developed an interest in Western studies, and in 1865 he was among the first Japanese to go abroad (to the University of London) for an education. He returned to Japan after the Meiji Restoration in 1868 and in 1870 was invited to join the new imperial government. He was appointed an investigator of parliamentary and educational systems and deputy minister to the United States.

In 1873 Mori, together with 15 other prominent intellectuals—including Fukuzawa Yukichi—formed the Meirokusha ("Sixth Year of Meiji Society"), to popularize Western ideas. Mori, one of the most vigorous westernizers of the group, wore Western clothing, engaged in ballroom dancing, and even advocated the writing of Japanese in the Latin alphabet.

After the Meirokusha was dissolved in 1875, Mori continued to serve in the new government, where he gained increasing influence. In 1885 he was appointed the first minister of education. As such, he helped develop a new centralized educational system, including an eight-year primary school program; a four-year middle school course; and higher levels of education up to and including a new national university. These schools not only educated the elite in Western subjects but also indoctrinated the general populace with Confucian ethics and patriotic fervour. Mori's iconoclasm, however, resulted in his death; he was assassinated by a religious fanatic after he allegedly desecrated the Ise Shrine, one of the holy places of the Shintō religion.

Mori Ōgai, pseudonym of MORI RINTARŌ (b. Feb. 17, 1862, Tsuwano, Japan—d. July 9, 1922, Tokyo), one of the creators of modern Japanese literature.

Ōgai studied medicine, at first in Tokyo and from 1884 to 1888 in Germany. In 1890 he published the story "Maihime" ("The Dancing Girl"), an account closely based on his own experience of an unhappy attachment between a German girl and a Japanese student in Berlin. It represented a marked departure from the impersonal fiction of preceding generations and initiated a vogue for autobiographical revelations among Japanese writers. Ōgai's most popular novel, *Gan* (1911–13; part translation: *The Wild Goose*), is the story of the undeclared love of a moneylender's mistress for a medical student who passes by her house each day.

In 1912 Ōgai was profoundly moved by the suicide of General Nogi Maresuke, following the death of the emperor Meiji, and he abandoned fiction in favour of historical works depicting the samurai code. The heroes of several works are warriors who, like General Nogi, commit suicide in order to follow their masters to the grave. Ōgai came to share with his samurai heroes a reluctance to dwell on emotions. His detachment made his later works seem cold, but their strength and integrity were strikingly close to the samurai ideals he so admired.

moribana (Japanese: "heaped-up flowers"), in Japanese floral art, a style of arranging in which naturalistic landscapes are constructed in low dishlike vases. Developed by Ohara Unshin, founder of the Ohara school of floral art, *moribana* breaks with the rigid structural rules of classical floral art; it sometimes incorporates flowers imported from Western countries and uses the basic triangular principle of floral art in a three-dimensional (foreground, middle ground, and distance) way.

Moribana arrangement of lilies and pine branches

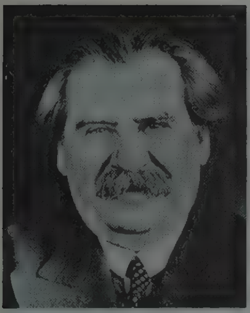
By courtesy of the International Society for Educational Information, Tokyo

In *moribana* the arranger conceives of the flat vase as four separate quarters: the part facing the room represents the south and summer; farthest away is the north and winter; the quarter to the right is the east and spring; to the left is west and autumn. He positions the arrangement in the dish according to the season represented; *e.g.,* a winter arrangement of dried flowers is placed in the winter quarter, with the three remaining sections holding only water. One of the most popular branches of *moribana* is *bonkei,* the art of creating miniature landscape gardens. *See also* Ohara.

Móricz, Zsigmond (b. June 29, 1879, Csécse, Hung., Austria-Hungary—d. Sept. 4, 1942, Budapest), Hungarian realist novelist.

Móricz published his first story (1908) in the review *Nyugat* ("The West"), which he later edited. In his many novels and short stories, finely characterized men and women of various social classes come into collision, and their fierce energies collapse or degenerate into a murderous passion. Some of his works centre obsessively on the morbid and doomed elements of society.

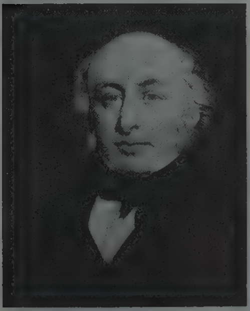
Móricz's greatest works include his first novel, *Sárarany* (1910; "Gold in the Mire"), and *A boldog ember* (1935; "The Happy Man"),



Móricz
Interfoto MTI

which portray individualist peasant characters against the collective life of a village. *Kivilágos kivirradtig* (1924; "Until the Small Hours of Morning") and *Rokonok* (1930; "Relatives") deal with the life of the decaying provincial nobility. In Móricz's world, marriage and family life are fraught with bitter conflicts; but he also evokes pure, even idyllic, love as in *Légy jó mindhalálig* (1920; "Be Good Until Death"), often considered the finest book about children written in Hungarian, and in *Pillangó* (1925; "Butterfly"). He also wrote monumental historical novels, *Erdély* (1922–35; "Transylvania") and *Rózsa Sándor* (1940–42). He was a master of Hungarian, his style absorbing elements of both the old language and the dialects.

Morier, James Justinian (b. *c.* 1780, Smyrna, Tur.—d. March 19, 1849, Brighton, Sussex, Eng.), English diplomat and writer whose fame depends on *The Adventures of Hajji Baba of Ispahan* (1824), a picaresque romance of Persian life that long influenced English ideas of Persia; its Persian translation (1905) led to the development of the modern Persian novel of social criticism. The first of a series of novels written by Morier after he retired, *Hajji Baba* drew on the knowledge of Persia and its people that he had acquired on the British embassy staff at Tehrān (1809–15) and in journeys described in two travel books.



Morier, portrait by an unknown artist
BBC Hulton Picture Library

Moriguchi, city, Ōsaka *fu* (urban prefecture), Honshu, Japan, on the southern bank of the Yodo River. A prosperous post town on the Ōsaka Highway during the Tokugawa period (1603–1867), it rapidly industrialized with the opening of a railway to Ōsaka in 1910. Manufactures include electrical machinery and appliances, textiles, and processed foods. The city is also a residential suburb of the Ōsaka-Kōbe metropolitan area. Pop. (1989 est.) 159,186.

Mörike, Eduard Friedrich (b. Sept. 8, 1804, Ludwigsburg, Württemberg [Germany]—d. June 4, 1875, Stuttgart), one of Germany's greatest lyric poets, sometimes ranked next to his master J.W. von Goethe.

After studying theology at Tübingen (1822–26), Mörike held several curacies before becoming, in 1834, pastor of Cleversulzbach, the remote Württemberg village immortalized in *Der alte Turmhahn,* where inhabitants and pastor are seen through the whimsical but percipient eyes of an old weathercock. All his life Mörike suffered from psychosomatic illnesses, which were possibly intensified by an unconscious conflict between his humanist aspirations and his church dogmas. When only 39, Mörike retired on a pension, but after his marriage to Margarete von Speeth in 1851, he supplemented his pension by lecturing on German literature at a girls' school in Stuttgart. After many years of rich literary achievement, the tensions caused by Margarete's jealousy of Clara, Mörike's sister who lived with them, almost killed his creative urge. Mörike spent his last two years with Clara and his younger daughter, separated from Margarete, and died poor and unhappy.

The variety of Mörike's small output is astonishing. Everything he wrote has its own distinctive flavour, but in his early days romantic influences preponderate. His novel, *Maler Nolten* (1832), in addition to its stylistic perfection and psychological insight into mental unbalance, explores the realm of the subconscious and the mysterious forces linking the main character and his early love even beyond the grave. Mörike's poems in folksong style and his fairy tales also show the influence of German romanticism, though his best folk tale, *Das Stuttgarter Hutzelmännlein* (1853), is peculiarly his own, with its Swabian background and humour. In his *Mozart auf der Reise nach Prag* (1856), Mörike penetrates deeper into Wolfgang Amadeus Mozart's personality than do many longer studies.

It is, however, as a lyric poet that Mörike is at the height of his powers. Mörike worked with free rhythms, sonnets, regular stanza forms, and, more particularly in his later poems, classical metres with equal virtuosity. The "Peregrina" poems, immortalizing a youthful love of his Tübingen days, and the sonnets to Luise Rau, his one-time betrothed, are among the most exquisite German love lyrics.

Morin, Jean, Latin JOANNES MORINUS (b. 1591, Blois, Fr.—d. Feb. 28, 1659, Paris), French theologian and biblical scholar who produced major studies on the history and discipline of the early Christian church. His edition of the Samaritan version of the Pentateuch represented the first European scholarship in that dialect.

Born to Calvinist parents, Morin converted to Roman Catholicism under the influence of Pierre de Bérulle, founder of the French Congregation of the Oratory; entered the Oratory; and, in 1619, was ordained. His studies of patristic writers led him to advocate the recognition by the Roman Catholic church of priests ordained in the Orthodox churches. In 1639 he went to Rome, where he was consulted by Pope Urban VIII in the latter's unsuccessful attempt to unite the Roman and Eastern churches.

Morin was recalled to Paris by Cardinal Richelieu, and he spent the rest of his life in scholarly pursuits. He advanced the theory that the Greek text of the Old Testament was superior to the Hebrew Masoretic text, which he felt had been unintentionally corrupted by the 6th-century Jewish scholars who compiled it from earlier Hebrew sources; his theories were rejected, but he accumulated much material that was of value to later biblical scholars and translators. Morin's major accomplishment was the editing and publication of the Pentateuch (the first five books of the Bible) in the Samaritan dialect, which appeared in the Paris Polyglot Bible in 1645. He learned Samaritan without a teacher (framing a grammar for himself) from manuscripts then newly brought to Europe.

Morini, ancient Celtic people living in the northwestern part of the region between the Seine and the Rhine rivers at the period when Julius Caesar began his conquest of Gaul. Closely allied to two other tribes, the Ambiani and the Atrebates, the Morini were separated from the Atrebates in the Roman division of the province. Up to this time the Celts were organized by tribes, groups related by kinship, that formed a military band at need. They were excellent ironworkers and horsemen, living in small agricultural settlements. The last historical record of the Morini reports that they revolted against Rome in 33 BC and again in 30 BC.

Morioka, capital, Iwate *ken* (prefecture), northeastern Honshu, Japan, on the Kitakami River, southeast of the volcanic cone of Iwate Mountain. Although the largest city of the prefecture, it retains the atmosphere of the feudal period (1185–1867), when it was the Nambu fief castle town. Now primarily a commercial, railway, and cultural centre, it is known for its traditional ironware and its annual horse fairs. Pop. (1989 est.) 230,967.

Moriori, extinct native inhabitants of the Chatham Islands of New Zealand. They were a Polynesian people whose language and culture was related to those of the Maori. They lived on fern root, eels, fish, *karaka* berries, and birds. Albatrosses were obtained by perilous expeditions to the outlying rocks where they nested. The clothing of the Moriori was of sealskin and rudely woven flax. Estimated to number more than 1,000 when discovered in the late 18th century, they were easily conquered and enslaved by a party of Maori in 1835 and were gradually assimilated. The last pureblood Moriori died in 1933.

Morisco (Spanish: "Little Moor"), one of the Spanish Muslims (or their descendants) who became baptized Christians.

During the Christian reconquest of Muslim Spain, surrendering Muslim (Mudejar) communities in Aragon (1118), Valencia (1238), and Granada (1492) were usually guaranteed freedom of religion by treaty. This tolerant policy was abandoned in the late 15th century, when Christian authorities began to make conversions and ordered the destruction of Islāmic theological books. The Muslims of Granada rebelled. In 1502, offered the choice of baptism or exile, many of them were baptized and continued to practice Islām secretly; in 1526 the Muslims of Valencia and Aragon were similarly forced to convert. Thereafter, Islām was officially prohibited in Spain.

The Moriscos, however, did not prove to be assimilable. Though they were racially indistinguishable from their Old Christian neighbours (Christians who had retained their faith under Muslim rule), they continued to speak, write, and dress like Muslims. The Old Christians suspected the Moriscos of abetting the Algerians and the Turks, both enemies of Spain, and were fearful of their holy wars (*jihāds*), which terrorized whole districts. Subjected to discriminative taxation while their staple industry, the silk trade, was reduced by a misguided fiscal policy, ill-taught in their new faith, yet punished for ignorance by church and Inquisition, the Moriscos turned outside Spain for Muslim support. They obtained legal opinions (*fatwās*) that assured them that it was permissible to practice Islām in secret (*taqīyah*), then produced books known as *aljamiados,* written in Spanish, using the Arabic alphabet, to instruct fellow Moriscos in Islām.

In 1566 Philip II issued an edict forbidding the Granada Moriscos their language, customs, and costume. They revolted in 1569; after two years of war they were removed en masse from Granada and scattered throughout northern Spain. Evidence of their continued political and religious infidelity led to a royal order for deportation on Sept. 22, 1609; their expulsion was completed some five years later. An estimated 300,000 Moriscos relocated mainly in Algeria, Tunisia, and Morocco, where again they found themselves an alien element. They were assimilated after several generations, but something of their Spanish heritage has survived into modern times.

Morison, James (b. Feb. 14, 1816, Bathgate, Linlithgowshire [now in Lothian], Scot.—d. Nov. 13, 1893, Glasgow), Scottish theologian and founder of the Evangelical Union (Morisonians).

Licensed to preach in 1839, Morison won many converts to his view that Christ's atonement saved nonbelievers as well as believers. This universalism, contrary to the Westminster Confession (a statement of beliefs based on the Reformation theology of John Calvin), led to a charge of heresy against Morison. In 1840 he was called to Kilmarnock, Ayrshire, where he became famous as an evangelist, but in 1841 the synod of the United Secession Church removed his name from its ministerial roll because of his beliefs. Morison and his father, Robert, with two others who shared his condemnation, became associates in a new denomination founded at Kilmarnock on May 16, 1843. Called the Evangelical Union, it trained its ministers first at Kilmarnock and then in Glasgow in a college that Morison served as president. In 1897 the Evangelical Union and the Scottish Congregationalists, totaling more than 90 congregations, united as the Congregational Union of Scotland. Morison was the author of biblical commentaries and several books on Christian doctrine, including *The Nature of the Atonement* (1841).

Morison, Robert (b. 1620, Aberdeen, Aberdeenshire [now in Grampian], Scot.—d. Nov. 10, 1683, London), Scottish botanist whose work, along with that of his contemporary John Ray, served to elucidate and develop the systematic classification of plants.

Morison was the director of the Royal Gardens at Blois, Fr. (1650–60). He returned to England as physician to Charles II and as the botanist and superintendent of all the royal gardens. He was the first regius professor of botany at the University of Oxford (1669–83).

His *Praeludia botanica* (1669), based on the catalog of plants at Blois, contained detailed criticism of the seminal classification theories of Jean and Gaspard Bauhin. Morison was dissatisfied with classification based on habit, inflorescence, and vegetative or medicinal qualities; he argued for basing it on morphological features—specifically on the form and structure of fruit—alone. Morison's attempt to apply his taxonomic principles to the entire plant kingdom, *Plantarum historiae universalis Oxoniensis,* 2 vol. (1680–99), failed to follow his principles consistently. While Morison's conceit and arrogance hindered collaboration with his contemporaries, later botanists such as Carolus Linnaeus and Joseph de Tournefort acknowledged his influence.

Morison, Samuel Eliot (b. July 9, 1887, Boston, Mass., U.S.—d. May 15, 1976, Boston), American biographer and historian who re-created in vivid prose notable maritime stories of modern history. Combining a gift for narrative with meticulous scholarship, he led the reader back into history to relive the adventures of such figures as Ferdinand Magellan, Christopher Columbus, and Sir Francis Drake. He also chronicled the exploits of the U.S. Navy during World War II.

Morison was educated at St. Paul's School in Concord, N.H., and at Harvard University and, after further study abroad, returned to teach at Harvard for 40 years. Taking the view that the art of writing history had been all but lost by American writers, Morison tried to revive it with a technique that combined experience, observation, and research. To give authenticity to his writing, Morison undertook numerous voyages himself, sailed the ocean routes followed by Columbus, and during wartime served on 12 ships as a commissioned officer in the Naval Reserve. By the time of his retirement from the navy in 1951, he had reached the rank of rear admiral.

Morison's writings include: *Maritime History of Massachusetts* (1921); *Admiral of the Ocean Sea* (1942), a biography of Columbus for which Morison was awarded a Pulitzer Prize; *John Paul Jones* (1959), which also received a Pulitzer; *The Oxford History of the American People* (1965); the monumental *History of U.S. Naval Operations in World War II,* 15 vol. (1947–62); *The Life of Commodore Matthew C. Perry* (1967); and *The European Discovery of America, The Northern Voyages* (1971).

Morison, Stanley (b. May 6, 1889, Wanstead, Essex, Eng.—d. Oct. 11, 1967, London), English typographer, scholar, and historian of printing, particularly remembered for his design of Times New Roman, later called the most successful new typeface of the first half of the 20th century.

Following an elementary-school education, Morison became, in 1905, a clerk in the London City Mission, where he remained for seven years. After reading a printing supplement in *The Times* in 1912, he became interested in the study of typography and type design. The supplement also contained an advertisement for a new periodical, *The Imprint,* the purpose of which was to raise the standards of printing. Answering an advertisement in the first issue, Morison joined the publication, which, although short-lived, gave him important typographic experience and led to his employment by the publishers Burns and Oates. There, from 1913 to 1917, he had an opportunity to design books and publicity material. Periods with the Pelican Press (1919–21) and Cloister Press (1921–22) gave him further printing and typographic experience.

In 1923 Morison was appointed typographic adviser to the Monotype Corporation, where he was instrumental in having many important typefaces of the past adapted to machine composition. For three years (1923–25) he was also a writer and an editor on the staff of the *Penrose Annual,* which he helped to broaden from its former stress on technical processes in the graphic arts. In 1923 he was appointed typographic adviser to Cambridge University Press, a position he held until 1959. From 1926 to 1930 he was editor of *The Fleuron,* an influential typographic journal.

In 1929 Morison joined the staff of *The Times,* for which he designed a new face, Times New Roman, which appeared for the first time on Oct. 3, 1932. He continued with *The Times* in various capacities until he retired in 1960. He was editor of *The Times Literary Supplement* from 1945 to 1947.

Morison's extensive and influential writings include *Four Centuries of Fine Printing* (1924) and *First Principles of Typography* (1936). He was the major author of *History of The Times,* 4 vol. (1935, 1939, 1947, and 1952). He was a member of the Board of Editors of *Encyclopædia Britannica* and a contributor to its 14th edition (1929).

Morisot, Berthe (b. Jan. 14, 1841, Bourges, Fr.—d. March 2, 1895, Paris), French painter and printmaker who exhibited regularly with the Impressionists and, despite the protests of friends and family, continued to participate in their struggle for recognition.

The daughter of a high government official (and a granddaughter of the important Rococo painter Jean-Honoré Fragonard), Morisot decided early to be an artist and pursued her goal with seriousness and dedication. From 1862 to 1868 she worked under the guidance of Camille Corot. She first exhibited paintings at the Salon in 1864. Her work was exhibited there regularly through 1874, when she vowed never to show her paintings in the officially sanctioned forum again. In 1868 she met Édouard Manet, who was to exert a tremendous influence over her work. He did several portraits of her (*e.g.,* "Repose," *c.* 1870). Manet had a liberating effect on her work, and she in turn aroused his interest in outdoor painting.

Morisot's work never lost its Manet-like quality—an insistence on design—nor did she become as involved in colour-optical experimentation as her fellow Impressionists. Her paintings frequently included members of her family, particularly her sister, Edma (*e.g.,* "The Artist's Sister, Mme Pontillon, Seated on the Grass," 1873; and "The Artist's Sister Edma and Their Mother," 1870). Delicate and subtle, exquisite in colour—often with a subdued emerald glow—they won her the admiration of her Impressionist colleagues. Like that of the other Impressionists, her work was ridiculed by many critics. Never commercially successful during her lifetime, she nevertheless outsold Claude Monet, Pierre-Auguste Renoir, and Alfred Sisley. She was a woman of great culture and charm and counted among her close friends Stéphane Mallarmé, Edgar Degas, Charles Baudelaire, Émile Zola, Emmanuel Chabrier, Renoir, and Monet. She married Édouard Manet's younger brother Eugène.

"The Artist's Sister, Mme Pontillon, Seated on the Grass," oil on canvas by Berthe Morisot, 1873; in the Cleveland Museum of Art

By courtesy of the Cleveland Museum of Art, gift of Hanna Fund

morisque dance: *see* Morris dance.

Morita Akio (b. Jan. 26, 1921, Nagoya, Japan—d. Oct. 3, 1999, Tokyo), Japanese businessman who was cofounder, chief executive officer (from 1971), and chairman of the board (from 1976) of Sony Corporation, world-renowned manufacturer of consumer electronics products.

Morita was the son of a sake brewer, one of a long line of sake brewers. He attended Ōsaka Imperial University, graduating in 1944 with a degree in physics. During World War II he was assigned to the Air Armoury at Yokosuka, where he met Ibuka Masaru, industry's representative on the Wartime Research Committee. Together the two men worked to develop thermal guidance systems and night-vision devices.

After the war Morita worked with Ibuka to establish a communications laboratory in Tokyo, while he taught at the Tokyo Institute of Technology. He and other former military officers were soon banned from serving in teaching posts. In 1946 Morita and Ibuka cofounded Tokyo Telecommunications Engineering Corporation (Tōkyō Tsūshin Kōgyō), which changed its name to Sony Corporation in 1958. Morita's major concerns were the financial and business matters; he was responsible for marketing Sony products all over the world. He led Sony to great success by "Americanizing" it, a process that included use of an American advertising agency to market its new products and establishing plants in places such as San Diego, Calif. In 1963, under Morita's direction, Sony became the first Japanese company to be listed on the New York Stock Exchange. Morita contributed to the company's further internationalization in a number of ways.

Moritz (German personal name): *see under* Maurice.

Moritz, Karl Philipp (b. Sept. 15, 1757, Hameln, Hannover [Germany]—d. July 26, 1793, Berlin, Prussia), German novelist whose most important works are his two autobiographical novels, *Andreas Hartknopf* (1786) and *Anton Reiser,* 4 vol. (1785–90). The latter is, with J.W. von Goethe's *Wilhelm Meister,* the most mature 18th-century German novel of contemporary life. He was also an influential writer on aesthetics.

Moritz' family was very poor, and he was apprenticed to a hatter, but patrons helped him to study theology. His restless and unhappy nature led him to abandon theology in an attempt to become an actor. This attempt failed, however, and, after completing his studies, he taught in Dessau and Potsdam and finally in a grammar school in Berlin, where he was briefly editor of the *Vossische Zeitung* (with which Gotthold Ephraim Lessing had been associated). In 1786 he traveled to Italy, where he met Goethe, whom he later advised on artistic theory. After his return to Berlin in 1789 he became professor of aesthetics and archaeology at the Academy of Arts.

Morland, George (b. June 26, 1763, London, Eng.—d. Oct. 29, 1804, London), English genre, landscape, and animal painter whose work was much imitated in England during the late 18th and early 19th centuries.

At age 10, Morland exhibited sketches at the Royal Academy, and he was apprenticed from 1777 to 1784 to his father, Henry Robert Morland, a painter and picture restorer. In 1780 his first signed engraving was published, and in 1781 his first oil painting, "A Hovel With Asses," was exhibited at the Academy. He studied briefly at the Royal Academy schools and held his first one-man show of paintings on private premises. In July 1786 he married Anne Ward, sister to William Ward, the engraver. After settling in London, Morland soon abandoned portraiture for sentimental rustic genre, which, through Ward's engravings, satisfied a steady public demand for the picturesque. Morland's best work occurred between 1787 and 1794, after which his painting deteriorated, and he alternated between periods of dissipation and concentrated work until his arrest for debt in 1799.

"Inside of a Stable," oil painting by George Morland, *c.* 1791; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

Morley, Christopher, in full CHRISTOPHER DARLINGTON MORLEY (b. May 5, 1890, Haverford, Pa., U.S.—d. March 28, 1957, Roslyn Heights, Long Island, N.Y.), American writer whose versatile works are lighthearted, vigorous displays of the English language.

Morley's father was a mathematician and his mother a musician and poet. The young Morley studied at Haverford College (B.A., 1910) and was a Rhodes scholar at New College, Oxford (1910–13). Over the years he found success in several fields. He gained popularity with his literary columns in the *New York Evening Post* (1920–24) and the *Saturday Review of Literature* (1924–41) and from collections of essays and columns such as *Shandygaff* (1918). His novels include the innovative *The Trojan Horse* (1937), a combination of prose, verse, and dramatic dialogue that satirized human devotion to luxury, and the sentimental best-seller *Kitty Foyle* (1939), about an office girl and a socialite youth. *The Old Mandarin* (1947) is a collection of witty free verse. Morley also edited Bartlett's *Familiar Quotations* (1937, 1948).

Morley, Edward Williams (b. Jan. 29, 1838, Newark, N.J., U.S.—d. Feb. 24, 1923, West Hartford, Conn.), American chemist who is best known for his collaboration with the physicist A.A. Michelson in an attempt to measure the relative motion of the Earth through a hypothetical ether.

Morley graduated from Williams College in 1860 and then pursued both scientific and theological studies. He took up a Congregational pastorate in Ohio in 1868 and in the following year joined the faculty of Western Reserve College, remaining with the school when it moved to Cleveland in 1882 and became Western Reserve University. He continued to teach there until his retirement in 1906. From 1873 to 1888 he also taught at the Cleveland Medical School.

Morley's personal research centred on questions requiring precise determinations of the density and atomic weight of various gases, especially of oxygen. His reputation as a skilled experimenter attracted the attention of Michelson, then at the nearby Case School of Applied Science. In 1887 the pair performed what have come to be known as the Michelson-Morley experiments, which failed definitively to detect any "ether-drag" effect on the speed of light measured in various directions relative to the motion of the Earth. This result was a major step leading toward Albert Einstein's special theory of relativity.

Morley, Robert (b. May 26, 1908, Semley, Wiltshire, Eng.—d. June 3, 1992, Reading, Berkshire), prolific English actor, director, and playwright whose forte was comedy and comedy-drama.

Morley was a graduate of the Royal Academy of Dramatic Art, London, and made his professional debut in Margate in 1928. His distinctive physical appearance, a rotund body and fleshy jowls, limited somewhat the characters he could portray, and his best roles tended to be seriocomic. He had his first notable stage success in the title role of *Oscar Wilde* (1936) in London and made his New York City debut in the same role in 1938. Later roles included Henry Higgins in *Pygmalion* (1937), Sheridan Whiteside in *The Man Who Came to Dinner* (1941), Prince Regent in *The First Gentleman* (1945), Mr. Assano in *A Majority of One* (1960), and Frank Foster in *How the Other Half Loves* (1970). Most of the plays that he wrote or adapted are in the same vein with the exception of his best-known play, *Edward, My Son* (1947, coauthored), in which he also starred.

Morley appeared in more than 60 films after his 1938 debut as Louis XVI in *Marie Antoinette.* Among his films are *Major Barbara* (1941), *The African Queen* (1951), *The Great Gilbert and Sullivan* (1953), *Around the World in 80 Days* (1956), *Oscar Wilde* (1960), *Topkapi* (1964), *Cromwell* (1970), and *Who Is Killing the Great Chefs of Europe?* (1978). Morley was made a Commander of the Order of the British Empire in 1957.

Morley, Thomas (b. 1557/58—d. October 1602), composer, organist, and theorist, and first of the great English madrigalists.

Morley held a number of church musical appointments, first as master of the children at Norwich Cathedral (1583–87), then by 1589 as organist at St. Giles, Cripplegate, in London, and by 1591 at St. Paul's Cathedral. In 1592 Morley was sworn in as a gentleman of the Chapel Royal.

It is highly probable that Morley became a Roman Catholic early in life, perhaps under the influence of his master, William Byrd. By 1591 Morley had defected from the church, for in that year he engaged in espionage work among the English Roman Catholics in the Netherlands.

About that time, Morley evidently began to recognize the possibilities that were offered by the new popularity of Italian madrigals fitted with English texts, for he began publishing sets of madrigals of his own composition. Morley published 25 canzonets ("little short songs," as he referred to them) for three voices in 1593; in 1597 he published 17 for five voices, and four canzonets for six voices in the same year. His first madrigals—a set of 22—appeared in 1594; and 20 ballets, modeled on the *balletti* of Giovanni Giacomo Gastoldi but with more elaborate musical development and a stronger sense of harmonic direction, came out in 1595. Morley excelled in the lighter and more cheerful types of madrigal or canzonet.

Among the works are a considerable proportion of Italian madrigals reworked and published by Morley with no acknowledgement of the original composers—a practice not uncommon at the time. In 1598 Morley brought out a volume of English versions of selected Italian madrigals; and in that same year he was granted a monopoly to print music in England for 21 years. His textbook, *A Plaine and Easie Introduction to Practicall Musicke* (1597), provides knowledge of the theoretical basis of composition of Morley's own time and that of earlier generations.

Morley's compositions are written in two distinct styles that may be chronologically separated. As a pupil of Byrd he was brought up in the premadrigalian English style of broad and strong polyphony. On the other hand, his madrigal volumes of the 1590s employ the style of the Italian madrigal, characterized by a direct effectiveness, gentle harmonic warmth, springy rhythms, and clarity of texture.

Morley edited *The Triumphes of Oriana* (published 1603), a collection of 25 madrigals by various composers. His last volume of original compositions was *The First Booke of Ayres* (1600). The six-voice motets, "Laboravi in gemitu meo" and "De profundis clamavi," are considered among his best works.

mormaer, also spelled MORMAOR (from Gaelic *mor,* "great"; *maer,* or *maor,* "steward," or "bailiff"), ruler of any of seven provinces into which Celtic Scotland (*i.e.,* the part of the country north of the Forth and the Clyde) was divided. This Celtic title was rendered *jarl* by the Norsemen and after the 12th century, under Anglo-Norman influence, "earl." The seven mormaorships, or original "earldoms," of Scotland were Angus, Atholl with Gowrie, Caithness with Sutherland, Fife, Mar with Buchan, Moray with Ross, and Strath Earn with Menteith.

Mormon, a member of any of several denominations and sects, the largest of which is the Church of Jesus Christ of Latter-day Saints, that trace their origins to a religion founded by Joseph Smith in the United States in 1830. The religion these churches practice is often referred to as Mormonism.

The Church of Jesus Christ of Latter-day Saints, the principal formal body embracing Mormonism, had roughly 10,000,000 members by the late 20th century and is headquartered in Salt Lake City, Utah. About 50 percent of the church's members live in the United States, with the rest in Latin America, Canada, Europe, and parts of Oceania. The next-largest Mormon denomination, the Reorganized Church of Jesus Christ of Latter Day Saints, is headquartered in Independence, Mo., and had a membership exceeding 250,000 in the late 20th century.

Mormonism was founded in upstate New York by Joseph Smith after he had allegedly translated by revelation the *Book of Mormon,* which recounts the history of certain tribes of Israel that migrated to America centuries before Christ and underwent experiences similar to those recounted in the Old Testament. The religion Smith founded had its origins in the millennial enthusiasm of the early 19th century. Mormonism proclaimed a new dispensation and the restoration of the "true church," since it viewed the various Christian denominations as having strayed from the true faith. The Mormons believe that spiritual perfection and thus godhood can be attained through a process of spiritual evolution. They are millennialists, that is, they believe in the Second Coming of Jesus Christ, which will usher in a 1,000-year period of peace under his rule. The Mormons gave millennialism the goal of building up Zion in the American West under prophets to whom were revealed not only theological truth but also day-to-day practical guidance. They devised new secular institutions, including collective ownership (later changed to a system of tithing) and polygamy, which was practiced by Smith himself and by most leading Mormons until, under pressure from the federal government, the practice was given up. The Mormon way of life is still distinguished by order and respect for authority, church activism, strong conformity within the group, and vigorous missionary work.

History. In western New York state in 1827, during a time of intense religious revivalism, Joseph Smith, Jr., a farmer's son, claimed an angel called Moroni gave him golden plates whose engraved records Smith translated into English as the *Book of Mormon*—so called after Mormon, an ancient American prophet who had made an abridgment of many previous plates. Smith published the *Book of Mormon* and organized his new church in 1830. His followers soon moved to Kirtland, Ohio, where a prominent preacher, Sidney Rigdon, and his following had embraced Mormonism. Smith established at Kirtland and in Jackson county, Missouri (where some Mormons had migrated), the communistic United Order of Enoch. But strife with non-Mormons in these communities led to killings and to the burning of Mormon property. Despite this persecution, the Mormons continued to make converts and their numbers increased. Tensions between the Mormons and local slave-owning Missourians, who viewed them as religious fanatics and possible Abolitionists, led to armed skirmishes which forced 15,000 Mormons to leave Missouri in 1839 for Illinois. There Smith built a new city, Nauvoo, but the Mormons' commercial success and growing political power provoked renewed hostility from the "Gentiles," and Smith's high-handed suppression of an apostasy among the Nauvoo Mormons in 1844 intensified non-Mormon resentment and furnished the state government with grounds for his arrest. Smith was murdered by a mob while he was held in jail in Carthage, near Nauvoo, on June 27, 1844.

Smith's death dissolved his presidency and placed the government of the church in the hands of the Council of the Twelve Apostles, whose senior member was Brigham Young. Despite the opposing claims of Rigdon, the majority of Mormons voted to follow Young, who became president of the church. Escalating mob violence had made the Mormons' continued presence in Illinois untenable, and under Young's direction, they undertook a mass 1,100-mile (1,800-kilometre) migration in 1846–47 to Utah. There the Mormons hoped to establish a commonwealth where they could practice their religion without persecution. A vanguard party of about 170 settlers reached the valley of the Great Salt Lake in July 1847. It is estimated that about 80,000 Mormon pioneers had reached Salt Lake City by 1869, when the railroads arrived and made the journey immensely easier.

Upon their arrival in the Far West, the Mormons began to colonize other valleys besides that of Salt Lake. In spite of the obstacles common to the desert area of the Great Basin, they made steady progress in farming the desert, partly through the use of scientific methods of irrigation, of which they were pioneers. The Utah Mormons' petition for statehood in 1849 was denied by the U.S. government, and the area was instead organized as a territory in 1850, with Young as its governor. The principal obstacle to statehood was the Mormons' practice of polygamy. Conflicts between Young and federal officials over this practice and over Mormon theocratic government in general sputtered throughout the 1850s, and, following the Mountain Meadows massacre (*q.v.*) in 1857, the U.S. president James Buchanan dispatched a military expedition to Utah to suppress a spurious Mormon "rebellion" against federal authority there. This abortive military episode aroused public sympathy for the Mormons and came to be known as "Buchanan's blunder," but it did end direct Mormon political control in Utah.

Under Young's leadership, the Mormons spread their colonizing activities all over the West, building temples and tabernacles, founding schools, and engaging in various mercantile and industrial ventures. After his death in 1877 Young was succeeded by John Taylor, the senior apostle in the Council of the Twelve. In 1890 the church relinquished the practice of polygamy in order to conform with U.S. civil law, which forbade polygamous practices, and in 1896 the territory of Utah was admitted into the union as the 45th state.

A minority of Mormons rejected Young as leader and remained in Iowa and Illinois, where, with Smith's son, also named Joseph Smith, they formed the Reorganized Church of Jesus Christ of Latter Day Saints in 1852–60. Much smaller splinter groups also arose after Smith's death. Rigdon led one; another went to Texas with Lyman Wight, who had been an apostle. David Whitmer and Martin Harris, two witnesses of the golden plates, eventually set up a church in Kirtland. James Jesse Strang, a recent convert, was joined by John C. Bennett and established a polygamous community of about 3,000 on Beaver Island in Lake Michigan. This breakaway group of Mormons became known as Strangites.

Among the most significant of Latter-day Saint factions that emerged in the 20th century are the fundamentalists, groups that practice polygamy. They first appeared in 1902 after the church imposed excommunication as the penalty for entering into or officiating over a plural marriage. A colony was established at Short Creek (now Colorado City, Ariz.), and additional colonies flourished in Mexico. Fundamentalist groups claim more than 30,000 members despite efforts by church authorities to stamp them out.

Scriptures. Mormons accept the Bible "as far as it is translated correctly." Smith did not finish his translation of the Bible, which incorporates prophecies of his own coming and of the *Book of Mormon,* which is central to Mormon belief. The *Book of Mormon* is largely similar in style and themes to the Old Testament. It recounts the history of a group of Hebrews who migrated from Jerusalem to America about 600 BC, led by the prophet Lehi. There they multiplied and split into two groups: the virtuous, industrious Nephites, who prospered for a time but were eventually exterminated by the other group, the sinful Lamanites. A familiar moral cycle is discernible: the virtue of God's people leads to prosperity; then to pride, iniquity, decadence, and sin; and so to God's chastisement and the people's repentance. Smith's other revealed scriptures were later incorporated into the *Pearl of Great Price,* together with his translation of papyri that he declared to be the *Book of Abraham* and the *Book of Moses. Doctrines and Covenants* is a selection of revelations to Smith and one given to Young and includes the manifesto of President Wilford Woodruff abolishing polygamy. The version of the Reorganized Church includes fewer revelations from the last decade of Smith's life.

Doctrines. The church's beliefs are in some ways similar to those of orthodox Christianity but also diverge markedly from them. Its statement of faith affirms belief in God, the Father; His Son, Jesus Christ; and the Holy Spirit. Mormons do not consider the three as united in the Trinity but as distinct entities. They believe Christ came to earth so that all might be saved but maintain that a person's future is determined by his or her own actions. Mormons stress faith and obedience to church ordinances, such as repentance, baptism by immersion, and laying on of the hands for the Spirit gifts (*e.g.,* prophecy, revelation, and speaking in tongues).

They believe that faithful members of the church will inherit eternal life as gods, and even those who had rejected God's law would live in glory. Mormons believe that the return of Christ to earth will lead to the first resurrection and the millennium, the main activity of which will be "temple work," especially Baptism on behalf of the dead. After the millennium and second resurrection, the earth will become a celestial sphere and all people will be assigned to the eternal kingdoms.

Mormons regard the Christian churches as apostate; lacking revelations, miracles, and Spirit gifts; and maintaining corrupt rituals, priesthoods, and teachings. They believe Smith came to restore the institutions of the church and God's law in society. Although calling people to repent, Smith's creed reflected contemporary optimism in emphasizing man's inherent goodness and limitless potential for progress. Smith tempered millennialism by calling the faithful to gather and labour to build Zion as a new social order. The presidents of the church have continued to claim divine inspiration.

Institutions and practices of the Mormons. The Mormons eliminate most distinctions between the priesthood and laity. At the age of 12, all worthy males become deacons in the Aaronic priesthood; they become teachers when 14 years old and priests at the age of 16. Two years later they may join the Melchizedek priesthood as elders and then may enter the upper ranks of the church hierarchy. Many Mormons also do missionary work. Men between the ages of 19 and 21 undertake a 2-year proselytizing mission, and women age 21 and older, and even married couples, serve as missionaries for 18 months. This missionary work has helped make Mormonism one of the fastest growing religions in the Western Hemisphere.

Adult Baptism, signifying repentance and obedience, has acquired additional importance as a ritual that may be undertaken by a proxy for the salvation of those who died without knowledge of the truth. The Mormons' interest in genealogy proceeds from their concern to save dead ancestors. Baptism for the dead, endowment, and sealing (which may also be undertaken by proxy for the dead) are secret but essential ceremonies that take place in the temple. At endowment, the person is ritually washed, anointed with oil, and dressed in temple garments. Initiates witness a dramatic performance of the story of creation, learn secret passwords and grips, and receive a secret name. The sealing ceremony, which was of special importance in the period when Mormons practiced polygamy, seals Mormon men and women in marriage for eternity. Although committed to millennialism and Spirit gifts, Mormons engage in worldly pursuits, business, and politics. Despite prohibitions (on alcohol, tobacco, tea, and coffee) and a vigorous work ethic, Mormonism is not ascetic; recreation, sport, and education are positive values. The positive attitude toward recreation, together with the emphasis on order and moral integrity, has been of great importance to the Mormons.

Structure of the Church of Jesus Christ of Latter-day Saints. The First Presidency (church president and two councillors), the Council of the Twelve, the First Quorum of Seventy (and its presidency, concerned especially with missions), and the presiding bishop and two councillors (who control the Aaronic priesthood) constitute the "General Authorities" of the church. They are "sustained in office" by the regular and now ritualized vote of confidence of the semiannual General Conference, which is open to all Mormons.

At the local level, members of the Church of Jesus Christ of Latter-day Saints are divided into "stakes" of, on the average, 4,000 to 5,000 members under stake presidents; and wards, each of a few hundred members, under a bishop. The life of the individual member is closely regulated by these local units, through which the religious, economic, and social activities, tithing, and the operation of the church's elaborate welfare plan are organized. The missionary work undertaken by many young men and women has helped make Mormonism one of the fastest growing religions in the Western Hemisphere.

Reorganized Church and other Mormon groups. The Reorganized Church of Jesus Christ of Latter Day Saints holds firmly to the *Book of Mormon* but rejects the evolutionary conceptions of deity and the polytheism implicit in it, the new covenant of celestial marriage, Baptism on behalf of the dead, polygamy, and tithing. Secret ceremonies are not performed in the Kirtland (Ohio) Temple, to which the Reorganized Church gained legal title in 1890, and the *Book of Abraham* is not accepted as of divine origin. The church's presidents continue to be lineal descendants of Smith, beginning with Joseph Smith (1832–1914).

Some Mormon splinter groups adopted communistic practices. The followers of Granville Hedrick took as their mission the building of Smith's projected temple in Missouri and acquired part of the "Temple Lot" in Independence, Mo. After the Church of Jesus Christ of Latter-day Saints renounced plural marriage in 1890, some Mormon groups in Utah and in northern Arizona continued the practice, but they remained secret.

(B.R.W./Ed.)

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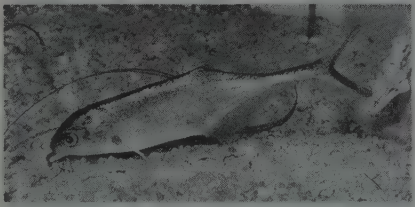
Mormon, Book of, work accepted as holy scripture, in addition to the Bible, in the Church of Jesus Christ of Latter-day Saints and other Mormon churches. First published in 1830 in Palmyra, N.Y., it was thereafter widely reprinted and translated. Mormons hold that it is a divinely inspired work revealed to and translated by the founder of their religion, Joseph Smith.

The Book of Mormon relates the history of a group of Hebrews who migrated from Jerusalem to America about 600 BC, led by a prophet, Lehi. They multiplied and eventually split into two groups. One group, the Lamanites, forgot their beliefs, became heathens, and were the ancestors of the American Indians. The other group, the Nephites, developed culturally and built great cities but were eventually destroyed by the Lamanites about AD 400. Before this occurred, however, Jesus had appeared and taught the Nephites (after his ascension). The history and teachings were abridged and written on gold plates by the prophet Mormon. His son, Moroni, made additions and buried the plates in the ground, where they remained about 1,400 years, until Moroni, a resurrected being or angel, delivered them to Joseph Smith; subsequently Smith returned them to Moroni.

Non-Mormon critics disagree in their opinions as to the origin of the book; some critics believe that it was written solely by Joseph Smith. Another theory, now discredited, claimed that it was based on the manuscript of a novel by a clergyman, Solomon Spaulding.

mormyrid, also called MORMYR, any of several species of slimy freshwater African fishes that comprise the family Mormyridae (order Mormyriformes). They are usually found in sluggish, muddy water. Mormyrids are soft-rayed bony fishes with abdominal pelvic fins, forked tail fins, small mouths and eyes, restricted gill openings, and small scales. They range from 9 to 50 cm (3.5 to about 20 inches) in length. Their brains are proportionately very large, comparable to that of humans in relation to body weight; enlarged areas of the brain indicate well-developed senses. A loosely attached bony plate on each side of the head covers a vesicle that communicates with the internal ear. Paired electric organs of mild power, present in the tail, set up a continuous electric field around the fish, acting as a sensory screen. Most mormyrids feed on small prey, aquatic vegetation, or organic debris.


Scaly mormyrid (*Gnathonemus*)
Russ Kinne—Photo Researchers

More than 100 species of unusual appearance are placed in about 11 genera. The elephant-snout fishes, species of *Gnathonemus,* have the mouth at the end of a long, trunklike snout. Other mormyrids have narrow heads, protruding lower lips, or short, rounded snouts. The Nile species of *Mormyrus* are represented in ancient Egyptian mural paintings and hieroglyphics.

Mornay, Philippe de, SEIGNEUR DU PLESSIS-MARLY, also called PHILIPPE DUPLESSIS-MORNAY (b. Nov. 5, 1549, Buhy, Normandy, Fr.—d. Nov. 11, 1623, La Forêt-sur-Sèvre), French diplomat who was one of the most outspoken and well-known publicists for the Protestant cause during the French Wars of Religion (1562–98).

Mornay received a Protestant education, studying Hebrew, law, and German at the University of Heidelberg. He only narrowly escaped death while in Paris at the time of the massacre of Protestants on St. Bartholomew's Day (Aug. 24, 1572). During the next four years he wrote numerous political tracts, including *Discours au roi Charles* (1572; "Discourse to King Charles") and *Remonstrances aux estats pour la paix* (1576; "Remonstrances on the Conditions for Peace"). Scholars have disputed whether the *Vindiciae contra tyrannos* (1579; "A Defense of Liberty Against Tyrants"), the most famous tract of Protestant political thought of the time, should be attributed to Mornay or to his friend Hubert Languet. The *Vindiciae* acknowledges a contract between a sovereign and his people: if the sovereign becomes a tyrant, the contract is broken and the people have the right to depose him.

Mornay, engraving by L. Gaultier
By courtesy of the Bibliotheque Nationale, Paris

Fighting for the Huguenots, Mornay was captured in 1575, but by concealing his identity he was able to secure release for only a small ransom. In 1576 he married Charlotte Arbaleste, whose memoirs are a major source for the events of her husband's life. Mornay became a valued counsellor of Henry of Navarre (later King Henry IV of France) and negotiated the reconciliation between Navarre and Henry III of France in April 1589. He conducted many important embassies for the Protestant cause and for Henry IV both before and after Henry's accession to the throne. During this time he was appointed governor of Saumur.

Henry IV's reconciliation with the Roman Catholic church (1593) ended his collaboration with Mornay, and the publication of Mornay's *De l'institution . . . de l'Eucharistie* (1598), in which he made use of scriptural quotations in an attack on Roman Catholic eucharistic doctrine, increased the breach between them. At a public disputation at Fontainebleau in 1600 with Jacques Davy Duperron, bishop of Évreux, it became clear that Mornay had lost Henry IV's favour. He played no further part in national affairs and in 1621 was deprived of his governorship.

Mornay also wrote a history of the papacy (1611). His *Mémoires et correspondance* (collected ed., 12 vol., 1824–25) contains many documents of French Protestant policy.

morning glory, any of several herbaceous, twining plants or shrubs in the genus *Ipomoea* (*q.v.*).

Morning Star (Cheyenne leader): *see* Dull Knife.

Mornington, Richard Colley Wellesley, 2nd earl of: *see* Wellesley (of Norragh), Richard Colley Wellesley, Marquess.

Morny, Charles-Auguste-Louis-Joseph, duc de (duke of) (b. Oct. 21, 1811, Paris—d. March 10, 1865, Paris), French political and social leader during the Second Empire who played an important part in the coup d'état of Dec. 12, 1851, which eventually led to the establishment of Charles Louis-Napoléon Bonaparte, Morny's half brother, as Emperor Napoleon III.

Morny was the illegitimate son of Hortense de Beauharnais (the estranged wife of Louis Bonaparte, a brother of Napoleon I) by Charles-Joseph, comte de Flahaut. He affected the fictitious title of comte (count) de Morny (he was not created a duke until late in life). He began his career as a lieutenant in the French Army, serving mainly in Africa (1832–36), but neither his interests nor his ambitions were military. Above all addicted to social pleasures, he resigned his commission and devoted himself to Parisian society and to making a fortune by speculation and by manufacturing beet sugar. He was elected to represent Clermont-Ferrand in the Chamber of Deputies in 1842 and again in 1846 but did not reach the first rank in politics until his half brother, Louis-Napoléon, was elected president of the republic in 1848. He was elected deputy for Puy-de-Dôme in 1849.

Becoming minister of the interior on the day of Louis-Napoléon's coup, Morny organized the plebiscite that made Louis-Napoléon dictator. Soon resigning his ministry, he served briefly as ambassador to Russia (1856) and then became president of the legislature. In this office he abandoned his formerly reactionary role and tried to persuade Napoleon III to give the country more liberty. He saw that Napoleon's dictatorial power could not last and urged him to yield it voluntarily rather than be compelled to do so. In any case, in spite of occasional dissensions, Morny's influence with the emperor remained very great, and he was created a duke in 1862. His health, however, undermined by a ceaseless round of political and financial business, of fashionable life and dissipation, was giving way and was further injured by indulgence in quack medicines. The emperor and the empress visited him just before his death in Paris.

Morny's valuable collection of pictures and art objects was sold after his death. In spite of his undoubted wit and social gifts, Morny failed to secure the distinction that he desired as a dramatist, and none of his plays, which appeared under the pseudonym of M. de St. Rémy—*Sur la grande route* ("On the Grand Route"), *Monsieur Choufleury restera chez lui* ("Monsieur Choufleury Will Remain at Home"), and the *Finesses du mari* ("The Husband's Finesses"), among others—met with any considerable success on the stage.

Moro, in the Philippines, any of several Muslim peoples of Mindanao, Palawan, the Sulu Archipelago, and other southern islands. Constituting about 5 percent of the Philippine population, they can be classified linguistically into 10 subgroups: the Maguindanao of North Cotabato, Sultan Kudarat, and Maguindanao provinces; the Maranao of Lanao del Norte and Lanao del Sur provinces; the Tausug, mostly of Jolo Island; the Samal, mostly in the Sulu Archipelago; the Bajau, mostly in the Sulu Archipelago; the Yakan of Zamboanga del Sur province; the Ilanon of southern Mindanao; the Sangir of southern Mindanao; the Melabugnan of southern Palawan; and the Jama Mapun of the Cagayán Islands. The Moro are not racially different from other Filipinos but—with a separate Islāmic faith (introduced from Borneo and Malaya in the 14th century) and local cultures—have remained outside the mainstream of Philippine life and have been the object of popular prejudice and national neglect. Moro conflict with ruling powers has a centuries-long history: from the 16th to the 19th century they resisted Roman Catholic Spanish colonialists, who tried to extirpate their "heresy"; in the first decade of the 20th century they battled against U.S. occupation troops in a futile hope of establishing a separate sovereignty; and, finally, they spawned insurgencies against the independent Philippine government, especially from the late 1960s on.

Historically, Muslim Filipinos have never constituted a collective entity. The various groups or tribes have often been fiercely independent, have clashed with one another at times, and have independently grafted Islāmic tenets and practices onto their distinct local cultures. Nevertheless, internal differences have been outweighed by the common grievances that the Moro have experienced vis-à-vis non-Muslims in the Philippines. After World War II, their traditional grievances as religious and economic outcasts were exacerbated by the great migration of northern Christian Filipinos into the southern provinces, where they bought up land and tried, Moros alleged, to Christianize the schools and other institutions. In 1971 the *Manila Times* estimated that 800,000 Muslims were refugees turned out of their lands by Christians.

The main contemporary resistance group espousing Moro separatism—the Moro National Liberation Front (MNLF), founded in 1968—instituted a terrorist insurgency that left 50,000 dead, drew in about half of the Philippine armed forces, and drove some 20,000 Muslim refugees to Sabah, East Malaysia, before a ceasefire was arranged in late 1976. In 1976–77 the Ferdinand Marcos administration in Manila offered regional autonomy to the various Moro groups, but in 1977 the MNLF president, Nur Misuari, renewed a demand for total independence for the southern Philippines and gained diplomatic and military support first from Libya and then from Iran. The war nevertheless dwindled to Moro raids and ambushes, and the MNLF itself was reported to have split into factions, partly on the lines of traditional ethnic and regional Moro rivalries.

Moro, Aldo (b. Sept. 23, 1916, Maglie, Italy—d. May 9, 1978, near or in Rome), law professor, Italian statesman, and leader of the Christian Democrat Party, who served five times as premier of Italy (1963–64, 1964–66, 1966–68, 1974–76, and 1976). In 1978 he was kidnapped and subsequently murdered by left-wing terrorists.

A professor of law at the University of Bari, Moro published several books on legal subjects and served also as president of the Federazione Universitaria Cattolica Italiana (Federation of Italian University Catholics, 1939–42) and the Movimento Laureati Cattolici (Movement of Catholic Graduates, 1945–46). After World War II, he was elected deputy to the Constituent Assembly and to the legislature. He held a succession of cabinet posts, including under secretary of foreign affairs (December 1947–May 1948), minister of justice (1955–57), and minister of public instruction (1957–59).

Moro took office as secretary of the Christian Democrats during a crisis that threatened to split the party (March 1959). Although he was the leader of the Dorothean, or centrist, group of the Christian Democrats, he favoured forming a coalition with the Socialists and helped bring about the resignation of the conservative Christian Democrat prime minister Fernando Tambroni (July 1960).

When he was invited to form his own government in December 1963, Moro assembled a cabinet that included some Socialists, who were participating in the government for the first time in 16 years. He resigned after a defeat on a budget issue (June 26, 1964) but formed a new cabinet much like the old one (July 22). After Amintore Fanfani's resignation in 1965, Moro temporarily became his own foreign minister, renewing Italian pledges to NATO and the United Nations.

Italy's inflation and failing industrial growth prevented Moro from initiating many of the reforms he had envisaged, and this angered the Socialists, who effected his defeat in January 1966. He succeeded, however, in forming a new government on February 23. After the general elections in 1968, Moro, as is customary, resigned (June 5, 1968). He was foreign minister during 1970–72. In November 1974 he became premier with a coalition government, the second party being the Republican, but this government fell on Jan. 7, 1976. Moro was again premier in 1976, from February 12 to April 30, remaining in office as head of a caretaker government until July 9.

In October 1976 he became president of the Christian Democrats and remained a powerful influence in Italian politics even though he held no public office. On March 16, 1978, Moro was kidnapped in Rome by Red Brigades terrorists while on his way to attend a special session of Parliament. After government officials repeatedly refused to release 13 members of the Red Brigades on trial in Turin, Moro was murdered in or near Rome by the terrorist kidnappers.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Moro, Antonio (Dutch painter): *see* More, Sir Anthony.

Moroccan crises (1905–06, 1911), two international crises centring on France's attempts to control Morocco and on Germany's concurrent attempts to stem French power.

In 1904 France had concluded a secret treaty with Spain partitioning Morocco and had also agreed not to oppose Britain's moves in Egypt in exchange for a free hand in Morocco. Germany, however, insisted upon an open-door policy in the area; and, in a dramatic show of imperial power, the emperor William II visited Tangier and, from his yacht on March 31, 1905, declared for Morocco's independence and integrity. The resultant international panic, the First Moroccan Crisis, was resolved in January–April 1906 at the Algeciras Conference (*q.v.*), where German and other national economic rights were upheld and where the French and Spanish were entrusted with the policing of Morocco.

On Feb. 8, 1908, a further Franco-German agreement reaffirmed Morocco's independence while recognizing France's "special political interests" and Germany's economic interests in North Africa.

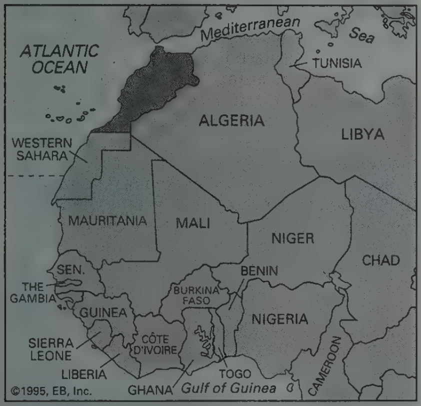
The Second Moroccan Crisis (1911) was precipitated when the German gunboat *Panther* was sent to Agadir on July 1, 1911, ostensibly to protect German interests during a local native uprising in Morocco but in reality to cow the French. This "Agadir Incident" sparked a flurry of war talk during the summer and fall (the British even made preparations for eventual war), but international negotiations continued, and the crisis subsided with the conclusion of the convention of Nov. 4, 1911, in which France was given rights to a protectorship over Morocco and, in return, Germany was given strips of territory from the French Congo. Spain at first objected; but, through the intervention of Great Britain, a Franco-Spanish treaty was concluded on Nov. 27, 1911, slightly revising the previous Franco-Spanish boundaries in Morocco. The negotiations of 1911–12 between the powers also resulted in the internationalization of the

Tangier zone, consisting of Tangier and its environs.

Morocco, officially KINGDOM OF MOROCCO, Arabic AL-MAGHRIB, or AL-MAMLAKAH AL-MAGHRIBĪYAH, country located on the northwestern corner of Africa. Morocco's maximum length from northeast to southwest is 825 miles (1,328 km), and its maximum width from east to west is 475 miles (765 km). The country borders Algeria (east and southeast) and Western Sahara (south); its western border is defined by the Atlantic Ocean, and its northern border is defined by the Mediterranean Sea. Morocco faces Spain across the Strait of Gibraltar to the north. The capital is Rabat. Area 177,117 square miles (458,730 square km). Pop. (2002 est.) 29,632,000.

A brief treatment of Morocco follows. For full treatment, *see* MACROPAEDIA: North Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.



Morocco

The land. Morocco is a mountainous country that has an average elevation of 2,600 feet (800 m) above sea level. Two northeast-southwest–trending mountain chains, the Rif along the northern coast and the Atlas in the centre, divide eastern Morocco from Atlantic Morocco to the west. Morocco's mountains are the highest in northern Africa and occupy more than one-third of the nation's total land area. The crescent-shaped range of the Rif rises to 8,058 feet (2,456 m) at Mount Tidirhine on the Mediterranean coast. In the centre of the country are the Atlas Mountains, with an average elevation of 11,000 feet (3,350 m). The median of their three chains includes Mount Toubkal (13,665 feet [4,165 m]), the highest peak in Morocco.

Morocco's lowlands and rocky plateaus also are dominated by the Atlas mountain system. Only in the fertile alluvial lowlands, which occupy about one-fifth of the total land area, is intensive agricultural cultivation possible. The country's lowlands include those of the Moulouya (northeast), Rharb (northwest), the piedmont plains of the High Atlas (central), and the Sous plain (southwest). Rocky plateaus (with average elevations approaching 3,000 feet [9,100 m]) cover almost half of the total land area and include the high plateaus of eastern Morocco, the coastal plateau of Rabat, and the semiarid Sahara plateau in the south.

All Moroccan rivers are torrential in nature, and they generally flow to the Atlantic Ocean or disappear in the Sahara—except for the Moulouya in the north, which flows into the Mediterranean Sea. Morocco lies in a zone of severe seismic activity, and destructive earthquakes are frequent.

A Mediterranean climate with warm, wet winters and hot, dry summers prevails over most of northern and central Morocco, giving way to semiarid and desert climate in the south. The annual range of average monthly temperatures is 63° to 73° F (17° to 23° C) along the coasts and 50° to 80° F (10° to 27° C) in the interior. Annual precipitation ranges from 32 inches (800 mm) in the north to 8 inches (200 mm) in the south and half of this amount or less along the Sahara in the southeast.

About one-fifth of the country's total area is covered by forests. Important species include cedar, fir, and juniper in the mountains and wild olive, cork oak, and dwarf palm at lower elevations. Wildlife includes mouflon (a wild sheep), gazelle, fennec (a type of fox), and macaco (a type of monkey) in the Atlas region.

Morocco's most important mineral resource is the world's largest reserves of phosphate, found near Khouribga and Youssoufia in the central-west. Other mineral deposits are iron ore, zinc, lead, rock salt, manganese, copper, and coal.

The people. Arabized Berbers are Morocco's predominant ethnolinguistic group, and many of them speak both Arabic and Berber. Less-assimilated Berbers make up about one-third of the population and live in the mountains, where the Berber language has been preserved. They fall into three groups: the Rif people of the Rif Mountains, the Tamazight of the Middle Atlas, and the Shluh of the High Atlas and the Sous valley. The country's French and Spanish minorities have diminished significantly since Morocco's independence in 1956; other minorities include Bedouin Arabs and blacks. Most of the country's substantial Jewish minority had immigrated to the state of Israel by the late 20th century. Arabic is the nation's official language. Most Moroccans are Sunnite Muslims of the Malikite order.

Morocco's population growth rate is relatively high, although it is below average for the Middle East and North African region. The government tried to initiate family-planning programs in the 1960s to reduce the country's high birth rate, but they were largely rejected by the Muslim culture. Two-fifths of the population is younger than 15 years of age, increasing the burden on those of working age.

Almost half of the population lives in urban areas. Overall population density is relatively low; the most densely settled areas are the urban centres of the west, and continued rural-to-urban migration has accentuated the cities' overcrowding. Casablanca is the nation's largest city, with Rabat, Fès, and Marrakech among the other large urban centres. Immigration restrictions initiated in western Europe during the early 1980s have diminished emigration from Morocco to that region.

The economy. Morocco has a mixed economy that is largely based on services, agriculture, and mineral industries. Economic growth has been somewhat offset by the rapid growth of the population, and there is a surplus of unskilled labour. The gross national product (GNP) per capita remains relatively low.

Agriculture accounts for less than one-fifth of the gross domestic product (GDP) but employs two-fifths of the workforce. Land reform that was initiated in 1963 has benefited only a limited number of peasants; Europeans whose land was expropriated have been partially indemnified. Most farms in Morocco are small and are worked by families. Government-subsidized irrigated farms produce citrus fruits, wine, and vegetables for export. Harvests of barley and wheat, the chief staples, fluctuate from year to year and do not meet domestic demand; sugar beets are also a major crop. The productivity of sheep, goats, and cattle is generally low, and milk must be imported. During the 1980s Morocco developed its fishing industry, with most of the catch consisting of sardines and mackerel from the Atlantic Ocean.

Morocco is the world's largest exporter of phosphate rock, or phosphorite, which is made into phosphate fertilizers for use in agriculture. The production of phosphorite is controlled by the government through the Office Chérifien des Phosphates. Iron ore, lead, cobalt, zinc, manganese, and silver are also mined. Morocco's production of petroleum meets only a small fraction of its domestic demand. The Islāmic Development Bank has helped finance imports of fuels, which have severely strained Morocco's balance of payments. Deposits of natural gas have been found near Essaouira and Mechra bel Ksiri.

Manufacturing industries account for approximately one-fifth of the GDP and employ one-sixth of the workforce. Industries are dominated by the production of phosphates. Casablanca is the nation's industrial and commercial centre, with light industries predominating there. The government has encouraged the development of industries outside Casablanca and has liberal codes regulating foreign investment. In its own economic enterprises, the government prefers to ally itself with private capital, both domestic and foreign. Small-scale industries employ most of the industrial workforce and produce light consumer goods. Chief manufactures include petroleum products, cement, textiles, processed foods, and chemicals. Electricity is generated primarily from imported fuels; little more than one-tenth is generated from hydroelectric power.

Morocco's transportation network is highly developed, especially among the cities of the north and west; 50 percent of the country's roads are paved. The principal ports include Agadir, Casablanca, and Tangier, all of which also have international airports. The government operates the railways.

Capital and semifinished goods, fuels, and consumer goods lead the nation's imports, which exceed its exports of agricultural commodities, phosphates, phosphoric acid, and clothing. Restrictions have been imposed on imports in an effort to stem the trade deficit. Chief trading partners include France, Spain, Italy, India, and Germany.

Government and social conditions. Morocco is a constitutional monarchy. The 1972 constitution, revised in 1980 and 1992, vests supreme executive power in the hereditary king, who appoints a prime minister. The country has universal adult suffrage. Legislative power is vested in a unicameral House of Representatives, two-thirds of its members directly elected and one-third chosen by an electoral college; the term of office is six years. The independent judiciary is headed by the Supreme Court appointed by the king. Extensive consitutional revisions in 1992 increased the powers of the prime minister and the House of Representatives.

The country's social-security programs extend to only a small percentage of the workforce. A wide range of other welfare services includes a temporary jobs and food program for the unemployed. Morocco's health conditions are generally poor for the Middle East and North Africa, and the concentration of health facilities and personnel in urban areas contributes to a regional disparity in living conditions. Average life expectancy in Morocco is only about 63 years. Malnutrition occurs in some rural areas and among the urban poor. There is also a serious and growing housing shortage, which is evident in the slums, or *bidonvilles,* found in larger cities. The government subsidizes private housing construction.

Education is compulsory between the ages of 7 and 15. The educational system comprises five-year primary and four- to seven-year secondary and technical schools, as well as institutions of higher education. The literacy rate, however, is only 50 percent.

The Moroccan press generally voices the point of view of the government or the political parties and reaches a limited audience. Because of the extent of illiteracy, the state-owned broadcast media are of far greater importance than the printed media. Educational and religious programs are emphasized.

Cultural life. The production of Arabic literature in Morocco has continued to grow and diversify. To the traditional genres—poetry, essays, and historiography—have been added forms inspired by Middle Eastern and Western literary models. Since 1956, when Morocco achieved independence, painting, sculpture, and amateur theatre have flourished. Painting is centred at the two schools of fine arts in Casablanca and Tetouan. Moroccan music includes Arab, Berber, popular, and classical forms.

History. The Berbers entered Morocco near the end of the 2nd millennium BC. Phoenician traders established trading posts along the Mediterranean coast during the 12th century BC, and Carthage had settlements along the Atlantic coast in the 5th century BC. After the fall of Carthage, Morocco became a loyal ally of Rome under the Berber king Juba II (25 BC–AD 24). In 46 Morocco was annexed by Rome as part of the province of Mauretania, and it is thought that the province was almost entirely Christianized during the latter part of Roman rule.

In the late 7th century the Muslim invasion from the east reached Morocco. In 740 the Berbers revolted against the rule of the Umayyads of Damascus, and the Berbers remained independent of Umayyad and Abbasid rule. After some three centuries of local wars of conquest and shifting control, a Berber confederation known as the Almoravids conquered all of Morocco in the middle of the 11th century and enforced their rule over the Muslim areas of Spain as well. In the early 12th century another Berber clan, the Almohads, revolted against the Almoravid dynasty and became the rulers of Morocco and all Muslim Spain. They were gradually driven from Spain in the 13th century and were defeated in Morocco in 1269 by the Marīnids. Under the Marīnids' rule, which lasted to the mid-15th century, Muslim mysticism, or Ṣūfism, developed in Morocco. After the fall of the Marīnids the country was divided into small independent states until the Saʿdīs established their rule over Morocco for a century after about 1550.

European intervention in North Africa increased in 1830. The French invaded Algeria and exacted Moroccan assistance in capturing the Algerian leader Abdelkader (1846). Great Britain obtained favourable trading rights from Morocco in 1856, and the Spanish increased their northern African territory at the expense of Morocco in 1859. In 1912 the sultan of Morocco, Moulay Abd al-Hafid, accepted French protectorate status.

Moroccan nationalism began to grow during and after World War II, and independence from France was negotiated in 1956, with Sultan Sidi Muḥammad forming a constitutional government. In 1961 Moulay Hassan succeeded his father as Hassan II. Several attempted military coups postponed the installation of a parliamentary government until 1977, when elections were held that brought the king's supporters into power.

In the late 1970s Morocco reasserted its claim to the Spanish Sahara, sending some 200,000 Moroccans into the region to claim Moroccan sovereignty there. In 1976 Spanish troops withdrew from the region, leaving the Algerian-supported Saharan guerrillas of the Polisario Front to contest the Moroccan claim. In the 1980s Morocco continued its policy of developing the Spanish Sahara region (renamed the Western Sahara), causing relations with both Algeria and Mauritania to deteriorate. The war over the region remained unresolved at the time of Hassan's death and ascension of his son, Muhammad VI, to the throne in 1999.

Moroleón, city, southern Guanajuato *estado* ("state"), north-central Mexico. It lies at 5,814 feet (1,772 m) above sea level in the Bajío region. Moroleón is the commercial and manufacturing centre for the surrounding farms and ranches. Corn (maize), beans, alfalfa, wheat, chick-peas, and onions thrive in the cool climate, and livestock raising is widespread. Shoes and rebozos (shawls) are the principal manufactures. The city is situated on a highway linking Salamanca, to the north, and Morelia, the capital of Michoacán state, to the south. Pop. (2000 est.) 47,100.

Morón, formerly (1930–43) SEIS DE SEPTIEMBRE, *cabecera* (county seat) and *partido* (county) of Gran (Greater) Buenos Aires, Argentina. It lies west of the city of Buenos Aires, in Buenos Aires *provincia.*

In the 16th century, Morón served as a way station for travelers en route to the area that is now Chile and Peru. The present-day county was part of the Pago (country district) de las Conchas during the 17th and early 18th centuries. In 1730 the region was incorporated within the Pago de la Matanza. The Chapel of Nuestra Señora del Buen Viaje ("Our Lady of the Safe Journey") became the centre of settlement for the city in 1769, and the region was named the Cañada de Morón ("Pass of Morón"). A justice of the peace was appointed to Cañada de Morón in 1784, and in the same year it became part of the county of Matanza. The area was demarcated and separated from Matanza in 1812, however. The county of Morón was officially established in 1870. It is bordered by the counties of Tres de Febrero (northeast), Matanza (southeast), Merlo (southwest), and Moreno and General Sarmiento as well as the Reconquista River (northwest). Morón county was the site of the Feb. 3, 1852, Battle of Caseros, where the Argentine military ruler Juan Manuel de Rosas was overthrown. From 1930 to 1943 the city and county were known as Seis de Septiembre in honour of a military uprising that took place on Sept. 6, 1930.

Horticulture, agriculture (grains and alfalfa), and livestock raising were once widespread in Morón's formerly rural areas. The county seat is now an important industrial centre, with meat-packing, dairy production, food canning, tanning, and varied manufacturing plants. Besides Morón, other localities include Hurlingham, Castelar, Ituzaingó, and Mariano J. Haedo.

With the growth of the national capital, Morón has been absorbed into the suburban area of Gran Buenos Aires. Thus, its population density is greater than that in many other counties. Morón is linked to other parts of the country by road and railway. It also has an airport. Area (county) 51 square miles (131 square km). Pop. (1999 est.) 340,645.

Morón, city, northern Ciego de Ávila *provincia,* east-central Cuba. Situated in the swampy coastal plain just south of the Leche Lagoon, Morón is an important regional transportation and manufacturing centre. From the hinterland come sugarcane, tobacco, cacao, coffee, fruit, cattle, and timber to be processed in the city. Asphalt and chromite are found in the vicinity. Morón is linked by railroad and highway to other urban centres along the northern coast and has an airfield. Pop. (1991 est.) 49,800.

Morón, town, central highlands of Carabobo *estado* ("state"), north-central Venezuela. In 1950 the site was selected for development under the government's policy of using the revenues from the petroleum industry to foster domestic production of as many goods as possible. Morón is one of Venezuela's major industrial centres and is a seat of the government's petrochemical industry. The town is favourably situated for the manufacture of petrochemicals because it is close to raw materials (petroleum, natural gas, salt, pyrite, phosphate, and limestone); to the country's principal population centres; to Puerto Cabello (14 miles [23 km] west), which is one of Venezuela's most important ports; and to a major railway and highway. Morón's well-planned industrial complex has facilities to refine petroleum and to manufacture synthetic rubber, detergents, plastics and plastic derivatives, pharmaceuticals, nylon, caustic soda, chlorine, ammonia, urea, herbicides, insecticides, explosives, and fertilizers. Pop. (1990 est.) 57,200.

Morón de la Frontera, city, Seville *provincia,* in the Andalusia *comunidad autónoma* ("autonomous community"), southwestern Spain. It lies in the valley of the Guadalquivir River, near the northwestern foothills of the Penibético Mountain System. The site was founded by the Phoenicians, and the place was settled by the Romans, who called it Arunci. The Arabs later gave it a hybrid name: the Hebrew *moram,* meaning "elevated site," and the Spanish *frontera,* referring to its 250-year position at the border of the Muslim kingdom of Granada. Reconquered by Melén Rodríguez Gallinato for Ferdinand III of León and Castile, it was ceded to Seville for repopulation by Christians after its Muslim inhabitants had been driven out. On a hill above the city stand the ruins of a Moorish castle, abandoned in the 17th century and partly destroyed by the French in 1812. Basically an agricultural community, Morón produces olives, olive oil, wheat, and liquors, as well as construction materials. Pop. (1999 est.) 28,207.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Morone, Giovanni (b. Jan. 25, 1509, Milan [Italy]—d. Dec. 1, 1580, Rome), Italian cardinal, one of the greatest diplomats of the Protestant Reformation, and the last president of the Council of Trent—the 19th ecumenical council of the Roman Catholic church—which convened between 1545 and 1563 at Trento to restore church morale and doctrines challenged by the Reformation.

Morone was named bishop of Modena in 1529. In 1536 Pope Paul III sent him as ambassador to Germany, where he encouraged theological discussions while working toward a general council that would bring peace to Christian countries and would appease Catholics and Protestants. He assisted at the German diets of Hagenau (1540), Ratisbon (now Regensburg; 1541), and Speyer (1542), where he succeeded in getting Trento accepted as the locality of the council which Paul III convoked for Nov. 1, 1542.

He returned to Rome in 1542 and was made cardinal. He was appointed as Paul's emissary to the Council of Trent, but when the council was postponed (until 1545), Paul made Morone governor of Bologna in 1544. Under Pope Julius III, Morone became bishop of Novara (1553–60). In 1557 Pope Paul IV imprisoned him at Rome on suspicion of heresy, but he was released on Paul's death (1559) and was absolved by Pius IV, who in 1563 appointed Morone president of the Council of Trent.

Morone's diplomacy saved the council from disaster when a large international body of bishops pressed for a statement that episcopal jurisdiction came to each bishop directly from God and not through the pope. Opposition by the Roman delegation resulted in a deadlock. Morone secured the surrender of the extremists on both sides, and the council finally accepted the statement that bishops were assigned by the Holy Ghost to rule the church. Thus he brought the council's last period to a successful conclusion.

Morone was made bishop of Ostia in 1570 and spent his last years administering the English College in Rome in his capacity as cardinal protector of England. N. Bernabei's *Vita del cardinale G. Morone* ("Life of Cardinal G. Morone") appeared in 1885.

Moroni, according to the teaching of the Church of Jesus Christ of Latter-day Saints, an angel or resurrected being who appeared to Joseph Smith on Sept. 21, 1823, to inform him that he had been chosen to restore God's church on earth. Four years later Smith purportedly received plates of gold from Moroni, who, as the last of the ancient prophets, had buried them in a hill called Cumorah (near Palmyra, N.Y.) some 14 centuries earlier. On these plates were written history and teachings about ancient American prophets and peoples; it was this knowledge that Smith recorded in the Book of Mormon (*see* Mormon, Book of), which became accepted as a holy scripture by the Mormon Church.

Moroni, coastal town and capital of Comoros, southwestern Grande Comore (also called Njazidja) island in the Indian Ocean. It was founded by Arabic-speaking settlers and is the largest settlement of the Comoros Islands. Dzaoudzi, the principal city of the island of Mayotte, was the original administrative capital of the Comoros, but Moroni succeeded it in 1958.

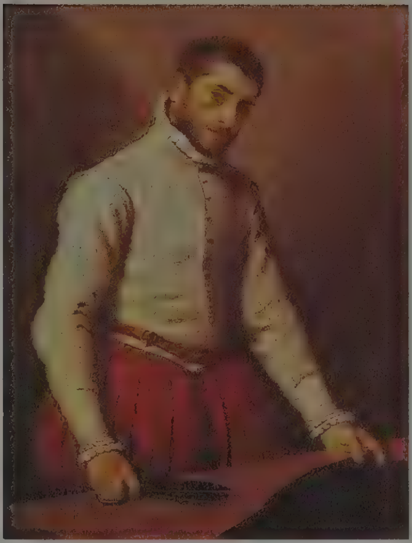
A mosque along the waterfront at Moroni, Comoros

Gerald Cubitt

The port of Moroni consists of a small quay in a natural cove and lacks natural protection for shipping. Vanilla, cacao, and coffee are exported from the port, whose facilities include warehouse storage for imports and exports and for petroleum products. Moroni's industries manufacture soft drinks, processed and distilled essential oils, metal and wood products, and processed pozzolana (cement). Despite the presence of modern office buildings, Moroni retains a traditional Arabic appearance. The city has numerous mosques, including Chiounda, a pilgrimage centre. Roads link Moroni with the coastal towns of Hahaia to the north and Mitsoudje to the south. Iconi International Airport is located in southern Moroni. Pop. (1995 est.) 34,168.

Moroni, Giovanni Battista (b. *c.* 1525, Albino, Republic of Venice—d. Feb. 5, 1578, Bergamo), Italian Renaissance painter notable for his sober and dignified portraits.

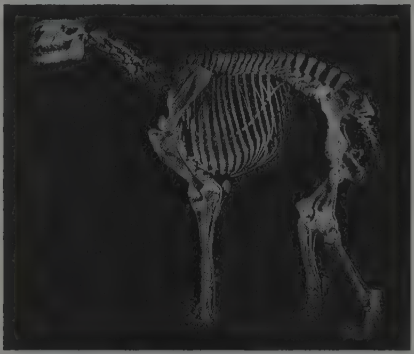
Moroni was a pupil of the local painter Moretto da Brescia, who strongly influenced Moroni's manner in painting religious compositions. It is Moroni's portraits that have earned him his importance, however, for he was one of the few Italian Renaissance artists who made portraiture their chief specialty. His portraits were mostly of the petty aristocracy and bourgeoisie of Bergamo. One of his best-known works is "The Tailor" (*c.* 1571; National Gallery, London). Moroni emphasized a sitter's dignity and nobility by means of natural, unforced poses and masterful compositions. Despite their impassive facial expressions, many of his portraits impart a sense of gentle melancholy that is reinforced by predominantly grey tonalities and by a restrained treatment of the textures of cloth and draperies. Moroni's simple yet subtle style of portraiture was clearly influenced by that of Titian, who himself commended Moroni's work. Among Moroni's other more notable portraits are the "Portrait of a Young Man" (Brera Picture Gallery, Milan) and the "Portrait of a Gentleman" (1563; Uffizi Gallery, Florence).



"The Tailor," oil on canvas by Giovanni Battista Moroni; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

Moropus, extinct genus of the chalicotheres, a group of very unusual mammals related to the horse. Fossil remains of *Moropus* are found in Miocene deposits in North America and Asia (the Miocene Epoch began 26,000,000 years ago and lasted 19,000,000 years). *Moropus* was as large as a modern horse, but, unlike other perissodactyls, it had claws instead of hoofs. The forelimbs were longer than the hind limbs, and the back sloped downward to the hindquarters. The teeth possessed low crowns; the molars were large and the premolars small. It is likely that *Moropus* did not browse or graze as did other horselike forms but instead probably used its large claws to dig up roots and tubers more suited to its type of dentition than grasses.



Moropus skeleton

By courtesy of the American Museum of Natural History, New York

Morosini FAMILY, noble Venetian family that gave four doges and several generals and admirals to the Republic, as well as two cardinals and many other prelates to the Roman Catholic Church. The Morosini first achieved prominence in the 10th century when they destroyed the rival Caloprino family for planning to surrender Venice to the Holy Roman emperor Otto II.

Domenico Morosini (d. 1156), who was elected doge in 1148, consolidated and extended Venetian power in Istria, Dalmatia, and the Adriatic. Marino was doge from 1249 to 1253. Ruggiero (Roger) served as admiral in the war against Genoa that ended with the Genoese victory at the Battle of Curzola (1298). Michele, who was doge for a few months in 1382, played a conspicuous part in the peace negotiations with Genoa of that year. Antonio (*c.* 1366–*c.* 1434) used his seat in the grand council as an observation post to assist in compiling a history of Venice. His chronicling of the events of his own time was more scrupulous than suited the government, which forced him to amend his text. By contrast, a later Morosini, Andrea (1558–1618), was commissioned by the Senate to contribute to an official history of the republic for the years 1521–1615. Andrea's history was acceptable to lay authorities but not the church.

The most illustrious member of the family, Francesco Morosini (1618–94), rose in the prolonged wars with the Turks in the 17th century to become one of the greatest captains of his time. Commander in chief of the Venetian fleet in 1657, he conducted several successful campaigns before he was recalled through the intrigues of a rival. Sent to relieve besieged Candia (Crete) in 1667, he was unable to save the city from surrender but was absolved of blame and, on the renewal of the war in 1684, again was appointed commander in chief. After several brilliant victories he reconquered the Peloponnesus and Athens; on his return to Venice he was loaded with honours and given the title "Peloponnesiaco." Elected doge in 1688, five years later, at the age of 75, he once more assumed command of the fleet against the Turks; such was the respect of the Turks for his prowess that their fleet, cruising in the Venetian archipelago, withdrew at his approach.

Francesco Morosini, engraving

Microfoto 35

Morotai, also called MORTY, island in Maluku Utara *kabupaten* (North Moluccas regency), Maluku *provinsi* ("province"), Indonesia. It is situated northeast of the larger island of Halmahera. With an area of some 700 square miles (1,800 square km), the island is mountainous and wooded, with swampy areas in the southwest; the chief products are resin and timber. The population is mainly either Tobilorese or Galelorese from Halmahera but also includes some Muslims and Christians. In World War II, it was a major Japanese military base; captured by Allied forces (1944), it was developed into a strategic air base, and an operational airfield still exists near Pitu on the southwestern end of the island. Pop. (latest est.) 27,333.

Moroto, town, northeastern Uganda. Located at an elevation of 4,500 feet (1,370 m), it is linked by road with Soroti, 106 miles (170 km) southwest, and with Kaabong, 120 miles (193 km) northwest. The town is basically a line of small *duka*s (shops) and is dominated by nearby Mount Moroto (10,007 feet [3,050 m]). Cattle are grazed on the surrounding scrub grassland, and food crops such as corn (maize), cassava, and soybeans are grown nearby. Crafts include woodwork, pottery, weaving, and clay products. There are several mission stations, and the town has an airfield. Pop. (1991) 10,517.

moroxite, clear blue variety of the mineral apatite (*q.v.*).

Morozov, Boris Ivanovich (b. 1590—d. Nov. 1 [Nov. 11, New Style], 1661), Russian boyar and statesman who was chief minister (1645–48) under Tsar Alexis and influential in the government thereafter. A man of considerable ability, Morozov implemented a number of measures to improve the position of the gentry and townspeople, as well as to stabilize state finances. However, his authoritarian manner and unpopular economy measures alienated many and contributed to the Moscow rebellion of 1648.

The tutor and later the brother-in-law of Alexis, Morozov was appointed to several key offices upon the impressionable tsar's accession to the throne in 1645. In order to reduce government expenditures, Morozov dismissed a number of officials and lowered the pay of many others, including the military. He also instituted state monopolies on tobacco and salt, which, in the case of the latter commodity, resulted in the quadrupling of the duty exacted. The salt monopoly proved so unpopular that it was abrogated in 1647, but discontent continued; and, when in 1648 commoners were prevented from petitioning the tsar with their grievances, riots broke out and a number of unpopular officials were lynched.

Morozov was exiled for his role but returned a few months later and, though unable to hold office again, effectively ran the government through intermediaries for the next decade. He played an important role in the formulation of the *ulozheniye* (code of laws) of 1649, which granted a number of rights to the gentry and equalized taxation on the townspeople. However, it also formally tied serfs to the estates on which they resided.

Morozov, Pavlik, byname of PAVEL TROFIMOVICH MOROZOV (b. Nov. 14, 1918, Gerasimovka, Russia—d. Sept. 3, 1932, Gerasimovka), Russian communist youth who was glorified as a martyr by the Soviet regime.

The son of poor peasants, Morozov was the leader of the Young Pioneers' group at his village school and was a fanatical supporter of the Soviet government's collectivization drive in the countryside. In 1930, at age 12, he gained notoriety for denouncing his father, the head of the local soviet, to the Soviet authorities. In court Morozov charged that his father had forged documents and sold favours to kulaks (*i.e.,* rich peasants who were resisting the collectivization drive). Morozov also accused other peasants of hoarding their grain and withholding it from the authorities. As a consequence of his denunciations, Morozov was brutally murdered by several local kulaks.

Morozov was subsequently glorified as a martyr by the Soviet regime. Monuments to him were erected in several Soviet cities, and his example as a model communist was taught to several generations of Soviet schoolchildren. By the late 20th century, however, his legend had dropped into disfavour with the liberalizing Soviet regime, which viewed him as a tragic symbol of the pressures that Stalinism could exert upon the family.

Morpeth, town, Castle Morpeth district, county of Northumberland, England, on the River Wansbeck. The town grew up around Morpeth Castle, a Norman fortress guarding the river crossing on the main east coast route to Scotland in the north. Only the castle's 14th-century gatehouse remains. Morpeth has a number of small industries, but the town primarily functions as a service centre for the surrounding rural area and the settlements of the Northumberland coalfield. Close by are the ruins of Newminster Abbey, a Cistercian foundation of the 12th century. Pop. (1981) 14,496.

morpheme, in linguistics, the smallest grammatical unit of speech; it may be a word, like "place" or "an," or an element of a word, like *re-* and *-ed* in "reappeared." So-called isolating languages, such as Vietnamese, have a one-to-one correspondence of morphemes to words; *i.e.,* no words contain more than one morpheme. Variants of a morpheme are called allomorphs; the ending *-s,* indicating plural in "cats," "dogs," the *-es* in "dishes," and the *-en* of "oxen" are all allomorphs of the plural morpheme. The word "talked" is represented by two morphemes, "talk" and the past-tense morpheme, here indicated by *-ed.* The study of words and morphemes is included in morphology (*q.v.*).

Morpheus, in Greco-Roman mythology, one of the sons of Hypnos (Somnus), the god of sleep. Morpheus sends human shapes (Greek *morphai*) of all kinds to the dreamer, while his brothers Phobetor (or Icelus) and Phantasus send the forms of animals and inanimate things, respectively. It is possible, although not very probable, that his name actually meant "Dark" (from Greek *morphnos*).

morphine, narcotic analgesic drug used in medicine in the form of its hydrochloride, sulfate, acetate, and tartrate salts. Morphine was isolated from opium by the German chemist F.W.A. Sertürner in 1806. In its power to reduce the level of physical distress, morphine is among the most important naturally occurring compounds, being of use in the treatment of pain caused by cancer and in cases where other analgesics have failed. It also has a calming effect that protects the system against exhaustion in traumatic shock, internal hemorrhage, congestive heart failure, and debilitated conditions (as certain forms of typhoid fever). It is most frequently administered by injection to ensure rapid action, but it is also effective when given orally.

Morphine produces a relaxed, drowsy state and many side effects that result from the depression of the respiratory, circulatory, and gastrointestinal systems. It also is an emetic and a general depressant. The most serious drawback to the drug is its addictiveness.

Morphine, an opium alkaloid, can be converted into heroin, which shows a considerably stronger euphoric effect and is so powerfully addictive that its manufacture is legally prohibited. Other derivatives of morphine include the analgesics methylmorphine (codeine), ethylmorphine, dihydrocodeinone, and dihydromorphinone and the emetic apomorphine.

The structure of morphine proposed in the 1920s by J.M. Gulland and R. Robinson was confirmed in 1952 by its total synthesis, accomplished by M. Gates and G. Tschudi. Synthetic organic chemistry also has provided a number of compounds (as meperidine, methadone, and pentazocine) that have in part supplanted morphine in medical use.

Morphine is extracted from the dried milky exudate of the unripe seed capsule of the opium poppy (*Papaver somniferum*). It occurs as colourless crystals or a white crystalline powder.

morpho (subfamily Morphinae), any of a group of New World tropical insects (genus *Morpho*) belonging to the brush-footed butterfly family Nymphalidae (order Lepidoptera). (They are sometimes classified as a separate family, Morphidae.) Microscopic ridges on the butterflies' wing scales break up and reflect light, producing the iridescent blue of some male *Morpho* species and the dull browns (brightened by contrasting eyespots on the wing undersurfaces) of male *Caligo* species. The generally duller coloured females have broader, less graceful wings than the males. The hairy larvae feed on plants and live and pupate in a communal web.

Morpho nestira

Appel Color Photography

Some *Morpho* species have poisonous hairs that cause a rash on human skin, but they are bred commercially in South America for use in jewelry, lampshades, pictures, and tray inlays. The adults of some species live in the tops of forest trees, rarely coming near the ground.

morphogenetic region, theoretical area devised by geomorphologists to relate climate, geomorphic processes, and landforms. Morphogenetic classification was first proposed by Julius Büdel, the German geographer, in 1945. The morphogenetic concept asserts that, under a particular climatic regime, certain geomorphic processes will predominate and produce a characteristic topographic expression. Proponents of the concept say that climatic controls outweigh rock type as a landform factor because the resistance of a rock type to erosion is dependent on the climate to which it is subjected. Present knowledge, however, indicates that landforms result from the interaction of climate, rock type, and physical processes.

morphology, in biology, the study of the size, shape, and structure of animals, plants, and microorganisms and the relationships of their internal parts. Morphology implies more than simple description; it involves some principle or generalization to which form can be related. The term morphology is used rather loosely, often being confused with anatomy. Whereas anatomy describes the structure of organisms (by dissection and other means), morphology is concerned with explaining the shapes and arrangement of parts of organisms in terms of such general principles as evolutionary relations, function, and development.

A brief treatment of morphology follows. For full treatment, *see* MACROPAEDIA: Biological Sciences.

The interest of the early morphologists lay in the patterns they could distinguish in the forms of animals and plants. An example is the pattern of bones in the human arm, which is repeated in the leg. Another example is the similarity between the pattern of bones in the human arm, the wing of a bird, and the front leg of a frog; or the pattern of bones in the skulls of vertebrates generally. Some early morphologists went to extreme lengths in attempting to show that such widely different sorts of animals as vertebrates and insects conformed to the same pattern, but these ideas have not survived.

The study of the similarities of form between different sorts of organisms received a great impetus when the idea of evolution was accepted. The pre-evolutionary biologists simply considered these similarities as a fact of nature. Charles Darwin regarded them as evidence that animals and plants evolve by successive, slow steps from earlier forms. Darwin's ideas stimulated morphologists (particularly animal morphologists) to study a very wide variety of organisms in order to discover from similarities and differences in the form of their bodies (including their embryonic stages) how closely or remotely they were related in an evolutionary sense. In the animal kingdom all animals which could reasonably be said to share the same basic pattern were classified together into the same phylum.

A quite different approach to the interpretation of form is through function. The functional morphologist is interested in how the form of part or all of an organism influences its performance. For example, there is a connection between the form of a tree and how it is affected by gravity and wind, or how light reaches the leaves. And the form of an animal's wing is related to the speed and manner of its flight, a subject that can be studied by means of models in a wind tunnel.

A third approach to the study of form arises from the fact that as an organism develops from ovum or seed, through embryonic stages to an adult, the particular form changes through these phases. Developmental morphology (or morphogenesis) is concerned not with describing these changes (which is the science of embryology) but with the mechanisms that bring them about. Much progress has been made in experiments designed to show how one part of an organism influences the way in which adjacent parts develop. Related to this is the way in which the inherited materials (genes) exert their control on development.

morphology, in linguistics, study of the internal construction of words. Languages vary widely in the degree to which words can be analyzed into word elements, or morphemes (*q.v.*). In English there are numerous examples, such as "replacement," which is composed of *re-*, "place," and *-ment,* and "walked," from the elements "walk" and *-ed.* Many American Indian languages have a highly complex morphology; other languages, such as Vietnamese or Chinese, have very little or none. Morphology includes the grammatical processes of inflection (*q.v.*) and derivation. Inflection marks categories such as person, tense, and case; *e.g.,* "sings" contains a final *-s,* marker of the 3rd person singular, and the German *Mannes* consists of the stem *Mann* and the genitive singular inflection *-es.* Derivation is the formation of new words from existing words; *e.g.,* "singer" from "sing" and "acceptable" from "accept." Derived words can also be inflected: "singers" from "singer."

morphophonemics, in linguistics, study of the relationship between morphology (*q.v.*) and phonology (*q.v.*). Morphophonemics involves an investigation of the phonological variations within morphemes, usually marking different grammatical functions; *e.g.,* the vowel changes in "sleep" and "slept," "bind" and "bound," "vain" and "vanity," and the consonant alternations in "knife" and "knives," "loaf" and "loaves."

Morphy, Paul Charles (b. June 22, 1837, New Orleans—d. July 10, 1884, New Orleans), U.S. Chess master who, during his public career of less than two years, became the world's leading player. Acclaimed by some as the most brilliant player of all time, he was first to rely on the now established principle of development before attack.

Morphy learned Chess at the age of 10. At 19 he was admitted to the Louisiana bar, on condition that he not practice until coming of age. After winning the first American Chess tournament at New York City in 1857, he travelled to Europe, where he defeated Adolf Anderssen of Germany, the unofficial champion, and every other master who would face him—English player Howard Staunton avoided a match. In Paris Morphy played blindfolded against eight strong players, winning six games and drawing two.

He returned to the U.S. in 1859 and issued a challenge, offering to face any player in the world at odds of Pawn and move. When there was no response, Morphy abandoned his public Chess career. After an unsuccessful attempt to practice law, he gradually withdrew into a life of seclusion, marked by eccentric behaviour and delusions of persecution.

Morquio's syndrome, also called MUCOPOLYSACCHARIDOSIS IV, uncommon hereditary disorder of intracartilaginous bone development that results in severe malformation of the skeleton and dwarfing. The disease is recognized within the first two years of life and is usually progressive until bone growth ceases in late adolescence. The vertebral bodies are wedge shaped and flattened, and back deformity is usual. The heads of the thighbones are small and malformed, sometimes resulting in dislocation of the hip; knock-knees and asymmetrical development of paired bones are also common. Associated findings include clouded corneas, circulatory malformations, and a tendency to compression of the spinal cord when back deformity is severe, but intelligence and life expectancy are apparently unaffected.

Morrell, Lady Ottoline (Violet Anne), *née* CAVENDISH-BENTINCK (b. June 16, 1873, London—d. April 21, 1938, Tunbridge Wells, Kent, Eng.), hostess and patron of the arts who brought together some of the most important writers and artists of her day. A woman of marked individuality and discernment, she was often the first to recognize a talent and assist its possessor—although not a few such relationships ended in quarrels.

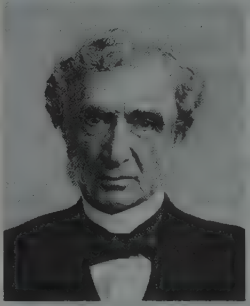
The daughter of a general, she broke with her conventionally upper class background as she formed her circle of artists and intellectuals, which included, among others, D.H. Lawrence, Virginia Woolf, Aldous Huxley, Bertrand Russell, and Augustus John. She and her husband, Philip Edward Morrell, Liberal member of Parliament, lived in London from 1902 until 1913, when they settled at Garsington Manor, Oxfordshire. Their home became a refuge for conscientious objectors during World War I, since the Morrells were pacifists. They lived in the Bloomsbury district of London from 1924. A collection of her writings, *Ottoline,* was edited by R. Gathorne-Hardy in 1963, as was *Ottoline at Garsington: Memoirs 1915–18* (1974).

morrice dance: *see* Morris dance.

Morrígan (Celtic: Queen of Demons), Celtic war goddess; sometimes called Macha (*q.v.*).

Morrill, Justin S(mith) (b. April 14, 1810, Strafford, Vt., U.S.—d. Dec. 28, 1898, Washington, D.C.), U.S. Republican legislator who established a record for longevity by serving 43 years in both houses of the Congress; his name is particularly associated with the first high protective tariff and with federal support of land-grant colleges.

Following a modest career in local business, Morrill became active in Whig politics in the 1850s. Struck by the internal dissension within the party, he devoted himself afterward to preserving harmony within the Republican Party, which he helped found in Vermont (1855). He then went on to serve 12 years in the House of Representatives (1855–67) and 31 years in the Senate (1867–98).



Morrill

By courtesy of the Library of Congress, Washington, D.C.

A financial conservative, Morrill sponsored the Tariff Act of 1861 and succeeding years, usually referred to as the Morrill tariffs, which introduced high import duties not for the traditional purpose of national revenue but to protect American industry from overseas competition. A consistent champion of "sound" currency, he opposed the resort to paper money during and after the U.S. Civil War (1861–65). He also opposed the various proposals for the use of silver as a monetary standard.

Many considered that Morrill's most important legislative contribution was the Morrill Act of 1862, which provided grants of land to state colleges, whose "leading object" would be to teach subjects "related to agriculture and the mechanic arts," without excluding the general sciences and classical studies. Morrill was henceforth called the "Father of the Agricultural Colleges," many of which have become leading educational institutions.

Morrilton, city, seat (1883) of Conway county, central Arkansas, U.S., in the Arkansas River Valley. Settlement in the area originated in 1819 at Lewisburg, a trading post founded by Stephen Lewis, which became an important river port on Point Remove Creek. In the 1870s the Little Rock and Fort Smith (now Missouri Pacific) Railroad was built a mile north. The population soon relocated to the railroad, and the new settlement was named to honour Henry Morrill, a Lewisburg resident. Morrilton developed as an agricultural trading and processing centre, especially for poultry. Some light manufactures subsequently were established. Petit Jean State Park and Winrock Farm (developed by Winthrop Rockefeller, governor from 1967 to 1971, and noted for the breeding of Santa Gertrudis cattle) lie to the southwest. Inc. 1880. Pop. (1990) 6,551.

Morris (board game): *see* Nine Men's Morris.

Morris, Alexander (b. March 17, 1826, Perth, Upper Canada—d. Oct. 28, 1889, Toronto), Canadian statesman and an advocate of Confederation who served as lieutenant governor of Manitoba and the Northwest Territories from 1872 to 1877.

After studying at McGill University in Montreal, Morris was called to the bar in 1851. He entered politics 10 years later, when he was elected to the legislature of the united province of Canada as Conservative member for Lanark, a seat he held through Confederation (1867) until 1872. He was an advocate of Confederation and wrote pamphlets supporting it. From 1869 to 1872 he served as the dominion's minister of inland revenue in Sir John A. Macdonald's administration. In 1872 he was appointed chief justice of the Manitoba Court of Queen's Bench. Later that year he was made lieutenant governor of Manitoba and the Northwest Territories, in which post he served for five years before returning to Ontario. From 1878 to 1886 he represented East Toronto in the Ontario legislature.

Morris, Clara, original name CLARA MORRISON (b. March 17, 1848, Toronto—d. Nov. 20, 1925, New Canaan, Conn., U.S.), American actress known for her realistic portrayal of unfortunate women in melodrama.

She began her stage career in Cleveland in her early teens. In 1869 she joined a company in Cincinnati and a year later was engaged by producer Augustin Daly for his theatre in New York City to portray Anne Sylvester in Wilkie Collins' *Man and Wife,* a part that brought her immediate popularity. One of her most remembered roles was as Miss Multon (1876), an Americanized version of a French translation of *East Lynne.* At the peak of her career her health failed, and from about 1900 she wrote about the theatre. In 1904 she returned to the stage in a revival and after 1905 appeared occasionally in vaudeville.

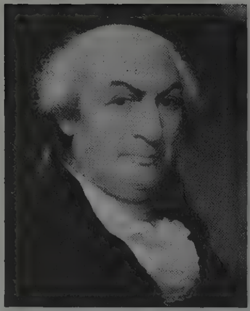
Morris (of St. John's and of Waterford), Edward Patrick Morris, 1st Baron (b. May 8, 1859, St. John's, Nfd. [Canada]—d. Oct. 24, 1935, London), statesman, premier of Newfoundland from 1909 to 1918, and member of the British House of Lords from 1918.

Morris was called to the bar in 1885 and was made queen's counselor in 1896. He represented St. John's West in the Newfoundland house of assembly from 1885 to 1918, originally as an Independent. From 1890 to 1895 Morris served as acting attorney general for Newfoundland under a Liberal administration, and he was director of the Newfoundland Savings Bank from 1893 to 1906. He left the Liberal Party in 1898 and led first the Independent Liberals (1898–1908) and then the People's Party (1908–19). He served as attorney general again in 1902 and later became minister of justice in Sir Robert Bond's Liberal government. Morris was knighted in 1904. He resigned in 1907, however, because he considered Bond's social policies to be overly cautious. He then joined with the Conservatives to lead the new People's Party, becoming premier in 1909.

Under Morris' leadership, many social improvements were begun, and help was given to the British war effort during World War I (1914–18). Morris attended several imperial councils, and he joined the privy council in 1911 and the imperial war cabinet in 1916. He persuaded the Liberal Party and Fisherman's Union to join him in a National government in 1917. He resigned in 1918, retiring to England and entering the House of Lords, having been made a peer.

Morris, Gouverneur (b. Jan. 31, 1752, Morrisania house, Manhattan [now in New York City]—d. Nov. 6, 1816, Morrisania house), American statesman, diplomat, and financial expert who helped plan the U.S. decimal coinage system.

Morris graduated from King's College (later Columbia University) in 1768, studied law, and was admitted to the bar in 1771. An extreme conservative in his political views, he distrusted the democratic tendencies of colonists who wanted to break with England, but his belief in independence led him to join their ranks. He served in the New York Provincial Congress (1775–77), where he led a successful fight to include a provision for religious toleration in the first state constitution. He then sat in the Continental Congress (1778–79).



Gouverneur Morris, detail of a portrait by Ezra Ames; in the New-York Historical Society collection

By courtesy of the New-York Historical Society

Following his defeat for reelection to Congress in 1779, Morris settled in Philadelphia as a lawyer. His series of essays on finance (published in the *Pennsylvania Packet,* 1780) led to his appointment, under the Articles of Confederation, as assistant to the superintendent of finance, Robert Morris (to whom he was not related). During his tenure (1781–85) he proposed the decimal coinage system that, with some modifications by Thomas Jefferson, forms the basis of the present U.S. monetary system. During the Constitutional Convention (1787), Morris advocated a strong central government, with life tenure for the president and presidential appointment of senators. He was largely responsible for the final wording of the Constitution.

Morris was appointed minister to France in 1792; he openly disapproved of the French Revolution and sought to aid King Louis XVI in fleeing the country. His hostility led the French Revolutionary government to request his recall in 1794. After a brief term in the U.S. Senate (1800–03), he ended his public career. Unsympathetic to the forces of republicanism, he allied himself with the extreme Federalists, who hoped to create a northern confederation during the War of 1812. From 1810 he was chairman of the commission in charge of the construction of the Erie Canal.

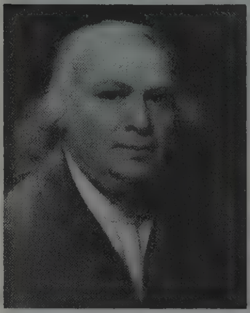
Morris, Richard B(randon) (b. July 24, 1904, New York City—d. March 3, 1989, New York City), American educator and historian, known for his works on early American history.

He graduated with honours from the City College of New York (B.A., 1924) and then attended Columbia University (M.A., 1925; Ph.D., 1930). After teaching at City College of New York (1927–49), he taught history at Columbia (1949–73), becoming emeritus in 1973. From 1959 to 1961 he was chairman of the history department.

Morris' output was enormous. He contributed articles to scholarly journals, edited or coedited numerous historical anthologies (*e.g., The Spirit of 'Seventy-Six* [1958], with Henry Steele Commager; *The Jeffersonians, 1801–1829* [1961], with James Woodress), and wrote books for children. He also edited the *Encyclopedia of American History* (1953; rev. ed. 1982). Virtually all of his works are concerned with colonial America and the causes, events, and significance of the Revolutionary War. Among his more notable books are *Government and Labor in Early America* (1946); *The Peacemakers; The Great Powers and American Independence* (1965), an authoritative and scholarly account of the multitude of diplomatic machinations involved in American independence; *John Jay, the Nation, and the Court* (1967); *The Founding Fathers: A Fresh Appraisal* (1974); and *Dissertations in American Biography* (1981). *The American Revolution Reconsidered* (1967), a detailed examination of the long-term effects of both the French and American revolutions, presents his theory that the American Revolution was the true social revolution, in comparison with the more ephemeral influence of the French Revolution.

Morris, Robert (b. Jan. 31, 1734, Liverpool, Merseyside, Eng.—d. May 8, 1806, Philadelphia), American merchant and banker who came to be known as the financier of the U.S. War of Independence (1775–83).

Morris left England to join his father in Maryland in 1747 and then entered a mercantile house in Philadelphia. During the war, Morris was vice president of the Pennsylvania Committee of Safety (1775–76) and was a member of both the Continental Congress (1775–78) and the Pennsylvania legislature (1778–79, 1780–81, 1785–86). Because he was hoping for reconciliation with Britain, he did not sign the Declaration of Independence until several weeks after its adoption.



Robert Morris, portrait by Bass Otis and Thomas Sully; in the Historical Society of Pennsylvania collection, Philadelphia

By courtesy of the Historical Society of Pennsylvania

As chairman or member of various committees of the Continental Congress, Morris practically controlled the financial operations of the war from 1776 to 1778. He raised the funds that made it possible for General George Washington to move his army from the New York area to Yorktown, where Lord Cornwallis surrendered (1781). Morris had borrowed from the French, requisitioned from the states, and also advanced money from his own pocket. That same year, in Philadelphia, Morris established the Bank of North America. After the war he served as superintendent of finance under the Articles of Confederation (1781–84). He was a delegate to the Constitutional Convention (1787) and served in the U.S. Senate (1789–95). Meanwhile, he had disposed of his mercantile and banking investments and had plunged heavily into land speculation. When returns from his lands slowed, he fell into bankruptcy and was confined in a debtors' prison for more than three years before his release in 1801.

Morris, Robert (b. Feb. 9, 1931, Kansas City, Mo., U.S.), American artist whose minimalist sculptures and personalized performance works contributed significantly to the avant-garde movements of the 1960s and '70s.

Morris studied at the Kansas City Art Institute, California School of Fine Arts, Reed College, and Hunter College, New York City, where he taught art from 1967. His first one-man exhibition of paintings was held in San Francisco in 1957. In 1960, while living in New York, he began producing large, monochromatic geometric sculptures, groups of which he exhibited in specific spatial relationships. His work of this period greatly affected the minimalist movement, which sought to reduce art to its essence by eliminating personal expression and historical allusion.

From the late 1960s, however, Morris moved toward a more spontaneous, if anonymous, expressiveness. He experimented in a wide variety of forms, including the "happening"; "dispersal pieces," in which materials were strewn in apparent randomness on the gallery floor; and environmental projects. His work of the 1970s showed a preoccupation with paradoxes of mental and physical imprisonment (*e.g.*, "In the Realm of the Carceral," 1979).

Morris, Thomas and Thomas, Jr., bynames OLD TOM and YOUNG TOM (respectively b. June 17/26, 1821, St. Andrews, Fifeshire, Scot.—d. May ?, 1908, St. Andrews; b. 1850/51, St. Andrews/Prestwick, Ayr [now in Strathclyde]—d. Dec. 25, 1875, St. Andrews), Scottish father and son, each of whom won the British Open golf tournament four times.

Old Tom spent most of his life at St. Andrews as professional and greenskeeper (1863–1903). During his lifetime he became an almost legendary figure in golf, winning what was later called the British Open in 1861, 1862, 1864, and 1867 and competing in that annual event continually from 1861 to 1896, when he was 75 years old.

Young Tom entered his first tournament at age 13 and won his first Open in 1868, at age 18. He went on to win the Open in 1869, 1870, and 1872 (there was no contest in 1871). Young Tom was elected to the World Golf Hall of Fame in 1975.

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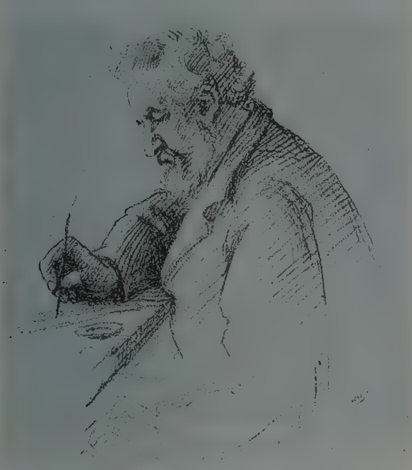
Morris, William (b. March 24, 1834, Walthamstow, near London—d. Oct. 3, 1896, Hammersmith, near London), English designer, craftsman, poet, and early Socialist, whose designs for furniture, fabrics, stained glass, wallpaper, and other decorative products generated the Arts and Crafts Movement in England and revolutionized Victorian taste.


William Morris, drawing by C.M. Watts
The Mansell Collection

Education and early career. Morris was born in an Essex village on the southern edge of Epping Forest, a member of a large and well-to-do family. From his preparatory school, he went at the age of 13 to Marlborough College. A schoolfellow describes him at this time as "a thick-set, strong-looking boy, with a high colour and black curly hair, good-natured and kind, but with a fearful temper." At Marlborough, Morris said that he learned "next to nothing . . . for indeed next to nothing was taught." As in later life, he learned only what he wanted to learn.

In 1853 Morris went to Exeter College at Oxford, where he met Edward Jones (later the painter and designer Burne-Jones), who was to become his lifelong friend. Both Morris and Jones became deeply affected by the High Church (Anglo-Catholic) movement of the Church of England, and it was assumed that they would become clergymen. Nevertheless, it was the writings of John Ruskin on the social and moral basis of architecture (particularly the chapter "On the Nature of Gothic" in *The Stones of Venice*) that came to Morris "with the force of a revelation." After taking his degree in 1856, he entered the Oxford office of the Gothic Revivalist architect G.E. Street. In the same year he financed the first 12 monthly issues of *The Oxford and Cambridge Magazine,* where many of those poems appeared that, two years later, were reprinted in his remarkable first published work, *The Defence of Guenevere and Other Poems.*

Visits with Street and Burne-Jones to Belgium and northern France, where he first saw the 15th-century paintings of Hans Memling and the Van Eyck brothers and the cathedrals of Amiens, Chartres, and Rouen, confirmed Morris in his love of medieval art. It was at this time that he came under the powerful influence of the Pre-Raphaelite painter and poet Dante Gabriel Rossetti, who persuaded him to give up architecture for painting and enrolled him among the band of friends who were decorating the walls of the Oxford Union with scenes from Arthurian legend based on *Le Morte Darthur* by the 15th-century English writer Sir Thomas Malory. Only one easel painting by Morris survives: "La Belle Iseult," or "Queen Guenevere" (Tate Gallery, London). His model was Jane Burden, the beautiful, enigmatic daughter of an Oxford groom. He married her in 1859, but the marriage was to prove a source of unhappiness to both. Morris appears at this time, in the memoirs of the painter Val Prinsep, as "a short square man with spectacles and a vast mop of dark hair." It was observed "how decisive he was: how accurate, without any effort or formality: what an extraordinary power of observation lay at the base of many of his casual or incidental remarks." From 1856 to 1859 Morris shared a studio with Burne-Jones in Red Lion Square, London, for which he designed, according to Rossetti, "some intensely medieval furniture."

After his marriage, Morris commissioned his friend the architect Philip Webb, whom he had originally met in Street's office, to build the Red House at Bexleyheath (so called because it was built of red brick when the fashion was for stucco villas). It was during the furnishing and decorating of this house by Morris and his friends that the idea came to them of founding an association of "fine art workmen," which in April 1861 became the firm of Morris, Marshall, Faulkner & Company with premises in Red Lion Square. The other members of the firm were Ford Madox Brown, D.G. Rossetti, Webb, and Burne-Jones. At the International Exhibition of 1862 at South Kensington they exhibited stained glass, furniture, and embroideries. This led to commissions to decorate the new churches then being built by G.F. Bodley, notably St. Martin's-on-the-Hill at Scarborough. The apogee of the firm's decorative work is the magnificent series of stained-glass windows designed during the next decade by Burne-Jones for Jesus College Chapel, Cambridge, the roof being painted by Morris and Webb. The designs for these windows came to Morris uncoloured, and it was he who chose the colours and put in the lead lines. He also designed many other windows himself, for both domestic and ecclesiastical use.

Two daughters, Jenny and May, were born in 1861 and 1862, and altogether the five years spent at Red House were the happiest of Morris' life. After a serious attack of rheumatic fever, brought on by overwork, he moved in 1865 to Bloomsbury in London. The greater part of his new house was given over to the firm's workshops—an arrangement that, combined with her husband's boisterous manners and Rossetti's infatuation with her, reduced Jane to a state of neurotic invalidism. Morris' first wallpaper designs, "Trellis," "Daisy," and "Fruit," or "Pomegranate," belong to 1862–64; he did not arrive at his mature style until 10 years later, with the "Jasmine" and "Marigold" papers.

Iceland and Socialism. As a poet, he first achieved fame and success with the romantic narrative *The Life and Death of Jason* (1867). In the 20th century, however, *Jason,* with its lax, easily flowing couplets, appears diffuse to the point of tenuity. All painful emotion is carefully avoided or smothered in prettiness, as it also is in his next work, in the seemingly endless stories of *The Earthly Paradise* (1868–70), a series of narrative poems based on classical and medieval sources. The best parts of *The Earthly Paradise* are the introductory poems on the months, in which Morris reveals his personal unhappiness. A sterner spirit informs his principal poetic achievement, the epic *Story of Sigurd the Volsung and the Fall of the Niblungs* (1876), written after a prolonged study of the sagas (medieval prose narratives) read by Morris in the original Old Norse. The exquisitely illuminated *Book of Verse,* telling once more of hopeless love and dedicated to Georgiana Burne-Jones, belongs to 1870.

In 1871 Morris and Rossetti took the Elizabethan manor house of Kelmscott in Oxfordshire. In the same year Morris paid his first visit to Iceland, and the journal he kept of his travels contains some of his most vigorous descriptive writing. He returned to Iceland in 1873. The joint tenancy of Kelmscott, however, was never a success, and, after the final breakdown of his health in 1874, Rossetti left the house for good, to Morris' great relief. At the same time, the firm was reorganized under his sole proprietorship as Morris & Company. In 1875 Morris began his revolutionary experiments with vegetable dyes, which, after the removal in 1881 of the firm to larger premises at Merton Abbey in Surrey, resulted in their finest printed and woven fabrics, carpets, and tapestries. In 1877 Morris gave his first public lecture, "The Decorative Arts" (later called "The Lesser Arts"), and his first collection of lectures, *Hopes and Fears for Art,* appeared in 1882. In 1877 he also founded the Society for the Protection of Ancient Buildings in an attempt to combat the drastic methods of restoration then being carried out on the cathedrals and parish churches of Great Britain.

The Morris family moved into Kelmscott House (named after their country house in Oxfordshire), at Hammersmith, in 1878. Five years later Morris joined Henry Mayers Hyndman's Democratic (later Social Democratic) Federation and began his tireless tours of industrial areas to spread the gospel of Socialism. But he was considerately treated by the authorities, even when leading a banned demonstration to London's Trafalgar Square on "Bloody Sunday" (Nov. 13, 1887), when the police, supported by troops, cleared the square of demonstrators. On this occasion he marched with the playwright George Bernard Shaw at his side. But by this time Morris had quarrelled with the autocratic Hyndman Federation and formed the Socialist League, with its own publication, *The Commonweal,* in which his two finest romances, *A Dream of John Ball* (1886–87) and *News from Nowhere* (1890), an idyllic vision of a Socialist rural utopia, appeared. Subsequently, he founded the Hammersmith Socialist Society, which held weekly lectures in the coach house next door to Kelmscott House as well as open-air meetings in different parts of London.

The Kelmscott Press. The Kelmscott Press was started in 1891, with the printer and type designer Emery Walker as typographical adviser, and between that year and 1898 produced 53 titles in 66 volumes. Morris designed three type styles for his press: Golden type, modelled on that of Nicolas Jenson, the 15th-century French printer; Troy type, a gothic font on the model of the early German printers of the 15th century; and Chaucer type, a smaller variant of Troy, in which *The Works of Geoffrey Chaucer* was printed during the last years of his life. One of the greatest examples of the art of the printed book, *Chaucer* is the most highly decorated of the Kelmscott publications. Most of the Kelmscott books were plain and simple, for Morris observed that 15th-century books were "always beautiful by force of the mere typography."

Death and assessment. A sea voyage to Norway in the summer of 1896 failed to revive Morris' flagging energies, and he died that autumn after returning home, worn out by the multiplicity of his activities. He was buried at Kelmscott beneath a simple gravestone designed by Philip Webb.

Morris is now regarded as one of the great men of the 19th century, though he turned away from what he called "the dull squalor of civilization" to romance, myth, and epic. Following his contemporary the art critic John Ruskin, Morris defined beauty in art as the result of man's pleasure in his work and asked, "Unless people care about carrying on their business without making the world hideous, how can they care about Art?" To Morris, art included the whole man-made environment.

In his own time William Morris was most widely known as the author of *The Earthly Paradise* and for his designs for wallpapers, textiles, and carpets. Since the mid-20th century it is as a designer and craftsman, rather than as poet or politician, that Morris is valued most, though future generations may esteem him more as a social and moral critic, a pioneer of the society of equality.

(P.P.H.)

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Morris, William (b. 1873, Schwarzenau, Ger.—d. Nov. 2, 1932, New York City), U.S. theatrical agent and manager who opposed the attempted monopoly of vaudeville talent in the early 20th century.

Morris was hired by Klaw and Erlanger, heads of a legitimate theatre trust, to book vaudeville acts for their theatre chain. This position put him in conflict with the Keith-Albee United Bookings Office, which sought to monopolize variety talent. Though Keith-Albee was forced to buy out Klaw and Erlanger, stipulating that they stay out of vaudeville for 10 years, the independent Morris was still free to harass them. He continued to manage theatrical acts, with the popular Harry Lauder as his chief attraction. When theatres were closed to Lauder, Morris appealed to "trust-busting" Pres. Theodore Roosevelt, who requested that Lauder be allowed to appear in Washington, D.C., and personally attended the performance.

Morris, with strong support from the theatrical trade paper *Variety,* finally won his case against theatrical monopolies. He founded the William Morris Agency, one of the foremost theatrical agencies in the country. His son, William Morris, Jr., was president of the agency for many years.

Morris, William Richard: *see* Nuffield of Nuffield, William Richard Morris, Viscount.

Morris, Wright (Marion) (b. Jan. 6, 1910, Central City, Neb., U.S.—d. April 25, 1998, Mill Valley, Calif.), U.S. novelist who portrayed the frustration of contemporary life and sought to recapture the American past.

Deeply involved with American themes and issues, Morris's novels form a chronicle of the nation from the 1920s through the 1970s. They include *The Works of Love* (1951), *The Field of Vision* (1956), *Ceremony in Lone Tree* (1960), the paired novels *Fire Sermon* (1971) and *A Life* (1973), and *Plains Song* (1980). Drawing on his life in the Midwest, Morris was an acute observer of American character. He replaced plot with lingering close-ups, using sharp details, subtle irony, and multiple perspectives to obliquely explore the idiosyncracies and failed lives of people from small Midwestern towns. Common objects of the plains are vital symbols in his work. One of his best-known books is the memoir *Solo: An American Dreamer in Europe* (1983), which chronicles his youthful travels in Europe. He also published essay collections and several volumes of photographs of the rural Midwest. His *Collected Stories: 1948–1986* appeared in 1986.

Morris chair, chair named for William Morris, the English poet, painter, polemicist, and craftsman, who pioneered in the 19th century the production of light, functional furniture of a traditional rural type. The Morris chair is of the "easy" variety, with padded armrests and detachable cushions on the seat and back. The wooden structure of the chair usually makes much use of turned (shaped on a lathe) spindle elements. In the United States the back was frequently hinged at the bottom, allowing for adjustment of its slant.

Morris chair of ebonized wood with turned decoration, designed by Phillip Webb, 1861, made by Morris & Co. from 1866; in the Victoria and Albert Museum, London

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Morris dancers, replica of the stained glass window in the house of George Tollet, Betley, Eng., early 15th century; in the Kingston-upon-Thames Museum and Art Gallery, London

Kingston Photographic Services Ltd.

Morris dance, also spelled MORESGUE, MORRICE, MORISQUE, or MORRISK, ritual folk dance performed in rural England by groups of specially chosen and trained men; less specifically, a variety of related customs, such as mumming, as well as some popular entertainments derived from them. Similar customs are widespread throughout Europe and extend to the Middle East, India, and parts of Central and South America. Notable examples are the *Perchten* dancer-masqueraders of Austria, the ritual dances such as the moriscas (or moriscos), *santiagos,* and matachinas of the Mediterranean and Latin America, and the *călușari* of Romania. The wide distribution of such dances suggests an ancient Indo-European origin. A common feature of many of them is that of a group of dancing men attendant on a pagan god who celebrates his revival after death. Often the dancers wear white clothes and dance with bells fastened to the legs or body. A feeling that the dances have magic power or bring luck persists wherever they are traditionally performed.

The central figure of the dances, usually an animal-man, varies considerably in importance. In some cases, he may dominate the rite; in others—as in many English Morris dances—the young men in the *corps d'élite* may dominate, with the animal-man and other dramatic characters either relegated to the subsidiary role of comics or omitted. The name Morris is also associated with the horn dance held each year at Abbots Bromley, Staffordshire, Eng. This dance-procession includes six animal-men bearing deer antlers, three white and three black sets; a man-woman, or Maid Marian, and a fool, both carrying phallic symbols; a hobby horse; and a youth with a crossbow who shoots at the leading "stags" whenever possible.

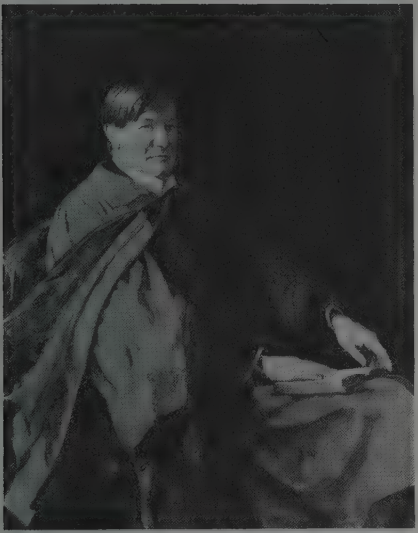
A comparable surviving animal custom is the May Day procession of a man-horse, notably at Padstow, Cornwall. There, the central figure, "Oss Oss," is a witch doctor disguised as a horse and wearing a medicine mask. The dancers are attendants who sing the May Day song, beat drums, and in turn act the horse or dance in attendance. The name Morris is also associated with groups of mummers who act, rather than dance, the death-and-survival rite at the turn of the year.

Throughout history, the Morris seems to have been common. It was imported from village festivities into popular entertainment after the invention of the court masque by Henry VIII. The word Morris apparently derived from "morisco," meaning "Moorish." Cecil Sharp, whose collecting of Morris dances preserved many from extinction, suggested that it might have arisen from the dancers' blacking their faces as part of the necessary ritual disguise.

Among specific Morris dances are Bean Setting, Leap Frog, and Laudnum Bunches. The few solo Morris dances are called Morris jigs; an example is the Shepherds' Hey. The name Morris dance is sometimes loosely applied to sword dances in which a group of men weave their swords into intricate patterns. *Compare* sword dance.

Morris Jesup, Cape, cape, one of the world's northernmost points of land, in the Peary Land region, at the northernmost extremity of Greenland, on the Arctic Ocean, 440 miles (710 km) from the North Pole. It was reached in 1900 by Robert E. Peary, the American Arctic explorer, and was named for Morris Ketchum Jesup, a merchant-banker who had financed several polar expeditions.

Morris-Jones, Sir John, original name (until 1918) JOHN JONES (b. Oct. 17, 1864, Llandrygarn, Anglesey, Wales—d. April 16, 1929, Bangor, Caernarvonshire), teacher, scholar, and poet who revolutionized Welsh literature. By insisting—through his teaching and his writings and his annual adjudication at national eisteddfodau (poetic competitions)—that correctness was the first essential of style and sincerity the first essential of the literary art, he helped restore to Welsh poetry its classical standards.



Morris-Jones, oil painting by Christopher Williams, 1924; in the National Museum of Wales, Cardiff

By courtesy of the National Museum of Wales, Cardiff

After graduation from the University of Oxford, Jones became the first professor of Welsh at the University College of North Wales, Bangor. When he was knighted in 1918, he began styling himself Morris-Jones.

His works include *A Welsh Grammar, Historical and Comparative* (1913), *Cerdd Dafod* (1925; "The Art of Poetry"), *Orgraff yr Iaith Gymraeg* (1928; "The Orthography of the Welsh Language"), and an unfinished study of syntax (1931), published posthumously under the title *Welsh Syntax.*

morrisk dance: *see* Morris dance.

Morrison, Arthur (b. Nov. 1, 1863, Kent, Eng.—d. Dec. 4, 1945, Chalfont St. Peter, Buckinghamshire), English writer noted for novels and short stories describing slum life—in London's East End at the end of the Victorian era—so vividly that they helped bring about changes in British housing legislation.

Morrison began his career as a journalist. He wrote for many of the notable London journals of his time, including the *National Observer,* in which most of the stories in his first major work, *Tales of Mean Streets* (1894), originally appeared. His next important publication was *A Child of the Jago* (1896), a novel credited with precipitating the clearance of the worst London slum of that time. His realistic novels and stories are sober in tone, but the characters are portrayed with a Dickensian colourfulness. His attitude toward the people he described was paternalist, rather than radical, and he opposed socialism and the trades-union movement. He also wrote detective fiction that featured the lawyer-detective Martin Hewitt and that kept the detective genre alive during the post-Sherlock Holmes period.

An authority on and collector of Chinese and Japanese art, Morrison also published the authoritative *Painters of Japan* (1911).

Morrison (of Lambeth), Herbert Stanley Morrison, Baron (b. Jan. 3, 1888, London—d. March 6, 1965, Sidcup, Kent, Eng.), British Labour statesman who played a leading role in London local government for 25 years and was a prominent member of the coalition government in World War II and of the postwar Labour governments.

From about 1905 Morrison was constantly engaged in socialist politics, and in December 1914 he became part-time secretary of the newly formed London Labour Party. He became mayor of the London borough of Hackney in November 1919 and in March 1922 was elected to the London county council for East Woolwich. He was member of Parliament for South Hackney from 1923 to 1924 during Ramsay MacDonald's first government and regained his seat in 1929. As minister of transport in the second MacDonald government, he was responsible for the Road Traffic Act of 1930 and the London Passenger Transport Act of 1931. Morrison again lost his parliamentary seat in 1931 but won it back in 1935 and became the dominant influence in turning the Labour Party away from its post-1931 extremism toward a pragmatic reformism.

On the formation of Winston Churchill's coalition government in May 1940, Morrison became minister of supply. The following October he became home secretary and minister of home security. He held these offices until 1945, also serving in the war cabinet from 1942. In the 1945 general election he organized the Labour Party's victory. Lord president of the council, deputy prime minister, and leader of the House of Commons in Clement Attlee's governments, he was highly successful in carrying through a heavy legislative program. He became foreign secretary in March 1951 but was less successful in that post, which he held until his party lost office five months later. When Attlee retired from the leadership of the Labour Party in December 1955, Morrison, who had been deputy leader since 1951, was a candidate but was defeated by Hugh Gaitskell. He retired from the House of Commons in 1959 and was created a life peer.

His publications include *Socialisation and Transport* (1933), *How London Is Governed* (1949), *Government and Parliament* (1954), and *Herbert Morrison* (1960).

Morrison, Robert (b. Jan. 5, 1782, Buller's Green, Northumberland, Eng.—d. Aug. 1, 1834, Canton, China), Presbyterian minister, translator, and the London Missionary Society's first missionary to China.

After studies in theology and Chinese, Morrison was ordained in 1807 and was immediately sent by the society to Canton. In 1809 he became translator to the East India Company, a post he held until his death. Only 10 converts were baptized during the 27 years of his service in China, but each proved faithful. Admission of the convert Liang A-fa to the office of evangelist was the first Protestant ordination performed in China.

With his colleague William Milne, Morrison founded the Anglo-Chinese College in Malacca (moved to Hong Kong in 1843) and translated the New Testament into Chinese (1813). Their translation of the entire Bible appeared in 1821. Among Morrison's other works are a *Grammar of the Chinese Language* (1815) and a *Dictionary of the Chinese Language, in Three Parts* (1815–23).

Morrison, Toni, original name CHLOE ANTHONY WOFFORD (b. Feb. 18, 1931, Lorain, Ohio, U.S.), American writer noted for her examination of black experience (particularly black female experience) within the black community. She received the Nobel Prize for Literature in 1993.

Morrison grew up in the American Midwest. She attended Howard University (B.A., 1953) in Washington, D.C., and Cornell University (M.A., 1955) in New York. After teaching at Texas Southern University for two years, she taught at Howard from 1957 to 1964. In 1965 she became a fiction editor. From 1984 she taught writing at the State University of New York at Albany, leaving in 1989 to join the faculty of Princeton University.

Morrison's first book, *The Bluest Eye* (1970), is a novel of initiation concerning a victimized adolescent black girl who is obsessed by white standards of beauty and longs to have blue eyes. In 1973 a second novel, *Sula,* was published; it examines (among other issues) the dynamics of friendship and the expectations for conformity within the community. *Song of Solomon* (1977) is told by a male narrator in search of his identity; its publication brought Morrison to national attention. *Tar Baby* (1981), set on a Caribbean island, explores conflicts of race, class, and sex. The critically acclaimed *Beloved* (1987), winner of the Pulitzer Prize for fiction, is based on the true story of a runaway slave who, at the point of recapture, kills her infant daughter in order to spare her a life of slavery. *Jazz* (1992) is a story of violence and passion set in Harlem during the 1920s. A work of criticism, *Playing in the Dark: Whiteness and the Literary Imagination,* also was published in 1992.

The central theme of Morrison's novels is the black American experience; in an unjust society her characters struggle to find themselves and their cultural identity. Morrison's use of fantasy, her sinuous poetic style, and her rich interweaving of the mythic gave her stories great strength and texture.

Morristown, town, seat (1740) of Morris county, New Jersey, U.S., on the Whippany River, 18 miles (29 km) west of Newark.

Wick House, Morristown National Historical Park, N.J.

George E. Jones III—Photo Researchers

Founded as West Hanover in 1710 when a forge was established to exploit local iron ore, it was renamed in 1740 for Lewis Morris, then governor of the colony.

The Morristown National Historical Park, established in 1933, includes Jockey Hollow, where the Continental Army wintered in 1779–80; Wick House, a restored farmhouse of the Revolutionary era; Ford Mansion, which served as George Washington's headquarters; and the site of Fort Nonsense, a low earthwork fortification built in 1777. The historical museum has a collection of relics, books, and manuscripts pertaining to Washington and the U.S. War of Independence. Benedict Arnold was court-martialed in the Dickerson Tavern (now demolished), and Samuel F.B. Morse and Alfred Vail developed the telegraph at the local Speedwell Ironworks. In the late 19th century Morristown was home to such notables as writers Bret Harte and Frank R. Stockton and cartoonist Thomas Nast. It was also surrounded by the estates of wealthy persons.

Morristown is now largely residential but has chemical and pharmaceutical industries and research laboratories. There are several private schools in the area and Seeing Eye Inc., which trains guide dogs for the blind. Inc. 1865. Pop. (1990) 16,189.

Morristown, city, seat (1870) of Hamblen county, northeastern Tennessee, U.S., 40 miles (64 km) northeast of Knoxville. It lies in a valley bounded on the north and west by the Clinch Mountains and on the southeast by the Great Smoky Mountains National Park. The community was named for Gideon Morris, who settled the site in 1787. The boyhood home (1794–1809) of Davy Crockett, the frontiersman, has been reproduced as a tavern-museum. A cavalry action of the American Civil War known as Gilliam's Stampede was fought in the vicinity on Nov. 12, 1864. Local industries produce nylon, rayon, furniture, and radio and television equipment. Tobacco, corn (maize), hay, soybeans, and poultry are marketed. Morristown College was founded in 1881, and Morristown State Area Vocational–Technical School in 1966. Cherokee and Douglas lakes, reservoirs of the Tennessee Valley Authority system, are nearby. Inc. 1885. Pop. (1990) 21,385.

Morrow, Dwight W(hitney) (b. Jan. 11, 1873, Huntington, W.Va., U.S.—d. Oct. 5, 1931, Englewood, N.J.), American lawyer, financier, and statesman.

The son of an educator, Morrow graduated from Amherst College (1895) and Columbia Law School (1899) and then entered practice, winning a reputation in corporation law. He aided in drafting a workmen's compensation law in 1911 and in preparing a report in 1917 that led to prison reform in New Jersey. He accepted a partnership in J.P. Morgan & Co. in 1914. Among his notable achievements was the organization of the Kennecott Copper Corp.

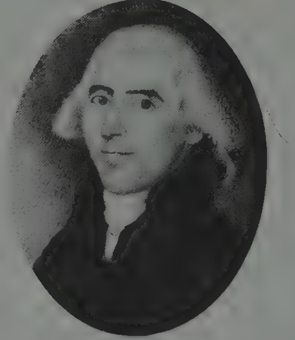
After the United States entered World War I, Morrow went to Europe early in 1918 as adviser to the Allied Maritime Transport Council. After the war Morrow helped Cuba solve its financial troubles. As chairman of the president's aircraft board in 1925 he aided in formulating a national military and civil aviation policy. In 1927 President Calvin Coolidge appointed him ambassador to Mexico, where he helped to settle the oil, debts, and claims problems and to restore some harmony between church and state. Morrow's work was a strong precedent for the "Good Neighbor Policy." As a delegate to the London Naval Conference in 1930 he played a vital conciliatory role. He was elected senator from New Jersey in 1930 but attended only one session of Congress before his death.

Anne Morrow, a daughter, married the aviator Charles A. Lindbergh in 1929.

Mörs (Germany): *see* Moers.

morse: *see* walrus.

Morse, Jedidiah (b. Aug. 23, 1761, Woodstock, Conn., U.S.—d. June 9, 1826, New Haven, Conn.), American Congregational minister and geographer, who was the author of the first textbook on American geography published in the United States, *Geography Made Easy* (1784). His geographical writings dominated the field in the United States until his death.



Jedidiah Morse, watercolour miniature by Nathaniel Hancock; in the Mabel Brady Garvan Collection, Yale University Art Gallery

By courtesy of Yale University Art Gallery, Mabel Brady Garvan Collection

While a young man teaching school in New Haven, Morse developed an interest in U.S. geography because, as he wrote, "so imperfect are all the accounts of America hitherto published . . . that from them very little knowledge of this country can be gained." The success of *Geography Made Easy* (25 editions during his lifetime) encouraged him to produce the work that firmly established his reputation, *The American Geography* (1789), known in later editions as *The American Universal Geography.* This book was followed by a work for children, *Elements of Geography* (1795), *The American Gazetteer* (1797), and *A New Gazetteer of the Eastern Continent* (1802). The inventor Samuel F.B. Morse (1791–1872) was his eldest son.

Morse, Samuel F(inley) B(reese) (b. April 27, 1791, Charlestown, Mass., U.S.—d. April 2, 1872, New York City), American painter and inventor who, independent of similar efforts in Europe, developed an electric telegraph (1832–35). In 1838 he developed the Morse Code.

Morse was the son of Jedidiah Morse, the distinguished geographer and Congregational clergyman. From Phillips Academy, Andover, where he had been an unsteady and eccentric student, his parents sent him to Yale College. Although an indifferent scholar, his interest was aroused by lectures on the then little-understood subject of electricity. To the distress of his austere parents, he also enjoyed painting miniature portraits.

Samuel Morse, detail of a self-portrait in oils, about 1814

By courtesy of the Addison Gallery of American Art, Phillips Academy, Andover, Mass.

After graduating from Yale in 1810, Morse became a clerk for a Boston book publisher. But painting continued to be his main interest, and in 1811 his parents helped him to go to England in order to study that art. During the War of 1812, between Great Britain and the United States, Morse reacted to the English contempt for Americans by becoming passionately pro-American. Like the majority of Americans of his time, however, he accepted English artistic standards, including the "historical" style of painting—the romantic portrayal of legends and historical events with personalities gracing the foreground in grand poses and brilliant colours.

But when, on his return home in 1815, Morse found that Americans did not appreciate his historical canvases, he reluctantly took up portraiture again to earn a living. He began as an itinerant painter in New England, New York, and South Carolina; after 1825, on settling in New York City, he painted some of the finest portraits ever done by an American artist. He combined technical competence and a bold rendering of his subjects' character with a touch of the Romanticism he had imbibed in England.

Although often poor during those early years, Morse was sociable and at home with intellectuals, the wealthy, the religiously orthodox, and the politically conservative. In addition, he possessed the gift of friendship. Among his friends in his middle years were the French hero of the U.S. War of Independence, the Marquis de Lafayette, whose attempts to promote liberal reform in Europe Morse ardently endorsed, and the novelist James Fenimore Cooper. Morse and Cooper shared several traits: both were ardent U.S. republicans, though both had aristocratic social tastes, and both suffered from American preference for European art.

Morse also had the gift of leadership. As part of a campaign against the licentiousness of the theatre, he helped launch, in 1827, the New York *Journal of Commerce,* which refused theatre advertisements. He also was a founder of the National Academy of Design, organized to increase U.S. respect for painters, and was its first president from 1826 to 1845.

In 1832, while returning by ship from studying art in Europe, Morse conceived the idea of an electric telegraph as the result of hearing a conversation about the newly discovered electromagnet. Although the idea of an electric telegraph had been put forward before 1800, Morse believed that his was the first proposal. He probably made his first working model by 1835. Meanwhile, he was still devoting most of his time to painting, teaching art at the University of the City of New York (later New York University), and to politics. But, by 1837, he turned his full attention to the new invention. A colleague at the university showed him a detailed description of an alternative model proposed in 1831, and a friend offered to provide materials and labour to build models in his family's ironworks. These two became partners in Morse's telegraph rights. By 1838 he had developed the system of dots and dashes that became known throughout the world as the Morse Code. In 1838, while unsuccessfully attempting to interest Congress in building a telegraph line, he acquired a congressman as an additional partner. After failing to organize the construction of a Morse line in Europe, Morse was finally able to obtain, without his partners' cooperation, financial support from Congress for the first telegraph line in the United States, from Baltimore to Washington. In 1844 the line was completed, and he sent the first message, "What hath God wrought!"

Morse was immediately involved in legal claims by his partners and by rival inventors. He fought vigorously in a series of legal battles which culminated in a U.S. Supreme Court decision that established his patent rights in 1854. As telegraph lines lengthened on both sides of the Atlantic, his wealth and fame increased. By 1847 Morse had bought Locust Grove, an estate overlooking the Hudson River near Poughkeepsie, N.Y., where, early in the 1850s, he built an Italian-villa-style mansion.

Even during Morse's own lifetime, the world was much changed by the telegraph. After his death in 1872, his fame as the inventor of the telegraph was obscured by the invention of the telephone, radio, and television, while his reputation as an artist has grown. At one time he did not wish to be remembered as a portrait painter, but his powerful and sensitive portraits, among them those of Lafayette, the American writer William Cullen Bryant, and other prominent men, have been exhibited throughout the United States. The number of Morse telegraphic operators has decreased sharply, but his memory is perpetuated by the Morse Telegraph Club (1942), an association of Canadian and American former telegraphers. His 1837 telegraph instrument is preserved by the Smithsonian Institution's National Museum of American History in Washington, D.C., while his estate, Locust Grove, is now designated as a historic landmark. (C.Ma.)

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Morse Code, either of two systems for representing letters of the alphabet, numerals, and punctuation marks by an arrangement of dots, dashes, and spaces. The codes are transmitted as electrical pulses of varied lengths or analogous mechanical or visual signals, such as flashing lights. One of the systems was invented in the United States by Samuel F.B. Morse during the 1830s for electrical telegraphy. This version was further improved by Alfred Vail, Morse's assistant and partner. Soon after its introduction in Europe, it became apparent that the original Morse Code was inadequate for the transmission of much non-English text, since it lacked codes for letters with diacritic marks. To remedy this deficiency, a variant called the International Morse Code was devised by a conference of European nations in 1851. This newer code is also called Continental Morse Code.

The two systems are similar, but the International Morse Code is simpler and more precise. For example, the original Morse Code used patterns of dots and spaces to represent a few of the letters, whereas the International Morse uses combinations of dots and short dashes for all letters. In addition, the International Morse Code uses dashes of constant length rather than the variable lengths used in the original Morse Code.

Except for some minor changes made to it in 1938, the International Morse Code has remained the same and is still in use today for certain types of radiotelegraphy, including amateur radio. The American telegraph industry never abandoned the original Morse Code, and so its use continued until the spread of teleprinters in the 1920s and '30s.

Morsztyn, Jan Andrzej (b. June 24, 1621, near Sandomierz, Pol.—d. Jan. 8, 1693, Châteauvillain, France), Polish Baroque poet and diplomat.

A courtier of Polish kings Władysław IV and John-Casimir, Morsztyn later became leader of the opposition during John III Sobieski's reign, an agent of the French king Louis XIV in Poland, and finally, as the comte de Châteauvillain, an émigré in France. His interest in literature led him to translate Italian and French poetry and drama into Polish. Throughout his life he wrote short poems, rhymed letters to friends, and witty epigrams—all gathered in two collections: *Kanikuła albo psia gwiazda* (1647; "Sweltering, or The Dog Star") and *Lutnia* (1661; "Lute"). First published in the 19th century, they secured Morsztyn's place in Polish literature.

mortality, in demographic usage, the frequency of death in a population.

In general, the risk of death at any given age is less for females than for males, except during the childbearing years (in economically developed societies females have a lower mortality even during those years). The risk of death for both sexes is high immediately after birth, diminishing during childhood and reaching a minimum at 10 to 12 years of age. The risk then rises again, until at late ages it surpasses that of the first year of life. The expectation of life at birth is the most efficient index of the general level of mortality of a population. In ancient Greece and Rome the average life expectancy was about 28 years; in the developed countries of the world it was about 74 years at the beginning of the 1990s.

For international statistical data on perinatal and general mortality levels and mortality by cause, *see* BRITANNICA BOOK OF THE YEAR.

mortar, in military science, short-range artillery piece with a short barrel and low muzzle velocity, firing an explosive projectile in a high-arched trajectory. Large types were used against fortifications and in siege operations from medieval times through World War I. Since 1915, small, portable models have become standard infantry weapons, especially for trench or mountain warfare. Medium mortars, with a calibre of 70–90 mm (about 3–4 inches), a range up to 4,000 m (about 2.5 miles), and a bomb weight of up to 5 kg (11 pounds), are now favoured.

	American Morse Code	International Morse Code
A	•—	•—
Ä		•—•—
Á		•— —•—
Å		•— —•—
B	—•••	—•••
C	•• •	—•—•
CH		— — — —
D	—••	—••
E	•	•
É		••—••
F	•—•	••—•
G	— —•	— —•
H	••••	••••
I	••	••
J	—•—•	•— — —
K	—•—	—•—
L	———	•—••
M	— —	— —
N	—•	—•
Ñ		— —•— —
O	• •	— — —
Ö		— — —•
P	•••••	•— —•
Q	••—•	— —•—
R	• ••	•—•
S	•••	•••
T	—	—
U	••—	••—
Ü		••— —
V	•••—	•••—
W	•— —	•— —
X	•—••	—••—
Y	•• ••	—•— —
Z	••• •	— —••
1	•— —•	•— — — —
2	••—••	••— — —
3	•••—•	•••— —
4	••••—	••••—
5	— — —	•••••
6	••••••	—••••
7	— —••	— —•••
8	—••••	— — —••
9	—••—	— — — —•
0	————	— — — — —

American Morse Code and International Morse Code

Encyclopædia Britannica, Inc.

mortar, in technology, material used in building construction to bond brick, stone, tile, or concrete blocks into a structure. Mortar consists of inert siliceous (sandy) material mixed with cement and water in such proportions that the resulting substance will be sufficiently plastic to enable ready application with the mason's trowel and to flow slightly but not collapse under the weight of the masonry units. Slaked lime is often added to promote smoothness, and sometimes colouring agents are also added. Cement is the most costly ingredient and is held to the minimum consistent with desired strength and watertightness.

Mortar hardens into a stonelike mass and, properly applied, distributes the load of the structure uniformly over the bonding surfaces and provides a weathertight joint.

mortar and pestle, ancient device for milling by pounding. Together with the saddle quern (a round stone rolled or rubbed on a flat stone bed), it was the first means known for grinding grain; the grain was placed in a shallow depression in a stone, the mortar, and pounded with a rodlike stone, the pestle. Refined versions of the mortar and pestle have continued to find use in kitchens for preparing pastes and other finely ground elements of cuisine, in pharmacy for preparing medicines, and in chemical laboratories.

Wooden mortar and pestle from Ontario, Canada

Shackleton—Miller Services Ltd.

Morte Darthur, Le, the first account of the Arthurian legend in modern English prose, completed by Sir Thomas Malory about 1470 and printed by William Caxton in 1485. It retells the adventures of the knights of the Round Table in chronological sequence from the birth of Arthur. Based on French romances, Malory's account differs from his models in its emphasis on the brotherhood of the knights rather than on courtly love, and on the conflicts of loyalty (brought about by the adultery of Lancelot and Guinevere) that finally destroy the fellowship. *See also* Arthurian legend.

Mortensen, Richard (b. Oct. 23, 1910, Copenhagen, Den.—d. Jan. 12, 1993, Copenhagen), Danish painter whose large, colouristic compositions of the 1930s, influenced by Wassily Kandinsky, were the first important abstract works in Danish art.

Mortensen studied at the Royal Academy of Art in Copenhagen but left after two years to work independently. During the 1930s he founded the Linien Group of abstract painters in Copenhagen. He first saw Kandinsky's work in Berlin in 1932, and the impact was profound. Except for a brief experimentation with Surrealism, Mortensen remained committed to geometric abstraction, conveying through vivid colour and lively rhythm a sense of spontaneity within hard-edged structure. After World War II he lived in Paris. Mortensen also designed tapestries and stage settings.

mortgage, in Anglo-American law, any of a number of related devices in which a debtor (mortgagor) conveys an interest in property to a creditor (mortgagee) as security for the payment of a money debt. The Anglo-American mortgage roughly corresponds to the hypothec in civil-law systems.

A brief treatment of mortgage follows. For full treatment, *see* MACROPAEDIA: Property Law.

The modern Anglo-American mortgage is the direct descendant of a form of transaction that emerged in England in the later Middle Ages. The mortgagor (debtor) conveyed the ownership of land to the mortgagee subject to the condition that, if the mortgagor repaid a debt he owed the mortgagee by a certain time, the mortgagee would reconvey the land to the mortgagor. If the mortgagor failed to repay the debt by the time that was specified in the mortgage, the land became the mortgagee's absolutely. This form of transaction was known, under different names, throughout the ancient world and throughout medieval Europe. It is to be distinguished from types of security devices (also known both anciently and today) in which the debtor gives the creditor possession but not ownership of the property (the pledge in civil-law systems and the gage of land in the early English common law) or in which the debtor does not even give the creditor possession of the property but simply a right to satisfy the debt out of the property if the debtor fails to pay (the lien or hypothec).

The common-law mortgage of the late Middle Ages was thus a strong form of security. The history of its development is one of progressive loosening in favour of the mortgagor. Already at the end of the Middle Ages, it had become the practice for the mortgagee to allow the mortgagor to remain in possession of the land, and this practice developed into a right in the mortgagor to remain in possession of the land so long as he was not in default on the debt.

Initially, the common-law courts interpreted the conditions in mortgages strictly. In the 16th and 17th centuries, however, the English equity courts intervened on the side of the mortgagor. Equity first gave the mortgagor a right to redeem the land by paying the amount that was owing, even after he had defaulted on the debt, so long as he did so within a "reasonable time." In order to clear their title to the land after the mortgagor had defaulted, mortgagees brought actions in equity to foreclose the mortgagor's "equity of redemption." As a condition of granting the foreclosure, equity gave the mortgagor a right to the proceeds of the sale of the land to the extent that the sale realized more than the outstanding amount of the debt. In most Anglo-American jurisdictions, legislation in the 19th century extended the mortgagor's right to redeem to a fixed period after the mortgagee had foreclosed. Finally, in many Anglo-American jurisdictions, legislation required that the mortgagee sell the land at public sale after he had foreclosed, and in some of these jurisdictions the sale had to be conducted by a public official.

In the early modern period, security devices similar to mortgages of land were used with personal property, particularly by merchants, and in the 19th century use of this so-called "chattel mortgage" was common throughout the Anglo-American world. The development of the law of chattel mortgages has followed a course different from that of mortgages of land, but in most jurisdictions the end result today is similar. The creditor's rights normally do not come into play unless and until the debtor defaults. Because the chattel mortgage was typically a device used by merchants, rather than ordinary citizens, there were, until quite recently, fewer protections for the debtor in such transactions (typically, for example, there was no statutory right to redeem). Recently, however, the extensive use of chattel mortgage and similar security devices in consumer credit transactions has led to an extensive body of regulatory law protecting the consumer's interest.

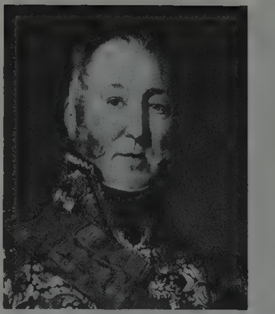
The mortgage is still the most widely used form of security device in transactions involving land in Anglo-American jurisdictions. Alternative devices, such as the deed of trust (whereby a trustee holds title to the property and conveys it to the debtor if he pays the debt or sells the property and divides the proceeds if the debtor defaults) or the long-term land contract (whereby the seller of the land retains title to the land until the purchaser has paid off the amount owed), are used in some jurisdictions, but they are increasingly subject to regulations that make them operate more like mortgages.

The mortgage serves as a means of promoting the best use of society's finite resources: people and land. It provides for the ready transferability of land and for the improvement or working of that land by those unable to buy the property with their current resources. An elderly farmer wishing to retire can sell the farm to a younger farmer; the latter can mortgage the property in order to pay the seller full value and obtain sufficient monies to carry out personal plans for the farm.

Mortgages play an even more important role in maintaining the market in residential housing, since they permit individuals with relatively little personal credit to purchase a house by offering the house itself as security for the loan. In the United States, the federal government has supported this type of transaction by developing a secondary market in mortgages. Banks that have placed residential mortgages can sell them in the secondary market in order to raise capital to make further loans. The operations of the secondary market have tended to make the law and practice of the various U.S. states more uniform, since the secondary market operates more efficiently if it is dealing with a standardized product.

Mortier, Édouard-Adolphe-Casimir-Joseph, DUC (duke) DE TREVISE (b. Feb. 13, 1768, Cateau-Cambrésis, Fr.—d. July 28, 1835, Paris), French general, one of Napoleon's marshals, who also served as prime minister and minister of war during the reign of King Louis-Philippe.

Mortier fought in the wars of the French Revolution, serving in the Army of the North, the Army of the Danube, and the Army of Helvetia. He was promoted to general in 1799, and became in May 1800 commander of the 10th military division, in charge of Paris. In April 1803 he occupied Hanover after the collapse of the peace of Amiens and in May 1804 was named one of the 18 marshals of the empire by Napoleon. In November 1805 he was defeated at Dürnstein in Austria by the Russian general Mikhail Kutuzov. He served in the Prussian campaign in 1806 and 1807 and fought in Spain in 1808, taking part in the siege of Saragossa and defeating 60,000 Spanish troops in the Battle of Ocaña. He commanded the Young Guard in the Russian campaign of 1812 and attempted to hold off the onslaught of the Allied armies outside Paris in 1814.



Mortier, detail from a portrait by Charles-Philippe de Larivière; in the National Museum of Versailles and of the Trianons, France

H. Roger-Viollet

At the First Restoration of the Bourbons (1814), Mortier was recognized as a peer, but during the Hundred Days, in which Napoleon tried to reconquer his empire, Mortier rejoined him. After the second return of the Bourbons, he was in disgrace until 1819, when his peerage was restored. After the Revolution of July 1830, in which Charles X was replaced by Louis-Philippe, Mortier served as ambassador to St. Petersburg and was prime minister and minister of war from November 1834 to March 1835. He was killed in Giuseppe Fieschi's assassination attempt on the life of King Louis-Philippe.

Mortillet, (Louis-Laurent-Marie) Gabriel de (b. Aug. 29, 1821, Meylan, Fr.—d. Sept. 25, 1898, Saint-Germain-en-Laye), French archaeologist who formulated the first chronological classification of the epochs of man's prehistoric cultural development. His ordering of the Paleolithic (Stone Age) epochs into Chellean, Acheulian, Mousterian, Solutrean, Magdalenian, and so on, continued into the 20th century as the basis for anthropological classification. Mortillet's early studies of the geology and paleontology of the Alps were summarized in his *Géologie et minéralogie de la Savoie* (1858; "Geology and Mineralogy of Savoie"). He joined the staff of the Museum of National Antiquities, Saint-Germain-en-Laye (1868), was assistant curator for 17 years, and was professor of prehistoric anthropology at the School of Anthropology in Paris (1876–98). His classifications, elaborated in *Le Préhistorique: antiquité de l'homme* (1882; "The Prehistoric: Man's Antiquity"), were revised in subsequent editions of the work.

Mortillet, engraving by L. Coutil, 1895

J.P. Ziolo

Mortimer FAMILY, an Anglo-Norman family, afterward earls of March and Ulster, that wielded great power on the Welsh marches, attained political eminence in the 13th and 14th centuries, and in the 15th possessed a claim to the English throne. Among the most notable members of the family were Roger Mortimer

(d. 1330), Earl of March; Edmund (d. 1381), 3rd earl, whose marriage to Philippa, daughter and heiress of Lionel of Antwerp, Duke of Clarence (second surviving son of Edward III), later brought the family a claim to the throne; and Edmund (d. 1428), 5th earl, son of the 3rd earl and Philippa, who had by the laws of ordinary descent a better claim to the throne than Henry IV, son of Edward III's third surviving son, John of Gaunt, but nevertheless remained loyal to him.

Mortimer, Edmund: *see* March, Edmund Mortimer, 5th Earl of.

Mortimer, John (Clifford) (b. April 21, 1923, Hampstead, London, Eng.), English barrister and writer who wrote plays for the stage, television, radio, and motion pictures, as well as novels and autobiographical works.

Educated at Harrow and at Brasenose College, Oxford, Mortimer began writing before he was called to the bar in 1948. The following year he married Penelope Ruth Fletcher (the novelist Penelope Mortimer, divorced 1972). Mortimer began his writing career as a novelist, with *Charade* (1947). Several subsequent novels drew on his legal experience, but it was not until 1957, with the BBC's production of his radio play *The Dock Brief,* that his reputation was established.

Mortimer wrote many other radio plays and several full-length plays for the stage, including *The Wrong Side of the Park* (performed 1960), *Two Stars for Comfort* (performed 1962), and *The Judge* (performed 1967). In 1965 he successfully adapted the farce *A Flea in Her Ear* from the French of Georges Feydeau. One of his finest works was an autobiographical play on his relationship with his blind father, *A Voyage Round My Father* (1970).

Throughout his writing career Mortimer maintained a thriving law practice, and in the 1960s he was one of Great Britain's principal defenders in free-speech and civil-rights cases as a Queen's Counsel. As a writer, Mortimer had his greatest popular success in the late 1970s and '80s with *Rumpole of the Bailey* and other short stories and television programs featuring the crusty old British barrister Horace Rumpole and his comical adventures as a defense lawyer.

Mortimer, Penelope (Ruth), *née* FLETCHER (b. Sept. 19, 1918, Rhyl, Flintshire [now in Denbighshire], Wales—d. Oct. 19, 1999, London, Eng.), British journalist and novelist noted for her compact style of writing depicting a nightmarish world of neuroses and broken marriages.

After her graduation from the University of London, she began to write poetry, book reviews, and short stories. In 1949 she married the playwright John Mortimer (divorced 1972), with whom she later collaborated on the book *Daddy's Gone A-Hunting* (1958). She is perhaps best known for her novel *The Pumpkin Eater* (1962), a disturbingly vivid story of a woman whose compulsive anxiety to bear children gradually isolates her from her successive husbands. The book was turned into a successful film in 1964. Her other novels include *My Friend Says It's Bullet-Proof* (1967) and *Long Distance* (1974).

Mortimer, Robert Harley, Earl: *see* Oxford, Robert Harley, 1st Earl of.

Mortimer, Roger: *see* March, Roger Mortimer, 1st Earl of; March, Roger Mortimer, 2nd Earl of.

mortmain, in English law, the state of land being held by the "dead hand" (French: *mort main*) of a corporation. In feudal days a conveyance of land to a monastery or other corporation deprived the lord of many profitable feudal incidents, for the corporation was never under age, never died, and never committed felony or married. Statutes were consequently passed between the 13th and the 16th century prohibiting alienation into mortmain without license from the crown. The modern law was contained in the Mortmain and Charitable Uses acts, 1888 and 1891, and in a number of acts that authorized limited companies and some other corporations to hold land without license in mortmain. An unauthorized conveyance into mortmain made the land liable to forfeiture to the crown.

The law of mortmain was abolished in Britain in 1960. Mortmain legislation still exists, however, in some other jurisdictions in the Commonwealth and in the United States.

Morton, Archibald Douglas, Earl of: *see* Angus, Archibald Douglas, 8th Earl of.

Morton, J(ulius) Sterling (b. April 22, 1832, Adams, N.Y., U.S.—d. April 27, 1902, Lake Forest, Ill.), U.S. secretary of agriculture under President Grover Cleveland (1893–97) and founder of Arbor Day.

In 1854 Morton settled in the Nebraska Territory, where he founded and edited the *Nebraska City News* and became active in local Democratic politics. He served in the territorial legislature (1855–56; 1857–58) and in 1858 was named by President James Buchanan to the post of territorial secretary. He served as secretary and later as acting governor until 1861. After Nebraska's admission to the Union in 1867, Morton ran four unsuccessful campaigns for governor. From 1893 to 1897 Morton served as secretary of agriculture in the Grover Cleveland administration.

An ardent and early proponent of forestation, Morton had for many years urged Nebraska to set aside a day, Arbor Day, to encourage the planting of trees. The holiday was first observed in April 1872 and proved an enormous success; more than a million trees were planted on that first Arbor Day. Since 1885 Arbor Day has been a public holiday in Nebraska, celebrated on April 22, in honour of Morton's birth. (Nearly all states eventually came to observe Arbor Day, either by legislation or by proclamation, although the date varies according to local climate.) Arbor Lodge, Morton's estate at Nebraska City, for many years the site of his agricultural experimentation, is now a state historical park. His son Joy Morton (1855–1934) established the Morton Arboretum in Lisle, Ill., in 1922.

Morton, James Douglas, 4th Earl of (b. *c.* 1516—d. June 2, 1581, Edinburgh, Scot.), Scottish lord who played a leading role in the overthrow of Mary, Queen of Scots (reigned 1542–67). As regent of Scotland for young King James VI (later James I of England) from 1572 to 1578, he restored the authority of the central government, which had been weakened by years of civil strife.

The son of Sir George Douglas, James succeeded to the earldom of his father-in-law, James Douglas, 3rd Earl of Morton, in 1548. In 1557 he was part of a group of Scottish nobles who signed a "band," or covenant, in support of the Scottish faith. Although he was a Protestant, Morton was in 1563 appointed chancellor by the Roman Catholic Mary Stuart. On March 9, 1566, Morton and several other Protestant nobles murdered the queen's influential secretary, David Riccio (Rizzio). Mary pardoned them in December, and Morton then became partially involved in a conspiracy against her treacherous husband Henry Stewart, Lord Darnley, who was mysteriously murdered on Feb. 9–10, 1567. In May the queen married the widely hated James Hepburn, 4th Earl of Bothwell. Morton led the forces that drove Bothwell from the kingdom in June, and in July he imprisoned Mary on Castle Island in Loch Leven, where she was forced to abdicate in favour of her infant son, James (King James VI). The queen escaped on May 2, 1568, but Morton decisively defeated her army at Langside, near Glasgow, 11 days later. She then fled to England.

During the ensuing civil war between the supporters of Mary and of James, Morton was an able ally of the regent, James Stewart, Earl of Moray (d. 1570). Upon becoming regent in 1572, Morton completed the suppression of the rebels, restored the rule of law, and introduced a reformed episcopacy. Nevertheless, the nobles resented the efficiency of his administration, and the Presbyterians rejected the episcopacy. He was also unsuccessful in seeking to persuade the English to enter a formal defensive league and financially support his government. His opponents forced him to resign the regency in 1578; three years later he was charged with complicity in Darnley's murder and executed.

Morton, Jelly Roll, byname of FERDINAND JOSEPH LA MENTHE (b. Oct. 20, 1890, New Orleans, La., U.S.—d. July 10, 1941, Los Angeles, Calif.), American jazz composer and pianist who pioneered the use of prearranged, semiorchestrated effects in jazz-band performances.

Morton learned the piano as a child and from 1902 was a professional pianist in the bordellos of the Storyville district of New Orleans. He was one of the pioneer ragtime piano players, but he would later invite scorn by claiming to have "invented jazz in 1902." He was, nevertheless, an important innovator in the transition from early jazz to orchestral jazz that took place in New Orleans about the turn of the century. About 1917 he moved west to California, where he played in nightclubs until 1922. He made his recording debut in 1923, and from 1926 to 1930 he made, with a group called Morton's Red Hot Peppers, a series of recordings that gained him a national reputation. Morton's music was more formal than the early Dixieland jazz, though his arrangements only sketched parts and allowed for improvisation. By the early 1930s, Morton's fame had been overshadowed by that of Louis Armstrong and other emerging innovators. As a jazz composer, Morton is best remembered for such pieces as "Black Bottom Stomp," "King Porter Stomp," "Shoe Shiner's Drag," and "Dead Man Blues."

BIBLIOGRAPHY. Morton's abilities as a composer, performer, and jazz theorist and historian are presented in Alan Lomax, *Mister Jelly Roll,* 2nd ed. (1973).

Morton, John (b. *c.* 1420, Bere Regis or Milborne St. Andrew, Dorset, Eng.—d. Oct. 12, 1500, Knole, Kent), archbishop of Canterbury and cardinal, one of the most powerful men in England in the reign of King Henry VII.

During the Wars of the Roses between the houses of York and Lancaster, Morton favoured the Lancastrian cause. He received minor ecclesiastical posts under the Lancastrian monarch Henry VI, but upon the accession of the Yorkist Edward IV, in 1461, he was declared a traitor and forced to sue for a pardon. In 1470 Morton helped assemble the coalition of Lancastrians and disaffected Yorkists that drove Edward IV from the country. Nevertheless, after Edward regained his throne in 1471, Morton was given ambassadorial posts and appointed bishop of Ely (1479). When Edward's brother seized the throne as King Richard III in 1483, Morton became one of Richard's bitterest enemies. While imprisoned by Richard in Brecon (Brecknock) Castle, the bishop helped plot the unsuccessful uprising led by Henry Stafford, 2nd Duke of Buckingham (October 1483). Morton then escaped to Flanders.

Upon his return to England after Henry VII assumed the throne in 1485, he became one of the most trusted and influential royal advisers. He was made archbishop of Canterbury in 1486, lord chancellor in 1487, and cardinal in 1493. Traditionally, Morton has been known as the inventor of "Morton's Fork," a sophistical dilemma imposed on both rich and poor by Henry's tax commissioners in order to extort funds for the crown. The rich were told that they could afford to contribute, and the poor were accused of having concealed wealth.

Morton, Levi (Parsons) (b. May 16, 1824, Shoreham, Vt., U.S.—d. May 16, 1920, Rhinebeck, N.Y.), American banker who became prominent in Republican politics, serving as vice president of the United States from 1889 to 1893; his prestige in New York business circles lasted from the American Civil War until after the Panic of 1907.

Levi Morton

By courtesy of the Library of Congress, Washington, D.C.

Gaining early experience as a merchant in Hanover, N.H., and in Boston, Morton moved to New York in the mid-1850s to become a partner in a dry goods store. In 1863 he established the banking house of L.P. Morton and Company (dissolved 1899).

Turning to politics, Morton won election to the U.S. House of Representatives (1879–81), after which he was appointed minister to France (1881–85). He was elected vice president under President Benjamin Harrison. Following 12 years of Democratic administration in New York, he was elected governor (1895–96), lending support to civil-service reform.

At the end of his term in office, Morton strongly upheld the gold-standard plank in the national Republican platform of 1896. He remained active in banking until his death.

Morton, Oliver H(azard) P(erry) T(hrock) (b. Aug. 4, 1823, Salisbury, Ind., U.S.—d. Nov. 1, 1877, Indianapolis, Ind.), American political leader and governor of Indiana during the American Civil War.

After a brief attendance at Miami University in Oxford, Ohio, Morton set up a law practice in Centerville, Ind., in 1845 and involved himself in Democratic politics. Breaking with the party over the Kansas–Nebraska Act of 1854, he participated in the formation of the Republican Party and in 1856 ran unsuccessfully for governor of Indiana. Elected lieutenant governor in 1860, he became governor the next year when Governor Henry S. Lane resigned to enter the U.S. Senate.

As a war governor, Morton achieved fame through his vigorous handling of political forces bent on disunion. Faced with a hostile legislature in 1863, he governed for two years virtually by fiat, raising the necessary funds through private appeals. After the war Morton was elected to the U.S. Senate (1865), where at first he supported the moderate policies of President Andrew Johnson. He soon altered his views, however, and emerged as a leader of the Radical Republicans, voting for President Johnson's impeachment and urging immediate Negro suffrage. A prominent, though unsuccessful, candidate for the Republican nomination for the presidency in 1876, he was hampered by his physical condition (a stroke suffered in 1865 left him paralyzed below the waist) as well as by his partisanship.

Morton, Thomas (b. *c.* 1590—d. *c.* 1647, Province of Maine [U.S.]), one of the most picturesque of the early British settlers in colonial America, who ridiculed the strict religious tenets of the Pilgrims and the Puritans.

He arrived in Massachusetts in 1624 as one of the owners of the Wollaston Company, which established a settlement at the site of modern Quincy. In 1626, when Wollaston and most of the settlers moved to Virginia, Morton stayed on and took charge of the colony and named it Merry Mount. Inevitably this free-living, prospering, sharp-tongued Anglican conflicted with his pious neighbours. He erected a maypole, encouraged conviviality and merriment, wrote bawdy verse, poked fun at his saintly neighbours, conducted religious services using the Book of Common Prayer, monopolized the beaver trade, and sold firearms to the Indians. The Pilgrims cut down the maypole in 1627, arrested Morton, and exiled him to the Isle of Shoals, whence he escaped to England. He returned within two years and was soon taken into custody again (1630) and his property confiscated. Exiled to England, he collaborated with the enemies of Massachusetts in an attempt to get the charter of the Puritans revoked and wrote an account of the colonies, *New English Canaan* (1637). On returning to Massachusetts in 1643, he was imprisoned again, fined, and exiled to Maine.

Morton has persisted as the epitome of the anti-Puritan; he appears as a character in a short story by Nathaniel Hawthorne, "The Maypole of Merrymount," two novels by John Lothrop Motley, *Morton's Hope* (1839) and *Merry Mount* (1849), and an opera, *Merry Mount* (1934), by American composer Howard Hanson.

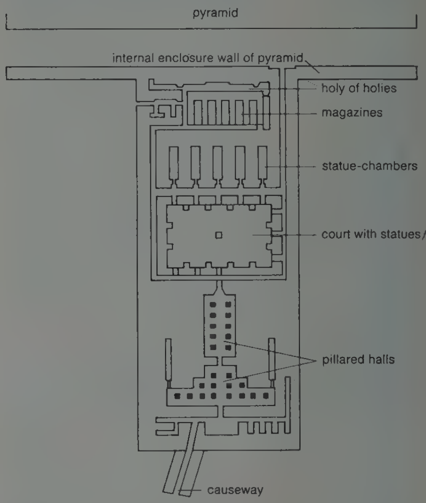
Morton, William Thomas Green (b. Aug. 9, 1819, Charlton, Mass., U.S.—d. July 15, 1868, New York City), American dental surgeon who in 1846 gave the first successful public demonstration of ether anesthesia during surgery. He is credited with gaining the medical world's acceptance of surgical anesthesia.

Morton began dental practice in Boston in 1844. In January 1845 he was present at Massachusetts General Hospital, Boston, when Horace Wells, his former dental partner, attempted unsuccessfully to demonstrate the anodyne properties of nitrous oxide gas. Determined to find a more reliable pain-killing chemical, Morton consulted his former teacher, Boston chemist Charles Jackson, with whom he had previously done work on pain relief. The two discussed the use of ether, and Morton first used it in extraction of a tooth on Sept. 30, 1846. On October 16 he successfully demonstrated its use, administering ether to a patient undergoing a tumour operation in the same theatre where Wells had failed nearly two years earlier.

Unfortunately, Morton attempted to obtain exclusive rights to the use of ether anesthesia. He spent the remainder of his life engaged in a costly contention with Jackson, who claimed priority in the discovery, despite official recognition accorded to Wells and the rural Georgia physician Crawford Long.

Morton National Park, national park in eastern New South Wales, Australia, lying in the coastal range 100 miles (160 km) south of Sydney. It has an area of 404 square miles (1,046 square km). It was established in 1938 and named for Mark Morton, a member of the state legislative assembly who campaigned vigorously for the reserve. The park is drained by the Shoalhaven and Kangaroo rivers and by several creeks. A notable feature is Fitzroy Falls. The sandstone summits in the park are covered with bloodwood-scribbly gum forest, and the sides and floors of the gorges are clothed in rain forest and hardwood trees. Among the forms of wildlife are platypus and native fish. Trails and rough roads lead from highways skirting the park.

mortuary temple, in ancient Egypt, place of worship of a deceased king and the depository for food and objects offered to the dead monarch. In the Old and Middle Kingdoms (*c.* 2575–*c.* 2130 BC; and 1938–*c.* 1600? BC) the mortuary temple usually adjoined the pyramid and had an open, pillared court, storerooms, five elongated shrines, and a chapel containing a false door and an offering table. In the chapel, priests performed the daily funerary rites and presented the offerings to the dead king's *ka* (protective spirit). In the New Kingdom (1539–1075 BC) the kings were buried in rock-cut tombs, but separate mortuary temples continued to be built nearby. All were provided with a staff of priests and assured of supplies through endowments of estates and lands to ensure religious services and offerings in perpetuity.



Mortuary temple of the pharaoh Khafre at Giza (4th dynasty)

Taken from *The Art of Egypt* by Immgard Woldering. © 1962 by Holle Verlag G.m.b.H. Used by permission of Crown Publishers, Inc.

Morty (Indonesia): *see* Morotai.

morula, solid mass of blastomeres resulting from a number of cleavages of a zygote, or fertilized egg. Its name derives from its resemblance to a mulberry (Latin: *morum*). A morula is usually produced in those species the eggs of which contain little yolk and, consequently, undergo complete cleavage. Those blastomeres on the surface of the morula give rise to extra-embryonic parts of the embryo. The cells of the interior, the inner cell mass, develop into the embryo proper.

Morungen, Heinrich von: *see* Heinrich von Morungen.

Morus, Huw, also called EOS CEIRIOG (b. 1622, Llangollen?, Denbighshire, Wales—d. August 1709, Llansilin, Denbighshire), one of the finest Welsh poets of the 17th century.

Morus wrote during the period when the strict bardic metres were in decline and the free metres of popular poetry were on the rise. He elevated this poetry to new dignity by skillful and sophisticated craftsmanship. Structurally complicated, his works are distinguished by internal rhyme and consonance. Many of his love poems were influenced by the Cavalier poets of England and were easily adapted to popular tunes.

A Royalist and a supporter of the Church of England, he was a warden of the Llansilin parish church. He spent the greater part of his life at Pontymeibion, within Llansilin parish, where he helped on the family farm.

Moruya, town, southeastern New South Wales, Australia, on the Moruya River. Founded in 1851, it grew as the gateway to the goldfields at Araluen and Braidwood and was given an Aboriginal name meaning "where the black swans meet" and "place down south." As the gold deposits depleted, Moruya came to depend increasingly upon dairying, and late in the 19th century many well-known farms, such as Bodalla, were created. It was declared a shire in 1906. On the Prince's Highway, 152 mi (245 km) south of Sydney, Moruya serves a district of dairying, lumbering, granite quarrying, arsenic and gold mining, and oyster farming; it has sawmills, freezing works, and butter and cheese factories. Tourism, based on local lakes and beaches, is an added source of income. Pop. (1981) 2,003.

Morvan, highland region, central France, forming a northeastern extension of the Massif Central in the direction of the Paris Basin. The headwaters of the Yonne and Armançon rivers, tributaries of the Seine River, drain the northern part of the region. The Aroux River, a tributary of the Loire River, drains the more southerly parts. The Morvan is thickly wooded and has large stretches of heathland. Covering an area of about 1,350 sq mi (3,500 sq km), it extends north–south approximately from Avallon to Saint-Léger-sous-Beuvray and east–west from the Saulieu Hills to Corbigny. Its rounded heights rise to the south to nearly 3,000 ft. The Signal du Bois-du-Roi massif culminates in the peak called the Haut-Folin at 2,956 ft (901 m). Mont Beuvray, 2,661 ft (811 m), was the site of the 18th-century-BC entrenched Gaulish camp of Bibracte. In modern times, some areas have been deforested, while some of the marshy areas have been reclaimed; these lands have then been fertilized for pasturage. Beauty spots in the Morvan attract Parisians for weekend and summer holidays. The Morvan regional nature park, 420,000 ac (170,000 ha), was created in 1970.

Morvi, town, Rājkot district, Gujarāt state, west central India, in the lowlands of the Kāthiāwār Peninsula, south of the Little Rann of Kutch. Formerly the capital of the princely state of Morvi, the town is a trade centre for agricultural produce. There also are cotton processing and various manufacturing industries. Morvi is also a rail and road junction. Pop. (1981) 73,327.

Morwell, town, southeastern Victoria, Australia, situated in the La Trobe Valley of west Gippsland. It was founded in 1861, near the short Morwell River, and gazetted a shire in 1892. After 1916, with the development of the valley's vast opencut brown-coal deposits, Morwell was transformed from a small rural settlement into an industrial town (one of a series in the valley, including Moe, Yallourn, and Traralgon) producing electrical power and briquettes. Other manufactures include wood pulp and paper, textiles, clothing, and shoes. The hinterland supports beef, dairy, and sheep farming. The town is connected by rail to Melbourne, 85 mi (137 km) to the northwest, and is the junction of the Midland and Prince's highways. Pop. (1981) 16,491.

Mosa (river, ancient Europe): *see* Meuse River.

Mosaddeq, Mohammad, Mosaddeq also spelled MASADDIQ, or MOSSADEGH (b. 1880, Tehrān—d. March 5, 1967, Tehrān), Iranian political leader who nationalized the huge British oil holdings in Iran and, as premier in 1951–53, almost succeeded in deposing the Shah.

The son of an Iranian public official, Mosaddeq grew up as a member of Iran's ruling elite. He received a doctor of law degree from the University of Lausanne in Switzerland and then returned to Iran in 1914 and was appointed governor general of the important Fārs province. He remained in the government following the rise to power of Reza Khan in 1921 and served as minister of finance and then briefly as minister of foreign affairs. Mosaddeq was elected to the Majles (parliament) in 1923. When Reza Khan was elected shah in 1925, however, Mosaddeq opposed the move and was compelled to retire to private life.

Mosaddeq
UPI Compix/EB Inc.

Mosaddeq reentered public service in 1944, following Reza Shah's forced abdication in 1941, and was elected again to the Majles. An outspoken advocate of nationalism, he soon played a leading part in successfully opposing the grant to the Soviet Union of an oil concession for northern Iran similar to an existing British concession in southern Iran. He built considerable political strength, based largely on his call to nationalize the concession and installations in Iran of the British-owned Anglo-Iranian Oil Company. In March 1951 the Majles passed his oil nationalization act, and his power had grown so great that the shah, Mohammad Reza Pahlavi, was virtually forced to appoint him premier.

The nationalization resulted in a deepening crisis in Iran, both politically and economically. Mosaddeq and his National Front Party continued to gain power but alienated many supporters, particularly among the ruling elite and in the Western nations. The British soon withdrew completely from the Iranian oil market, and economic problems increased when Mosaddeq could not readily find alternate oil markets.

A continuing struggle for control of the Iranian government developed between Mosaddeq and the Shah. In August 1953, when the Shah attempted to dismiss the Premier, mobs of Mosaddeq followers took to the streets and forced the Shah to leave the country. Within a few days, however, Mosaddeq's opponents, with U.S. support, overthrew his regime and restored the Shah to power. Mosaddeq was sentenced to three years' imprisonment for treason and, after he had served his sentence, was kept under house arrest for the rest of his life. The Iranian oil-production facilities remained under control of the Iranian government.

Mosaddeq's personal behaviour, which included wearing pajamas for numerous public appearances; speeches to the Majles from his bed, which was brought into the chambers; and frequent bouts of public weeping, helped focus world attention upon him during his premiership. Supporters claim the behaviour was a result of illness; detractors say he had a shrewd sense of public relations.

Mosāferīd DYNASTY, also called SALLĀRID, or KANGARID (AD *c.* 916–1090), Iranian dynasty that ruled in northwestern Iran.

The founder of the dynasty was Moḥammad ebn Mosāfer (ruled *c.* 916–941), military commander of the strategic mountain fortresses of Ṭārom and Samīrān in Daylam, in northwestern Iran. With the increasing weakness of the Justānid dynasty that ruled the region, Moḥammad increased his power and gained control of most of Daylam. After Moḥammad's death in 941, his domains were divided between his two sons, Marzobān I (ruled 941–957) and Vahsūdān (ruled 941–957). Vahsūdān ruled over the fortresses of Ṭārom and Samīrān. Marzobān I expanded northward and westward and captured Azerbaijan and east Transcaucasia; these territories, however, were lost by the Mosāferīds by 984.

Ebrāhīm II (ruled 997–*c.* 1030) was able to reestablish Mosāferīd control over Daylam and to expand southward as far as Zanjān. After Ebrāhīm's death, however, the history of the dynasty becomes fragmentary; Ebrāhīm's descendants ruled in Daylam, first as vassals of the Ghaznavids and then of the Seljuqs. At the end of the 11th century the Mosāferīds were extinguished by the Ismāʿīlīs of Alamūt.

mosaic, in art, surface decoration of small coloured components—such as stone, mineral, glass, tile, or shell—closely set into an adhesive ground. The mosaic pieces, usually small squares, triangles, or other regular shapes (called tesserae), are applied to the surface, frequently a wall or floor, which has been prepared with mortar or adhesive to receive the design.

A brief account of mosaic follows. For full treatment, *see* MACROPAEDIA: Decorative Arts and Furnishings.

Mosaic differs from inlay in that the pieces are applied to the surface and not inset into a recess below the surface. Each mosaic piece is small, and it is only when the piece forms part of an overall mosaic design that it takes on decorative significance.

Mosaic as an art form has most in common with painting. It represents a design or image in two dimensions. It is also, like painting, a technique appropriate to large-scale surface decoration. Unlike the painter, however, the mosaic artist is limited in the range of colours available to him by the physical limitation of his materials. It is difficult, therefore, to achieve the same variation of light and shadow as is possible in painting, although mosaic has qualities that render it more effective for distance effects. The light-catching qualities of the glass tesserae used in Byzantine mosaic work, for example, as well as the elimination of the middle tones in Byzantine mosaics gave a greater brilliance than painting ever did. Like each decorative medium, mosaic has qualities unique to itself, which lends it particular suitability to certain decorative functions.

The earliest known mosaics date from the 8th century BC and are made of pebbles, a technique refined by Greek craftsmen in the 5th century. Pebbles of uniform size, ranging in colour from white to black, were collected and used uncut to form floor and pavement mosaics. Even with this seemingly limited technique, Greek craftsmen were able to create elaborate and complex designs, using pebbles between one and two centimetres in diameter and outlining areas with tiny black pebbles. By the 4th century, pebbles painted red and green were added to give greater variety of effect.

Throughout antiquity, mosaic remained primarily a technique used for floors or pavements where durability and resistance to wear were paramount considerations. Stone, especially marble and limestone, was particularly suitable for this purpose. It could be cut into small pieces and the natural colours of stone provided a reasonable basic range of hues for the artist.

The use of glass for mosaic originated in the Hellenistic period, and it was to remain the most important mosaic material right through the Byzantine period. Glass could be made in any colour, and thus the range of colour available to the artist was virtually unlimited.

Glass was less suitable than stone for floors, though its lightness made it particularly suitable for wall mosaic where durability was not so important. During the Early Christian period, gold and silver glass tesserae were invented, made by applying metallic foil to the glass. This "mirror glass" enabled even greater intensity of light to be created, and gold in particular was to create one of the most characteristic effects of the great shimmering mosaics of the Byzantine period. In the 6th century AD, Byzantine mosaicists were using a gold background as the norm. They also developed a technique of setting tesserae into the mortar at a sharp angle to reflect the maximum amount of light.

The Romans used mosaic widely, particularly for the floors of domestic buildings. Fine examples have survived from Pompeii, Herculaneum, and Ostia. During the Early Christian period, wall mosaics came into favour as church decoration, and these were to remain the major form of decorative art throughout the Byzantine period. The greatest examples of Byzantine mosaic work are at Ravenna at the churches of S. Apollinaire Nuovo and S. Vitale, where the continuous "skin" of rich mosaic is an integral part of the architecture. Striking later examples were executed at Torcello, near Venice, in the 12th century; at Daphni, near Athens, in the 11th century; and at St. Mark's cathedral, in Venice, from the 11th to the 14th century. The influence of these Byzantine mosaics spread throughout Europe, but mosaic gradually declined in popularity as the quest for realism in the Renaissance led to a reaction against the stylized decorative quality of Byzantine art. It enjoyed a revival in the 19th century, when many public buildings were decorated with mosaics, usually of mass-produced ceramic tile or glass tesserae.

Pre-Columbian American Indians favoured mosaics of semiprecious stones such as garnet and turquoise and mother-of-pearl. These were normally used to encrust small objects such as shields, masks, and cult statues. Mexican artists in the 20th century have been among the greatest proponents of mosaic, primarily of natural stone, which has been widely used to decorate modern architecture in Mexico.

mosaic, in botany, plant disease caused by various strains of several hundred viruses. Symptoms are variable but commonly include irregular leaf mottling (light and dark green or yellow patches or streaks). Leaves are commonly stunted, curled, or puckered; veins may be lighter than normal or banded with dark green or yellow. Plants are often dwarfed, with fruit and flowers fewer than usual, deformed, and stunted. Flowers may be blotched or streaked (flower breaking), a condition appreciated in certain tulips, often termed Rembrandt tulips, for their attractive and colourful streaking. Mosaic symptoms may be masked or latent, especially at temperatures above 27° C (81° F), and are sometimes confused with nutrient deficiency or herbicide injury. The causal viruses are spread by aphids and other insects, mites, fungi, nematodes, and contact; pollen and seeds can carry the infection as well.

Mosaic can be avoided by using virus-free seeds and plants, growing resistant varieties, separating new from old plantings, rotating annuals, and observing stringent sanitation and pest-control measures.

mosaic, pebble: *see* pebble mosaic.

mosaic evolution, the occurrence, within a given population of organisms, of different rates of evolutionary change in various body structures and functions. An example can be seen in the patterns of development of the different elephant species. The Indian elephant underwent rapid early molar modification with little foreshortening of the forehead. The African elephant underwent parallel changes but at different rates: the foreshortening of the forehead took place in an early stage of development, molar modification occurring later.

Similarly, in man there was early evolution of structures for bipedal locomotion, but during the same time there was little change in skull form or brain size; later, both skull and brain evolved rapidly into the state of development associated with modern human species.

The phenomenon of mosaic evolution would seem to indicate that the process of natural selection acts differently upon the various structures and functions of evolving species. Thus, in the case of human development, the evolutionary pressures for upright posture took precedence over the need for a complex brain. Furthermore, the elaboration of the brain was probably linked to the freeing of the forelimbs made possible by bipedal locomotion. Analysis of incidences of mosaic evolution adds greatly to the body of general evolutionary theory.

mosaic glass, glassware made by fusing together pieces of diversely coloured glass. The earliest known glassware—vases produced in Egypt about the 15th century BC—is of this type. The Egyptian vases were formed by wrapping rods of different coloured glass softened by heating around a core of sand and dung. After the Syrians invented glassblowing during the 1st century BC, mosaic-type glassware was produced by decorating the surface of hot blown glass with chips of coloured glass and then reheating and reblowing it. This technique is similar to that used in manufacturing millefiori glass (*q.v.*). Mosaic glass enjoyed a revival in modern times during the Art Nouveau period (about 1890 to 1910).

mosaic pavement: *see* tessellated pavement.

Mosan school, regional style of Romanesque manuscript illumination, metalwork, and enamelwork that flourished in the 11th and 12th centuries and was centred in the Meuse River valley, especially at Liège and the Benedictine monastery of Stavelot. Two of the most important artists associated with the Mosan school were Godefroid de Claire, a goldsmith from Huy, and Nicholas of Verdun, who also was a goldsmith, as well as one of the most renowned enamellers of the Middle Ages. Among the major examples of Mosan art are the Stavelot Bible (1093–97; British Museum, London); the Reliquary Triptych of the Holy Cross (*c.* 1150; Pierpont Morgan Library, New York City); the gilded bronze cross from the Abbey of St. Bertain (*c.* 1170; Musée de Saint-Omer, France); and the portable Altar of Stavelot (*c.* 1150; Musées Royaux d'Art et d'Histoire, Brussels).

Mosander, Carl Gustaf (b. Sept. 10, 1797, Kalmar, Swed.—d. Oct. 15, 1858, Angsholmen), Swedish chemist whose work revealed the existence of numerous rare-earth elements with closely similar chemical properties.

In 1826 Mosander was placed in charge of the chemical laboratory of the Caroline Medical Institute, Stockholm, and in 1832 became professor of chemistry and mineralogy. While studying a compound of cerium, he discovered the element lanthanum in 1839. He pursued his investigations of the rare earths and in 1843 reported discovery of the elements erbium, terbium, and didymium. In 1885 the Austrian chemist Baron Carl Auer von Welsbach found that didymium was in reality a mixture of two elements: neodymium and praseodymium.

mosasaur, family of extinct aquatic lizards closely related to the present-day Oriental and African monitor lizards. They attained a high degree of adaptation to the marine environment and became distributed around the world during Cretaceous time (from 65,000,000 to 136,000,000 years ago). The mosasaurs competed with other marine reptiles—the plesiosaurs and ichthyosaurs—for food, which consisted largely of fish and cuttlefish. Many of the Late Cretaceous forms were large animals, exceeding 9 metres (30 feet) in length; but the most common ones were no larger than most of the porpoises of today.

The mosasaurs had snakelike bodies with large skulls and long snouts. Fore and hind limbs were modified as paddles, having shorter limb bones and more numerous finger and toe bones than their precursors. The tail region of the body was long, and its end was slightly downcurved in a manner similar to that of the early ichthyosaurs. The backbone consisted of more than 100 vertebrae. The construction of the skull was very similar to that of the modern monitors. The jaws bore many conical, slightly recurved teeth set in individual sockets. The jawbones are noteworthy in that they were jointed near mid-length, as in some of the advanced monitors, and connected in front by ligaments only. This arrangement enabled the animals not only to open the mouth by lowering the mandible but also to extend the lower jaws sideways while feeding on large prey.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Mosby, John Singleton (b. Dec. 6, 1833, Edgemont, Va., U.S.—d. May 30, 1916, Washington, D.C.), Confederate ranger whose guerrilla band frequently attacked and disrupted Union supply lines in Virginia and Maryland during the American Civil War.

Reared near Charlottesville, Va., Mosby entered the University of Virginia in 1849 and graduated in 1852. While there, he shot at and wounded a few students, but his resulting jail sentence was later annulled by the state legislature. In 1855 Mosby was admitted to the bar, and he practiced law in Bristol, Va., until the start of the Civil War in 1861. Enlisting in the Confederate cavalry, he saw action at Bull Run and spent most of 1862 as a scout with Gen. J.E.B. Stuart's forces. It was not until Jan. 2, 1863, that Mosby, with just nine men, launched the ranger attacks for which he is best remembered.

Mosby's band struck isolated Union posts in northern Virginia and Maryland in an effort to cut communications and disrupt supply lines. The rangers furnished their own guns (mostly revolvers), food, horses, and uniforms. They did not keep a common camp, boarding instead where they chose. At the end of a mission or when danger threatened, they scattered, only to link up once again at a predetermined time and location. They divided captured goods among themselves, leading Union officials to regard them as criminals rather than soldiers.

The lack of regimentation, combined with Mosby's success as a commander, drew additional rangers to his band. The best known of their exploits took place on March 9, 1863, when they slipped through federal lines at Fairfax Court House and captured a Union general along with 100 of his men. This mission and subsequent triumphs earned Mosby promotions to captain, major, and, eventually (December 1864), colonel.

By April 1865, Mosby had eight companies of well-equipped, well-trained rangers under his command. But his last raid took place on April 10, the day following Robert E. Lee's surrender at Appomattox. On April 21, he disbanded his men, and two months later he personally surrendered.

Mosby returned to private law practice in Warrenton, Va. At first a hero to Southerners, he lost their admiration when he entered politics as a Republican and backed Ulysses S. Grant for president. From 1878 to 1885 he served as U.S. consul at Hong Kong, and from 1904 to 1910 he was an assistant attorney in the Justice Department. He wrote two books about his war experiences: *Mosby's War Reminiscences, and Stuart's Cavalry Campaigns* (1887) and *Stuart's Cavalry in the Gettysburg Campaign* (1908).

Mosca, Gaetano (b. April 1, 1858, Palermo, Sicily, Kingdom of the Two Sicilies [now in Italy]—d. Nov. 8, 1941, Rome, Italy), Italian jurist and political theorist who, by applying a historical method to political ideas and institutions, elaborated the concept of a ruling minority (*classe politica*) present in all societies. His theory seemed to have its greatest influence on apologists for fascism who misunderstood his works.

Educated at the University of Palermo, Mosca taught constitutional law there (1885–88) and at the Universities of Rome (1888–96) and Turin (1896–1908). A member of the Italian chamber of deputies from 1908, he served as under secretary of state for the colonies from 1914 to 1916 and was made a senator for life by King Victor Emmanuel III in 1919. His last speech in the Senate was an attack on Benito Mussolini.

Mosca's *Teorica* (*Sulla teorica dei governi e sul governo parlamentare,* 1884; "Theory of Governments and Parliamentary Government") was followed by *Elementi di scienza politica* (1896; *The Ruling Class*). In these and other writings, but especially in the *Elementi,* he asserted, contrary to theories of majority rule, that societies are necessarily governed by minorities: by military, priestly, or hereditary oligarchies or by aristocracies of wealth or of merit. He showed an impartial indifference to the most diverse political philosophies. For him the will of God, the will of the people, the sovereign will of the state, and the dictatorship of the proletariat were all mythical.

Though sometimes called "Machiavellian," Mosca actually considered most of Niccolò Machiavelli's political ideas impractical. He opposed the racist elitism preached in Nazi Germany; condemned Marxism, which in his view expressed the hatred within Karl Marx; and mistrusted democracy, seeing the greatest threat to liberal institutions in "the extension of the suffrage to the most uncultured strata of the population." To him the most enduring social organization was a mixed government (partly autocratic, partly liberal) in which "the aristocratic tendency is tempered by a gradual but continuous renewal of the ruling class" by the addition of men of lower socioeconomic origin who have the will and the ability to rule.

Moscheles, Ignaz (b. May 23, 1794, Prague, Bohemia, Austrian Habsburg domain [now in Czech Republic]—d. March 10, 1870, Leipzig [Germany]), Czech pianist, one of the outstanding virtuosos of his era.

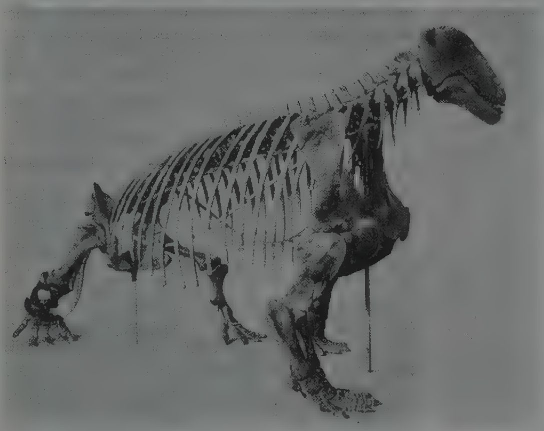
Moscheles studied at the Prague Conservatory and later at Vienna under J.G. Albrechtsberger and Antonio Salieri. In 1814, commissioned by Artaria & Co., publishers, he made the first piano arrangement of Ludwig van Beethoven's opera *Fidelio,* under the composer's supervision. After giving piano recitals in Germany and France, he settled in London in 1821. In 1829 he took part in the first London performance of the *Concerto for Two Pianos* by Felix Mendelssohn, who had been his pupil. He conducted the first English performance of Beethoven's *Missa Solemnis* and later conducted Beethoven's *Ninth Symphony* at the Philharmonic Society, of which he was a regular conductor from 1845. From 1846 he was principal professor of piano at the Leipzig Conservatory, and his reputation and skill as a teacher were important factors in the continued success of that institution.

Moscheles belonged to a conservative school of piano playing that did not lend itself to the works of Frédéric Chopin and Franz Liszt; of the younger composers of his day, he leaned more toward Mendelssohn and Robert Schumann. Nevertheless, his explorations of the gradations of tone colour influenced Liszt as well as Schumann. He was also admired for his brilliant extempore performances. His own compositions include eight piano concerti, studies, and chamber works.

Moscherosch, Johann Michael, pseudonym PHILANDER VON SITTEWALD (b. March 5, 1601, Willstädt, near Strassburg [now in Germany]—d. April 4, 1669, Worms), German Lutheran satirist whose bitterly brilliant but partisan writings graphically describe life in a Germany ravaged by the Thirty Years' War (1618–48). His satires, which at times are tedious, also show an overwhelming moral zeal added to a sense of mission.

Moscherosch, detail from an engraving
Bavaria-Verlag

Moscherosch was educated at Strassburg (now Strasbourg) and was for some years tutor in the family of the Count of Leiningen-Dagsburg. He held various government offices, including those of president of the chancellery and counselor to the chamber of finances (1656) to the Count of Hanau and privy councillor to the Countess of Hesse-Kassel.


Moschops, skeleton
By courtesy of the American Museum of Natural History, New York

Moscherosch's most famous work, *Wunderliche und wahrhafftige Gesichte Philanders von Sittewald* (1641–43; "Peculiar and True Visions of Philander von Sittewald"), displays his satirical ability. Modeled on *Los sueños* (1627; "Dreams") of Francisco de Quevedo y Villegas, it lampoons the customs and culture of the Germany of his day from the standpoint of a staunch Lutheran patriot. Another work is the *Insomnis Cura Parentum* (1643), a religious tract addressed to his family that reflects his strict Lutheran piety. Moscherosch was also a member of the Fruchtbringende Gesellschaft ("Productive Society"), which was founded for the purification of the German language and the fostering of German literature.

Moschopoulos, Manuel (fl. late 13th–early 14th century, Constantinople, Byzantine Empire [now Istanbul, Turkey]), Byzantine grammarian and critic during the reign (1282–1328) of Andronicus II Palaeologus.

Little is known of Moschopoulos' life except what can be gathered from his correspondence and a reference in a letter of one Maximus Planudes, who describes him as his pupil. He was a prominent representative of those humanist scholars active during the last revival of classical learning in Byzantium and is best remembered for his *Erotemata grammatika* ("Grammatical Questions," first printed in Milan, 1493), a handbook of Greek in the form of question and answer that enjoyed great popularity among Western humanists of the early Renaissance. He also compiled a lexicon of Attic Greek (*Sylloge onomaton Attikon*) and wrote treatises on mathematics and theology. He studied the works of several Greek poets and wrote commentaries on them; but his major contribution to classical scholarship is his recension of three Sophoclean tragedies (*Ajax, Electra, Oedipus Tyrannus*), in which he displays awareness of metrical problems and considerable critical acumen.

Moschops, extinct genus of mammallike reptiles found as fossils in rocks of Permian age (286 to 245 million years ago) in southern Africa. *Moschops,* which is representative of a group of mammallike reptiles (*see* therapsid) that became adapted to a diet of plant food, was about 2.6 m (8 feet) long. The body was massive; the skull was high and shortened front to back. Numerous chisel-edged teeth suitable for cropping vegetation were present in the jaws. The animal's back characteristically sloped downward from the front to the back in giraffelike fashion. The limb girdles or supports were massive, especially in the shoulder region, in order to support the animal's great bulk. The bone on the top of the skull was greatly thickened and perhaps employed for butting. *Moschops* probably inhabited dry upland regions.

Moschus (fl. *c.* 150 BC), Greek pastoral poet and grammarian from Syracuse, in Sicily, whose only surviving works are three short extracts from his *Bucolica,* a longer piece translated as *Love the Runaway,* and an elegiac piece on love as a plowman. The short epic poem *Europa* is perhaps correctly attributed to him, the *Lament for Bion,* considered an excellent work, less certainly so. No traces of his activity as a grammarian survive, with the possible exception of a reference by the Greek grammarian Athenaeus to a Moschus who wrote a work on Rhodian words.

Moschus, John (b. *c.* 540–550, probably Damascus, Syria—d. 619, Rome [Italy], or 634, Constantinople, Byzantine Empire), Byzantine monk and writer whose work *Pratum spirituale* ("The Spiritual Meadow"), describing monastic spiritual experiences in the Middle East, became a popular example of ascetic literature during the medieval period and was a model for similar works.

Moschus began his monastic life at St. Theodosius Monastery near Jerusalem about 565. After observing monastic practices among hermits along the Jordan River, followed by sojourns in Egypt, the Sinai Desert, Cyprus, and Antioch, he settled at Rome and composed a personal narrative of his monastic encounters, augmenting it from other sources. "The Spiritual Meadow," or "The New Paradise" (a translation of its Greek title), contains more than 300 tales of religious practices in simple language, replete with details of the life and beliefs of the times.

Abounding in reports of miracles and spiritual ecstasies and lacking any critical standards, "The Spiritual Meadow" nevertheless provides singular data on the modes of worship and ceremonies in 6th- and 7th-century monasticism, devotion to the Virgin Mary, political circumstances (including accounts of Persian and Arabic invasions), and criticism of prevailing heresies.

Mościcki, Ignacy (b. Dec. 1, 1867, Mierzanów, Pol., Russian Empire [now in Poland]—d. Oct. 2, 1946, Versoix, Switz.), Polish statesman, scholar, and scientist, who, as president of Poland, was a strong supporter of the dictatorship of Józef Piłsudski.

Mościcki was educated as a chemist. He joined the nationalistic Polish Socialist Party in the early 1890s and was involved in an attempt on the life of the governor-general of Warsaw. Sought by the Russian police for that involvement, Mościcki fled to England (1892), where he met Piłsudski.

Mościcki, *c.* 1937
By courtesy of Mrs. Marya Moscicka

Returning to the European continent, in 1897 Mościcki began to teach at the Roman Catholic university in Fribourg, Switz. In 1912 he was given the professorship of electrochemistry at the University of Lemberg (Polish: Lwów). After World War I Mościcki served the new Polish state by restoring synthetic nitrogen production at Królewska Huta (now Chorzów), Upper Silesia, at a plant that had been stripped by the Germans.

After the Piłsudski coup d'état in May 1926, Mościcki was installed as president of the republic in June, in which post he served Piłsudski faithfully. He served another seven-year term as president from 1933 until the German and Soviet occupation of Poland in September 1939; at this time Mościcki fled to Romania, where he was interned briefly, and thence to Switzerland, where he resided until his death.

Mosconi, Willie, byname of WILLIAM JOSEPH MOSCONI (b. June 27, 1913, Philadelphia, Pa., U.S.—d. Sept. 16, 1993, Haddon Heights, N.J.), American pocket billiards player who was men's world champion 15 times between 1941 and 1957.

The son of a billiards parlour owner, Mosconi showed a precocious talent for the game. When his father forbade him to play, hoping that he would pursue a career in vaudeville, young Mosconi practiced with potatoes and a broomstick. He began playing professionally in 1931 or 1932 in order to help support his family during the Great Depression. He first won the pocket billiards world championship title in 1941, winning again in 1942, 1944–45, 1947–48, and 1950–57. Mosconi was known for his accurate, rapid-fire shooting. During one exhibition tournament he had a run (series of consecutive successful shots) of 526 balls. He assisted in the making of the motion picture *The Hustler* (1961), executing fancy shots and advising the actors on the game.

In 1957 Mosconi was forced to resign from the game after suffering a stroke. He rapidly regained his strength and skill, however, and returned to compete and win regularly. He served as a consultant for the Brunswick Corporation, a manufacturer of sports equipment, and appeared in many demonstration games on television. Mosconi wrote *Winning Pocket Billiards* (1965) and an autobiography, *Willie's Game* (1993).

Moscow, Russian MOSKVA, *oblast* (province), western Russia. The *oblast* surrounds and includes the city of Moscow, the capital of Russia. Moscow *oblast* was formed in 1929. The main feature of its relief is the Klin-Dmitrov Ridge, which stretches roughly east-west across the *oblast,* north of Moscow city. The ridge, a line of terminal moraines, reaches a height of 1,000 feet (300 m) with a steep northern slope to the boulder clay plain of the upper Volga River. South of the ridge is the broad, level plain of the Oka River and its major tributary, the Moskva River, on which the capital stands. In the southeast the plain gradually drops to the Meshchera Lowland, an area of extensive swamps. South of the Oka the land rises toward the northern edge of the Central Russian Upland.

The climate is continental: winters are prolonged and cold, with January average temperatures of about 14° F (−10° C); summers are mild, with a July average of 64° F (18° C). Average annual precipitation ranges from 18 inches (450 mm) in the southeast to 26 inches (660 mm) on the Klin-Dmitrov Ridge, with the maximum precipitation falling in the summer. The natural vegetation of mixed forest, dominated by spruce, pine, oak, and birch, now survives over only 40 percent of the surface, but almost all remaining forest has been put under protective regulation for preservation. Grass marsh and peat bog occur, especially in the Meshchera Lowland. There are broad floodplain meadows along the rivers.

The *oblast* continues to be heavily industrialized despite the decline of industry throughout Russia in the 1990s. The area retains its historic importance, dating back to the late 17th century, as Russia's chief producer of textiles, especially of cotton and woolen cloth. Artificial textiles, silk, linen, clothing, and knitwear are also made. The second major branch of industry, engineering, produces a wide range of heavy machinery, machine tools, locomotives, and buses. The chemical industry produces artificial fibres, plastics, and fertilizers. Old established glass and chinaware industries still flourish, especially in the north. Other manufactures include cement, furniture and other timber products, footwear, and foodstuffs. Lignite (brown coal) and phosphorite are mined in the south, and peat is extensively dug to supply peat-burning power stations, especially in the east around Shatura. Local fuel resources have been supplanted by natural-gas pipelines from the northern Caucasus, western Ukraine, and from Saratov to the south; a high-tension grid transmits power from the giant Volga hydroelectric stations.

The *oblast* is highly urbanized; of its total population, 90 percent lives in more than 140 urban places. The city of Moscow and the satellite towns within its surrounding "forest-park" greenbelt dominate the urban scene; many workers commute into the city from adjacent areas. Although it is the *oblast*'s administrative centre, Moscow is administered independently.

Agriculture plays a relatively minor role in the economy. Throughout the *oblast,* but especially around Moscow, dairying and market gardening are well developed to serve the city. In the east the emphasis is on dairy and beef cattle, and pig keeping and poultry farming are widespread. Grain, chiefly rye and oats, is of minor importance; fodder crops occupy more than half the arable land. In the west and north considerable areas are under flax. Reclamation work occurs in swampy areas.

Communications throughout the *oblast* are excellent. Trunk railways from all parts of Russia focus on Moscow, and there is a network of electrified suburban lines. The *oblast* has the highest proportion of asphalt-surfaced roads in Russia. It is also served by waterways, including the Moscow Canal from the capital north to the Volga and the Oka—all giving access to the Volga River system. Area (including Moscow city) 18,200 square miles (47,000 square km). Pop. (2000 est.) *oblast* only, 6,511,000.

Moscow, Russian MOSKVA, city, capital of Russia. The city is located in western Russia about 400 miles (640 km) southeast of St. Petersburg and 600 miles (970 km) east of the Polish border. Area city, 410 square miles (1,062 square km). Pop. (2000 est.) city, 8,631,000.

A brief treatment of Moscow follows. For full treatment (and a map), *see* MACROPAEDIA: Moscow.

Moscow lies in the broad, shallow valley of the Moskva River, a tributary of the Oka and thus of the Volga, in the centre of the vast plain of European Russia. This region is one of the most highly developed and densely populated areas of Russia.

The climate of Moscow is of the continental type, modified by the temperate influence of westerly winds from the Atlantic Ocean. Winters are cold and long (average January temperature, 14° F [−10° C]); summers are short and mild (average July temperature, 64° F [18° C]). The moderate (23 inches [582 mm]) annual precipitation occurs predominantly in the summer months, often in brief, heavy downpours.

Only a small percentage of Moscow's population is employed in the city centre because of the decentralization of workplaces. Industry is the dominant source of employment, followed by science and research. Although Moscow's role in the country's administration is of prime importance, government as a source of employment is relatively minor.

Engineering (production of automobiles and trucks, ball bearings, machine tools, and precision instruments) and metalworking are by far the most important industries. Aerospace design also plays an important role in the engineering sector. Other important activities include the manufacture of textiles, chemicals and derivative products, and consumer goods (foodstuffs, footwear, and pianos); timber processing; construction; and printing and publishing. Moscow is the headquarters of state insurance and banking organizations. Economic reforms in the 1990s have transformed the economy but increased unemployment.

The pattern of rings and radials that marked the historical stages of Moscow's growth remains evident in its modern layout. Successive epochs of development are traced by the Boulevard Ring and the Garden Ring (both following the line of former fortifications), the Moscow Little Ring Railway, and the Moscow Ring Road. From 1960 to the mid-1980s the Ring Road was the administrative limit of the city, but several areas of the largely greenbelt zone beyond the road have been annexed.

Moscow's centre and historical heart is the fortified enclosure of the Kremlin. Its crenellated redbrick walls and 20 towers (19 with spires) were built at the end of the 15th century and were partially rebuilt in later years. Within the walls of the Kremlin are the meeting places of the Russian government. Among these are the former Senate building (1776–88), the Kremlin Great Palace (1838–49), and the modern Palace of Congresses (1960–61). Other features within the Kremlin are the central Cathedral Square, around which are grouped three cathedrals, all examples of Russian church architecture at its height in the late 15th and early 16th centuries; a group of palaces of various periods; the white bell tower of Ivan III the Great; the Armoury Museum; and the Arsenal (1702–36).

Along the east wall of the Kremlin lies Red Square, the ceremonial centre of the capital. The Lenin Mausoleum stands beneath the Kremlin walls, and the Church of the Intercession, or Cathedral of St. Basil the Blessed, is at the southern end of the square. The State Department Store, GUM, faces the Kremlin, and the State Historical Museum (1875–83) closes off the northern end of the square.

In the rest of central Moscow, within the Garden Ring, are buildings from every period of Moscow's development since the 15th century. Examples of the Moscow Baroque style, the Classical period, and the revivalist Old Russian style may be found. In the Soviet period streets were widened, and much of the old part of the inner city was demolished and replaced by large office and apartment buildings, government ministries, headquarters of national and international bodies and organizations, hotels and larger shops, and principal cultural centres. During the 1990s, the city underwent a construction boom, with the building of new structures and the refurbishment of cultural landmarks.

Beyond the Garden Ring is a middle zone dominated by 18th- and 19th-century developments; many factories, railway stations, and freight yards are located there. Since 1960 extensive urban renewal has occurred, producing neighbourhoods of high-rise apartment buildings. The outer zone has been the site of modern factory development and extensive housing construction in the 20th century. Beyond the newer suburbs are areas of open land and forest, together with satellite industrial towns and dormitory suburbs.

Moscow's inhabitants are overwhelmingly of Russian nationality, but members of more than 100 other nationalities and ethnic groups also live there. Population density, though lowered by outward expansion of the city, has remained high because of the vast number of large apartment buildings.

Moscow has a large concentration of educational institutions, and its centres of higher education draw students from throughout Russia. Moscow State University (1755) is the leading educational institution. The city's many specialized educational institutions include the Moscow Timiryazev Academy of Agriculture and the Moscow P.I. Tchaikovsky Conservatory. Scientific research is conducted by the Academy of Sciences of Russia and many institutions linked to industry. These institutions supply Moscow's engineering and aerospace industries with vast numbers of skilled workers. The city's libraries include the Russian State Library (formerly the V.I. Lenin State Library).

Theatre, music, and art are important in the city's life. The State Academic Bolshoi ("Great") Theatre (1825), Maly ("Little") Theatre, and Moscow Art Theatre are especially renowned. Of the many museums and galleries, the Pushkin State Museum of Fine Arts and the State Tretyakov Gallery are notable.

The city's residents rely heavily on public transportation provided by the Metropolitan (Metro) subway, buses, streetcars, and trolleybuses. The Metro system is known for the elaborate architecture of its stations. Moscow is the centre of the country's rail network, on which freight transport is heavily dependent. Trunk rail lines radiate from the city in all directions to major Russian population and industrial centres, to Ukraine, Belarus, and eastern Europe, and to Central Asia. Suburban commuter traffic is facilitated by the Moscow Little Ring Railway (1908) and the Greater Moscow Ring Railway, which link radial lines. Passenger trains connect to destinations throughout Russia and Europe. Moscow is also a major river port and is served by the Moscow Canal. The Volga's various canals link Moscow to all the seas surrounding European Russia. Moscow is the centre of the country's airline network; the Sheremetyevo airport, 24 miles (39 km) north, handles international flights.

Moscow, city, seat (1888) of Latah county, northwestern Idaho, U.S. The city is situated on Paradise Creek, in the Palouse country just north of Lewiston, near the Washington border. The area was settled in 1871 and developed as a stagecoach station. The town was probably named by Jonathan Neff, a homesteader who had lived near communities named Moscow in Iowa and Pennsylvania. The establishment of the University of Idaho (1889) was a major factor in its development. The state Bureau of Mines and Geology has its headquarters on the campus, and the university maintains agricultural and other research stations in the area. Agriculture (peas and wheat), lumbering, and clay production are the major economic activities in the surrounding area. St. Joe National Forest is to the northeast. Inc. town, 1887; city, 1893. Pop. (2000) 21,291.

Moscow, Grand Principality of, also called MUSCOVY, Russian MOSKOVSKOYE VELIKOYE KNAZHESTVO, medieval principality that, under the leadership of a branch of the Rurik dynasty, was transformed from a small settlement into the dominant political unit in northeastern Russia.

Muscovy became a distinct principality during the second half of the 13th century under the rule of Daniel, the youngest son of the Rurik prince Alexander Nevsky. Located in the midst of forests and at the intersection of important trade routes, it was well protected from invasion and well situated for lucrative commerce. In 1326 it became the permanent residence of the Russian metropolitan of the Orthodox church. Muscovy attracted many inhabitants, and its princes collected large revenues in customs and taxes. After a short period of rivalry with the princes of Tver during the reign of Prince Daniel's son Yury (d. 1326), the princes of Muscovy received the title of grand prince of Vladimir from their Tatar overlords (1328). That title enabled them to collect the Russian tribute for the Tatar khan and, thereby, to strengthen the financial and political position of their domain.

The Muscovite princes also pursued a policy of "gathering the Russian lands." Yury extended his principality to include almost the entire Moscow basin; and Ivan I (Ivan Kalita, reigned 1328–40), followed by his sons Semyon (reigned 1341–53) and Ivan II (reigned 1353–59), purchased more territory.

Dmitry Donskoy (reigned as prince of Moscow from 1359, grand prince of Vladimir 1362–89) increased his holdings by conquest; he also won a symbolically important victory over the Tatars (Battle of Kulikovo, 1380). His successors Vasily I (reigned 1389–1425) and Vasily II (reigned 1425–62) continued to enlarge and strengthen Moscow despite a bitter civil war during the latter's reign.

Ivan III (reigned 1462–1505) completed the unification of the Great Russian lands, incorporating Ryazan, Yaroslavl (1463), Rostov (northwest of Vladimir and southeast of Yaroslavl; 1474), Tver (1485), and Novgorod (1478) into the Muscovite principality. By the end of Ivan's reign, the prince of Moscow was, in fact, the ruler of Russia proper. *See also* Rurik dynasty.

Moscow, Treaty of (March 16, 1921), pact concluded at Moscow between Turkey and the Soviet Union that fixed Turkey's northeastern frontier and established friendly relations between the two nations.

With the advent of the Russian Revolution (October 1917), Russia withdrew from World War I and ceased hostilities against the Ottoman Empire. The new Soviet regime found itself allied against the West with the Turkish nationalists, who were fighting against both Western domination and the Ottoman government that had capitulated to the Western Allies. Diplomatic relations between the nationalists and the Soviets began in August 1920 and led to the Treaty of Moscow, which settled border disputes by giving Kars and Ardahan to Turkey and Batumi to Russia and by which the Soviets recognized the nationalist leadership under Mustafa Kemal (later styled Kemal Atatürk) as the only government in Turkey. As a result of the treaty, the Soviets supplied the nationalists with weapons and ammunition, which the Turks used successfully in a war against Greece in 1921–22.

Moscow Academic Art Theatre, also called (until 1939) MOSCOW ART THEATRE, Russian MOSCOVSKY AKADEMICHESKY KHUDOZHESTVENNY TEATR, or MOSCOVSKY KHUDOZHESTVENNY TEATR, abbreviation MKHAT, outstanding Russian theatre of theatrical naturalism founded in 1898 by Konstantin Stanislavsky and Vladimir Nemirovich-Danchenko (*qq.v.*). Its purpose was to establish a theatre of new art forms, with a fresh approach to its function. Sharing similar theatrical experience and interests, the cofounders met and it was agreed that Stanislavsky was to have absolute control over stage direction while Nemirovich-Danchenko was assigned the literary and administrative duties. The original ensemble was made up of amateur actors from the Society of Art and Literature and from the dramatic classes of the Moscow Philharmonic Society, where Stanislavsky and Nemirovich-Danchenko had taught. Influenced by the German Meiningen Company (*q.v.*), Stanislavsky began to develop a system of training for actors that would enable them to perform realistically in any sort of role and situation.

After some 70 rehearsals, the Moscow Art Theatre opened with Aleksey Tolstoy's *Tsar Fyodor Ioannovich* in October 1898. For its fifth production it staged Anton Chekhov's *The Seagull,* a play that had failed in its first production. With its revival of *The Seagull,* the Art Theatre not only achieved its first major success but also began a long artistic association with one of Russia's most celebrated playwrights: in Chekhov's artistic realism, the Art Theatre discovered a writer suited to its aesthetic sensibilities. In *The Seagull,* as in all of Chekhov's plays, the Art Theatre emphasized the subtext, the underlying meaning of the playwright's thought. Artistically, the Art Theatre tried all that was new. Its repertoire included works of Maksim Gorky, L.N. Andreyev, Leo Tolstoy, Maurice Maeterlinck, and Gerhart Hauptmann, among others, and it staged works of political and social significance as well as satires, fantasies, and comedies.

After the Russian Revolution it received crucial support from V.I. Lenin and A.V. Lunacharsky, first commissar of education in the Soviet Union, and in 1922 the Art Theatre toured Europe and the United States, garnering critical acclaim wherever it performed. Returning to Moscow in 1924, the theatre continued to produce new Soviet plays and Russian classics until its evacuation in 1941. Two successful tours of London in the late 1950s and early '60s reestablished its preeminence in world theatre. The Art Theatre has exercised a tremendous influence on theatres all over the world: it fostered a number of experimental studios (*e.g.*, Vakhtangov Theatre, Realistic Theatre, Habima Theatre, Musical Studio of Nemirovich-Danchenko), and, today, virtually all professional training in acting uses some aspects of Konstantin Stanislavsky's method.

Moscow Canal, Russian KANAL MOSKVA, ship waterway linking Moscow to the Volga River at Ivankovo, north of Moscow. Built between 1932 and 1937, the canal replaced the canalized Moskva River, which can take only small craft, as the main water access to Moscow. The water journey to the important industrial centre of Nizhny Novgorod (formerly Gorky) was shortened by 75 miles (120 km). Along the Moscow Canal's length of 80 miles (128 km) there are 11 locks. The minimum depth is 18 feet (5.5 m), and lock dimensions are 950 by 100 feet (290 by 30 m).

Moscow River (Russia): *see* Moskva River.

Moscow school, major school of late medieval Russian icon and mural painting that flourished in Moscow from about 1400 to the end of the 16th century, succeeding the Novgorod school as the dominant Russian school of painting and eventually developing the stylistic basis for a national art. Moscow began a local artistic development parallel to that of Novgorod and other centres as it rose to a leading position in the movement to expel the Mongols, who had occupied most of Russia since the mid-13th century. The autocratic tradition of the city fostered from the beginning a preference for abstracted spiritual expression over practical narrative.

"The Savior," icon painted on panel by Andrey Rublyov, Moscow school, 1411; in the State Tretyakov Gallery, Moscow

Novosti—Sovfoto

The first flowering of the Moscow school occurred under the influence of the painter Theophanes the Greek, who was born and trained in Constantinople (Istanbul), assimilated the Russian manner and spirit at Novgorod, and moved from Novgorod to Moscow about 1400. Theophanes went far beyond contemporary models in complexity of composition, subtle beauty of colour, and the fluid, almost impressionistic rendering of his deeply expressive figures. His achievements instilled in Muscovite painting a permanent appreciation of curving planes. Theophanes' most important successor was the most distinguished of Russia's medieval painters, a monk, Andrey Rublyov, who painted pictures of overwhelming spirituality and grace in a style that owes almost nothing to Theophanes except a devotion to artistic excellence. He concentrated on delicacy of line and luminous colour; he eliminated all unnecessary detail to strengthen the impact of the composition, and he constructed remarkably subtle and complex relationships among the few forms that remained. Elements of Rublyov's art are reflected in most of the finest Moscow paintings of the 15th century.

The period from the time of Rublyov's death, about 1430, to the end of the 15th century was marked by a sudden growth in Moscow's prestige and sophistication. The grand dukes of Moscow finally drove out the Mongols and united most of the cities of central Russia, including Novgorod, under their leadership. With the fall of Constantinople to the Turks in 1453, Moscow, for some time the centre of the Russian Orthodox church, became the virtual centre of Eastern Orthodoxy. An artist whose career reflected the new sophistication was the major painter Dionisy, a layman. Dionisy's compositions, based more on intellect than on an instinctive expression of spirituality, are more arresting than either Theophanes' or Rublyov's. His figures convey an effect of extreme elongation and buoyancy through a drastic reduction, by simplified drawing, to silhouette and through a disparate spacing that spreads them out in a processional effect, breaking with the earlier Russian predilection for tight composition. There is a subtle colour scheme of turquoise, pale green, and rose against darker blues and purples. Perhaps the most significant quality of Dionisy's painting was his ability to emphasize the mystical over the dramatic content of narrative scenes.

The new prestige of the Russian Orthodox church led to an unprecedented seriousness in the mystical interpretation of traditional subject matter; by the mid-16th century there were specific directives from the church based on a new didactic iconography that expounded mysteries, rites, and dogmas. The general stylistic traditions already established were followed throughout the 16th and 17th centuries, but icons became smaller and crowded in composition and steadily declined in quality. By the late 16th century much of the former spirituality had been lost, replaced by decorative enrichment and often insipid elegance.

At the beginning of the 17th century the so-called Stroganov school (*q.v.*) of accomplished Moscow artists assumed the leadership of the last phase of Russian medieval art.

Moscow State University, in full MOSCOW M.V. LOMONOSOV STATE UNIVERSITY, Russian MOSKOVSKY GOSUDARSTVENNY UNIVERSITET IMENI M.V. LOMONOSOVA, state-controlled institution of higher learning at Moscow, the oldest-surviving, largest, and most prestigious university in Russia. It was founded in 1755 by the linguist M.V. Lomonosov and was modeled after German universities, its original faculty being predominantly German. In the second half of the 19th century, Moscow State University became the most important centre of scientific research and scholarship in Russia. The university underwent a notable expansion following the Russian Revolution, and it maintained its preeminent role in mathematics, physics, chemistry, mechanics, astronomy, and other disciplines during the Soviet period. It presently has more than 350 laboratories, a number of research institutes, several observatories, and also several affiliated museums. The university's A.M Gorky Research Library is one of the largest libraries in Russia. The university has continued to grow and is now housed in new buildings on the Lenin Hills within Moscow.

Among Moscow State University's better-known students were the writers Mikhail Lermontov, Anton Chekhov, and Ivan Turgenev, the radical intellectuals Aleksandr Herzen and V.G. Belinsky, and the Soviet leader Mikhail Gorbachev.

Moscow Zoo, Russian MOSKOVSKY ZOOPARK, largest zoo in Russia, exhibiting an outstanding collection of northern animals and many exotic species. Founded by a public society in 1864, the zoo later was privately owned. In 1919 it was declared the property of Soviet Russia and in 1923 was put under the Moscow City Soviet (council). It incorporates 20 hectares (49 acres) and includes small, unbarred enclosures as well as large paddocks for herds. The Moscow Zoo remained open during World War II, though much of the park was destroyed. The zoo contains more than 3,000 specimens of 550 species.

Moseley, Henry Gwyn Jeffreys (b. Nov. 23, 1887, Weymouth, Dorset, Eng.—d. Aug. 10, 1915, Gallipoli, Tur.), English physicist who experimentally demonstrated that the major properties of an element are determined by the atomic number, not by the atomic weight, and firmly established the relationship between atomic number and the charge of the atomic nucleus.

Educated at Trinity College, Oxford, Moseley in 1910 was appointed lecturer in physics at Ernest (later Lord) Rutherford's laboratory at the University of Manchester, where he worked until the outbreak of World War I, when he entered the army. His first researches were concerned with radioactivity and beta radiation in radium. He then turned to the study of the X-ray spectra of the elements. In a brilliant series of experiments he found a relationship between the frequencies of corresponding lines in the X-ray spectra. In a paper published in 1913, he reported that the frequencies are proportional to the squares of whole numbers that are equal to the atomic number plus a constant.

Known as Moseley's law, this fundamental discovery concerning atomic numbers was a milestone in advancing the knowledge of the atom. In 1914 Moseley published a paper in which he concluded that there were three unknown elements between aluminum and gold (there are, in fact, four). He also concluded correctly that there were only 92 elements up to and including uranium and 14 rare-earth elements.

Moseley's death at the Battle of Suvla Bay (in Turkey) at the age of 27 deprived the world of one of its most promising experimental physicists.

Moselle, *département,* Lorraine *région,* northeastern France, established in 1790 from territories of Lorraine and the city of Metz. The area was annexed by Germany after the Franco-German War (1870–71) and was restored to France in 1919 after World War I. Germany annexed it again in World War II and held it until 1944. The *département,* which contains one of the most important concentrations of heavy industry in France, occupies an area of 2,400 square miles (6,216 square km) between the eastern border of Meurthe-et-Moselle and the western border of the German Saarland. It extends from the forested Vosges massif in the southeast, across the Plateau Lorrain (elevation about 600 feet [180 m]), to the Luxembourg border in the north. The Moselle River crosses the northwest region, flowing north through Metz, capital of Moselle, and alongside the iron-ore fields of Côtes de Moselle and Thionville. The Lorraine coalfield, a prolongation of the Saar River basin, is situated near the German border east of the industrial complex. In the southeast the *département* is watered by the Saar (French: Sarre) River, which flows north through Sarrebourg past salt mines and chemical works. Canals link the industrial regions of Moselle and the Saar region of Germany with both the Rhine system (of canals and rivers) and the Paris Basin. The canalization of the Moselle River assures a direct connection with the Rhine River valley to the north. Communications through Metz to Nancy, the Saar, and Luxembourg were improved with the construction of high-volume motorways.

Moselle has warm summers and severe winters. The agricultural population, which has declined with industrialization, tends to concentrate on cattle raising and dairy farming for local markets. The Moselle iron-ore fields began to be exploited after 1875, when it became technologically possible to eliminate the high phosphorus impurities they contain. Abundant and easy to exploit, these deposits permitted the creation of a powerful industrial district that served markets in the north of France and in Germany's Ruhr. Today the reserves have diminished, and with competition from much richer foreign sources, the decline and eventual end of exploitation of these fields is foreseen. The Lorraine coalfields are still the main source of supply in France, responsible for most of national production; these coalfields are among the most completely mechanized in Europe and among the most productive in output per worker. The Moselle River valley near Thionville and the valleys of Fentsch and Orne are lined with scores of blast furnaces, iron- and steelworks, and coking plants, although this activity is thought by planners to have an uncertain future. The *département* accounts for much of France's total output of coal, iron, and steel. Gas produced as a by-product is fed to the Paris region by pipeline. Moselle has nine *arrondissements*—Boulay-Moselle, Château-Salins, Forbach, Metz-Ville, Metz-Campagne, Sarrebourg, Sarreguemines, Thionville-Est, and Thionville-Ouest. It is in the educational division of Strasbourg. Pop. (1992 est.) 1,010,000.

Moselle River, German MOSEL, river, a west-bank tributary of the Rhine River, flowing for 339 miles (545 km) across northeastern France and western Germany. Rising on the forested slopes of the Vosges massif, the river meanders past Épinal, Pont-Saint-Vincent, Toul, Frouard, Metz, and Thionville before leaving France to form the frontier between Germany and Luxembourg for a short distance. The river enters Germany and flows past Trier to its confluence with the Rhine at Koblenz. In this sector of the valley (German: Moseltal) are the vineyards from which the famous Moselle wines are produced. The Moselle River's chief tributaries are the Madon, Orne, and Sauer (French: Sûre) on the west and the Meurthe, Seille, and Saar (French: Sarre) on the east. Above Metz the Moselle has been navigable to 300-ton barges since the 19th century. It connects at Toul and Frouard with the Rhine-Marne Canal. From Metz to Thionville the river has been navigable by 300-ton barges since 1932; below Thionville it was not navigable until the inauguration in 1964 of the Moselle Canal from Metz to Koblenz, built to take barges up to 1,500 tons. The canal is administered by a tripartite authority representing France, Germany, and Luxembourg. There are several iron and steel plants and power stations along the waterway.

Möser, Justus (b. Dec. 14, 1720, Osnabrück, Münster [now in Lower Saxony, Germany]—d. Jan. 8, 1794, Osnabrück), German political essayist and poet who was a forerunner of the Sturm und Drang ("Storm and Stress") movement of rebellious young German writers.

Trained in jurisprudence at the universities of Jena and Göttingen, Möser was named state's attorney at Osnabrück (1747), a prince-bishopric, and from 1764 he was very influential as an adviser to the estates and government. Möser also served as chief justice of the criminal court (1762–68), privy councillor of justice (1768), and councillor of justice (1783).

In Möser's collection of weekly papers, *Patriotischen Phantasien* (1774–76; "Patriotic Ideas"), he called for the national organic development of a state rather than a system of arbitrary laws imposed by a sovereign; J.W. von Goethe compared the *Phantasien* to analogous writings by Benjamin Franklin. Möser's *Osnabrückische Geschichte* (1768; "History of Osnabrück") was a pioneer work, showing the influence of folk traditions on the customs and government of a community. His complete writings, including essays, poems, and a tragedy, are available in *Sämtliche Werke,* 14 vol. (1943–90; "Collected Works").

Moser-Proell, Annemarie, *née* PROELL (b. March 27, 1953, Kleinarl, Austria), Austrian downhill skier who held the all-time record of six women's World Cup championships, five in succession (1971–75).

Proell skied from the age of four. She tried out for the Austrian national ski team at the age of 15. Her Winter Olympic Games success came late. She won silver medals for the downhill and the slalom in the 1972 games, and in the 1980 games she won the gold medal for downhill, her specialty. In 1973 she won a record 11 consecutive women's downhill World Cup races. She retired in 1976 but returned to competition in 1978. She retired again after the 1980 Winter Olympic Games. She established a career record for both men and women in World Cup races won.

Moses, Hebrew MOSHE (fl. 14th–13th century BC), Hebrew prophet, teacher, and leader who delivered his people from Egyptian slavery and founded the religious community known as Israel, based on a Covenant relationship with God. As the vehicle and interpreter of these Covenant stipulations, including the Ten Commandments, he exerted a lasting influence on the religious life, moral concerns, and social ethics of Western civilization.

A brief treatment of Moses follows. For full treatment, *see* MACROPAEDIA: Moses.

According to the biblical account, in Exodus and Numbers, Moses, a Hebrew foundling adopted and reared in the Egyptian court, somehow learned that he was a Hebrew and killed an Egyptian taskmaster who was beating a Hebrew slave. He fled to Midian (mostly in northwest Arabia), where he became the shepherd and eventually the son-in-law of a Midianite priest, Jethro. While tending his flocks he had the experience of seeing a burning bush that remained unconsumed and of a call there from the God—thereafter to be called Yahweh—of Abraham, Isaac, and Jacob to deliver his people, the Hebrews, from their bondage in Egypt. Because Moses was a stammerer, his brother Aaron was to be his spokesman, but Moses would be Yahweh's representative.

Ramses II (reigned 1279–13 BC) was probably the pharaoh of Egypt at the time. Regarding himself as divine, he rejected the demand of this unknown God through Moses and Aaron and responded by increasing the oppression of the Hebrews. During the ensuing contest, Moses used plagues sent by Yahweh to bend Ramses' will. Whether the Hebrews were finally permitted to leave Egypt or simply fled is not clear; but in any case, according to the biblical account, the pharaoh's forces pursued them eastward to the Sea of Reeds, a papyrus lake (not the Red Sea), which the Hebrews crossed safely but in which the Egyptians were engulfed. Moses then led the people to Mount Sinai (Horeb) at the southern tip of the Sinai Peninsula. In the biblical narrative, the appearance of Yahweh in a terrific storm there was a revelatory experience for Moses, as the burning bush had been. Out of this came the Covenant between Yahweh and the people of Israel, including the Ten Commandments; and Moses began issuing ordinances for specific situations, instituted a system of judges and hearings in civil cases, and regulated the cult.

After leaving Mount Sinai and continuing the journey toward Canaan, Moses faced increasing resistance and frustration and once got so angry at the people that, according to tradition, Yahweh accounted it a lack of faith and denied him entrance into Canaan. As his last official act, Moses renewed the Sinai Covenant with the survivors of the wanderings and then climbed Mount Pisgah to look over the land that he would not enter. The Hebrews never saw him again, and the circumstances of his death and burial remain shrouded in mystery.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Moses DE LEÓN, original name MOSES BEN SHEM TOV (b. 1250, León [Spain]—d. 1305, Arevalo), Jewish Kabbalist and presumably the author of the *Sefer ha-Zohar* ("Book of Splendour"), the most important work of Jewish mysticism; for a number of centuries its influence among Jews rivaled that of the Old Testament and the Talmud, the rabbinical compendium of law, lore, and commentary.

The details of Moses de León's life, like those of most Jewish mystics, are obscure. Until 1290 he lived in Guadalajara (the Spanish centre of adherents of the Kabbala). He then traveled a great deal and finally settled in Ávila. On a trip to Valladolid, he met a Palestinian Kabbalist, Isaac ben Samuel of Acre; to him (as recorded in Isaac's diary), Moses confided that he possessed the centuries-old, original manuscript of the *Zohar,* copies of which he had been circulating since the 1280s. He promised to show it to Isaac at his home in Ávila. Because the authorship of the *Zohar* was ascribed to the 2nd-century Palestinian rabbinic teacher Simeon ben Yoḥai (a reputed worker of miracles), the original manuscript would have been of incomparable interest and value. Unfortunately, Moses died before he could fulfill his promise, and Isaac subsequently heard rumours that Moses' wife had denied the existence of this manuscript, claiming rather that Moses himself was the author of the *Zohar.*

The *Zohar,* written for the most part in a strange, artificial, literary Aramaic, is primarily a series of mystical commentaries on the Pentateuch (the Five Books of Moses), in manner much like the traditional Midrashim, or homilies based on Scripture. Against the backdrop of an imaginary Palestine, Simeon ben Yoḥai and his disciples carry on a series of dialogues. In them, it is revealed that God manifested himself in a series of 10 descending emanations, or *sefirot* (*e.g.,* "love" of God, "beauty" of God, and "kingdom" of God). In addition to the influence of Neoplatonism, the *Zohar* also shows evidence of the influence of Joseph Gikatilla, a medieval Spanish Kabbalist thought to have been a friend of Moses de León. Gikatilla's work *Ginnat egoz* ("Nut Orchard") provides some of the *Zohar*'s key terminology.

These influences, although cunningly disguised, were discerned by Gershom Scholem, one of the great 20th-century scholars of Jewish mysticism, and he became convinced that the *Zohar* was a medieval work. He was able to demonstrate, further, that the Aramaic in which the *Zohar* is written is, in both vocabulary and idiom, the work of an author whose native language was Hebrew. Finally, by comparing the *Zohar* with the Hebrew works of Moses de León, Scholem identified León as the *Zohar*'s author. Scholem theorized that the *Zohar* was León's attempt to combat the rise of rationalism among Spanish Jewry and the resultant laxity in religious observance. With the *Zohar,* according to Scholem, Moses de León attempted to reassert the authority of traditional religion (Kabbala itself means "tradition") by simultaneously giving its doctrines and rituals a fresh, compelling reinterpretation and ascribing this reinterpretation to an old, mythically revered authority. Many traditional scholars, nevertheless, still hold that Simeon ben Yoḥai wrote the *Zohar.*

Moses OF KHOREN, Armenian MOVSES KHORENATZI, author known as the father of Armenian literature. Traditionally believed to have lived in the 5th century, Moses has also been dated as late as the 9th century. Nothing is known of his life apart from alleged autobiographical details contained in the *History of Armenia,* which bears his name as author. His claims to have been the disciple of St. Sahak (Isaac) and St. Mesrob, to have studied in Edessa and Alexandria after the Council of Edessa (431), and to have been commissioned to write his *History* by the governor Sahak Bagratuni, have been rejected by most serious scholars, in large part because of anachronisms in his text. His work, however, is a valuable record of earlier religious tradition in pre-Christian Armenia.

Moses, Assumption of, a pseudepigraphal work (not in any biblical canon), a prophecy of the future relating to Israel, put into the mouth of Moses and addressed to Joshua just before the great lawgiver died. Using Moses' predictions and instructions to Joshua as a framework, the book's unknown author sets forth a brief history of Israel from Moses to the messianic age as viewed in apocalyptic terms. The tone of the work is decidedly negative toward the fusion of politics with religion and condemns the Hasmonean leaders who ruled Judaea after the Maccabean revolt of 168–161 BC. The most striking feature of the work is the writer's scathing condemnation of the priesthood before, during, and after the Maccabean period, obviously meant as an attack on the Sadducean high priests of his own time.

The narrative loses its concreteness after it reaches the time of Herod's sons. The author predicts that eventually the true Jewish religion will be persecuted by a mighty king, and in response a certain Taxo of the tribe of Levi shall appear, exhorting his seven sons to withdraw with him to a cave and die rather than transgress the law of God; God will avenge them, the author claims, and then the kingdom of God shall be established.

The book was originally written in Hebrew or Aramaic, although the only extant text is a Latin translation made from a previous Greek translation. The book does not mention the actual ascension of Moses, but it is clear from other evidence that the work must have described the actual assumption in chapters that have been lost. Several passages, moreover, are incomplete.

References in the work to the death of King Herod the Great and other events of the year 4/3 BC indicate that the book was written in that year or shortly thereafter, probably in Palestine. There is evidence that the *Assumption of Moses* was written by a sympathizer or member of the Essene sect, the members of which deplored the introduction of nationalism into Judaism and were characterized by strict observance of Mosaic Law and a heightened interest in messianism.

Moses, Edwin, byname ED MOSES (b. 1956, Dayton, Ohio, U.S.), U.S. world-record-holding hurdler and winner of the gold medal for the 400-metre hurdles in the 1976 and 1984 Olympic Games.

Moses competed in cross-country, track, and football in high school and entered Morehouse College (Atlanta, Ga.) on an academic scholarship. There he first ran the 400-metre race and the 120-yard high hurdles but began running the 400-metre hurdles in 1976. In the 1976 Olympic Games at Montreal, he won the gold medal and set his first world record of 47.64 sec. Moses proceeded to set successive world records for the 400-metre hurdles of 47.45 sec (1977), 47.13 sec (1980), and 47.02 sec (1983). He received a B.S. degree in physics in 1978 and moved to California, where he worked as an engineer and trained. In 1984 he won the James E. Sullivan Award as the best U.S. amateur athlete.

Moses, Grandma, byname of ANNA MARY ROBERTSON MOSES (b. Sept. 7, 1860, Greenwich, N.Y., U.S.—d. Dec. 13, 1961, Hoosick Falls, N.Y.), U.S. folk painter, internationally popular for her naive documentation of U.S. rural life in the late 19th and early 20th centuries. At 12 she left her parents' farm and was a hired girl until she married Thomas Moses in 1887. They first farmed in the Shenandoah Valley near Staunton, Va., and in 1905 moved to a farm at Eagle Bridge, N.Y., near the place where she had been born. Thomas died in 1927, and Anna continued to farm with the help of her youngest son until advancing age forced her to retire to a daughter's home in 1936.

"Out for the Christmas Trees," oil on masonite by Grandma Moses, 1946; in the Galerie St. Etienne, New York City

By courtesy of the Galerie St. Etienne, New York; © Grandma Moses Properties, Inc., New York

As a child Grandma Moses had drawn pictures and coloured them with the juice of berries and grapes. After her husband died she created worsted embroidery pictures, and when her arthritis made manipulating a needle too difficult, she turned to painting.

Her first works, done around 1938, were copies of prints by Currier & Ives and picture postcards. She soon turned to painting her memories of what she called "old-timey" farm life in New York and Virginia, painting such nostalgic reminiscences of past American life as "Catching the Thanksgiving Turkey," "Out for the Christmas Trees," "Over the River to Grandma's House," and "Sugaring-Off in the Maple Orchard."

Her first pictures sold in a drugstore in Hoosick Falls. By 1939, however, her pictures were exhibited throughout the United States and Europe (where she had 15 one-man shows). In 1952 she wrote in the bright style of her pictures an autobiography, *My Life's History.*

Moses, Robert (b. Dec. 18, 1888, New Haven, Conn., U.S.—d. July 29, 1981, West Islip, N.Y.), U.S. state and municipal official whose career in public-works planning resulted in a virtual transformation of the New York landscape. Among the works completed under his supervision were a network of 35 highways, 12 bridges, numerous parks, Lincoln Center for the Performing Arts, Shea Stadium, many housing projects, two hydroelectric dams, and the 1964 New York World's Fair. His projects greatly influenced large-scale planning in other cities in the United States. He was also instrumental in bringing the UN complex to Manhattan's East River waterfront.

Moses studied political science at Yale, Oxford, and Columbia universities. He began a long career of public service for the state and especially for the city of New York in 1913, when he joined the city's bureau of municipal research. His work there led to his appointment in 1919 by Gov. Alfred E. Smith as chief of staff of the New York state reconstruction commission, which sought administrative reforms in the state government.

In 1924 Smith named Moses head of both the New York and Long Island state park commissions, and for the next 40 years, more or less, through various state administrations at Albany and under various titles, he was virtual tsar of the state's park system. Moses vastly expanded the existing park system and built a network of roads (parkways) that gave the public easy access to the new parks.

In 1933 Moses was appointed head of the New York City Parks Department and head of the Triborough Bridge and Tunnel Authority. He began a massive building program in the city that included hundreds of new playgrounds and city parks, along with several major bridges, tunnels, and highways. In 1934, in his first and only bid for elective office, Moses ran for governor and lost by the rather large margin of 800,000 votes.

During the 1940s and 1950s, Moses replaced tenement slums with huge public-housing towers, which became less and less attractive to the public. In 1959, his popularity waning, Moses relinquished his city posts and became president of the World's Fair. He lost most of his state jobs in 1962, when Nelson Rockefeller unexpectedly accepted his routine resignation. In 1968 Moses was stripped of his last post.

Moses was the prototype of the grandiose public builder concerned with immense but impersonal projects. He was able to achieve rapid funding and construction of his projects through his skillful use of the public authority, an autonomous organization that built public works with money raised by issuing bonds, the revenues of which Moses could control and use free from government interference. Moses' approach to urban development gradually became unpopular in the 1950s and '60s as community concern shifted from further expansion of the urban infrastructure to the preservation of existing neighbourhoods by the use of unobtrusive, small-scale development. Moses' career and accomplishments are critically analyzed by Robert Caro in a massive biography entitled *The Power Broker* (1974).

Moses ben Maimon (Jewish philosopher): *see* Maimonides, Moses.

Moses ben Nahman (Jewish scholar): *see* Naḥmanides.

Moses ben Samuel ibn Tibbon: *see* ibn Tibbon, Moses ben Samuel.

Moses ibn Ezra: *see* ibn Ezra, Moses (ben Jacob ha-Sallaḥ).

Moses Lake, city, Grant county, central Washington, U.S., situated on the northeast shore of Moses Lake. The town was settled in 1897 and was laid out in 1910 as Neppel; it was incorporated in 1938 and renamed for the Indian chief Moses. Located in the Columbia Basin, the city serves as the trade centre of an irrigated farm region producing sugar beets, alfalfa, cereals, potatoes, and livestock. The impounded waters of Grand Coulee Dam (60 mi north) have raised the water table and created numerous lakes. Tourism, based on Moses Lake Recreation Area (including Potholes Reservoir) and food processing are the main economic factors. Nearby Larson Air Force Base (1943–66) has been developed as an industrial park. Moses Lake is the home of Big Bend Community College (1962). Pop. (1990) 11,235.

moshav (Hebrew: "settlement"), plural MOSHAVIM, in Israel, a type of cooperative agricultural settlement. The *moshav*, which is generally based on the principle of private ownership of land, avoidance of hired labour, and communal marketing, represents an intermediate stage between privately owned settlements and the complete communal living of the kibbutz. *Moshavim* are built on land belonging to the Jewish National Fund or to the state. The commonest type, the *moshav ʿovdim* ("workers' settlement"), consists of privately farmed agricultural plots. In a newer variant, the *moshav shitufi* ("partnership settlement"), the land is farmed as a single large holding, but contrary to practice in the kibbutz, households are independently run by their members. In the *moshav shitufi,* light industry, as well as farming, is common; the older *moshavim ʿovdim* emphasize citriculture and mixed farming.

Moshavim ʿovdim were first established before World War I but did not last; the first successful settlements of this type were Nahalal and Kefar Yeẖezqel, founded in 1921 in the Plain of Esdraelon. The first *moshavim shitufiyyim* were Kefar H̱ittim (1936) and Bene Berit (Moledet; 1938), both in lower Galilee.

In the period of large-scale immigration after the creation of Israel (1948), the *moshav* was found to be an ideal settlement form for the new immigrants, almost none of whom were accustomed to communal living. In the late 1970s some 136,500 persons lived in *moshavim ʿovdim,* and about 7,000 in *moshavim shitufiyyim.*

Moshe (Hebrew prophet): *see* Moses.

Mosheim, Johann Lorenz von (b. Oct. 9, 1694, Lübeck—d. Sept. 9, 1755, Göttingen, Hanover), German Lutheran theologian who founded the pragmatic school of church historians, which insisted on objective, critical treatment of original sources. In 1723 Mosheim became professor at Helmstedt and in 1747 was made professor of divinity and chancellor of the university at Göttingen.

Departing from the established method of writing history as a simple narration of unquestioned events, Mosheim called for fresh attention to wide historical movements and pervasive themes. Among his 85 works written in Latin and German on church history is *Institutiones Historiae Ecclesiasticae Antiquae et Recentioris* (1755; *Institutes of Ecclesiastical History*). A biography by K. Heussi was published in 1906.

Moshesh, also spelled MOSHOESHOE (Sotho leader): *see* Mshweshwe.

Mosi (people): *see* Mossi.

Mosken Marine Channel (Norway): *see* Maelstrøm.

Moskva: *see* Moscow.

Moskva River, English MOSCOW RIVER, river flowing through Moscow *oblast* (province) and part of Smolensk *oblast*, in western Russia. It is a left-bank tributary of the Oka River in the Volga basin. Rising in the Smolensk-Moscow Upland, the river flows 312 mi (502 km) in a southeasterly direction and drains an area of 6,800 sq mi (17,600 sq km). It is an important source of Moscow's water supply. Major cities along the river include Moscow, Mozhaysk, Zvenigorod, Zhukovsky, Bronnitsy, Voskresensk, and Kolomna. Its principal tributaries are the Kuza, Istra, Pakhra, and Severka.

Moskvin, Ivan Mikhailovich (b. 1874, Moscow—d. Feb. 16, 1946, Moscow), Russian actor of stage and screen whose career is closely identified with the Moscow Art Theatre, of which he became director in 1943.

Moskvin studied in the drama department of the Moscow Philharmonic Society from 1893 to 1896. He then performed in the Yaroslavl company and in the Korsh company in Moscow. In 1898 he was invited by V.I. Nemirovich-Danchenko to join the newly formed Moscow Art Theatre, and he appeared opposite Olga Knipper in the title role of the theatre's first production, *Czar Fyodor Ioannovich* (1898), by Aleksey Tolstoy. He went on to create the role of Luka in Maksim Gorky's *Lower Depths* (1902) and Epikhodoff in Anton Chekhov's *Cherry Orchard* (1904). The international acclaim Moskvin won when touring Europe and the United States (1919–24) was reinforced in later years by his work in Soviet motion pictures that were distributed worldwide.

Among Moskvin's film roles were the Russian serf in *Polikushka,* the government clerk in *Ranks and People,* and the title role in *The Station Master,* a film he also helped direct. Moskvin was a much-respected teacher with three generations of Moscow Art Theatre actors, and he continued to appear in the theatre's productions through 1942, when he played a principal role in N.F. Pogodin's *Kremlin Chimes.* He was awarded a Stalin Prize in 1943 and was a member of the Supreme Soviet at the time of his death.

Moslem: *see under* Muslim.

Mosley, Sir Oswald (Ernald), 6TH BARONET (b. Nov. 16, 1896, London—d. Dec. 3, 1980, Orsay, near Paris), English politician who was the leader of the British Union of Fascists from 1932 to 1940 and of its successor, the Union Movement, from 1948 until his death. These groups were known for distributing anti-Semitic propaganda, conducting hostile demonstrations in the Jewish sections of east London, and wearing Nazi-style uniforms and insignia.

Serving in the House of Commons from 1918 to 1931, Mosley was successively a Conservative, an Independent, and a Labour Party member, serving in a Labour ministry in 1929–30. In 1931 he tried to form a socialist party but was defeated for reelection to Parliament. The next year he founded the British Union of Fascists, for which some enthusiasm was generated by his own powerful oratory and by the support of the newspaper publisher Viscount Rothermere. Interned after the outbreak of World War II, Mosley was released in 1943 because of illness. On Feb. 7, 1948, he launched the Union Movement, which he described as an amalgam of 51 organizations, most of them right-wing book clubs.

Mosley married in 1920 Lady Cynthia Blanche Curzon (died 1933), daughter of the 1st Marquess Curzon of Kedleston; and in 1936 Diana Guinness (*née* Freeman-Mitford), daughter of the 2nd Baron Redesdale, himself a prewar apologist of Nazi Germany. Mosley's autobiography, *My Life,* was published in 1968.

mosque, Arabic MASJID, or JĀMIʿ, any house or open area of prayer in Islām. The *masjid jāmiʿ*, or "collective mosque," is the centre of community worship. In the early centuries of Islām a city might have many mosques but only one collective mosque, where the Friday services were held. It was also used for many public functions—military, political, social, and educational. Schools and libraries were often attached to medieval mosques (*e.g.,* al-Azhar mosque in Cairo). The mosque also functioned as a court of justice until the introduction of secular law into many Islāmic countries in modern times.

Worshipper praying before the *miḥrāb* (prayer niche) in the Blue Mosque, Cairo; the *minbar* (pulpit) is on the right

© Mathias Oppersdorff

The first mosques were modelled on the place of worship of the Prophet Muḥammad—the courtyard of his house at Medina—and were simply plots of ground marked out as sacred. Though the mosque as such underwent architectural changes under the influence of local styles, the building remained essentially an open space, generally roofed over, with a minaret sometimes attached to it. Within, the *miḥrāb*, a semicircular niche reserved for the prayer leader (*imām*), points to the *giblah*, the direction of Mecca; the *minbar,* a seat at the top of steps placed at the right of the *miḥrāb,* is used by the preacher (*khaṭīb*) as a pulpit. Occasionally there also is a *maqsūrah*, a box or wooden screen near the *miḥrāb*, which was originally designed to shield a worshipping ruler from assassins. Mats or carpets cover the floor of the mosque, where the ritual prayer (salat) is performed by rows of barefoot men, who bow and prostrate themselves under the *imām*'s guidance. Professional chanters (*qurrāʾ*) may chant the Qurʾān according to rigidly prescribed systems taught in special schools, but no music or singing is allowed. Statues, ritual objects, and pictures are also proscribed.

Outside the mosque stands the minaret (*maʾdhanah*), originally any elevated place but now usually a tower; it is used by the muezzin ("crier") to proclaim the call to worship (*adhān*) five times each day. A place for ablution, containing running water, is usually attached to the mosque but may be separated from it.

Whereas many of the social, educational, and political functions of the mosque have been taken over by other institutions in modern times, it remains a centre of considerable influence. In some cases a *maktab* (elementary school) is attached to a mosque, mainly for the teaching of the Qurʾān, and informal classes in law and doctrine are given for people of the surrounding neighbourhood.

Mosquera, Tomás Cipriano de (b. Sept. 20, 1798, Popayán, New Granada [Colombia]—d. Oct. 7, 1878, Coconuco), president of New Granada from 1845 to 1849 and of Colombia from 1864 to 1867 who, as a Conservative during his first term and a Liberal during his second, embodied the leftward shift in Colombian politics in his time.

Scion of a powerful family long influential in New Granada, Mosquera began his career in the army, serving under Simón Bolívar at 15 and becoming a brigadier general at 30. He entered politics in 1834 and was elected a deputy to Congress. He was the presidential choice of the ruling Conservative Party in 1845, and during his tenure he instituted many economic reforms. He left office in 1849.

By the end of the 1850s, Colombia was torn by civil war as the Liberals and Conservatives fought for control. Mosquera took the side of the Liberals. With the army under his command, he took Bogotá (July 1861) and declared himself president. He ruled as a dictator until a new Liberal constitution was adopted (1863), which provided for a two-year presidential term and changed the name of the country to the United States of Colombia. Not fully trusting Mosquera, the Liberals limited his first term to one year (1864–65). He was reelected in 1865, however, and soon imposed a dictatorship. His rule was overthrown in 1867, and he was exiled for two years. He returned to Colombia to serve as president of the state of Cauca and as senator, retiring from public life in 1876.

Mosquito (people): *see* Miskito.

mosquito, plural MOSQUITOES, or MOSQUITOS (family Culicidae), any of the familiar insects, numbering about 2,500 species, that are important in public health because of the bloodsucking habits of the females. Mosquitoes are known to transmit such serious diseases as yellow fever, malaria, filariasis, and dengue. (*See also* dipteran.)

The slender, elongated body of the adult is covered with scales; in addition the mosquito is characterized by its long, fragile-looking legs and its mouthparts, which are contained in an elongated proboscis. The threadlike antennae of the male are generally bushier than those of the female. The males, and sometimes the females, feed on nectar and other plant juices. In most species, however, the females require a blood meal in order to mature their eggs, which are laid on the surface of water. Different species of mosquitoes show preferences and, in many cases, narrow restrictions as to host animals.

The eggs laid by mosquitoes hatch into aquatic larvae, or wrigglers, which swim with a jerking, wriggling movement and feed on algae and organic debris; a few are predatory and may even feed on other mosquitoes. Unlike most insects, mosquitoes in the pupal stage, called tumblers, are active and free-swimming. The pupae breathe by means of tubes on the thorax. The adults mate soon after emerging from their pupal cases. The duration of the life cycle varies greatly depending on the species.

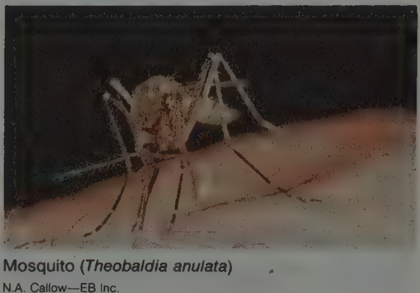
Mosquitoes are apparently attracted to host animals by moisture, lactic acid, carbon dioxide, body heat, and movement. The mosquito's hum results from the high frequency of its wingbeats; the female's slightly lower frequency may serve as a means of sex recognition.

Measures used to control mosquitoes include the elimination of breeding sites, the application of surface films of oil to clog the breathing tubes of wrigglers, and the use of larvicides. Synthetic organic insecticides may be used to destroy adult mosquitoes indoors.

There are three important mosquito genera. *Anopheles,* the only known carrier of malaria, also transmits filariasis and encephalitis. *Anopheles* mosquitoes are easily recognized in their resting position, in which the proboscis, head, and body are held on a straight line to each other but at an angle to the surface. The spotted colouring on the wings results from coloured scales. Breeding usually occurs in water containing heavy vegetation. The female deposits her eggs singly on the water surface. *Anopheles* larvae lie parallel to the water surface and breathe through posterior spiracular plates on the abdomen instead of through a tube, as do most other mosquito larvae. The life cycle is from 18 days to several weeks.

The genus *Culex* is a carrier of viral encephalitis and, in tropical and subtropical climates, of filariasis. It holds its body parallel to the resting surface and its proboscis is bent downward relative to the surface. The wings, with scales on the veins and the margin, are uniform in colour. The tip of the female's abdomen is blunt and has retracted cerci (sensory appendages). Breeding may occur on almost any body of fresh water, including standing polluted water. The eggs, which float on the water, are joined in masses of about 100 or more. The long and slender *Culex* larvae have breathing tubes that contain hair tufts; they lie head downward at an angle of 45° from the water surface. The life cycle, usually 10 to 14 days, may be longer in cold weather. *C. pipiens pipiens* is the most abundant house mosquito in northern regions; *C. pipiens quinquefasciatus* is abundant in southern regions.

The genus *Aedes* carries yellow fever, dengue, and encephalitis. Like *Culex,* it holds its body parallel to the surface with the proboscis bent down. The wings are uniformly coloured. *Aedes* may be distinguished from *Culex* by its silver thorax with white markings and posterior spiracular bristles. The tip of the female's abdomen is pointed and has protruding cerci. *Aedes* usually breeds in floodwater, rain pools, or salt marshes, the eggs being capable of withstanding long periods of dryness. The short, stout larvae have a breathing tube containing a pair of tufts; the larvae hang head down at a 45° angle from the water surface. The life cycle may be as short as 10 days or, in cool weather, as long as several months. *A. aegypti,* the important carrier of yellow fever, has white bands on its legs and spots on its abdomen and thorax. This domestic species breeds in almost any kind of container, from flower pots to discarded car-tire casings. *A. sollicitans, A. taeniorhynchus,* and *A. dorsalis* are important salt-marsh mosquitoes. They are prolific breeders, strong fliers, and irritants to animals, including humans.



Mosquito (*Theobaldia anulata*)
N.A. Callow—EB Inc.

Mosquito, in full DE HAVILLAND DH-98 MOSQUITO, British twin-engine, two-seat, mid-wing bomber aircraft that was adapted to become the prime night fighter of the Allies during World War II. The Mosquito had a frame of wood and a skin of plywood, and it was glued and screwed together in England, Canada, and Australia. The plane was designed in 1938 and entered service in 1941.

As a night fighter, the Mosquito downed more than 600 Luftwaffe planes over Germany and as many V-1 missiles (buzz bombs) over England and the English Channel. As a bomber, it proved able to carry twice the bomb load for which it was designed. The Mosquito had a maximum speed in excess of 400 miles per hour (640 km/h) and a range of more than 1,500 miles (2,415 km) with a 4,000-pound (1,816-kilogram) bomb load. Its original armament included four .303-calibre machine guns and four 20-millimetre cannons, all firing through the nose. The airplane was produced in so many modifications for so many missions, however, that armament varied widely through the war and later, when it was used in the air forces of countries around the world. Including production in the three continents where it was made, there were 42 "marks," or versions, of the 7,780 Mosquitos that were built. It served as a bomber, fighter, night fighter, high-altitude fighter, and photo-reconnaissance plane, and it was even used to fly a wartime airline connection over enemy territory between Britain and Sweden.

British de Havilland Mosquito
By courtesy of the RAF Museum, London

Mosquito Coast, also spelled MISKITO, Spanish COSTA DE MOSQUITOS, coastal region of Nicaragua and Honduras. It comprises a band approximately 40 miles (65 km) wide of lowland that skirts the Caribbean Sea for about 225 miles (360 km). Although it was visited by Columbus in 1502, Europeans had little contact with the area until the rise of the buccaneers in the 17th century, after which the English established a protectorate over the Miskito Indians, for whom the region is named. Spain, Nicaragua, and the United States disputed this claim until the matter was finally settled by the occupation of the Mosquito Coast by the Nicaraguan government and by the Clayton-Bulwer Treaty of 1850 between the United States and Great Britain.

The Mosquito Coast's principal city is Blue-fields; other centres, also in Nicaragua, are Puerto Cabezas and San Juan del Norte. A majority of the population is Miskito Indian.

mosquito fish (species *Gambusia affinis*), live-bearing topminnow of the family Poeciliidae (*see* live-bearer), native to freshwaters of the southeastern United States but widely introduced in other parts of the world for mosquito control. The hardy mosquito fish, which has a prodigious appetite for mosquito larvae, is usually light grayish but may be spotted or blotched with black. The female reaches a length of about 6.4 cm (2.5 inches), the male about 4 cm (1.5 inches).

Mosquito fish (*Gambusia affinis*)
Gene Wolfsheimer

Moss, town, port, and seat of Østfold *fylke* (county), southeastern Norway, on the eastern shore of Oslo Fjord. Founded in the 16th century, Moss was the site of the signing of the Convention of Moss, which united Norway and Sweden, in 1814. The town has paper and cotton mills, metalworks, shipyards, textile factories, breweries, and facilities for glass, asphalt, and tar production. The harbour is protected by adjacent Jel Island, called the "Pearl of Oslo Fjord" for its fine resort area and many large estates. The Moss River drains into the largest lake in the *fylke*, Vann Lake, and then flows through the town and into Oslo Fjord. Pop. (1991 est.) mun., 24,687.

moss (class Bryopsida, or Musci), any of at least 10,000 species of small, spore-bearing land plants (division Bryophyta) distributed throughout the world except in salt water. Valvate mosses constitute the subclass Andreaeidae, and peat mosses compose the subclass Sphagnidae. The large subclass Bryidae constitutes most species of mosses, but the subclass Polytrichidae also has some important members. Other, smaller subclasses are represented by only a few species. (*See* bryophyte.)

Mosses are commonly found in moist, shady locations and are best known for those species that carpet woodland and forest floors. Mosses may range in size from microscopic forms to plants more than 1 m (40 inches) long. They differ primarily in the structure and specialization of their sporangia (spore cases). The stemlike and leaflike structures of moss plants constitute the gametophytic (sexual) generation. The sporophytic (asexual) generation develops from the gametophyte and usually consists of a raised stalk, or seta, which terminates in the sporangium. The sporangium remains dependent on the gametophyte, to varying degrees, for water and nutrients. Mosses reproduce by branching and fragmentation, by regeneration from tiny pieces of leaves or stems, and by the production of spores. The spore, under favourable conditions, germinates and grows into a branching, green thread (protonema). Ultimately, the gametophyte grows from an apical cell of the protonema.

Mosses break down exposed substrata, releasing nutrients for the use of more complex plants that succeed them. They aid in soil-erosion control by providing surface cover and absorbing water, and they are important in the nutrient and water economy of some vegetation types. Economically important species are those in the genus *Sphagnum* that form peat.

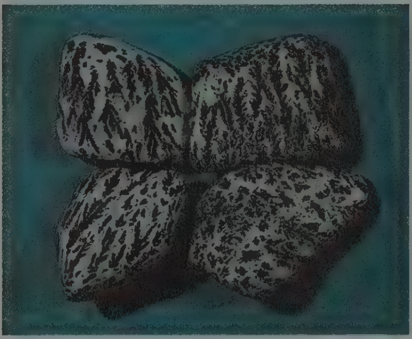
Many small plants bearing the name moss are in fact not mosses. The "moss" found on the north side of trees is the green alga *Pleurococcus;* Irish moss is a red alga. Beard lichen (beard moss), Iceland moss, oak moss, and reindeer moss are lichens. Spanish moss is a common name for both a lichen and an air plant of the pineapple family (Bromeliaceae). Club moss is an evergreen herb of the family Lycopodiaceae.

Mosses existed as early as the Permian period (286 to 245 million years ago), and more than 100 species were present during the Tertiary period (66.4 to 1.6 million years ago). *Muscites, Protosphagnum, Palaeohypnum,* and other fossil mosses are similar in structure to modern genera.

Moss, Howard (b. Jan. 22, 1922, New York, N.Y., U.S.—d. Sept. 16, 1987, New York), American poet and editor who was the poetry editor of *The New Yorker* magazine for almost 40 years.

Moss graduated from the University of Wisconsin in 1943 and published the first of 12 volumes of poetry, *The Wound and the Weather,* in 1946. He joined the staff of *The New Yorker* in 1948, and throughout his tenure there he showcased the works and helped establish the careers of such poets as Sylvia Plath, Richard Wilbur, and Elizabeth Bishop. His own poetry exhibited a technical virtuosity and a lucid, compressed style that focused on the "mysteries of the commonplace." Moss also published volumes of criticism and was an accomplished playwright. His plays include *The Folding Green* (1958), *The Oedipus Mah-Jongg Scandal* (1968), and *The Palace at 4 A.M.* (1972).

moss agate, also called MOCHA STONE, grayish to milky-white agate (*q.v.*), a variety of the silica mineral quartz that contains opaque, dark-coloured inclusions whose branching forms resemble ferns, moss, or other vegetation. The included materials, mainly manganese and iron oxides, are of inorganic origin. Most moss agates are found as fragments weathered from volcanic rocks. Long used for ornamental purposes, they are obtained chiefly from India, Brazil, Uruguay, central Europe, and the western United States. The best stones are cut in flat or rounded form, and some are dyed to improve their colour. Its properties are those of quartz (*see* silica mineral [table]).


Polished nodules of moss agate
B.M. Shaub

moss animal, also called BRYOZOAN (phylum Bryozoa, Polyzoa, or Ectoprocta), an aquatic invertebrate whose individual members (called zooids) form colonies of varying size and shape.

A brief treatment of moss animals follows. For full treatment, *see* MACROPAEDIA: Moss Animals.

Bryozoa is a very diverse group. The small genus *Monobryozoon* lives between sand particles in the ocean and is less than one millimetre in length, while the warm-water *Zoobotryon* colony hangs from harbour pilings in clumps or chains that can be as much as a foot and a half across. Moss animals are inevitably found as growths or crusts on other objects, such as overhanging rocks by the shore, plants, or the hulls of ships. They are separated into three classes: Phylactolaemata (freshwater-dwelling), Stenolaemata (marine), and Gymnolaemata (mostly marine), which includes the order Cheilostomata, the most successful of all bryozoan groups.

The texture of different moss animal colonies can be soft and gelatinous (as is the case in many marine varieties), tufted with leaflike fronds, or covered with slender branches formed by lime deposits in the zooid walls. Other colonies form hard, calcified skeletons, like the lace corals *Retepora* or *Sertella,* which create slender branchlike twigs.

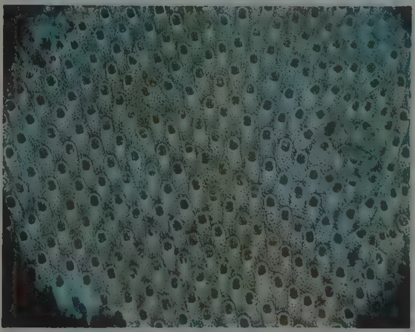
Colonies are made up of individual zooids, each of which is a complete and fully organized animal. Zooids are connected by the matrix of the colony and may communicate by tiny pores in their body walls. Most zooids have ciliated tentacles (tentacles with mobile, hairlike projections) that propel food particles toward the simple mouth of the animal. Their guts are sectioned and fold upward to end in an anus just outside the tentacle-lined mouth. These tentacles, the digestive tract, and the nervous system and muscles that control them, form the polypide of the zooid.

A colony is formed from a single zooid that buds—that is, asexually duplicates itself—forming a colony of a definite shape and growth pattern. This zooid originates from a resting bud (statoblast) or from an ancestrula, which originated from the metamorphosis of a sexually produced larva.

In Gymnolaemata and Phylactolaemata the zooids are generally hermaphroditic, with clusters of male and female reproductive organs either near the polypide or lining the body wall. Stenolaemates are more specialized, however, with most zooids male and only a few females per colony. The female zooids develop spacious brood chambers; a developing embryo may squeeze off secondary embryos and continue repeating the process, so that many larvae develop in a single chamber.

Freshwater moss animals live primarily on leaves, stems, and tree roots in shallow water. Marine moss animals have a wide range of habitats, from coastal areas to great ocean depths, but they are most common just below the tidemarks. While the presence of currents and flowing water is important, since it brings food within reach of the colony, vigorous wave action militates against bryozoan growth, and shallow, sheltered channels are preferred. Sea slugs and sea spiders seem to be their chief predators.

Moss animals have no respiratory, excretory, or circulatory system. The major role of the tentacles is to capture plankton, and they are arranged in a manner similar to a funnel with


Moss animal (*Membranipora*)
Grant Heilman

the mouth at its vertex. If disturbed, a feeding zooid will pull in its tentacles with the aid of powerful retractor muscles. To extend them, the zooid pulls in its body wall, forcing fluid and the tentacles back into the water.

Since most zooidal walls are calcareous, moss animals have left a long fossil record. The earliest fossils were stenolaemates found in rocks dating from the Lower Ordovician Period (430,000,000 to 500,000,000 years ago). A majority of limestone formations, especially those alternating with strata of shale, preserve moss animal fossils. Bryozoans apparently evolved rapidly, in several cases producing orders that flourished for millions of years only to become extinct.

Mossad, Mossad also spelled MOSAD, in full MOSSAD MERKAZI LE-MODIIN U-LETAFKIDIM MEYUHADIM (Hebrew: "Central Institute for Intelligence and Security"), one of the five major intelligence organizations of Israel, being concerned with espionage, intelligence gathering, and covert political operations in foreign countries.

Mossad is the most important Israeli intelligence agency, and its head reports directly to Israel's prime minister. The Mossad maintains numerous Israeli secret agents in Arab and other nations, and its operatives are believed to have carried out undercover operations against enemies of Israel and former Nazi war criminals living abroad. In 1960, for instance, Mossad agents kidnapped the former Nazi Adolf Eichmann from Argentina and brought him to Israel to stand trial for war crimes. Mossad agents are thought to have tracked down and assassinated the Arab guerrilla leaders responsible for the massacre of Israeli athletes at the 1972 Munich Olympic Games. In 1976 Mossad agents rescued the hostages of a skyjacked Israeli airliner that was being held at Entebbe, Uganda. Mossad has also been linked with several assassinations of Palestinian leaders in Europe, the Middle East, and North Africa.

Isser Harel, who founded the Mossad in 1951 and served as its director until 1963, is credited with building the Mossad into a professional organization.

Mossadegh, Mohammad (Iranian politician): *see* Mosaddeq, Mohammad.

Mossamedes (city, Angola): *see* Namibe.

Mössbauer, Rudolf Ludwig (b. Jan. 31, 1929, Munich), German physicist and winner, with Robert Hofstadter of the United States, of the Nobel Prize for Physics in 1961 for his discovery of the Mössbauer effect (*q.v.*). This effect has found applications in verifying Albert Einstein's theory of relativity and is also used for the measurement of the magnetic field of atomic nuclei and the study of other properties of solid materials.

Mössbauer discovered the effect in 1957, one year before he received his doctorate from the Technical Academy of Munich. He became professor of physics at the California Institute of Technology, Pasadena, in 1961. Three years later he returned to Munich to become professor of physics at the Technical Academy.

Mössbauer effect, also called RECOIL-FREE GAMMA-RAY RESONANCE ABSORPTION, nuclear process permitting the resonance absorption of gamma rays. It is made possible by fixing atomic nuclei in the lattice of solids so that energy is not lost in recoil during the emission and absorption of radiation. The process, discovered by the German-born physicist Rudolf L. Mössbauer in 1957, constitutes a useful tool for studying diverse scientific phenomena.

In order to understand the basis of the Mössbauer effect, it is necessary to understand several fundamental principles. The first of these is the Doppler shift. When a locomotive whistles, the frequency, or pitch, of the sound waves is increased while the whistle is approaching a listener and decreased as the whistle recedes. The Doppler formula expresses this change, or shift in frequency, of the waves as a linear function of the velocity of the locomotive. Similarly, when the nucleus of an atom radiates electromagnetic energy in the form of a wave packet known as a gamma-ray photon it is also subject to the Doppler shift. The frequency change, which is perceived as an energy change, depends on how fast the nucleus is moving with respect to the observer.

The second concept, that of nuclear recoil, may be illustrated by the behaviour of a rifle. If it is held loosely during firing, its recoil, or "kick," will be violent. If it is firmly held against the marksman's shoulder, the recoil will be greatly reduced. The difference in the two situations results from the fact that momentum (the product of mass and velocity) is conserved: the momentum of the system that fires a projectile must be opposite and equal to that of the projectile. By supporting the rifle firmly, the marksman includes his body, with its much greater mass, as part of the firing system and the backward velocity of the system is correspondingly reduced. An atomic nucleus is subject to the same law. When radiation is emitted in the form of a gamma ray, the atom with its nucleus experiences a recoil due to the momentum of the gamma ray. A similar recoil occurs during absorption of radiation by a nucleus.

Finally, it is necessary to understand the principles governing the absorption of gamma rays by nuclei. Nuclei can exist only in certain definite energy states. For a gamma ray to be absorbed its energy must be exactly equal to the difference between two of these states. Such an absorption is called resonance absorption. A gamma ray that is ejected from a nucleus in a free atom cannot be resonantly absorbed by a similar nucleus in another atom because its energy is less than the resonance energy by an amount equal to the kinetic energy given to the recoiling source nucleus.

Principles of application. By embedding the same kind of nuclei in two solids, those in one solid being in a radiating or excited state and those in the other being in an absorbing or ground state, it is possible to use gamma radiation from the first solid for resonant absorption in the second. The method is so sensitive that if one solid moves relative to the other with a velocity as small as a 10th of a centimetre per second the resonance is destroyed by the Doppler shift in the gamma-ray energy. In this fact lies the usefulness of the Mössbauer effect as a tool of experimental physics. If an energy state of the radiating or absorbing nucleus is disturbed by any external effect, resonance absorption will also be nullified. Then, by varying the relative velocity of the radiating and absorbing solids until resonant absorption is reestablished, the precise magnitude of the disturbing effect can be determined.

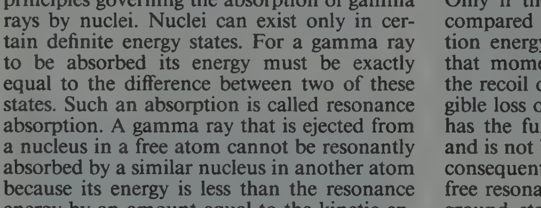


Figure 1: *Spectrometer utilizing Mössbauer effect concept*
Effect is usually observed by measuring transmission of gamma rays from radioactive source through absorber containing resonant isotope

Apparatus. The Mössbauer effect is usually observed by measuring the transmission of gamma rays from a radioactive source through an absorber containing the same isotope in the ground state. The device used for this experiment is termed a Mössbauer effect Doppler-velocity spectrometer because it utilizes the Doppler shift to scan a region of energy in the vicinity of the energy of the gamma ray itself. A spectrometer utilizing this concept is shown schematically in Figure 1. A radioactive source is mounted on an electromechanical transducer that moves with a well-defined velocity. Generally, velocities of a few centimetres per second are required. The energy of the emitted gamma rays is shifted, owing to the Doppler effect, by an amount proportional to the velocity. In this example, nuclei of the radioactive source and the resonant absorber are identical, not having been perturbed by an outside field. The gamma rays pass through an absorber containing the resonant isotope and are detected by a proportional counter. The gamma rays detected per second are plotted as a function of the Doppler velocity, resulting in a Mössbauer effect absorption spectrum like that shown in Figure 2. The drop in counting rate in the centre is due to resonant absorption—*i.e.,* the Mössbauer effect. At high positive or negative velocity, the resonant absorption has been destroyed by the Doppler shift.

Isotope suitability. The Mössbauer effect has been observed in more than 35 isotopes. Suitable isotopes must have a stable or long-lived ground state and a low-lying excited state that decays to an appreciable extent by gamma-ray emission. The condition on the energy of the excited state arises from the need to achieve recoil-free gamma-ray emissions. Only if the free-atom recoil energy is small compared to the characteristic lattice vibration energy will there be a finite probability that momentum conservation is satisfied by the recoil of the crystal as a whole with negligible loss of energy. The resulting gamma ray has the full energy of the nuclear transition and is not broadened by thermal vibrations. It consequently has the exact energy for recoil-free resonant reabsorption by a nucleus in its ground state. The condition on the magnitude of the free-atom recoil energy generally restricts the Mössbauer effect to gamma rays with energy less than 150 KeV. The natural width of a resonance or nuclear level, Γ, is related to its lifetime, τ, by $\Gamma\tau = h/2\pi$, in which h is Planck's constant. The lifetime of the excited state must be greater than 10^{-11} second; otherwise the resonance level would be so broad that the distinction between ordinary and recoil-free emission is lost. The longest useful lifetime is about 10^{-5} sec because the corresponding width is comparable to that due to other mechanisms.

Applications. Mössbauer's discovery has had far-reaching consequences because it has made available electromagnetic radiation (gamma rays) whose frequency is more precisely defined than any other known to date and has provided a new technique for measuring the interaction of nuclei with their environment. Energy resolution better than one part in 10^{12} has been achieved with recoil-free gamma rays.

The Mössbauer effect has found application

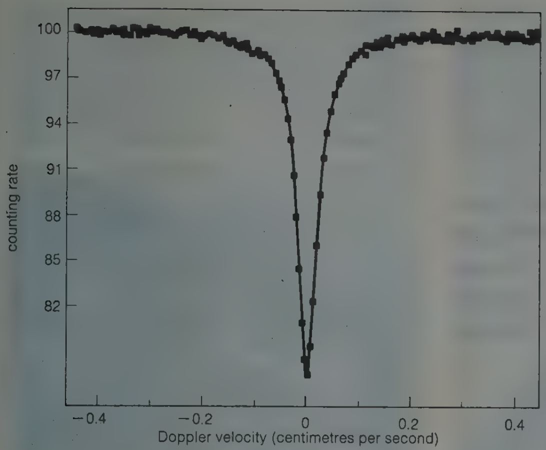


Figure 2: Plot of intensity of gamma ray flux passing through absorber as function of Doppler velocity applied to source; dip in centre is caused by nuclear resonant absorption (see text)

in many areas of science. In relativity studies the high precision with which the energy of the gamma ray can be measured has made possible a direct demonstration of the gravitational red-shift; *i.e.,* the change in the energy of a quantum of electromagnetic radiation as it moves through a gravitational field. This was accomplished by measuring the Doppler shift required to compensate for the change in the energy of the gamma ray resulting from a change in vertical position of 2,260 centimetres through the Earth's gravitational field. The measured change amounted to 2.5 parts in 10^{15} (a Doppler velocity of 2.7 millimetres per hour) and was in close agreement with theoretical predictions. That is, it was found that a photon of energy E behaves as though it had a mass of E/c^2, in which c is the velocity of light. In a related experiment it was found that the energy of the recoil-free gamma ray decreases with increasing source temperature. This thermal red-shift can be interpreted in a number of ways. It may be viewed as a second-order relativistic Doppler effect resulting from the mean square velocity of the atoms in the solid; *i.e.,* the thermal motion. On the other hand, it can be viewed as a direct demonstration of the relativistic time dilation; *i.e.,* the slowing down of the clock in a moving coordinate system, here the atom, when viewed by a stationary observer. It has been argued that the Mössbauer effect thermal red-shift provides direct experimental resolution of the famous twin paradox of relativity by showing that a space traveller will be younger upon return to Earth than his stay-at-home twin.

Applications in nuclear physics are manifold. The Mössbauer effect makes possible the direct measurement of a gamma-ray line width, which corresponds to the width of the decaying nuclear level. Results are in close agreement with the measured decay time, indicating that the width of recoil-free gamma rays in fact is determined entirely by the lifetime of the decaying state. The isomer shift, the change in the energy of a nuclear gamma ray due to the electrostatic interaction between nuclear and electronic charge, provides a measurement of the change in the nuclear-charge radius when the nucleus is raised to an excited state. The splitting of nuclear levels into hyperfine components by electric field gradients in crystals of low symmetry or by magnetic fields in ferromagnets makes possible the measurement of nuclear electric quadrupole and magnetic dipole moments. Both isomer shifts and hyperfine structure splittings are readily resolved in Mössbauer spectra. The energy width of a Mössbauer resonance provides a direct measurement of the width of the excited state involved in the gamma-ray emission and absorption process. From the width, the lifetime of the excited state can be directly obtained.

Applications in solid-state physics fall broadly into the categories of lattice dynamics and hyperfine interactions, although contributions have been made in other areas. The probability that a gamma-ray emission process will be recoil free depends on the amplitude of the thermal vibrations compared to the wavelength of the gamma ray. A measurement of the fraction of emission events that are recoil free as determined by their ability to be resonantly absorbed provides the mean square amplitude of the thermal motion in the solid. Using single crystals, the amplitude of the motion can be measured in specific crystallographic directions, providing a stringent test of lattice dynamical models. The thermal red-shift mentioned above gives in addition the mean square thermal velocity.

Magnetic hyperfine interactions have been particularly useful in the study of magnetically ordered materials; *i.e.,* ferromagnets, ferrimagnets, and antiferromagnets. The hyperfine interaction gives an indirect measure of the magnetization of the lattice of magnetic ions and has been used to elucidate the details of magnetic interactions as well as their temperature dependence.

Applications in chemistry are based largely on the isomer shift and quadrupole splitting. The former measures the s-electron charge density at the nucleus and gives information on the character of chemical bonds; *e.g.,* valence and covalence. The latter is sensitive both to the symmetry of the structural environment and to the wave function of the outer electrons of the atom containing the Mössbauer nucleus. The technique has been applied to the study of metal-organic compounds of tin and iron, including hemoproteins; to inorganic compounds of iron, tin, iodine, and the rare earths; as well as to clathrates, catalysts, and glasses containing dilute Mössbauer isotopes.

mossbunker (fish): *see* menhaden.

Mossi, also spelled Mosi, people of Burkina Faso (formerly Upper Volta) and other parts of West Africa. Their language, More, belongs to the Gur branch and is akin to that spoken by the Mamprusi and Dagomba of northern Ghana, from whom the Mossi ruling class trace their origin.

The Mossi are sedentary farmers, growing millet and sorghum as staples. Some artisans, such as smiths and leatherworkers, belong to despised castes.

Mossi society, which is organized on the basis of a feudal kingdom, is divided into royalty, nobles, commoners and, formerly, slaves. Each village is governed by a chief who, in turn, is subordinate to a divisional chief. At the top of the hierarchy is the paramount ruler, the *morho naba* ("big lord"), whose seat is located at Ouagadougou. Divisional chiefs serve as advisers to the *morho naba* and theoretically choose his successor. Usually, however, the paramount chief's eldest son succeeds.

Prior to its modernization during the latter part of French rule and since independence (1960) the Mossi kingdom provided an example of a typical African realm. The king's elaborate court, in addition to nobles and high officials, contained numerous bodyguards, page boys, and eunuchs; his wives lived in special villages, all of whose male inhabitants were eunuchs.

The Morho Naba, or paramount chieftain, of the Mossi tribe, attended by a servant

Marc and Evelyne Bernheim—Woodfin Camp and Associates

Most Mossi participate in ancestor worship and nature worship. Islām and Christianity are minority religions.

Mossi states, complex of independent West African kingdoms (fl. *c.* 1500–1895) around the headwaters of the Volta River (within the modern republics of Burkina Faso [Upper Volta] and Ghana) including in the south Mamprusi, Dagomba, and Nanumba, and in the north Tenkodogo, Wagadugu (Ouagadougou), Yatenga, and Fada-n-Gurma (Fada Ngourma).

Though Mossi traditions held that ancestors came from the east—perhaps in the 13th century—the origins of the kingdoms are obscure. The Mossi, unlike their forest neighbours, relied on long-ranging light cavalry with which they harassed the empire of Mali to the north and that of Songhai, with which they vied for control of the Middle Niger. From about 1400 they acted as trading intermediaries between the forest states and the cities of the Niger. Confined by Songhai after 1600 to a more southerly region, they nevertheless remained independent until the French invasions of the late 19th century. *See also* Mali empire; Songhai empire.

Mossoró, city, northwestern Rio Grande do Norte state, northeastern Brazil, on the Rio Apodi, 30 mi (48 km) from its mouth on the Atlantic coast, at 66 ft (20 m) above sea level. Formerly known as Santa Luiza de Mossoró, it was given city status in 1870 and is now the state's second largest community. Salt from evaporated seawater and clay are the most important products of the region, but cotton is also widely cultivated. Textiles, carnauba wax, and oil of oiticica are produced in Mossoró, which is accessible by railroad from Sousa (Paraíba state) and by highway from Natal, the state capital (200 miles [320 km] east-southeast), and other communities in Rio Grande do Norte and Ceará states. Pop. (1991 prelim.) mun., 191,959.

mossy cup oak: *see* bur oak.

Most, German BRÜX, city, Severočeský *kraj* (region), Czech Republic. It lies along the Bílina River, southwest of Ústí nad Labem. It was mentioned in early 11th-century German documents as Brüx, which means "bridge," as does its Czech name. This probably refers to an ancient structure spanning marshy ground near the old town.

Most is the heart of the northern Bohemian coalfield and the headquarters of the state lignite-mining authority. In the 1960s, in connection with expansion of the coalfield, the town was entirely relocated; the project included the spectacular removal of the medieval Gothic Church of St. Mary to the new site. The production of steel, chemicals, and ceramics is also important in Most, and a petrochemical plant at nearby Záluží processes crude oil. Pop. (1991 prelim.) 70,675.

most-favoured-nation treatment, guarantee of trading opportunity equal to that accorded to the most-favoured nation; it is essentially a method of establishing equality of trading opportunity among states by making originally bilateral agreements multilateral. As a principle of public international law, it establishes the sovereign equality of states with respect to trading policy; as an instrument of economic policy it provides a treaty basis for competitive international transactions.

Attempts to guarantee such equality of trading opportunity were incorporated into the provisions of commercial treaties and agreements as early as the beginning of the 17th century. The Anglo-French treaty negotiated in 1860 by Richard Cobden and Michel Chevalier became the model for many later agreements. They established a set of interlocking tariff concessions that were extended by most-favoured-nation treatment worldwide.

Such treatment has always applied primarily to the duties charged on imports, but specific provisions have extended the most-favoured-nation principle to other areas of international economic contact—for example, the establishment of enterprises of one country's nationals in the territory of the other; navigation in territorial waters; real and personal property rights; intangible property rights such as patents, industrial designs, trademarks, copyrights, and literary property; government purchases; foreign-exchange allocations; and taxation.

There are two forms of most-favoured-nation treatment: conditional and unconditional. The conditional form grants gratuitously to the contracting party only those concessions originally made gratuitously to a third party and grants concessions originally obtained as part of a bargain only under equivalent conditions or in return for equivalent gains. Under the unconditional form, any tariff concession granted to a third party is granted to the contracting party, a principle that was included in the 1948 General Agreement on Tariffs and Trade (GATT).

Application of most-favoured-nation treatment was limited in the past by the practice of granting concessions to the principal supplier country in an effort to obtain reciprocal concessions or by reclassifying and minutely defining items in the customs tariff so that a duty concession, while general in form, applies in practice only to one country.

International concern with most-favoured-nation treatment decreased as new devices of trade regulation (import quotas, exchange control, and state trading) became greater obstacles to trade than tariffs. The discretionary and often arbitrary nature of such regulations rendered any specific guarantee of equal trading opportunity impossible. Most-favoured-nation treatment came under concerted attack with the rise of the European Economic Community, which reduced duties among its members only.

Mostaert, Jan (b. *c.* 1475, Haarlem, Neth.—d. 1555/56), Dutch painter of portraits and religious subjects.

Little is known about Mostaert's life. According to one account, he spent 18 years in Brussels and Mechelen as court painter to Margaret of Austria, regent of the Netherlands, but other evidence suggests that he worked chiefly in Haarlem. His best-known work is a "Deposition" triptych in the Royal Museums of Fine Arts, Brussels. Other works include "The Adoration of the Kings" (Rijksmuseum, Amsterdam) and a "Tree of Jesse" and a west Indian landscape (both in private collections). Although he was a contemporary of the Flemish artists Quentin Massys and Joachim de Patinir, Mostaert's style was essentially conservative, exhibiting the careful detail, smooth finish, and crystalline brightness of an older generation of Dutch painters.

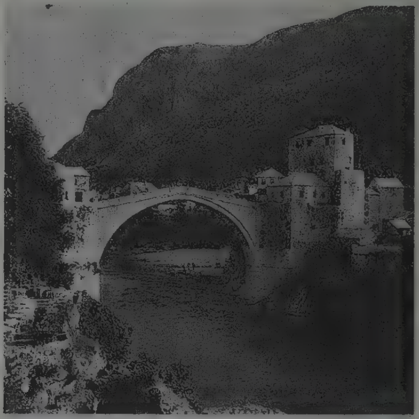
"Portrait of a Man," painting by Jan Mostaert; in the Royal Museums of Fine Arts, Brussels

By courtesy of the Musees Royaux des Beaux-Arts, Brussels

Mostaganem, also called (after 1981) MESTGHANEM, town and Mediterranean port, northern Algeria, on the Gulf of Arzew. Known as Murustuge in the 11th century, it contains Bordj el-Mehal (the old citadel), attributed to the 11th-century Almoravid emir Yūsuf ibn Tāshufīn. Captured in 1516 by the sea rover Khayr ad-Dīn (Barbarossa), the town passed to his brother, enjoyed great commercial prosperity, and then declined. It was garrisoned by the French in 1833.

The town is divided by the ravine of the Wadi Aïn Sefra, with the modern quarter on the left bank and the compact Muslim sector of Tidgit on the right. The port area and bathing beaches at La Salamandre and Les Sablettes are to the southwest. Industries include sugar refining and paper-pulp processing. Wine, fruit, vegetables, and diatomite are exported. The surrounding region is noted for its cereals (wheat, barley), citrus fruits, grapes, and cotton. Pop. (1987 prelim.) 114,534.

Mostar, town, Bosnia and Herzegovina. Mostar is the chief city and, historically, the capital of Herzegovina. It is situated in mountainous country along the Neretva River and lies on the Sarajevo-Ploče rail line. First mentioned in 1452, Mostar became a Turkish garrison town in the 16th century. In 1566 the Turks replaced the town's wooden suspension bridge over the Neretva with a stone arch one, whence the name Mostar (Serbo-Croatian: Stari Most, "Old Bridge"). This stone bridge had a single arch 90 feet (27 m) wide and was a masterpiece of Ottoman engineering. In November 1993, during the Bosnian civil war, the bridge was destroyed by artillery fire from Bosnian Croat forces. The town served as a centre for crafts and trade, and its reconstructed coppersmith's bazaar is a tourist attraction. While under Austrian rule (1878–1918), Mostar became a centre for Serbian scholars and poets and for a strong nationalistic movement.



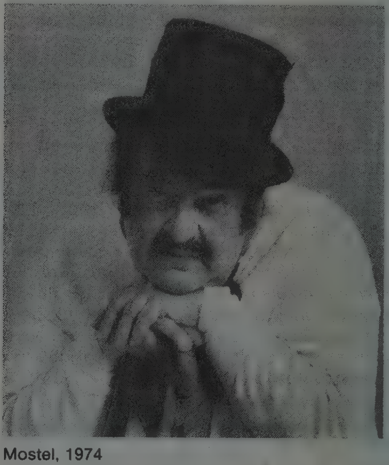
Stone arch bridge across the Neretva River at Mostar, Bosnia and Herzegovina, destroyed in 1993

Art Resource

The region is noted for its quality wines (žilovka and blatina), tobacco, fruit, and vegetables. Počitelj, just south of Mostar, is famous for its Muslim architecture with a mosque, madrasah (school), and Turkish houses. An aluminum works, completed in 1976, processes locally mined bauxite, utilizing power from a nearby hydroelectric plant. Mostar University was founded in 1977. Pop. (1991 prelim.) 126,067.

Mostel, Zero, byname of SAMUEL JOEL MOSTEL (b. Feb. 28, 1915, New York, N.Y., U.S.—d. Sept. 8, 1977, Philadelphia, Pa.), American actor, singer, and artist best known for his comedic acting.

Mostel studied and taught art in the 1930s while pursuing the career of a serious painter.



Mostel, 1974

NYT Pictures/Don Hogan Charles

He began entertaining at parties to earn money to buy paints and made his nightclub debut in 1942. This was followed by other nightclub appearances, radio work, and his first film role. After World War II he became a dramatic film actor.

Mostel's career was suspended, however, after a 1955 appearance before the House Un-American Activities Committee. In 1958 he began to work in the legitimate theatre in New York City, earning acclaim for his performance as Leopold Bloom in *Ulysses in Nighttown,* and in 1961 he gave an award-winning performance in *Rhinoceros* by Eugene Ionesco. This was followed in 1962 by the lead role in the musical *A Funny Thing Happened on the Way to the Forum* and in 1964 by the lead in another musical, *Fiddler on the Roof.* These successes brought him once more into motion-picture work, first with a reprise of *A Funny Thing* (1966) and then in the Mel Brooks comedy *The Producers* (1968). He also played a major role in *The Front* (1976), a serious film about the blacklisting era in Hollywood. Mostel continued to paint throughout his career.

Mostique (people): *see* Miskito.

Mosul, Arabic AL-MAWṢIL, city, northwestern Iraq. It lies on the right bank of the Tigris River across from the ruins of the ancient Assyrian city of Nineveh, 225 miles (362 km) northwest of Baghdad. Mosul is Iraq's third largest city and constitutes the chief commercial centre of the northwestern portion of the country.

Probably built on the site of an earlier Asyrian fortress, Mosul succeeded Nineveh as the Tigris bridgehead of the road that linked Syria and Anatolia with Persia. By the 8th century AD it had become the principal city of northern Mesopotamia. In succeeding centuries a number of independent dynasties ruled the city, which reached its political zenith under the Zangid dynasty (AD 1127–1222) and under Sultan Badr ad-Din Lu'lu' (reigned 1222–59). Famous schools of metalwork and miniature painting arose in Mosul at this time, but the region's prosperity ended in 1258 when it was ravaged by the Mongols under Hülegü. The Ottoman Turks ruled the region from 1534 to 1918, during which time Mosul became a trade centre of the Ottoman Empire and the headquarters of a political subdivision. After World War I the Mosul area was occupied by Britain until a border settlement (*c.* 1926) placed it in Iraq rather than in Turkey. The city's commercial importance thereafter declined because it was cut off from the rest of the former Ottoman Empire.

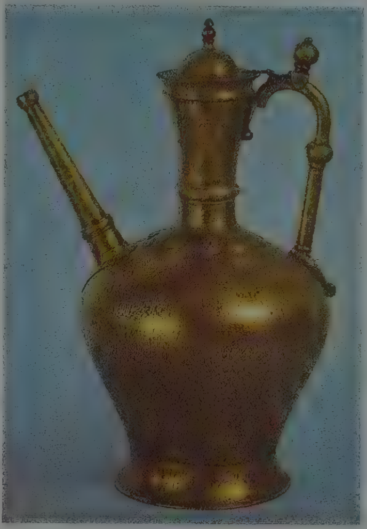
Great Mosque (Jāmiʿ al-Kabīr), with leaning minaret in background, Mosul, Iraq

Art Resource

Mosul has since grown more prosperous with increased trade and the development of important oil fields nearby to the east and north. There is a refinery in the city. Mosul was once famous for its fine cotton goods; it is now a centre of cement, textile, sugar, and other industries and a marketplace for agricultural products. The city has road and rail connections with Baghdad and other Iraqi cities and with nearby Syria and Turkey, and it has an airport. The population consists mainly of Kurds, along with a large minority of Christian Arabs.

Mosul contains many ancient buildings, some dating from the 13th century. These include the Great Mosque, with its leaning minaret, the Red Mosque, the mosque of Nabi Jarjis, several Christian churches, and various Muslim shrines and mausoleums. Since World War II the city has been enlarged several times in area by new construction. The buildings of the University of Mosul (1967) and a modern five-span bridge stretching across the Tigris to the new suburb of Nineveh are among the city's modern structures. Pop. (1985 est.) 570,926.

Mosul school, in metalwork, a group of 13th-century metal craftsmen who were centred in Mosul, Iraq, and who for centuries to come influenced the metalwork of the Islāmic world from North Africa to eastern Iran. Under the active patronage of the Zangid dynasty, the Mosul school developed an extraordinarily refined technique of inlay—particularly in silver—that far overshadowed the earlier work of the Sāmānids in Iran and of the Būyids in Iraq.



Mosul brass ewer, 1223; in the Cleveland Museum of Art

By courtesy of the Cleveland Museum of Art; purchase, John L. Severance Fund

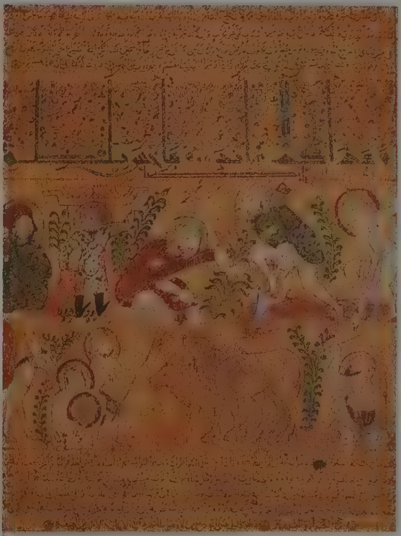
Mosul craftsmen used both gold and silver for inlay on bronze and brass. After delicate engraving had prepared the surface of the piece, strips of gold and silver were worked so carefully that not the slightest irregularity appeared in the whole of the elaborate design. The technique was carried by Mosul metalworkers to Aleppo, Damascus, Baghdad, Cairo, and Iran; a class of similar metalwork from these centres is called Mosul bronzes.

Among the most famous surviving Mosul pieces is a brass ewer inlaid with silver (1232; British Museum) made by Shujāʿ ibn Mana. The ewer features representational as well as abstract design, depicting battle scenes, animals, and musicians within medallions. Mosul metalworkers also created pieces for eastern Christians. A candlestick of this variety (1238; Museum of Decorative Arts, Paris), attributed to Dā'ūd ibn Salamah of Mosul, is bronze with silver inlay. It displays the familiar medallions but is also engraved with scenes showing Christ as a child. Rows of standing figures, probably saints, decorate the base. The background is decorated with typically Islāmic vine scrolls and intricate arabesques, giving the piece a unique flavour.

Mosul school, in painting, a style of miniature painting that developed in northern Iraq in the late 12th to early 13th century under the patronage of the Zangid dynasty (1127–1222).

In technique and style the Mosul school was similar to the painting of the Seljuq Turks, who controlled Iran at that time, but the Mosul artists emphasized subject matter and degree of detail rather than the representation of three-dimensional space. Most of the Mosul iconography was Seljuq—for example, the use of figures seated cross-legged in a frontal position. Certain symbolic elements, such as the crescent and serpents, derived, however, from the classical Mesopotamian repertory.

Most Mosul paintings were illustrations of manuscripts—predominantly scientific works, animal books, and lyric poetry. A frontispiece painting (Bibliothèque Nationale, Paris) from a late 12th-century copy of Galen's medical treatise the *Kitāb al-diriyak* ("Book of Antidotes"), is a good example of the earlier work of the Mosul school. It depicts four figures surrounding a central, seated figure who holds a crescent-shaped halo. By the 13th century the Baghdad school, which combined the styles of the Syrian and early Mosul schools, had begun to surpass them in popularity. With the invasion of the Mongols in the mid-13th century, the Mosul school came to an end, but its achievements were influential in both the Mamlūk and the Mongol schools of miniature painting.



"Physician Andromachus Watching Labourers," Mosul miniature from the *Kitāb al-diriyak* ("Book of Antidotes"), 1199 (Bibliothèque Nationale, Paris, MS. arabe 2964, fol. 22)

By courtesy of the Bibliotheque Nationale, Paris

Moszkowski, Moritz (b. Aug. 23, 1854, Breslau, Prussia [now Wrocław, Poland]—d. March 4, 1925, Paris, France), German pianist and composer known for his Spanish dances.

Moszkowski studied piano at Dresden and Berlin, where he gave his first concert in 1873. In 1879 he settled in Paris. His two books of *Spanische Tänze,* Opus 12, were published in 1876 for piano duet and later in many different arrangements. They were long popular as examples of national music in a light style. Other attempts with national idioms were less successful. His opera *Boabdil der Maurenkönig* (1892; "Boabdil the Moor King") was known chiefly for its ballet. He also wrote concerti and chamber music.

Mot (from Hebrew *met,* "death"), ancient West Semitic god of the dead and of all the powers that opposed life and fertility; he was the favourite son of the god El, and the most prominent enemy of the god Baal. Mot was the god of sterility and the master of all barren places. Traditionally, Mot and Baal (a god of springs, sky, and fertility) were perpetually engaged in a seasonal struggle in which Baal, like many similar harvest deities, was annually vanquished and slain. Mot, however, was also annually killed by Baal's sister Anath, who thus aided Baal's resurrection.

Motacillidae (bird family): *see* pipit.

Motagua River, Spanish RÍO MOTAGUA, river in eastern Guatemala, rising in the central highlands near Chichicastenango, in southern Quiché department. The Motagua is Guatemala's longest river, measuring approximately 250 mi (400 km). Flowing generally eastward and northeastward through Chimaltenango, El Progreso, Zacapa, and Izabal departments, it empties into Omoa Bay off the Gulf of Honduras at the Honduran border. Near its source it is referred to locally as the Silbapec River and further downstream as the Río Grande. The Sierra de Chuacús, Sierra de las Minas, and Cerro de San Isidro rise from the left bank of the Motagua; the major tributaries, including the Chiquimula, flow from the south. Navigable by shallow-draft boats for approximately 125 mi (200 km) upstream from its mouth, the Motagua is a major transportation artery for the bananas, coffee, and other fruits raised in the valleys of the eastern portion. There is some placer gold mining along its course. The Puerto Barrios–Guatemala City railroad and Atlantic Highway follow the river valley upstream as far as El Progreso.

Motala, town, in Östergötland *län* (county), southern Sweden, situated on Vättern (lake), at the efflux of the Motala Ström (Motala Stream). The town, incorporated in 1881, is a centre of heavy industry and the site of a hydroelectric plant and a transmitting station, as well as being a summer resort, with open-air bathing at Varamon on Vättern. Motala is a station on the Göta Kanal and has good road and rail connections with the rest of Sweden. Pop. (1984 est.) mun., 41,432.

motel, also called MOTOR LODGE, MOTOR COURT, TOURIST COURT, or MOTOR INN, originally a hotel designed for persons travelling by automobile, with convenient parking space provided. Motels serve commercial and business travellers and persons attending conventions and meetings as well as vacationers and tourists. The automobile became the principal mode of travel by 1950 in the United States and by the 1960s in Europe and Japan; and motels were built as near as possible to interstate highways, just as hotels had been built as near as possible to railroad stations. Most motels provide an informal atmosphere compared to hotels; often the guest transports his own luggage to and from his room. Most but not all motels have restaurant facilities and many have swimming pools; most rooms contain a television set.

Motels originated as a series of separate or attached roadside cabins, independently operated; but when professional management took over, their size increased, and the chain concept became popular. Franchising operations, in which an individual is allowed to go into business for himself under the widely advertised name of a chain of motels, thus realizing the benefits of chain operations with relatively modest investment, has achieved remarkable growth for several chains.

Moten, Bennie (b. Nov. 13, 1894, Kansas City, Mo., U.S.—d. 1935), U.S. pianist, one of the earliest known organizers of bands in the Midwest in the emergent years of jazz.

Moten became a bandleader in and around his hometown in 1922 and remained so until his death. His recording debut was in 1923; and, although many of his recordings sound unremarkable, he is regarded as a figure of great importance in the development of the larger jazz orchestra, his achievement being verified when, after his death, the remnants of his group were taken up by his second pianist, Count Basie, and fashioned into a new, far more streamlined orchestra destined to become one of the outstanding orchestras in jazz history.

motet (French *mot:* "word"), style of vocal composition that has undergone numerous transformations through many centuries. Typically, it is a Latin religious choral composition, yet it can be a secular composition or a work for soloist(s) and instrumental accompaniment, in any language, with or without a choir.

The motet began in the early 13th century as an application of a new text (*i.e.,* "word") to older music. Specifically, the text was added to the wordless upper-voice parts of descant clausulae. These were short sections of organum, a 13th-century and earlier form consisting of a plainchant melody in the tenor, above which were added one, two, or three simultaneous melodies; in descant clausulae, as opposed to other organum, all the voice parts were set in short, repeated rhythmic patterns called rhythmic modes.

In forming motets from descant clausulae, two or even three parts were each given a text. Although the earliest motets were usually in Latin and intended for church use, there later arose bilingual motets (French–Latin, English–Latin) on secular and sacred texts or combinations of both. Particularly during the late 13th century, the motet was secular in its added texts, which were often all in French. Tenors were sometimes chosen from French popular songs, rather than from plainchant. Rhythmic patterns became freer and more varied, and the rhythmic modes fell into disuse. Instruments apparently played the lower voice parts as accompaniment to a singer's performance of the upper part, so that the motet became an accompanied solo song.

In the 14th century secular motets were largely serious in content (*e.g.,* on historical topics) and were used for ceremonial occasions. Both sacred and secular motets often used the technique of isorhythm: the repetition of an often complex rhythmic pattern throughout the composition. This pattern often overlapped but did not always coincide with the repetition of a melody.

By the second half of the 15th century, motets were normally sung in all voice parts. Nearly always all parts now shared the same text. The musical texture was largely contrapuntal (*i.e.,* consisting of interwoven melodies). Syllables and words were not always sung simultaneously in the different voice parts except in contrasting sections based on chords. The tenor melodies were largely chosen from plainchant, and sacred Latin texts predominated. The use of cantus firmus plainchant declined during the 16th century.

Motets were frequently written for a particular holy day and were sung at mass between the Credo and Sanctus or at Vespers in the divine office. Such motets were often based on plainchants associated with their texts. The music of the mass might also be founded on the same musical themes, giving the entire service a musical unity not approached in any later church music, even under J.S. Bach. Even when a motet was not founded on a plainchant fragment, it was possible for a composer to design a motet and a mass setting on the same themes. Titles of 16th-century masses often indicate either the motet or the plainchant on which they are founded. Thus, the *Missa nos autem gloriari* by the Roman composer Francesco Soriano was based on the motet *Nos autem gloriari* by Giovanni da Palestrina. When a motet was in two movements, or self-contained sections, the second movement usually ended with the last musical phrases and text of the first.

After about 1600 the term motet came to indicate any composition setting a serious nonliturgical but often sacred text. In the late 16th century, Venetian composers such as Giovanni Gabrieli wrote motets for multiple choirs and contrasting instruments. In the 17th and 18th centuries, the musical style varied from instrumentally accompanied motets for solo voice to the large choral motets of Bach, which may have been sung with instrumental accompaniment. In Lutheran Germany motets were based on the texts, and often the melodies, of chorales (German hymns). In England motets with English texts for use in Anglican services were called anthems (*q.v.*). They were either for chorus (full anthems) or for soloist(s) and chorus (verse anthems). Instrumental accompaniment was common in both types. After the end of the Baroque era in the mid-18th century, the motet became a less prominent form. Motets continued to be written; *e.g.,* by Mozart in the 18th century, Brahms in the 19th century, and in the 20th century by the German Hugo Distler and the French composer Francis Poulenc.

moth, any of several thousand species of usually nocturnal insects belonging to about 47 families in the order Lepidoptera, which also includes the butterflies and the skippers. Moths vary greatly in size, ranging in wing span from about 4 millimetres to nearly 300 millimetres (about 1 foot). Highly diversified, they live in all but polar habitats.

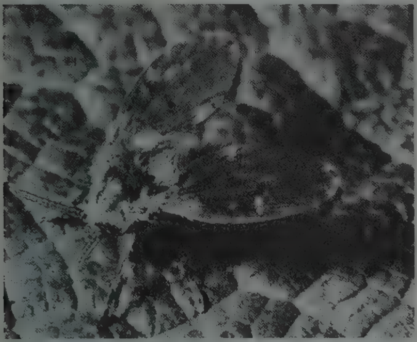
Like those of butterflies, the wings, bodies, and legs of moths are covered with dustlike scales that come off if the insect is handled. There are, however, several differences between butterflies and moths. Although some moth species are active during the day, moths generally tend to be nocturnal. Compared to butterflies, they have stouter bodies, duller colouring, and proportionately smaller wings. Moths also have distinctive feathery antennae, and, when at rest, they either fold their wings, wrap them around the body, or hold them extended at their sides.

Like those of other lepidopterans, the life cycle of the moth has four stages: egg, larva (caterpillar), pupa (chrysalis), and adult (imago). The larvae and adults of most moth species are plant eaters. Larvae, in particular, do considerable damage to ornamental trees and shrubs and to many plants of economic importance. The so-called bollworm and measuring worm (*qq.v.*) are two of the most destructive types of moth larvae. Some moth species (especially those of the family Tinidae, which includes the clothes moth) eat wool, fur, silk, and even feathers.

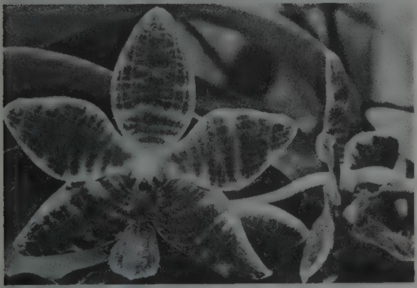
Some of the better known moth families include: Gelechiidae, called the gelechiid moths, known for their destructive bollworm larvae that attack cotton, corn, tomatoes, and other crops; Tortricidae, or leaf-roller moths, a forest pest; Arctiidae, called tiger moths, including many brightly coloured tropical species; Olethreutidae, the olethreutid moths, including several destructive species such as the codling moth and the Oriental fruit moth; Noctuidae, the owlet moths, largest family of Lepidoptera; and Geometridae, the geometrid moths (or measuring worm moths), including the waves, pugs, and carpet moths.

moth fly, any member of the family Psychodidae (order Diptera), commonly found around the openings of drain pipes. No more than 5 millimetres (0.2 inch) long, these flies, with broad hairy wings that are held rooflike over the body when at rest, resemble tiny moths.

The larvae, which feed on decaying matter, inhabit drain pipes regardless of the temperature of the entering water. Most species are harmless, but there are bloodsucking members, sometimes classified separately as the family Phlebotomidae, commonly called sand flies (*see* sand fly).


Moth fly
William E. Ferguson

moth orchid, any plant of the genus *Phalaenopsis,* family Orchidaceae, consisting of about 40 species native to southeastern Asia and part of Australia. A moth orchid has a short stem that bears several broad, leathery leaves.


Moth orchid (*Phalaenopsis violacea*)
Walter Chandoha

The flower spike arises from the base of the plant and has one to several long-lasting flowers. Some species are cultivated for the commercial flower trade and are crossed to produce hybrids with beautiful white, purple, and pink flowers.

moth owl, Australian bird, a species of owlet frogmouth (*q.v.*).

Mothe-Fénelon, François de Salignac de La: *see* Fénelon, François de Salignac de La Mothe-.

Mother Church, designation used by Christian Scientists for the original Boston church established by Mary Baker Eddy, also known as the First Church of Christ, Scientist (*q.v.*).

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mother goddess, any of a variety of feminine deities and maternal symbols of creativity, birth, fertility, sexual union, nurturing, and the cycle of growth. The term also has been applied to figures as diverse as the so-called Stone Age Venuses and the Virgin Mary. Because motherhood is one of the universal human realities, there is no culture that has not employed some maternal symbolism in depicting its deities. Because of the wide variations concerning maternal figures, there is a pressing, but as yet unmet need for a more complex and useful typology of mother goddesses and maternal motifs based on meaning, symbolism, and function.

Mother goddesses, as a specific type, should be distinguished from the Earth Mother (*q.v.*), with which they have often been confused. Unlike the mother goddess, who is a specific source of vitality and who must periodically undergo intercourse, the Earth Mother is a cosmogonic figure, the eternally fruitful source of everything. In contrast, mother goddesses are individual, possess distinct characters, are young, are not cosmogonic, and are highly sexual. Although the male plays a relatively less important role, being frequently reduced to a mere fecundator, mother goddesses are usually part of a divine pair, and their mythology narrates the vicissitudes of the goddess and her (frequently human) consort.

The essential moments in the myth of most mother goddesses are her disappearance and reappearance and the celebration of her divine marriage. Her disappearance has cosmic implications. Sexuality and growth decline. Her reappearance, choice of a male partner, and intercourse with him restore and guarantee fertility, after which the male consort is frequently set aside or sent to the underworld to be replaced the next year (this has led to the erroneous postulation of a dying-rising deity).

The other major form of the mother goddess emphasizes her maternity. She is the protector and nourisher of a divine child and, by extension, of all humanity. This form occurs more frequently in iconography—a full-breasted (or many-breasted) figure holding a child in her arms—than in myth.

Mother Goose, fictitious old woman, reputedly the source of the body of traditional children's songs and verses known as nursery rhymes. She is often pictured as a beak-nosed, sharp-chinned elderly woman riding on the back of a flying gander. "Mother Goose" was first associated with nursery rhymes in an early collection of "the most celebrated Songs and Lullabies of old British nurses," *Mother Goose's Melody; or Sonnets for the Cradle* (1781), published by the successors of one of the first publishers of children's books, John Newbery. The oldest extant copy dates from 1791, but it is thought that an edition appeared, or was planned, as early as 1765, and it is likely that it was edited by Oliver Goldsmith, who may also have composed some of the verses. The Newbery firm seems to have derived the name "Mother Goose" from the title of Charles Perrault's fairy tales, *Contes de ma mère l'oye* (1697; "Tales of Mother Goose"), a French folk expression roughly equivalent to "old wives' tales."

The persistent legend that Mother Goose was an actual Boston woman, Elizabeth Goose (Vergoose, or Vertigoose), whose grave in Boston's Old Granary Burying Ground is still a tourist attraction, is false. No evidence of the book of rhymes she supposedly wrote in 1719 has ever been found. The first U.S. edition of Mother Goose rhymes was a reprint of the Newbery edition published by Isaiah Thomas in 1785.

Mother Lode Country, the gold rush belt, stretching through the Sierra Nevada foothills in central California, U.S. About 150 miles (240 km) long but only a few miles wide, it extended north and northwest from the vicinity of Mariposa through Tuolumne, Calaveras, Amador, El Dorado, Placer, and Nevada counties. The gold rush was sparked by James Marshall's discovery in 1848 of placer gold in the tailrace of Sutter's Mill near Coloma (commemorated by the Marshall Gold Discovery State Historic Park). The term "Mother Lode" evolved from the miners' concept of one main quartz vein with subsidiary offshoot veins. The scenic country is dotted with scores of ghost camps and old mining towns bearing relics of their former past. Some, including Amador City, Auburn, Chinese Camp, Columbia, Donnieville, Grass Valley, Jackson, Nevada City, Placerville, San Andreas, Sonora, and Trudeau, have been designated state historic landmarks. Gold rush fever and the rip-roaring, wide-open mining towns formed the setting for many famous adventure tales by Bret Harte and Mark Twain. Exhaustion of the main gold streaks, a changing market, and a government-enforced price structure slowed down the California gold boom by the end of the century, and by the 1930s operations came to a virtual halt. Increases in the international price of gold in the late 1970s stimulated scattered efforts to mine it commercially, but most of the new settlers came searching for land, rather than gold.

Motherwell, district, Strathclyde region, southwestern Scotland, created by the reorganization of 1975 from part of the former county of Lanark. The district covers an area of 69 square miles (179 square km) in the Clyde valley and includes the large industrial burgh of Motherwell and Wishaw, the seat of the district authority.

Rapid growth in the late 19th and early 20th centuries was based on coal mining, steel, and heavy engineering. Motherwell already contained the largest steelworks in Britain before World War I. The same firm produced the steel plates for the great Cunard transatlantic liners the *Queen Mary* and *Queen Elizabeth.* A new steel strip mill established at Ravenscraig in 1958 produces more than 3 million tons of steel per annum, and there are plans for further expansion. The establishment of light engineering industries has done much to absorb the large numbers left unemployed by the cessation of coal mining and the continued decline of other heavy industry. Pop. (1989 est.) 146,740.

Motherwell, Robert (b. Jan. 24, 1915, Aberdeen, Wash., U.S.—d. July 16, 1991, Provincetown, Mass.), American painter, one of the founders and principal exponents of Abstract Expressionism (*q.v.*), who was among the first American artists to cultivate accidental elements in his work.

A precocious youth, Motherwell received a scholarship to study art when he was 11 years old. He preferred academic studies, however, and eventually took degrees in aesthetics from Stanford and Harvard universities.

Motherwell, photograph by Arnold Newman, 1959
© Arnold Newman

Motherwell decided to become a serious artist only in 1941. Although he was especially influenced by the Surrealist artists Max Ernst, Yves Tanguy, and André Masson, he remained largely self-taught. His early work followed no single style but already contained motifs from which much of his later art grew. He received his first one-man show in 1944 at Peggy Guggenheim's Art of this Century Gallery in New York City.

In the mid-1940s Motherwell painted abstract figurative works that showed the influence of Surrealism. But in 1949 he painted the first in a series of works collectively entitled "Elegy to the Spanish Republic." He painted almost 150 versions of these "Elegies" in the next three decades. These Abstract Expressionist paintings show his continuous development of a limited repertory of simple, serene, and massive forms that are applied in black paint to the picture plane in such a way that they generate a sense of slow, solemnly suggestive movement.

During the 1960s he painted in several different styles, so that such paintings as "Africa" (1964–65) look like enlarged details of elegant calligraphy, while "Indian Summer, #2" (1962–64) combines the bravura brushwork typical of Abstract Expressionism with the broad areas of evenly applied colour characteristic of the then-emerging Colour Field Painting style. By the end of the decade, paintings in his "Open" series (1967–69) had abandoned Abstract Expressionism in favour of the new style.

From 1958 to 1971 Motherwell was married to the American painter Helen Frankenthaler. He taught art at Hunter College (1951–58, 1971–72), directed the publication of the series "The Documents of Modern Art" (1944–52), and wrote numerous essays on art and aesthetics. He was generally regarded as the most articulate spokesman for Abstract Expressionism.

Motīhāri, city, northwestern Bihār state, northeastern India. Motīhāri is situated on the east bank of a lake. It was constituted a municipality in 1869. A major road centre, the city trades in oilseeds and has sugar-milling and cotton-weaving industries. Motīhāri has several colleges affiliated with the University of Bihār. Pop. (1991 prelim.) 77,400.

Motilón (Spanish: "Hairless Ones"), collective name loosely applied by the Spaniards to various highland and lowland American Indian peoples who lived in and about the Colombian and Venezuelan Andes and Lake Maracaibo. Chief among them were the Chaké and the Mape, who were agricultural and forest-dwelling and hostilely resisted European encroachments well into the 20th century.

motion, in parliamentary rules of order, a procedure by which proposals are submitted for the consideration of deliberative assemblies. If a motion is in order, it then becomes subject to the action of the assembly. *See* parliamentary procedure.

In procedural law, a motion is an application to a court or judge for a ruling or order. Generally speaking, a motion is an oral application, as opposed to a petition, which is written.

motion, in physics, change of position of a body relative to another body or with respect to a frame of reference or a coordinate system. All motions take place on definite paths, and the nature of these paths determines the character of the motions. If all points in a body have similar but not necessarily straight paths relative to another body, the first body has motion of translation relative to the second body. If the paths are straight, it is called rectilinear translation. In both cases all points in the body have the same velocity (directed speed) and the same acceleration (time rate of change of velocity).

If all points in a body have different paths on another body, the motion of the first body relative to the second is a combination of translation and rotation. Rotation occurs when any line on a body changes its orientation relative to a line on another body. For example, on a reciprocating engine, one end of the connecting rod is attached by a hinge-type joint (the wrist pin) to the piston and moves with it on a straight path relative to the cylinder block, while the other end of the rod is attached by a hinge-type joint (the crankpin) to the crankshaft and moves with it on a circular path relative to the block.

Bodies connected by hinges can only rotate relative to one another. Consequently, the motion of the connecting rod relative to the piston and relative to the crankshaft is pure rotation. Relative to the block, the motion is a combination of translation and rotation, which is the most general type of plane motion—*i.e.,* motion in parallel planes relative to the block.

All motions are relative, but the term relative motion is usually reserved for motion relative to a moving body—*i.e.,* motion on a moving path. Strictly speaking, Newton's laws of motion are valid only for motions on paths that are fixed to the centre of the solar system. These are known as absolute paths, and, because the Earth rotates and moves around the Sun, motion relative to the Earth is not absolute motion. In most cases, however, the effects of the Earth's motion on calculations involving Newton's laws are small and can be neglected. Motions relative to the Earth or to any body that is fixed to the Earth are assumed to be absolute.

In addition to rotating about moving axes, like the connecting rod, or about a fixed axis, like the crankshaft, a body can also rotate about a fixed point. This is the type of motion that a spinning top executes. *See also* dynamics.

Motion, Andrew, in full ANDREW PETER MOTION (b. Oct. 26, 1952, London, Eng.), British poet, biographer, and novelist, especially noted for his narrative poetry, who was made poet laureate of England in 1999. As poet laureate, Motion sought to make poetry accessible to a wider audience. He especially targeted younger people, encouraging schools to teach poetry regularly.

Motion attended Radley College and University College, Oxford (B.A., 1974; M.Litt., 1977), where he was a student of poet John Fuller. From 1976 to 1980 he taught at the University of Hull and from 1995 at the University of East Anglia in Norwich. In the interim between these teaching positions, he was the editor of *Poetry Review* (1980–83) and worked in a variety of editorial capacities for two London publishing houses.

Motion's first verse collection, *The Pleasure Steamers,* was published in 1978. It contains "Inland," which describes the fear and helplessness of 17th-century villagers who must abandon their homeland following a devastating flood; the poem received the Newdigate Prize in 1975. Noted for his insight and empathy, Motion frequently wrote about isolation and loss. Much influenced by the poets Edward Thomas and Philip Larkin—whose low-key poetic voices often caused their work to be overlooked and undervalued—Motion wrote critical works on both men, *The Poetry of Edward Thomas* (1980) and *Philip Larkin* (1982), as well as a biography of Larkin (*Philip Larkin: A Writer's Life,* 1993). He also produced a biography of poet John Keats (*Keats,* 1997), and his biography of the talented Lambert family, *The Lamberts: George, Constant & Kit* (1986), earned him the Somerset Maugham Award (established by Somerset Maugham to enable writers under age 35 to travel to "enrich their writing") in 1987.

Motion's later collections of poetry include *Secret Narratives* (1983), *Dangerous Play: Poems, 1974–84* (1984), *Natural Causes* (1987), *Love in a Life* (1991), *The Price of Everything* (1994), and *Salt Water* (1997). Among his works of fiction are *The Pale Companion* (1989), *Famous for the Creatures* (1991), and *Wainewright the Poisoner* (2000).

motion, equation of, mathematical formula that describes the position, velocity, or acceleration of a body relative to a given frame of reference. Newton's second law, which states that the force F acting on a body is equal to the mass m of the body multiplied by the acceleration a of its centre of mass, $F = ma$, is the basic equation of motion in classical mechanics. If the force acting on a body is known as a function of time, the velocity and position of the body as functions of time can, theoretically, be derived from Newton's equation by a process known as integration. The gravitational force (g) acting on a falling body, for example, accelerates it and is the weight of the body W, which is constant with respect to time; thus, using Newton's equation, $W = mg$ and $m = W/g$. Substituting these values in Newton's equation, $W = (W/g)a$, from which $a = g$, the acceleration of gravity. Acceleration is the rate of change of velocity with respect to time, so that by integration the velocity v in terms of time t is given by $v = gt$. Velocity is the time rate of change of position S, and, consequently, integration of the velocity equation yields $S = \frac{1}{2}gt^2$.

If the force acting on a body is specified as a function of position or velocity, the integration of Newton's equation may be more difficult. When a body is constrained to move in a specified manner on a fixed path, it may be possible to derive the position-time equation; from this equation the velocity-time and acceleration-time equations can, theoretically, be obtained by a process known as differentiation.

motion, Newton's laws of: *see* Newton's laws of motion.

motion picture, also called FILM, or MOVIE, a series of still photographs on film, projected in rapid succession onto a screen by means of light, that, because of an optical phenomenon known as persistence of vision, gives the illusion of actual, smooth, and continuous movement. Motion pictures are usually filmed with a motion-picture camera, which makes rapid exposures of people or objects in motion, and shown with a motion-picture projector, which is usually capable of reproducing sound in synchronism with the visual images.

The motion picture is both a form of mass entertainment and one of the newest of the fine arts.

A brief treatment of motion pictures follows. For full treatment, *see* MACROPAEDIA: Motion Pictures.

Motion-picture production. Motion pictures are created through the combination of four basic elements: story, direction, camera work, and editing. In commercial studios, each of these roles is carried out by different individuals and production crews under the overall supervision of a producer, who oversees the financing of the project.

Traditionally, the director has almost total control of the actual making of a film. He translates the material in the script into a motion picture through his recruitment and supervision of camera operators, set and costume designers, actors, and film editors. The director controls the composition, lighting, and actors' performances in each shot and scene. During shooting, he works closely with his chief camera operator, who is skilled in the techniques of cinematography (*q.v.*) and is responsible for positioning the cameras. After shooting has been completed, the director works with the film editor to determine which shots and sequences will be used in the finished picture. The film editor fits the various shots and scenes recorded by the cameras into a final, complete performance. The sound track is also combined with the visual track during the editing process.

History. The basic technical innovations that made motion pictures possible were achieved in the 1880s and '90s in France and the United States. The pioneers of actual motion pictures, Thomas A. Edison in the United States and the brothers Auguste and Louis Lumière in France, sought to exploit their cinema machines, the Vitascope and the Cinématographe, because they feared that the novelty would not last. Actually, public enthusiasm for filmed shows—initially in music halls and public fairgrounds but soon in specially built theatres—grew rapidly. Throughout the first decade of the 20th century, French film production led the world, and Charles Pathé created the first international film empire; his company produced films and then exhibited them through chains of motion-picture theatres.

In the United States the popularity of the nickelodeons spurred film production in the major Eastern cities, though the basic product remained one- or two-reel comedies and melodramas. The Motion Picture Patents Company's attempts (1908–12) to control the American film industry roused independent production companies to seek higher standards and to develop the star system, and filmmakers seeking to foil the Patents Company began moving to the West Coast and to Hollywood, Calif., in particular.

At this time the director D.W. Griffith revolutionized motion pictures by creating longer, more ambitious films and by basic technical innnovations in editing, cinematography, and lighting. His *The Birth of a Nation* (1915) established the motion picture as an art form in the United States. World War I damaged European film industries and their domestic markets and enabled the American film studios to surpass them in commercial success and critical esteem. By the end of the war, Hollywood, with massive production and stars of worldwide appeal—including Douglas Fairbanks, Sr., Mary Pickford, and Charlie Chaplin—dominated the international market.

The silent film reached its peak in the United States between 1917 and 1927. Hollywood's films became more lavish, and the major studios came to rely on the drawing power of the most popular actors, or stars. Among the most important figures in American filmmaking during the 1920s were the directors Griffith, Mack Sennett, and Cecil B. deMille and such actors as Fairbanks, Chaplin, Lillian Gish, Buster Keaton, and William S. Hart. Filmmaking also regained momentum in many European countries after the war, and Germany's films in particular—made by such figures as F.W. Murnau, G.W. Pabst, Fritz Lang, and Ernst Lubitsch—were notable for their experimental expressionism and powerful social realism. Carl Dreyer of Denmark and Sergey Eisenstein of the Soviet Union were other important silent-film directors.

Between 1926 and 1930, the Warner Brothers studio in the United States introduced sound films, and the other industry giants promptly followed. During the first decade of sound film, filmmakers learned to use the camera and the sound track together to help build the action of a story. Sound enabled filmmakers to create more convincing characterizations, and new directors emerged to exploit the possibilities of the medium. Among them were Frank Capra, John Ford, and Howard Hawks in the United States, Alfred Hitchcock in Great Britain (and later in the United States), and Jean Renoir in France. Musical comedies and song-and-dance films became popular during the 1930s, along with films starring such verbal comedians as W.C. Fields and the Marx Brothers.

The 1930s and early '40s saw the Hollywood studios at their zenith as World War II seriously curtailed film production in Europe. After the war's end, however, the Hollywood studios found themselves embattled on several fronts. They were gradually forced by antitrust legislation to dismantle their theatre chains and other controls over film distribution, and television began to reduce film audiences after 1950. The most significant postwar developments in filmmaking occurred in Europe rather than in the United States. In Italy, the Neorealist filmmakers Vittorio De Sica, Federico Fellini, and Michelangelo Antonioni led a renewed trend toward realism, while the New Wave directors Jean-Luc Godard and François Truffaut played a similar role in France. British filmmakers continued to develop comic genres, but a trend toward realism emerged in the films of the so-called Angry Young Men. The new emphasis on film as a medium for personal artistic expression was evident in the works of directors in other countries as well, such as Ingmar Bergman in Sweden, Luis Buñuel in Spain and Mexico, Kurosawa Akira in Japan, and Satyajit Ray in India.

Meanwhile, in the United States, the big studios concentrated on producing works in such standard genres as westerns, musicals, crime dramas, and historical and biblical epics. But while major producers were making big pictures, there was a growing trend among independent and younger filmmakers toward more serious and more artistic pictures. Established directors like Hitchcock and John Huston were joined in the 1960s and '70s by such newcomers as Stanley Kubrick, Sidney Lumet, Robert Altman, Francis Ford Coppola, Woody Allen, Martin Scorsese, and Steven Spielberg. The American film industry continued to dominate the world market in the second half of the 20th century. Hollywood's advantages included a vast domestic audience, an unrivaled mastery of the techniques and marketing of films, and a continuing ability to create films of mass popular appeal. American science-fiction and action-adventure films exploited the full range of film technology, including sophisticated special effects.

Motion Picture Arts and Sciences, Academy of, honorary association of motion-picture industry personnel in the United States. Membership is based on outstanding contribution to the film industry and includes actors, administrators, art directors, cinematographers, directors, executives, film editors, producers, writers, musicians, public relations experts, and sound technicians.

The organization was formed in 1927 by Louis B. Mayer, the executive head of the Metro-Goldwyn-Mayer production studio, and a group of leading motion-picture personalities. Its purpose was to raise standards of the arts and sciences in motion-picture production. It quickly became best-known, however, for its annual presentation of the Academy Awards of Merit, gold-plated statuettes (traditionally called Oscars) symbolizing recognition for excellence in acting, directing, and other activities in films released during the previous calendar year. Nominations for all of the awards except that of "best picture" are made by members of the appropriate craft (such as actors, film editors, or directors), while the final balloting is conducted among the entire membership of the academy. (The nominations for best picture are made by all of the members as well.) The academy also keeps official records of screen credits, maintains a film archive, a library, and a theatre at its headquarters in Los Angeles, and publishes trade journals.

Motion Picture Association of America, (MPAA), in the United States, organization of the major motion-picture studios that rates films for suitability to various kinds of audiences, aids the studios in international distribution, advises them on taxation, and carries on a nationwide public relations program for the film industry. The MPAA, originally called the Motion Picture Producers and Distributors of America (MPPDA), was established in 1922 by the major Hollywood production studios in response to increasing government censorship of films, which arose in turn from a general public outcry against both indecency on the screen and various scandals involving motion-picture celebrities. The MPPDA, popularly called the Hays Office for its first director, Will H. Hays (*q.v.*), codified the complaints of local censoring boards and informed producers of their views. Hollywood in effect opted to censor its own productions rather than allow the government to censor them.

In 1930 the Hays Office adopted the Motion Picture Production Code, a detailed description of what was morally acceptable on the screen. The code was liberalized in 1966 after it had become hopelessly outdated and ineffective because of the more relaxed social and sexual mores of the time. In 1968 the MPAA set up a rating board that classified films as G, M, R, and X. After various changes, the MPAA ratings are now as follows: G, for general audiences; PG, parental guidance suggested; PG-13, parents strongly cautioned, because film contains material inappropriate for children under 13; R, restricted to adults and to children under 17 accompanied by parent or guardian; and NC-17, no children under 17 admitted. Jack Valenti, a former adviser to U.S. President Lyndon B. Johnson, headed the MPAA from 1966.

motion-picture camera, also called MOVIE CAMERA, any of various complex photographic cameras that are designed to record a succession of images on a reel of film that is repositioned after each exposure. Commonly, exposures are made at the rate of 24 or 30 frames per second on film that is either 8, 16, 35, or 70 mm in width.

A motion-picture camera essentially consists of a body, a film-transport system, lenses, shutter, and a viewing-focusing system. The motor-driven transport system is the chief element that differentiates motion-picture cameras from still cameras. Within the camera, the unexposed film is housed in a totally dark chamber called the forward magazine. One or both edges of the film are lined with regularly spaced perforations, or sprocket holes. Sprocket-driven gears grip these perforations, feeding the film into an enclosed exposure chamber. A mechanical claw pulls the film into position behind the shutter, locking the film momentarily in place. The shutter opens, exposes an image onto the film, and closes. Then the claw, with an automatic pulldown movement, advances the film for the next exposure. Each frame of the film comes to a complete stop for its exposure, and hence each exposure is a single still photograph, or frame. As the film moves through the camera, the exposed sections are fed into the rear magazine, which is another totally dark chamber.

Most cameras now use the reflex system for viewing and focusing; in this system a mirror diverts to the viewfinder some of the light rays coming through the lens. Zoom lenses are commonly used on many cameras, as are ordinary wide-angle and telephoto lenses. The shutter is located behind the lens and in front of the film gate. It is usually rotary, and consists of a half-circle that is pivoted around in synchronization with the claw's pulldown of the film, so that the half-circle blocks out light from the lens when the film is in transit and moves out of the way to let light through when the film frame is motionless. Cameras used in sound filming contain internal insulation to dampen the noise of their moving parts.

Motion Picture Patents Company, also called MOVIE TRUST, EDISON TRUST, or THE TRUST, trust of 10 film producers and distributors who attempted to gain complete control of the motion-picture industry in the United States from 1908 to 1912. The original members were the American companies Edison, Vitagraph, Biograph, Essanay, Selig, Lubin, and Kalem; and the French companies Pathé, Méliès, and Gaumont. The company, which was sometimes called the Movie Trust, possessed most of the available motion-picture patents, especially those of Thomas A. Edison, for camera and projection equipment. It entered into a contract with Eastman Kodak Company, the largest manufacturer of raw film stock, to restrict the supply of film to licensed members of the company.

The company was notorious for enforcing its restrictions by refusing equipment to uncooperative filmmakers and theatre owners and for its attempts to terrorize independent film producers. It limited the length of films to one and two reels (10 to 20 minutes) because movie audiences were believed incapable of enjoying more protracted entertainment. The company also forbade the identification of actors because popular entertainers might demand higher salaries. By 1912, however, the success of European and independent producers and the violent opposition of filmmakers outside the company weakened the Movie Trust, which, in 1917, was dissolved by court order. The Movie Trust, which was based in New York and other cities of the East Coast, was indirectly responsible for the establishment of Hollywood, Calif., as the nation's film capital, since many independent filmmakers migrated to the latter town to escape the Trust's restrictive influence in the East.

motion sickness, sickness induced by motion and characterized by nausea. The term motion sickness was proposed by J.A. Irwin in 1881 to provide a general designation for such similar syndromes as seasickness, train sickness, car sickness, and airsickness. This term, though imprecise for scientific purposes, has gained wide acceptance.

Motion sickness comprises a constellation of symptoms resulting from sudden exposure to periodic unnatural accelerations. The symptoms include dizziness, pallor, cold sweating, salivation, and (most important from a practical standpoint) nausea and vomiting.

Motion sickness may result from exposure to swinging, turning, rocking, or up-and-down movements. The disorder apparently stems from the contradictory data relayed to the brain during such motions by the eyes and by the balance centre within the nonacoustic portion of the inner ear, which must be functional for symptoms to develop. In each ear the three semicircular canals and the paired otolith organs participate in maintaining the body's equilibrium and in the coordination of eye-head-body movements. These organs are stimulated continually by gravity and also by sudden linear accelerations. The eyes, by contrast, relay information to the brain about the body's position and movement based on external surroundings rather than internal cues. Motion sickness arises when the vestibular systems of the inner ear send messages about body position or movement that are contradicted by the information sent by the eyes. An example of this is seasickness; the inner ear senses changes in linear and angular acceleration as the body bobs up and down with the movement of the ship. But since the cabin bobs up and down in synchrony with the passenger, his eyes register a relatively stable scene. The brain becomes confused by these contradictory messages from different sensory receptors. In response, it stimulates the production of abnormally large amounts of the stress hormones epinephrine, norepinephrine, and vasopressin. After a few more minutes of exposure to motion, electrical rhythms in the muscles of the stomach accelerate markedly from a normal three cycles per minute to as much as nine per minute. By this time the visible symptoms of motion sickness are well advanced, and feelings of nausea may culminate in vomiting. It remains unknown, however, why the mind responds to incongruities of movement perception with these particular bodily mechanisms.

Motion sickness is a self-limiting disorder, and prevention of the motion is the key to recovery in all cases. In cases where this is not possible, as in many travel situations, there are nevertheless several strategies for avoiding or mitigating the effects of the disorder. In cases of sustained exposure to motion, such as during sea voyages and space missions, many people can adapt to motion sickness after three or four days and feel progressively fewer symptoms. During shorter exposures, and depending on the situation, several different tactics can be helpful. The single most effective measure is to fix the body, especially the head, with reference to the vehicle. Minimizing accelerations in a particular vehicle involves such things as seat location and time of day in an aircraft, and cabin location and time of year in a ship. The choice of vehicle for a given mode of travel may be important—*e.g.,* flying above turbulence in a jet aircraft and the use of stabilizers in a ship. Sitting in a reclining posture, trying to avoid making turning movements of the head, closing one's eyes, and focusing one's gaze on relatively distant objects can also prove helpful. Motion sickness is also sometimes alleviated by concentrating on other tasks. Generally, unless vision is used to "lock" onto the horizon or to engage in activities resulting in distraction, there is less tendency to motion sickness if the eyes are closed. Reading and excessive eating or drinking tend to exacerbate the symptoms, as do anxiety and other stressful or painful emotional states. Certain illnesses, especially those with gastrointestinal symptoms, may also increase one's susceptibility to motion sickness. Given these suggestions, however, the prevention of motion sickness remains a highly individual matter.

Several drugs have been developed for the prevention or relief of motion sickness, though they often produce unwanted side effects. A combination of 1-scopolamine hydrobromide and dextroamphetamine sulfate, taken 40 minutes before departure, affords some protection for several hours. Promethazine hydrochloride, with minimal risk of side effects, is a good substitute for scopolamine. Several drugs in the antihistamine category also decrease susceptibility to motion sickness, including diphenidol, dimenhydrinate, cyclizine, and meclizine. The last named is effective over periods up to 24 hours.

motion study: *see* time-and-motion study.

motivation, factors within a human being or other animal that arouse and direct goal-oriented behaviour.

A brief treatment of motivation follows. For full treatment, *see* MACROPAEDIA: Motivation, Human.

Psychologists have presented a multitude of often-conflicting theories that purport to explain why individuals act at all, why they select the actions they do, and why some people are more motivated than others and succeed where others of similar talents and abilities fail. Some theorists have sought an internal mechanism that gives rise to action; some have explored external stimuli in the environment; some have studied the basic motivations themselves, attempting to establish which are innate needs and which are learned; and some have tried to determine whether motivation directs behaviour toward a particular goal, or whether it simply energizes behaviour determined by other factors such as habit.

Thinkers have long identified needs and desires as major elements in the human personality, but it was not until Charles Darwin's theories were applied to psychological adaptation to the environment that researchers began to attend to the question of motivation. Theorists saw two important relationships between Darwin's ideas and motivation. First, that humans, as part of the animal kingdom, are at least partially governed by instincts for food, water, sex, etc. Second, that behavioral characteristics, such as the capacity for motivation, serve an evolutionary purpose just as physical characteristics do.

The psychological community seized on the concept of instinct, and, at about the turn of the century, almost every possible behaviour was called instinctive. There was no way to prove these assertions, however, and they lost favour as experiments began to demonstrate that much behaviour previously considered innate was highly modifiable by learning and experience.

In the early 20th century, the Anglo-American psychologist William McDougall believed instincts were the prime motivators of human behaviour and emphasized the power of motivation over perceptions and emotions: one perceives what one's instincts motivate one to perceive, and the appropriate object, once perceived, generates a surge of emotions that incites action. Sigmund Freud also based much of human behaviour on irrational instinctive urges and was most interested in the unconscious nature of these motivations. Freud believed the two basic human motivations are Eros (the life or sexual instinct) and Thanatos (the death instinct). In the early 20th century, the American psychologist Robert S. Woodworth introduced the word drive as a substitute for the controversial term instinct. Drive is the force that energizes the organism into action.

The American neurologist Walter B. Cannon coined the term homeostasis to explain what he and others (including Freud) considered the main function of motivation—to regulate the body. The body, it was postulated, is activated whenever its internal conditions reach a certain level of imbalance. Nonbiological drives were called learned drives and were thought to gain their motivational power through association with biological drives. Later theorists specified that drive itself is a homeostatically conceived but non-goal-oriented state of energy. Direction of this energy toward reduction of the appropriate tension was attributed to habit learned through reinforcement in previous experiences.

The drive theory held sway from the 1920s to the '50s, when neurological experiments produced discoveries of arousal states that were at odds with the belief that tension relief was the essential learning reinforcement. It was discovered that intermediate levels of arousal are pleasurable in and of themselves. Furthermore, there are so-called pleasure centres in the brain which, when stimulated artificially, will cause a rat to work until it drops from fatigue. Also, it was shown that animals (including humans) learn even when the reward consists simply of the exploration of a new environment, watching others, or some other stimulation.

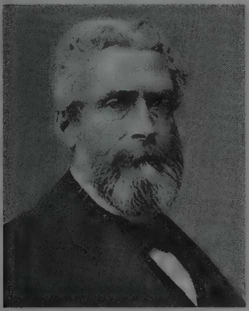
Other psychologists studied human needs rather than the mechanisms that powered them. Henry A. Murray published a list of needs that were divided into primary (innate) and secondary (learned). These needs, he believed, make human behaviour goal-oriented. Abraham H. Maslow postulated a hierarchy of motivations, from physiological needs (*e.g.,* hunger and thirst) at the bottom, to needs for safety, belongingness, and love, to the need for esteem and, at the top, the needs for self-actualization and for various cognitive and aesthetic goals. He believed that the baser needs have to be satisfied before the individual can move on to satisfying the higher needs.

From a behavioral viewpoint, there can be no motivation without a goal. Generally speaking, the more strongly one needs or desires a goal, the more successful one will be in attaining it, although myriad factors such as individual temperament, upbringing, and self-image may intervene. Behaviour therapists stress the importance of a person's attitude toward his goal and postulate three factors that influence motivation: the degree of ambivalence one feels about the object of desire, one's ability to visualize one's goal clearly, and one's ability to break the goal down into accomplishable smaller tasks.

Cognitive psychologists have found that a motive sensitizes the person in cognitive areas related to the motive. Someone with a high need for achievement tends to recognize achievement-related words quickly when they are briefly flashed on a screen; a poor subject sees or remembers coins as being larger than does a rich subject; a hungry subject perceives food stimuli as larger than other stimuli. *See also* emotion.

motive, in music, a leading phrase or figure that is reproduced and varied through the course of a composition or movement. *See* melody.

Motley, John Lothrop (b. April 15, 1814, Boston, Mass., U.S.—d. May 29, 1877, Dorchester, Dorset, Eng.), American diplomat and historian best remembered for *The Rise of the Dutch Republic,* a remarkable work of amateur scholarship that familiarized readers with the dramatic events of the Dutch revolt against Spanish rule in the 16th century.



John Lothrop Motley

By courtesy of the Library of Congress, Washington, D.C.

Motley graduated from Harvard in 1831 and then studied law in Germany, returning to Boston in 1835. He was appointed secretary to the U.S. legation in St. Petersburg, Russia, in 1841, and he later served as minister to Austria (1861–67) and Great Britain (1869–70). He published *The Rise of the Dutch Republic* in 1856. Motley viewed the Dutch revolt as a conflict between a democratic, tolerant, and rational Protestantism and the persecuting absolutism of Roman Catholic Spain. This work was a classic of popular history in the 19th century, though later scholarship modified Motley's concept of the religious basis of the revolt to include constitutional and economic factors.

Motley planned to carry his history down to 1648, but he died before he could complete his work. By then he had published, in four volumes, *The History of the United Netherlands, 1584–1609* (1860–67) and, in two volumes, *The Life and Death of John of Barneveld* (1874).

Motley, Marion (b. June 5, 1920, Leesburg, Ga., U.S.—d. June 27, 1999, Cleveland, Ohio), African American football player who helped desegregate professional football in the 1940s.

Motley played for both South Carolina State University and the University of Nevada (Reno) and for Great Lakes Naval Training Station during World War II. He signed with the Cleveland Browns of the All-America Football Conference (AAFC) in 1946, and in doing so, with three others, he broke a race barrier that had stood for 13 years.

A punishing fullback, Motley was the leading rusher in the four-year history of the AAFC (3,024 yards) and a three-time All-AAFC linebacker. The Cleveland Browns won every AAFC title and compiled a 47–4–3 regular-season record. When the Browns joined the National Football League (NFL) in 1950, Motley led the league with 810 yards, and the team won the league title. In his NFL career Motley totaled 4,720 rushing yards (a 5.7-yard average) and scored 31 touchdowns. He was inducted into the Pro Football Hall of Fame in 1968.

motmot, any of about eight species of long-tailed forest birds of the family Momotidae (order Coraciiformes) of Central and South America. In six species the two central tail feathers are elongated and become racket-tipped as very brittle barbs (branches) along the shaft snap off in preening. Motmots are about 17 to 50 cm (6.5 to 20 inches) long and are mostly brownish green, often with touches of bright blue on the head or wings.

Turquoise-browed motmots (*Eumomota superciliosa*)

Anthony Mercieca from Root Resources

Motmots take flying insects and pluck a variety of other invertebrates and small vertebrates from branches. When perched, a motmot often swings the tail from side to side or holds it askew. The nest is a hole dug with the down-curved bill, generally in a sandbank.

motocross, form of motorcycle racing in which cyclists compete on a course marked out over open and often rough terrain. Courses vary widely but must be 1.5 to 5 km (1 to 3 miles) in length in international competition, with steep uphill and downhill grades, wet or muddy areas, and many left and right turns of varying difficulty. Motocross is probably the most physically demanding motorcycle sport, although its races are quite short—40 minutes or less for each of the two heats of a race. Riders must use the same motorcycle throughout a race, with repairs made between heats if necessary. A cotton jersey, nylon pants padded at the knee and thigh, padded boots and gloves, a helmet and goggles, a plastic chest protector, and a kidney belt for support constitute the usual outfit of the motocross cyclist.

For international competition, under supervision of the Fédération Internationale Motocycliste, motorcycles are grouped in three classes according to engine-displacement limits of 125, 250, and 500 cubic centimetres. A world-championship series of races in each class is held annually.

Motocross racing

Kinney Jones

Supercross, which began in the United States in the early 1970s, is an indoor version of motocross. Supercross is run on artificial dirt tracks constructed in large arenas. These courses are typically shorter than those in motocross, but they feature more jumps.

Motoori Norinaga (b. June 21, 1730, Matsuzaka, Japan—d. Nov. 5, 1801, Matsuzaka), the most eminent scholar in Shintō and Japanese classics. His father, a textile merchant, died when Norinaga was 11 years old, but with his mother's encouragement he studied medicine in Kyōto and became a physician. In time he came under the influence of the National Learning (Kokugaku) movement, which emphasized the importance of

Motoori Norinaga, detail of a self-portrait, paint on paper canvas, 1773; in the Museum of Motoori Norinaga, Matsuzaka, Japan

By courtesy of the Museum of Motoori Norinaga, Matsuzaka

Japan's own literature. Motoori applied careful philological methods to the study of the *Koji-ki, The Tale of Genji,* and other classical literature and stressed *mono no aware* ("sensitiveness to beauty") as the central concept of Japanese literature.

Motoori's study of Japanese classics, especially the *Koji-ki,* provided the theoretical foundation of the modern Shintō revival. Rejecting Buddhist and Confucian influence on the interpretation of Shintō, he instead traced the genuine spirit of Shintō to ancient Japanese myths and the sacred traditions transmitted from antiquity. Motoori also reaffirmed the ancient Japanese concept of *musubi* (the mysterious power of all creation and growth), which has become one of the main tenets of modern Shintō. While he accepted ethical dualism, he believed that evil existed for the sake of good, as an antithetic element of the dialectical higher good.

Motoori's 49-volume commentary on the *Koji-ki* (*Koji-ki-den*), completed in 1798 after 35 years of effort, is incorporated in the *Moto-ori Norinaga Zenshū,* 12 vol. (1926–27; "Complete Works of Motoori Norinaga").

motor, electric: *see* electric motor.

motor, linear: *see* linear motor.

motor court, also called MOTOR HOTEL, MOTOR INN, or MOTOR LODGE: *see* motel.

motor generator, also called MOTOR-GENERATOR SET, apparatus for transforming or converting electric power from alternating current (AC) to direct current (DC), or vice versa, consisting of one or more motors coupled to and driving one or more generators. The motors operate from the power source available, and the generators provide power of the desired characteristics. For example, a set may be designed to convert commercially available alternating current to direct current, as in many welding applications; or it may, from the same commercial source, provide high-frequency AC power for induction heating or other purposes. Such a combination is often termed a dynamotor. The term motor generator also denotes a combination of an electric generator and a driving motor, such as a gasoline or diesel engine.

motor racing: *see* automobile racing.

motor-vehicle insurance, also called AUTOMOTIVE INSURANCE, a contract by which the insurer assumes the risk of any loss the owner or operator of a motor vehicle may incur through damage to property or persons as the result of an accident. There are many specific forms of motor-vehicle insurance, varying not only in the kinds of risk that they cover but also in the legal principles underlying them.

Liability insurance pays for damage to someone else's property or for injury to other persons resulting from an accident for which the insured is judged legally liable; collision insurance pays for damage to the insured car if it collides with another vehicle or object; comprehensive insurance pays for damage to the insured car resulting from fire or theft and also from many other causes; medical-payment insurance covers medical treatment for the policyholder and his passengers.

In many countries, other approaches to automobile accident insurance have been tried. These include compulsory liability insurance on a no-fault basis and loss insurance (accident and property insurance) carried by the driver or owner on behalf of any potential victim, who would recover without regard to fault.

Most existing no-fault plans are limited in the sense that they usually permit the insured party to sue the party at fault for damages in excess of those covered by the plan and permit insuring companies to recover costs from each other according to decisions on liability. Total no-fault insurance, on the other hand, would not permit the insured to enter tort liability actions or the insurer to recover costs from another insurer.

Consult the INDEX *first*

motorboat, also called POWERBOAT, a relatively small watercraft propelled by an internal-combustion or electric engine. Motorboats range in size from miniature craft designed to carry one person to seagoing vessels of 100 feet (30 m) or more. Most motorboats, however, have space for six passengers or fewer. Motorboats are used recreationally for traveling on water (cruising) and for the enjoyment of such sports as fishing, duck hunting, swimming, skin diving, and water skiing. In sport they are used for racing and in piloting and navigation contests.

Types. The two most common types of motorboats are classified by the manner in which the engine is installed. An inboard motorboat has the engine permanently mounted within the hull, with the drive shaft passing through the hull. An outboard motorboat has a portable, detachable motor, incorporating drive shaft and propeller, that is clamped or bolted to the stern or in a well within the hull. The motorboat engine usually turns a propeller acting against the water. However, for shallow water there are such variations as the paddle wheel, airscrew, and water jet pump. The two main types of hulls used on motorboats are displacement hulls, which push through the water; and planing hulls, which skim across the water's surface. The displacement hull has a V-shaped or round bottom, a relatively deep draft, a narrow width relative to its length, a sharp bow, and a narrow stern. The planing hull, by contrast, has a flat bottom that at higher speeds rises to the surface and skims across the water, thus reducing the friction and resistance between hull and water.

Motorboats come in many types. The outboard runabout, or motor launch, is a fairly small open boat with seats running laterally across the width of the craft and occasionally with decking over the bow area. Inboard runabouts are usually a bit larger and are either open or have a removable shelter top. Cruisers, or cabin cruisers, are equipped with sleeping and cooking facilities in an enclosed cabin for persons to live aboard them. Smaller cruisers may use outboard motors, but the larger types usually have inboard engines. An inboard cruiser that is longer than 15 m (50 feet) is usually called a motor yacht; this type of boat is usually designed for operation in less protected waters, and frequently navigates coastal oceanic routes.

Working motorboats include ferries, fishing boats, motor barges, tugs, coasters, passenger boats, police and harbour officials' launches, fuel and water boats, fire-fighting craft, and many others. Various types of small naval craft can also be regarded motorboats. Hydroplanes are motorboats built to skim over the surface with only a minimum of the hull in contact with the water at high speeds. An auxiliary sailboat is basically designed as a sailing craft but is powered with an internal-combustion engine for use in adverse weather conditions and for maneuvering in confined spaces. The motor sailer, by contrast, is designed mainly to operate as a motorboat but is equipped with sail for auxiliary power.

History. Electric and internal-combustion engines were used experimentally in the second half of the 19th century in Germany, France, and Britain, one of the earliest of the latter kind of engine being designed by Gottlieb Daimler in the late 1880s. The use of motorboats became increasingly popular in Europe and North America after the turn of the century, mainly with motors adapted from automobile engines. In 1903 Alfred Harmsworth (later Lord Northcliffe) donated to the Royal Motor Yacht Club the British International Trophy for Motor Boats, popularly called the Harmsworth Cup (*q.v.*), which has been intermittently contested for by international teams since that year. In 1904 the American Power Boat Association (founded 1903) instituted the Gold Cup (*q.v.*), which later became one of a series of races (for hydroplanes from 1911) leading to a national championship. By 1910 manufacturers of outboard motors, led by Evinrude, were producing motors that could easily be detached from one boat, tuned, transported, and attached to another, thus making both sporting and recreational motorboating more economical and easier. The shift from the early displacement hulls to planing hulls increased speed spectacularly, as did new engine types. After World War II the materials for hulls shifted from wood to metals to fibreglass, the latter being used particularly where speed was wanted. The use of motorboats for recreational and sport purposes underwent a spectacular expansion in the second half of the 20th century.

Speeds. The average speed of the winning boat for the first Harmsworth Cup race in 1903 was 31.4 km per hour (19.5 miles per hour) and that for the first Gold Cup race winner was 37.9 km/h (23.6 miles/h). Sir Malcolm Campbell of England held the one-mile (1.6-kilometre) water speed record of 141.74 miles/h (228.6 km/h) with his hydroplane *Bluebird II* from 1939 to 1950, when the hydroplane *Slo-Mo-Shun IV* took the record with an average 160.323 miles/h (257.960 km/h) at Seattle, Wash. *Miss U.S. I* broke the 200-mile per hour barrier in 1962 with an average speed of 200.419 miles/h (322.53 km/h) at Guntersville, Ala. In 1955 Donald Malcolm Campbell, son of Sir Malcolm, became the first man to successfully pilot a jet-propelled boat over a timed course, with a mark of 202.32 miles/h (325.53 km/h). Campbell raised his record in 1959 to 260.35 miles/h (418.90 km/h), but in 1967 the *Hustler* raised the speed record to 285.213 miles/h (458.901 km/h) at Guntersville. Ken Warby set a straightaway record of 319.627 miles/h (514.39 km/h) in 1978 with the *Spirit of Australia.*

Outboard craft lagged significantly behind inboard boats in speed, and not until 1954 was Massimo Leto di Priolo of Italy able to attain a speed of 100.36 miles/h (161.48 km/h) over a one-mile run. Bert Ross, Jr., raised that to 115.547 miles/h (185.915 km/h) at Seattle in 1960.

Racing. The Union of International Motorboating was founded in 1922 to serve as a clearinghouse for European (and currently world) racing records. The major divisions in motorboat competition are between various types of inboard and outboard craft. Each division has a number of classes, depending mostly on piston displacement. Many hundreds of regattas and races are held annually under the auspices of local and national groups, mostly over closed courses. Some races, such as the Mississippi Marathon and the Six Heures de Paris, are endurance contests. (In a separate division, pleasure boats compete in marathons of 50 to more than 250 miles [80 to 400 km]). The Union of International Motorboating awards a world championship based on points accrued by the first six finishers in such races as the Wills International in England, the Miami-Nassau Race from Florida to the Bahamas, and the Naples Trophy and the Viareggio in Italy.

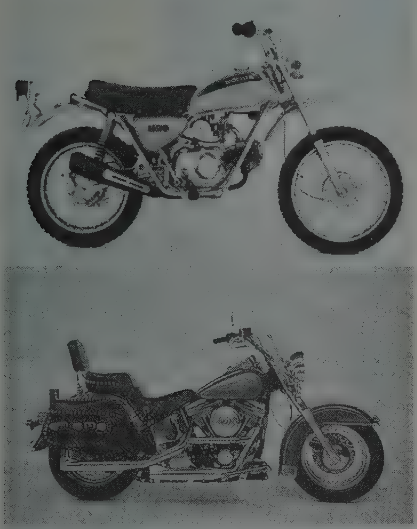
Many yacht clubs hold predicted log races in which navigational skill rather than speed is the basis for scoring. The skipper of a boat predicts the exact time he will pass specified points on a predetermined course, which he traverses without a watch, adjusting his speed in accordance with variations of wind, tide, and current. The skipper coming closest to his prediction wins.

motorcar: *see* automobile.

motorcycle, bicycle or tricycle propelled by an internal-combustion engine (or, less often, by an electric engine).

A brief treatment of motorcycles follows. For full treatment, *see* MACROPAEDIA: Transportation.

The motors on minibikes, scooters, and mopeds (from *mot*or *ped*al) are usually air-cooled and range from 25 to 250 cubic cm (1.5 to 15 cubic inches) in displacement; the multiple-cylinder motorcycles have displacements of more than 1,300 cubic cm. The European method of rating an engine is by the volumetric displacement of the pistons in cubic centimetres. The horsepower method of rating is used in some countries, including the United States. A rough equivalent is 8 to 10 horsepower per 100 cubic cm.



(Top) Honda Motosport 70 (SL-70), designed for trail riding; (bottom) Harley-Davidson Heritage Softail Classic, a cruiser motorcycle

By courtesy of (top) American Honda Motor Co., Inc.; (bottom) Harley-Davidson Motor Co., Inc.

Two-stroke engines, which typically burn a mixture of gasoline and oil, are more economical to run than four-stroke engines, but because of their greater emission of pollutants they are usually only found in smaller single-cylinder engines (below 250 cubic cm). All multiple-cylinder (two, four, and six) engines are gasoline-only, four-stroke engines. Most motorcycles are air-cooled, though a few larger engines are water-cooled.

Most large modern machines use coil-ignition electrical systems, but magneto ignition is common on lightweight two-strokes. Transmission is normally through chain or gearing between engine and a two- to six-speed gearbox and then by primary chain to the rear-wheel sprocket. In some more advanced machines the final drive is via a shaft and bevel-gear system. Electric push-button starters have become common, largely replacing kick starters.

Controls on handlebar grips govern the throttle action and often the front-wheel brake system as well; the rear-wheel brake is usually controlled by foot pedal, but these systems vary. Modern braking systems mostly utilize hydraulic disc brakes.

motorcycle racing, the recreational and competitive use of motorcycles, a sport practiced by both professionals and amateurs on roads, tracks, closed circuits, and natural terrain.

The development of motorcycling largely paralleled and often coincided with the development of automobile sports. There was a class for motorcycles in many of the old town-to-town automobile road races, the Paris-Vienna race, for example. The de Dion tricycle dominated the sport in 1897, but two-wheelers like the Werner soon set the stage for an entirely different form of racing. In 1904 the Fédération Internationale du Motocyclisme (renamed the Fédération Internationale Motocycliste [FIM] in 1949) created the international cup, uniting five nations: Austria, Denmark, France, Germany, and Britain. The first international cup race took place in 1905 at Dourdan, France. The race for the Tourist Trophy (TT) became the most famous of all European motorcycle races, however. The first TT race took place in 1907 on the Isle of Man, on a course that was the world's most famous for many decades thereafter.

Motorcycle racing in North America began in 1903 with the formation of the Federation of American Motorcyclists in New York City. By 1924 this society evolved into the still-active American Motorcycle Association. Since 1937 the Daytona 200-mile (320-kilometre) race has been the leading U.S. race. It is held on the same road circuit used for the Daytona 500 auto race. Grand Prix racing (in the sense of being a major event in the country in which it is held) for motorcycles started in the United States soon after auto racing resumed after the end of World War I. The Belgian motorcycle-racing Grand Prix dates from 1921, while Germany began motorcycle Grand Prix racing in 1925, and the Dutch Grand Prix started that same year.

There are about as many forms of motorcycle racing as there are of automobile racing. The main types are road racing, off-road racing, trials, speedway, motocross, drag racing, ice racing, and hill climbs.

Road races are held on closed courses, parts or all of which may be public roads. The motorcycle road-racing world championships were established in 1949; in these races, machines are divided into classes based on engine displacement, engine type (two- or four-stroke), number of cylinders, and customizing allowed. Offroad motorcycle racing developed following World War II as an alternative to trail racing and has become popular in the American Southwest. Drivers typically must improvise their own routes from start line to finish line.

Motorcycle trials, which date back to pre-World War I days, are relatively slow, on-and-off highway events of long duration in which speed is not a determining factor. Speedway racing, which came into being in the early 1920s in Australia, is conducted on short, flat oval dirt tracks for short distances. The machines used are ultralightweight, with small fuel tanks and small brakes.

Motocross is a type of cross-country race consisting of a specified number of laps over a closed course laid out on rough, natural terrain. Motocross racing was introduced in Great Britain and on the European continent in the late 1940s and early '50s, and by the '60s it had become a popular spectator sport. It was demonstrated in North America in the 1960s, and the first regularly scheduled series of motocross events there was held in 1970.

Motorcycle drag racing is an American event dating from about 1950. This type of racing consists of a series of acceleration, or top speed, contests, each between two racers, on a straight, smooth-surfaced course that is one-quarter mile long. Motorcycle ice racing started in Scandinavia in the 1930s and has spread to other temperate-climate countries. It is held on ovals on frozen lakes or on ice-covered stadium tracks, and the bikes use spiked (studded) tires. Motorcycle hill climbs are uphill-road races in which each rider races against the clock, and only one machine is in motion at any time.

Motorola, Inc., American manufacturer of wireless communications, electronic systems, and semiconductors. Its headquarters are located in Schaumberg, Ill.

The company was founded in 1928 in Chicago by brothers Paul and Joseph Galvin as the Galvin Manufacturing Corp. In 1930 the company began selling a low-cost automobile radio, called the Motorola, that became the most popular new-car option. During World War II the company developed the Walkie-Talkie for the military.

In 1947 the company changed its name to Motorola, which was by then a well-known brand name, and the next year extended its role in the U.S. consumer market by introducing a television set and later a high-fidelity phonograph.

Motorola licensed the design for transistors from Bell Laboratories in 1952 and began to sell them to other manufacturers in 1956. By 1962 the company had more than 4,000 different electronic components on the market. One of the largest early markets was for automobiles. In 1962 Motorola began supplying radio communications gear to NASA.

In 1974 the company sold its Quasar television line to Masushita Electrical Industrial Co., Ltd., of Japan, ending most of its historic consumer business. That same year, Motorola released its first microprocessor for sale to computer makers. Its most popular computer chips, the MC680x0 series, were used in all of the early Apple Macintosh computers. In 1993 the company developed the first consumer RISC (reduced-instruction-set computing) chip, the PowerPC, with IBM Corporation and Apple Computer, Inc., in an unsuccessful attempt to unseat Intel Corporation as the leading seller of microprocessors. Motorola was more successful in the market for embedded microprocessors, which became ubiquitous in automotive control units, industrial control systems, and such common items as kitchen appliances, pagers, video games, and handheld personal computers. In this market Motorola became the leading manufacturer.

In 1977 Motorola developed a handheld wireless telephone that was able to communicate with the public telephone network through a system of short-range "cells." By 1985 most major cities in the world were installing cellular systems, and in 1989 the company introduced the MicroTAC flip cellular phone, which quickly became an international status symbol. The overwhelming success of cellular telephony inspired the company to invest in the development of Iridium, a system of 66 small satellites deployed in low-Earth orbit that enabled communications over virtually the entire surface of the Earth. Operational in 1998, Iridium found too few subscribers for its expensive service, and Motorola pulled out of the venture.

motorway: *see* expressway.

Motown, in full MOTOWN RECORD CORPORATION, also called HITSVILLE, recording company founded by Berry Gordy, Jr., in Detroit, Mich., U.S., in January 1959 that became one of the most successful black-owned businesses and one of the most influential independent record companies in U.S. history. The company gave its name to the hugely popular style of soul music it created.

After an attempt at a professional boxing career and a stint in the army, Gordy briefly owned a record store, then worked as an independent songwriter and record producer. Despite cowriting hit songs for Jackie Wilson, Gordy remained on the fringes of the pop music business until he discovered singer and songwriter William ("Smokey") Robinson, then a Detroit high school student. After recording Robinson's group, the Miracles, in

1959 for End Records and establishing Jobete Publishing Company, Gordy began Motown Records (its name derived from Detroit's nickname, "Motor City").

Motown capitalized on the ascendance of a new urban dance music, rhythm and blues, which was almost exclusively recorded by small independent labels. Indeed, by the late 1950s two other black-owned independent record companies, Peacock (in Houston, Texas) and Vee Jay Records (in Chicago), had been enjoying success for nearly a decade—partly because of the growth of black radio since World War II.

Gordy assembled an extraordinary array of local talent at the house at 2648 West Grand Boulevard that served as both recording studio and administrative headquarters. In addition to the Miracles, who had Motown's first million-selling single, "Shop Around" (1960), the company's rooster included Marvin Gaye, Stevie Wonder, Mary Wells, the Temptations, Martha and the Vandellas, the Marvelettes, and the Four Tops. Yet, despite the considerable acclaim these performers garnered, no Motown act of the 1960s matched the success of the Supremes, a girl group with glamorous lead singer Diana Ross, who scored a string of number one hits including "Where Did Our Love Go" (1964).

Motown's songwriters and producers—most notably Robinson; Brian Holland, Lamont Dozier, and Eddie Holland; and Norman Whitfield—gained fame in their own right. The company also had an extraordinary house band, including Earl Van Dyke (keyboards), Benny Benjamin (drums), and James Jamerson (bass), that contributed greatly to the development of the Motown sound, a branch of soul music that featured more sophisticated arrangements and orchestration than the grittier Southern soul that contemporaneously flourished in Memphis, Tenn. Motown brought together rhythm-and-blues, gospel, and pop influences as it sought to "cross over" (*i.e.,* move beyond single-genre listeners) to reach a wide audience that included white teenagers. Motown records were specifically mixed to sound good on car radios and were characterized by a thumping backbeat that made dancing easy for everyone.

Motown sought to be and indeed became the "Sound of Young America," enjoying its greatest success between 1965 and 1968, when it dominated the Billboard charts. Although the company was never quite the force in the 1970s that it was in the '60s (having lost several key performers), it was still a formidable enterprise with the Jackson 5, the Commodores, Wonder, and Ross. It also moved successfully into filmmaking in the 1970s when it relocated to Los Angeles. In the 1980s Gordy found it difficult to prosper in a music industry increasingly dominated by multinational conglomerates, and in 1988 he sold Motown to MCA, which later sold the company to PolyGram.

Motse (Chinese philosopher): *see* Mo-tzu.

Mott, Charles Stewart (b. June 2, 1875, Newark, N.J., U.S.—d. Feb. 18, 1973, Flint, Mich.), American automotive industrialist and philanthropist.

In 1900, when Mott started managing the Weston-Mott Co., his family's bicycle-tire manufacturing firm in Utica, N.Y., he expanded the business by manufacturing wheels for automobiles as well as bicycles. As president of the company from 1903 to 1913, Mott moved the company to Flint in 1906 to be close to the production centre of the growing automobile industry.

When General Motors was formed in 1908, Mott acquired a great quantity of their stock in exchange for 49 percent of his Weston-Mott holdings. In 1913, when Weston-Mott had become the world's leading supplier of automobile axles, Mott traded in the remaining 51 percent of his Weston-Mott stock for General Motors stock. (By 1942 he was the corporation's largest stockholder.) Mott was active in General Motors leadership as a corporation director from 1913 until his death and was also a vice president from 1916 to 1937.

Mott was mayor of Flint three times between 1912 and 1918. In 1926 he created the Charles Stewart Mott Foundation. His subsequent gifts of cash and stock made his foundation one of the largest in the country, with $300 million in assets by the time of his death. The foundation funded a wide range of social and educational services for Flint, among other projects.

Mott, John R., in full JOHN RALEIGH MOTT (b. May 25, 1865, Livingston Manor, N.Y., U.S.—d. Jan. 31, 1955, Orlando, Fla.), American Methodist layman and evangelist who shared the Nobel Prize for Peace in 1946 (with Emily Greene Balch) for his work in international church and missionary movements.

John R. Mott, 1930

By courtesy of the National Council of the Young Men's Christian Association, New York

Mott became student secretary of the International Committee of the Young Men's Christian Association (YMCA), holding this position from 1888 until 1915. He was one of the organizers of the World Missionary Conference (Edinburgh, 1910), which marked the beginning of the modern ecumenical movement and which ultimately resulted in the formation of the World Council of Churches. He was chairman of the Student Volunteer Movement for Foreign Missions (1915–28) and of the International Missionary Council (1921–42) and president of the World's Alliance of YMCAs (1926–37).

Mott, Lucretia, *née* COFFIN (b. Jan. 3, 1793, Nantucket, Mass., U.S.—d. Nov. 11, 1880, near Abington, Pa.), pioneer reformer who, with Elizabeth Cady Stanton, founded the organized women's rights movement in the United States.

At the age of 13, young Lucretia was sent to a Friends' boarding school near Poughkeepsie, N.Y., where two years later she was engaged as an assistant and later as a teacher. It was then that her interest in women's rights began. Solely because of her sex, she was paid only half the salary male teachers were receiving.

After her marriage in 1811 to James Mott, also a teacher at the school, the couple moved to Philadelphia. Both were members of the Society of Friends, and Lucretia became an official Quaker minister in 1821. The Motts were active in the campaign against slavery, and, after the passage of the Fugitive Slave Law of 1850, their home became a sanctuary for runaway slaves.

In 1848, taking up the cause of women's rights, she and Stanton called a convention at Seneca Falls, N.Y., the first of its kind, "to discuss the social, civil, and religious rights of women." The convention issued a "Declaration of Sentiments" modeled on the Declaration of Independence; it stated that "all men and women are created equal . . . ." From that time Mott devoted most of her attention to the women's rights movement. She wrote articles ("Discourse on Woman" appeared in 1850), lectured widely, was elected president of the 1852 convention at Syracuse, N.Y., and attended almost every annual meeting thereafter. After the Civil War (1861–65) she also worked for voting rights and educational opportunities for freedmen. Until her death at 87, she maintained her reputation as one of the most consistently effective reformers in the country.

Lucretia Mott

By courtesy of the Library of Congress, Washington, D.C.

Mott, Sir Nevill F., in full SIR NEVILL FRANCIS MOTT (b. Sept. 30, 1905, Leeds, West Yorkshire, Eng.—d. Aug. 8, 1996, Milton Keynes, Buckinghamshire), English physicist who shared (with P.W. Anderson and J.H. Van Vleck of the United States) the Nobel Prize for Physics in 1977 for his independent researches on the magnetic and electrical properties of noncrystalline, or amorphous, semiconductors.

Mott earned bachelor's (1927) and master's (1930) degrees at the University of Cambridge. He was a lecturer at Manchester University in 1929 and professor of theoretical physics at the University of Bristol in 1933. At Bristol his work in solid-state physics included studies of metals and metal alloys, semiconductors, and photographic emulsions. In 1938 Mott devised the theoretical description of the effect that light has on a photographic emulsion at the atomic level. In 1954 he became Cavendish professor of experimental physics at the University of Cambridge, retiring in 1971.

Mott's studies of electrical conduction in various metals led him in the 1960s to explore the conductivity potential of amorphous materials, which are so called because their atomic structures are irregular or unstructured. He devised formulas describing the transitions that glass and other amorphous substances can make between electrically conductive (metallic) states and insulating (nonmetallic) states, thereby functioning as semiconductors. These glassy substances, which are relatively simple and cheap to produce, eventually replaced more expensive crystalline semiconductors in many electronic switching and memory devices, and this in turn led to more affordable personal computers, pocket calculators, copying machines, and other electronic devices. Mott was knighted in 1962.

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Mottelson, Ben R., in full BEN ROY MOTTELSON (b. July 9, 1926, Chicago, Ill., U.S.), American-Danish physicist who won a Nobel Prize for Physics (1975) for his work in determining the asymmetrical shapes of certain atomic nuclei and the reasons behind such asymmetries.

Having taken his doctorate in theoretical physics at Harvard University in 1950, Mottelson accepted a fellowship at the Niels Bohr Institute of Theoretical Physics in Copenhagen and then joined the faculty of the Nordic Institute for Theoretical Nuclear Physics there; he subsequently became a naturalized Danish citizen. From experiments conducted in collaboration with Aage N. Bohr in the early 1950s, Mottelson discovered that the motion of subatomic particles can distort the shape of the nucleus, thus challenging the widely accepted theory that all nuclei are perfectly spherical. Subsequently it was discovered that such asymmetries occur in atoms of all elements. For his work, Mottelson was awarded, jointly with Bohr and James Rainwater, the Nobel Prize for Physics in 1975.

Mottl, Felix (b. Aug. 24, 1856, Unter-St.-Veit, Austria—d. July 2, 1911, Munich, Ger.), Austrian conductor known for his performances of the operas of Richard Wagner.

Mottl studied at the Vienna Conservatory and took part in the Bayreuth festival in 1876, conducting *Tristan and Isolde* there in 1886. From 1881 to 1903 he directed the opera at Karlsruhe, which he developed into one of the finest opera companies in Germany. There he was noted for his performances of all the operas of Hector Berlioz and of Wagner. He conducted several times in England, and in 1903–04 at the Metropolitan Opera, New York. Subsequently he was conductor at Munich. He was active as a conductor of symphonies as well as of opera. He orchestrated Wagner's *Wesendonck Lieder* and works by Emmanuel Chabrier and edited Peter Cornelius' opera *Der Barbier von Bagdad.*

mottramite, vanadate mineral similar to descloizite (*q.v.*).

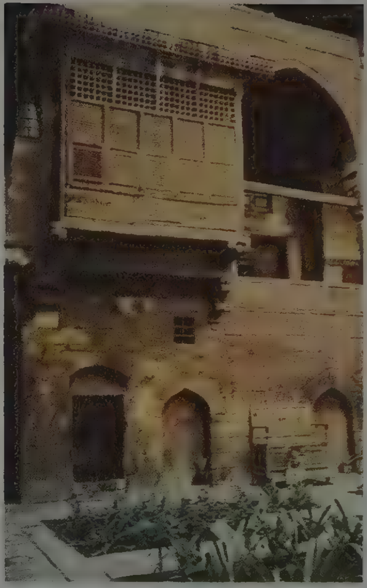
motu proprio (Latin: "on one's own initiative"), in the Roman Catholic church, a papal document personally signed by the pope to signify his special interest in the subject, less formal than constitutions and carrying no papal seal. Its content may be instructional (*e.g.,* on the use of plainchant), administrative (*e.g.,* concerning a church law or the establishment of a commission), or merely to confer a special favour. The words *motu proprio* always introduce the document.

Motze (Chinese philosopher): *see* Mo-tzu.

mou, Chinese unit of land measurement that varies with location but is commonly 806.65 square yards (0.165 acre, or 666.5 square m). Based on the *ch'ih,* a unit of length measuring 14.1 inches, the *mou* has been defined by customs treaty as 920.417 square yards. In ancient China, where units of measure displayed great regional and functional variety, the *mou* ranged from 1/30 to 1/8 hectare (333.333 to 1,250 square m).

Mouanda, also spelled MOANDA, town, southeastern Gabon. Large manganese deposits were discovered near the town in 1938, and exploitation began in 1951; the reserves are estimated to be among the world's largest. A consortium of American and French mining interests built a plant for producing manganese dioxides, as well as schools, roads, airfields, two hospitals, and several dispensaries, in the locality. The company also has facilities for training skilled workers, draftsmen, and chemists and promotes literacy classes. An influx of workers from neighbouring areas has caused the population of Mouanda to increase rapidly. Pop. (1985 est.) 45,500.

Mouaskar (Algeria): *see* Mascara.

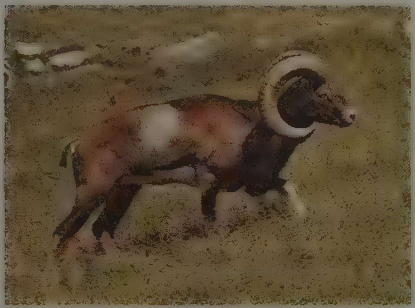


Muslim house with a moucharaby, Cairo
A.A.A.—FPG/EB Inc.

moucharaby, Arabic MASHRABĪYAH, or MUSHRABĪYAH, in Islāmic or Islāmic-influenced architecture, an oriel, or projecting second-story window of latticework. The moucharaby is a familiar feature of residences in cities of North Africa and the Middle East; in France, where it was introduced from colonial sources, it is known as *moucharabieh.* These windows are characterized by the use of grills or lattices to replace glass and shutters. The grills are composed of small, turned (shaped on a lathe) wooden bobbins put together in intricate geometric patterns.

Moucharaby work, delicate and beautiful, provides the interior with light and air as it shades it from the hot African sun. It also permits those within to observe the street below and at the same time maintain their privacy, which was particularly important for the women of the segregated Muslim harem.

mouflon (*Ovis musimon*), small wild sheep, family Bovidae (order Artiodactyla), of Corsica, Sardinia, and Cyprus. The mouflon stands about 70 cm (27–28 inches) at the shoulder and is reddish brown with white underparts. The male has a light, saddle-shaped mark on its back and bears large, curving horns with the tips turned outward. The female is hornless. The mouflon has been introduced into parts of Europe but has become endangered in its original range. It is thought by some to be one of the animals from which the domestic sheep (*Ovis aries*) was derived.



Mouflon (*Ovis musimon*)
Anthony Mercieca from Root Resources—EB Inc.

Mouhot, (Alexandre-)Henri (b. May 15, 1826, Montbéliard, Fr.—d. Nov. 10, 1861, near Luang Prabang, Laos), French naturalist and explorer who alerted the West to the ruins of Angkor, capital of the ancient Khmer civilization of Cambodia (Kampuchea).

Mouhot went to Russia as a young professor of philology in the 1850s and traveled throughout Europe with his brother Charles, studying photographic techniques developed by Louis Daguerre. In 1856 the two went to England, where Henri devoted himself to zoological studies. British academic societies proved sympathetic to Mouhot's interest in natural history and foreign travel, and he received support from the Royal Geographical Society and the Zoological Society of London for a zoological mission to Indochina in 1858.

While exploring the tributaries of the Mekong River in Siam (Thailand), Cambodia, and Laos in 1858, Mouhot, came upon Angkor. Through Mouhot, Angkor became known to Western scholars as an important archaeological site.

Mouhot, a tireless explorer, was warmly received by the sovereigns of the several kingdoms and tribes he visited. In October 1861 Mouhot was overcome by jungle fever, and he succumbed to it just a few weeks later. He was buried near Luang Prabang, where in 1867 a tomb was erected in his honour by the French.

Mouhot's explorations are recorded in his *Voyage dans les royaumes de Siam, de Cambodge, de Laos et autres parties centrales de l'Indo-Chine* (1863; *Travels in the Central Parts of Indo-China, Cambodia and Laos During the Years 1858, 1859, and 1860*).

Mouila, town, southwestern Gabon. It lies along the Ngounié River and on the road from Lambaréné to Pointe-Noire. The town is a trading centre in cassava, bananas, yams, groundnuts (peanuts), and corn (maize). Coffee and palm oil are important exports, and there is a cooperative palm-oil mill at Moabi, 35 miles (56 km) southwest. Diamonds are found at nearby Makongonio and gold at Ekété, but production of both is small. Mouila has a Roman Catholic church and teachers' college, a Protestant church, a hospital, and a government secondary school. Pop. (1985 est.) 37,500.

Moulay (Muslim title): *see under* proper name (*e.g.,* Hassan I *for* Moulay Hassan I).

mould (fungus): *see* mold.

moulding (architecture): *see* molding.

moulin (French: "mill"), a nearly cylindrical, vertical shaft that extends through a glacier and is carved by meltwater from the glacier's surface. Postglacial evidence of a moulin, also called a glacial mill, is a giant kettle, or, more properly, a moulin pothole, scoured to great depth in the bedrock by the rocks and boulders transported by the falling water. A moulin pothole in Lucerne, Switz., was scoured to a depth of 8 m (27 feet). Although the process of formation is thought to be approximately the same as that of a fluvial pothole, the moulin pothole can be distinguished by its location. Moulin potholes have been found on hilltops and steep slopes and may occur scattered over a valley floor, without the kind of alignment that occurs when streams are involved. A moulin is noted for the thunderous sound of the meltwater that funnels into it.

Moulin, Jean (b. June 20, 1899, Béziers, Fr.—d. July 8, 1943, Metz, Ger. [now in France]), French civil servant and hero of the Résistance during World War II.

After studying law at Montpellier, Moulin entered the civil service. In 1930 he became the youngest subprefect (in charge of an *arrondissement*) and in 1937 the youngest prefect (of the Eure-et-Loir *département*) in all of France. When the Germans occupied his *département* in 1940, he refused to sign a document describing atrocities alleged to have been committed by the French army and tried to commit suicide.

After being removed from his prefecture, he joined the Résistance and escaped to England. He returned to France in January 1942 as General Charles de Gaulle's delegate general for the unoccupied zone. He played a leading part in the organization of the Maquis (French guerrillas who fought the Germans) and in the development of the National Council of the Résistance, which coordinated all the noncommunist resistance groups in France and secured their loyalty to de Gaulle's Free French movement. Moulin became the first chairman of this council in May 1943. His organizational abilities and political skills made him a legendary figure. In June 1943, however, the Gestapo arrested him at Caluire, near Lyon. Tortured in one prison after another, he died in a train taking him to Germany.

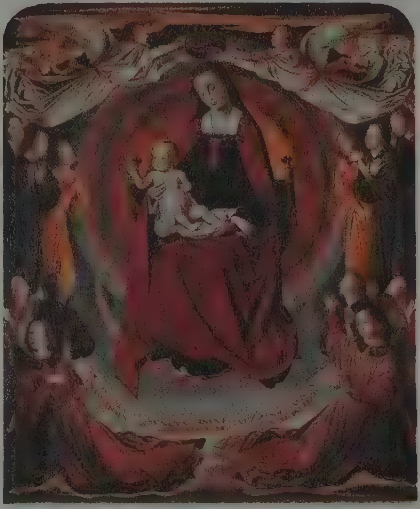
Moulin, *c.* 1940
H. Roger-Viollet

Moulins, town, capital of Allier *département,* Auvergne *région,* central France. It lies northwest of Lyon and is situated on the right bank of the Allier River.

The town's 16th- to 17th-century Flamboyant Gothic Cathedral of Notre-Dame houses the famous triptych by the 15th-century Dutch painter referred to as the Master of Moulins (*q.v.*). The cathedral has some fine 15th- and 16th-century stained-glass windows. The nearby 15th-century tower has a quaint *jaquemart* clock with automatons that strike the quarter-hours. The municipal library opposite contains the 12th-century Bible of Souvigny, a magnificent illuminated manuscript from Souvigny Priory, 7 miles (12 km) southeast of Moulins. Part of the ancient castle of the dukes of Bourbon currently serves as a prison. The town, which has some fine old houses, reached a high state of prosperity in the 15th and 16th centuries. Today it has light industries (footwear and electromechanical appliances) and food processing; it is also a market town for a prosperous agricultural region. Pop. (1982) 25,096.

Jacquemart (or jack) clock and tower in Moulins, Fr.; in the background are the steeples of the Cathedral of Notre-Dame
Editions Modernes "Theojac"

Moulins, Master of (fl. *c.* 1480–*c.* 1500), anonymous French painter and miniaturist, considered the most significant artist of the French school of International Gothic painting. His anonym derives from his most notable work, a triptych (*c.* 1498) in the Cathedral of Notre-Dame at Moulins. While the brittle draperies, explicit detail, and enamel-like colours of this work reveal the artist's lifelong affinity for Flemish art (especially with that of Hugo van der Goes, under whom he may have studied), his style is unmistakably rooted in French artistic traditions, particularly those of Bourges and the Bourbonnais schools. The modeling of the faces suggests that he may also have been familiar with Italian art.


"Madonna and Child Surrounded by Angels," central panel of the triptych by the Master of Moulins, *c.* 1498; in the Cathedral of Notre-Dame, Moulins, Fr.
Telarci—Giraudon from Art Resource/EB Inc.

Other paintings, such as the well-known "Nativity with Cardinal Rolin" (*c.* 1480), "Portrait of a Praying Child" (*c.* 1495), and "Female Donor with St. Magdalen" (*c.* 1495–1500), are attributed to the Master of Moulins on the basis of their stylistic relationship to the Moulins triptych. These works and others attributed to him indicate that he worked mainly for King Charles VIII, the Bourbon family, and the archduchess Margaret of Austria.

A number of attempts have been made to identify the Master of Moulins. One hypothesis, based on the sitters of his portraits, identifies him as Jean Perréal, official painter of Charles VIII and of Margaret of Austria. Another theory, based only on a strong similarity of style, identifies him with Jean Hay of Flemish origin, the painter of an "Ecce Homo" (1494) in the Musée d'Art Ancien, Brussels.

Moulins faience, tin-glazed earthenware produced in Moulins, Fr., at first a slavish copy of the wares of nearby Nevers. It is distinguished only by its use of an iron red not found on Nevers ware. Later, Moulins showed more originality, especially in its ware decorated in Chinese style. Typical themes in this style are a Chinese standing near a large flowered plant and holding a parasol, the so-called Chinese music lover, and the Tatar rider.

Moulmein, town, southeastern Myanmar (Burma). It is an important port on the Gulf of Martaban near the mouth of the Salween River. Moulmein was the chief town of British Burma from the Treaty of Yandabo (1826) until the annexation of Pegu in 1852. Sheltered by Bilugyun Island, it is approached from the south and lies opposite Martaban at the confluence of the Gyaing and Ataran rivers. The low hills that flank the town on the east and west are dotted with ancient pagodas, including the Kyaikthanlan, renowned for its view, and Uzina, with life-sized figures representing the four events that influenced the Buddha to become a hermit. The city lies in an area that has a sizable Mon population.

Moulmein has ferry service to Martaban, which is the railhead for a line to Yangon (Rangoon). Another rail line begins at Moulmein and ends at Ye to the south. River steamers ply the lower Salween and several of its major tributaries. Teak and rice are floated downriver for export, and there are several steam-powered rice mills and sawmills. Moulmein was once a busy shipbuilding centre, and it has remained an important port. It has an airport, a diesel electric plant, and a museum and is noted for its gastronomy. Moulmein College is affiliated with the Arts and Science University of Yangon. A state teacher-training college and a large hospital are also located there. Moulmein is the site of a solar-powered plant for extracting salt from seawater. Pop. (1983) 219,991.

Moulouya, Wadi, chief river of northeastern Morocco. Rising in the High Atlas mountains in central Morocco, it flows for 320 miles (515 km) northeastward through a semiarid valley to the Mediterranean Sea just west of the Algerian border. Although not navigable and of irregular volume, it has been harnessed by a dam (completed 1967) at Mechra Klila to provide electricity for the towns of northern Morocco. Lead and manganese deposits are worked in the river valley.

moult (biology): *see* molt.

Moultrie, William (b. Dec. 4, 1730, Charleston, S.C. [U.S.]—d. Sept. 27, 1805, Charleston), American general who resisted British incursions into the South during the U.S. War of Independence (1775–83).

Elected to the provincial assembly of South Carolina (1752–62), Moultrie gained early military experience fighting against the Cherokee Indians. A member of the provincial congress (1775–76) at the outbreak of the Revolution, he sided with the patriot cause and took command (March 1776) of a fort he had built of sand and palmetto logs on Sullivan's Island off Charleston. He held the fort against heavy British attack on June 28, and it was named

Moultrie, oil painting on wood by John Trumbull, 1791; in Yale University Art Gallery
Yale University Art Gallery

Fort Moultrie in his honour. He received the thanks of the federal Congress and was made a brigadier general in the Continental Army that September.

Moultrie went on to campaign in Georgia and dislodged the British from Beaufort, S.C. (February 1779), but surrendered with the fall of Charleston (May 1780). He was a prisoner on parole until February 1782, when he was exchanged, and he then served until the end of hostilities. After the war he served two terms as governor of his state (1785–87, 1792–94) and in the state senate between terms. He was also a member of the state convention that ratified the federal Constitution.

Mounana, town, southeastern Gabon. It lies along the road from Lastoursville to Franceville. Uranium was discovered in the locality in 1956, exploitation began in 1961, and in 1968 mining changed from quarry to underground. The ore, which is of a superior grade, is sold to France for processing, although Mounana has its own processing plant for uranium concentrates. Extensive manganese deposits are mined at Mouanda, 13 miles (20 km) south. Pop. (1993) 6,372.

mound builder (bird): *see* megapode.

Mound City Group National Monument (Ohio, U.S.): *see* Hopewell Culture National Historical Park.

Mound State Monument, habitation site (from AD 1200 to 1500) of Indian farmers and pottery makers, near Moundville, western Alabama, U.S. It lies on a plain above the Black Warrior River, 17 miles (27 km) south of Tuscaloosa.

Archaeological excavations, started in 1906 by Clarence B. Moore, led to the establishment (1933) of Mound State Park, which became a state monument in 1938. Developed by the Alabama Museum of Natural History, it became part of the museum in 1961. The monument (315 acres [127 hectares]) contains 40 square and rectangular flat-topped earth mounds that were used as foundations for dwellings rather than for burial. The largest, Mound B (58.5 feet [18 m] high and about 2 acres at its base), was the foundation of a temple. A museum (1939) is built partly over exposed burial grounds.

Moundou, city, southwestern Chad, on the Logone River. With a warm, seasonally wet climate, it lies in the centre of the nation's cotton-growing region and is the site of a cotton-research institute established in 1939. It is also the site of one of Chad's largest commercial enterprises, a brewery established in 1964. Moundou has a secondary-school branch, a hospital, an electrical-power supply, and a local air service. The Logone is seasonally navigable from Moundou to N'Djamena. Pop. (1993) 99,530.

Moundsville, city, seat (1835) of Marshall county, northwestern West Virginia, U.S. It lies along the Ohio River, just south of Wheeling. The original settlement, known in 1771 as Grave Creek for a large Indian burial mound (now within city limits), was renamed Elizabethtown in 1798. Mound City was established nearby in 1831, and the two communities were consolidated as Moundsville in 1865. The city is in a rich coal-mining area and has varied industries, including one of the largest handmade-glass factories in America. The city is also the site of a state penitentiary. Grave Creek Mound, one of the nation's largest conical Indian mounds, is 69 feet (21 m) high, 50 feet (15 m) across the top, and 900 feet (275 m) in circumference. Numerous relics dating from 800 BC have been recovered from two burial chambers in excavations begun in 1838. Inc. city, 1911. Pop. (2000) 9,998.

Mount, William Sidney (b. Nov. 26, 1807, Setauket, Long Island, N.Y., U.S.—d. Nov. 19, 1868, Setauket), American genre painter who mainly depicted rustic life in his native Long Island. He was one of the first and best 19th-century American anecdotal painters.

A farm boy until age 17, Mount apprenticed himself to his older brother Henry, a sign painter working in New York. They were joined by another brother, Shepard Alonzo (1804–68), who eventually became a portrait painter. In 1826, when the National Academy of Design opened drawing classes, Mount was one of its first students. He stayed only a year before returning to Setauket, where he continued painting and exhibiting his work. He became an associate member of the design academy in 1832 and a full member in 1833.

"Eel Spearing at Setauket," oil on canvas by William Sidney Mount, 1845; in the New York State Historical Association, Cooperstown

By courtesy of the New York State Historical Association, Cooperstown

Mount began by painting historical subjects. His first genre painting, "The Rustic Dance" (1830), was an immediate success, and Mount never departed from this vein. His genial portrayals of country life—a blend of affection and humour—are a valuable record of a bygone agrarian age. The recognizable situations and the detailed representational character of Mount's paintings struck a responsive chord in Victorian America. Mount did not sentimentalize but portrayed the relationship of his subjects with naturalness and simplicity.

Mount Ābu (India): *see* Ābu.

Mount Aspiring National Park, park in west-central South Island, New Zealand. Established in 1964, it has an area of 1,223 square miles (3,167 square km). Embracing a substantial area of the Southern Alps, it is bounded by the Olivine and Haast ranges (west), Mataketake and Thomas ranges (north), Young Range (east), and Richardson and Harris mountains (southeast). The park's northern boundary is the Haast River, and in the south it is bounded by Fiordland National Park.

Tussock moorland at Lake Harris in Mount Aspiring National Park, South Island, New Zealand

Gerald Cubitt

The park's landscape is varied and complex, being the source of headwaters of seven major rivers, and featuring glaciers, rocky mountains, gorges, waterfalls, and passes. Its forests are mostly protected to control soil erosion and stream flow. Silver and mountain beech forests are found in the east, and dense ratakamahi forests are in the west. The vegetation has been extensively depleted by the introduction of red deer, chamois, and goats. Birds common in the park include the tui, bellbird, fantail, gray warbler, and pipit, and kaka, kea, and kiwi are also seen. The park has scientific, wilderness, natural-environment, and development areas.

Mount Barker, town, southwest Western Australia, lying at the base of 1,890-foot (576-metre) Mount Barker, which was sighted in 1829 and named after Captain Collett Barker, the last military commandant at Albany on the coast, 35 miles (56 km) south. The town, proclaimed in 1899, is the administrative headquarters of Plantagenet shire. Situated on the Great Southern Railway and Albany Highway to Perth (210 miles northwest), it is a processing centre for a region of beef, sheep, grape, apple, and vegetable farming and manufactures concrete pipe. Mount Barker is a base for excursions to the scenic Porongorup and Stirling ranges. Pop. (1986) 1,390.

Mount Carmel, borough, Northumberland county, east-central Pennsylvania, U.S., at the head of Shamokin Creek. Settled about 1775, it was laid out in 1848 and became an anthracite-coal-mining town. The economic mainstay is now light manufacturing. Inc. 1862. Pop. (2000) 6,390.

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Mount Cenis Tunnel, first great Alpine tunnel to be completed. It lies under the Fréjus Pass, from Modane, France, to Bardonècchia, Italy. The 8.5-mile (13.7-kilometre) rail tunnel, driven from two headings from 1857 to 1871, was constructed under the direction of Germain Sommeiller, and it pioneered several techniques, notably the use of dynamite in rock blasting, an improved rock drill invented by Sommeiller, and compressed-air machinery developed by Daniel Colladon of Geneva. Mount Cenis was the first long-distance rock tunnel driven from two headings with no intervening shafts and as such remains a landmark engineering achievement. Running roughly parallel with it is the Fréjus Tunnel (8 miles [12.9 km] long), which was completed in 1980 and carries automobile traffic.

Mount Clemens, city, seat (1818) of Macomb county, southeastern Michigan, U.S. It lies along the Clinton River, near the latter's mouth on Lake St. Clair, immediately northeast of Detroit. The site's permanent settlement dates from 1795, and Christian Clemens laid out the town in 1818. Cooperage and glassmaking were early economic activities, and since 1873 local sulfurous health springs have attracted bathers. Mount Clemens is noted for its pottery and is one of the nation's largest producers of roses under glass. At Grand Trunk Station, the young Thomas Edison first learned telegraphy. The Center Campus of Macomb County Community College (1954) is located in the city. Inc. village, 1851; city, 1879. Pop. (2000) 17,312.

Mount Cook National Park, park, in west-central South Island, New Zealand. Established in 1953, it has an area of 270 square miles (700 square km) and has a common western boundary with Westland National Park. The park extends for about 40 miles

(65 km) along the crest of the Southern Alps. At the park's widest point, the eastern boundary is 10 miles (16 km) from the main divide of the Southern Alps. Some 27 peaks rising to more than 10,000 feet (3,000 m) are located within the park. Mount Cook, the highest point in New Zealand at 12,349 feet (3,764 m), dominates the valleys, glaciers, and surrounding peaks.

More than a third of the park is covered by permanent snow and glacial ice. The Tasman, Godley, and Murchison are the principal rivers, being the outfall of park glaciers of the same names. Trees include beech, tussock, ribbonwood, alpine scrub, tree daisies, celery pine, and others. There are kea (alpine parrot), rock wren, bush hawk, pipit, pigeon, fantail, warbler, and a number of other varieties of birdlife. The park's animal life includes tahr (a type of wild goat), chamois, red deer, feral cat, and others. Mountain climbing, skiing, hunting, and walking provide recreation to visitors.

Mount Darwin, town, northern Zimbabwe. It formerly served as administrative headquarters for the Tribal Trust Lands areas set aside for African occupation and is now home to the Makorekore people. Mount Darwin was probably the earliest site for European missionary efforts in Zimbabwe, and the Jesuit Father da Silveria met with a fatal rebuff there in 1561. The town is also an agricultural and mining (gold, asbestos) centre. To the southeast, Mount Darwin, named for the naturalist Charles Darwin, rises 4,951 feet (1,509 m) above sea level. Africans call it Pfura, meaning "rhinoceros." Pop. (1982) 5,335.

Mount Desert Island, island in Hancock county, southeastern Maine, U.S., in Frenchman Bay of the Atlantic Ocean. With an area of 108 square miles (280 square km), it is 15 miles (24 km) long and about 8 miles (13 km) wide. Somes Sound, a 6-mile- (10-kilometre-) long, narrow fjord, divides it into eastern and western segments. The island was first visited in September 1604 by the French explorer Samuel de Champlain and was named by him for the bare-rock summits of its mountains. Until 1713 it was part of French Acadia.

Gorham and Champlain mountains, Mount Desert Island, Maine

Richard W. Brown

A bridge connects the mainland and the island's network of roads, bridle paths, and foot paths. Towns on the island included Bar Harbor, Mount Desert, Southwest Harbor, Northeast Harbor, Seal Harbor, and Tremont. In 1947 the island was swept by fire that destroyed many buildings and natural attractions. Mount Desert Island's 18 summits, including Cadillac Mountain (1,530 feet [466 m]), are the highest on the Atlantic Coast north of Rio de Janeiro.

The first eastern national park in the United States, Acadia National Park (*q.v.*), was established on the island in 1919; the park also includes picturesque Schoodic Point on the mainland and part of Isle au Haut. Pop. (1990) 9,618.

Mount Gambier, city, southeastern South Australia. It is situated 235 miles (380 km) southeast of Adelaide, with which it is connected by road, rail, and air. It lies at the foot of Mount Gambier (623 feet [190 m]), an extinct volcano with four crater lakes that was sighted in 1800 by Lieutenant James Grant of the Royal Navy, who named it after Admiral James (later Lord) Gambier. Stephen Henty surveyed the area in 1839, climbed the mountain, and established a livestock station in 1841. A private settlement called Gambier Town was founded in 1854 there by Hastings Cunningham and was proclaimed a municipality in 1876. Proclaimed a city in 1954, Mount Gambier is the centre of a mixed-farming area (cereals, potatoes, onions, livestock) and processes dairy foods, meats, and flour; woolens, cellulose, particleboard, veneer, and concrete pipes are manufactured. Local plantations of pine trees supply a timber industry; and coralline limestone, dolomite, and diatomite are mined in the vicinity. Pop. (1986) 20,813.

Mount Hagen, town, east-central New Guinea island, Papua New Guinea. The town, established as a patrol post in 1936, is near the Wahgi River, a tributary of the Purari. It takes its name from a 12,392-foot (3,777-metre) peak in the Hagen Range of the central highlands, 15 miles (24 km) northwest. It is believed that the mountain, an extinct volcano, once stood 6,000 feet (1,800 m) higher but was reduced by an ancient cataclysmic eruption.

Mount Hagen is on the Highland Highway, an important truck route leading 380 miles (610 km) east to Lae (on the coast). The town's industries include processing locally grown tea, coffee, and pyrethrum. There are also timber mills and a cordial factory. An airport has regularly scheduled flights. The town holds a large biennial agricultural show and is becoming an increasingly popular resort because of its mile-high elevation. Pop. (1985 est.) 16,800.

Mount Hareh (Egypt): *see* Sinai, Mount.

Mount Holly, township, seat (1795) of Burlington county, south-central New Jersey, U.S. It lies along Rancocas Creek, 19 miles (31 km) east of Philadelphia. Established by Quakers in 1677 and incorporated in 1688, it was known successively as Northampton and Bridgetown until it was renamed for the holly-covered hill on which it was built. A temporary capital of New Jersey during the U.S. War of Independence, Mount Holly was raided several times by the British. Surviving 18th-century buildings include the County Court House; the Friends Meeting House; the Stephen Girard House, home of the founder of Girard College (a Philadelphia school for orphan boys); the original building of the Relief Fire Company, one of the oldest volunteer fire companies in the United States; and the Woolman Memorial, honouring John Woolman (1720–72), Quaker reformer and abolitionist. Mount Holly serves as an agricultural-trade centre and has some light manufacturing. Pop. (1990) 10,639.

Mount Hood National Forest, national forest in northwestern Oregon, U.S., extending along the Cascade Range southward from the Columbia River. Established in 1911 and formerly called Oregon National Forest, it covers an area of 1,060,092 acres (429,003 hectares). The forest provides timber, water, forage, wildlife habitat, and recreation; it is drained by the Columbia, Sandy, Clackamas, Hood, and White rivers and their tributaries. Mount Hood (11,235 feet [3,424 m]), near the centre of the forest, is Oregon's highest point. Features of the national forest include Mount Hood Wilderness Area; Timberline Lodge; Multnomah Falls (605 feet [184 m]); Austin and Bagby hot springs; Timothy Lake; and Eagle Creek Trail, leading through a region of waterfalls. Recreational activities include hunting, fishing, skiing, mountain climbing, and hiking. Headquarters are at Portland.

Punch Bowl Falls, Mount Hood National Forest, Oregon

B. Nelson—Shostal/EB Inc.

Mount Hope Bay, bay, Rhode Island, U.S. It is the northeastern arm of Narragansett Bay, southwest of the city of Fall River, Mass. The bay is about 7 miles (11 km) long and 2–3 miles (3–5 km) wide and extends southwestward to the northern coast of Rhode (Aquidneck) Island, R.I. The Taunton River empties into the bay in the northeast. The Mount Hope Bridge (built 1929), the largest in New England, connects the Rhode Island cities of Portsmouth and Bristol at the bay's mouth. The battleship USS *Massachusetts,* now a state World War II memorial, is anchored at Fall River, Mass.

Mount Isa, mining city, Queensland, Australia, located at the northern end of the Selwyn Range. The city's name is attributed to John Campbell Miles, who in 1923 discovered deposits of silver-lead ore and named one of his leases after his sister Isabelle. Subsequently, Mount Isa Mines, Ltd., the principal leaseholder, developed the minefields, which are Australia's main source of silver, lead, zinc, and copper. In the early 1970s large silver, lead, and zinc deposits found at

Lead smelter at Mount Isa Mines, Queensland

By courtesy of the Australian Information Service

Hilton, about 20 mi (32 km) north of Mount Isa, made Mount Isa Mines, Ltd. the world's largest single producer of silver, lead, and zinc. Cattle are raised in the area, and there is an annual rodeo held there. Lake Moondarra nearby was formed in 1958 by damming the Leichhardt River. Pop. (1981) 23,679.

Mount Lofty Ranges, series of hills in southeastern South Australia, east of Adelaide. A southerly continuation of the Flinders Range, they extend south from Peterborough for 200 mi (320 km) to Cape Jervis. Averaging 15 to 20 mi wide, the ranges are divided at the Barossa Valley into northern and southern segments. The former is higher and rises to Mt. Byron (3,058 ft [932 m]); the latter has peaks generally below 2,000 ft with a high point at Mt. Lofty (2,385 ft). Most of the rivers originating in these hills, including the Onkaparinga, Gawler, Light, and Torrens, flow down the western slopes to the Gulf St. Vincent.

Cascade in the Morialta Falls Reserve situated in a gorge on the western side of the Mount Lofty Ranges, South Australia

By courtesy of the South Australia Publicity and Tourist Bureau

The ranges were named by Matthew Flinders, the explorer who viewed them offshore from Kangaroo Island in 1802. To Adelaide they are important as sources of food (orchards, truck gardens, and dairy farms in the valleys and hills), water, and recreation. Suburbs of Adelaide extend into the foothills. Belair National Park, in the ranges, has been comprehensively developed.

Mount McKinley National Park (Alaska, U.S.): *see* Denali National Park and Preserve.

Mount Morgan, mining town, eastern Queensland, Australia, in the Dee Range. One of Australia's most important gold strikes, called the "mountain of gold," was made there in 1882 by Edwin and Thomas Morgan. Although there were early difficulties in mining and treating the ore, the "Glory Hole" (½ mi [1 km] in diameter and 850 ft [260 m] deep) has yielded more than 100 tons of gold and 250,000 tons of copper, as well as large amounts of iron pyrites.

By 1982, however, all ore supplies were exhausted, and in that year a plant was opened to extract ore from tailings in an effort to keep the town alive. The opencut excavation has created a gaping, terraced crater in the mountain overlooking the town on the Dee River flats below. Declared a town in 1890, Mount Morgan was merged with the shire of Calliungal in 1931. It is linked by rail and the Burnett Highway to Rockhampton (22 mi north) and Brisbane (313 mi southeast). Pop. (1981) 2,974.

Mount of Olives (Jerusalem): *see* Olives, Mount of.

Mount Pleasant, city, seat (1836) of Henry county, southeastern Iowa, U.S., near the Skunk River, 28 mi (45 km) northwest of Burlington. Settled in 1834, it was surveyed in 1837 and named for its commanding elevation and pleasant shade trees. It is the site of the state's first courthouse (1839).

Mount Pleasant is now a livestock shipping point with some light industry, including the manufacture of bus bodies. It is the home of Iowa Wesleyan College (1842); the Harlan–Lincoln Museum on the campus was formerly the home of Sen. James Harlan, whose daughter Mary married Robert Todd Lincoln. Inc. 1842. Pop. (1990) 8,027.

Mount Pleasant, city, seat (1859) of Isabella county, central Michigan, U.S., on the Chippewa River, 46 mi (74 km) west of Bay City. It was an Indian trading post and lumber camp in the 1850s, later becoming a farming centre. Its development was sustained by the arrival of the railroad (1879) and the foundation (1892) of a normal school (which by 1959 had developed into Central Michigan University) and of a federal Indian school (1891; now operating as the Center for Human Development). After the discovery of oil in the vicinity (1927), the city became the state's "oil capital." Its economy is now balanced between diversified agriculture, industry, and educational activities. Inc. village, 1875; city, 1889. Pop. (1990) 23,285.

Mount Pleasant, town, Charleston county, southeastern South Carolina, U.S., on the Atlantic Intracoastal Waterway, overlooking Charleston Harbor and linked to Charleston (west) by the Cooper River (John P. Grace) Bridge. Settled in the 1690s, the town originated around Jacob Motte's plantation as a resort for island planters. Nearby Sullivan's Island, site of Ft. Moultrie (1776), was the setting for Edgar Allen Poe's story "The Gold Bug." The economy is based on pulp and paper, aircraft assembly, the Shem Creek shipyards, and the seafood industry. Inc. 1837. Pop. (1990) 30,108.

Mount Rainier National Park, national park, Washington, U.S., created in 1899 to preserve 235,404 ac (95,264 ha) of the Cascade Range, including Mt. Rainier, a dormant volcano 14,410 ft (4,392 m) high. This peak is sculptured by ice, and 41 glaciers remain around the summit. During the warm months, the park and the mountain are largely covered with wild flowers that bloom progressively higher up the slopes as the summer passes. The lower areas also have dense forests.

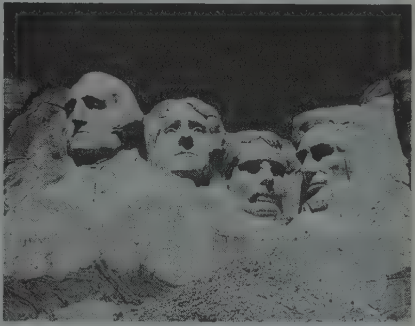
Mt. Rainier near the Chinook Pass in Mount Rainier National Park, Washington

By courtesy of the Union Pacific Railroad

The park's wildlife is likewise abundant and varied. Deer, elk, bears, and mountain goats are the largest animals; there are also raccoons, squirrels, and other smaller mammals. Small birds are also numerous.

Mount Revelstoke National Park, park, southeastern British Columbia, Canada, occupying the western slope of the Selkirk Mountains, above the city of Revelstoke, which lies at the junction of the Columbia and Illecillewaet rivers. Established in 1914, it covers an area of 100 sq mi (260 sq km). An 18-mi- (29-km-) long road leads from the Trans-Canada Highway to the summit of Mt. Revelstoke (6,375 ft [1,943 m]), which affords a spectacular view of three mountain ranges (Monashee, Selkirk, Purcell).

Mount Rushmore National Memorial, national memorial (6,000 ft [1,829 m]) in the Black Hills of southwestern South Dakota, U.S., 25 mi (40 km) southwest of Rapid City. Huge sculptures of the heads of presidents George Washington, Thomas Jefferson, Abraham Lincoln, and Theodore Roosevelt are carved in granite on the northeast side of Mt. Rushmore. The four heads, each about 60 ft high, represent, respectively, the nation's founding, political philosophy, preservation, and expansion and conservation. The memorial, first suggested by Jonah Robinson of the South Dakota State Historical Society, was dedicated in 1925. Work began in 1927 under Gutzon Borglum and was finished in 1941, after six and a half years of actual work. The federal government paid most of the costs. About 2,000,000 persons visit the memorial each year.



Mount Rushmore National Memorial, South Dakota

David W. Corson—DEVANEY STOCK PHOTOS

Mount Stromlo and Siding Spring Observatories, pair of astronomical observatories in southeast Australia that are operated by the Australian National University and that together constitute the most important facilities for such observation in the Southern Hemisphere. Mount Stromlo Observatory is situated at an elevation of 768 metres (2,520 feet) on Mt. Stromlo, 10 kilometres (6 miles) west of Canberra. It was founded in 1924 as a centre for solar studies but shifted its emphasis in the 1940s to stellar astronomy. Its main telescope is a 1.9-metre (74-inch) reflector.

The Mount Stromlo Observatory's viewing capability was threatened in the 1950s by the lights of the growing city of Canberra, and so a new site was established at an elevation of 1,165 m (3,822 ft) on Siding Spring Mountain, about 31 km (19 mi) from Coonabarabran, New South Wales. The Siding Spring Observatory was originally a field station for the Mount Stromlo site, but it has become in itself one of the most important optical observatories in the world. Its main telescope is the Anglo-Australian Telescope, which was jointly built by Australia and Great Britain and has been operated by them since 1975. The instrument is a 3.9-metre (153-inch) reflector that has notably distortion-free optics and an extremely precise computer-controlled system for pinpointing and tracking celestial objects. The telescope is most useful for viewing distant cosmic objects of extremely faint luminosity. The Siding Spring Observatory also has a 1.2-metre (48-inch) Schmidt telescope, which is owned and operated by the United Kingdom Science Research Council. It has been used to extend the sky survey conducted by its sister instrument, the 1.2-metre (48-inch) Schmidt telescope at the Palomar Observatory, to the southern skies.

Mount Vernon, city, seat (1819) of Jefferson county, southern Illinois, U.S. Founded in 1819 by settlers from Virginia and the Carolinas, it was named for George Washington's home. The Illinois Supreme Court was located in Mount Vernon (1856–96), and there in 1859 Abraham Lincoln argued and won a tax case. The city is an agricultural, manufacturing, and distributing centre, and oil is produced in the area. Mount Vernon is the site of Rend Lake (junior) College, and a state tuberculosis sanitarium. Inc. town, 1837; city, 1872. Pop. (1990) 16,988.

Mount Vernon, city, Westchester county, New York, U.S., situated on the Bronx and Hutchinson rivers, adjacent to the Bronx, New York City (south). It was settled in 1664 near the site where religious dissenter Anne Hutchinson (banished from the Massachusetts Bay Colony) was killed in 1643 by Indians. It became a farm village (considered part of Eastchester Township), the meeting house of which was the scene of the election of Lewis Morris to the provincial assembly in 1773. Colonial governor William Cosby's persistent opposition to Morris was reported by the antigovernment newspaper of John Peter Zenger, whose subsequent trial for seditious libel was the first major victory for the principle of freedom of the press in the American colonies. Mount Vernon was the scene of several Revolutionary War battles, including a delaying action by Glover's Brigade on Oct. 18, 1776, which probably saved General George Washington's army from defeat by General William Howe. The village's growth was assured when the Industrial Home Association, a cooperative group seeking relief from high New York City rents, purchased land for home sites there in 1851 and named the community for Washington's home. Diversified industrial development includes book publishing and the manufacture of clothing, machinery, electrical instruments, and chemicals. A dredged portion of the Hutchinson River serves as a port, and the city is a major petroleum-storage centre.

St. Paul's Church, Mount Vernon, N.Y.
Milt and Joan Mann from CameraMann

St. Paul's Church (1761), used during the Revolutionary War as a British military hospital, was dedicated a national historic site in 1943 and commemorates the Zenger affair and the Bill of Rights. Inc. village, 1853; city, 1892. Pop. (1990) 67,153.

Mount Vernon, city, seat (1808) of Knox county, central Ohio, U.S. It lies along the Kokosing River, 45 miles (72 km) northeast of Columbus. John Chapman (Johnny Appleseed), the orchardist, owned several lots in the original settlement that was laid out in 1805. The settlement was incorporated as a city in the same year and named for its location on a height by the river (then called Vernon but now known by its Indian name). Mount Vernon is the centre for an area of general farming and of oil and gas production. Livestock auctions are held regularly in the city. Manufactures include diesel engines, compressors, and glass and paper products. Daniel (Dan) Emmett, the composer of "Dixie" and other well-known songs, was born (1815) in Mount Vernon, and Mary Ann Bickerdyke, a pioneering war nurse in the service of the Union armies, was born (1817) on a nearby farm. Mount Vernon Nazarene College opened in 1968, and Kenyon College (1824) is in nearby Gambier. Pop. (1990) 14,550.

Mount Vernon, home and burial place of George Washington, in Fairfax county, Va., U.S., overlooking the Potomac River, 15 miles (24 km) south of Washington, D.C. The 18th-century two-story Georgian mansion is built of wood; but the siding is of wide, thick boards paneled so as to give the appearance of cut and dressed stonework. The rooms have been restored as they were when occupied by Washington and his family; most of the furniture pieces on the first floor and all of those in Washington's bedchamber are originals. Additional Washington relics are in a separate museum building.

From both ends of the house, a curved colonnade leads to a row of outbuildings. A spacious lawn surrounds the mansion, with shaded drives, walks, and gardens. A short distance southwest of the mansion is a plain brick tomb built at Washington's direction on a site chosen by himself. It contains his remains and those of his wife (removed there from the old family vault in 1831) and of several members of the family.

The estate, originally called Little Hunting Creek Plantation, consisted of about 5,000 acres (2,000 hectares). It descended by inheritance from John Washington, the first of the family in America, to his son Lawrence, who in turn devised it to his daughter Mildred. From Mildred it was purchased in 1726 by her brother Augustine, George Washington's father, and in 1735, when George was three years old, the family moved from "Wakefield" (a site now occupied by the George Washington Birthplace National Monument). The central part of the house was probably built during this time. In 1740, Augustine conveyed the plantation to his son Lawrence, elder half brother of George; and Lawrence settled there three years later. He renamed the plantation Mount Vernon in honour of Admiral Edward Vernon, under whom he had served in the Caribbean. Young George, after his father's death in 1743, spent part of his youth at Mount Vernon with Lawrence.

Mount Vernon, family home of George Washington
By courtesy of the Washington Convention and Visitor's Bureau

After Lawrence's death in 1751, George inherited the property; but because of military service he did not take up residence until January 1759, when he married Martha (Dandridge) Custis. During the next 15 years he enlarged the house, added smaller wings, erected several of the outbuildings, and expanded the gardens. He also tried crop rotation and other agricultural experiments on the plantation. Again called into public service, it was not until December 1783, when he tendered his resignation to Congress as commander in chief of the Continental Army, that he again settled at Mount Vernon. But in 1789 his plantation life was again interrupted when he became the first president of the United States. From 1797 until his death (Dec. 14, 1799) he lived at Mount Vernon. At his death, a life interest in the place went to his widow; the estate then passed to his nephew, Bushrod Washington; from Bushrod it descended to John Augustine Washington, Jr., who was authorized by will to sell it to the U.S. government, which refused to buy the property.

In 1853 Ann Pamela Cunningham of South Carolina organized the Mount Vernon Ladies' Association of the Union, which raised about $200,000 and purchased the house and 200 acres (80 hectares) of the original estate in 1858. The association, under its charter, was bound to restore and maintain the estate, which was designated a national historic landmark; the state of Virginia agreed to exempt the estate from taxation so long as these terms were fulfilled.

Mount Wilson Observatory, astronomical observatory located atop Mount Wilson, about 16 km (10 miles) northeast of Pasadena, Calif., U.S. It was founded in 1904 by George Ellery Hale, who served as its first director. For years the Mount Wilson Observatory and the Palomar Observatory (*q.v.*), near San Diego, were operated jointly as the Hale Observatories by the Carnegie Institution of Washington in Washington, D.C., and by the California Institute of Technology in Pasadena. In 1980 the two observatories became separate units, with Mount Wilson coming under the administrative control of the Carnegie Institution.

The Mount Wilson Observatory houses an array of optical telescopes. The most significant of these is a pair of reflectors, one with a diameter of 1.5 m (60 inches) and the other with a diameter of 2.5 m (100 inches). The latter enabled Edwin P. Hubble and his associates to make important discoveries about the universe, notably its expansion and size. Other major instruments at the observatory include two solar telescopes, which are used to study such phenomena as magnetic fields on the surface of the Sun.

Mountagu, Edward: *see* Sandwich, Edward Montagu, 1st earl of.

Mountague, Richard (Anglican bishop): *see* Montagu, Richard.

mountain, landform that rises prominently above its surroundings, generally exhibiting steep slopes, a relatively confined summit area,

Highest mountains of the world

name* and *location*	height		year first climbed
	feet	metres	
Africa			
Kilimanjaro (Kibo peak), *Tanzania*	19,340	5,895	1889
Mt. Kenya (Batian peak), *Kenya*	17,058	5,199	1899
Margherita, *Ruwenzori Range, Zaire–Uganda*	16,795	5,119	1906
Ras Dashen, *Simen Mtns., Ethiopia*	15,157	4,620	1841
Meru, *Tanzania*	14,978	4,565	. . .
Lageda, *Ethiopia*	14,869	4,532	. . .
Karisimbi, *Virunga Mtns., Zaire–Rwanda*	14,787	4,507	1903
Analu, *Ethiopia*	14,698	4,480	. . .
Weynober, *Ethiopia*	14,672	4,472	. . .
Mikeno, *Virunga Mtns., Zaire–Rwanda*	14,557	4,437	1927
Bwahit, *Ethiopia*	14,557	4,437	. . .
Elgon, *Kenya–Uganda*	14,178	4,321	1890
America, North			
McKinley, *Alaska Range, Alaska, U.S.*	20,320	6,194	1913
Logan, *St. Elias Mtns., Yukon, Can.*	19,524	5,951	1925
Citlaltépetl (Orizaba), *Cordillera Neo-Volcánica, Mexico*	18,406	5,610	1848
St. Elias, *St. Elias Mtns., Alaska, U.S.–Can.*	18,009	5,489	1897
Popocatépetl, *Cordillera Neo-Volcánica, Mexico*	17,930	5,465	1519
Foraker, *Alaska Range, Alaska, U.S.*	17,400	5,304	1934
Iztaccíhuatl (Ixtacihuatl), *Cordillera Neo-Volcánica, Mexico*	17,159	5,230	1889
Lucania, *St. Elias Mtns., Yukon, Can.*	17,146	5,226	1937
King, *St. Elias Mtns., Yukon, Can.*	16,972	5,173	1952
Steele, *St. Elias Mtns., Yukon, Can.*	16,644	5,073	1935
Bona, *Wrangell Mtns., Alaska, U.S.*	16,421	5,005	1930
Blackburn, *Wrangell Mtns., Alaska, U.S.*	16,390	4,996	1912
Sanford, *Wrangell Mtns., Alaska, U.S.*	16,237	4,949	1938
Wood, *St. Elias Mtns., Yukon, Can.*	15,886	4,842	1941
Vancouver, *St. Elias Mtns., Yukon, Can.–Alaska, U.S.*	15,700	4,785	1949
Churchill, *Wrangell Mtns., Alaska, U.S.*	15,638	4,766	. . .
Toluca, *Cordillera Neo-Volcánica, Mexico*	15,354	4,680	*c.* 1800
Fairweather, *St. Elias Mtns., British Columbia, Can.–Alaska, U.S.*	15,299	4,663	1931
Hubbard, *St. Elias Mtns., Yukon, Can.–Alaska, U.S.*	15,015	4,577	1951
Bear, *Wrangell Mtns., Alaska, U.S.*	14,831	4,520	1951
Walsh, *St. Elias Mtns., Yukon, Can.*	14,780	4,505	1941
La Malinche, *Cordillera Neo-Volcánica, Mexico*	14,636	4,461	. . .
Hunter, *Alaska Range, Alaska, U.S.*	14,573	4,442	1954
Alverstone, *St. Elias Mtns., Yukon, Can.–Alaska, U.S.*	14,565	4,439	1951
Brown, *Alaska Range, Alaska, U.S.*	14,530	4,429	. . .
Whitney, *Sierra Nevada, California, U.S.*	14,494	4,418	1875
Elbert, *Sawatch Mtns., Rockies, Colorado, U.S.*	14,433	4,399	1874
Massive, *Sawatch Mtns., Rockies, Colorado, U.S.*	14,421	4,396	1874
Harvard, *Sawatch Mtns., Rockies, Colorado, U.S.*	14,420	4,395	1869
Rainier, *Cascade Range, Washington, U.S.*	14,410	4,392	1870
America, South			
Aconcagua, *Andes, Argentina–Chile*	22,831	6,959	1897
Ojos del Salado, *Andes, Argentina–Chile*	22,615	6,893	1937
Bonete, *Andes, Argentina*	22,546	6,872	1913
Tupungato, *Andes, Argentina–Chile*	22,310	6,800	1897
Pissis, *Andes, Argentina*	22,241	6,779	1937
Mercedario, *Andes, Argentina*	22,211	6,770	1934
Huascarán, *Cordillera Blanca, Andes, Peru*	22,205	6,768	1908
Tres Cruces, *Andes, Argentina–Chile*	22,156	6,753	1937
Llullaillaco, *Cordillera Occidental, Andes, Argentina–Chile*	22,057	6,723	1952
Cachi (El Libertador), *Sierra de Pastos Grandes, Andes, Argentina*	22,047	6,720	1904
Yerupajá, *Cordillera Huayhuash, Andes, Peru*	21,759	6,632	1950
Incahuasi, *Andes, Argentina–Chile*	21,719	6,620	1910
Sajama, *Cordillera Occidental, Andes, Bolivia*	21,463	6,542	1939
El Muerto, *Andes, Argentina–Chile*	21,457	6,540	1950
Coropuna, *Cordillera Ampato, Andes, Peru*	21,079	6,425	1911
Illampu, *Cordillera Real, Andes, Bolivia*	21,066	6,421	1928
Ausangate, *Cordillera Vilcanota, Andes, Peru*	20,945	6,384	1953
Ancohuma, *Cordillera Real, Andes, Bolivia*	20,932	6,380	1915
Ampato, *Cordillera Ampato, Andes, Peru*	20,702	6,310	1972
Chimborazo, *Cordillera Occidental, Andes, Ecuador*	20,702	6,310	1880
El Cóndor, *Cordillera Occidental, Andes, Argentina*	20,669	6,300	. . .
Colorados, *Alto de los Colorados, Andes, Argentina–Chile*	19,846	6,049	. . .
Cotopaxi, *Cordillera Central, Andes, Ecuador*	19,347	5,897	1872
Cristóbal Colón, *Sierra Nevada de Santa Marta, Colombia*	18,947	5,775	1939
Simón Bolívar, *Sierra Nevada de Santa Marta, Colombia*	18,947	5,775	...
Ruiz, *Cordillera Central, Andes, Colombia*	17,717	5,400	1936
Antarctica			
Vinson Massif, *Sentinel Range, Ellsworth Mtns.*	16,066	4,897	1966
Tyree, *Sentinel Range, Ellsworth Mtns.*	15,919	4,852	1967
Shinn, *Sentinel Range, Ellsworth Mtns.*	15,751	4,801	1966
Kirkpatrick, *Queen Alexandra Range*	14,856	4,528	. . .
Markham, *Queen Elizabeth Range*	14,272	4,350	. . .
Asia			
Everest (Chomolungma), *Himalayas, Nepal–Tibet, China*	29,035	8,850	1953
K2 (Godwin Austen) (Chogori), *Karakoram Range, Pakistan–Sinkiang, China*	28,251	8,611	1954
Kānchenjunga I (Gangchhendzonga), *Himalayas, Nepal–India*	28,169	8,586	1955
Lhotse I, *Himalayas, Nepal–Tibet, China*	27,940	8,516	1956
Makālu I, *Himalayas, Nepal–Tibet, China*	27,766	8,463	1955
Cho Oyu, *Himalayas, Nepal–Tibet, China*	26,906	8,201	1954
Dhaulāgiri I, *Himalayas, Nepal*	26,795	8,167	1960
Manāslu I, *Himalayas, Nepal*	26,781	8,163	1956
Nānga Parbat I, *Himalayas, Pakistan*	26,660	8,126	1953
Annapūrna I, *Himalayas, Nepal*	26,545	8,091	1950
Gasherbrum I, *Karakoram Range, Pakistan–Sinkiang, China*	26,470	8,068	1958
Broad Peak I, *Karakoram Range, Pakistan*	26,401	8,047	1957
Gosainthan I (Kao-seng-tsan Feng) (Shisha Pangma), *Himalayas, Tibet, China*	26,286	8,012	1964
Gyāchung Kang I, *Himalayas, Nepal–Tibet, China*	26,089	7,952	1964
Kangbachen, *Himalayas, Nepal*	25,928	7,903	1974
Himālchūli I, *Himalayas, Nepal*	25,896	7,893	1960
Disteghil Sār I, *Karakoram Range, Pakistan*	25,869	7,885	1960
Peak 29 (Dakura), *Himalayas, Nepal*	25,823	7,871	1970
Nuptse I, *Himalayas, Nepal*	25,771	7,855	1961
Masherbrum, East Peak, *Karakoram Range, Pakistan*	25,659	7,821	1960
Nanda Devi, *West Peak, Himalayas, India*	25,643	7,816	1936
Ngojumba Ri, West I, *Himalayas, Nepal–Tibet, China*	25,610	7,806	1965
Rakaposhi, *Karakoram Range, Pakistan*	25,551	7,788	1958
Kanjut Sār I, *Karakoram Range, Pakistan*	25,459	7,760	1959
Kāmet I, *Himalayas, India–Tibet, China*	25,446	7,756	1931
Namcha Barwa I (Namuchabawashan), *Himalayas, Tibet, China*	25,446	7,756	. . .
Kua-la-man-ta-t'a (Gurla Mandhata) (Memo Nani), *Himalayas, Tibet, China*	25,354	7,728	. . .
Wu-lu-k'o-mu-shih, *K'un-lun Shan, Sinkiang, China*	25,338	7,723	. . .
Kung-ko-erh (Kongur), *Mu-shíh-t'a-ko Shan, Sinkiang, China*	25,325	7,719	1981
Jannu, *Himalayas, Nepal*	25,295	7,710	1962
Tirich Mīr, *Hindu Kush, Pakistan*	25,230	7,690	1962
Saser Kangri I, *Karakoram Range, Pakistan*	25,171	7,672	1973
Kungk'a (Minya Konka), *Ta-hsüeh Shan, Szechwan, China*	24,790	7,556	1932
Kula Kangri, *Himalayas, Bhutan–Tibet, China*	24,780	7,553	. . .
Mu-shih-t'a-ko (Muztagh Ata), *Pamirs, Sinkiang, China*	24,757	7,546	1956
Communism, *Pamirs, Tajikistan*	24,590	7,495	1933
Jongsang, *Himalayas, Nepal*	24,551	7,483	1930
Gangapurna, *Himalayas, Nepal*	24,459	7,455	1965
Victory (Pobedy), *Sheng-li Shan, Sinkiang, China–Kyrgyzstan*	24,406	7,439	1956
Europe			
Mont Blanc, *Alps, France–Italy*	15,771	4,807	1786
Dufourspitze (Monte Rosa), *Alps, Switzerland–Italy*	15,203	4,634	1855
Dom (Mischabel), *Alps, Switzerland*	14,911	4,545	1858
Weisshorn, *Alps, Switzerland*	14,780	4,505	1861
Matterhorn, *Alps, Switzerland–Italy*	14,692	4,478	1865
Mont Maudit, *Alps, France–Italy*	14,669	4,471	. . .
Dent Blanche, *Alps, Switzerland*	14,295	4,357	1862
Grand Combin, *Alps, Switzerland*	14,154	4,314	1859
Dôme du Goûter, *Alps, France*	14,121	4,304	1784
Finsteraarhorn, *Alps, Switzerland*	14,022	4,274	1812
Zinalrothorn, *Alps, Switzerland*	13,848	4,221	1864
Les Grandes Jorasses, *Alps, France*	13,806	4,208	1868
Rimpfischhorn, *Alps, Switzerland*	13,776	4,199	1859
Oceania			
Jaya (Sukarno, Carstensz), *Sudirman Range, Indonesia*	16,500†	5,030	1962
Pilimsit (Idenburg), *Sudirman Range, Indonesia*	15,750†	4,800	1962
Trikora (Wilhelmina), *Jayawijaya Mtns., Indonesia*	15,580†	4,750	1912
Mandala (Juliana), *Jayawijaya Mtns., Indonesia*	15,420†	4,700	1959
Wisnumurti (Jan Pieterszoon Coen), *Jayawijaya Mtns., Indonesia*	15,080†	4,595	. . .
Wilhelm, *Bismarck Range, Papua New Guinea*	14,793	4,509	. . .
Giluwe, *Hagen Range, Papua New Guinea*	14,331	4,368	. . .
Kubor, *Kubor Range, Papua New Guinea*	14,301	4,359	. . .
Herbert, *Bismarck Range, Papua New Guinea*	13,999	4,267	. . .
Mauna Kea, *Hawaii, U.S.*	13,796	4,205	. . .
Mauna Loa, *Hawaii, U.S.*	13,678	4,169	. . .
Caucasus			
Elbrus, *Caucasus, Russia*	18,510	5,642	1874
Dykh-Tau, *Caucasus, Russia*	17,073	5,204	1888
Koshtan-Tau, *Caucasus, Russia*	16,900	5,151	1889
Shkhara, *Caucasus, Russia–Georgia*	16,627	5,068	1888
Dzhangi-Tau, *Caucasus, Russia–Georgia*	16,594	5,058	1903
Kazbek, *Caucasus, Georgia*	16,512	5,033	1868
Shota Rustaveli, *Caucasus, Russia–Georgia*	16,273	4,960	. . .
Dzhimara, *Caucasus, Georgia*	15,682	4,780	. . .
Ushba, *Caucasus, Georgia*	15,420	4,700	1888
Uilpata, *Caucasus, Russia*	15,253	4,649	. . .
Tikhtengen, *Caucasus, Russia–Georgia*	15,128	4,611	1903
Dzhailykbashi, *Caucasus, Russia*	14,882	4,536	. . .
Tebulos-Mta, *Caucasus, Russia–Georgia*	14,741	4,493	. . .
Sugan, *Caucasus, Russia*	14,718	4,486	1896
Bazar-Dyuzyu, *Caucasus, Russia–Azerbaijan*	14,652	4,466	1873
Shan, *Caucasus, Georgia*	14,603	4,451	. . .
Tepli, *Caucasus, Russia*	14,537	4,431	1896
Adaykhokh, *Caucasus, Russia*	14,462	4,408	. . .
Laboda, *Caucasus, Russia–Georgia*	14,150	4,313	. . .
Diklos-Mta, *Caucasus, Russia–Georgia*	14,058	4,285	. . .
Shakhdag, *Caucasus, Azerbaijan*	13,921	4,243	. . .

*"I" in the name of a peak refers to the highest in a group of numbered peaks of the same name. †Conversions rounded to nearest 10 feet.

and considerable local relief. Mountains generally are understood to be larger than hills, but the term has no standardized geological meaning.

A brief treatment of mountains follows. For full treatment, *see* MACROPAEDIA: Continental Landforms.

Very rarely do mountains occur individually. In most cases, they are found in elongated ranges or chains. When an array of such ranges or chains are linked together, they constitute a mountain belt (*e.g.,* the Andes and Rocky Mountains). The major mountain belts of the world belong to either of two enormous systems, the Circum-Pacific System and the Alpine-Himalayan (or Tethyan) System.

Mountains are formed by the folding, faulting, or upwarping of the Earth's surface or by the emplacement of volcanic rock onto the surface. The origin of the major mountain systems is intimately bound up with the interaction of the enormous rigid plates that are thought to make up the lithosphere—the outermost shell of the Earth. Most mountains have been elevated above adjacent areas relatively recently with respect to geological time; and erosional processes, if given sufficient time, will reduce them to comparatively low levels. Such processes are primarily responsible for determining the specific shape of a mountain, though its topography is also influenced by its structure and the kinds of rock of which it consists.

A collision between lithospheric plates causes extreme compressional folding and the uplifting of large areas. For example, the northward movement of the plate that comprises the Indian subcontinent and its contact with the Eurasian plate has thrust up the Himalayan Mountain Range. Farther west the northward movement of the African plate has resulted in the closure of the Tethys Ocean, of which the Mediterranean is a remnant, and the upthrust of the Alps, Pyrenees, and Atlas Mountains. The mountain ranges around the Pacific Basin are commonly attributed to what is termed the subduction process—the sinking of one plate beneath another at convergent plate boundaries. As the leading edge of the plates underlying the Pacific Ocean are subducted, a portion of the rock material carried into the asthenosphere (layer of molten rock beneath the lithosphere) is melted and subsequently ejected as lava and pyroclasts at the surface. This gives rise to a landscape dominated by steep volcanic cones, such as those in the Cascades of western North America and in Japan. Along other stretches of the Pacific Basin, crustal thickening on the overriding continental plate has led to the formation of mountain belts in which volcanoes constitute only a very small part of the relief, as, for example, the Andes of South America. In some regions, mountain ranges are created by crustal shortening within a continental plate rather than along the boundaries of two colliding plates. Such is the case with the Rockies of North America and the Atlas Mountains of northwestern Africa.

Mountains can be classified into a variety of types according to the way they are formed and their resultant structure. The major types include dome, fault-block, fold, and volcanic.

Dome mountains are produced by fractureless upwarping of the surface. They have a comparatively flat, dissected surface that gradually slopes toward the adjacent lowlands. This type of mountain is typified by the Black Hills of South Dakota.

Fault-block mountains are composed of segments of the Earth's crust that have been uplifted along linear fracture zones in the form of enormous blocks. These upthrown fault blocks are usually separated by valleys or basins. The Sierra Nevada and Teton ranges of western North America are familiar examples of fault-block mountains.

Fold mountains are formed by lateral compression and attendant uplift. They tend to occur where extensive basins have been filled with layers of sedimentary rock material. This cover of stratified, unmetamorphosed sedimentary rock reacts differently from the underlying basement rock of granite or gneiss when subjected to compressive forces. Simple-fold mountains are created wherever the sedimentary rock cover is folded by sliding laterally over the basement. The Swiss Jura is representative of this type of mountain, as are certain members of the Appalachian system in eastern North America.

In general, volcanic mountains are associated with the island arcs that occur near subduction zones and with the fault zones that are attendant on major orogenic activity. Mountains resulting from volcanic activity fall into one of two major groups. First, there are mountains that result directly from volcanism. These are the ash, cinder, and lava cones that are built up by active volcanoes. Some volcanoes, such as Mount Fuji in Japan, give rise to steep composite cones. If the lava is fairly fluid, then broad-shield volcanoes, as exemplified by Mauna Loa in Hawaii and Cameroon Mountain in West Africa, may result. Second, the residual products of volcanism can produce mountains. Often resistant lavas solidified in volcanic pipes and necks are exhumed by erosion to produce spectacular mountain forms such as Ship Rock in New Mexico or the Devils Tower, Wyoming. On a much larger scale, magma intruded into the crust may be uncovered by erosion to stand up as mountain areas. The granitic Cairngorms of Scotland are such a laccolith.

Mountain, The, French LE MONTAGNE, the Montagnards collectively, who were extreme democrats of the French Revolutionary period. *See* Montagnard.

Mountain Ash, Welsh ABERPENNAR, industrial town, Cynon Valley district, Mid Glamorgan county, Wales. The town's growth dates almost entirely from *c.* 1850 with the exploitation of rich reserves of coal in the vicinity, and only after about 1945 were significant factory industries introduced to offset the serious fall in local mining employment. It contains a huge pavilion, built in 1906 for the national eisteddfod (Welsh festival of the arts). Pop. (1981) 23,547.

mountain ash, any of several shrubs or trees of the genus *Sorbus*, in the rose family (Rosaceae), native to the Northern Hemisphere. They are widely cultivated as ornamentals for their white flower clusters and brightly coloured fruits. Most noteworthy are the American mountain ash (*S. americana*), also called dogberry, and the European mountain ash (*S. aucuparia*), also called rowan, or quickbeam. Both are handsome trees, the European growing to 18 m (60 feet), twice the height of the American species, and yielding several cultivated varieties popular in landscaping.

American mountain ash (*Sorbus americana*)
Grant Heilman—EB Inc.

mountain beaver (rodent): *see* sewellel.

mountain climbing: *see* mountaineering.

mountain fever: *see* Colorado tick fever.

mountain forest: *see* cloud forest.

mountain goat, also called ROCKY MOUNTAIN GOAT (*Oreamnos americanus*), North American ruminant, family Bovidae (order Artiodactyla). Mountain goats occur from the Yukon to the northern U.S. Rockies. Although goatlike, they are more closely related to antelopes than to true goats. Stocky, and with a slight hump at the withers, mountain goats stand about 1 m (39 inches) at the shoulder. Members of both sexes bear short, hollow, slightly backward-curving horns. The hair is coarse, white, and shaggy over a thick, wooly underfur, and a beard frames the slender muzzle. The blackish hooves and horns stand out in contrast.

Mountain goat (*Oreamnos americanus*)
Earl Kubis—Root Resources

Surefooted relatives of the chamois, mountain goats live among rugged, craggy mountain peaks, usually above the timberline. They excel even the bighorn in climbing rocky precipices and slopes. Mountain goats live in small bands. They mate in November, and the males fight for possession of the females. A single kid, rarely two, is born in late spring in a nursery group. A few minutes later it begins to walk about and nurse. Mountain goats eat a variety of plants—moss, lichen, scrub foliage—and seemingly require little. Their slow gait is a stiff-legged walk. They are agile climbers and are capable of leaping more than 3.5 m (11.5 feet).

mountain lion: *see* puma.

mountain mahogany (*Cercocarpus*), any of a genus of North American evergreen shrubs or small trees, in the rose family (Rosaceae). The hard heartwood of these trees is highly valued for carving. *C. betuloides* and *C. ledifolius* are scaly-barked trees that may reach up to 9 m (30 feet) in height. *C. intricatus,* a shrub growing to 3 m (10 feet), has intricate branching.

It is said that the common name was given to species of these plants by the Mormons, who used the wood to build the Tabernacle Organ at Salt Lake City, Utah.

mountain man, any of the pioneers of the North American Rocky Mountain West who went to that region first as fur trappers. Attracted by the beaver in virgin streams, the trappers became the explorers of the Far West. The most experienced trappers were the

French, who were joined by American and Spanish fur traders. In the early 19th century, St. Louis was an important base for them for trading groups and trading-company caravans. Mingling extensively with the Indians, the mountain men adopted many of their manners of life and their beliefs as well as their love of adornment. Summer rendezvous, especially at Green River (in present-day Wyoming), became an institution of the mountain men, combining trade with recreation. As permanent settlers arrived, many mountain men served as scouts and guides, but their way of life was gradually eliminated by advancing civilization.

Mountain Meadows massacre (September 1857), in U.S. history, slaughter of a band of Arkansas emigrants passing through Utah on their way to California. Angered by the U.S. government's decision to send troops into the Utah territory, Mormons there were further incensed in 1857 when a band of emigrants set up camp 40 miles (64 km) from Cedar City. On September 7 or 8, the travelers were attacked by a party of Paiute Indians and some Mormon settlers led by John Doyle Lee. The attackers, promising safe conduct, persuaded the emigrants to lay down their arms. Then, as the band of 137 proceeded southward toward Cedar City, they were ambushed, and all except the young children were massacred. Details of the atrocity leaked out, but Lee's trial in Beaver in 1875 resulted in a hung jury. Retried the following year, he was convicted of first degree murder and on March 23, 1877, was shot at the site of the massacre.

mountain sheep: *see* bighorn.

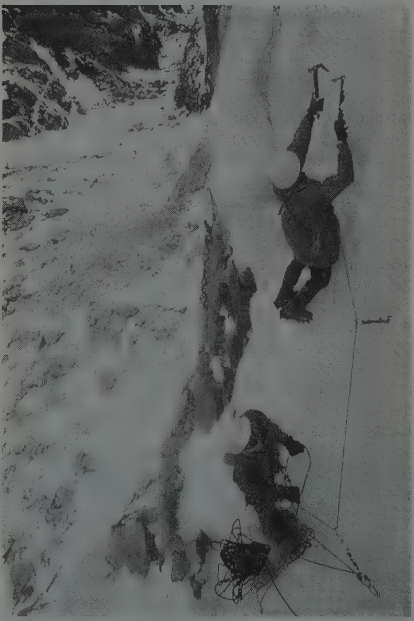
mountain sickness: *see* altitude sickness.

mountain spectre (optical phenomenon): *see* Brocken bow.

Mountain View, city, Santa Clara county, California, U.S. It lies on the southwest shore of San Francisco Bay. Settled in 1852 as a stagecoach station, it became a shipping point for fruit and grain and a centre of religious book publishing in the early 1900s. In 1929 Moffett Field Naval Air Station was established there, and in 1940 the Ames Laboratory of the National Advisory Committee for Aeronautics (now the Ames Research Center) was located nearby. These facilities influenced the development of the city's aerospace and electronics industries. Inc. 1902. Pop. (2000) 70,708.

mountaineering, also called MOUNTAIN CLIMBING, the sport of attaining, or attempting to attain, high points in mountainous regions, mainly for the pleasure of the climb. For the untrained, mountaineering is a dangerous pastime. Although the term is often loosely applied to walking up low mountains that offer only moderate difficulties, it is more properly restricted to climbing in localities where the terrain and weather conditions present such hazards that, for safety, a certain amount of previous experience will be found necessary. Mountaineering differs from other outdoor sports in that nature alone provides the field of action—and just about all of the opposition—for the participant. Climbing mountains embodies the thrills produced by testing one's courage, resourcefulness, cunning, strength, ability, and stamina to the utmost in a situation of inherent risk. Mountaineering, to a greater degree than other sports, is a group activity, with each member both supporting and supported by the group's achievement at every stage. For most climbers, the pleasures of mountaineering lie not only in the "conquest" of a peak but also in the physical and spiritual satisfactions brought about through intense personal effort, ever-increasing proficiency, and contact with natural grandeur.

History. Early attempts to ascend mountain peaks were inspired by other than sporting motives: to build altars or to see if spirits actually haunted once-forbidden heights, to get an overview of one's own or a neighbouring countryside, or to make meteorological or geological observations. Before the modern era, history has recorded few attempts to ascend mountain peaks for the mere sake of the accomplishment. During the 18th century more and more natural philosophers—the scientists of their day—began making field trips into the Alps of Europe to make scientific observations. The area around Chamonix, France, became a special attraction to these investigators because of the great glaciers on the Mont Blanc chain. Mountaineering in a contemporary sporting sense was born when a young Genevese scientist, Horace-Bénédict de Saussure, on a first visit to Chamonix in 1760, viewed Mont Blanc (at 15,771 feet [4,807 m] the tallest peak in Europe) and determined he would climb to the top of it or be responsible for its being climbed. He offered prize money for the first ascent of Mont Blanc, but it was not until 1786, more than 25 years later, that his money was claimed by a Chamonix doctor, Michel-Gabriel Paccard, and his porter, Jacques Balmat. A year later de Saussure himself climbed to the summit of Mont Blanc. After 1850 groups of British climbers with Swiss, Italian, or French guides scaled one after another of the high peaks of Switzerland. A landmark climb in the growth of the sport was the spectacular first ascent of the Matterhorn (14,692 feet) on July 14, 1865, by a party led by an English artist, Edward Whymper. In the mid-19th century the Swiss developed a coterie of guides whose leadership helped make mountaineering a distinguished sport as they led the way to peak after peak throughout central Europe.



Ice climbing in the Sierra Nevada, California, showing the lead climber front-pointing on steep ice using ice tools and (below) the belayer feeding him rope

© Gordon Wiltsie

By 1870 all of the principal Alpine summits had been scaled, and climbers began to seek new and more difficult routes on peaks that had already been ascended. As the few remaining minor peaks of the Alps were overcome, by the end of the 19th century climbers turned their attention to the Andes of South America, the North American Rockies, the Caucasus, Africa's peaks, and finally the Himalayan vastness. Aconcagua (22,831 feet), the highest peak of the Andes, was first climbed in 1897, and the Grand Teton (13,747 feet) in North America's Rocky Mountains was ascended in 1898. The Italian duke of the Abruzzi in 1897 made the first ascent of Mount St. Elias (18,009 feet), which stands athwart the international boundary of Alaska and Canada, and in 1906 successfully climbed Margherita in the Ruwenzori Group (16,795 feet) in East Africa. In 1913 an American, Hudson Stuck, ascended Mount McKinley (20,320 feet) in Alaska, the highest peak in North America. The way was opening for greater conquests, but it would be midcentury before the final bastion, Mount Everest, was ascended.

As the 20th century wore on, the truly international character of mountaineering began to reveal itself. Increasingly Austrians, Chinese, English, French, Germans, Indians, Italians, Japanese, and Russians turned their attention to opportunities inherent in the largest mountain landmass of the planet, the Himalayas. After World War I the British made Everest their particular goal. Meanwhile, climbers from other countries were making spectacularly successful climbs of other great Himalayan peaks. A Soviet team climbed Stalin Peak (24,590 feet), later renamed Communism Peak, in 1933; a German party succeeded on Siniolchu (22,600 feet) in 1936; and the English climbed Nanda Devi (25,643 feet) the same year. *The Alpine Journal* of London, a reliable chronicler of ascents, lists no peaks ascended for the first time between 1940–47, a reflection, of course, of the imperatives of World War II.

In the 1950s came a series of successful ascents of mountains in the Himalayas: a first climb by the French of Annapūrna I (26,545 feet) in June 1950; Nānga Parbat (26,660 feet) by the Germans and Austrians in 1953; K2 (28,251 feet) by the Italians in 1954; Kānchenjunga (28,169 feet) by the British in 1955; and Lhotse (27,940 feet) by the Swiss in 1956. Beyond all of these, however, the success of the British on Mount Everest (29,035 feet) when a New Zealand beekeeper, Edmund Hillary, and the Sherpa guide Tenzing Norgay stood on the top of the world on May 29, 1953, was a culminating moment. This expedition, which was led by Colonel John Hunt, was the eighth team in 30 years to attempt Everest, and there had also been three reconnaissance expeditions.

K2 was climbed by two members of an Italian party in July 1954. An Austrian party reached the summit of Cho Oyu (26,906 feet), which is only slightly higher than Dhaulāgiri, in 1954. In May 1955 a French party succeeded in getting all of its members and a Sherpa guide to the summit of Makālu 1 (27,766 feet), a neighbour of Everest. Also in May 1955, as mentioned earlier, Kānchenjunga, at 28,169 feet often considered one of the world's most difficult mountaineering problems, was climbed by an English expedition led by Charles Evans, who had been deputy leader of the first successful climb of Everest.

In the 1960s mountaineering underwent several transformations. As in the golden age of the Alps, once peaks were climbed, the emphasis moved to a search for more and more difficult routes up the mountain face to the summit. Moreover, vertical or other so-called impossible rock faces were being scaled through the use of newly developed artificial aids and advanced climbing techniques. Smooth, vertical faces of granite were overcome in climbs lasting days or even weeks at a time—for example, the 27-day conquest in 1970 of the sheer 3,000-foot southeast face of the granite monolith El Capitan in the North American Sierra Nevadas by American climbers.

Techniques. While it is necessary for the complete mountaineer to be competent in all three phases of the sport—hiking, rock climbing, and snow and ice technique—each is quite different. There are wide variations within these categories, and even the most accomplished mountaineers will have varying degrees of competence in each. The good climber will strike that balance that is consonant with his own physical and mental capabilities and approach.

Hiking is the essential element of all climbing, for in the end mountains are climbed by placing one foot in front of another over and over again. The most arduous hours in mountaineering are those spent hiking or climbing slowly, steadily, but hour after hour, on the trails of a mountain's approach or lower slopes.

Rock climbing, like hiking, is a widely practiced sport in its own right. The essentials of rock climbing are often learned on local cliffs, where the teamwork of mountaineering, the use of the rope, and the coordinated prerequisites of control and rhythm are mastered. The rope, the artificial anchor, and carabiner (or snap link, a metal loop or ring that can be snapped into an anchor and through which the rope may be passed) are used primarily as safety factors. An exception occurs in tension climbing, in which the leader is supported by a judiciously placed series of anchors and carabiners through which the rope is passed. He is then supported on the rope by his fellow climbers as he slowly moves upward to place another anchor and repeat the process.

Anchors are used with discretion rather than in abundance. Anchors include the chock, which is a small piece of shaped metal that is attached to rope or wire cable and wedged by hand into a crack in the rock; the piton, which is a metal spike, with an eye or ring in one end, that is hammered into a crack; the bolt, which is a metal rod that is hammered into a hole drilled by the climber and to whose exposed, threaded end a hanger is then attached; and the "friend," which is a form of chock with a camming device that automatically adjusts to a crack. Anchors are rarely used as handholds or footholds.

For the majority of rock climbers, hands and feet alone are the essential, with the feet doing most of the labour. The layperson's notion that one must be extraordinarily strong in arms and shoulders is true only for such situations as the negotiation of serious overhangs. By and large, hands are used for balance, feet for support. Hands and arms are not used for dragging the climber up the cliff.

Balance is essential, and the body weight is kept as directly over the feet as possible, the climber remaining as upright as the rock will permit. An erect stance enables the climber to use that fifth element of climbing, the eyes. Careful observation as one moves up a cliff will save many vain scrambles for footholds. Three points of contact with the rock are usually kept, either two hands and a foot or two feet and a hand. Jumping for holds is extremely dangerous because it allows no safety factor. Rhythmic climbing may be slow or fast according to the difficulty of the pitch. Rhythm is not easily mastered and, when achieved, becomes the mark of the truly fine climber.

The harder the climb, the more the hands are used for support. They are used differently in different situations. In a chimney, a pipelike, nearly cylindrical vertical shaft, they press on opposite sides in opposition to each other. On slabs, the pressure of the palms of the hand on smooth rock may provide the necessary friction for the hold.

Climbing down steep rock is usually harder than going up because of the difficulty in seeing holds from above and the normal reluctance of a climber to reach down and work his hands low enough as he descends. The quick way down is via the doubled rope in the technique called rappelling. The rope, one end being firmly held or secured, is wrapped around the body in such a way that it can be fed out by one hand slowly or quickly as desired to lower the body gradually down the face of the rock.

Rope handling is a fine art that is equally essential on snow, ice, and rock. Sufficient rope for the pitch to be climbed and of sufficient length for rappelling is needed. As a lifeline the rope receives the greatest care and respect. A good rope handler is a valued person on the climb. The techniques involved are not easily learned and are mastered primarily through experience. Anchors and carabiners must be so placed and the rope strung in such a way as to provide maximum safety and to minimize effort in ascending and descending. This includes keeping the rope away from cracks where it might jam and from places where it might become caught on rock outcrops or shrubbery. A rope should not lay over rough or sharp-edged rock, where under tension it may be damaged from friction or cut by falling rock. The use of helmets while climbing is controversial (they may be uncomfortable or may limit vision or mobility) but is often recommended.

Constantly changing conditions of snow and ice are important hazards faced by mountaineers. A good mountaineer must have an intimate knowledge of snow conditions; he must be able to detect hidden crevasses, be aware of potential avalanches, and be able to safely traverse other tricky or dangerous concentrations of snow or ice. In snow-and-ice technique, the use of the ice ax is extremely important as an adjunct to high mountaineering. Consisting of a pick and an adze opposed at one end of a shaft and a spike at the other, it is used for cutting steps in ice, probing crevasses, obtaining direct aid on steep slopes, achieving balance as necessary, and securing the rope (belaying). Crampons (sets of spikes that can be strapped on boot soles) are intended to preclude slipping and are useful on steep slopes of snow and ice and in steps that have been cut. By biting into the surface, they make progress possible where boots alone would not do. On many slopes crampons also render unnecessary the cutting of steps. On extremely difficult snow and ice, ice pitons and carabiners are used. The pitons, when driven in, are allowed to freeze in place.

In climbing long snow slopes, a tedious task, it is necessary to strike a slow and rhythmic pace that can be sustained for a long time. It is desirable, too, to make a start on the mountain early in the day when the snow is in hard condition. As in all phases of mountaineering, judgment is important when engaging in snow and ice climbing. The length of the climb, the nature of the weather, the effect of the sun's heat on snow and ice, and the potential avalanche danger must all be considered.

The basic organization of the sport is the mountaineering or rock-climbing club. Every nation with mountaineers has its own clubs, among which the Alpine Club in Great Britain, founded in 1857, is perhaps the most venerable. The largest numbers of clubs are found in the Alpine countries, in the British Isles, and in North America. Major mountaineering clubs frequently participate financially in the sponsorship of major expeditions. Most of the clubs publish annual or periodic reports, journals, or bulletins. (G.A.Sm./C.D.K./Ed.)

Mountbatten FAMILY: *see* Battenberg family.

Mountbatten, Louis Alexander: *see* Milford Haven, Louis Alexander Mountbatten, 1st Marquess of.

Mountbatten (of Burma), Louis Mountbatten, 1st Earl, Viscount Mountbatten of Burma, Baron Romsey of Romsey, original name LOUIS FRANCIS ALBERT VICTOR NICHOLAS, PRINCE OF BATTENBERG (b. June 25, 1900, Frogmore House, Windsor, Eng.—d. Aug. 27, 1979, Donegal Bay, off Mullaghmore, County Sligo, Ire.), British statesman, naval leader, and the last viceroy of India. He had international royal-family background; his career involved extensive naval commands, the diplomatic negotiation of independence for India and Pakistan, and the highest military defense leaderships.

Mountbatten

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He was the fourth child of Prince Louis of Battenberg, afterward Marquess of Milford Haven, and his wife, Princess Victoria of Hesse-Darmstadt, granddaughter of Britain's Queen Victoria. He entered the Royal Navy in 1913 and had various naval assignments before becoming aide-de-camp to the Prince of Wales (1921). In 1922 he married Edwina Ashley (who died in 1960 in North Borneo while on tour as superintendent-in-chief of the St. John Ambulance Brigade). In 1932 he was promoted to captain and the next year qualified as an interpreter in French and German. In command of the destroyer *Kelly* and the 5th destroyer flotilla at the outbreak of World War II, he was appointed commander of an aircraft carrier in 1941. In April 1942 he was named chief of combined operations and became acting vice admiral and a de facto member of the chiefs of staff. From this position he was appointed supreme allied commander for Southeast Asia (1943–46), prompting complaints of nepotism against his cousin the king. He successfully conducted the campaign against Japan that led to the recapture of Burma (Myanmar). As viceroy of India (March–August 1947) he administered the transfer of power from Britain to the newly independent nations of India and Pakistan at the Aug. 15, 1947, partition of the subcontinent. As governor-general of India (August 1947–June 1948) he then helped persuade the Indian princes to merge their states into either India or Pakistan. He was created viscount in 1946 and earl in 1947.

Mountbatten was fourth sea lord in 1950–52, commander in chief of the Mediterranean fleet in 1952–54, and first sea lord in 1955–59. He became an admiral of the fleet in 1956 and served as chief of the United Kingdom Defense Staff and chairman of the Chiefs of Staff Committee in 1959–65. He became governor (1965) and then lord lieutenant (1974) of the Isle of Wight. Mountbatten was assassinated in 1979 by Provisional Irish Republican Army terrorists who planted a bomb in his boat.

Mountbatten, Philip: *see* Philip, Duke of Edinburgh.

Mountford, Ces, byname of CECIL MOUNTFORD (b. 1921, Blackball, N.Z.), New Zealand rugby player and coach who was considered to be one of the best stand-off halfs in the sport. He joined Wigan (Lancashire, Eng.) in 1946 and in 1947–48 set an appearance record of 54 games in a season. In 1952 he moved to Warrington (Cheshire) as manager and steered them to seven trophies before leaving to coach Blackpool borough for two seasons. He later returned to New Zealand.

Mounties: *see* Royal Canadian Mounted Police.

Mountjoy, Charles Blount, 8th Lord, also called (1603–06) EARL OF DEVONSHIRE (b. *c.* 1562—d. April 3, 1606, London), soldier, English lord deputy of Ireland, whose victory at Kinsale, County Cork, in 1601 led to the conquest of Ireland by English forces.

The second son of James Blount, 6th Lord Mountjoy, he succeeded to the family peerage on the death of his elder brother, the 7th Lord, in 1594. After fighting in the Low Countries against Spain, Mountjoy in 1597 accompanied the 2nd Earl of Essex and Sir Walter Raleigh on an expedition to the Azores against Spanish treasure ships. After the defeat of Sir Henry Bagnal's English army in Ireland (August 1598), Mountjoy was expected to assume command there. Essex, who was sent instead, also failed and was subsequently dismissed from office in June 1600, when Mountjoy was appointed lord deputy.

Mountjoy, detail of an engraving by Valentine Green after a portrait by Paul van Somer

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

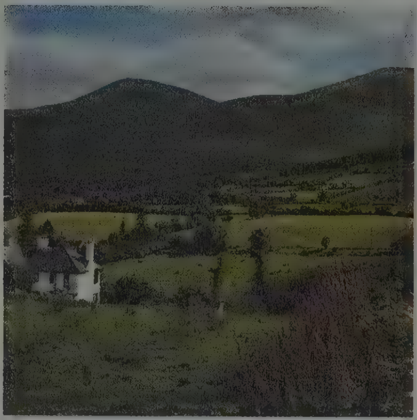
Spanish troops landed at Kinsale in 1601, and the Irish leader, Hugh O'Neill, 2nd earl of Tyrone, marched south from Ulster to join them. Mountjoy waited outside Kinsale, and on Dec. 24, 1601, his cavalry routed the Irish army. The Spanish evacuated Kinsale, and Ulster thus was left open to English invasion. Mountjoy received Tyrone's submission in 1603 and was able to win moderate treatment for him from King James I of England. In the same year Mountjoy was created earl of Devonshire.

He carried on a torrid affair with Lady Penelope Rich, whom he finally married after she obtained an annulment from her husband in 1605. Biographies of Mountjoy were written by Cyril B. Falls (1955) and F.M. Jones (1958).

Mounty, plural MOUNTIES: *see* Royal Canadian Mounted Police.

Moura, town, eastern Queensland, Australia, on the Dawson River. Together with its neighbouring town, Kianga, Moura is the focus of a 350-sq-mi (910-sq-km) coalfield from which high-quality coking coal is mined for export to Japan. Local farms are supplied from Moura Weir, part of the Dawson Valley's irrigation system. Moura is served by the Dawson Highway from Brisbane, 460 mi (740 km) south-southeast. Pop. (1981) 2,871.

Mourne Mountains, Irish BEANNA BOIRCHE, mountains astride a corner of Down district and Newry and Mourne district, formerly in County Down, Northern Ireland, a compact range of granite peaks rising abruptly from the Irish Sea at Carlingford Lough (inlet of the sea) and extending for 9 mi (14.5 km) between Newcastle and Rostrevor. Their oval outline reflects the extent of five overlapping granite intrusions into Silurian shales in later Tertiary times. Slieve Donard rises to 2,796 ft (852 m) within 2 mi of the sea. A dozen other peaks, including Slieve Bearnagh and Slieve Binnian, exceed 2,000 ft. The hills are used as reservoirs that supply Belfast, Portadown, and Banbridge. There is also some sheep raising. The lower hillslopes have been extensively reforested. The historic kingdom of Mourne separates the mountains from the sea. The small coastal towns of Newcastle, Annalong, Kilkeel, and Rostrevor, once engaged in exporting dressed granite, are now fishing and vacation centres. Ruined castles at Greencastle and Dundrum attest the efforts of the Anglo-Norman settlers to hold this difficult coast. Between Newcastle and Castlewellan is the Tollymore Forest Park.



Part of the Mourne Mountains astride Down district and Newry and Mourne district, Northern Ireland

G.F. Allen—Bruce Coleman

mourning, formal demonstration of grief at the death of a person, practiced in most societies. Mourners are usually relatives, although they may be friends or members of the community. Mourning rites, which are of varying duration and rationale, usually weigh more heavily on women than on men. Mourners may deny themselves certain amusement, ornaments, or food. They may practice sexual continence or keep vigil over the body of the deceased. Changes in garb, such as black robes, and alterations in hairstyle may distinguish mourners, but such evidences of mourning have declined in many societies.

mourning dove (*Zenaida macroura*), a member of the pigeon order Columbiformes, the common wild pigeon of North America having a long pointed tail and violet and pink on the sides of the neck. This game bird may live up to 16 years in captivity; however, most mourning doves live only 4 or 5 years in the wild. First-year mortality is about 80 percent. These doves migrate south in the winter; the most northward-living ones migrate the farthest south.

Mourning dove (*Zenaida macroura*)

Alvin E. Staffan—The National Audubon Society Collection/Photo Researchers

Mouron, Adolphe-Jean-Marie: *see* Cassandre.

Mousa (Greek religion): *see* Muse.

Mousa (Mali emperor): *see* Mūsā.

Mouscron (French), Flemish MOESKROEN, town, Hainaut province, eastern Belgium, on the Belgian-French border across from Tourcoing, Fr. Located 6 mi (10 km) southwest of Kortrijk (Courtrai), it is a textile manufacturing centre including clothing, carpets, and wool products. Machinery and plastics are also made; wheat and flax are grown nearby. Saint Bartholomew's Church dates from the 15th century and has been rebuilt several times. Mouscron has railway and road connections with Kortrijk, Tournai, and Lille, Fr. Pop. (1982) mun., 54,562.

mouse, any of many small, scampering rodents, particularly the house mouse (*Mus musculus*), family Muridae (order Rodentia). The term mouse, like the term rat, has no scientific definition; it is used simply to designate any of numerous ratlike, but small, rodents. Many species of the large family Cricetidae (grasshopper mice, harvest mice) are called mice, as are members of the families Muridae (Old World mice), Heteromyidae (pocket mice), and Zapodidae (jumping mice and birch mice). The marsupial mouse is not a rodent but a mouselike relative of the kangaroos.

House mouse (*Mus musculus*)

Ingmar Holmasen

Mice are common and are indigenous to almost every land area. They eat various foods, including grain, roots, fruit, grass, insects, and in some instances human foodstuffs. Many species seem to prefer dwelling in man-made structures and can become serious pests by destroying food, gnawing all types of materials, and, possibly, harbouring such disease-producing organisms as murine typhus and plague. Mice living in the wild may be so numerous as to become serious, although usually temporary, agricultural pests. Except in abnormal circumstances, however, mice are beneficial to man because they form the bulk of the diet of most furbearers and of predators that otherwise would take more valuable animals, including livestock. Serious household infestations of mice may require the services of trained exterminators, but minor infestations can be handled adequately and most safely by trapping.

The house mouse, the mouse most often encountered in buildings, has been distributed by man from Eurasia to all inhabited areas of the world. It usually seeks shelter and food in human dwellings. A brown or gray rodent, it grows up to 20 centimetres (8 inches) long, including a 10-cm tail. It consumes almost anything edible, even sampling soap, paste, and glue. It matures quickly, being ready to mate two to three months after birth. Litters consist of as many as 12 young; gestation takes about three weeks. In warm areas or heated buildings, breeding occurs throughout the year.

The common white laboratory mouse is a domesticated form of the house mouse that is widely used in medical experiments and is also commonly kept as a pet. Various other strains of house mice include: piebald mice; singing mice, which emit faint twitterings; and waltzing mice, which cannot move normally because of an inherited, defective sense of balance. *See also* field mouse; harvest mouse; spiny mouse.

mouse deer: *see* chevrotain.

mousehare: *see* pika.

mousetail, any of about 15 species of small, annual, herbaceous (nonwoody) plants constituting the genus *Myosurus* of the buttercup family (Ranunculaceae). They occur in the temperate zones of both the Northern and Southern Hemispheres. Mousetails are so named for a long, slender column covered with pistils (female seed-bearing organs) that arises from the centre of the flower.

Mousetail (*Myosurus*)

Ron Foord from the Natural History Photographic Agency—EB Inc.

moussaka, dish of baked lamb and eggplant prepared throughout the Balkans and Middle East, but most closely associated with Greece and Turkey.

In the Greek version the eggplants are sliced and fried lightly in olive oil, then layered in a casserole with a mixture of ground lamb, onions, tomato sauce, and seasonings. A béchamel (white sauce) with grated cheese is poured over the meat and vegetables before the dish is baked. Sliced potatoes are sometimes placed first in the casserole to form a bottom layer; zucchini can replace the eggplant. The dish can be baked in a deep pot lined with eggplant skins, which form a shiny, decorative casing when the moussaka is unmolded. The Arabic *musakk'a* is a meatless dish of eggplants, tomatoes, chickpeas, and onions stewed in olive oil.

mousse, savoury or sweet dish with the consistency of a dense foam, composed of a puréed chief ingredient mixed with stiffly beaten egg whites, whipped cream, or both. Mousses are almost always cold dishes, sweet mousses sometimes being served frozen. Savoury mousses are frequently prepared from poultry, foie gras, fish, or shellfish, to be eaten as a first course or light entree. They may be stabilized by the addition of gelatin.

Chocolate and mocha mousses are sometimes made with a custard base. For a fruit mousse, pureed fruit or juice replaces the milk in the custard. The term mousse is also used for gelatin desserts that are whipped to a froth after they have partially set.

Moussorgsky, Modest (Petrovich) (Russian composer): *see* Mussorgsky, Modest (Petrovich).

moustache: *see* mustache.

Mousterian industry, tool culture traditionally associated with Neanderthal man in Europe, western Asia, and northern Africa during the early Fourth (Würm) Glacial Period (*c.* 40,000 BC). The Mousterian tool assemblage shows flaking techniques in common with the Clactonian, as well as the frequent practice in some assemblages of the Levallois flaking technique.

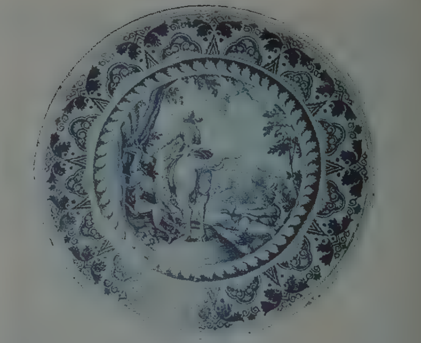
Tools included small hand axes made from disk-shaped cores; flake tools, such as well-made sidescrapers and triangular points, probably used as knives; denticulate (toothed) instruments produced by making notches in a flake, perhaps used as saws or shaft straighteners; and round limestone balls, believed to have served as bolas (weapons of a type used today in South America, consisting of three balls on the end of a thong, which is hurled at an animal, wraps itself around its legs, and trips it). Wooden spears were used to hunt large game such as mammoth and wooly rhinoceros. Mousterian "tool kits" often have quite different contents from site to site. Some investigators explain this by suggesting that different groups of Neanderthal men had varying toolmaking traditions; other workers believe the tool kits were used by the same peoples to perform different functions (*e.g.*, hunting, butchering, food preparation). Mousterian implements disappeared abruptly from Europe with the passing of Neanderthal man.

Consult the INDEX *first*

Moustiers faience, French tin-glazed earthenware produced by factories in the town of Moustiers from about 1679 into the 19th century. The wares manufactured in the 17th and 18th centuries were so distinctive, and of such high quality, that they were extensively copied at other faience centres in France.

According to tradition, a monk, originally from Faenza, a major Italian centre for the production of maiolica, gave the secret of faience making to a local potter named Antoine Clérissy, who established the most important factory in Moustiers and founded a dynasty of *faïenciers* active until the late 18th century. Characteristic Clérissy faience, which is blue and white, falls into two periods: in the early period (1680–1710), decoration was inspired by the engravings of Antonio Tempesta (d. 1630); in the later period (1710–40), by the engravings of Jean Bérain the Elder (1638–1711), whose designs greatly influenced French decorative art at the time. Wares in the Bérain style, for which Moustiers is probably most famous, are delicate and fanciful; large dishes, for example, are decorated with a spidery net, made up of arabesques, architectural motifs, birds, vases of flowers, and the like, which serves as a frame for a classical scene.

Another important Moustiers factory was that of Joseph Olerys, founded in 1738 and active until *c.* 1793. Olerys introduced polychrome decoration, producing faience in the Bérain style painted in purple, soft green, and orange as well as blue. Other polychrome faience wares produced by this factory were decorated with such designs as chinoiseries (designs in the Chinese manner), military motifs, medallions, and a so-called potato flower motif. Overglaze painted decoration was introduced in the late 18th century by yet another Moustiers factory. Nineteenth-century Moustiers faience consisted of reproductions of earlier wares.



Moustiers faience plate decorated with a scene after an engraving by Antonio Tempesta, the Clérissy factory, *c.* 1700; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

mouth, also called ORAL CAVITY, or BUCCAL CAVITY, in human anatomy, orifice through which food and air enter the body. The mouth opens to the outside at the lips and empties into the throat at the rear; its boundaries are defined by the lips, cheeks, hard and soft palates, and glottis. It is divided into two sections: the vestibule, the area between the cheeks and the teeth, and the oral cavity proper. The latter section is mostly filled by the tongue, a large muscle firmly anchored to the floor of the mouth by the frenulum linguae. In addition to its primary role in the intake and initial digestion of food, the mouth and its structures are essential in humans to the formation of speech.

The chief structures of the mouth are the teeth, which tear and grind ingested food into small pieces that are suitable for digestion; the tongue, which positions and mixes food and also carries sensory receptors for taste; and the palate, which separates the mouth from the nasal cavity, allowing separate passages for air and for food. All these structures, along with the lips, are involved in the formation of speech sounds by modifying the passage of air through the mouth.

The oral cavity and vestibule are entirely lined by mucous membranes containing numerous small glands that, along with the three pairs of salivary glands, bathe the mouth in fluid, keeping it moist and clear of food and other debris. Specialized membranes form both the gums (gingivae), which surround and support the teeth, and the surface of the tongue, on which the membrane is rougher in texture, containing many small papillae that hold the taste buds. The mouth's moist environment and the enzymes within its secretions help to soften food, facilitating swallowing and beginning the process of digestion. *See also* digestion.

mouthbreeder, any fish that breeds its young in the mouth. Examples include certain catfishes and cardinal fishes. The male of the sea catfish *Galeichthys felis* places up to 50 fertilized eggs in its mouth and retains them until they are hatched and the young are two or more weeks old. The cardinal fish *Apogon imberbis* incubates the eggs in the pharynx. Both the male and female *Symphysodon discus* take turns mouthing the eggs.

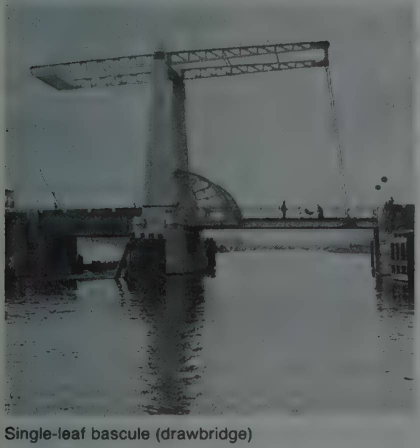
Mouton, Jean (b. *c.* 1459, Haut-Wignes, Fr.—d. Oct. 30, 1522, Saint-Quentin), composer in the Franco-Flemish style of the early 16th century, known for his sacred music.

Mouton was a chorister in Nesle (1477–83) and worked in Amiens and Grenoble from 1500 to 1502 before joining the French royal chapel under Louis XII and Francis I. His music leads away from the older style, which falls into clear sections, and instead emphasizes a continuous flow of vocal lines from beginning to end, with pervasive melodic imitation. He was a master of the technique of canon. His output is largely masses and motets, published during his life by printers such as Ottaviano dei Petrucci and Pierre Attaignant.

Mouvement Républicain Populaire (French political party): *see* Popular Republican Movement.

movable and immovable, in later Roman and modern civil-law systems, the basic division of things subject to ownership. In general, the distinction rests on ordinary conceptions of physical mobility: immovables would be such things as land or buildings, which are thought to be stationary in space; movables would be such things as cattle or personal belongings, which can either move themselves or be moved in space. The definition is by no means rigid, however; the law may be so written as to place a specified thing in one category or the other for the sake of legal convenience or utility, even though the thing may seem illogically categorized in the layman's mind. Thus, in French law, standing crops are movables; farm implements and animals are immovables (largely because they are thought to serve the land and be components of it). In German law, the distinction is somewhat clearer: immovables are tracts of land and their component parts; movables are everything else. In the Anglo-American common-law system, there exists a similar distinction between real (immovable) and personal (movable) property.

movable bridge, either a drawbridge, a vertical-lift bridge, a transporter bridge, or a swing (pivot) bridge. The drawbridge, or bascule, is the best known; it may be single- or double-leafed. It originated in medieval Europe, probably Normandy, as a defensive feature of castles and towns. It was operated by a counterweight and winch. The drawbridge that formed one span of Old London Bridge was occasionally raised to permit passage of a ship having masts too tall to pass under at this point. In the late 19th century drawbridges began to be built specifically to aid navigation; the Tower Bridge, London, and the Van Buren Street Bridge, Chicago, were built almost simultaneously. Both were double-leaf bascules, and their success led to wide imitation; more than 20 were built to span the Chicago River alone.



Single-leaf bascule (drawbridge)
De Cou—Ewing Galloway

At the same time, another movable bridge was pioneered in Chicago: the vertical lift, designed by J.A.L. Waddell. For several years it was unimitated; later, when its great strength for railroad loading was appreciated, it was repeated widely, in increasing span lengths, many exceeding 500 feet (152 m). The vertical lift also relies on counterweights; the entire bridge roadway is elevated by counterweights and machinery in two towers. The transporter bridge consists of a car suspended from a trolley traveling along an overhead bridge superstructure. It carries passengers and vehicles across a waterway.

For exceptionally long spans, the pivot, or swing bridge, which turns on a table, is suitable. Several of more than 500 feet have been built in the United States, but the turntable obstructs the river, limiting its use.

movement perception, process through which human beings and other animals orient themselves to their own or others' physical movements.

A brief treatment of the perception of movement follows. For full treatment, *see* MACROPAEDIA: Perception, Human.

The ability to perceive movement is essential to the survival of virtually all animals, including human beings. An animal needs to detect movement in order to hunt, to elude dangers, and to mate. Although movement is perceived primarily through vision, it can also be detected by several nonvisual senses.

The processing of visual data is shared between eye and brain, in proportions that vary from species to species. In general, the eyes of lower animals are adapted to the job of detecting motions directly relevant to the animal's survival. For example, the eyes of frogs are able to register when an insect is moving near enough to be captured. The visual data do not have to be processed by the frog's brain before they are acted on—the eye itself triggers the proper reaction.

In higher animals, the brain plays a more active part, permitting responses to a vastly wider range of stimuli. The eye serves primarily to collect visual data, which is transmitted to the brain for processing. Apparently, there are special cells in the visual area of the brain whose function is to detect movement. However, the outer area of the retinas of most higher animals is especially sensitive to movement, which stimulates a reflex turning of the eye in order to bring the moving object into the more acute centre of the field of vision.

There are various mechanisms by which the visual system aids the perception of movement. Obviously, if the eye were held motionless, a moving object would soon move out of the centre of vision, if not out of the visual field altogether. But in fact the eyes reflexively follow a moving object in order to keep it in the centre of vision.

When the eyes move to take in a stationary scene, the images on the retinas change exactly as if the scene were moving and the eyes were standing still. The scene is experienced as stationary, however, because the brain takes account of the signals to the eye muscles in its interpretation of the retinal image. If something interferes with the normal control over the eye muscles, perceptual errors can result whereby an involuntary movement of the eye produces an apparent motion in what is seen.

Perception of movement also exploits the relation between the moving object and the stationary objects that surround it. These objects serve as a frame of reference that fixes the sense of what is moving and what is not. Without such a frame, a stationary object will look as if it is drifting. Side-to-side movement is easier to perceive than movement toward or away from the eye. Depth perception is gained by binocular vision (*see* space perception), changes in focusing, change in size of the retinal image, and variations in the object's brightness.

Technological means can be used to induce the appearance of movement. Two phenomena permit the illusion of motion. First is the persistence of vision, where a visual stimulus continues to be registered by the brain for a very short time after the stimulus ends. Second is the so-called phi function. If two adjacent lights flash on and off alternately, we seem to see a single light shifting back and forth. This is because we tend to fill in gaps between closely spaced objects of vision. These two phenomena are exploited by motion pictures, which consist of rapid successions of still frames in which the "moving" objects are displaced a very short distance.

Several nonvisual senses are also used to perceive movement. Although land animals can infer an object's motion from changes in its sounds' loudness or direction, sound as an indication of movement is generally more useful to fish and to bats. Another important source of data about the movements of our own bodies is kinesthesis. Kinesthetic sensations are produced by sense organs found in membranes at the joints and from the effort felt during consciously controlled motions.

Another mode of perceiving our own movements involves the vestibular system, which consists of a series of enclosed cavities (vestibules) found in the inner ear, and responds mainly to movements of the head. The brain uses information from the vestibular system to maintain bodily balance and also to control the aforementioned compensatory eye movements.

movie: *see* motion picture.

Movilă, Petru (Orthodox prelate): *see* Mogila, Peter.

Movimento Sociale Italiano: *see* Italian Social Movement.

Movses KHORENATZI: *see* Moses of Khoren.

Mowatt, Anna Cora, *née* OGDEN (b. March 5, 1819, Bordeaux, France—d. July 21, 1870, London, Eng.), American playwright and actress, best known as the author of the satirical play *Fashion.*

Anna Cora Mowatt, engraving from a daguerreotype
By courtesy of the Library of Congress, Washington, D.C

A precocious child, she acted at the age of 5 and had read all of William Shakespeare's plays before she was 10. Her marriage at 15 to James Mowatt, a New York lawyer, gave her ample opportunity to continue dabbling in the arts. In 1841, after her husband lost his wealth, she turned to performing and writing in earnest, giving poetry readings and writing articles for the popular magazines. In 1845 she wrote *Fashion; or, Life in New York,* a social satire that expressed the growing feeling in the United States against the emulation of European manners. In June 1845 Mowatt made a successful debut as an actress. In addition to *Fashion,* she wrote the plays *Gulzara* (1841) and *Armand* (1847) and, in 1854, her *Autobiography of an Actress.* James Mowatt having died in 1851, she married William F. Ritchie in 1854 and retired from the stage.

Mowbray, Thomas: *see* Norfolk, Thomas Mowbray, 1st duke of.

Mowinckel, Johan Ludwig (b. Oct. 22, 1870, Bergen, Nor.—d. Sept. 30, 1943, New York City), Norwegian prime minister during the 1920s and '30s and shipping magnate considered to be the outstanding statesman of his time in Norway.

Educated at Oslo University, Mowinckel entered public life as a town councillor and then as president of the council of his native city, Bergen. In 1906 he was elected to the Storting (Parliament) as a member of the Venstre (Liberal) Party, and he also served as president of the Storting for several years. In 1911 he was instrumental in founding the Norwegian–America shipping line, and in 1925 he became a member of the Nobel Peace Prize Committee.

Mowinckel was three times prime minister of Norway (1925–27, 1928–31, 1933–35) and also held the post of minister of foreign affairs during these periods. He took the initiative for the Oslo Convention in 1930 to encourage free trade between the Benelux and Scandinavian countries, thus anticipating postwar efforts toward European economic union. Mowinckel condemned the menace of Nazism, and when Germany overran Norway in 1940 he escaped with the government-in-exile. He died while representing his country in the United States.

Mowinckel, Sigmund (Olaf Plytt) (b. Aug. 4, 1884, Kjerringy, Nor.—d. June 4, 1965, Oslo), Norwegian biblical scholar, founder of the Scandinavian school of Old Testament studies.

Educated at the University of Oslo (then Kristiania), Mowinckel spent his life from 1917 teaching there. His greatest contribution was in cultic-religious history. He conducted substantial research into the motivation for the psalms and in the practice of worship in ancient Israel. He wrote *Psalmenstudien,* 6 vol. (1921–24; "Studies in the Psalms," later popularized as *The Psalms in Israel's Worship,* 1962), one of the major works of biblical commentary of the 20th century. Depicting the psalms in their concrete cultural milieu, he emphasized the cultic nature of their origin and development.

moxa treatment, also called MOXIBUSTION, traditional medical practice that originated in China and thence spread to Japan and other Asian countries. It is performed by burning small cones of dried leaves on certain designated points of the body, generally the same points as those used in acupuncture.

The term derives from the name of the wormwood plant most frequently used, *Artemisia moxa,* or (Japanese) *A. mogusa.* Acupuncture and moxibustion are sometimes used in combination for the treatment of disease and for anesthesia.

From ancient times, the Chinese believed that burning or heating certain points on the body increased circulation "full-bloodedness" and relieved pain. Generally, points near large blood vessels, eyes, and ears are treated by moxa, because acupuncture at these points is deemed inadvisable.

The process was developed in northern China and probably was first used to relieve the pains of rheumatism. In ancient times the points on the skin were actually blistered by burning, but now the areas to be stimulated are warmed. Hot rods were replaced by rolled leaves of the mugwort, mulberry, ginger, and aconite plants.

In modern practice the herb is usually crushed, wrapped in special paper, and, when lit, held above the point to be warmed or placed on the skin and removed before overheating occurs. The Japanese developed small tubes, fitted with handles, in which the powdered plant is burned away and heating is controlled by the therapist. A moxa stick burns for four or five minutes; it is used to relieve pain and congestion and to provide an anesthetic effect. Pieces of heated ginger are used to treat stomachache, vomiting and diarrhea, and rheumatic pain; garlic is applied in respiratory disorders; and salt is used to stimulate the abdominal organs. Chinese practitioners emphasize the importance of correct body positioning for best results.

Attempts have been made to correlate the acupuncture–moxa treatment with accepted Western treatment for specific ailments. Although stimulation of points on the body by moxa is believed to affect the autonomic nervous system, no physiological basis for moxibustion has yet been found.

Moyano, Sebastián: *see* Belalcázar, Sebastián de.

Moyen Atlas, English MIDDLE ATLAS, mountain range in central Morocco, Africa, lying between a plateau and plain region (northwest) and the main part of the Atlas Mountains (southeast). Many peaks exceed 8,000 feet (2,400 m), with the highest being Mount Bou Nasser (Bou Naceur; 10,958 feet [3,340 m]). Covered by cedar forests, the mountains form a fishing, hunting, and skiing area.

Moyen-Congo (French: "Middle Congo"), one of the four territories comprising French Equatorial Africa, the origins of which derive from the establishment in 1880 by the explorer Pierre Savorgnan de Brazza of a station at Ntamo. From 1934 Moyen-Congo was directly administered by the governor-general of French Equatorial Africa. It was granted independent status as the Congo Republic in 1960 and was subsequently renamed the People's Republic of the Congo, abbreviated Congo (Brazzaville).

Moyle, district, Northern Ireland. Formerly within County Antrim, in 1973 Moyle was established as a district covering 191 square miles (494 square km) of land along the northern coast of Ireland and including Rathlin Island, Northern Ireland's only populated island. The district has 42 miles (68 km) of bays, headlands, and sheer, basalt cliffs dissected by wooded glens. The Antrim Mountains extend through eastern Moyle, reaching an elevation of 1,817 feet (554 m) at Trostan Mountain and descending to high, rolling moors in the west. The area derives its name from "the Straits of Moyle," an old name for the channel between Northern Ireland and Scotland. A cave on Rathlin Island 3 miles (5 km) north of the mainland is said to have been the hiding place of the Scots-Irish leader Robert the Bruce in 1306. In 1898 Guglielmo Marconi tested his wireless system between a Rathlin Island lighthouse and the town of Ballycastle.

Potatoes, oats, barley, and livestock (mostly sheep) are produced in Moyle, but the district's most important industry is tourism. Other industry is distinctly limited because of the strict planning policies governing the areas of "outstanding natural beauty." Two of the best known physical features of Northern Ireland, The Giant's Causeway, comprising about 38,000 mostly hexagonal-shaped basalt columns along the coastal cliffs, and five of the nine Glens of Antrim are found in Moyle. Ballycastle, a fishing harbour and popular resort town located on Ballycastle Bay, is the administrative seat and market centre of the district. Limestone is quarried in the west, and Bushmills town, located on the western edge of the district, has an old distillery of Irish whiskey. Pop. (1983 est.) 14,500.

Moynihan (of Leeds), Berkeley George Andrew Moynihan, 1st Baron (b. Oct. 2, 1865, Malta—d. Sept. 7, 1936, Carr Manor, Leeds, Yorkshire, Eng.), British surgeon and teacher of medicine who was a noted authority on abdominal surgery.

Shifting his interests from a military life to a career in medicine, Moynihan studied at Leeds Medical School and the University of London. In 1890 he became a fellow in England's Royal College of Surgeons, of which organization he was to be named president 36 years later. He took a position teaching anatomy at Leeds Medical School, where he then became a professor of surgery and a surgeon in the Leeds General Infirmary. His expertise in abdominal surgery drew students from all over the world.

Moynihan was the author or coauthor of several well-known and authoritative monographs, including works on the surgical treatment of diseases of the stomach (1901) and pancreas (1902) and upon gastric and duodenal ulcers (1903) and gallstones (1904). His classic exposition of his surgical doctrine, *Abdominal Operations,* was published in 1905 and remained a standard text for two decades. His book *Duodenal Ulcer* (1910) secured his reputation as a clinical scientist.

Moynihan also stressed the value of medical evidence obtained from living bodies on the operating table rather than from postmortem examinations. In 1913 he sponsored the introduction of a new journal, the *British Journal of Surgery,* which was designed to unite British surgeons with those of other countries. He was also instrumental in founding a number of clubs and organizations designed to promote exchange of information among surgeons and specialists. Moynihan was knighted in 1912 and raised to the peerage in 1929.

Moynihan, Daniel Patrick (b. March 16, 1927, Tulsa, Okla., U.S.), American scholar and Democratic party politician, U.S. senator from New York state from 1977.

Moynihan grew up in poverty in New York City and, after service in the U.S. Navy in World War II, attended Tufts University (Medford, Mass.) on the GI Bill (B.A., 1948) and Tufts's Fletcher School of Law and Diplomacy (M.A., 1949), later receiving a Ph.D. from Fletcher (1961). His first taste of politics came in 1953 as a Democratic campaign worker in New York City, and he held various public and party posts in New York state in the 1950s.

During the 1960s he was in Washington, D.C., and, while serving in the Department of Labor, cowrote *The Negro Family: The Case for National Action,* popularly called the Moynihan Report, which held that many of the educational problems of American blacks resulted from the instability of black urban families. The report caused a storm of controversy and made Moynihan famous. He became a professor at Harvard in 1966, held advisory posts in the Richard M. Nixon administration, and served as U.S. ambassador to India (1973–75) and permanent representative to the United Nations (1975–76). As a neoconservative, Moynihan campaigned vigorously for Senator Henry Jackson's ill-fated presidential bid in 1976; and, when that bid failed, Moynihan put himself into the race for U.S. senator in New York. He won the election despite the opposition of liberal Democrats, and in his reelection campaign six years later he won by a landslide.

Moyobamba, capital of Moyobamba province and San Martín department, north central Peru. The city sits on a bluff overlooking the Río Mayo, at 2,820 feet (860 m) above sea level, in the humid, tropical region known as the *selva.* The second oldest Spanish town east of the Andes, Moyobamba (from the Quechua Indian *mayupampa,* meaning "a circular plain") was founded on the site of an Inca settlement and was named Santiago de los Valles de Moyobamba (Saint James of the Moyobamba Valleys). An important commercial centre during the colonial era (1533–

1821), it was given city status in 1857. It is the centre of a large agricultural region, producing cotton, sugarcane, tobacco, cocoa, and rice. Alcohol, liquor, wines, and straw hats are produced in the city. Hot springs, gold, and some petroleum are found nearby. Moyobamba is linked by road with Tarapoto to the southeast and Bagua to the northwest. Roads connect Moyobamba to the Pacific coast by way of Bagua and Olmos to the north and Cajamarca to the southwest. Pop. (1990 est.) 26,000.

Mozabite (Muslim sect): *see* M'zabite.

Moẓaffar od-Dīn Shāh (b. 1852, Tehrān, Iran—d. Jan. 9, 1907, Tehrān), Persian ruler of the Qājār dynasty whose incompetence precipitated a constitutional revolution in 1906.

The son of the Qājār ruler Naṣer od-Dīn Shāh, Moẓaffar od-Dīn was named crown prince and sent as governor to the northern province of Azerbaijan in 1861. He spent his 35 years as crown prince in the pursuit of pleasure; his relations with his father were frequently strained, and he was not consulted in important matters of state. Thus, when he ascended the throne in May 1896, he was unprepared for the burdens of office. At Moẓaffar's accession Iran faced a financial crisis, with annual governmental expenditures far in excess of revenues. He had to make up this deficit by contracting unpopular loans from Russia, which exacted political concessions in return.

Increased influence of Russia and Moẓaffar's squandering of the loans on extravagant European trips in 1900, 1902, and 1905 raised strong domestic opposition. The shah's capricious rule, his court's corruption, and his inability to come to grips with Iran's financial crisis brought demands for constitutional limits to his rule. Widespread popular disturbances in 1906 forced him to convene a Majles (National Consultative Assembly) that October and to grant two months later, in December, a constitution modeled on that of Belgium. The political crisis may have precipitated the heart attack from which Moẓaffar died.

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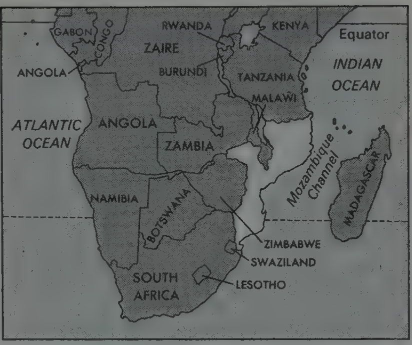
Moẓaffarid DYNASTY (*c.* 1314–93), Iranian dynasty that ruled over southern Iran. The founder of the dynasty was Sharaf od-Dīn Moẓaffar, a vassal of the Il-Khanid rulers of Iran, who was governor of Meybod, a city lying between Eṣfahān and Yazd. In 1314 his son Mobārez od-Dīn Moḥammad was made governor of Fārs and Yazd by Abū Saʿīd, the Il-Khanid ruler. After Abū Saʿīd's death, Moḥammad expanded his possessions. In 1340 he married the only daughter of Shāh Jahān, the last ruler of the Qutlugh dynasty in Kermān, thus gaining possession of that region. By 1356, after a series of campaigns, Moḥammad had become the undisputed ruler of southern Iran. In 1356 he attacked and captured Tabrīz, but he was unable to hold it. In 1358 he was deposed by his two sons, Qoṭb od-Dīn Shāh Maḥmūd (reigned 1358–75) and Jalāl od-Dīn Shāh Shojāʿ (reigned 1358–84), who divided the Moẓaffarid territories between them.

Shortly before his death in 1384, Shāh Shojāʿ divided his possessions among his three sons. The Moẓaffarid power was thus fragmented, and Shāh Shojāʿ's sons were forced to become vassals of Timur, who in 1393 extinguished the dynasty by defeating and killing its last ruler, Manṣūr (reigned 1384–93).



Mozambique

Mozambique, officially REPUBLIC OF MOZAMBIQUE, Portuguese REPÚBLICA DE MOÇAMBIQUE, country located on the southeastern coast of Africa. Elongated in shape, the country extends for about 1,100 miles (1,770 km) from north to south, and from east to west about 400 miles (645 km) in the north and 200 miles (320 km) in the south. Mozambique is bounded on the north by Tanzania, and on the west by Malaŵi, Zambia, Zimbabwe, South Africa, and Swaziland; the entire eastern boundary is defined by the Mozambique Channel of the Indian Ocean. The capital is Maputo. Area 313,661 square miles (812,379 square km). Pop. (1992 est.) excluding refugees in nearby countries, 14,842,000.

A brief treatment of Mozambique follows. For full treatment, *see* MACROPAEDIA: Southern Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Mozambique can be divided into two broad regions: the lowlands in the south and the highlands in the north, separated by the southeastward-flowing Zambezi River. The lowlands (less than 600 feet [200 m] above sea level) extend almost the entire width (about 200 miles [320 km] at some places) of the country in the south except in the Chimoio highlands which include Mount Binga (7,992 feet [2,436 m]), Mozambique's highest peak. In the northern highland region of the country, narrow coastal lowlands give way to the west to an interior plateau at elevations of between 600 and 2,000 feet (200 and 600 m) and eventually rise to the mountainous region (5,000 to 8,000 feet [1,500 to 2,450 m]) that adjoins Malaŵi in the northwest. The Zambezi River, which has a drainage basin of more than 87,000 square miles (225,000 square km) in the central part of the country, is Mozambique's principal river; the multipurpose Cabora Bassa dam and power complex on the Zambezi is one of the largest hydroelectric projects in Africa.

The country has a tropical maritime climate with two main seasons, wet (November–March) and dry (April–October). The average January temperatures in the lowlands are 79° to 86° F (26° to 30° C), and average July temperatures are 59° to 68° F (15° to 20° C); corresponding January temperatures in the highlands are 71° to 77° F (22° to 25° C) and in July 52° to 59° F (11° to 15° C). Mean annual precipitation ranges from 56 inches (1,420 mm) on the northwestern highlands to 20 to 30 inches (500 to 750 mm) in the southeastern lowlands; drought conditions are more common in the south. The wetter northwestern highlands support a dense tropical vegetation (ironwood, palm, and ebony), and the drier interior lowlands support a thin savanna vegetation of grass and shrubs; coconut palm and mangroves are common along the coast, especially in the Zambezi River delta.

Mozambique's rich fauna include zebra, water buffalo, elephant, giraffe, lion, and hippopotamus and crocodile in the rivers. Wildlife is protected in game reserves and national parks, the largest of which is the Gorongosa National Park (1,456 square miles [3,770 square km]), considered one of the most interesting in southern Africa.

Coal is the most important natural mineral resource of Mozambique; reserves were estimated at about 6 billion tons in the late 20th century, chiefly in the northwest; iron-ore deposits (estimated reserves of 360 million tons) are in the northeast. The country has what may be the world's largest deposit of tantalite; there are known deposits of natural gas, bauxite, copper, garnet, and asbestos.

The people. Almost the entire population consists of Bantu-speaking Africans. Ethnolinguistic groups living north of the Zambezi River, including, most notably, the Makua-Lomwe, practice shifting cultivation and trace their ancestry by matrilineal descent. The Yao, also in the north, are Muslims who intermediated in the slave trade between the Arabs and interior tribes during the 18th and 19th centuries.

Groups residing south of the Zambezi River trace their ancestry patrilineally and engage in cattle raising and farming. The largest southern group are the Tsonga, who make up most of Mozambique's labour force in South Africa. The Shona and Nguni are other groups. About half of the population follow traditional beliefs; Islām is practiced in the north and Christianity in the south. Although Portuguese is the official language, its usage tends to be limited to urban areas. The Portuguese make up about 2 percent of the population and, like the Asian minority groups, usually inhabit the cities.

The annual rate of growth of Mozambique's population, once the highest in southern Africa, has decreased steadily since the mid-1970s. About 1.1 million Mozambican refugees are mostly in neighbouring Malaŵi and Zimbabwe. The population is young—more than two-fifths are younger than 15 years of age. About four-fifths of the population is rural, and the trend of migration is toward the cities.

The economy. Mozambique has a centrally planned, developing economy based largely on agriculture, international trade, and light industries. Several industries were nationalized after 1975 (although in 1980 the government invited former owners to resume management), and the skilled work force has been depleted by the emigration of Portuguese and Asian workers. The gross national product (GNP) has virtually a zero growth rate, and the GNP per capita is one of the lowest in the world.

Agriculture accounts for approximately two-fifths of the gross domestic product (GDP) and employs four-fifths of the work force. Numerous farms were collectivized after independence, and agricultural management followed Cuban and Chinese models; in the 1980s, structural adjustment plans imposed by the International Monetary Fund required decentralization and support for private ownership. Production of corn (maize), which is a chief staple, does not meet domestic demand; cassava is the other staple crop. Coconuts, peanuts (groundnuts), cotton, sugar, and cashew nuts are important cash crops. The number of livestock has been kept low by the prevalence of the tsetse fly. The shrimp-fishing industry accounts for as much as one-third by value of the country's exports. Roundwood is exported, in large part to South Africa.

Mining and manufacturing industries account for one-fifth of the GDP and centre on the processing of domestic raw materials. Limited quantities of coal, limestone, and salt are produced. Petroleum must be imported and is refined and distributed by a public corporation.

Electricity is generated from the Cabora Bassa dam, but the destruction of current-line pylons during the postindependence conflict has eclipsed the power flow.

Mozambique is linked by railway to South

Africa, Swaziland, Zimbabwe, and Malaŵi and reexports their goods. The improvement of railways and roads has been hampered by a shortage of skilled labour and years of civil warfare. Mozambique's balance of trade is unfavourable and is only partially offset by remittances from citizens working in South Africa. South Africa, countries of the European Union, and the United States are Mozambique's principal trading partners.

Government and social conditions. Mozambique made the transition from a single-party republic to a multiparty system in 1994. Under its original constitution (1975), power was vested in the Mozambique Liberation Front (Frente de Libertação de Moçambique; Frelimo). Until 1990, conflict between Frelimo and the Mozambican National Resistance (Resistência Nacional Moçambicana; Renamo) undermined the government's attempts to fully establish its socialist economic, social, and administrative policies. In November 1990 a new constitution was introduced legalizing opposition parties and establishing a new unicameral parliament of 200 to 250 members elected by universal adult suffrage; the elected president is limited to three five-year terms.

Although inadequate, health-care facilities are improving. Medical care is free in the nationalized health-care system. Government health plans give priority to medical training, in an attempt to replace medical personnel who left the country at the end of colonial rule. The government has initiated a campaign against infectious disease, including extensive vaccination programs and improved sanitation. Malaria, tuberculosis, dysentery and other gastroenteric infections, pneumonia, measles, and hepatitis appear to be the most common diseases. AIDS is a serious health threat. The average life expectancy is about 48 years, and the infant mortality rate is among the highest in the world.

Education is free at all levels and is compulsory between the ages of 7 and 14. The school system, nationalized in 1975, includes five-year primary schools and seven-year secondary schools. Enrollment in primary and secondary schools is about one-third of the total school-age population. Higher education is available at Eduardo Mondlane University (1962) in Maputo.

Cultural life. Mozambique enjoys great cultural diversity. Makonde carved wood sculpture and the *midogo,* or Chopi orchestral music, are among the best-known artistic traditions. Since the mid-20th century, several Mozambican writers have become known internationally for their poetry, novels, and short stories written in Portuguese.

History. The early inhabitants of Mozambique were probably Bantu-speaking peoples who settled in the region about the 3rd century AD. Arab traders established settlements beginning in the 8th century that developed into independent city-states. By the 14th century most of the coast was linked to them politically and commercially.

The Maravi kingdom of the Mwene Matapa controlled most of the Zambezi Basin when Vasco da Gama landed on Mozambique Island in 1498, and by 1507 the Portuguese had occupied it. In 1531 they established two inland trading settlements and in 1544 founded a post on the coast at Quelimane. The Mwene Matapa recognized Portuguese sovereignty in 1629, but Portuguese ascendency was short-lived because the *changamire* of the Rozwi kingdom conquered the Mwene Matapa and pushed the Portuguese south of the Zambezi in the late 17th century. Portuguese hegemony was slowly reestablished north of the Zambezi, and in 1752 its first colonial governor was appointed. During the late 17th and early 18th centuries the slave trade, controlled primarily by Arabs and Swahili-speakers, became a vital factor in Mozambique's economy. In the mid-18th century the slave trade was outlawed, but it continued illegally.

The Portuguese attempted to control Mozambique with a minimum of government expense. The *prazo* (land grant) system was established to administer the inland region, but it was unsuccessful because the Portuguese could not control the *prazeros.* Their power was broken in the late 19th century, and the Portuguese government chartered private companies to administer portions of the inland territory. Beginning in the late 19th century, part of Mozambique was administered directly by Portugal and the remainder by private companies. In 1929 the Portuguese government took over administration of the company lands north of the Lurio River and in 1940 assumed control of the Manica and Sofala company territories.

The Colonial Act (1930) ended a period of limited autonomy for Mozambique, and a more centralized government was established by Portugal. In 1951 Mozambique became an overseas province. The independence movement began there in the early 1960s with the establishment of Frelimo. Fighting erupted between Frelimo forces and Portuguese troops on Sept. 25, 1964, the day celebrated as the beginning of Mozambique's struggle for independence. Portugal dispatched more than 70,000 troops to restore order. The costs of retaining Mozambique were too great for Portugal, whose army officers revolted in the mid-1970s causing the Portuguese government to collapse. Mozambique achieved independence on June 25, 1975, and a Frelimo government proclaiming its allegiance to Marxist-Leninist ideology was established. Rebel groups, especially Renamo, were effective in disrupting the nation's economy, causing tens of thousands of deaths, and creating vast numbers of refugees. In the late 1980s Frelimo was induced by the International Monetary Fund to eschew its Marxist-Leninist stance in exchange for aid. A new, multiparty constitution was introduced late in 1990; in 1992 Frelimo and Renamo leaders signed a peace accord; in 1994 the country held its first free elections. Issues of land tenure, stemming from the country's colonial and socialist past, remained important at the beginning of the 21st century.

Mozambique (town, Mozambique): *see* Moçambique.

Mozambique Channel, Portuguese CANAL DE MOÇAMBIQUE, channel of the western Indian Ocean, threading between the island nation of Madagascar on the east and Mozambique on the African mainland (west). About 1,000 miles (1,600 km) long, it varies in width from 250 to 600 miles (400 to 950 km) and reaches a maximum depth of 10,000 feet (3,000 m). The Comoro Archipelago marks the northern entrance, and the islands of Bassas da India and Europa lie in the south. An important route for shipping in eastern Africa, it receives all major Madagascar rivers and has the ports of Mahajanga (Majunga) and Toliary (Tuléar) on the same coast. Along the opposite coast are the mouth of the Zambezi River and the ports of Maputo (formerly Lourenço Marques), Moçambique, and Beira. The Mozambique Current passes through the strait.

Mozambique Conventions, series of agreements concerning relations between South Africa and Mozambique. The initial convention, concluded between Portugal and the Transvaal republic in 1875, provided for commercial relations between the parties and the building of a railroad between Lourenço Marques in Mozambique and the Transvaal. After the annexation of the Transvaal by Great Britain in 1877, the convention was recognized by Britain and Portugal in 1882 and reaffirmed in 1901. A new convention, in 1909, between Portugal and the governor of the Transvaal, included provisions for recruiting labourers in Mozambique for work in the Transvaal mines. These provisions were revised in a convention of 1928 between Portugal and the Union of South Africa. Further revisions were made later, notably in 1934 and 1964.

Mozambique Current, relatively warm surface current of the western Indian Ocean. The southeast trade winds move the Indian South Equatorial Current toward the east coast of Africa, off which, because of the Earth's rotation, it is directed south to follow the outline of the mainland and its continental shelf. While some of this flow passes east of the island of Madagascar, the rest funnels to the west through the Mozambique Channel, bringing with it strong influences on the climate of the island and mainland. South of Madagascar both streams feed into the Agulhas Current.

Mozarab, Spanish MOZÁRABE (from Arabic *mustaʿrib,* "arabicized"), any of the Spanish Christians living under Muslim rule (8th–11th century), who, while unconverted to Islām, adopted Arabic language and culture. Separate Mozarab enclaves were located in the large Muslim cities, especially Toledo, Córdoba, and Seville, where they formed prosperous communities ruled by their own officials and were subject to a Visigothic legal code. They also maintained their own bishoprics, churches, and monasteries and translated the Bible into Arabic. The Mozarabs eventually relocated in the north of the Iberian Peninsula, bringing with them the architectural style of Islāmic Córdoba, characterized by the horseshoe arch and the ribbed dome.

Mozarabic art, architecture and other visual arts of the Mozarabs, Christians who lived in the Iberian Peninsula after the Arab invasion of 711. The conquered Christians were tolerated, although called *mustaʿrib* ("arabicized," from which "Mozarab" is derived), and maintained their traditional religion. Exposure to Islāmic culture and art forms proved to be influential, however, and their art became a synthesis of the two traditions. The subject matter is Christian, but the style shows the

"St. Luke," illuminated page from the Beatus Apocalypse, Mozarabic, 975; in the Gerona Cathedral

Archivo Mas, Barcelona

assimilation of Islāmic decorative motifs and forms. Even those who emigrated to reconquered territory or to other countries continued to produce art and architecture in the Mozarabic style, and it was in part the result of these movements that Arabic influences spread northward into Europe.

The Mozarabic style is identifiable only in religious art; in the minor arts—especially textiles, ceramic tiles, and pottery—the style is so close to contemporary Islāmic work that only by the Christian subject matter is it known that the artists were not Arabs. Among the most characteristic Mozarabic productions was a series of manuscripts called the Beatus Apocalypses, brightly illustrated copies of commentaries on the Book of Revelation by the monk Beatus of Liébana. Their iconography influenced the Romanesque works that superseded them.

Mozarabic architecture also shows the influence of Islāmic style, especially in its use of the horseshoe-shaped arch and the ribbed dome. Restrictions on building and restoring their shrines inhibited the Mozarabs still living under Muslim rule, but a large number of churches built in the Mozarabic style by monks who emigrated to the non-Islāmic territories of northern Spain survive from the late 9th to early 11th century. San Miguel de Escalada, near León, for example, the largest surviving example of Mozarabic architecture, was founded by monks from Córdoba and consecrated in 913.

Mozarabic chant, liturgical music and text forming the eucharistic rite of the Roman Catholic church in Spain in and before the 11th century. By the 5th century, Spain had its own religious and liturgical traditions, which reached a full flowering under the Visigoths in the 6th and 7th centuries. The term Mozarab, denoting Christians under Muslim rule, came into use after the Iberian Peninsula was invaded by the Muslim Arabs (711) and eventually came to designate the Spanish liturgy before, during, and after the Muslim domination, which began to decline in the late 11th century.

The earliest extant manuscripts of Mozarabic chant (8th–11th century) preserve the musical notation and texts of the entire church year. The notation consists of neumes, or signs showing one or more notes; but it lacks a musical staff, which alone could give the exact pitches of the notes.

In the 11th century Pope Gregory VII, desiring to unify liturgical practice, suppressed the Mozarabic rite in favour of the Roman. Only six parishes in Toledo and some monasteries were allowed to continue using it. In the early 16th century, Cardinal Francisco Jiménez de Cisneros tried to revive the Mozarabic chant, but by this time the key to the transcription of the neumes had been lost.

The Mozarabic liturgy contains one element found in no other liturgy of equal antiquity. This is a Clamor (Shout) in the mass, added on feast days to the Psallendum, a chant that follows the scriptural readings, in order to elicit religious fervour. Musically, Mozarabic chant contains not only influences of Eastern church chant—such as the long melismata of the Alleluia (prolongations of one syllable over many notes)—but it also has affinities to the Gallican (Frankish) and Ambrosian (Milanese) rites and chants.

Mozarabic language, also called AJAMI, archaic dialect of Spanish that was spoken in those parts of Spain under Arab occupation from the early 8th century until about 1300. Mozarabic retained many archaic Latin forms and borrowed many words from Arabic. Although almost completely overshadowed by Arabic during the period of Muslim domination, Mozarabic nevertheless maintained a completely Romance sound system and typically Romance grammar. The dialect is known almost entirely from refrains, known as *kharjahs*, added to Arabic and Hebrew poems of the 11th century. These refrains are written in Arabic characters that lack most vowel markings and are often rather difficult to decipher. *See also* Spanish language.

Mozart, (Johann Georg) Leopold (b. Nov. 14, 1719, Augsburg [Germany]—d. May 28, 1787, Salzburg, Archbishopric of Salzburg [Austria]), Austrian violinist, teacher, and composer, the father and only teacher of Wolfgang Amadeus Mozart.

Leopold Mozart became a violinist at the court of the Prince-Archbishop of Salzburg and rose through the orchestra's ranks to become court composer (1757) and (1762) vice chapelmaster. His treatise setting forth his method of teaching, *Versuch einer gründlichen Violinschule* (1756; *A Treatise on the Fundamental Principles of Violin Playing*), was long a standard text and was widely reprinted and translated. Among his musical compositions are concerti for various instruments, symphonies, and other pieces.

In 1763 he began the first of many triumphant and highly publicized exhibitions of his two talented children (the other five of his seven children did not survive infancy): Maria Anna (Nannerl; 1751–1829), an accomplished clavierist, and the precocious genius Wolfgang Amadeus, who, at age six, performed his own and others' works on several instruments, improvised, and played at sight difficult, unfamiliar compositions. Although often criticized for exploiting his son and commercializing his talents, Leopold Mozart sincerely felt it was his God-given obligation to develop such abilities and to exhibit them to the world. Some of the extensive correspondence of father and son is contained in *The Letters of Mozart and His Family* (1963), by E. Anderson.

Mozart, Wolfgang Amadeus, in full JOHANN CHRYSOSTOM WOLFGANG AMADEUS MOZART, baptized as JOANNES CHRYSOSTOMUS WOLFGANGUS THEOPHILUS MOZART (b. Jan. 27, 1756, Salzburg, Archbishopric of Salzburg [Austria]—d. Dec. 5, 1791, Vienna), Austrian composer who, together with Joseph Haydn, represents the climax of the late 18th-century Viennese Classical style and who, by virtue of the extraordinary quality of his achievements in opera, chamber music, symphonies, and piano concerti, is regarded as one of the greatest musical geniuses of all time.

A brief treatment of Wolfgang Amadeus Mozart follows. For full treatment, *see* MACROPAEDIA: Mozart.

Mozart began to compose when he was five and soon became proficient on the harpsichord and violin. He concentrated later on the pianoforte and was taken with his sister on tours of Europe by his father. He continued to compose while on his travels. From 1775 he was at Salzburg in the service of the archbishop until his break with him in 1781. The first of his mature operas, *Idomeneo,* was written for Munich in 1781. He settled in Vienna and, after years of waiting, was engaged by the emperor Joseph II as chamber composer in 1787. Meanwhile, he continued to earn his living as an independent musician and composer, producing many of his most famous concerti and symphonies. Despite successes, such as the operas *The Marriage of Figaro* in 1786 and *Don Giovanni* in 1787, he fell repeatedly into debt. His last great opera, *Die Zauberflöte* (*The Magic Flute*), was first performed in 1791. In that year Mozart's health failed, and he died in the autumn.

Mozart's three great operas place him with Richard Wagner and Giuseppe Verdi in the triumvirate of opera composers who have no other equals. In Mozart's operas, music of virtually flawless workmanship is reconciled with all of the dramatic claims made by a libretto, resulting in the perfect delineation of characters and the faultless handling of complex emotion in unified musical pieces. Mozart's achievements in instrumental music are of equal importance to those in opera. He excelled at the writing of piano concerti, symphonies, piano sonatas, and string quartets. Especially notable are his last two symphonies, the *Symphony No. 40 in G Minor* and the *Symphony No. 41 in C Major* (both 1788), which carried that musical form beyond anything hitherto achieved in monumentality and power. Mozart made even greater contributions to the piano concerto, and the last 10 such works that he wrote for the instrument are among his masterpieces. He also wrote notable concerti for the violin, clarinet, and other instruments. Some of his later piano sonatas and string quartets are also very well known. His church music was climaxed by the *Requiem* in D minor, which he left unfinished at his death.

Mozelekatse (South African king): *see* Mzilikazi.

Mozu (Chinese philosopher): *see* Mo-tzu.

Mozyr, also spelled MOZYR', city and centre of Mozyr *rayon* (sector), Gomel *oblast* (province), Belarus. It is situated on the high bank of the Pripyat River. The city dates from at least the 12th century, and from the 18th century it was a centre of trade and handicrafts. Mozyr was a woodworking centre in the early Soviet period but now also has important oil-refining, machine-building, and metalworking industries, as well as clothing and food industries. It is an important river terminal and has significant salt deposits. A pipeline carrying oil to eastern Europe branches in two at Mozyr. There is a teacher-training institute and a medical school in the city. Pop. (1991 est.) 103,000.

mozzarella, mild, smooth-textured cheese made in its authentic Italian version from the milk of the water buffalo; imitations of varying quality are commonly made of cow's milk.

Mozzarella is a plastic or stretched-curd cheese; the curd is mixed with heated whey and stretched and kneaded until it attains a smooth, pliable consistency. It is then molded into spheres or ovals and stored in water to keep it moist. Mozzarella is made fresh daily in many parts of Italy and in Italian delicatessens in the United States and elsewhere.

Creamy white or pale ivory in colour, mozzarella has a mild, fresh lactic flavour and is used primarily in cooking, especially as a main ingredient in pizza. Delicate and perishable, it typically lasts only a few days; some versions, however, undergo an aging process that strengthens their flavour, toward that of provolone, and prolongs their storage life. Lightly smoked mozzarella is known as Scamorze.

MPAJA: *see* Malayan People's Anti-Japanese Army.

Mpezeni, also spelled MPESENI (b. *c.* 1830—d. Sept. 21, 1900, near Fort Jameson, Northern Rhodesia [now Chipata, Zambia]), South African chief, a son of the great Ngoni king Zwangendaba. Mpezeni found himself in the middle of European competition for control of southeastern Africa, and his unwillingness to grant land and mineral concessions to European colonists earned him their enmity. He was eventually defeated by the British.

At Zwangendaba's death in 1845, the Ngoni kingdom split into five major groups under different sons of the old king. Mpezeni led his group to what is now southern Zambia, where they were undisturbed by external threats until the closing years of the 19th century. From 1889, however, Germany, Portugal, and Britain attempted to gain control of his territory. Mpezeni tried to play off the

European powers against each other, but by 1896 his policy of procrastination began to cause dissension among his own people, and in 1897 he reluctantly consented to an attack on British settlements in the Nyasaland Protectorate (now Malaŵi). The British counterattacked in force, and in February 1898 Mpezeni was forced to surrender.

Mphahlele, Es'kia, original name EZEKIEL MPHAHLELE (b. Dec. 17, 1919, Marabastad, S.Af.), novelist, essayist, short-story writer, and teacher whose autobiography, *Down Second Avenue* (1959), has become a South African classic. It combines the story of a young man's growth into adulthood with penetrating social criticism of the conditions forced upon black South Africans by apartheid.

Mphahlele grew up in Pretoria and attended St. Peter's Secondary School in Rosettenville and Adams Teachers Training College in Natal. His early career as a teacher was terminated for political reasons, and in 1957 he went into voluntary exile in Nigeria.

Thereafter Mphahlele held a number of academic and cultural posts in Africa, Europe, and the United States. He was coeditor with Ulli Beier and Wole Soyinka of the influential literary periodical *Black Orpheus* (1960–64), published in Ibadan, Nigeria; founder and director of Chemchemi, a cultural centre in Nairobi for artists and writers (1963–65); and editor of the periodical *Africa Today* (1967). He received a doctorate from the University of Denver in 1968. In 1977 he returned to South Africa and became head of the department of African Literature at the University of Witwatersrand in Johannesburg (1983–87).

Mphahlele's critical writings include two books of essays, *The African Image* (1962) and *Voices in the Whirlwind* (1972), that address Negritude, the African personality, nationalism, the black African writer, and the literary image of Africa. He helped to found the first independent black publishing house in South Africa. His later works include the novels *The Wanderers* (1971) and *Chirundu* (1979) and a sequel to his autobiography, *Africa My Music* (1984).

Mpondo, also spelled PONDO, group of Nguni-speaking peoples who have for several centuries occupied the area between the Mtata and Mtamvuna rivers in Eastern province of South Africa. The Mpondo homeland formed one of the largest parts of the former Transkei (until 1994), an independent republic that was established under the South African government's policy of apartheid but was dissolved and reincorporated (in part) into the new province in 1994.

At the beginning of the 19th century, the Mpondo people shared with other Nguni speakers a basic social organization and material culture that set them off from other South African peoples. They settled in dispersed households. Agriculture was a female occupation. Men were responsible for cattle raising, which played a central role in both subsistence and social relations and which also formed the basis of Mpondo wealth. Patrilineal succession and exogamous marriage were the rule, and cattle were used to obtain wives through the payment of *lobola* (bridewealth). Political structure consisted of a number of subsidiary chiefdoms subordinated in varying degrees to a central chieftaincy under a royal lineage.

The series of wars known as the Mfecane ("The Crushing"), which resulted from the expansionist policies of the Zulu leader Shaka, brought great changes to the Mpondo in the 1820s. In 1828 the Zulu defeated them, and they fled as refugees across the Mzimvubu River, losing their cattle and their lands. Under the leadership of their chief, Faku, however, the Mpondo reorganized themselves. Faku established an army on the Zulu model and organized production of grain for sale to facilitate the rebuilding of their cattle herds. By the early 1840s Faku had re-created the Mpondo state and, in order to gain grazing land for the new Mpondo herds, had gradually reoccupied the lands to the east of the Mzimvubu River. By 1860 Faku ruled over a state containing an estimated 100,000 people.

In the 1860s European traders established many trading posts throughout Mpondo territory, and the Mpondo traded cattle and hides for agricultural implements, luxury items, and weapons. With increased use of draft animals and new agricultural techniques, agricultural productivity improved, and in the 1880s the state seemed secure. The colonial governments of both the Cape Colony and Natal coveted Mpondo territory, however, and civil conflict among competing Mpondo groups gave the Cape government under Cecil Rhodes the opportunity to annex Mpondo territory in 1894. The destruction of Mpondo political independence was paralleled in 1897 by the great, continent-spanning rinderpest epidemic that decimated their herds.

To obtain fresh cattle many adult men became migrant workers in the gold mines of the Witwatersrand. Gradually, the rural economy was rebuilt, although in the early 20th century there was increased social stratification of the Mpondo families based on wealth. In 1913, when the Natives' Land Act was passed giving the best lands in South Africa to the white population, its effect on the Mpondo was less severe than elsewhere in the country; most Mpondo land remained in Mpondo possession. Later, during the 1920s and '30s, state policies against cattle diseases ensured the survival of the cattle-oriented society of the Mpondo. The state also accepted the continued legitimacy of Mpondo chiefly institutions and the enforcement of customary law. It was therefore relatively easy for the South Africans to utilize Mpondo territory as a fundamental part of the Nguni-speaking Transkei.

Mpumalanga, province, northeastern South Africa. It is bordered by Northern province in the north, Mozambique and Swaziland on the east, the provinces of KwaZulu/Natal and Free State on the south, and Gauteng province on the west. Mpumalanga province (called Eastern Transvaal province in 1994–95) was part of former Transvaal (*q.v.*) province until 1994. Nelspruit is the provincial capital.

The province contains several distinct physiographic regions: the Highveld in the west, a plateau ranging in elevation from 4,000 to 6,000 feet (1,200 to 1,800 m); the forested Drakensberg mountains rising to more than 7,500 feet (2,300 m) in the east; and the Lowveld, a bush-clad plain that slopes gently toward the Lebombo Mountains on the Mozambique boundary to the northeast. Much of Mpumalanga is drained by eastward-flowing tributaries of the Limpopo River.

Temperatures in Mpumalanga vary with the elevation, ranging from a mean of 61° F (16° C) in the Highveld to one of 74° F (23° C) in the subtropical Lowveld. Rainfall generally increases from west to east, averaging from 20 to 30 inches (510 to 760 mm) annually in the Highveld and Drakensberg to more than 39 inches (1,000 mm) in parts of the Lowveld. Most of the natural vegetation in the province consists of various types of grassland or savanna parkland, with acacia trees.

Blacks belonging mainly to the Nguni (including Swazi-speaking peoples and the Ndebele) make up about 90 percent of the province's total population. They reside mainly in rural areas and speak Bantu languages. Whites make up 10 percent of the province's total population. Four-fifths of them speak Afrikaans, the remainder English.

Mpumalanga's farms produce corn (maize), wheat, peanuts (groundnuts), cotton, sugar, potatoes and other vegetables, and a variety of fruits, including oranges and mangoes in the subtropical Lowveld and peaches at higher elevations. Beef and dairy cattle and sheep (producing Merino wool) are also important to the agricultural economy. The province possesses deposits of asbestos, copper, iron ore, platinum, chromium, and coal. Witbank is the only major urban centre. Mpumalanga encompasses the southern half of Kruger National Park, which lies along the border with Mozambique. Area 30,259 square miles (78,370 square km). Pop. (1994 est.) 2,921,559.

Mqhayi, S.E.K., in full SAMUEL EDWARD KRUNE MQHAYI (b. Dec. 1, 1875, near Gqumahashe, Cape Colony [now in South Africa]—d. July 29, 1945, Ntab'ozuko, S.Af.), Xhosa poet, historian, and translator who has been called the "father of Xhosa poetry."

Mqhayi, who was born into a family of long Christian standing, spent several of his early years in rural Transkei, a circumstance that is reflected in his evident love of Xhosa history and his mastery of the praise poem. He taught school and helped to edit several Xhosa-language journals. In 1905 he was appointed to the Xhosa Bible Revision Board, and he later helped codify Xhosa grammar and standardize Xhosa orthography. After completing this work, Mqhayi devoted most of his time to writing.

His first published book, *U-Samson,* was a version of the biblical story of Samson. In 1914 his *Ityala lamawele* ("The Lawsuit of the Twins") appeared. Inspired by another biblical story, *Ityala lamawele* is a defense of Xhosa law before European administration. In the 1920s Mqhayi wrote several biographies and *Imihobe nemibongo* (1927; "Songs of Joy and Lullabies"), the first published collection of Xhosa poems, many of which celebrate current events or important figures. A work of fiction, *U-Don Jadu* (1929), describes a utopian multiracial state that combines elements of Western society and Xhosa culture. Mqhayi's autobiography, *U-Mqhayi wase Ntab'ozuko* (1939; "Mqhayi of the Mountain of Beauty"), gives a vivid picture of late 19th-century Xhosa life.

Mqhayi's collected poems, *Inzuzo* ("Reward"), were published in 1942. A short autobiography and two works, "The Death of Hintsa" and "The Dismissal of Sir Benjamin D'Urban," were published in *Mqhayi in Translation* (1976).

MRA (revivalistic movement): *see* Moral Re-Armament.

Mrohaung, Arakanese Kingdom of, in southern Myanmar (Burma), state whose longevity (1433–1785) provided a strong tradition of independence for the Arakan region, a coastal strip on the Bay of Bengal.

King Narameikhla founded a strong, stable kingdom in 1433. In 1531 the first European ships appeared in the region, and Portuguese freebooters began to settle at Chittagong. Mrohaung's navy, under the leadership of King Minbin and with Portuguese assistance, was the terror of the Ganges River region. Arakan's neighbour and traditional antagonist, Bengal, was weak; the freebooters raided there at will, carrying hundreds of slaves off to Arakan. For almost a century Mrohaung retained its naval power.

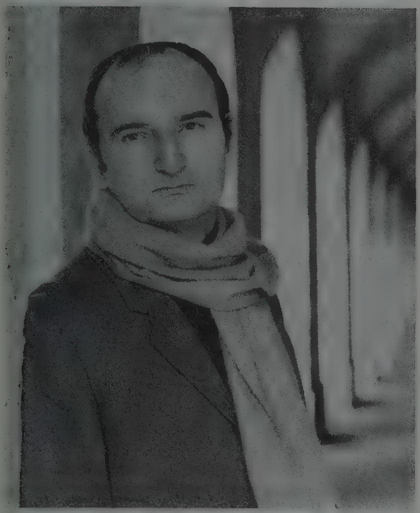
The slave markets at Mrohaung attracted the attention of Dutch traders, who purchased slaves from the Arakanese. To stop the depopulation of coastal Bengal, the Mughal emperor Shāh Jahān in 1629 wiped out a Portuguese pirate nest on the Chittagong coast. Mrohaung endured as a naval power until 1666, when Bengal annexed the coastal area.

When King Sandathudamma died in 1684, the country became prey to internal disorder.

Another 25 kings came to the throne, however, before the armies of the Burmese king Bodawpaya invaded the kingdom and deposed the last king, Thamada, in 1785.

Mrożek, Sławomir (b. June 26, 1930, Borzęcin, near Kraków, Pol.), Polish playwright noted for his subtle parody and stylized language.

The son of a postman, Mrożek entered journalism as a cartoonist and author of short articles, the humour of which arose from the use of wordplay and grotesque situations. During the 1950s and '60s he became a prominent figure in Polish literature by virtue of his plays in the style of the Theatre of the Absurd; through these he evaded the rigours of Communist censorship. He left Poland in 1964 and thereafter lived in Paris, eventually becoming a French citizen. Six of his plays—*Policja* (1958; "Police"), *Męczeństwo Piotra Oheya* (1959; "The Martyrdom of Peter Ohey"), *Na pełnym morzu* (1961; "Out at Sea"), *Karol* (1962; "Charlie"), *Zabawa* (1963; "The Party"), and *Czarowna noc* (1963; "Enchanted Night")—were translated into English by Nicholas Bethell in *Six Plays by Sławomir Mrożek* (1967). The most successful of Mrożek's plays, produced in many Western countries, is *Tango* (1964). His later plays include *Wacław* (1970; *Vatzlav: A Play in 77 Scenes*), *Amor* (1979; "Cupid"), *Ambasador* (1984; *The Ambassador*), and *Emigranci* (1974; *The Emigrants*).



Mrożek
Jerry Bauer

MRP (French political party): *see* Popular Republican Movement.

MS: *see* multiple sclerosis.

MSG: *see* monosodium glutamate.

Mshweshwe, also spelled MOSHOESHOE, or MOSHESH, original name LEPOQO (b. *c.* 1786, near the upper Caledon River, northern Basutoland [now in Lesotho]—d. March 11, 1870, Thaba Bosiu, Basutoland), founder and first paramount chief of the Sotho (Basuto, Basotho) nation. He is particularly noted for his superior military tactics and his skillful diplomacy.

Son of a lesser chieftain, Mshweshwe (then known by his post-circumcision name of Letlàma, "The Binder") won a reputation for leadership as a young man by conducting daring cattle raids. According to tradition Mshweshwe in 1806 visited the chief and wise man Mohlomi to learn how to become a great chief; Mohlomi recommended gentleness and benevolence and suggested that Mshweshwe extend his influence by marrying many wives. These words guided Mshweshwe's actions throughout his life. In 1809 he took the name Mshweshwe, an imitation of the sounds made by a knife in shaving.

A series of cattle raids and subsequent conquests brought Mshweshwe greater prestige. He eventually united the various small groups to form the Sotho nation, called by English-speaking persons Basutoland. Ruling from his impregnable stronghold, Thaba Bosiu (*q.v.;* "Mountain of the Night"), he pursued a policy of peace and prosperity.

In 1833 the Sotho leader welcomed French missionaries. Though he encouraged them in their activities, he continued to support the old customs and religion. He relied heavily on the missionaries for advice in dealing with the British and the Boers, who were coming north into his lands. With characteristic temporizing, Mshweshwe maintained his power, often playing off British and Boer against one another, until 1843, when he allied himself with the British. Five years later most of his lands were annexed by Britain, and soon disputes led to a war in which the overconfident British were defeated. Mshweshwe continued to fight against encroachment on Sotho lands. The Orange Free State was established in 1854, and Mshweshwe became involved in a another series of wars. When that conflict began to go against him, Mshweshwe succeeded in persuading the British to annex Sotho lands in 1868. Thereafter the region officially became known by the British name Basutoland. Though Mshweshwe's power waned in the last years of his life, the Sotho continue to venerate his name, and he is considered to be the father of his country.

MSI (Italian political party): *see* Italian Social Movement.

M'Sila, town, north-central Algeria. It is situated on the Plains of Hodna between the saline lake Chott el-Hodna (south) and the east–west extending Hodna Mountains to the north at an elevation of 1,542 feet (470 m). A dam on the Wadi Ksob in the Hodna Mountains irrigates the cereal-growing area around the town. M'Sila is a farming and trading centre whose chief industry is leather working.

The surrounding region is largely covered with salt lakes (*chotts*), which drain intermittent streams. The chief economic activities of the region are the non-intensive raising of cereals (wheat and barley), seminomadic herding (goats and sheep), and date production. Pop. (1987) 65,805.

Msiri, also called NGELENGWA, or MWENDA (b. near Tabora, Tanganyika—d. Dec. 20, 1891, Katanga, Congo Free State), African ruler, one of the most successful of the 19th-century immigrant adventurers and state builders in Central Africa.

About 1856 Msiri settled in southern Katanga with a few Nyamwezi followers, and by about 1870 he had succeeded in taking over most of this valuable copper region from its previous Lunda rulers. During the height of his power in the mid-1880s Msiri not only ruled directly a very large kingdom but also received tribute from neighbouring areas. His prosperity was largely based on the copper trade, though he dealt in slaves and ivory as well; thus his basic policy was to keep trade routes open toward both the east and west coasts. In the 1870s he began to trade with the Arab trader and state builder Tippu Tib. Msiri was especially interested in buying rifles, which he saw as absolutely necessary to his military strength.

Missionaries first entered Msiri's kingdom in 1886. Of greater consequence, however, was the realization by other Europeans that Katanga was rich in minerals. Msiri refused to negotiate with the British South Africa Company, but in 1891 more importunate expeditions arrived from the Belgian king Leopold II's Congo Free State. One tried to encourage rebellion against Msiri, who was fatally shot while negotiating with another expedition.

Though Msiri adopted older patterns of indigenous Lunda state building, he also introduced new political titles and ceremonies and made some changes in customary law. Of at least equal importance was the introduction by the Nyamwezi into Katanga of the sweet potato, smallpox vaccination, and a technique for making copper wire.

Mswati, also spelled MSWAZI (b. *c.* 1820, near Manzini, Swaziland—d. 1868, Swaziland), South African chief and son of Sobhuza I, the founder of Swaziland. Mswati was the greatest of the Ngwane kings, and the Swazi (as the Ngwane came to be called) take their name from him. He extended his kingdom northward into Rhodesia (now Zimbabwe), including territory since lost by the Swazi.

Mswati became king in 1840 and established control over the Bantu-speaking peoples in eastern South Africa. Reorganizing the Ngwane along the lines of the successful Zulu regimental castes, he made them one of the most powerful nations of southern Africa. In 1860 a disputed succession in the Shangane kingdom to the north enabled Mswati to extend his influence into southern Rhodesia and Mozambique. In 1845 he ceded some territory to Boer settlers in the Transvaal, South Africa, and in 1864 he aided them in conquering the Poko. Apparently unaware of the dangers involved, Mswati encouraged contact with the Boers, though this eventually led to the loss of Swazi independence in 1894.

Mt.: *see under* Mount.

Mtetwa, also spelled MTHETHWA, empire that arose in northern Zululand, in South Africa, at the end of the 18th century, probably in response to the increased trading opportunities in Delagoa Bay and possibly also because of population growth and an increasing need for grazing land. Under the rule of Dingiswayo (died 1817) many of the military and administrative innovations, including the system of age-regiments that later characterized the Zulu empire, were initiated, and it was in the Mtetwa armies that the Zulu chieftain Shaka first rose to fame. On Dingiswayo's death the Mtetwa was absorbed by the Zulu empire.

MTS (Soviet history): *see* machine-tractor station.

Mtshali, Oswald Mbuyiseni (b. 1940, Vryheid, Natal, S.Af.), South African poet who wrote in English and Zulu and whose work drew deeply upon the immediate experience of life in the Johannesburg township of Soweto.

He worked as a messenger before his first collection of poems, *Sounds of a Cowhide Drum* (1971), won the Olive Schreiner Prize for 1974. After studying in the United States at the University of Iowa and Columbia University (New York), Mtshali returned to South Africa in 1979 and taught at a private school in Soweto. His second volume of poems, *Fireflames* (1980), was banned by the South African government because it was dedicated to the schoolchildren of Soweto, an obvious reference to the uprising there in 1976.

Mtshali's poetry inevitably reflects his harsh experiences under the apartheid regime. He observes with a bitter and sardonic eye the grimy beer halls, the crowded trains, the slum housing, and the harsh working conditions that make up the lot of black Africans in South Africa. His bitterness finds expression in brilliantly controlled lines etched with an acid irony. Mtshali's poetry is remarkable for its evocative imagery, and his confident and unexpected similes have a rich emotional impact.

Mtskheta, town, Georgia, at the confluence of the Kura and Aragvi rivers, just northwest of Tbilisi. One of the oldest settlements of Transcaucasia, Mtskheta was the capital of Georgia from the 2nd to the 5th century AD. Of historical and architectural interest are the Cathedral of Sveti-Tskhoveli, which was founded in the 4th century and reconstructed in the 15th and 18th centuries; the Samtavro convent; and the Dzhvari Church. The cathedral was the traditional burial place for the kings of Georgia. On a hilltop outside the town stand the ruins of the Armaz-Tsikhe Castle, the oldest in Georgia and the seat of the 2nd–5th-century Georgian kings. Pop. (1991 est.) 9,900.

Cathedral of Sveti-Tskhoveli, in Mtskheta, Georgia
Alexander M. Chabe

Mu-ch'i, Pinyin MUQI, also called FA-CH'ANG, Pinyin FACHANG (fl. 13th century), one of the best known of Chinese Ch'an (Japanese: Zen) Buddhist painters whose works were influential in Japan.

Toward the end of the Sung dynasty (960–1279), Mu-ch'i found himself in political trouble and fled to a monastery near the capital city of Hangchou. His paintings on Ch'an themes stimulated many copies in Japan; thus, it is there that paintings likely to be authentic works by Mu-ch'i are now found, though the Japanese painter Mokuan (d. *c.* 1345) traveled to Mu-ch'i's monastery and is said to have received two of Mu-ch'i's seals from the abbot of the temple, making the paintings in Japan somewhat suspect. Mu-ch'i, like many other Chinese painters, painted a variety of subjects—including landscapes, flowers, still lifes, and more orthodox iconographic subjects. While there are various examples of each extant, indicating his diverse interests and styles, the most famous paintings associated with Mu-ch'i include "Six Persimmons"; a triptych with a white-robed Kuan-yin at the centre flanked on either side by a scroll of monkeys and a crane; and a surviving set of four sections of an original set of "Eight Views of the Hsiao and Hsiang Rivers." However different the paintings in style and subject matter, there is throughout an appropriate sense of immediate vision and creation and a totally responsive hand, expressed with broad and evocative washes of ink.

"A Monkey with Her Baby on a Pine Branch," right portion of a hanging scroll triptych by Mu-ch'i, ink and slight colour on silk; in the Daitoku Temple, Kyōto
Daitoku-ji, Kyōto

Mu-fu Mountains, Wade-Giles romanization MU-FU SHAN, Pinyin MUFU SHAN, range in northern Hunan and Kiangsi provinces, China. The Mu-fu extend for more than 125 miles (200 km), from near P'ing-chiang in Hunan northeastward to the Yangtze River valley west of Chiu-chiang. The main range averages about 3,300 feet (1,000 m) in height; but Mount Mu-fu itself, the great peak from which the range takes its name, reaches 5,236 feet (1,596 m), and Mount San-feng, further east, reaches 5,489 feet (1,673 m). The range divides the Yangtze valley from the valley of the Hsiu River.

Mu Gia Pass, Vietnamese DEO MUGIA, mountain pass in the Annamite Chain between northern Vietnam and Laos, 55 miles (90 km) northwest of Dong Hoi, Vietnam. The pass lies 1,371 feet (418 m) above sea level and carries the road from Tan Ap in Vietnam to Muang Khammouan (formerly called Thakhek) in Laos, on the Mekong River. The strategic pass was the principal point of entry of the Ho Chi Minh Trail access system into Laos and was heavily bombed during the Vietnam War (1955–75).

Mu River, river in north-central Myanmar (Burma), flowing south to the Irrawaddy River west of Sagaing. The Mu is about 170 miles (275 km) long and has been used for irrigation in the Dry Zone since the 9th century. The modern Mu Valley Irrigation Project is one of the largest in Myanmar.

Mu-shih-t'a-ko Range, Wade-Giles romanization MU-SHIH-T'A-KO SHAN, Pinyin MUZTAGATA SHAN, also called KASHGAR RANGE, mountain range in westernmost Uygur Autonomous Region of Sinkiang, China. It extends 200 miles (322 km) in a north-northwest and south-southeast axis parallel to the eastern edge of the Pamir mountainous area and rises to 25,325 feet (7,719 m) in the Kungur massif. The peak of Mu-shih-t'a-ko (24,757 feet [7,546 m]) in the range is about 100 miles (160 km) southwest of Kashgar.

Mu-tan-chiang, Pinyin MUDANJIANG, city in southeastern Heilungkiang *sheng* (province), China. It is located about 70 miles (115 km) west of the Chinese-Russian border. It is situated on the upper reaches of the Mu-tan River, which is a tributary of the Sungari River in the mountains of eastern Manchuria (Northeast provinces). Until the 1920s Mu-tan-chiang was little more than a large village that was overshadowed by the nearby county town of Ning-an.

The area was first settled after the completion of the Chinese Eastern Railway in 1908, when both Chinese settlers and a considerable Russian colony established themselves there. Substantial growth occurred in the 1930s under the Japanese occupation, when Mu-tan-chiang became a military and administrative centre, and particularly after the construction in 1935 of a rail link to Harbin and to Chia-mu-ssu. At that time some industry (light engineering, lumbering, and food processing) was established in the town.

After 1949 Mu-tan-chiang grew rapidly into an industrial city. The city is provided with electricity from a hydroelectric power station on the Mu-tan River at Lake Ching-po that was originally constructed by the Japanese and then rehabilitated in the early 1950s after being dismantled by Soviet occupation forces in 1945. There is a large rubber-manufacturing industry; much of its production is delivered to the automotive industry centred in Ch'ang-ch'un in Kirin province. The city is also the centre of a large aluminum-smelting plant. Pop. (1990 est.) 571,705.

Mu Tsung (1856–75): *see* T'ung-chih.

Muʿallaqāt, Al-, a collection of seven pre-Islāmic Arabic odes (qasida), each considered to be the best piece by its author. Since the authors themselves are among the dozen or so most famous poets of the 6th century, the selection enjoys a unique position in Arabic literature, representing the finest of early Arabic poetry.

The idea of grouping together these particular poems is most commonly attributed to Ḥammād ar-Rāwiyah, who was an 8th-century collector of early poetry. An often-repeated legend that originated in the 10th century states that the poems were written down in golden letters on scrolls of linen that were then hung, or "suspended" (*muʿallaq*), on the walls of the Kaʿbah in Mecca. It is by no means clear, however, that Ḥammād himself ever used the name *Muʿallaqāt* in referring to his compilation. Instead, he appears to have referred to it as the "seven renowned ones" (*as-sabʿ al-mashhūrāt*), or simply as "the renowned ones" (*al-mashhūrāt*). Most probably, the name *Muʿallaqāt* in this context is a derivative of the word *ʿilq,* "a precious thing," so that its meaning would be "the poems which are esteemed precious." All that can be said with certainty is that the name *Muʿallaqāt* appeared about 900 to distinguish the seven poems as a subset in a larger compilation of poems.

The precise poems included in the *Muʿallaqāt* present another puzzle. The list usually accepted as standard was recorded by Ibn ʿAbd Rabbihi and names poems by Imruʾ al-Qays, Ṭarafah, Zuhayr, Labīd, ʿAntarah, ʿAmr ibn Kulthum, and al-Ḥārith. Such authorities as Ibn Qutaybah, however, count ʿAbid ibn al-Abras as one of the seven, while Abū ʿUbaydah replaces the last two poets of Ibn ʿAbd Rabbihi's list with an-Nābighah adh-Dhubyānī and al-Aʿshā.

Of the authors of the *Muʿallaqāt,* the earliest is Imruʾ al-Qays, who lived in the early part of the 6th century. The others belong to the latter half of that century. Zuhayr and Labīd are said to have survived into the time of Islām, but their poetic output belongs to the pre-Islāmic period.

The *Muʿallaqāt* odes are all in the classical qasida pattern, which some Arab scholars believed to have been created by Imruʾ al-Qays. After a conventional prelude, the *nasib,* in which the poet calls to mind the memory of a former ladylove, most of the rest of the ode consists of an arbitrary succession of descriptions of the poet's horse or camel, scenes of desert events, and other aspects of Bedouin life and warfare. The main theme of the qasida (the *madīḥ,* or panegyric, the poet's tribute to himself, his tribe, or his patron) is often disguised in these vivid descriptive passages, which are the chief glory of the *Muʿallaqāt.* Their vivid imagery, exact observation, and deep feeling of intimacy with nature in the

Arabian Desert contribute to the *Muʿallaqāt*'s standing as a masterpiece of world literature. The lively description of a desert storm at the end of Imru' al-Qays' qasida is a splendid example of such passages.

The physiological exactitude of the odes' descriptions of horses and camels may seem tedious to some readers, but it must be remembered that the camel and the horse were the mainstays of the Bedouins' life, without which their existence in the desert would have been impossible. Little wonder, then, that the early Arabs felt a passionate, even romantic, interest in every detail connected with these animals.

While little in the way of historical data can be gleaned from the actual texts of the *Muʿallaqāt,* they do provide a picture of Bedouin life, manners, and modes of thought. English translations include *The Seven Golden Odes of Pagan Arabia* (1903) by Lady Anne and Sir Wilfrid Scawen Blunt and *The Seven Odes* (1957) by A.J. Arberry.

Muan: *see* Shōhaku.

Muar, also called BANDAR MAHARANI, town and port on the southwestern coast of West Malaysia (Malaya). It lies along the strait of Malacca, at the mouth of the Muar River. An old town, it was occupied by the end of the 14th century AD by Parameswara, founder of the Malay kingdom of Malacca (Melaka). Naval battles involving neighbouring sultanates and kingdoms were fought at Muar in 1517, 1615, and 1616. The present town of Muar was founded by Sultan Abu Bakar and named as Bandar Maharani in 1887. Local industries produce food products, beverages, oils and fats, chemical products, paper, and transport equipment. Pop. (1991) 63,123.

Muʿāwiyah I, in full MUʿĀWIYAH IBN ABĪ SUFYĀN, Muʿāwiyah also spelled MOAWIYAH (b. *c.* 602, Mecca, Arabia—d. April/May 680, Damascus), early Islāmic leader and founder of the great Umayyad dynasty of caliphs. He fought against the fourth caliph, ʿAlī (Muḥammad's son-in-law), seized Egypt, and assumed the caliphate after ʿAlī's assassination in 661. He restored unity to the Muslim empire and made Damascus its capital. He reigned from 661 to 680.

Early years. It is ironic that a man who was to become the political-religious head of Islām was born (*c.* 602) into a clan (ʿAbd Shams) that rejected the Prophet Muḥammad in his home city, Mecca, and continued to oppose him on the battlefield after he had emigrated to Medina. Muʿāwiyah did not become a Muslim until Muḥammad had conquered Mecca and had reconciled his former enemies by gifts. Possibly as a part of Muḥammad's policy of conciliation, Muʿāwiyah was made a scribe in his service. But Muʿāwiyah's contributions to Islāmic history are wholly associated with his career in Syria, which began shortly after the death of the Prophet, when he, along with his brother Yazīd, served in the tribal armies sent from Arabia against the Byzantine forces in Syria. Upon the death of Yazīd in 640, Muʿāwiyah was appointed governor of Damascus by the caliph ʿUmar and gradually gained mastery over other areas of Syria. By 647 Muʿāwiyah had built a Syrian tribal army strong enough to repel a Byzantine attack and in subsequent years to take the offensive against the Byzantines in campaigns that resulted in the capture of Cyprus (649) and Rhodes (654) and a devastating defeat of the Byzantine navy off the coast of Lycia in Anatolia (655). At the same time, Muʿāwiyah periodically dispatched land expeditions into Anatolia. All these campaigns, however, came to a halt with the accession of ʿAlī ibn Abī Ṭālib to the caliphate, when a new and decisive phase of Muʿāwiyah's career began.

As a kinsman of the slain caliph ʿUthmān, Muʿāwiyah bore the duty of revenge. Because ʿAlī neglected to apprehend and punish ʿUthmān's murderers, Muʿāwiyah regarded him as an accomplice to the murder and refused to acknowledge his caliphate. Thereupon ʿAlī marched to the Euphrates border of Syria and engaged Muʿāwiyah's troops at the famous Battle of Ṣiffīn (657). Muʿāwiyah's guile turned near defeat into a truce. Resorting to a trick that played upon the religious sensibilities of ʿAlī's forces, he persuaded the enemy to enter into negotiations that ultimately cast doubt on the legitimacy of ʿAlī's caliphate and alienated a sizable number of his supporters. When these former supporters—the Khārijites—rose in rebellion against ʿAlī, Muʿāwiyah took advantage of ʿAlī's difficulties in Iraq to send a force to seize control of Egypt. Thus, when ʿAlī was assassinated in 661, Muʿāwiyah held both Syria and Egypt and, as commander of the largest force in the Muslim Empire, had the strongest claim to the caliphate. ʿAlī's son Ḥasan was persuaded to remove himself from public life in exchange for a subsidy, which Muʿāwiyah provided.

Caliphate. During his 20-year governorship of Syria and during the war against ʿAlī, Muʿāwiyah had succeeded in recruiting and training a large Arab tribal army that was remarkably loyal to him. It was therefore natural that he should base his caliphate in Syria, with Damascus as the new capital of Islām. But, if Muʿāwiyah's chief support came from the tribes of Syria, the tribes of other areas posed the chief threat to his reign. It is not surprising then that early Umayyad government followed certain tribal principles as a means of retaining and winning the loyalty of the Arabs. The clearest examples of such a policy are provided by Muʿāwiyah's adoption of two tribal institutions: the council of notables—the *shūrā*—which was convoked by the caliph for consultation and the delegations—and the *wufūd*—which was sent by tribes to keep the caliph informed of their interest. Within this context, Muʿāwiyah ruled as a traditional Arab chieftain. Although he may not have consciously encouraged renewed warfare against non-Muslim territory as a means of directing Bedouin aggressive tendencies into channels that would aggrandize Islām and stabilize his own power, there is no doubt that warfare served these purposes during his reign, and in this respect it is significant that Muʿāwiyah used the Syrian army only for domestic defense and for campaigns against the Byzantines, who threatened the borders of Syria.

During the civil war, Muʿāwiyah had purchased a truce with the Byzantines in order to free his army for the struggle against ʿAlī. Soon after his accession to the caliphate, however, he curtailed the payment of tribute and sent expeditions against the Byzantines almost yearly. These campaigns served both to fulfill Muʿāwiyah's obligation to conduct holy war (jihad) against unbelievers and to keep his Syrian troops in fighting trim. Otherwise, the war against Byzantium was inconclusive. Even though two expeditions reached the vicinity of Constantinople, the Arabs never succeeded in permanently occupying territory in Asia Minor beyond the Taurus Mountains. Troops stationed in other parts of Muʿāwiyah's empire were sent on campaigns into remote areas. In North Africa, raids were conducted as far west as Tlemcen in present-day Algeria. More permanent, however, was the conquest of Tripolitania and Ifrīqīyah, which was consolidated by the foundation in 670 of the garrison city of Kairouan, soon to become the base for further expansion later in the Umayyad period. At the same time, a vigorous campaign was being conducted in the east by means of which Muslim borders were extended to the Oxus River and Khorāsān was established as an Umayyad province.

It had become apparent during the reigns of the first caliphs that tribal tradition and the practices of Muḥammad in Medina were inadequate resources for administering a vast empire. To solve this problem, Muʿāwiyah resorted to a solution that lay at hand in Syria—that is, the imitation of administrative procedures that had evolved during centuries of Roman and Byzantine rule there. Although the process by which the borrowing took place is not fully known, it is clear that Muʿāwiyah initiated certain practices that were apparently inspired by the previous tradition. Basically, he aimed at increased organization and centralization of the caliphal government in order to exert control over steadily expanding territories. This he achieved by the establishment of bureaus—*dīwāns*—in Damascus to conduct the affairs of government efficiently. Early Arabic sources credit two *dīwān*s in particular to Muʿāwiyah: the *dīwān al-khatam,* or chancellery, and the *barīd,* or postal service, both of which were obviously intended to improve communications within the empire. Prominent positions within the nascent bureaucracy were held by Christians, some of whom belonged to families that had served in Byzantine governments. The employment of Christians was part of a broader policy of religious tolerance that was necessitated by the presence of large Christian populations in the conquered provinces, especially in Syria itself.

Such administrative innovations coupled with the observance of tribal traditions caused historians of a later period to deny Muʿāwiyah the religious title of caliph and to characterize him as a king (*malik*) instead. As a symbol of the increasingly secular nature of the caliphate, derived in part from a non-Islāmic tradition, the title is apt for Muʿāwiyah and for most of the Umayyads. It is particularly appropriate for the most startling of all of Muʿāwiyah's innovations, the one by which he secured the allegiance of the tribes for the caliphate of his son Yazīd and thereby established the practice of hereditary rule in Islām. As an alternative to the various unreliable precedents for selecting a caliph, this measure was certainly consonant with Muʿāwiyah's policy and achievement as caliph, which, in summary, consisted of invigorating the theocratic origins of Islāmic governance with borrowings from other traditions better-adapted to the demands of tribesmen and the needs of an empire.

Assessment. Muʿāwiyah stands out as one of the few caliphs who is depicted both in Muslim historiography and in modern scholarship as a decisive force in Islāmic history. Undoubtedly one reason for the prominence that is assigned to him is that he was a controversial figure. Pious scholars of the dominant Sunnite sect of Islām together with writers of the minority, dissenting Shīʿites, have always heaped opprobrium on Muʿāwiyah: the Sunnites because of his deviations from the pattern of leadership set by the Prophet Muḥammad and the "rightly guided" caliphs; the Shīʿites because he had usurped the caliphate from ʿAlī.

Although Muʿāwiyah has been and still is condemned for his sins from these two quarters, he has also been the subject of lavish praise in Arabic literature as the ideal ruler. In other words, unlike most of the other caliphs, Muʿāwiyah looms large in Islāmic history because he has consistently aroused partisanship at different extremes. But, beneath the biased portraits given in traditional Muslim historiography, there is a person whose actual accomplishments were of great magnitude quite apart from partisan value judgments and interpretations. These accomplishments lay primarily in political and military administration, through which Muʿāwiyah was able to rebuild a Muslim state that had fallen into anarchy and to renew the Arab–Muslim military offensive against unbelievers. (D.P.L.)

Mubārak, Hosnī, in full MUḤAMMAD HOSNĪ SAID MUBĀRAK, Hosnī also spelled HUSNĪ (b. May 4, 1928, Al-Minūfiyah governorate, Egypt), president of Egypt from October 1981.

Mubārak, 1982
Barry Iverson/Gamma

Born in the Nile River delta, Mubārak graduated from the Egyptian military academy at Cairo (1949) and the air academy at Bilbeis (1950), receiving advanced flight and bomber training in the Soviet Union. He held command positions in the Egyptian air force and from 1966 to 1969 was director of the air academy. In 1972 President Anwar el-Sādāt appointed Mubārak chief commander of the air force, and, in this capacity, he was credited with the successful performance of the Egyptian air force in the opening days of the war with Israel in October 1973. He was promoted to the rank of air marshal in 1974.

In April 1975 Sādāt named him vice president, and in subsequent years Mubārak was active in most of the negotiations involving Middle Eastern and Arab policy. He served as the chief mediator in the dispute between Morocco, Algeria, and Mauritania over the future of Western (Spanish) Sahara.

Mubārak became president upon Sādāt's assassination on Oct. 6, 1981, the anniversary of the start of the 1973 Egyptian-Israeli war. His years in office were marked by an improvement in Egypt's relations with the other Arab countries and by a cooling of relations with Israel, especially following the Israeli invasion of Lebanon in 1982. He reaffirmed Egypt's peace treaty with Israel (1979) under the Camp David Accords, however, and cultivated good relations with the United States, which remained Egypt's principal aid donor. In 1987 Mubārak was elected to a second six-year term as president. During the Persian Gulf crisis and war following Iraq's invasion of Kuwait in 1990–91, Mubārak led other Arab states in supporting the Saudi decision to invite the aid of a U.S.-led military coalition to recover Kuwait. He also played an important role in mediating the bilateral agreement between Israel and the Palestine Liberation Organization that was signed in 1993.

Mubarrad, al-, original name ABŪ AL-ʿABBĀS MUḤAMMAD IBN YAZĪD (b. March 25, 826, Basra, Iraq—d. October 898, Baghdad), Arab grammarian and literary scholar whose *Al-Kāmil* ("The Perfect One") is a storehouse of linguistic knowledge.

After studying grammar in Basra, al-Mubarrad was called to the court of the ʿAbbāsid caliph al-Mutawakkil at Sāmarrāʾ in 860. When the caliph was killed in 861, al-Mubarrad went to Baghdad, remaining there most of his life as a teacher. In *Al-Kāmil,* al-Mubarrad gives excerpts from Arab poetry and proverbs and from Arab history and the Ḥadīth (traditions of the prophet Muḥammad) and subjects them to grammatical and literary scrutiny.

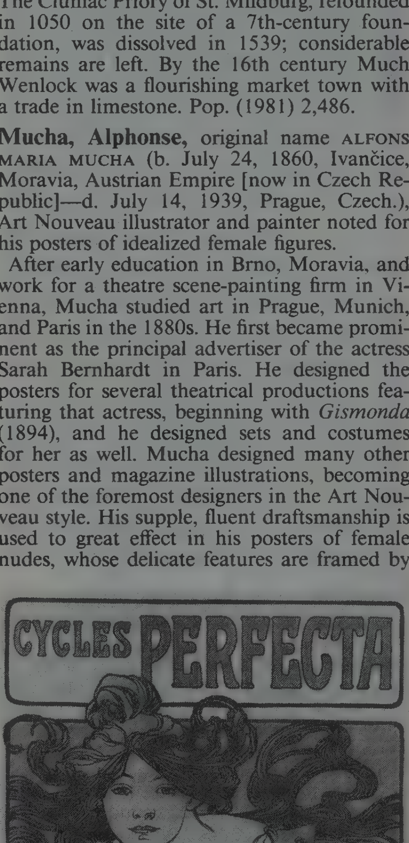
Mubi, town, northeastern Adamawa state, northeastern Nigeria. It lies on the west bank of the Yedseram River, a stream that flows north into Lake Chad, and is situated on the western flanks of the Mandara Mountains.

Probably founded in the late 18th century by the Fulani people, Mubi remained under the jurisdiction of the sultanate of Mandara until conquered in the Fulani jihad (holy war) by Modibbo Adama. By the 1820s the peoples of Mubi and the surrounding area were incorporated into Adama's Fulani kingdom of Fumbina, later called Adamawa; in the 1890s they were subjected to slave raids by Adamawa's emir Zubeiru. The town was taken by German forces in 1903 and served as a frontier post and administrative centre of German Kamerun until its capture by the British in 1914. Mubi and its surrounding region were placed in the British Cameroons by a League of Nations mandate in 1922. In 1961 it became part of Nigeria. The town is the site of a federal polytechnic college. Pop. (1991 est.) 56,570.

Much Wenlock, town ("parish"), Bridgnorth district, county of Shropshire, England. The community is situated at the northeastern end of the sharp limestone ridge of Wenlock Edge. The Cluniac Priory of St. Mildburg, refounded in 1050 on the site of a 7th-century foundation, was dissolved in 1539; considerable remains are left. By the 16th century Much Wenlock was a flourishing market town with a trade in limestone. Pop. (1981) 2,486.

Mucha, Alphonse, original name ALFONS MARIA MUCHA (b. July 24, 1860, Ivančice, Moravia, Austrian Empire [now in Czech Republic]—d. July 14, 1939, Prague, Czech.), Art Nouveau illustrator and painter noted for his posters of idealized female figures.

After early education in Brno, Moravia, and work for a theatre scene-painting firm in Vienna, Mucha studied art in Prague, Munich, and Paris in the 1880s. He first became prominent as the principal advertiser of the actress Sarah Bernhardt in Paris. He designed the posters for several theatrical productions featuring that actress, beginning with *Gismonda* (1894), and he designed sets and costumes for her as well. Mucha designed many other posters and magazine illustrations, becoming one of the foremost designers in the Art Nouveau style. His supple, fluent draftsmanship is used to great effect in his posters of female nudes, whose delicate features are framed by luxuriantly flowing strands of hair. The sensuous bravura of the draftsmanship, particularly the use of twining, whiplash lines, imparts a strange refinement to these nudes.



"Cycles Perfecta," poster by Alphonse Mucha to advertise an English brand of bicycle, 1902
Posters Please, Inc.

Between 1903 and 1922 Mucha made four trips to the United States, where he attracted the patronage of Charles Richard Crane, a Chicago industrialist and Slavophile, who subsidized Mucha's series of 20 large historical paintings (1912–30) illustrating the "Epic of the Slavic People." After 1922 Mucha lived in Czechoslovakia, donating his "Slavic Epic" paintings to the city of Prague.

Mucianus, Publius Licinius Crassus Dives: *see* Crassus Dives Mucianus, Publius Licinius.

Muck, Karl (b. Oct. 22, 1859, Darmstadt, Hesse-Darmstadt [Germany]—d. March 3, 1940, Stuttgart, Ger.), German conductor considered one of the greatest conductors of the works of Richard Wagner.

Muck obtained a Ph.D. in classical philology while virtually training himself in conducting. In 1880 he made his debut in Leipzig with the Gewandhaus Orchestra. Engagements in Zürich, Salzburg, Brno, and Graz followed in which he devoted himself almost entirely to opera. In 1886 Muck was appointed principal Kapellmeister of the Deutsches Landestheater in Prague. His performances of *Der Ring des Nibelungen* established him as a major Wagner interpreter. He was made principal Kapellmeister at the Berlin Opera in 1892, becoming general music director there in 1908. During that period he also directed the Silesian music festivals in Görlitz. His performances of *Parsifal* at Bayreuth became an established tradition of three decades.

In 1912 Muck became director of the Boston Symphony Orchestra. Embittered by 14 months' internment in the United States in 1918–19 as an enemy alien, he returned to Germany, where from 1922 to 1933 he conducted the Hamburg Symphony Orchestra.

muckraker, any of a group of American writers, identified with pre-World War I reform and exposé literature. The muckrakers provided detailed, accurate journalistic accounts of the political and economic corruption and social hardships caused by the power of big business in a rapidly industrializing United States. The name muckraker was pejorative when used by President Theodore Roosevelt in his speech of April 14, 1906; he borrowed a passage from John Bunyan's *Pilgrim's Progress,* which referred to "the Man with the Muckrake . . . who could look no way but downward." But "muckraker" also came to take on favourable connotations of social concern and courageous exposition.

The muckrakers' work grew out of the yellow journalism of the 1890s, which whetted the public appetite for news arrestingly presented, and out of popular magazines, especially those established by S.S. McClure, Frank A. Munsey, and Peter F. Collier. The emergence of muckraking was heralded in the January 1903 issue of *McClure's Magazine* by articles on municipal government, labour, and trusts, written by Lincoln Steffens, Ray Stannard Baker, and Ida M. Tarbell.

The intense public interest aroused by articles critical of political corruption, industrial monopolies, and fraudulent business practices rallied journalists, novelists, and reformers of all sorts to sharpen their criticism of American society. Charles Edward Russell led the reform writers with exposés ranging from *The Greatest Trust in the World* (1905) to *The Uprising of the Many* (1907), the latter reporting methods being tried to extend democracy in other countries. Lincoln Steffens wrote on corrupt city and state politics in *The Shame of the Cities* (1904). Brand Whitlock, who wrote *The Turn of the Balance* (1907), a novel opposing capital punishment, was also a reform mayor of Toledo, Ohio. Thomas W. Lawson, a Boston financier, in "Frenzied Finance" (*Everybody's,* 1904–05), provided a major exposé of stock-market abuses and insurance fraud. Ida M. Tarbell's *History of the Standard Oil Company* (1904) exposed the corrupt practices used to form a great industrial monopoly. Edwin Markham's *Children in Bondage* was a major attack on child labour. Upton Sinclair's novel *The Jungle* (1906) and Samuel Hopkins Adams' *Great American Fraud* (1906), combined with the work of Harvey W. Wiley and Senator Albert J. Beveridge, brought about passage of the Beef Inspection Act and the Pure Food and Drug Act. David Graham Phillips' series "The Treason of the Senate" (*Cosmopolitan,* 1906), which inspired President Roosevelt's speech in 1906, was influential in leading to the passage of the Seventeenth Amendment to the Constitution, providing for popular senatorial elections. Muckraking as a movement largely disappeared between 1910 and 1912.

mucopolysaccharidosis, any of a group of genetic disorders characterized by the abnormal production, storage, and excretion of one or more mucopolysaccharides, the complex carbohydrates that are the chief constituents of the so-called ground substance, which fills the spaces between the cells and fibres of the connective tissues. These disorders cause abnormal skeletal development, mental retardation, and shortened life spans. For these disorders, all of which are classified under the mucopolysaccharidosis, or MPS, designation, *see* Hurler's syndrome; Hunter's syndrome; Sanfilippo's syndrome; Morquio's syndrome; and Maroteaux-Lamy syndrome. *See also* polysaccharide.

mucous membrane, membrane lining bodily cavities and canals that lead to the outside, chiefly the respiratory, digestive, and urogenital tracts. Mucous membranes line many tracts and structures of the body, including the mouth, nose, eyelids, windpipe and lungs, stomach and intestines, and the ureters, urethra, and urinary bladder. The membranes vary in structure, but they all have a surface layer of epithelial cells over a deeper layer of connective tissue. They are called mucous because they contain cells that secrete mucin, a mucopolysaccharide that is the principal constituent of mucus.

mucoviscidosis (metabolic disorder): *see* cystic fibrosis.

mucus, viscous fluid that moistens, lubricates, and protects many of the passages of the digestive and respiratory tracts in the body. Mucus is composed of water, shed epithelial (surface) cells, dead leukocytes, mucin, and inorganic salts, all held in suspension. Mucus is produced by small cells called mucous cells. These are frequently clustered into small glands, which in turn are located on surface tissues, called mucous membranes (*q.v.*), which line virtually the entire digestive tract. Great numbers of mucous cells occur in the mouth, where mucus is used both to moisten food and to keep the oral membranes moist while they are in direct contact with the air. Mucus in the nose helps to trap dust, bacteria, and other small particles breathed in with the air. The stomach also has large numbers of mucous cells. There gastric mucus forms a layer about one millimetre thick that lines the stomach walls, protecting them from the highly acidic gastric juice and preventing the juice from digesting the stomach itself.

mud hen, North American species of coot (*q.v.*).

mud plantain, any aquatic annual or perennial plant of the genus *Heteranthera* of the pickerelweed family (Pontederiaceae), consisting of about 10 species, distributed primarily in tropical America. The broad or ribbonlike leaves of these plants have leafstalks that form sheaths around the long stems. Some species of *Heteranthera* grow below the water; others float or are rooted on muddy stream banks and lakeshores. Water star grass (*H. dubia*) is widely distributed throughout North America; it has yellow star-shaped flowers.

mud puppy, any of five species of salamanders in a genus (*Necturus*) belonging to the family Proteidae (or Necturidae), in the order Caudata. Their popular name derives from the mistaken belief that they are able to bark. They are found in lakes, rivers, and swamps of eastern North America. Those of the southern United States are commonly called water dogs.

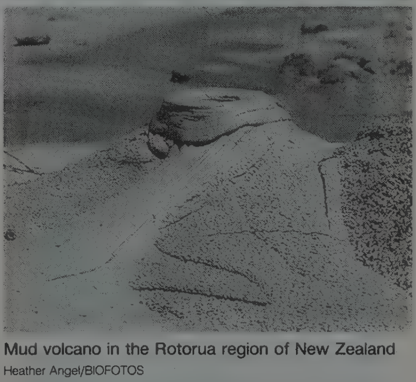
Adults range from approximately 20 to 33 cm (8 to 13 inches). The body is gray or brown and usually has a scattering of blurry blue-black spots. The tail fins have an orange tint. The external gills, retained throughout life, are bright red. The short, weak legs have four toes.

Mud puppies usually hide during the day under stones or buried in mud. They eat small animals such as crayfish or mollusks and the eggs of other aquatic animals. Fertilization is internal, and the female lays eggs.

mud turtle, any of about a dozen species of freshwater turtles belonging to the genus *Kinosternon* (family Kinosternidae). Mud turtles are highly aquatic and are found in North, Central, and South America. Like the related musk turtles (*Sternotherus*), they are small animals (usually 15 cm [6 inches] or less in shell length) with fleshy barbels on the chin and the ability to exude a strong, musky odour. They differ in having a broad lower shell with a hinged section at either end. The hinged portions of the shell can be pulled up to cover and protect the head, legs, and tail of the turtle.

Little is known of the habits of most mud turtles. The common, or eastern, mud turtle (*Kinosternon subrubrum*) of the eastern United States is semiaquatic and lives in shallow, often brackish, water. It eats mollusks and other small animals.

mud volcano, mound of mud heaved up through overlying sediments. The craters are usually shallow and may intermittently erupt mud. These eruptions continuously rebuild the cones, which are eroded relatively easily.



Mud volcano in the Rotorua region of New Zealand
Heather Angel/BIOFOTOS

Some mud volcanoes are created by hot-spring activity where large amounts of gas and small amounts of water react chemically with the surrounding rocks and form a boiling mud. Variations are the porridge pot (a basin of boiling mud that erodes chunks of the surrounding rock) and the paint pot (a basin of boiling mud that is tinted yellow, green, or blue by minerals from the surrounding rocks).

Other mud volcanoes, entirely of a non-igneous origin, occur only in oil-field regions that are relatively young and have soft, unconsolidated formations. Under compactional stress, methane and related hydrocarbon gases mixed with mud force their way upward and burst through to the surface, spewing mud into a conelike shape. Because of the compactional stress and the depth from which the mixture comes, the mud is often hot and may have an accompanying steam cloud.

mudang, in Korean religion, priestess who employs magic to effect cures, to tell fortunes, to soothe spirits of the dead, and to repulse evil. Her male counterpart is called a *paksu;* both, however, are also known by numerous other names in various parts of Korea.

Hereditary *mudang,* especially in former times, formed a separate religious group of low social standing and seldom married into families on a higher social level. Daughters of such shamans became either *mudang* after proper training or *kisaeng,* waitresses at Korean drinking houses. Sons of hereditary shamans usually became singers of *p'ansori,* the one-man opera of Korea, or musicians accompanying shamanistic rituals.

The principal occasion for the performance of a *mudang* is the *kut,* a trance ritual in which singing and dancing are used to invite happiness and repel evil. The *kut* usually comprises 12 *kŏri* (procedures), each of which is addressed to such specific gods or spirits as the god of childbirth, good harvest, and property, the goddesses in control of specific diseases, the patron spirit of shamans, or the protector god of households. Before the *kut* begins, an altar is set on the floor and offerings are made. As the ritual progresses, the *mudang* goes into a trance during which the god is said to arrive, to be placated, and then to communicate a message to the client (on behalf of a family, a village, or the state) through the *mudang.*

In modern times, the professionalism and attendant esteem of the *mudang* have increasingly fallen prey to economic opportunism.

Mudanjiang (China): *see* Mu-tan-chiang.

Muddiman, Henry (baptized Feb. 5, 1629, St. Martin's-in-the-Fields, London, Eng.—d. March 7, 1692, Coldhern, near Earl's Court, London), English journalist who supported the Royalist cause during the Civil Wars and became a privileged publisher of newsletters after the Restoration of the monarchy in 1660.

Muddiman issued the *Parliamentary Intelligencer* and *Mercurius Publicus* (*Public Mercury*), advocating a free parliament, and received support from General George Monck, a key figure in the royal Restoration. With this backing Muddiman was able to supplant Marchamont Needham, the anti-Royalist journalist who had played a similar role for Oliver Cromwell, and he went on to write many official documents. Along with Sir Joseph Williamson, publisher of the *London Gazette,* Muddiman for several years had a virtual monopoly on news publishing under King Charles II.

Muddiman's monopoly was threatened in 1663 when Sir Roger L'Estrange was named surveyor, or censor, for the crown. L'Estrange had the right to publish the official news and all bills. Muddiman and Williamson nonetheless remained the principal publishers of newsletters until 1675, when the government tried to suppress all news publications. The effort failed, partly because of the public demand for news. Eventually Muddiman worked for L'Estrange while remaining attached to the office of the secretary of state. He continued to publish manuscript newsletters that were designed mainly to appeal to the upper classes.

Mudejar, Spanish MUDÉJAR (from Arabic *mudajjan,* "permitted to remain"), any of the Muslims who remained in Spain after the Christian reconquest of the Iberian Peninsula (11th–15th century). In return for the payment of a poll tax, the Mudejars were a protected minority, allowed to retain their own religion, language, and customs. Headed by leaders assigned by the local Christian princes, they formed separate communities and quarters in larger towns, where they were subject to their own Muslim laws.

Mudejar lustreware dish, known also as Hispano-Moresque ware, made in Valencia, early 15th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

By the 13th century the Mudejars, most of whom converted to Islām after the Arab invasion of Spain, began to abandon their Arabic for the Spanish spoken by the Christians—though they always wrote it in Arabic characters, giving rise to their characteristic *aljamiado* literature.

As highly skilled craftsmen, the Mudejars were also responsible for an extremely successful blending of Arabic and Spanish artistic elements: a Mudejar style, marked by the frequent use of the horseshoe arch and the vault, distinguishes the church and palace architecture of Toledo, Córdoba, Seville, and Valencia. The Mudejar hand is also evident in the ornamentation of wood and ivory, metalwork, ceramics, and textiles, and their lustre pottery is second only to that of the Chinese.

With the fall of Granada, the last Muslim stronghold in Spain (1492), however, the situation of the Mudejars rapidly deteriorated. They were dubbed Moriscos (Spanish: "Little Moors") and forced to leave the country or convert to Christianity; thus, by 1614 the last of an estimated 3,000,000 Spanish Muslims were expelled from Spain.

mudfish: *see* bowfin.

mudflow, flow of water that contains large amounts of suspended particles and silt. It has a higher density and viscosity than a streamflow and can deposit only the coarsest part of its load; this causes irreversible sediment entrainment. Its high viscosity will not allow it to flow as far as a water flow.

Mudflows occur on steep slopes where vegetation is not sufficient to prevent rapid erosion but can occur on gentle slopes if other conditions are met. Other factors are heavy precipitation in short periods and an easily erodible source material. Mudflows can be generated in any climatic regime but are most common in arid and semiarid areas. They may rush down a mountainside at speeds as great as 100 km (60 miles) per hour and can cause great damage to life and property. Boulders as large as houses have been moved by mudflows.

Mudflow deposits are poorly sorted mixtures of silt, boulders, organic materials, and other debris. They have abrupt and well-defined edges, irregular surfaces, and a lobate appearance; they may be 3 to 6 m (10 to 20 feet) high. Such deposits are extensive on alluvial fans and around the bases of many volcanoes.

Mudge, Thomas (b. Sept. 1717, Exeter, Devon, Eng.—d. Nov. 14, 1794, Newington Place, Surrey), English watchmaker who invented the lever escapement, the most dependable and widely used device for regulating the movement of the spring-driven watch.

Mudge served as apprentice to the watchmaker George Graham and in 1750 opened a shop in partnership with William Dutton. The quality of his work brought him commissions from Ferdinand VI of Spain, the engineer John Smeaton, and other influential persons throughout Europe. He invented the lever escapement in 1765, introducing it commercially in a watch that he made in 1770 for Queen Charlotte of England.

In 1771 he retired from business and turned his attention to the improvement of marine chronometers. He achieved some success by refinement of detail and by somewhat complicating the mechanism but made no basic advance. He sent his first chronometer to the Royal Greenwich Observatory in 1776.

muditā (Sanskrit and Pāli), in Buddhism, the perfect virtue of joy. *See* brahmavihāra.

mudlark, bird of the family Grallinidae (*q.v.*).

mudminnow, any of several hardy fishes, family Umbridae, found in cool, mud-bottomed ponds, lakes, and streams of Europe and North America. Somewhat pikelike fishes with rounded snouts and tails, mudminnows are about 7.5 to 15 cm (3 to 6 inches) long. They frequently bury themselves, tail first, in the mud; they can survive in water too low in oxygen to support other fishes.

Mudminnow (*Umbra*)

E.R. Degginger

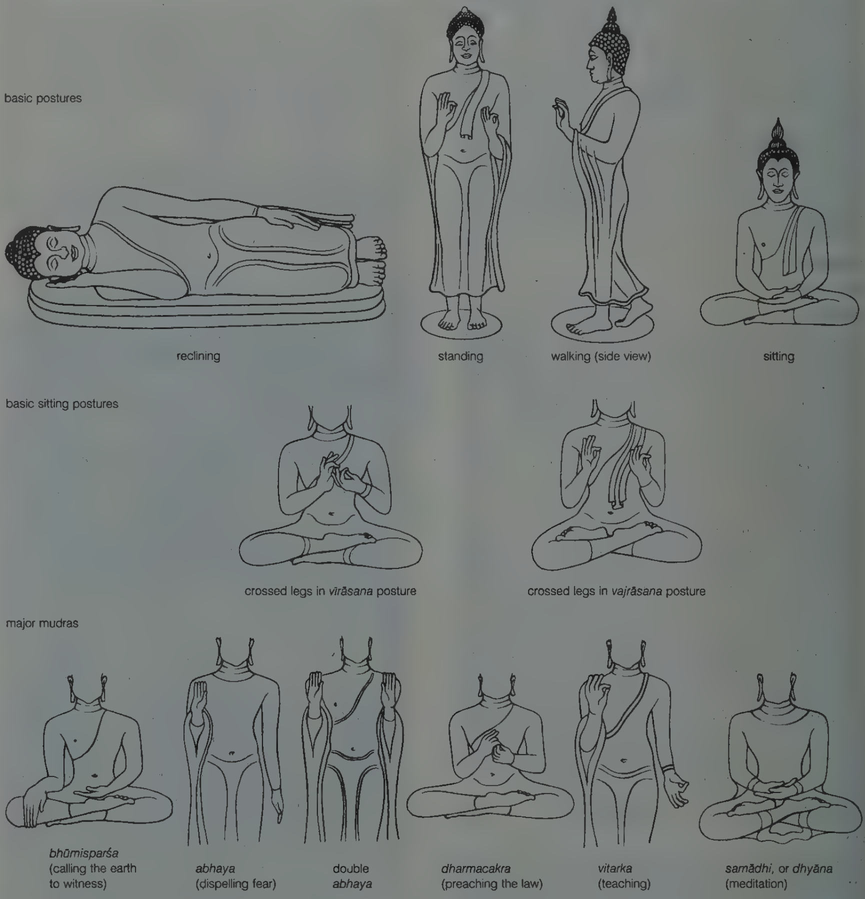
The several species are of the genera *Umbra* and *Novumbra.* In North America the eastern mudminnow (*U. pygmaea*) is sometimes called rockfish, and the central mudminnow (*U. limi*) mudfish or dogfish. Mudminnows are often used as bait and sometimes kept in home aquariums.

mudnest builder, any bird of the family Grallinidae (*q.v.*).

mudra, Sanskrit MUDRĀ ("seal," "mark," or "gesture"), in Buddhism and Hinduism, a symbolic gesture of the hands and fingers used either in ceremonies and dance or in sculpture and painting. Mudras used in ceremony and dance tend to be numerous, complicated, and often esoteric (the *hasta-mudrā*s of Hindu classical dance can express about 500 different meanings, involving not only the hands and fingers but also the wrists, elbows, and shoulders, all in movement). Mudras in sculpture and other visual arts, being necessarily immobile, are relatively restricted in number.

In ceremonies, especially in Buddhism, a mudra acts as a kind of visual "seal," affirming a mystical or magical vow or utterance, such as a supplication to ward off evil. A mudra often accompanies the spiritual utterance known as the mantra (*q.v.*).

Sculptural and other pictorial renderings of the Buddha show him in four basic postures—



basic postures
reclining
standing
walking (side view)
sitting
basic sitting postures
crossed legs in *vīrāsana* posture
crossed legs in *vajrāsana* posture
major mudras
bhūmisparśa (calling the earth to witness)
abhaya (dispelling fear)
double *abhaya*
dharmacakra (preaching the law)
vitarka (teaching)
samādhi, or *dhyāna* (meditation)

Mudras

Adapted from J. Auboyer et al., *Oriental Art: A Handbook of Styles and Forms* (1980) reclining, standing, walking, and sitting. The two most traditional seated postures are the *vīrāsana* posture (the right leg bent and positioned over the left leg) and the *vajrāsana* posture (the legs tightly crossed so that the soles of both feet are visible, the feet sometimes resting on the opposing thighs). Different mudras, or hand gestures, may appear in any of the postures. (The accompanying figure illustrates some of the major mudras.) Although pictorial mudras are used most commonly in portraying the Buddha, they can also appear in representations of lesser personages. The *añjali* ("reverence") mudra, for example, which has the suppliant or worshiper joining his two hands before him, palm to palm, slightly cupped, in a gesture of respectful adoration (comparable to the Western gesture of prayer), would appear only in representations of deities or persons other than the Buddha; it would never be shown for the Buddha.

The hundreds of mudras of Hindu and other related Asian dances are described in technical manuals, but, in practice, performers usually limit their gestures or "phrases" (sequences of mudras) to those familiar and meaningful to their audiences. The selection may differ from region to region.

Mudros, Armistice of (Oct. 30, 1918), pact signed at the port of Mudros, on the Aegean island of Lemnos, between the Ottoman Empire and Great Britain (representing the Allied powers) marking the defeat of the Ottoman Empire in World War I (1914–18).

Under the terms of the armistice, the Ottomans surrendered their remaining garrisons in Hejaz, Yemen, Syria, Mesopotamia, Tripolitania, and Cyrenaica; the Allies were to occupy the Straits of the Dardanelles and the Bosporus, Batum (now in southwest Georgia), and the Taurus tunnel system; and the Allies won the right to occupy "in case of disorder" the six Armenian provinces in Anatolia and to seize "any strategic points" in case of a threat to Allied security. The Ottoman army was demobilized, and Turkish ports, railways, and other strategic points were made available for use by the Allies.

Mudskippers (*Periophthalmus*)

Ivan Polunin from Natural Historic Photographic Agency

mudskipper, any of about six species of small tropical gobies of the family Periophthalmidae (order Perciformes). Mudskippers are found in the Indo-Pacific, from Africa to Polynesia and Australia. They live in swamps and estuaries and on mud flats and are noted for their ability to climb, walk, and skip about out of water. Elongated fishes, they range up to about 30 cm (12 inches) long. They have two dorsal fins, and their pelvic fins are placed forward under the body, either partly or completely fused. Their blunt heads are topped by large, movable, close-set, and protuberant eyes, and their strong pectoral fins aid them in movements on land. Out of water, they breathe air and moisture trapped in their gill chambers. They prey on crustaceans and other small animals.

mudstone, sedimentary rock composed primarily of clay- or silt-sized particles (less than 0.063 mm [0.0025 inch] in diameter); it is not laminated or easily split into thin layers. Some geologists designate as mudstone any similar rock that is blocky or massive; others, however, prefer a broader definition that includes all of the members of the shale group. *See also* lutite; siltstone.

Mudumalai Wild Life Sanctuary, wildlife preserve in Tamil Nādu state, southern India, established in 1940. It has an area of 124 square miles (322 square km) and is located about 35 miles (56 km) north of Ootacamund on the main road to Mysore city. The sanctuary is composed of hills and valleys with several perennial streams and swamps. The thick jungle growth of teak, rosewood, laurel, and bamboo provides cover for the elephant, gaur (Indian bison), tiger, black leopard, sloth bear, hyena, jackal, wild pig, python, gray jungle fowl, spur fowl, and golden eagle found in the preserve. The preserve has a network of fair-weather tracks, observation towers overlooking salt licks and water holes, and riding elephants for transport.

Mueller, Sir Ferdinand von, in full SIR FERDINAND JAKOB HEINRICH, FREIHERR (Baron) VON MUELLER, Mueller also spelled MÜLLER (b. June 30, 1825, Rostock, Mecklenburg-Schwerin [now in Germany]—d. Oct. 10, 1896, Melbourne, Vic., Australia), German-born Australian botanist and explorer who was known for his studies of the plants of Australia.

After an apprenticeship as pharmacist, Mueller began the study of botany at the University of Kiel. Soon after receiving his Ph.D., he left Germany for Adelaide, South Australia (1847), where for some time he worked as a pharmacist. The same year he started writing a series of papers on the flora of southern Australia. Appointed as a foundation government botanist of Victoria in 1853, he moved to Melbourne and traveled throughout the surrounding area conducting extensive botanical studies.

In 1857 Mueller was appointed director of the botanical gardens at Melbourne, where he had built what is now the national herbarium. He continued to make numerous explorative trips throughout Australia. In 1858 the first volume of his *Fragmenta Phytographiae Australiae,* 12 vol. (1858–82), appeared. With the British botanist George Bentham he wrote a systematic monograph on the flora of Australia, *Flora Australiensis: A Description of the Plants of the Australian Territory* (1863–78). His most popular book was *Select Plants Readily Eligible for Industrial Culture or Naturalization in Victoria* (1876). In recognition of his outstanding contributions to botany, Mueller was elected to membership in the Royal Society of London at the age of 36. He was created a hereditary baron by the king of Württemberg in 1871, and he was knighted in 1879.

Muenster cheese: *see* Münster cheese.

muezzin, Arabic MUʾADDIN, in Islām, the official who proclaims the call to prayer (*adhān*) on Friday for the public worship and the call to the daily prayer (*ṣalāt*) five times a day, at dawn, noon, mid-afternoon, sunset, and nightfall. To summon worshipers the Jews use a trumpet and the Christians use a bell, but the Muslims use the human voice. The muezzin is the servant of the mosque and is chosen for his good character. He stands either at the door or side of a small mosque or on the minaret (*manāra*) of a large one. He faces each of the four compass directions in turn: east, west, north, and south. To each direction he cries: "Allāh is most great. I testify that there is no God but Allāh. I testify that Muḥammad is the prophet of Allāh. Come to prayer. Come to salvation. Allāh is most great. There is no God but Allāh." Shīʿite muezzin add, "Come to the best work," after "Come to salvation." Many mosques have installed electronic recordings of the call to prayer, and amplifiers have displaced the muezzin.

Mufaḍḍalīyāt, al- (Arabic: "The Examination of al-Mufaḍḍal"), an anthology of ancient Arabic poems, compiled by al-Mufaḍḍal ibn Muḥammad ibn Yaʿlah between 762 and 784. It is of the highest importance as a record of the thought and poetic art of Arabia in the last two pre-Islāmic centuries. Not more than five or six of the 126 poems appear to have been composed by poets born under Islām, and, though a certain number converted to Islām, their work bears few marks of it. The ancient virtues alone—hospitality to the guest and to the poor, profuse expenditure of wealth, valour in battle, faithfulness to the cause of the tribe—were praised.

The 126 pieces are distributed among 68 poets, and the work represents a selection from the composition of those called *al-muqillūn,* "authors of whom little has survived," rather than from the famous poets whose works had been collected in divans, or *dīwāns*. Not all poems of *al-Mufaḍḍaliyāt* are complete, many are mere fragments, and even in the longest there are often gaps. Al-Mufaḍḍal, however, always tried to present complete poems and evidently set down all that he could collect of a poem from the memory of a *rāwī* (professional reciter).

Despite the sparseness of their extant work, several of the poets of *al-Mufaḍḍaliyat* are well known and highly respected, such as ʿAlqamah ibn ʿAbadah, Mutammim ibn Nuwayrah, Salamah ibn Jandal, Shanfarā, ʿAbd Yaghuth, and Abu Dhuʿayb. Al-Ḥārith was already celebrated for his ode in the *Muʿallaqāt* collection.

muff, in wearing apparel, usually cylindrical covering of fur, fabric, feathers, or other soft material, with open ends into which the hands are placed to keep them warm. Originally a purse and hand warmer in one, the muff was first introduced to women's fashion in 1570, when fur trimming was becoming popular.

Woman carrying a fur muff, "November," an engraving by Robert Dighton, c. 1785–90

By courtesy of the Victoria and Albert Museum, London

In the 17th century they were used by both men and women. In the 19th century, however, muffs were considered an essential accessory only for feminine dress and ranged from large down muffs to small fur or velvet ones matching the trim on a woman's dress.

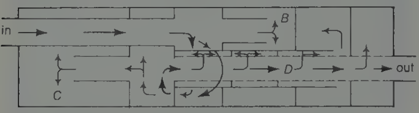
Muffat, Georg (baptized June 1, 1653, Megève, Savoy [now in France]—d. Feb. 23, 1704, Passau, Bishopric of Passau [now in Germany]), composer whose concerti grossi and instrumental suites were among the earliest German examples of those genres.

Muffat held positions as organist at Molsheim and Strasbourg cathedrals and in 1678 became organist to the archbishop of Salzburg. In 1681 he went to Italy and in Rome studied with Arcangelo Corelli and Bernardo Pasquini. He spent about six years in Paris, where he acquainted himself thoroughly with the music of Jean-Baptiste Lully. He became organist to the bishop of Passau in 1687 and chapelmaster there in 1690.

Muffat's most famous work, 12 orchestral suites, *Florelegia* (two sets, 1695 and 1698), was one of the earliest German collections of suites in the French manner, using dance movements influenced by those of Lully's stage works. The *Florelegia* also contains valuable information about French performance practices in the late 17th century. His *Ausserlesene . . . Instrumental-Music* (1701) was an early collection of concerti grossi in the style developed by Corelli. Among his other works are the *Armonico tributo,* a set of five-part trio sonatas, and the *Apparatus musico-organisticus,* toccatas for organ.

His son Gottlieb Muffat (1690–1770) became organist to the Holy Roman emperor. His most important works were *Versetten oder Fugen* for organ (1726) and *Componimenti musicali* (*c.* 1739), from which George Frideric Handel borrowed heavily.

muffler, also called SILENCER, device through which the exhaust gases from an internal-combustion engine are passed to suppress the airborne noise of the engine. To be efficient as a sound silencer, a muffler must decrease the velocity of the exhaust gases and either absorb the sound waves or cancel them by interference with reflected waves coming from the same source.



Noise flow through a typical muffler

From C.M. Harris (ed.), Handbook of Noise Control (copyright 1957); used with permission of McGraw-Hill Book Company

A typical sound-absorbing material used in a muffler is a thick layer of fine fibres; the fibres are caused to vibrate by the sound waves, thus converting the sound energy to heat. Muffler configurations that cancel sound waves by interference generally separate the waves into two components that follow different paths and then come together again out of phase (out of step).

In the typical muffler shown schematically in the illustration, the heavy arrows indicate the gas flow, and the light arrows the acoustic flow. The chambers *B* and *C* are known as resonators and are of such dimensions that they cancel sound waves of specified frequencies. The discharge tube *D* is surrounded by small annular (ringlike) chambers; sound enters these chambers through small holes in the discharge tube and is absorbed.

Mufflers of the straight-through type have a single tube with small holes connecting with annular chambers that are frequently stuffed with a sound-absorbing material.

mufti, Arabic MUFTĪ, an Islāmic legal authority who gives a formal legal opinion (*fatwā*) in answer to an inquiry by a private individual or judge. A *fatwā* usually requires knowledge of the Qurʾān and Ḥadīth (narratives concerning the Prophet's life and sayings), as well as knowledge of exegesis and collected precedents, and might be a pronouncement on some problematic legal matter. Under the Ottoman Empire, the mufti of Istanbul, the sheikh al-Islām (Turkish: *şeyhülislâm*), ranked as Islām's foremost legal authority, theoretically presiding over the whole judicial and theological hierarchy. The development of civil codes in most Islāmic countries, however, has tended to restrict the authority of mufti to cases involving personal status, such as inheritance, marriage, and divorce; and even in this area, the prerogatives of the mufti are in some cases circumscribed by modern legislation.

Mufulira, town, north-central Zambia. Mufulira is situated just southwest of the border with Congo (Kinshasa). One of the country's chief copper-mining centres, the rich local deposits have been exploited for many years. Smelting and refining of copper and an explosives-manufacturing plant are surface industries in the town. Pop. (1990) 152,944.

Mugabe, Robert (Gabriel) (b. Feb. 21, 1924, Kutama, Southern Rhodesia [now Zimbabwe]), the first prime minister (1980–87) of the reconstituted state of Zimbabwe, formerly Rhodesia. A black nationalist of Marxist persuasion, he eventually established one-party rule in his country, becoming executive president of Zimbabwe in 1987.

Born the son of a village carpenter, Mugabe was trained as a teacher in a Roman Catholic mission school. He was introduced to nationalist politics while he was a student at the University College of Fort Hare, South Africa, and he spent some years in the late 1950s in Ghana.

Mugabe returned home to Rhodesia in 1960, and in 1963 he helped the Reverend Ndabaningi Sithole to form the Zimbabwe African National Union (ZANU) as a breakaway from Joshua Nkomo's Zimbabwe African People's Union (ZAPU). In 1964 he was arrested for "subversive speech" and spent the next 10 years in prison. During that period he acquired law degrees by correspondence courses. While still in prison he led a coup in 1974 deposing Sithole as ZANU's leader.

In 1975 he was freed, and during the civil war that pitted Rhodesia's black majority population against Prime Minister Ian Smith's white-ruled Rhodesian government (1975–79), Mugabe was joint leader, with Nkomo, of the Patriotic Front of Zimbabwe, whose guerrillas operated against the Rhodesian government from bases in neighbouring Zambia, Mozambique, and Angola. Fresh negotiations in London in 1979 ended the war and led to new British-supervised parliamentary elections in February 1980. Mugabe's party won a landslide victory over the other black parties, and he became prime minister.

As prime minister, Mugabe initially followed a pragmatic course designed to reassure Zimbabwe's remaining white farmers and businessmen, whose skills were vital to the economy. He formed a coalition government between his party, ZANU (which drew its support from the majority Shona people), and Nkomo's ZAPU (which drew its support from the minority Ndebele people), and he abided by the new constitution's guarantees of substantial parliamentary representation for whites. At the same time, Mugabe took steps to improve the lot of black Zimbabweans through increased wages, improved social services, and food subsidies. In 1982 Mugabe ousted Nkomo from the coalition cabinet, and ethnic strife between the Shona and the Ndebele subsequently troubled the country. Zimbabwe's economy steadily declined despite Mugabe's measures, and whites continued to emigrate in substantial numbers.

Mugabe, who had always intended to convert Zimbabwe from a parliamentary democracy into a one-party socialist state, reorganized his party in 1984 as the Zimbabwe African National Union (Patriotic Front), or ZANU (PF). He set up a new party structure designed to rule both the party and the country and became the first executive president on Dec. 31, 1987, with the country thenceforth under one-party rule. He was reelected twice in the 1990s and in 2002. Citing violence and irregularities in the 2002 election, the Commonwealth suspended Zimbabwe for a year.

Mugabe faced growing opposition. In the 1990s he had begun to change his earlier tolerant stance toward the white farmers in his country and supported measures to evict them from the land they occupied. By the beginning of the 21st century, this stance had brought him international censure and isolation.

Muggleton, Lodowick (b. July 1609, London, Eng.—d. March 14, 1698, London), English Puritan religious leader and anti-Trinitarian heretic whose followers, known as Muggletonians, believed he was a prophet.

After claiming to have had spiritual revelations, beginning in 1651, Muggleton and his cousin John Reeve announced themselves as the two prophetic witnesses referred to in Revelations 11:3. Their book, *A Transcendent Spiritual Treatise upon Several Heavenly Doctrines,* was published in 1652. They further expounded their beliefs in *A Divine Looking-Glass* (1656), maintaining that the traditional distinction between the three Persons of the Triune God is purely nominal, that God has a real human body, and that he left the Old Testament Hebrew prophet Elijah, who had ascended to heaven, as his vice regent when he himself descended to die on the Cross.

According to Muggleton and Reeve, the unforgivable sin was disbelief in them as true prophets. Although some notable men became Muggletonians, the group's notions provoked much opposition. Muggleton was imprisoned for blasphemy in 1653, and his own followers temporarily repudiated him in 1660 and again in 1670. His attack on the Quakers led their leader, William Penn, to write *The New Witnesses Proved Old Hereticks* (1672). Tried for blasphemy in 1677, Muggleton was convicted and fined £500. His sect survived until the early 20th century.

Mughal DYNASTY, also spelled MOGUL, Arabic MONGOL, Muslim dynasty that ruled most of northern India from the early 16th to the mid-18th century. The Mughal dynasty was notable for about two centuries of effective rule over much of India, for the ability of its rulers, who through seven generations maintained a record of unusual talent, and for its administrative organization. A further distinction was the attempt of the Mughals, who were Muslims, to integrate Hindus and Muslims into a united Indian state.

The dynasty was founded by a Chagatai Turkic prince named Bābur (reigned 1526–30), who was descended from the Turkic conqueror Timur (Tamerlane) on his father's side and from Chagatai, second son of the Mongol ruler Genghis Khan, on his mother's side. Ousted from his ancestral domain in Central Asia, Bābur turned to India to satisfy his appetite for conquest. From his base in Kabul, he was able to secure control of the Punjab, and in 1526 he routed the forces of the Delhi sultan Ibrāhīm Lodī at the First Battle of Pānīpat. The following year he overwhelmed the Rajput confederacy under Rānā Saṅga of Mewār, and in 1529 he defeated the Afghans of eastern Uttar Pradesh and Bihar. At his death in 1530 he controlled all of northern India from the Indus River on the west to Bihar on the east and from the Himalayas south to Gwalior.

Bābur's son Humāyūn (reigned 1530–40 and 1555–56) lost control of the empire to Afghan rebels, but Humāyūn's son Akbar (reigned 1556–1605) defeated the Hindu usurper Hemū at the Second Battle of Pānīpat (1556) and thereby reestablished his dynasty in Hindu-stan. The greatest of the Mughal emperors and an extremely capable ruler, Akbar reestablished and consolidated the Mughal Empire. Through incessant warfare, he was able to annex all of northern and part of central India, but he adopted conciliatory policies toward his Hindu subjects and sought to enlist them in his armies and government service. The political, administrative, and military structures that he created to govern the empire were the chief factor behind its continued survival for another century and a half. At Akbar's death in 1605 the empire extended from Afghanistan to the Bay of Bengal and southward to Gujarāt and the northern Deccan.

Akbar's son Jahāngīr (reigned 1605–27) continued both his father's administative system and his tolerant policy toward Hinduism and thus proved to be a fairly successful ruler. His son, Shāh Jahān (reigned 1628–58), had an insatiable passion for building and left the Tāj Mahal and the Great Mosque of Delhi, among other monuments. His reign marked the cultural zenith of Mughal rule, but his military expeditions brought the empire to the brink of bankruptcy. Jahangir's tolerant and enlightened rule stood in marked contrast to the Muslim religious bigotry displayed by his more orthodox successor, Aurangzeb (reigned 1658–1707). Aurangzeb annexed the Muslim Deccan kingdoms of Bijāpur and Golconda and thereby brought the empire to its greatest extent, but his political and religious intolerance laid the seeds of its decline. He excluded Hindus from public office and destroyed their schools and temples, while his persecution of the Sikhs of the Punjab turned that sect against Muslim rule and roused rebellions among the Rajputs, Sikhs, and Marāṭhās. The heavy taxes he levied steadily impoverished the farming population, and a steady decay in the quality of Mughal government was thus matched by a corresponding economic decline. When Aurangzeb died in 1707, he had failed to crush the Marāṭhās of the Deccan and his authority was disputed throughout his dominions.

During the reign of Muḥammad Shāh (1719–48), the empire began to break up, a process hastened by dynastic warfare, factional rivalries, and the Iranian conqueror Nādir Shāh's brief but disruptive invasion of northern India in 1739. After the death of Muḥammad Shāh in 1748, the Marāṭhās overran almost all of northern India. Mughal rule was reduced to only a small area around Delhi, which passed under Marāṭhā (1785) and then British (1803) control. The last Mughal, Bahādur Shāh II (reigned 1837–57), was exiled to Rangoon (Yangon) by the British after his involvement with the Indian Mutiny of 1857.

Mughal architecture, building style that flourished in northern and central India under the patronage of the Mughal emperors from the mid-16th to the late 17th century. The Mughal period marked a striking revival of Islāmic architecture in northern India. Under the patronage of the Mughal emperors, Persian, Indian, and various provincial styles were fused to produce works of unusual quality and refinement.

The tomb of the emperor Humāyūn (begun 1564) at Delhi inaugurated the new style, though it shows strong Persian influences. The first great period of building activity occurred under the emperor Akbar (reigned 1556–1605) at Āgra and at the new capital city of Fatehpur Sīkri, which was founded in 1569. The latter city's Great Mosque (1571; Jāmiʿ Masjid), with its monumental Victory Gate (Buland Darzāwa), is one of the finest mosques of the Mughal period. The great fort at Āgra (1565–74) and the tomb of Akbar at Sikandarā, near Āgra, are other notable structures dating from his reign. Most of these early Mughal buildings use arches only sparingly, relying instead on post and lintel construction. They are built of red sandstone or white marble.

Mughal architecture reached its zenith during the reign of emperor Shāh Jahān (1628–58), its crowning achievement being the magnificent Tāj Mahal (*q.v.*). This period is marked by a fresh emergence in India of Persian features that had been seen earlier in the tomb of Humāyūn. The use of the double dome, a recessed archway inside a rectangular fronton, and parklike surroundings are all typical of Shāh Jahān period buildings. Symmetry and balance between the parts of a building were always stressed, while the delicacy of detail in Shāh Jahān decorative work has seldom been surpassed. White marble was a favoured building material. After the Tāj Mahal, the second major undertaking of Shāh Jahān's reign was the palace-fortress at Delhi, begun in 1638. Among its notable buildings are the red-sandstone-pillared Dīvān-e ʿĀmm ("Hall of Public Audience") and the so-called Dīvān-e Khāṣṣ ("Hall of Private Audience"), which housed the famous Peacock Throne. Outside the citadel is the Great Mosque (1650–56; Jāmiʿ Masjid). The impressive mosque sits on a raised foundation and is approached by a majestic flight of steps, with an immense courtyard in front.

The architectural monuments of Shāh Jahān's successor, Aurangzeb (reigned 1658–1707), represent a distinct decline, though some notable mosques were built before the beginning of the 18th century. Subsequent works lost the balance and coherence characteristic of mature Mughal architecture.

Mughal carpet, also spelled MOGUL, any of the handwoven floor coverings made in India in the 16th and 17th centuries for the Mughal emperors and their courts. Aside from patterns in the Persian manner, a series of distinctively Indian designs were developed, including scenic and landscape carpets; animal carpets with spirited chases backward and forward across the field; elaborate architectural latticeworks in the Italian manner, with floral content; and several magnificent prayer rugs with a prominent central flowering plant. Characteristic of the floral patterns is common use of trailing racemes such as wisteria or elongated bunches of grapes.

Mughal carpet from India, 17th century; in the Textile Museum, Washington, D.C.

Textile Museum Collection, Washington, D.C.; photograph, Otto E. Nelson

Many carpets, including a series of prayer rugs that may have been produced in Kashmir, have densely packed millefleur patterns and are possibly of a later date. Fine-quality Mughal carpets, with the warp in bands of contrasting colours and with pile of such extremely fine wool that it is sometimes taken for silk on a silken foundation, have the tightest and most delicate knotting found among antique Orientals. The prayer rugs with a central flowering plant motif, for example, have approximately 2,000 knots to the square inch (300 per square cm), and a fragmentary lattice rug in the Textile Museum, Washington, D.C., has more than 2,500. Most Mughal rugs, however, have a foundation of cotton. Mughal carpets are thought to have been made in Lahore, Āgra, and perhaps Fatehpur Sīkri. One of the most noted is the Girdlers' Carpet, in Girdlers' Hall, London.

Mughal glass, also spelled MOGUL, type of glass made in India during the Mughal period (1556–1707). Because imported Persian craftsmen were patronized by the Mughal court, Mughal glass of the 17th and 18th centuries shows an obvious indebtedness to Persian influences. Floral arabesques and sprays and, to a lesser extent, geometric motifs were popular with Mughal glassmakers.

Hookah bowl of blue glass painted with gold, Mughal, 18th century; in the Prince of Wales Museum of Western India, Bombay

P. Chandra

Bottles, hookah bowls, dishes, and spittoons were made in various fanciful and elegant shapes, the use of coloured glass with painted designs becoming increasingly frequent. In addition to Delhi and the provincial Mughal capitals, Kapadvanj, in Gujarāt, was an important centre of production.

Mughal painting, also spelled MOGUL, style of painting, confined mainly to book illustration and the production of individual miniatures, that evolved in India during the reigns of the Mughal emperors (16th–18th century). In its initial phases it showed some indebtedness to the Ṣafavid school of Persian painting but rapidly moved away from Persian ideals. Probably the earliest example of Mughal painting is the illustrated folktale *Tuti-nameh* ("Tales of a Parrot") at the Cleveland (Ohio) Museum of Art.

Mughal painting was essentially a court art; it developed under the patronage of the ruling Mughal emperors and began to decline when the rulers lost interest. The subjects treated were generally secular, consisting of illustrations to historical works and Persian and Indian literature, portraits of the emperor and his court, studies of natural life, and genre scenes.

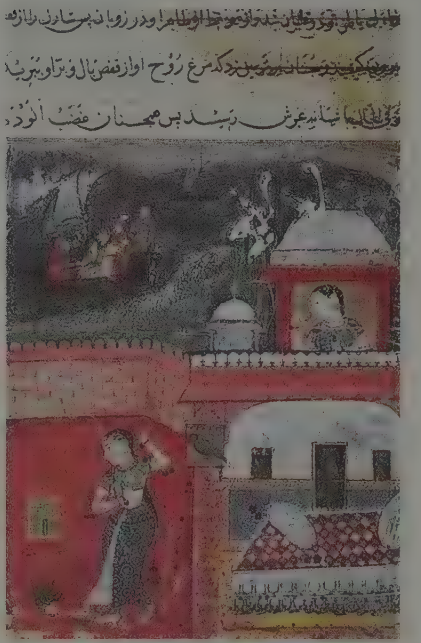
The school had its beginnings during the reign of the emperor Humāyūn (1530–40 and 1555–56), who invited two Persian artists, Mīr Sayyid ʿAlī and Khwāja ʿAbd-uṣ-Ṣamad, to join him in India. The earliest and most important undertaking of the school was a series of large miniatures of the *Dāstān-e Amīr Ḥamzeh,* undertaken during the reign of Akbar (1556–1605), which, when completed, numbered some 1,400 illustrations of an unusually large size (22 by 28 inches [56 by 71 cm]). Of the 200 or so that have survived, the largest number are in the Austrian Museum of Applied Art in Vienna.

Though retaining the upright format, general setting, and flat aerial perspective of Persian painting, the Indian artists of Akbar's court exhibited an increasing naturalism and detailed observation of the world around them. Akbar's fondness for history resulted in his commissioning of such dynamic illustrated histories as the *Akbar-nāmeh* in the Victoria and Albert Museum, London. An empathy for animals is evident in the illustrations of the animal fables, particularly the *Kalīlah wa Dimnah* and the *Anwār-e Suhaylī*. Other outstanding series are the illustrations of the *Razm-nāmeh* (the Persian name for the Hindu epic the *Mahābhārata*) in the City Palace Museum, Jaipur, and the *Dīvān* of Ḥāfeẓ in the Reza Library, Rāmpur. Outstanding painters of the period were Dasvant and Basāvan.

Bird perched on rocks, Mughal painting, *c.* AD 1610; in the State Museum, Hyderābād, Andhra Pradesh, India
P. Chandra

Less emphasis was given to book illustration during the period of Jahāngīr (1605–27). Instead, Jahāngīr preferred court scenes, portraits, and animal studies, which were assembled in albums, many of them with richly decorated margins. The style shows technical advancement in the fine brushwork; the compositions are less crowded, colours are more subdued, and movement is much less dynamic. The artist of the Jahāngīr period exhibited a sensitive understanding of human nature and an interest in the psychological subtleties of portraiture. Noted painters of the period were Abū al-Ḥasan, called the "wonder of the age"; Bishandās, praised for his portraiture; and Ustād Mansūr, who excelled in animal studies.

The elegance and richness of the Jahāngīr period style continued during the reign of Shāh Jahān (1628–58) but with an increasing tendency to become cold and rigid. Genre scenes—such as musical parties, lovers on a terrace, or ascetics gathered around a fire—became frequent, and the trend continued in the reign of Aurangzeb (1658–1707). Despite a brief revival during the reign of Muḥammad Shāh (1719–48), Mughal painting continued to decline, and creative activity ceased during the reign of Shāh ʿĀlam II (1759–1806).


Khujista slaying the bird that advises her against marital infidelity, folio from an illustrated manuscript of *Tuti-nameh* ("Tales of a Parrot"), Mughal painting, c. 1560; in the Cleveland Museum of Art, Ohio
The Cleveland Museum of Art, gift of Mrs. A. Dean Perry, 62.279; photograph, Pramod Chandra

The technique of Mughal painting, in the initial phases, often involved a team of artists, one determining the composition, a second doing the actual colouring, and perhaps a specialist in portraiture working on individual faces.

Muğla, city, southwestern Turkey, on the edge of a small plain about 12 miles (20 km) north of the Gulf of Gökova. A favourite residence of the emirs of the 14th-century Turkmen Menteşe principality, it was annexed to the Ottoman Empire in 1425. It is a local market for the agricultural products of the region and is linked by road with İzmir and Denizli.

The surrounding region borders on both the Aegean and the Mediterranean seas. The coast is extremely irregular, with deeply penetrating gulfs and bays backed by the mountains. Interspersed among the hills and mountains are heavily cultivated small, enclosed basins. The climate is Mediterranean, with heavy winter precipitation. Citrus fruits are grown on the coastal strip and cereals, cotton, and tobacco in the hinterland; vines are grown in the fertile basin below Muğla. Lying in the region of ancient Caria, the area is rich in historical sites. The associated harbour towns of Bodrum (ancient Halicarnassus), Marmaris, and Fethiye are the focus of a growing tourist trade. Pop. (1997) 40,586.

Lycian rock-cut tombs at the site of ancient Kavnos, a Carian town, Muğla province, Turkey
Jane Taylor—Sonia Halliday Photographs

Mugwump, in U.S. politics, member of a reform-oriented faction of the Republican Party that refused to support the candidacy of James G. Blaine for the presidency in 1884. Instead, the Mugwumps supported the Democratic nominee, Grover Cleveland. Their leaders included Theodore Roosevelt, George Curtis, and Henry Cabot Lodge; all returned to Republican ranks after the defeat of Blaine. The term, first used by Charles A. Dana in the New York *Sun,* was derived from the Algonkian Indian word *mogkiomp* ("great man," or "big chief"). In U.S. political slang "mugwump" came to mean any independent voter, and later the term was adopted in England.

Muhallab ibn Abī Ṣufrā, al- (b. 632, Arabia—d. February 702), Arab general in the service of the Umayyad caliphate and an important participant in the political developments of his time.

Al-Muhallab first served under the caliph Muʿāwiyah, campaigning in India and raiding the country between Kābul and Multān. Later he was stationed in the eastern provinces, leading expeditions against the Central Asian city of Samarkand for the governors of Khorāsān. Soon after the death of Muʿāwiyah (680), the Islāmic community was convulsed by civil wars. During this time al-Muhallab deserted the Umayyads and sided with the anti-caliph ʿAbd Allāh ibn az-Zubayr, who appointed him governor of the eastern province of Khorāsān. Before he could assume his responsibilities, however, he was forced to undertake several campaigns against the Azraqīs, a fanatical Muslim sect that made war on all who would not join them. He eventually pursued them into Persia and was able to break their power after a religious schism divided their ranks. Al-Muhallab finally assumed his duties in Khorāsān and began to launch campaigns deeper into Central Asia, in the course of which he met his death.

Muhammad (Arabic or Turkish personal name): *see under* Mahmud, Mehmed, Mohammed, or Mohammad except as below.

Muḥammad, also spelled MOḤAMMED, or MAHOMET, Turkish MEHMED, name of rulers grouped below by country and indicated by the symbol •.

ARAB EMPIRE

• **Muḥammad,** in full ABŪ AL-QĀSIM MUḤAMMAD IBN ʿABD ALLĀH IBN ʿABD AL-MUṬṬALIB IBN HĀSHIM (b. *c.* 570, Mecca, Arabia [now in Saudi Arabia]—d. June 8, 632, Medina), prophet, according to tradition, to whom the religion of Islām was revealed and founder of the Muslim community. Muḥammad initiated religious, social, and cultural developments of monumental significance in the history of mankind.

A brief account of the life and works of Muḥammad follows. For full treatment, *see*

MACROPAEDIA: Islām, Muḥammad and the Religion of.

During his early life in Mecca his merchant activities resulted in his marriage in about 595 to the wealthy widow Khadījah. He received his prophetic call in about 610 and began his religious activities among his friends and members of his own family. He began preaching publicly in about 613. The rise of Meccan opposition about 615 and the withdrawal of his clan's protection about 619 caused Muḥammad to seek aid elsewhere. In 620 he began negotiations with clans in Medina, leading to his emigration (*hijrah*) there in 622. He eventually went to battle with his Meccan opponents and achieved, at the battle near Badr (624), his first military victory, which he interpreted as divine vindication of his prophethood. He again engaged his Meccan opponents at Uḥud (625) and lost, but, in outwitting them at the siege of Medina (627), he further strengthened his position. The Treaty of al-Ḥudaybiyah (628) forced the Meccans to acknowledge his political authority and grant him concessions. Muḥammad's following was meanwhile growing; and in January 630 he entered Mecca with 10,000 men. Because he had also formed alliances with nomadic tribes scattered throughout the peninsula, he left, on his death, most of Arabia united and ready for spreading the faith in Syria and Iraq. Muḥammad's divine revelation was recorded after his death in the Qur'ān, for which he claimed merely to be the earthly vehicle.

GRANADA

• **Muḥammad XI,** in full ABŪ ʿABD ALLĀH MUḤAMMAD XI, Spanish name BOABDIL (d. 1527), last Naṣrid sultan of Granada, Spain. His reign (1482–92) was marked by incessant civil strife and the fall of Granada to Ferdinand and Isabella, the Roman Catholic rulers of Aragon and Castile.

Instigated by his mother, a jealous wife, Boabdil rebelled against his father, the sultan Abū al-Ḥasan ʿAlī (called in Spanish sources Muley Hacén, or Alboacen); and with the aid of the Abencerrajes family seized the Alhambra in 1482 and was recognized as sultan. Abū al-Ḥasan succeeded in recapturing the capital but was deposed by his brother az-Zaghall (Abū ʿAbd Allāh Muḥammad az-Zaghall). On Boabdil's first military venture (1483) against the Castilians, he was captured and to obtain his release signed the Pact of Córdoba, promising to deliver to the Castilians that part of his domain that was in the control of az-Zaghall in return for their help in recovering the part that was held by Abū al-Ḥasan; the death of his father in 1485 enabled Boabdil to reoccupy the Alhambra. In 1491 az-Zaghall, after stiff resistance, was forced to surrender the territory under his command (eastern Granada and the district of Almería) to the Castilians and emigrated. Boabdil, holding only the town of Granada, was now in a hopeless position. After a siege that began in 1491, he too surrendered, on Jan. 2, 1492, bringing an end to Muslim rule in Spain and the completion of the Christian Reconquista.

Boabdil was granted a small territory in the Alpujarras district of southern Spain. In 1493 he went into exile in Morocco and entered the service of the Marīnid ruler of Fès. Called *el rey chico* ("the little king") by the Castilians and *al-zogoybi* ("the poor devil") by his own subjects, Boabdil emerges as a tragic figure, victimized by his ambitious mother and his own weak nature. His life story, interwoven with legend, survives in folktales, such as those collected by Washington Irving in *The Alhambra* (1832).

MOROCCO

• **Muhammad V,** original name SIDI MUḤAMMAD BEN YUSUF (b. Aug. 10, 1909, Fès, Mor.—d. Feb. 26, 1961, Rabat), sultan of Morocco (1927–57) who became a focal point of nationalist aspirations, secured Moroccan independence from French colonial rule, and then ruled as king from 1957 to 1961.

Muḥammad was the third son of Sultan Moulay Yusuf; when his father died in 1927, French authorities chose him to be successor, expecting him to be more compliant than his two older brothers. The first indication of Muḥammad's nationalist feelings occurred in 1934, when he urged the French to abandon the Berber Dahir legislation of 1930 that had established different legal systems for the two Moroccan ethnic groups, Berbers and Arabs—a policy resented by both groups. It had been promulgated to help the protectorate, but, instead, it divided the country and accelerated nationalism. Wanting to make Muḥammad a national symbol, the Moroccan nationalists organized the Fête du Trône, an annual Throne Day festival to commemorate the anniversary of Muḥammad's assumption of power. On these occasions he gave speeches that, though moderate in tone, encouraged nationalist sentiment. The French reluctantly agreed to make the festival an official holiday, and for the next decade Muḥammad remained above nationalist agitation but gave it his tacit support.

During World War II, Muḥammad supported the Allies, and in 1943 he met with U.S. President Franklin D. Roosevelt, who encouraged him to seek independence. Muḥammad's determination increased in January 1944, when French authorities arrested a number of nationalists. In 1947 he visited Tangier and made a speech stressing Moroccan links with the Arab world, making no mention of France. He found an effective means of resistance in refusing to sign, and thus make legally binding, the decrees of the French resident general.

In 1951 the French encouraged a tribal rebellion against him, and on the pretext of protecting him they surrounded his palace with troops. Under these conditions he was induced to denounce the nationalist movement. In August 1953 the French deported the sultan to Corsica and then to Madagascar. Acts of terrorism multiplied during Muḥammad's absence, and his prestige soared. The French government, already faced with rebellion in Algeria, allowed him to return in November 1955, and in March 1956 he negotiated a treaty securing full independence.

Thereafter Muḥammad asserted his personal authority, ruling with moderation. He took the title of king in 1957. His son Muḥammad Hassan (who later reigned as Hassan II) resented the slow pace of government, and in May 1960 Muḥammad made him deputy prime minister and relinquished active direction of the country.

OTTOMAN EMPIRE

• **Muhammad I–VI:** *see* Mehmed I–VI.

SEVILLE

• **Muḥammad II al-Muʿtamid:** *see* Muʿtamid, al-.

SONGHAI EMPIRE

• **Muḥammad I Askia,** also spelled MOHAMMED I ASKIYA, also called ASKIA MUḤAMMAD, or MUḤAMMAD TURE, original name MUḤAMMAD IBN ABĪ BAKR TURE, Ture also spelled TOWRI, or TURÉE (d. March 2, 1538, Gao, Songhai Empire), West African statesman and military leader who usurped the throne of the Songhai Empire (1493) and, in a series of conquests, greatly expanded the empire and strengthened it. He was overthrown by his son, Askia Mūsā, in 1528.

Rise to power. Both Muḥammad's place and date of birth are unknown. For a long time, he was thought to be a Silla (a Tukulor clan of Senegal) or a Touré of Sarakole (Soninke) origin, but it now seems that his name, as spelled in Arabic by 18th-century Timbuktu chroniclers, was Moḥammed Towri, or Moḥammed of the Toro (Fouta-Toro of Senegal). It is thus believed that he was probably of Tukulor origin, from a Senegalese family that had settled in Gao. The name of his clan was probably Kan, or Dyallo. Oral tradition, however, which is still very much alive, makes Mamar (Muḥammad's popular name) out to be Sonni ʿAlī's nephew, his sister Kasey's son by a *jinnī*.

After the death of Sonni ʿAlī Ber, the ruler who had solidified the Songhai Empire from 1464 to 1492, Muḥammad tried, as early as February 1493, to wrest power from Sonni ʿAlī's son Sonni Baru, who had been elected by acclamation on January 21. In the Battle of Anfao on April 12, 1493, Muḥammad's forces, though inferior in number, were victorious. Paganism tinged with the esoteric Songhai Islām of the Sonnis gave way to an Islāmic state whose civil code was the Qur'ān and whose official writing was Arabic. After conquering the enemy, Muḥammad assumed the title of Askia (or Askiya) in order to ridicule, it is said, the daughters of the fallen Sonnis who said of him *a si tya,* or "he will not be." The name Askia became the name of the dynasty that he founded and the name of its leaders.

While Sonni ʿAlī had been a warrior, Muḥammad was above all a statesman. He set up an efficient administration of the regions conquered by his predecessor. He began by dividing Songhai into provinces and placed each under a governor. A standing army and a fleet of war canoes were organized under the command of a general and an admiral. Moreover, Muḥammad created the positions of director of finance, justice, interior, protocol, agriculture, waters and forests, and of "tribes of the white race" (Moors and Tuaregs who at that time were vassals of the Songhai and furnished them with squadrons of dromedary-mounted troops). All these officials were for the most part chosen from among the nobles and were brothers, sons, or cousins of Muḥammad.

Organization of the Songhai Empire. This exemplary organization of an African state was completed by a religious organization. Although a faithful believer, Muḥammad was not very well informed in matters of religious orthodoxy and therefore took as an adviser the Moroccan reformer el-Mehrili, persecutor of the Jews of Touat, to help him put his realm in order, in particular to recover the possessions belonging to the descendants of the defeated Sonnis and to "servile tribes" not converted to Islām. Establishing Islām as the official religion of the nobles was without doubt the only error of this statesman. From then on, it was no longer a popular religion but an imported one that later was to justify the conquest of the Songhai by Moroccan Muslims.

And yet it was to receive the necessary counsel directly from "God's House" that in 1495, two years before his accession to power, Muḥammad undertook a pilgrimage to Mecca. This pilgrimage has remained famous as much for the pomp with which it was carried out as for the marvelous tales to which it gave rise. The chronicler Mahmud Kati, who accompanied Muḥammad, wrote in *Taʾrīkh al-fattāsh* that the *jinnī* of Mecca had had Muḥammad named caliph and had told him what his rights were over the former vassal tribes of the Sonnis. By the time he returned in 1497, he was a leader deeply converted to Islām. Next he would proceed to consolidate and enlarge Songhai.

Militarily he met with uneven success. Although between 1498 and 1502 he was victorious over the Mossi of Yatenga and the inhabitants of the Aïr (Niger), a few years later (1505–06) he undertook an unsuccessful campaign against Borgu (the present boundary region of Niger and Nigeria). And similarly, although during 1507 and 1514 he reduced the insurgent Fulani factions in Senegal and the Bornu factions near Agadez, one of his lieutenants, the Karta of Kabi, revolted against him in turn and, despite his efforts during 1516 and 1517, remained independent. As an organizer of an effective administrative system he was more successful.

During the course of his lengthy sojourns in the capital, Gao (1502–04 and 1506–07), he set up with rare talent the system of tithes and taxes, the regulation of agriculture and fishing, and the recruitment and training of his administrators and governors.

The extent of the Songhai Empire of this period remains conjectural. Sadi, the Timbuktu chronicler, has said that the territory that Muḥammad conquered "by fire and sword" extended west as far as the Atlantic Ocean, northwest to the salt mines of Teghaza (on the northern border of present-day Mali), southwest as far as Bendugu (Segu), southeast to Bussa, and northeast to Agadez. It is certain that the influence of Songhai during Muḥammad's time was considerable and extended even beyond these boundaries. All the surrounding states, whether allies or enemies, experienced its civilizing ferment.

This influence was reinforced by an indirect, though nonetheless profound, Islāmic propaganda. Muslim scholars went into areas they would not have been able to penetrate without the Gao ruler's support. And for several centuries to come, the small African states and the neighbouring leaders would take as their model the Islāmic empire of Songhai and its prestigious leader, Muḥammad. Even today, according to oral tradition, Muḥammad appears as a supernatural being, a *jinnī*, who either took after his father or after those with whom, by a special gift, he was able to consult during his pilgrimage to Mecca.

Fall from power and death. The end of his reign was, however, tragic. Little by little his dream of an Islāmized Sudan, whose emir he would be, evaporated. Even during his lifetime, his children were quarreling over the spoils. After the death of his commander in chief, Kanfari Omar, one of his brothers, in 1519, Muḥammad was no longer safe even in Gao, and the Songhai people seemed to him "as crooked as the course of the Niger River . . ." Embittered, half blind, the old man had no one left but his friend and adviser, his servant Ali Folen. The almost religious fear that he inspired gave way to contempt. Musa, his eldest son, plotted against him and in 1528 killed his new general in chief, Yaya, another of Muḥammad's brothers, who had remained faithful to him. Musa then dispossessed his father, taking the name Askia Mūsā. He kept this title for three years before being assassinated himself by one of his brothers. Now deposed, the old Askia Muḥammad was banished to an island in the river, a place "infested with mosquitos and toads." There, from 1528 to 1537, he was a blind and despairing witness to the murderous quarrels of his children over the territory of Songhai.

In 1537 his third successor, his son Askia Ismaïl, recalled his father to Gao. To reward him, Muḥammad bequeathed to him his green turban and his caliph's sabre. In 1538, during a period of temporary calm, this founder of a dynasty died. He was buried in Gao, under a pyramid of earth surmounted by wooden spikes. His tomb is still standing and has become one of the most venerated mosques in all of West Africa. (J.P.R.)

Muhammad, Elijah, original name ELIJAH POOLE (b. Oct. 7, 1897, Sandersville, Ga., U.S.—d. Feb. 25, 1975, Chicago), leader of the black separatist religious movement known as the Nation of Islam (sometimes called Black Muslims) in the United States.

The son of sharecroppers and former slaves, Muhammad moved to Detroit in 1923 where, around 1930, he became assistant minister to the founder of the sect, Wallace D. Fard, at Temple No. 1. When Fard disappeared in 1934 Muhammad succeeded him as head of the movement, with the title "Minister of Islam." Because of dissension within the Detroit temple, he moved to Chicago where he established Temple No. 2. During World War II he advised followers to avoid the draft, as a result of which he was charged with violating the Selective Service Act and was jailed (1942–46).

Muhammad slowly built up the membership of the Black Muslims through assiduous recruitment in the postwar decades. His program called for the establishment of a separate nation for black Americans and the adoption of a religion based on the worship of Allah and on the belief that blacks are his chosen people. Muhammad became known especially for his flamboyant rhetoric directed at white people, whom he called "blue-eyed devils." In his later years, however, he moderated his anti-white tone and stressed self-help among blacks rather than confrontation between the races. Because of Muhammad's separatist views, his most prominent disciple, Malcolm X, broke with the group and, before his assassination in 1965, helped to lend an identity to the group (once known as the American Muslim Mission and now part of the worldwide orthodox Muslim community) that split from the Nation of Islam after Muhammad's death in 1975. Another group, retaining both the name and the founding principles of Elijah Muhammad's original Nation of Islam, was established under the leadership of Louis Farrakhan.

Muhammad, Wallace Fard: *see* Fard, Wallace D.

Muḥammad ʿAbduh (Egyptian reformer): *see* ʿAbduh, Muḥammad.

Muḥammad al-Mahdī al-Ḥujjah, also called MUḤAMMAD AL-MUNTAZAR, HIDDEN IMAM, or TWELFTH IMAM (disappeared 878), 12th and last imam, venerated by the Ithnā ʿAsharīyah, or Twelver sect, the main body of Shīʿite Muslims. It is believed that Muḥammad al-Mahdī al-Ḥujjah has been concealed by God (a doctrine known as *ghaybah,* or occultation) and that he will reappear in time as the mahdi, or messianic deliverer. *See also* Ithnā ʿAsharīyah.

Muḥammad ʿAlī (b. 1769, Kavala, Macedonia, Ottoman Empire [now in Greece]—d. Aug. 2, 1849, Alexandria), viceroy and pasha of Egypt (1805–49), founder of the dynasty that ruled Egypt from the beginning of the 19th century to the middle of the 20th. He encouraged the emergence of the modern Egyptian state.

Muḥammad ʿAlī, lithograph

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman and Co. Ltd.

Rise to power. Muḥammad ʿAlī's ethnic background is unknown, though he may have been an Albanian and was certainly a Muslim and an Ottoman subject. His father, Ibrahim Agha, the commander of a small provincial military force that was maintained by the governor of Kavala, died when Muḥammad ʿAlī was a boy, and he was brought up by the governor. At 18 he was married to one of the governor's relatives, who became the mother of five of Muḥammad ʿAlī's 95 children. He became involved in the tobacco trade, an experience that may account for his later commercial interests.

In 1798 Egypt, at that time a semi-autonomous province of the Ottoman Empire, was occupied by a French force under Napoleon Bonaparte. Muḥammad ʿAlī went there as part of an Ottoman expeditionary force to oppose the French. With great political skill, he managed by 1805 to be named the *wālī,* the Ottoman sultan's viceroy in Egypt, with the rank of pasha.

Nowhere in the Ottoman Empire was there greater opportunity for a total restructuring of society than in Egypt. The three-year French occupation (1798–1801) had disrupted the country's traditional political and economic structure. Continuing the task begun by the French, Muḥammad ʿAlī put an end to Egypt's traditional society. He eliminated the Mamlūks, the former ruling oligarchy, expropriated the old landholding classes, turned the religious class into pensioners of the government, restricted the activities of the native merchant and artisan groups, neutralized the Bedouins, and crushed all movements of rebellion among the peasants. The task of rebuilding Egypt along modern lines now lay before him.

But, though Muḥammad ʿAlī had considerable native intelligence and great personal charm, he was a man of limited knowledge and of narrow horizons. He proved insensitive to the possibilities open to him and governed generally according to Ottoman principles. No group within Egyptian society was capable of forcing fundamental changes upon him; elements that might have served as the instruments of change had been crushed at the outset of his regime. Neither was there an ideology capable of bringing together the ruler and the ruled in a great national effort. Finally, Muḥammad ʿAlī had to devote much of his effort to resisting attempts by his Ottoman overlord to remove him from office. His policies were designed more to entrench himself and his family in Egypt as its hereditary rulers than to create a new society.

Administrative and economic reforms. To strengthen his position within Egypt and to increase his revenues, Muḥammad ʿAlī instituted sweeping changes. By 1815 most of Egypt's agricultural land had been converted into state land, and profits from agriculture became available to the ruler. He improved Egypt's irrigation system, on which its agriculture depended; he introduced new crops, such as cotton, which promised high cash returns; and he reorganized the administrative structure of the government to insure strict control of the economy. He also attempted to construct a modern industrial system to process Egypt's raw materials. Disbanding his mercenary army, he created a fleet and an army of Egyptians conscripted from the peasant class but commanded by Turks and others recruited from outside Egypt. To supply services for his armed forces, he created Western-style schools to train doctors, engineers, veterinarians, and other specialists. He also began sending educational missions to European countries for training in modern techniques.

His industrial experiments failed, largely because Egypt lacked sources of power, a native managerial class, and a trained working class. Even the agricultural sector declined ultimately because of administrative mismanagement, excessive taxation, military conscription of the peasantry, and his monopolization of trade. By the mid-1830s Muḥammad ʿAlī's policy of turning Egypt into a massive plantation for his own benefit had reached a point of diminishing returns. Furthermore, his financial requirements had greatly increased because of his military campaigns.

Attempts at expansion. Muḥammad ʿAlī initially supported the Ottoman sultan in suppressing rebellion both in Arabia and in Greece, and he also invaded the Nilotic Sudan in search of recruits for his army and gold for his treasury. Victorious in all three campaigns, until European intervention in Greece caused the destruction of his fleet at Navarino in 1827, Muḥammad ʿAlī felt that he was strong enough to challenge the sultan. His first war against the sultan (1831–33) gained him control of Syria as far north as Adana. In the second war (1838–41) the decisive defeat of Ottoman troops at the Battle of Nizip (1839) and the desertion of the Ottoman fleet to Muḥammad ʿAlī led to intervention by the European powers. In July 1840 Great Britain, Russia, Austria, and Prussia agreed to end Egyptian rule in Syria, shattering Muḥammad ʿAlī's hopes for greater independence from the Ottoman Empire. In 1841 he and his family were granted the hereditary right to rule Egypt and the Sudan, but his power was still subjected to restraints, and the sultan's suzerain rights remained intact.

Muḥammad ʿAlī retired from office in 1848 and died in the following year. Many of his reforms were abandoned after his death, having been too closely allied to his policies of self-aggrandizement to survive. But Muḥammad ʿAlī cleared the path for the creation of an independent Egyptian state; that his successors failed to meet the challenge may be traced in part to the inadequacies of his rule, but their failures remain largely their own.

(H.A.B.R.)

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Muḥammad Askia: *see* Muḥammad I Askia *under* Muḥammad (Songhai Empire).

Muḥammad Ghūrī: *see* Muʿizz-ud-Dīn Muḥammad ibn Sām.

Muhammad Hasan bin Munas: *see* To' Janggut.

Muḥammad ibn ʿAbd al-Karīm al-Khaṭṭābī: *see* Abd el-Krim.

Muḥammad ibn ʿAbd al-Malik ibn Muḥammad ibn Muḥammad ibn Ṭufayl al-Qaysī (Moorish philosopher and physician): *see* Ibn Ṭufayl.

Muḥammad ibn ʿAbd al-Wahhāb: *see* Wahhāb, Muḥammad ibn ʿAbd al-.

Muḥammad ibn Abī Bakr Ture, Ture also spelled TOWRI, or TURÉE: *see* Muḥammad I Askia *under* Muḥammad (Songhai Empire).

Muḥammad ibn Abū ʿĀmir al-Manṣūr (Muslim ruler of Córdoba): *see* Manṣūr, Abū ʿĀmir al-.

Muḥammad ibn Aḥmad al-Maqdisī (Arab geographer): *see* Maqdisī, al-.

Muḥammad ibn al-Ḥanafīyah (b. 637—d. 710, Medina, Arabia [now Saudi Arabia]), Muslim religious figure who many thought was the legitimate caliph. He was a son of ʿAlī, the fourth caliph, but not by his wife, Fāṭimah, who was the daughter of the Prophet Muḥammad. By nature, Muḥammad ibn al-Ḥanafīyah was retiring and inclined to avoid partisan strife; he acted with much caution despite the support of various factions that would have made him caliph. He eventually pledged allegiance to the Umayyad caliph ʿAbd al-Malik, from whom he received a large annual pension.

To make the best use of the Britannica, consult the INDEX *first*

Muḥammad ibn Falāḥ (b. *c.* 1400, Wāsiṭ, Iraq—d. 1461, Hoveyzeh, Iran), Muslim theologian who founded the extremist Mushaʿshaʿ sect of Shīʿism.

Muḥammad ibn Falāḥ was reputed to be descended from the seventh Shīʿite imam, Mūsā al-Kāẓim. He received a traditional Islāmic religious education in al-Ḥillah, a famous centre for Shīʿite studies. As a student he was noted for his extremist religious views, which bordered on heresy, and he was excommunicated from the faith by his teacher, himself a noted Shīʿite theologian.

From 1436 onward Muḥammad ibn Falāḥ actively propagated his views among Arab tribesmen, trying to create a coalition of discontented Arab tribes on what is now the border between Iraq and Iran. This coalition was held together by his contention that he was the mahdi (the "divinely guided one") and the representative of ʿAlī (whom the Shīʿites regarded as the legitimate successor to the Prophet Muḥammad). In 1440 he and his followers were defeated in a clash with the authorities, but in February 1441 they managed to capture the city of Hoveyzeh, which became the seat of the Mushaʿshaʿ movement. Warfare persisted for the next 10 years, during which time Muḥammad ibn Falāḥ was able to consolidate his power in the vicinity of Hoveyzeh and the Tigris River. He owed his success as much to the weakness and division of his opponents as to his own messianic zeal and doctrinal propaganda.

The doctrinal foundations of the Mushaʿshaʿ are found in Muḥammad ibn Falāḥ's *Kalām al-mahdi* ("The Words of the Mahdi"). Written in the style of the Qurʾān, the book contains a rigid code of conduct regulating the affairs of the community. Beside acting as the spiritual leader of the Mushaʿshaʿ, he was also the military and temporal ruler of the movement. On his death he was succeeded by his son ʿAlī as the head of the movement.

Muḥammad ibn Khāvandshāh ibn Maḥmūd: *see* Mīrkhwānd.

Muḥammad ibn Muḥammad ibn Ṭarkhān ibn Uzalagh al-Fārābī (Muslim philosopher): *see* Fārābī, al-.

Muḥammad ibn Mūsā al-Khwārizmī (Muslim mathematician and astronomer): *see* Khwārizmī, al-.

Muḥammad ibn Mūsā Kamāl ad-Dīn ad-Damīrī (Muslim theologian): *see* Damīrī, ad-.

Muḥammad ibn Tughluq (b. *c.* 1290, Delhi, India—d. March 20, 1351, Sonda), second sultan of the Tughluq dynasty (reigned 1325–51), who briefly extended the rule of the Delhi sultanate of northern India over most of the subcontinent. As a result of misguided administrative actions and unexampled severity toward his opponents, he eventually lost his authority in the south; at the end of his reign, the sultanate had begun to decline in power.

Life. Muḥammad was the son of the sultan Ghiyās-ud-Dīn Tughluq. Very little is known of his childhood, but he apparently received a good education. He possessed an encyclopaedic knowledge of the Qurʾān, Muslim jurisprudence, astronomy, logic, philosophy, medicine, and rhetoric. In 1321–22 his father sent him against the city of Warangal in the Deccan, in which campaign, after initial reverses, he subdued the rebellious Hindu rajas. From his accession to the throne in 1325 until his death in 1351, Muḥammad contended with 22 rebellions, pursuing his policies consistently and ruthlessly. Ziyāʾ-ud-Dīn Baranī, his close companion and counsellor for 17 years, often advised him to abdicate, but Muḥammad disdainfully rejected his advice.

As his reign began, Muḥammad attempted, without much success, to enlist the services of the *ʿulamāʾ*, the Muslim divines, and the Ṣūfīs, the ascetic mystics. Failing to win the *ʿulamāʾ* over, he tried to curtail their powers, as some of his predecessors had, by placing them on an equal footing with other citizens. The Sultan wanted to use the Ṣūfīs' prestigious position to stabilize his authority as ruler. Yet they had always refused any association with government and would not accept any grants or offices except under duress. Muḥammad tried every measure, conciliatory or coercive, to yoke them to his political wagon. Although he humiliated them, he could not break their opposition and succeeded only in dispersing them from the towns of northern India.

In the four pages of his so-called autobiography, Muḥammad's only surviving literary work, he confesses that he had wavered from traditional orthodoxy to philosophic doubts and then found his way to a rational faith. To still his own doubts, as well as to counteract the opposition of the Muslim divines, he obtained from the caliph in Cairo a *manshūr* (patent of royalty) legitimizing his authority.

The transfer of the capital in 1327 to Deogir (now Daulatābād) was intended to consolidate the conquests in southern India by large-scale, in some cases forced, migration of the people of Delhi to Deogir. As an administrative measure it failed, but it had far-reaching cultural effects. The spread of the Urdu language in the Deccan may be traced to this extensive influx of Muslims. He introduced several reforms in the monetary system, and his coins, in design as well as in workmanship and purity of metal, excelled those of his predecessors. His introduction of token currency, coins of baser metal with the face value of silver coins, however, failed dismally.

A projected Khorāsān expedition (1327–28) that never materialized was intended to secure more defensible frontiers in the west. The Karajil (Garhwal-Kumaon) expedition (1329–30), an attempt to adjust the boundary dispute with the northern hill states then dominated by China, ended in disaster, but it was followed by an exchange of emissaries between China and Delhi. The conquest of Nagarkot in the foothills of the Himalayas in northwestern India was based on Muḥammad's policy of establishing secure frontiers.

Between 1328 and 1329 the Sultan increased the land tax in the Doab—the land between the Ganges and Jumna rivers—but the taxpayers resisted it, especially because a severe drought coincided. Muḥammad was the first ruler to introduce rotation of crops, establish state farms, and tend cultivation and improve artificial irrigation by establishing a department of agriculture. When famine broke out in northern India (1338–40), he moved his residence to Swargdawari to supervise famine relief measures himself.

Muḥammad's last expedition, against the rebel Ṭaghī, ended with his death at Sonda in Sind in 1351. He died with a smile on his face and verses of his own composition on his lips. In the words of a contemporary, "the Sultan was rid of the people and the people of the Sultan."

Assessment. Sultan Muḥammad was among the most controversial and enigmatic figures of the 14th century. A dauntless soldier, he was tolerant in religion and was normally humane and humble, but these traits were vitiated at times by cruelty sometimes approaching the inhuman. He lived in constant conflict between faith and action, faith in the correctness of his policies and action in the means by which he sought to implement them. A born revolutionary, he desired to create a more equitable social order by making Islām a religion of service rather than a means of exploitation. This end, he believed, could be achieved only by a strong centralized authority based on justice and patronage of the poor, the learned, and the pious and on the suppression of rebellions mainly of the privileged classes in a tradition-ridden society.

All contemporary historians based their assessment of Muḥammad on his administrative measures, which were neither vicious nor visionary. They failed because of the harshness of the Sultan in executing them, the challenge they posed to the privileged classes, the general lethargy and conservatism of his subjects, and the expansion of the empire with which Muḥammad's administrative machinery could not cope. (S.A.R.)

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Muḥammad of Ghūr: *see* Muʿizz-ud Dīn Muḥammad ibn Sām.

Muḥammad Shāh, in full NĀṢIR-UD-DĪN MUḤAMMAD SHĀH (b. Aug. 7, 1702, Ghaznā, Afghanistan—d. April 6, 1748, Delhi [now in India]), ineffective, pleasure-loving Mughal emperor of India from 1719 to 1748.

The son of Shāh Jahān, Muḥammad Shāh was made emperor in 1719 by the powerful Sayyid brothers, ʿAbdullāh and Ḥusayn ʿAlī, who had killed the emperor Farrukh-Siyar. In 1720 the assassination of Ḥusayn ʿAlī and the defeat of ʿAbdullāh at the battle of Hasanpur (southwest of Delhi) liberated Muḥammad Shāh from effective Sayyid control. In 1721 he married the daughter of Farrukh-Siyar. After Niẓām-ul-Mulk Āṣaf Jāh, who was the court-appointed vizier, had left court in disgust in 1724, the provinces steadily slipped out of imperial control: Sādāt Khān became practically independent in Oudh; the Afghan Rohilla tribesmen made themselves masters of Rohilkhand (southeast of Delhi); Bengal paid only an annual tribute to Delhi; and the leaders of the Marāṭhā, under the peshwa Bājī Rāo, made themselves lords of the regions of Gujarāt, Mālwa, and Bundelkhand and, in 1737, raided Delhi. In 1739 Nāder Shāh of Iran took advantage of Mughal neglect of the North-West Frontier areas (now in Pakistan) to rout the Mughals at Karnāl and occupy Delhi. In March 1748 Muḥammad Shāh defeated the Afghan ruler Aḥmad Shāh Durrānī, at Sirhind, thus achieving a success in his final years.

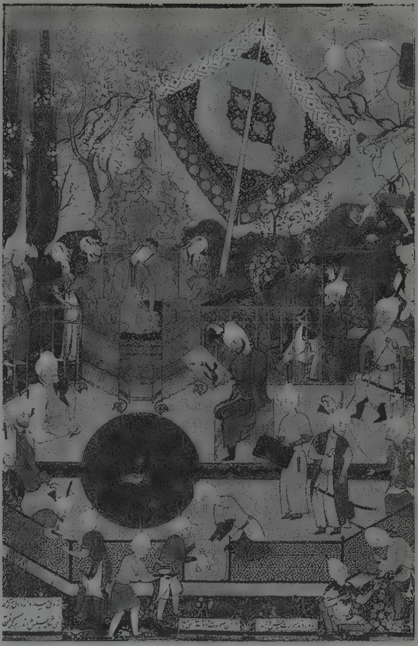
Muḥammad Taqī Bahār: *see* Bahār, Muḥammad Taqī.

Muḥammad Ture, Ture also spelled TOWRI, or TURÉE: *see* Muḥammad I Askia *under* Muḥammad (Songhai Empire).

Muhammad Yusof bin Ahmad: *see* To' Kenali.

Muḥammadī, byname of MĪRZĀ ʿALĪ (fl. 16th century, Ṣafavid Iran), one of the leading court painters during the time (1548–97) that the Ṣafavid capital was Qazvīn.

A native of western Iran, he was a son of the painter Sulṭān Muḥammad, who was one of his teachers. A master of line, Muḥammadī (so called after his great father) began to paint while still young and while Tabrīz was still the capital. The surviving examples of his work were executed between the 1530s and the 1580s, an unusually long period of activity.



"The Portrait of Khosrow Is Shown to Shīrīn," miniature by Muḥammadī in the *Khamseh* of Neẓāmī done for Shāh Ṭahmāsp I, 1539–43; in the British Library (OR. MS. 2265 fol 48v)

By courtesy of the British Library Board

He worked on some of the greatest Ṣafavid manuscripts, including Ṭahmāsp I's *Shāh-nāmeh* and the *Khamseh* (1539–43) of Neẓāmī. His debt to the Herāt painters of the school of Behzād is clear, but he is best known for a calligraphic, wiry line and a mannered, almost expressionist, personal style. This assertion of the individuality of the painter marked Ṣafavid painting thereafter. Like his contemporaries, he signed few of his paintings.

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Muhammadiyah, socioreligious organization in Indonesia, established in 1912 at Jogjakarta, aimed at adapting Islām to modern Indonesian life. The organization was chiefly inspired by an Egyptian reform movement, led by Muḥammad ʿAbduh, that had tried to bring the Muslim faith into harmony with modern rational thought. The Muhammadiyah advocated the abolition of all superstitious customs, mostly relics of pre-Islāmic times, and the loosening of the stiff traditional bonds that tended to strangle modern cultural life. To achieve these aims, the Muhammadiyah employed many methods of the Christian missionaries. It established schools along modern lines, where Western subjects (including Dutch) as well as religion were taught. It set up orphanages, hospitals, and other social services. By the 1920s the Muhammadiyah was the dominant force in Indonesian Islām and the most effective organization in the country.

The Muhammadiyah was willing to cooperate with the Dutch colonial government, and its schools were qualified to receive government financial assistance. It was therefore criticized by radical Indonesian nationalists, who had adopted a noncooperation policy toward the Dutch authorities. The membership of the Muhammadiyah increased steadily, however, and by 1937 there were 913 branches, although more than half of them were in the outer islands. The Muhammadiyah was paralyzed by the Japanese occupation during World War II and never really recovered afterward.

Muhammed bin Hamid: *see* Tippu Tib.

Muhando, Penina O. (b. 1948, Tanganyika [now Tanzania]), Tanzanian playwright and scholar, one of the few female writers published in the Swahili language as of the late 20th century.

Muhando studied education and theatre in Tanzania at the University of Dar es-Salaam, later joining the faculty of the department of theatre arts. Her plays include *Hatia* (1972; "Guilt"), *Tambueni haki zetu* (1973; "Reveal Our Rights"), *Heshima yangu* (1974; "My Honour"), and *Pambo* (1975). They explore a variety of themes and situations but generally are concerned with contemporary problems involved in Tanzanian society's rapid adjustment to development and westernization. Muhando's work is distinguished by excellent characterizations and a natural, realistic use of modern standard Swahili. In addition to her plays, Muhando wrote several scholarly works dealing with Swahili literature.

Muḥarraq, Al-, municipality in the state and emirate of Bahrain, on Al-Muḥarraq Island, the northernmost island of the Bahrain archipelago, in the Persian Gulf. It lies at the southwest tip of the island and is connected by a causeway, about 1.5 miles (2.5 km) long, to the capital city of Manama, on Bahrain island. Many of its residents commute to work on the main island across the causeway.

Taken by the Portuguese (1521) and the Persians (1602), Al-Muḥarraq passed to the control of the Āl Khalīfah dynasty in 1783 with the rest of Bahrain. It developed as a trade centre, its harbour being the chief headquarters for the formerly important Bahraini pearl-diving industry, virtually extinct since the 1930s. At the beginning of the 20th century, Al-Muḥarraq's population was estimated at 20,000, and almost 300 pearling boats were harboured there. It was also politically important since the ruling sheikh (chief) used to reside there most of the year. Al-Muḥarraq has retained its character as a Middle Eastern town, with narrow, winding streets and traditional Arab *sūq*s (marketplaces).

Al-Muḥarraq Island is the third largest of the Bahraini group; its area is 6.7 square miles (17 square km). Roughly horseshoe-shaped, it is indented by Muḥarraq Bay on the south. Bahrain International Airport lies just north of Al-Muḥarraq city. Until shortly before Bahraini independence (1971), the airfield served as a Royal Air Force base, the country then being a British-protected state. Al-Ḥadd, another sizable town on the island, is on a spit at its southeast tip. South of Al-Ḥadd on a man-made island at the end of a 7-mile-long causeway is a shipbuilding yard and drydock financed by the Organization of Arab Petroleum Exporting Countries (OAPEC). The drydock opened in 1977 and is capable of accepting tankers of 450,000 deadweight tons. On a peninsula across the bay to the east of Al-Muḥarraq city are the village and fort of ʿArād; the fort was built by the Omanis during the brief (1799–1809) occupation of the country by the sultanate of Muscat and Oman. Pop. (1988 est.) 78,000.

Muḥāsibī, al- (Arabic: "He Who Examines His Conscience"), in full ABŪ ʿABD ALLĀH AL-ḤARITH IBN ASAD AL-ʿANAZĪ AL-MUḤĀSIBĪ (b. *c.* 781, Basra, Iraq—d. 857, Baghdad), eminent Muslim mystic (Ṣūfī) and theologian renowned for his psychological refinement of pietistic devotion and his role as a precursor of the doctrine of later Muslim orthodoxy. His main work was *ar-Riʿāyah li-ḥūqūq Allah,* in which he acknowledges asceticism to be valuable as an act of supererogation but always to be tempered by inner and outer duties toward God.

There is little historical information about al-Muḥāsibī's life. His parents apparently left for Baghdad shortly after his birth, perhaps attracted by the many opportunities afforded by the newly founded capital. His father had acquired some wealth, but al-Muḥāsibī is said to have refused it because of doctrinal differences. He led a normal life, owned a beautiful house, and liked sumptuous clothes. This image of the ordinary bourgeois, however, is qualified by a trait that al-Muḥāsibī imported from Basra: the otherworldly spirituality propagated by the famous Ṣūfī theologian al-Ḥasan al-Baṣrī (died 728).

Muslim asceticism had developed some specific features: nightly recitals of the Qurʾān (the Muslim sacred scriptures), restrictions concerning the kind and quantity of food one should eat, and a special attire consisting of woollen clothing. These habits had been adapted from the life-style of Christian monks. But whereas Christian monks used to live in seclusion, a Muslim ascetic felt obliged to remain an active member of his community.

Philosophy and teachings. Thus, al-Muḥāsibī came to realize that, in his urban society with its inevitable public exposure, the practice of outward asceticism was open to ambiguity: although it could serve to suppress the normal sins of passion, it could also become a deceptive vehicle for inner vices like hypocrisy and pride. As soon as outward piety becomes a part of a person's image, it can act as a screen for the hidden intentions of the ego. Man has to recognize that sinful actions are frequently defined not by their objective reality but by the subjective attitude of the sinner. Outside the realm of the commandments and prohibitions of the Qurʾān, nothing should be labelled good or bad without restriction. The most commendable attitude is scrupulosity, although even this can be ambiguous, because it might result in spiritual paralysis. Asceticism is valuable as something additional, an act of supererogation, but it must always be tempered by attention paid to the inner and outer duties toward God (*ar-Riʿāyah li-ḥūqūq Allāh,* the title of al-Muḥāsibī's main work). The proper instrument for this is reason, the importance of which al-Muḥāsibī stressed far beyond the normal practice of mystics, who often tended to emphasize irrationality and spiritual intoxication. The method he proposed was *muḥāsabah,* the anticipation of the Last Judgment through constant self-examination. This seems to have been an impediment to real mystical experiences; the ruthlessness of this psychological technique buried every attempt at ecstatic exaltation under an enormous inferiority complex.

Al-Muḥāsibī propagated his ideas in didactic conversations, which he would record immediately afterward; his books still preserve this dialogical structure. His influence on posterity was immense, especially through his pupil Junayd. During his lifetime, however, he was regarded with suspicion, and his last years were embittered by persecution. He had joined a group of theologians who, led by ʿAbd Allāh ibn Kullāb (died 855), criticized the doctrines of the rationalist Muʿtazilī school dominant at that time.

The discussion was focussed on the problem of the essence of God and the nature of his attributes. The Muʿtazilī, in stressing the unity of God, tended to reduce the attributes to mere nominal aspects; al-Muḥāsibī, in order to preserve their individual value, accentuated much more their independent status. And whereas the Muʿtazilī held the attribute of God's speech to be created, realized in temporal revelations like that of the Qurʾān, al-Muḥāsibī believed that it was also uncreated if seen under the aspect of the eternal Word of God. He did not go so far as to support the popular belief that the Qurʾān, too, was uncreated; he avoided this shibboleth used in the inquisition initiated in favour of the Muʿtazilī by the caliph al-Maʾmūn in 833.

This diplomatic attitude became precarious when, in 850–851, a later caliph, al-Mutawakkil, put an end to the pro-Muʿtazilī policy of his predecessors and, two years later, prohibited rationalist theology altogether. Al-Muḥāsibī's theological position was now viewed as treasonous by the former victims of the inquisition, precisely because he had been closest to them in their dogmatic outlook, for they considered the use of any rational theological method as heresy, regardless of the doctrine it supported. He was consequently forced to give up his public teaching and appears to have emigrated to Kūfah. Later on he was allowed to return to Baghdad, perhaps at the price of abandoning his theological convictions. Yet the boycott persisted: when he died there in 857, only four people attended his funeral. (J.v.E.)

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Muhavura, extinct volcano at the easternmost end of the Virunga Mountains in east central Africa. It lies northeast of Lake Kivu on the border between Uganda and Rwanda. It is more than 13,500 ft high, and its crater contains a lake. The volcano forms part of the Virunga National Park, which is the home of the mountain gorilla.

Muḥī-ud-Dīn Muḥammad (Mughal emperor): *see* Aurangzeb.

Muhlenberg FAMILY, distinguished U.S. family long associated with the state of Pennsylvania and the Lutheran Church, whose members included prominent figures in education, the military, and government.

Henry Melchior Mühlenberg (b. Sept. 6, 1711, Einbeck, Hanover—d. Oct. 7, 1787, Trappe, Pa., U.S.), the founder of the family, studied theology at Göttingen and Halle. In 1742, in reply to a call from the Lutheran churches of Pennsylvania, he went to America. Although occupied particularly with the congregation at New Providence (later Trappe), Pa., he functioned as overseer of all Lutheran churches from New York to Maryland. In 1748 he organized the first Lutheran synod in America.

John Peter Gabriel Muhlenberg (1746–1807), eldest child of Henry Melchior, was a Lutheran minister and a brigadier general in the Continental (American revolutionary) Army. He commanded the infantry at the battle of Yorktown. A congressman for several terms, he was also a friend of Thomas Jefferson and James Monroe.

Frederick Augustus Conrad Muhlenberg (1750–1801), second son of Henry Melchior, a Lutheran minister, served as a member of the Continental Congress and first speaker of the national House of Representatives. His brother Gotthilf Henry Ernest Muhlenberg was, in addition to being a Lutheran minister, a botanist of some note. He was the first president (1787) of Franklin College, Lancaster, Pa.

William Augustus Muhlenberg (1796–1877), a grandson of Frederick Augustus Conrad, was an Episcopal priest, ecumenical theologian, and hymnologist. He founded St. Paul's College, Flushing, Long Island (1838); St. Luke's Hospital, New York City (1858); and, to realize his understanding of Christianity as expressed by social service, the first U.S. order of Episcopal deaconesses (1852).

Frederick Augustus Muhlenberg (1818–1901), grandson of Gotthilf Henry Ernest, a Lutheran clergyman and educator, was instrumental in the establishment of several Pennsylvania colleges. He was also the first president of Muhlenberg College, Allentown, Pa. (1867).

Mühlhausen, also called MÜHLHAUSEN IN THÜRINGEN, city, Thuringia *Land* (state), central Germany, on the Unstrut River, in the Thüringer Becken (Thuringian Basin). Originally a Germanic village and later a Frankish settlement, it was first documented in 775. It was granted royal privileges and was where Philip of Swabia was elected German king in 1198. Created a free imperial city after 1256, it joined the Hanseatic League *c.* 1420. After the Reformation Mühlhausen became a centre of the people's reform movement, and during the Peasants' War (1523–25) against the feudal princes it was associated with the peasant leader Thomas Müntzer, who was executed there after the Battle of Frankenhausen. The city was subsequently deprived of its privileges but regained its independence under the supremacy of the Holy Roman Empire in 1548. From 1802 to 1945 it was in the former Prussian province of Saxony, except from 1807 to 1815, when it was attached to Westphalia. Notable medieval buildings include the Church of St. Mary on the site of a Romanesque basilica, St. Blasius' Church (with an organ constructed to the plans of Johann Sebastian Bach), and the 13th-century town hall. There are remains of medieval fortifications. Mühlhausen has a teachers' training college, a school for agriculture, and a folklore museum.

Industries include the manufacture of textiles, leather, machinery, electrical and radio equipment, wood products, and cigarettes. Pop. (1989 est.) 42,994.

muhly, any of about 125 species of range grasses constituting the genus *Muhlenbergia* (family Poaceae), native to North and South America. Some species are less than 10 centimetres (4 inches) tall and bushy, others are highly branched and matlike, and still others are taller (up to 1 metre, or [3 feet]) and grow in tufts.

Ringgrass (*Muhlenbergia torreyi*)
Grant Heilman—EB Inc.

Most muhlys are perennials, and all species have only one floret on each branch, or subdivision, within a panicle (flower cluster). Some species are used for fodder. Bush muhly (*M. porteri*) is so palatable to browsing animals that it is rarely found where livestock has access to it.

Muhu, German MOON, archipelago and island, Estonia, separating the Gulf of Riga from the Baltic Sea. The archipelago's three main islands are Saaremaa (*q.v.*), the largest, in the south; Hiiumaa (*q.v.*) in the north; and Muhu, the smallest, in the east nearest the mainland. Navigable straits separate the islands from each other and from the mainland. Ferries serve the archipelago, and a causeway links the road networks of Saaremaa and Muhu islands.

Muhu island, with an area of 79 sq mi (204 sq km), is composed largely of limestone and dolomite. Its main village is Kuivastu, a ferry station on the east coast. Pop. (latest est.) island, 2,586.

Muḥyī' ad-Dīn (Iraqi ruler): *see* Abū Kālījār al-Marzubān ibn Sulṭān ad-Dawlah.

Muḥyī ad-Dīn abū ʿAbd Allāh Muḥammad ibn ʿAlī ibn Muḥammad ibn al-ʿArabī al-Ḥātimī aṭ-Ṭāʾī (Muslim mystic): *see* Ibn al-ʿArabī.

Muir, Edwin (b. May 15, 1887, Deerness, Orkney, Scot.—d. Jan. 3, 1959, Cambridge, Cambridgeshire, Eng.), literary critic, translator, and one of the chief Scottish poets of his day writing in English.

The son of a crofter, Muir received his education in Kirkwall. After his marriage (1919) to Willa Anderson, Muir went to London where he wrote literary reviews; he later taught English on the Continent.

His stature as a poet did not become widely recognized until the publication of *The Voyage* (1946) and *The Labyrinth* (1949). His *Collected Poems*, which reveal his meditative and myth-haunted vision, appeared in 1960. The critical works *Latitudes* (1924) and *Transition* (1927) were notable for their appreciation of D.H. Lawrence.

Of greater influence than his criticism, however, were the translations of Kafka, done in collaboration with his wife, that appeared during the 1930s and established Kafka's reputation in Britain. He also translated works of Sholem Asch, Hermann Broch, and Lion Feuchtwanger. Muir's *Autobiography* was published in 1954.

Muir, John (b. April 21, 1838, Dunbar, East Lothian, Scot.—d. Dec. 24, 1914, Los Angeles), naturalist, advocate of U.S. forest conservation, who was largely responsible for the establishment of Sequoia and Yosemite national parks in California.

John Muir

By courtesy of the Library of Congress, Washington, D.C.

Muir emigrated from Scotland with his family to a farm near Portage, Wis., in 1849. After attending the University of Wisconsin, Madison, he worked on mechanical inventions, but in 1867, when an industrial accident nearly cost him an eye, he abandoned that career and devoted himself to nature. He walked from the Middle West to the Gulf of Mexico, keeping a journal (published 1916) as he went. In 1868 he went to the Yosemite Valley, California, from which he took many trips into Nevada, Utah, Oregon, Washington, and Alaska, inspired by his interest in glaciers and forests. He was the first to attribute the spectacular Yosemite formations to glacial erosion, a theory now generally accepted.

As early as 1876, Muir urged the federal government to adopt a forest conservation policy. The Sequoia and Yosemite national parks were established in 1890. Early in 1897, Pres. Grover Cleveland designated 13 national forests to be preserved from commercial exploitation; business interests induced Congress to postpone the effect of that measure, but two eloquent magazine articles (June and August 1897) by Muir swung public and Congressional opinion in favour of national forest reservations. He also influenced the large-scale conservation program that was initiated by Pres. Theodore Roosevelt, who in 1903 accompanied Muir on a camping trip to the Yosemite region.

In 1908 the government established the Muir Woods National Monument in Marin County, California.

Muir Woods National Monument, one of the two virgin stands of coastal redwoods (*Sequoia sempervirens*) in the U.S. National Park Service. The groves lie near the Pacific coast of California, U.S., 15 mi (24 km) northwest of San Francisco at the foot of Mt. Tamalpais. Some of these trees are more than 300 ft (90 m) high and 15 ft in diameter and are more than 2,000 years old. The forest, established in 1908 with an area of 503 ac (204 ha), was a gift of Congressman and Mrs. William Kent and was named in honour of John Muir (1838–1914), the advocate of U.S. forest conservation.

Muisca (people): *see* Chibcha.

Muʿizz, al-, in full AL-MUʿIZZ LI-DĪN ALLAH, original name ABŪ TAMĪM MAʿAD (b. *c.* 930—d. 975), the most powerful of the Fāṭimid caliphs, whose armies conquered Egypt and who made the newly founded al-Qāhirah, or Cairo, his capital in 972–973.

He was about 22 years of age when he succeeded his father, al-Mansur, in 953 with the title of al-Muʿizz. His authority was acknowledged over the greater part of the region now comprising Morocco, Algeria, and Tunisia, and he soon took the island of Sicily. In the years 958–959 he sent his general Jawhar westward to reduce Fès and other places where the authority of the Fāṭimid caliph had been repudiated; after a successful expedition Jawhar advanced to the Atlantic.

As early as 966 a fresh invasion of Egypt was prepared; but it was delayed, it is said, at the request of the caliph's mother, who wished to make a pilgrimage to Mecca first; and her honourable treatment by the local ruler, Kafūr, when she passed through Egypt induced the caliph to postpone the invasion until after Kafūr's death in 968. In any event, his general Jawhar succeeded where the generals of the founder of the Fāṭimid dynasty had failed, and he conquered Egypt in 969. A few years after the conquest al-Muʿizz resolved to transfer the centre of Fāṭimid power to Egypt, and he entered Cairo, the new capital founded by Jawhar just to the north of the old city of al-Fusṭāṭ, in 972 or 973, leaving behind in North Africa as surrogate his lieutenant general Yusuf ibn Ziri. (The original North African dominion became a province called al-Maghrib, or "the West.")

Under al-Muʿizz and his son al-ʿAziz (reigned 976–996) the momentum of the conquest of Egypt was sufficient to carry the Fāṭimid armies into Syria, most of which remained in their hands until the second half of the 11th century.

Muʿizz-ud-Dīn Muḥammad ibn Sām, Arabic MUʿIZZ AD-DĪN MUḤAMMAD IBN SĀM, also called MUḤAMMAD GHŪRĪ, or SHIHĀB-UD-DĪN MUḤAMMAD GHŪRĪ (d. March 15, 1206, Damyak, India), the Ghūrid conqueror of the north Indian plain; he was one of the founders of Muslim rule in India.

Muʿizz-ud-Dīn's elder brother, Ghiyāṣ-ud-Dīn, acquired power east of Herāt in the region of Ghūr (Ghowr, in present Afghanistan) *c.* 1162. Muʿizz-ud-Dīn always remained his brother's loyal subordinate. Thus Muʿizz-ud-Dīn expelled the Oğuz Turkmen nomads from Ghazna (Ghaznī) in 1173 and came as required to his brother's assistance in his contest with Khwārezm for the lordship of Khorāsān.

After Ghiyāṣ-ud-Dīn's death in 1202, the rivalry between the two powers came to a head with Muʿizz-ud-Dīn's attack in 1204 on the Khwārezmian capital, Gurganj (in present Uzbekistan). In Hindustān, Muʿizz-ud-Dīn captured Multān and Uch in 1175 and annexed the Ghaznavid principality of Lahore in 1186. After being defeated by a coalition of Rājput kings at Tarāorī (*see* Tarāorī, Battles of) in 1191, he returned the next year with an army of mounted archers and won a great victory over them on the same field, opening the way for his lieutenants to occupy most of northern India in the years that followed. Muʿizz-ud-Dīn was assassinated, according to some, by Hindu Khokars, according to others by Ismāʿīlīs. *See also* Delhi Sultanate.

mujāhadah (Arabic: "striving"), in Ṣufism, struggle with the carnal self; the word is related to *jihad* (struggle), which is often understood as "holy war." The Ṣūfīs refer to *mujāhadah* as *al-jihād al-akbar* (the greater war) in contrast to *al-jihād al-aṣghar* (the minor war), which is waged against unbelievers. It is one of the major duties that a Ṣūfī must perform throughout his mystical journey toward union with God.

All acts of penance and austerity, such as prolonged fasts and abstinence from the comforts of life, have become part of the *mujāhadah* practice. Some Ṣūfīs have gone beyond mere bodily torture to the extreme of self-immolation. Such excesses, however, are frowned upon by most Ṣūfīs. The purpose of *mujāhadah* is to conquer the temptations of the self in order to purify one's soul and bring one's soul to a state of readiness to receive the divine light.

Mujib, Sheikh (president of Bangladesh): *see* Rahman, Mujibur.

Mujica Láinez, Manuel (b. Sept. 11, 1910, Buenos Aires—d. April 21, 1984, Córdoba province, Arg.), popular Argentine writer whose novels and short stories are best known for their masterful and fascinating blend of myth and fantasy with historical figures and events.

Mujica Láinez was descended from an Argentine family that included the writers Juan Cruz Varela and Miguel Cané. He was educated in Buenos Aires, France, and England. At age 22 he returned to Buenos Aires and became a correspondent of *La Nación*, a newspaper with which he was associated as an art critic and correspondent for the remainder of his life.

His first novel, *Don Galaz de Buenos Aires* (1938), was a re-creation of city life in the 17th century. *Canto a Buenos Aires* (1943), his first literary success, is a poetic chronicle of the foundation and development of the Argentine capital. He solidified his reputation in Argentina with a series of novels known as his Buenos Aires cycle; *Los Ídolos* (1953; "The Idols"), *La Casa* (1954; "The House"), *Los Viajeros* (1955; "The Travellers"), and *Invitados en El Paraíso* (1957; "Guests at The Paradise") are an account of the decadence and dissolution of the wealthy class in Buenos Aires. *Aquí vivieron* (1949; "They Lived Here") and *Misteriosa Buenos Aires* (1950) are collections of short stories that develop some of the themes of his previous works.

His masterpiece is the novel *Bomarzo* (1962; Eng. trans., 1969), a painstaking re-creation of the life and times of Pier Francesco Orsini, one of the most powerful men of the Italian Renaissance. Mujica Láinez also wrote the libretto and program notes for the opera *Bomarzo* by Alberto Ginastera, which had its premiere in Washington, D.C., in 1967.

Rooted in Latin-American literary tradition, Mujica Láinez's novels are characterized by social satire and an ironic perspective on history. In addition to fiction, Mujica Láinez wrote biographies and critical studies of many Latin-American artists and poets. His later works include *Cecil* (1972), *El viaje de los siete demonios* (1974; "The Journey of the Seven Demons"), *El laberinto* (1974; "The Labyrinth"), *Sergio* (1976), and *El gran teatro* (1979; "The Great Theatre").

Mujur rug, any of the prayer rugs handwoven in Mucur (Mujur, or Mudjar), a village near Kırşehir in central Turkey. As have the designs of Makri rugs, the designs of Mujur prayer rugs have been likened to those on the medieval stained-glass windows of European churches.

The characteristic design in older examples, from the 19th century, is a prayer niche with a stepped arch crowned by a little turret form that is echoed in the crenellations of a narrow cross panel above. The niche is soft red and may contain a skeleton tree or be perfectly plain except for an edging of small triangular indentations. The green spandrels (spaces between the exterior curves of the arch and the enclosing right angle) display stylized ewers. The broad stripe of the border is composed of varicoloured, carefully detailed squares, reminiscent of tilework, and the soft-blue inner stripe has a diamond pattern.

Mujur prayer rug from Anatolia, 19th century; in a New York state private collection

New York state private collection; photograph, Otto E. Nelson

Mukacheve, Russian MUKACHOVO, also spelled MUKACHEVO, or MUKAČEVO, Hungarian MUNKÁCS, city, Zakarpattya *oblast* (province), western Ukraine, on the Latoritsa River. Its location controls the southern approach to a major pass across the Carpathian Mountains, today followed by road and rail. This position has given Mukacheve a key fortress role in sub-Carpathian Ruthenia since its foundation in the 10th century—mainly during its period of Hungarian rule (1018–1920). The city and its surrounding district were ceded to the Soviet Union by Czechoslovakia in 1945. Modern Mukacheve has light engineering, food-processing, and timber-working industries. It is also a significant tourist centre. Pop. (1991 est.) 88,000.

Mukai Kyorai, original name MUKAI KANETOKI, also called RAKUSHISHA (b. 1651, Nagasaki, Japan—d. Oct. 8, 1704, Kyōto), Japanese haiku poet of the early Tokugawa period (1603–1867) who was one of the first disciples of the haiku master Matsuo Bashō.

Kyorai first trained as a samurai, but at age 23 he gave up martial service and turned to the writing of poetry. In 1684 he made the acquaintance of Takarai Kikaku, a disciple of Bashō, and shortly thereafter Kyorai also became a disciple. He built a small retreat on the outskirts of Kyōto, which Bashō often used. There Bashō wrote *Saga nikki* (1691; "Saga Diary").

Kyorai helped edit two major collections of haiku by Bashō and his followers, *Arano* (1689; "Wilderness") and *Sarumino* (1691; "The Monkey's Raincoat"). After his master's death in 1694 Kyorai devoted himself to teaching haiku and to interpreting Bashō's works. He published several anthologies of his own poetry and essays that illustrated his principles, including *Kyorai shō* (1775; "Conversations with Kyorai") and *Tabine ron* (1778; "Discourses of a Weary Traveler").

Mukallā, al-, port, southeastern Yemen, on the Hadhramaut coast of the Gulf of Aden.

Harbour of al-Mukallā, on the Hadhramaut coast, Yemen

Claude Deffarge

The largest settlement and the only important port in the eastern part of the country, it is a centre of the fishing industry and has a fish-canning plant and a fish meal factory. It is also a marketplace for the interior. Fish products, tobacco, and other goods are exported, and boatbuilding is important. During the southwest monsoon (from June to September) when the town's usefulness as a port is limited, the more sheltered anchorage at Burūm, to the southwest, takes its place. A road from al-Mukallā to Aden was completed in 1977. There is an airfield to the east-northeast. Pop. (1984 est.) 59,100.

Mukammas, David al-, in full DAVID ABŪ SULAYMĀN IBN MARWĀN AR-RAQQĪ AL-MUKAMMAS, also called DAVID HA-BAVLI (fl. 900, Raqqah, Syria), Syrian philosopher and polemicist, regarded as the father of Jewish medieval philosophy.

A young convert to Christianity, al-Mukammas studied at the Syriac academy of Nisibis but became disillusioned with its doctrines and wrote two famous polemics against the Christian religion. While he is considered a Jewish scholar by both Jews and Muslims, it is not entirely clear whether al-Mukammas returned fully to Judaism. Faulting Christianity for the impurity of its monotheism, he also attacked Islām; he maintained that the style of the Qurʾān did not prove its divine origin.

Al-Mukammas was almost unknown until the late 19th century, and the details of his life remain uncertain. The publication in 1885 of a commentary included a Hebrew translation from the Arabic of a small segment of al-Mukammas' *ʿIshrūn maqālāt* ("Twenty Treatises"). Then, in 1898, 15 of the 20 "treatises" were discovered in the Imperial Library of St. Petersburg.

Al-Mukammas was the first Jewish thinker to introduce the methods of kalam (Arab religious philosophy) into Judaism and the first Jew to mention Aristotle in his writings. He cited Greek and Arab authorities, but his own Jewishness was not apparent in his writings, for he never quoted the Bible. Among the subjects presented in *ʿIshrūn maqālāt* are a proof of God's existence and his creation of the world, a discussion of the reality of science, the substantial and accidental composition of the world, the utility of prophecy and prophets, and the signs of true prophets and prophecy. Al-Mukammas also wrote on Jewish sects.

Mukden (China): *see* Shen-yang.

Mukden Incident, also called MANCHURIAN INCIDENT (1931), seizure of the Manchurian city of Mukden (now Shen-yang, China) by Japanese troops, which was followed by the Japanese invasion of all of Manchuria and the establishment of the Japanese-dominated state of Manchukuo in the area.

Throughout the early 20th century the Japanese had maintained special rights in Manchuria, and they had felt that the neutrality of the area was necessary for the defense of their colony in Korea. They were thus alarmed when their position in Manchuria was threatened by the increasingly successful unification of China in the late 1920s by Chiang Kai-shek, at the same time that Soviet pressures on Manchuria increased from the north. Responding to this pressure, officers of the Japanese Kwantung Army, which was stationed in Manchuria, initiated an incident in Mukden without the approval of the civil government of Japan.

On the night of Sept. 18, 1931, Japanese troops used the pretext of an explosion along the Japanese-controlled South Manchurian Railway to occupy Mukden. On September 21, Japanese reinforcements arrived from Korea, and the army began to expand throughout northern Manchuria. In Tokyo neither the high command of the Japanese army nor Prime Minister Wakatsuki Reijirō proved able to restrain the Kwangtung Army in the field, and within three months Japanese troops had spread throughout Manchuria. Wakatsuki's cabinet fell in December, and its successor reacted to a growing tide of public opinion by sanctioning the invasion.

The Kwantung Army met little resistance in its conquests because Chiang Kai-shek, who was intent on establishing his control over the rest of China, ordered the commander of the Chinese forces in Manchuria, Chang Hsüeh-liang, to pursue a policy of nonresistance and withdrawal. The League of Nations, Chiang announced, would determine the outcome of the case. The Lytton Commission, appointed by the League to investigate the situation, labeled Japan as the aggressor, but Japan withdrew from the League and continued to occupy Manchuria until 1945.

Mukha, Arabic AL-MUKHĀ (Yemen): *see* Mocha.

Mukhtār ibn Abū ʿUbayd at-Thaqafī, al- (b. *c.* 622, aṭ-Ṭaʾif, Arabia [now in Saudi Arabia]—d. March 687, Kūfah, Iraq), Shīʿite Muslim leader who in 686 championed the unenthusiastic Muḥammad ibn al-Ḥanafīyah, a son of ʿAlī (the fourth caliph in Islām), as leader of the Islāmic community in opposition to the Umayyad dynasty.

In his call for revolt, Mukhtār appealed to the pro-Shīʿite sentiments of Iraq's Arab tribesmen. He also rallied the *mawālī,* non-Arab (mainly Persian) Muslims of Kūfah, to his cause by preaching the imminent coming of a Mahdi, or saviour, who would wipe out ethnic and class distinctions and implant the egalitarian society of believers envisioned in the Qurʾān. His troops defeated an Umayyad army on the banks of the Khāzir River in August 686, but the following year Mukhtār was defeated and slain by the forces of the anticaliph ʿAbd Allāh ibn az-Zubayr.

As a promoter of the idea of the Mahdi and of equality of Arab and non-Arab Muslims, Mukhtār influenced the course of later Shīʿite Islām and is thus more important than his brief success as leader of an egalitarian revolutionary movement would indicate.

Muktafī, al- (d. 908), ʿAbbāsid caliph (reigned 902–908) who prosecuted wars on several fronts vigorously in a period of disintegration of the Islāmic empire.

The son of al-Muʿtaḍid, al-Muktafī ascended to the throne in 902 with somewhat more popular support than his predecessors, thanks to his liberal rule and abolition of dungeons in Baghdad. He immediately faced battle with the Qarmaṭians, a schismatic sect and political movement, and defeated them once in 903 and decisively in 907. Al-Muktafī ended the independent rule of the Ṭūlūnids in Egypt in 905. In a war against the Byzantine Empire, he defeated the general Andronicus in battles in Tarsūs and other cities. However, al-Muktafī was unable to prevent the establishment of the independent Fāṭimid dynasty in Tunisia.

mukti (Hinduism): *see* moksha.

Mula Sankara (Hindu reformer): *see* Dayananda Sarasvati.

Mūlamadhyamakakārikā (Sanskrit: "Fundamentals of the Middle Way"), Buddhist text by Nāgārjuna, the exponent of the Mādhyamika (Middle Way) school of Mahāyāna Buddhism. It is a work that combines stringent logic and religious vision in a lucid presentation of the doctrine of ultimate "emptiness."

Nāgārjuna, who was apparently a southern Indian Brahman, makes use of the classifications and analyses of the Theravāda *Abhidhamma,* or scholastic, literature; he takes them to their logical extremes and thus reduces to ontological nothingness the various elements, states, and faculties dealt with in *Abhidhamma* texts. Nāgārjuna's basic philosophy, on the other hand, comes out of the *Prajñāpāramitā* ("Perfection of Wisdom") tradition, and the *Mūlamadhyamakakārikā* systematically sets forth the vision of the void that informs the *Prajñāpāramitā-sūtra*s. In some 450 verses, the *Mūlamadhyamakakārikā* develops the doctrine that nothing, not even the Buddha or Nirvāṇa, is real in itself. It ends by commending to spiritual realization the ultimate identity of the transitory phenomenal world and Nirvāṇa itself.

Mulanje, formerly MLANJE, administrative headquarters of Mulanje District, Southern Region, Malaŵi. At the southwestern foot of Mulanje Peak, it lies on the railway to Blantyre and is the area's commercial centre. The district (1,329 sq mi [3,442 sq km]) borders Mozambique to the south and east and Lake Chilwa to the north. Intensive agriculture produces tea, pineapples, tung, and tobacco, and there is limited softwood afforestation. Industries include canning, tea packing, and tourism. Pop. (1998 prelim.) town, 12,596; district, 428,079.

Mulanje Mountains, mountains in Mulanje District, southeastern Malaŵi. They rise abruptly from the surrounding plateau in an almost rectangular syenite mass measuring 12 mi (19 km) across and overlook the Lake Chilwa–Phalombe Plain to the northeast. Mulanje Peak reaches a height of 9,848 ft (3,002 m), the highest point in Malaŵi; other peaks include Manene (8,695 ft), Chinzama (8,391 ft), and Chambe (8,385 ft). Two outliers, Mchese to the northeast and Chambe to the northwest, are both eroded ring structures. Erosional features are characteristic and include plateaus, deep narrow clefts, and craterlike hollows. The numerous mountain streams drain into the Ruo River system and Lake Chilwa. Red soils support a dense canopy of short, broad-leaved trees crowned by stands of Mulanje cedar (*Widdringtonia whytei*) at its northernmost occurrence in Africa. These trees grow on steep slopes and ravine walls and often reach heights of more than 100 ft and base diameters of 6 ft. Although access is difficult, they are an important factor in the forestry industry. Bauxite deposits occur on the plateaus, and the southern slopes support tea plantations.

Mulaydah, Battle of al- (1891), decisive victory for Ibn Rashīd, the ruler of the Rashīdī kingdom at Ḥā'il, near Jabal Shammar in Najd, northern Arabia, who defeated allies of ʿAbd ar-Raḥmān, the head of the Wahhābī (fundamentalist Islāmic) state in Najd. The battle marked the end of the second Wahhābī empire.

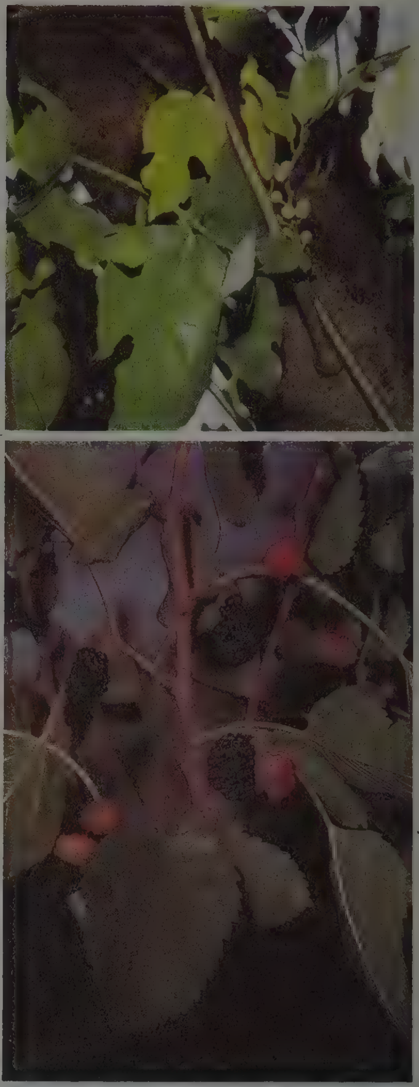
The Wahhābī prince ʿAbd Allāh lost many of the territories that his father, Fayṣal (reigned 1834–65), had acquired by conquest following the collapse of the first Wahhābī empire (1818). In 1885 ʿAbd Allāh was "invited" to Ḥā'il to be the "guest" of Ibn Rashīd, the dominant figure in Arabian politics at the time, while a representative of Ibn Rashīd was appointed governor of Riyadh, the Wahhābī capital.

Although ʿAbd Allāh was restored to the Wahhābī throne in 1889, he died the same year, and his youngest brother, ʿAbd ar-Raḥmān, soon became embroiled in hostilities with Ibn Rashīd and assembled against him an alliance of tribes in al-Qaṣīm. Ibn Rashīd promptly marched on Riyadh but, unable to take it, stationed himself in al-Mulaydah, on the edge of the ad-Dahnā' desert, where he engaged and defeated the rebellious tribesmen of al-Qaṣīm in 1891. ʿAbd ar-Raḥmān, having missed the battle, fled Riyadh with most of his family and after some difficulty was able to take refuge in Kuwait. Ibn Rashīd, meanwhile, annexed the Wahhābī realm to his own empire.

mulberry, any of several distinct small to medium-sized trees valued primarily for their ornamental effects. The common mulberries, in the genus *Morus* (family Moraceae), are 10 species, with more or less juicy fruits, native to temperate Asia and North America. Paper mulberry (*Broussonetia papyrifera*), of the same family, has red globular fruit and an inner bark that yields a fibre used in the Orient for papermaking and in Polynesia for the manufacture of a coarse fabric called tapa cloth. The beautyberry (*Callicarpa americana*), with showy violet fruits, is also called French mulberry; it is a 2-metre- (6-foot-) tall shrub in the verbena family (Verbenaceae).

A true mulberry has toothed leaves and blackberry-like fruits; each fruit develops from an entire flower cluster. The red mulberry (*Morus rubra*) of eastern North America is the largest of the genus, often reaching a height of 70 ft. It has two-lobed, three-lobed, or unlobed leaves and dark-purple, edible fruits. White mulberry (*M. alba*), native to Asia, is so called because of the white fruits it bears; its leaves are used as food for silkworms. It is naturalized in eastern North America. Several useful varieties of the white mulberry are the cold-resistant Russian mulberry (*M. alba tatarica*), introduced into western North America for shelterbelts and local timber use; and fruitless sorts such as Stribling or maple leaf. The weeping mulberry, *M. alba* 'Pendula,' is frequently used as a lawn tree. The black mulberry (*M. nigra*), a native of western Asia, spread westward in cultivation at an early period. Up to the 15th century it was extensively grown in Italy for raising silkworms, but it has since been superseded by *M. alba*. Now an introduced species in North America, it is mainly cultivated for its large, juicy, purple-black fruits, which are superior in flavour to those of *M. rubra.*

The paper mulberry is a tough fast-growing tree that tolerates city conditions; it is available in several varieties (cut-leaved, white-fruited, and variegated) that find use as hardy ornamentals and in naturalized landscapes. It may also be grown in pots or in conservatories and succeeds best in a rich, deep, and somewhat moist loam.



(Top) paper mulberry (*Broussonetia papyrifera*), (bottom) Texas mulberry (*Morus microphylla*)

(Top) Douglass David Dawn, (bottom) Werner W. Shulz

Mulcaster, Richard (b. 1530?, Cumberland?, Eng.—d. April 15, 1611, Stamford Rivers, Essex), English schoolmaster, many of whose pedagogical theories were not generally accepted until at least 250 years after his death.

He was educated at Eton, Cambridge, and Oxford. In 1561 he became the first headmaster of the Merchant-Taylors' School, later acting as high master at St. Paul's.

Mulcaster's fame rests mainly upon his two books *Positions* and *The First Part of the Elementarie.* He recommended special university training for teachers, comparable to that for doctors or lawyers, careful selection of teachers and adequate salaries, assignment of the best teachers to the lowest grades, and close association between teachers and parents. He emphasized the importance of individual differences in children, the adjustment of the curriculum to these differences, and the use of readiness rather than age in determining progress.

Mulde River, tributary of the Elbe River in east-central Germany, formed just north of Colditz by the confluence of the 63-mi- (102-km-) long Freiberger Mulde and the 80-mi Zwickauer Mulde. It flows generally northward past Grimma, Wurzen, Eilenburg, and

The Zwickauer Mulde flowing past the castle of Rochlitz, Germany

Wolfgang Krammisch—Bruce Coleman Inc.

Bitterfeld until reaching the Elbe near Dessau after a course of 77 miles (124 km).

Muldoon, Robert, in full ROBERT DAVID MULDOON (b. Sept. 25, 1921, Auckland, N.Z.—d. Aug. 5, 1992, Auckland), accountant, politician, and prime minister of New Zealand from 1975 to 1984.

After completing his secondary education, Muldoon joined the army in World War II (1940) and learned accounting, serving in the South Pacific and in Italy. Thereafter, as a successful accountant and president of the New Zealand Institute of Cost Accountants (1956), Muldoon was elected a member of Parliament (1960) and served as minister of tourism (1967), minister of finance (1967–72), deputy prime minister (1972), and leader of the opposition (1974–75). He soon led the National Party to victory and turned a 25-seat deficit into a 19-seat winning margin in the general elections of November 1975. His tenure as prime minister was plagued by an economic pattern of low growth, high inflation, growing unemployment, and high external debts and borrowing. This situation was aggravated by the country's dependence on imported oil. Muldoon responded to these conditions with generally conservative financial policies that included the flexible use of tax cuts, industrial incentives, subsidies, import duties, and other devices in an effort to fine-tune the economy and achieve balanced growth without undue inflation. In foreign policy, Muldoon was decidedly anti-Soviet in his views and reemphasized New Zealand's defense commitments to the United States and Australia under the ANZUS pact. He was succeeded as prime minister by David Lange following the Labour Party victory in 1984.

Muldoon, William, byname IRON DUKE (b. May 25, 1852, Caneadea, N.Y., U.S.—d. June 3, 1933, Purchase, N.Y.), American wrestling champion and boxing trainer.

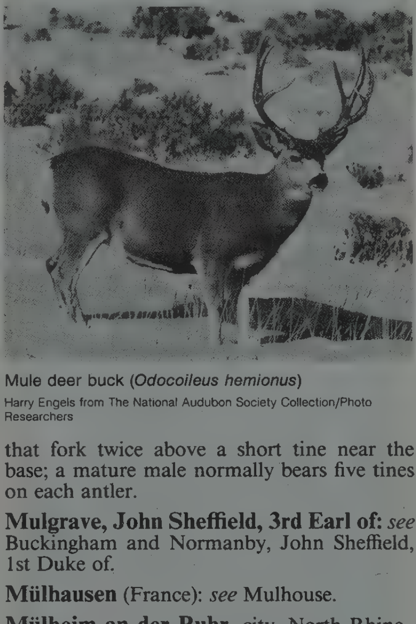
Muldoon was a policeman from 1876 to 1882, won the New York Police heavyweight title, and in 1880 the American Greco-Roman wrestling title. He became well known when he began to tour the United States as a boxing promoter and coach of John L. Sullivan. Muldoon was chairman of the New York Boxing Commission from 1921 to 1924. A proponent of strict physical conditioning, Muldoon established his notable gymnasium on East 22nd Street in New York City and later developed a training camp and health resort in White Plains, N.Y. He also invented the medicine ball. He and boxer Gene Tunney established the bronze heavyweight trophy on July 28, 1928.

mule, the hybrid offspring of a male ass (jackass, or jack) and a female horse (mare). The less-frequent cross between a female ass and a male horse results in a hinny, or hinney, which is smaller than a mule. Mules were beasts of burden in Asia Minor at least 3,000 years ago and are still used today in many parts of the world because of their ability to withstand hardships and perform work under conditions too severe for many other draft and pack animals. Mules are usually sterile.

The mule resembles the horse in height, uniformity of coat, and shape of neck and croup. It resembles the ass in its short, thick head, long ears, thin limbs, small hooves, and short mane. The coat is usually brown or bay. In size, mules range widely from about 12 to 17.5 hands (120 to 180 cm, or 50 to 70 inches) in height and from 275 to 700 kg (600 to 1,500 pounds) in weight.

mule deer (species *Odocoileus hemionus*), large-eared deer, family Cervidae (order Artiodactyla), found in western North America from Alaska to Mexico. A valued game animal, prized for its flesh, hide, and antlers, the mule deer lives alone or in small groups, sometimes gathering in larger herds in winter, in rough, mountainous terrain, and also in desert regions. The mule deer is migratory; it seeks lower altitudes during the winter months and returns to its summer pastures long after the snow has melted.

The mule deer is stockier than the related white-tailed deer (*O. virginianus*). It stands 90–105 cm (3–3.5 feet) at the shoulder and is yellowish to reddish brown in summer, grayish brown in winter. The tail is white with a black tip, except in the black-tailed deer (*O. hemionus columbianus*), a subspecies of the Pacific Northwest in which the tail is black on the entire upper surface. The male has antlers that fork twice above a short tine near the base; a mature male normally bears five tines on each antler.



Mule deer buck (*Odocoileus hemionus*)

Harry Engels from The National Audubon Society Collection/Photo Researchers

Mulgrave, John Sheffield, 3rd Earl of: *see* Buckingham and Normanby, John Sheffield, 1st Duke of.

Mülhausen (France): *see* Mulhouse.

Mülheim an der Ruhr, city, North Rhine–Westphalia *Land* (state), western Germany, just southwest of Essen, in the Ruhr industrial region. First mentioned in 1093, it was early associated with the counts von Broich, whose medieval castle still overlooks the city. It later belonged to the duchy of Berg, with which it passed to Prussia in 1814. It was chartered in 1808. Between 1878 and 1929 Mülheim absorbed a number of neighbouring towns, including Broich and Heissen. Historical buildings include St. Peter's Church (11th century, now entirely rebuilt); Styrum Castle and the former Cistercian convent of Saarn (both 13th century); and the house of Gerhard Tersteegen (d. 1769), a pious braid maker and hymn writer.

Mülheim is a hub of rail and road traffic and a Rhine-Ruhr river port. Well-planned modern sections were reconstructed after World War II, and there are many open-air recreational facilities, including the Raffelberg racecourse and spa. Heavy industry includes iron foundries, blast furnaces, tube and rolling mills, and machine works. There are also chemical and electrical industries. Mülheim was formerly an important coal-mining centre. Located in the city is the Max Planck Institute for Coal Research, where the Fischer-Tropsch process for liquefying coal and the Ziegler process for the production of polyethylene plastics were discovered. Pop. (1989 est.) 175,454.

Mulhouse, German MÜLHAUSEN, industrial town, Haut-Rhin *département,* Alsace *région,* northeastern France, located in the plain of Alsace between the Vosges and Jura mountains. Situated on the Ill River and on the Rhône au Rhin Canal, it lies 12 miles (19 km) southwest of the Rhine River and 21 miles (34 km) northwest of Basel, Switz. Mulhouse, first mentioned in the 9th century, became a free imperial city in 1308. It entered into defensive alliances with the Swiss in the 16th century. In 1798 it joined the French Republic. It passed to Germany after the Franco-German War (1871) and was reunited to France in 1918. Its most noteworthy ancient building is the 16th-century Hôtel de Ville (town hall), covered with mural paintings. A reproduction of the Klapperstein, the evil gossips' stone, hangs on the southwest facade; the original Klapperstein, now in the historical museum, is a stone weighing more than 25 pounds (12 kg), which was hung around the necks of malicious prattlers on fair days, a practice that persisted until 1781. The 19th-century Protestant Church of Saint-Étienne has its original 14th-century stained-glass windows. The restored 13th-century St. John Chapel, built by the Knights of Malta, has notable wall paintings.

In the middle of the 18th century, the textile industry developed printed calico cotton fabrics that brought a measure of prosperity to the town. Then, after 1912, exploitation of an important potash deposit brought the chemical industry and participation in the export market. Both of these early industries are now in decline, but since 1960 the metallurgical industries (machine tools, textile machinery, electrical apparatus, and others) have retrieved the city's fortunes. Parallel with this has been the development of the chemical industry (pharmaceuticals and organic chemicals, in particular). Pop. (1990) 108,357.

Mull, second largest island of the Inner Hebrides group, district of Argyll and Bute, Strathclyde region. Mull lies off the western coast of Scotland and is separated from the mainland by the Sound of Mull and the Firth of Lorn. The island is mountainous (reaching 3,169 feet [966 m] at Ben More), and its coastline is deeply indented. Granite is quarried on Mull, and the island's restricted farmland is predominantly devoted to sheep and cattle grazing. There are several ancient castles, including Aros and Duart. Tobermory, the largest settlement on Mull, was founded in 1788 as a fishing village. It is now a summer resort and the chief link with the mainland. Pop. (1981) 2,605.

Mullā Ṣadrā, also called ṢADR AD-DĪN ASH-SHĪRĀZĪ (b. *c.* 1571, Shīrāz, Iran—d. 1640, Basra, Iraq), philosopher, who led the Iranian cultural renaissance in the 17th century. The foremost representative of the illuminationist, or Ishrāqī, school of philosopher-mystics, he is commonly regarded by Iranians as the greatest philosopher their country has produced.

A scion of a notable Shīrāzī family, Mullā

Ṣadrā completed his education at Eṣfahān, then the leading cultural and intellectual centre of Iran. After his studies with scholars there, he produced several works, the most famous of which was his *Asfār* ("Journeys"). *Asfār* contains the bulk of his philosophy, which was influenced by a personal mysticism bordering on the ascetic that he experienced during a 15-year retreat at Kahak, a village near Qom, Iran.

Expounding his theory of nature, Mullā Ṣadrā argued that the entire universe—except God and his Knowledge—was originated both eternally as well as temporally. Nature, he asserted, is the substance of all things and is the cause for all movement. Thus, nature is permanent and furnishes the continuing link between the eternal and the originated.

Toward the end of his life, Mullā Ṣadrā returned to Shīrāz to teach. His teachings, however, were considered heretical by the orthodox Shīʿite theologians, who persecuted him, though his powerful family connections permitted him to continue to write. He died on a pilgrimage to Arabia.

mullah, Arabic MAWLĀ, or MAWLĀY ("protector"), French MŪLĀY, or MOULAY, a Muslim title generally denoting "lord"; it is used in various parts of the Islāmic world as an honorific attached to the name of a king, sultan, or other noble (as in Morocco and other parts of North Africa) or of a scholar or religious leader (as in parts of the Middle East and the Indian subcontinent). The term appears in the Qurʾān in reference to Allāh, the "Lord" or "Master," and thus came to be applied to earthly lords to whom religious sanctity was attributed.

The most common application of the title mullah is to religious leaders, teachers in religious schools, those versed in the canon law, leaders of prayer in the mosques (imams), or reciters of the Qurʾān (*qurrāʾ*). There are no formal requirements for acquisition of the title, but normally persons called by it have had some training in a madrasah, or religious school. The word is often used to designate the entire class that upholds the traditional interpretation of Islām.

mullein, any of the 250 to 300 species of the genus *Verbascum* (family Scrophulariaceae, *q.v.*), large biennial or perennial herbs native to northern temperate regions, especially eastern Eurasia. The common mullein (*V. thapsus*) grows 0.6 to 2 m (2 to 7 feet) tall, has a single, unbranched stem with large, thick, densely velvety leaves, and has pale-yellow, slightly irregular flowers about one inch across in a crowded terminal spike.

Mullein (*Verbascum thapsus*)
G.J. Chafaris—EB Inc.

Mulleins are often troublesome weeds in pastures and are common in disturbed areas and along roadsides, but they have also found some uses in the garden. The flowers of the different species vary in colour from white to blue, purple, and red.

muller, in painting, an instrument used in conjunction with a slab to grind artists' colours by hand. The modern muller and slab are made from glass, although from ancient Egyptian times until the 18th century porphyry was invariably used. After the introduction of the mechanical paint mill in the middle of the 19th century, the muller and slab became obsolete except when small quantities of pigment had to be ground.

Müller, Erwin Wilhelm (b. June 13, 1911, Berlin—d. May 17, 1977, Washington, D.C.), German-U.S. physicist who originated field emission microscopy. Besides working on solid surface phenomena and gas discharge, Müller studied field electron and field ion emissions, inventing the field emission microscope (1937) and the field ion microscope (1956), which for the first time made it possible to take pictures of individual atoms.

A research physicist for certain German firms (1935–45), he joined the Kaiser Wilhelm Institute for Physical Chemistry in Göttingen and then the Free University of Berlin. He finally (1951) went to the United States, becoming professor of physics at Pennsylvania State University, where he taught until his retirement in 1976. He became a naturalized U.S. citizen in 1962.

Müller, Friedrich, byname MALER ("Painter") MÜLLER (b. Jan. 13, 1749, Kreuznach, Palatinate—d. April 23, 1825, Rome), German poet, dramatist, and painter who is best known for his slightly sentimental prose idylls on country life.

After studying painting at Zweibrücken, Müller was appointed court painter at Mannheim (1777) but left the next year for Italy. He abandoned painting soon after his arrival and devoted himself to the history of art. He remained in Italy until his death.

The years 1774–78 were primarily devoted to literature, and his writing shows the influence of the Sturm und Drang movement of young literary rebels. His principal works include *Niobe* (1778), a lyric drama; *Fausts Leben dramatisiert* (1778); *Golo und Genoveva* (begun 1776; published 1811), a skillful imitation of Goethe's *Götz von Berlichingen;* and the idylls *Die Schafschur* (1775) and *Das Nusskernen* (1811), reproducing scenes, some satirical, from German peasant life.

Müller, Georg Elias (b. July 20, 1850, Grimma, Saxony—d. Dec. 23, 1934, Göttingen, Ger.), German psychologist who, as director of one of the major centres of psychological research at the University of Göttingen (1881–1921), contributed to the advancement of knowledge of sensations, memory, learning, and colour vision.

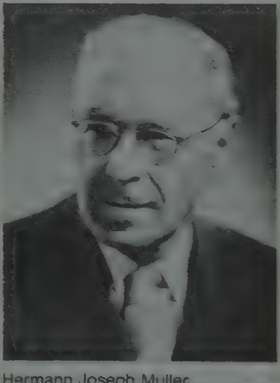
Müller received a Ph.D. from Göttingen (1873) for his basic analysis of sensory attention. He was appointed *Privatdozent,* or lecturer, at Göttingen in 1876 and wrote *Toward a Foundation of Psychophysics* (1878), in which he dealt primarily with Weber's law concerning the stimulus–sensory intensity relationship. Initially he concerned himself mainly with perceptual thresholds. A noteworthy outcome was the knowledge that day-to-day fluctuations in individual thresholds are the result of individual variations in sensitivity. His papers on the sensory discrimination of weights (1899), revealing the effect of anticipation on discrimination, may also be viewed as one of the early experimental studies of attitude.

By the mid-1890s Müller began extending the pioneer efforts of the psychologist Hermann Ebbinghaus on memory and learning and also began exploring the stimulus–response relation in vision. He made a thorough analysis of Ebbinghaus' methods and began to distinguish the active processes, such as conscious organization, in learning. He maintained that learning is not mechanical and is not accounted for by contiguous associations. He also suggested that there is an active effort to find relations and that judgment involves such components as anticipated sensations and feelings, as well as doubt, hesitation, and readiness. In his work on colour vision he suggested that the brain adds a gray to retinally induced colours. Though these principles were later partly adopted by Gestalt psychology, Müller declared his opposition to the Gestalt approach in 1923. His *Outline of Psychology* (1924) was among his final works.

Müller, Hermann (b. May 18, 1876, Mannheim, Ger.—d. March 20, 1931, Berlin), statesman and leader of the German Social Democratic Party (SPD) who was twice chancellor of coalition governments during the Weimar Republic. Unable to avert the disastrous effects of the Great Depression on Germany in 1929, he was forced to resign his second chancellorship.

Of middle-class origin, Müller became editor of the Social Democratic paper *Görlitzer Zeitung* in 1889. He was elected to the executive committee of the SPD in 1906, where he steered a moderate course between the left and right wings. In July 1914 he was sent on an abortive mission to France to coordinate Socialist opposition to the impending World War I. Müller became a member of the Reichstag (federal lower house) in 1916 and, after the revolution of November 1918, entered the new provisional government. As foreign minister he signed the Treaty of Versailles for Germany. After the failure of the Kapp Putsch (March 1920), he assumed office as chancellor until the June 1920 elections. From 1920 on, Müller headed his party. After the success of the Social Democrats in the 1928 elections, he formed a coalition government with the moderate parties. Under his administration, Germany began a naval construction program and negotiated the Young Plan, which reduced the reparations payments stipulated by the Treaty of Versailles. The advent of the Depression, however, led to the breakup of the coalition, and Müller, whose party wished to increase unemployment benefits for the workers, was forced to resign on March 27, 1930.

Muller, Hermann Joseph (b. Dec. 21, 1890, New York City—d. April 5, 1967, Indianapolis, Ind., U.S.), American geneticist best remembered for his demonstration that mutations and hereditary changes can be caused by X rays striking the genes and chromosomes of living cells. His discovery of artificially induced mutations in genes had far-reaching



Hermann Joseph Muller
By courtesy of Indiana University, Bloomington

consequences, and he was awarded the Nobel Prize for Physiology or Medicine in 1946.

Muller attended Columbia University from 1907 to 1909. At Columbia his interest in genetics was fired first by E.B. Wilson, the founder of the cellular approach to heredity, and later by T.H. Morgan, who had just introduced the fruit fly *Drosophila* as a tool in experimental genetics. The possibility of consciously guiding the evolution of man was the initial motive in Muller's scientific work and social attitudes. His early experience at Columbia convinced him that the first necessary prerequisite was a better understanding of the processes of heredity and variation.

A laboratory assistantship in zoology in 1912 allowed him to spend part of his time doing research on *Drosophila* at Columbia. He produced a series of papers, now classic, on the mechanism of crossing-over of genes, obtaining his Ph.D. in 1916. His dissertation established the principle of the linear linkage of genes in heredity. The work of the *Drosophila* group, headed by Morgan, was summarized in 1915 in the book *The Mechanism of Mendelian Heredity*. This book is a cornerstone of classical genetics.

After three years at the Rice Institute, Houston, Texas, and an interlude at Columbia as instructor, Muller in 1920 became associate professor (later professor) at the University of Texas, Austin, where he remained until 1932. The 12 years that he spent at Austin were scientifically the most productive in Muller's life. His studies of the processes and frequencies of mutations enabled Muller to form a picture of the arrangements and recombinations of genes and later led to his experimental induction of genetic mutations through the use of X rays in 1926. This highly original discovery established his international reputation as a geneticist and eventually won him the Nobel Prize. At this time Muller was able to demonstrate that mutations are the result of breakages in chromosomes and of changes in individual genes. In 1931 he was elected to the U.S. National Academy of Sciences.

After undergoing a nervous breakdown in 1932 due to personal pressures, Muller spent one year at the Kaiser Wilhelm Institute in Berlin, where he investigated various physical models for explaining mutations in genes. In 1933 he moved to Leningrad and then to Moscow at the invitation of N.I. Vavilov, head of the Institute of Genetics there. Muller was a Socialist, and he initially viewed the Soviet Union as a progressive, experimental society that could pursue important research in genetics and eugenics. But by this time the false doctrines of the biologist T.D. Lysenko were becoming politically powerful, bringing to an end valid Soviet scientific research in genetics.

Muller fought Lysenkoism whenever possible, but he ultimately had to leave the Soviet Union in 1937. He spent three years at the Institute of Animal Genetics in Edinburgh, returning to the United States in August 1940. On returning to the United States, Muller obtained temporary positions at Amherst College, Massachusetts (1941–45), and, finally, a professorship in zoology (1945–67) at Indiana University, Bloomington.

The award of the Nobel Prize to Muller in 1946 increased his opportunities to publicize one of his major concerns—the dangers posed by accumulating spontaneous mutations in the human gene pool as a result of industrial processes and radiation. He was foremost in promoting public awareness of the dangers of radiation to future generations. He also became more actively involved in discussions on the relaxed processes of natural selection operating in modern society, and he made a controversial suggestion that the sperm of gifted men be frozen and preserved as part of a purposeful program of eugenics for future generations.

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A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Müller, Johann (German mathematician and astronomer): *see* Regiomontanus.

Müller, Johannes Peter (b. July 14, 1801, Koblenz, Fr. [of the Consulate]—d. April 28, 1858, Berlin), German physiologist and comparative anatomist, one of the great natural philosophers of the 19th century. His major work was *Handbuch der Physiologie des Menschen für Vorlesungen*, 2 vol. (1834–40; *Elements of Physiology*).

Müller was the son of a shoemaker. In 1819 he entered the University of Bonn, where the faculty of medicine was permeated with a naturalistic romanticism, which the young Müller eagerly espoused. His thesis *Über die Bewegungsgesetze der Tiere* (1822; "On the Laws of Movement of Animals") was written in the naturalistic manner. He continued his studies at the University of Berlin, where he came under the influence of the sober, precise anatomist Karl Rudolphi and thereby freed himself from naturalistic speculation.

In 1824 he was granted a lectureship in physiology and comparative anatomy at the University of Bonn. In his inaugural lecture, "Physiology, a science in need of a philosophical view of nature," he outlined his approach to science, maintaining that the physiologist must combine empirically established facts with philosophical thinking. Two years later he was appointed associate professor, and in 1830 he became a full professor.

In the meantime, his voluminous *Zur vergleichenden Physiologie des Gesichtssinnes . . .* (1826; "Comparative Physiology of the Visual Sense . . .") brought Müller to the attention of scholars by its wealth of new material on human and animal vision; he included the results of analyses of human expressions and research on the compound eyes of insects and crustaceans. His most important achievement, however, was the discovery that each of the sense organs responds to different kinds of stimuli in its own particular way or, as Müller wrote, with its own specific energy. The phenomena of the external world are perceived, therefore, only by the changes they produce in sensory systems. His findings had an impact even on the theory of knowledge.

Müller's monograph "On Imaginary Apparitions" was also published in 1826. According to this theory the eye as a sensory system not only reacts to external optical stimuli but can also be excited by internal stimuli generated by the imagination. Thus, persons who report seeing religious visions, ghosts, or phantoms may actually be experiencing optical sensations and believe them to be of external origin, even though they do not in fact have an adequate external stimulus.

Because of his research Müller became the best known figure on the Bonn faculty of medicine. Maintaining an almost incredible level of output, he examined many problems in physiology, evolution, and comparative anatomy. He studied the passage of impulses from afferent nerves (going to the brain and spinal cord) to efferent nerves (going away from the same centres), further elucidating the concept of reflex action. By careful experiments on live frogs, he confirmed the law named after Charles Bell and François Magendie, according to which the anterior roots of the nerves originating from the spinal cord are motor and the posterior roots are sensory. He investigated the nervous system of lower animal species, the intricate structure of glands, and the process of secretion. When tracing the development of the genitalia, he discovered what is now known as the Müllerian duct, which forms the female internal sexual organs. He contributed to knowledge of the composition of the blood and lymph, the process of coagulation, the structure of lymph hearts of frogs, the formation of images on the retina of the eye, and the propagation of sound in the middle ear.

In 1833 Müller was called to Berlin to succeed Rudolphi. In his new post he again carefully explored many problems concerning animal function and structure. His early years in Berlin were devoted mainly to physiology. His *Handbuch der Physiologie des Menschen für Vorlesungen* was recognized throughout the world and established a beneficial interchange between physiology and hospital practice in Germany. It stimulated further basic research and became a starting point for the mechanistic concept of life processes, which was widely accepted in the second half of the 19th century.

Inspired by the vast Berlin anatomical collection, Müller became interested again in pathology. After the demonstration by his assistant, Theodor Schwann, that the cell was the basic unit of structure in the animal body, he concentrated on the cellular structure of tumours with the aid of a microscope. In 1838 his work *Über den feineren Bau und die Formen der krankhaften Geschwülste* (*On the Nature and Structural Characteristics of Cancer, and of Those Morbid Growths Which May Be Confounded with It*) began to establish pathological histology as an independent branch of science. Müller also distinguished himself as a teacher. His students included the renowned physiologist and physicist Hermann Helmholtz and the cellular pathologist Rudolf Virchow.

Beginning in 1840 Müller increasingly focused his research on comparative anatomy and zoology, in so doing becoming one of the most respected scholars in these subjects. He was a master at collecting and classifying specimens; he devised an improved classification of fish and, based on an ingenious analysis of vocal organs, did the same for singing birds. For several years he concentrated on the lowest forms of marine vertebrates, the Cyclostomata and Chondrichthyes. He painstakingly described the structures and complex development of members of various classes of the invertebrate phylum Echinodermata. His last research activities were concerned with the marine protozoans Radiolaria and Foraminifera.

In 1827, 1840, and 1848, Müller suffered periods of depression that rendered him incapable of working for months on end. They may perhaps be attributed—as his periods of explosive productivity—to a manic-depressive disposition. It may also be regarded as the cause of his death in 1858. Some scholars have assumed that he died by his own hand. (J.Ste.)

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Müller, Johannes von (b. Jan. 3, 1752, Schaffhausen, Switz.—d. May 29, 1809, Kassel, Westphalia [Germany]), Swiss scholar and public official who was the most important Swiss historian of the 18th century.

Müller's life was marked by the tension between his work as a scholar and his activity as a diplomat and political journalist at the court of the archbishop of Mainz (1786–92) and in the imperial chancery at Vienna (1793–98). In the last years of his life he entered the service of Napoleon as director of education for the kingdom of Westphalia, and his posthumous reputation was long clouded by what was unjustly interpreted as a betrayal of the idea of freedom.

His most important work was *Geschichten Schweizerischer Eidgenossenschaft* (1786–1808; "History of the Swiss Confederation"). In it he combined a comprehensive knowledge of chronicle sources (especially Aegidius Tschudi) with a terse elegance that earned him the title of the Swiss Tacitus; Tacitus, the 1st-century-AD Roman historian, was indeed his model. His idealistic and patriotic picture of the ancient Swiss constitution profoundly influenced the 19th-century European view of Switzerland. (Among other things, it was the source for Friedrich Schiller's *Wilhelm Tell.*) Müller's attempt at universal history, the *24 Bücher allgemeiner Geschichten* (1810 *et seq.; The History of the World*), is indebted to the historical outlook of the Enlightenment but points forward to Leopold von Ranke in its religious conception. In *Fürstenbund* (1787; "League of Princes") and *Reisen der Päpste* (1782; "Travels of the Popes"), which are political journalism, Müller appears as an important theorist of the European balance of power.

Müller tried to unite the spiritual heritage of Rome with the German origins of his own civilization. The classics and Christianity went to make up this remarkably gifted personality whom German classicism—J.G. von Herder, Goethe, and Schiller—claimed as its own historian.

Müller, Karl Alex(ander) (b. April 20, 1927, Basel, Switz.), Swiss physicist who, along with J. Georg Bednorz, was awarded the 1987 Nobel Prize for Physics for their joint discovery of superconductivity in certain substances at higher temperatures than had previously been thought attainable.

Müller received the Ph.D. degree from the Swiss Federal Institute of Technology in 1958, and beginning in 1963 he performed research in solid-state physics at the IBM Zürich Research Laboratory, heading the physics department there for several years and becoming an IBM fellow in 1982.

A specialist in the ceramic compounds known as oxides, Müller in the early 1980s began searching for substances that would become superconductive (*i.e.,* conduct electricity with no resistance) at higher temperatures than had theretofore been obtained. The highest transition temperature (the temperature below which a material loses all electrical resistance) attainable at that time was about 23 K (−250° C [−418° F]). In 1983 Müller recruited Bednorz to help him systematically test various oxides, materials which a few recent studies had indicated might be suitable for superconductivity. In 1986 the two men succeeded in achieving superconductivity in a recently developed barium-lanthanum-copper oxide at a temperature of 35 K (−238° C [−396° F]), 12 K higher than had previously been achieved. Their discovery immediately prompted a wave of renewed superconductivity experiments by other scientists worldwide, this time using oxides, and within a year transition temperatures approaching 100 K (−173° C [−280° F]) had been achieved. The intense research generated by Müller's and Bednorz's discovery raised the prospect that superconductivity could be achieved at temperatures high enough for the generation and transmission of electric power, a feat that would have important economic implications.

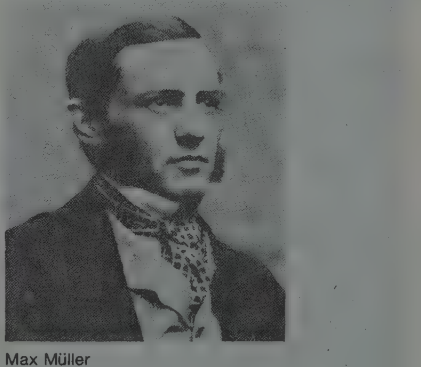
Consult the INDEX *first*

Müller, Karl Otfried (b. Aug. 28, 1797, Brieg, Silesia [now in Poland]—d. Aug. 1, 1840, Athens), German professor and scholar of classical Greek studies whose considerations of ancient Greece in a broad historical and cultural context began an important era in the development of Hellenic scholarship.

Müller was a pupil of August Boeckh, founder of a famous school of philology. His first published work, *Aegineticorum liber* (1817; "On the Isle of Aegina"), was of such brilliance that within two years he was made adjunct professor of ancient literature at the University of Göttingen (1819), where he lectured on archaeology and the history of ancient art. His most important work, *Geschichten hellenischer Stämme und Städte* (1820; "History of Greek Peoples and Cities"), provides a cultural history of the civilizations of ancient Greece and emphasizes the study of myths, successfully combining the historical and allegorical methods. His other works include numerous archaeological papers, historical surveys on the Dorians and Etruscans, and valuable methodological studies. Among the more noteworthy are his *Prolegomena zu einer wissenschaftlichen Mythologie* (1825; "Prolegomena to a Scientific Mythology"), which prepared the way for the scientific investigation of myths, and his edition of Aeschylus' *Eumenides* (1833), in which he attacks the prevalent philological criticisms of the classics. As political troubles made his position at Göttingen difficult, Müller left Germany for archaeological visits in Greece, where he succumbed to fever.

Müller, Lucas (painter): *see* Cranach, Lucas.

Müller, (Friedrich) Max (b. Dec. 6, 1823, Dessau, duchy of Anhalt [Germany]—d. Oct. 28, 1900, Oxford, Eng.), German Orientalist and language scholar whose works stimulated widespread interest in the study of linguistics, mythology, and religion. His principal achievement was the editing of *The Sacred Books of the East,* 51 vol. (1879–1904).



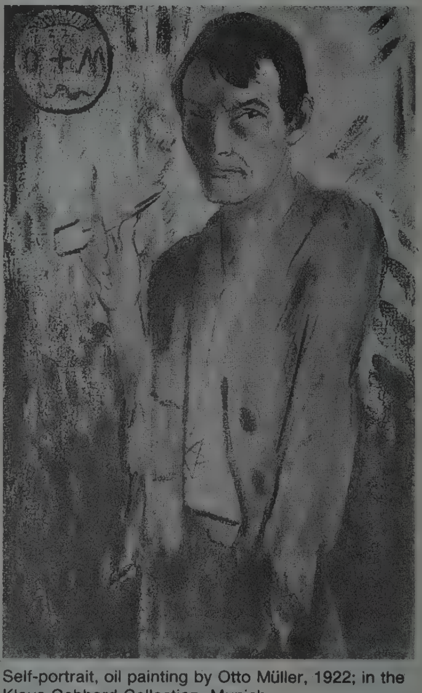
Max Müller

By courtesy of the Curator of the Senior Common Room, Christ Church, Oxford

Originally a student of Sanskrit, Müller turned to comparative language studies, and around 1845 he began studying the Avesta, the Zoroastrian sacred scripture written in Old Iranian. This interest led him to the study of comparative religion and to the editing of the most ancient of Hindu sacred hymns, the Rigveda, which was published after he had settled at the University of Oxford (1849–75). There he was appointed deputy professor of modern languages (1850) and professor of comparative philology (1868). While at Oxford he sought to popularize comparative studies of Indo-European language.

Müller's essays on mythology are among his most appealing writings. His exploration of mythology also led him further into comparative religion and to the publication of *The Sacred Books of the East,* begun in 1875. Of the 51 volumes, including indexes, of translations of major Oriental, non-Christian scriptures, all but three appeared under his superintendence during his lifetime. In his later years, Müller also wrote on Indian philosophy and encouraged the search for Oriental manuscripts and inscriptions. Among such discoveries were early Indian Buddhist scriptures written in Japan.

Müller, Otto (b. 1874, Liebau, Ger.—d. Sept. 24, 1930, Breslau, Ger.), German painter and printmaker who became a member of the Expressionist movement. He is especially known for his characteristic paintings of nudes and gypsy women.



Self-portrait, oil painting by Otto Müller, 1922; in the Klaus Gebhard Collection, Munich

By courtesy of Klaus Gebhard; permission S.P.A.D.E.M. 1973 by French Reproduction Rights, Inc.; photograph, Gertrud Bingel

When, in 1910, he joined Die Brücke, a Dresden-based group of Expressionist artists, his work still displayed the early influence of the curvilinear art of Jugendstil, the German Art Nouveau movement. But his radically elongated figures reveal his affinity for the work of the Expressionist sculptor Wilhelm Lehmbruck. He taught at the Breslau Academy from 1919 until his death. Like the work of many other modern German artists, his was declared "decadent" when the Nazis gained power in Germany in 1933.

Müller, Paul Hermann (b. Jan. 12, 1899, Olten, Switz.—d. Oct. 12, 1965, Basel), Swiss chemist who received the Nobel Prize for Physiology or Medicine in 1948 for discovering the potent toxic effects on insects of DDT—with its chemical derivatives, the most widely used insecticide for more than 20 years and a major factor in increased world food production and the suppression of insect-borne diseases.

A research chemist at the J.R. Geigy Company, Basel (1925–65), Müller began his career with investigations of dyes and tanning agents.

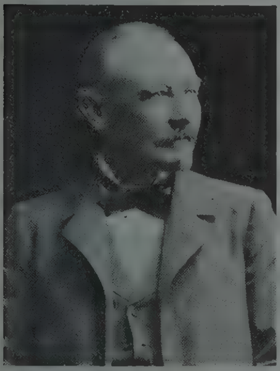
Paul Müller
EB Inc.

In 1935 he began his search for an "ideal" insecticide, one that would show rapid, potent toxicity for the greatest number of insect species but would cause little or no damage to plants and warm-blooded animals. He also required that it have a high degree of chemical stability, so that its effect would persist for long periods of time and its manufacture would be economical. Four years later Müller synthesized and tested a substance known as dichlorodiphenyltrichloroethane (DDT) and found that it satisfied these requirements. The German chemist Othmar Zeidler had first synthesized the compound in 1874 but had failed to realize its value as an insecticide.

In 1939 DDT was tested successfully against the Colorado potato beetle by the Swiss government and by the U.S. Department of Agriculture in 1943. In January 1944 DDT was used to quash an outbreak of typhus carried by lice in Naples, the first time a winter typhus epidemic had been stopped.

Although Müller had required his ideal insecticide to be relatively nontoxic to warm-blooded animals, the widespread use and persistence of DDT (in 1968 it was estimated that 1,000,000,000 pounds [453,000,000 kg] of the substance remained in the environment) made it a hazard to animal life, and it showed signs of disrupting ecological food chains. By 1970 DDT was rapidly being supplanted by more quickly degraded, less toxic agents; its use was banned in a number of countries.

Müller, Sophus Otto (b. May 24, 1846, Copenhagen, Den.—d. Feb. 23, 1934, Copenhagen), Danish paleontologist who, during the late 19th century, discovered the first of the Neolithic battle-ax cultures in Denmark.



Sophus Müller
By courtesy of the Royal Danish Embassy, London

Assistant (1878) and inspector (1885) at the Museum of National Antiquities, Copenhagen, Müller became codirector of the Danish prehistoric and ethnographic collections at the National Museum, Copenhagen, when it was established in 1892. His discovery in central Jutland of single burial graves enclosed within barrows (burial mounds) was the first evidence of the later Middle Neolithic Periods in Scandinavia. Excavations uncovered chronological sequences of graves containing well-proportioned battle-axes, flint axes, amber beads, beakers, and cups.

Müller developed new techniques of excavation and monument preservation and supported the principle of the influence of Mediterranean civilization on northern Europe. His writings include *Vor oldtid* (1897; "Our Antiquity"), *Ordning af danmarks oldsager,* 3 vol. (1888–95; "System of Danish Antiquities"), and *Oldtidens kunst i danmark,* 3 vol. (1918–33; "Ancient Art of Denmark").

Müllerian mimicry, a form of biological resemblance in which two or more unrelated noxious, or dangerous, organisms exhibit closely similar warning systems, such as the same pattern of bright colours. According to the widely accepted theory advanced in 1878 by the German naturalist Fritz Müller, this resemblance, although differing from the better-known Batesian mimicry (in which one organism is not noxious), should be considered mimicry nonetheless, because a predator that has learned to avoid an organism with a given warning system will avoid all similar organisms, thus making the resemblance a protective mechanism.

mullet, any of the abundant, commercially valuable schooling fishes of the family Mugilidae (order Perciformes). Mullets number fewer than 100 species and are found throughout tropical and temperate regions.

They generally inhabit salt water or brackish water and frequent shallow, inshore areas, commonly grubbing about in the sand or mud for microscopic plants, small animals, and other food. They are silvery fishes 30–90 cm (1–3 feet) long, with large scales; relatively stocky, cigar-shaped bodies; forked tails; and two distinct dorsal fins, the first containing four stiff spines. Many have strong, gizzard-like stomachs and long intestines capable of handling a largely vegetarian diet.

The common, or striped, mullet (*Mugil cephalus*), cultivated in some areas because of its rapid growth rate, is a well-known species found worldwide. The red surmullet, also called red mullet, is an unrelated species of the goatfish family.

Mullett, Alfred B., in full ALFRED BULT MULLETT (b. April 7, 1834, Taunton, Somerset, Eng.—d. Oct. 20, 1890, Washington, D.C., U.S.), British-born American architect best known as the designer of the State, War, and Navy Building (1871–89; now the Old Executive Office Building) in Washington, D.C.

Mullett's family immigrated to the United States in 1845. He studied there and in Europe. From 1866 to 1874 he was the supervising architect of the U.S. Department of the Treasury, responsible for the design and construction of all federal projects.

The State, War, and Navy Building is Mullett's principal achievement. A massive structure in the Second Empire style, it was the largest office building in the world when completed. Steep mansard roofs with projecting dormers crown the building; the elaborate facade—no area is unadorned—is covered with classical details, including some 900 Doric columns. Within, there are cantilevered stairways at each corner and two libraries with intricate designs in cast iron. Historian Henry Adams called it Mullett's "architectural infant asylum," but it remains one of Washington's best-loved buildings.

Mullett worked in a variety of styles, including Second Empire, Greek Revival, and Italian Renaissance. His nine-story Sun Building (1885–86) in Washington, D.C., can be regarded as one of the first skyscrapers because of its slim, elongated vertical form.

Mulligan, Gerry, byname of GERALD JOSEPH MULLIGAN (b. April 6, 1927, Queens Village, Long Island, N.Y., U.S.—d. Jan. 20, 1996, Darien, Conn.), American baritone saxophonist, arranger, and composer noted for his role in popularizing "cool" jazz—a delicate, dry, understated approach to jazz style.

Mulligan showed strong musical instincts from his early youth. He played piano and wind instruments with a number of small musical ensembles throughout his school years. Leaving school in 1944, he worked with a number of bands, most notably with Gene Krupa's big band (1946), as an arranger. Shortly after that, Mulligan became involved in a movement to develop a different style of jazz, known as cool jazz. He also had begun to specialize in baritone saxophone and to perform live and on recordings with groups led by such musicians as Miles Davis, Kai Winding, Elliot Lawrence, and Claude Thornhill. In 1952 Mulligan formed his own quartet, which included Chet Baker on trumpet. The group, notable for its lack of a pianist, brought international acclaim to both Baker and Mulligan. During the following decades Mulligan continued to work as a freelance arranger, formed groups varying in size from four to 20 (including the 13-piece Concert Jazz Band of the 1960s), and played throughout Europe and the United States and in Japan. He is considered to be a versatile musician, equally comfortable with many styles of jazz, and one of the more important baritone saxophonists in the jazz idiom.

Mulligan River, intermittent stream in east-central Australia. Rising in the Toko Range, Queensland, it flows southeast past Barrington Peak on the west. It widens into a dry salt bed with artesian wells on its route before merging with Eyre Creek near Muncoonie Lake salt beds. Upon crossing the South Australian border and emptying into Goyder Lagoon, it completes its course of 700 miles (1,100 km). In 1876 Mulligan River was named by William Oswald Hodgkinson for the explorer and prospector James Venture Mulligan. The river crosses the pastoral Channel Country.

Mulliken, Robert Sanderson (b. June 7, 1896, Newburyport, Mass., U.S.—d. Oct. 31, 1986, Arlington, Va.), American chemist and physicist who received the 1966 Nobel Prize for Chemistry for "fundamental work concerning chemical bonds and the electronic structure of molecules."

A graduate of Massachusetts Institute of Technology, Cambridge, Mulliken worked, during World War I and for a few years afterward, in government chemical research, and then he studied under the physicist Robert A. Millikan at the University of Chicago, receiving his Ph.D. in 1921. He taught at New York University (1926–28) and then joined the faculty of the University of Chicago (1928–85).

Mulliken began working on his theory of molecular structure in the 1920s. He theoretically systematized the electron states of molecules in terms of molecular orbitals. Departing from the idea that electron orbitals for atoms are static and that atoms combine

Mulliken, 1966
By courtesy of the Nobel Foundation, Stockholm

like building blocks to form molecules, he proposed that, when molecules are formed, the atoms' original electron configurations are changed into an overall molecular configuration. Further extending his theory, he developed (1952) a quantum-mechanical theory of the behaviour of electron orbitals as different atoms merge to form molecules.

During World War II Mulliken worked on the Plutonium Project, part of the development of the atomic bomb, at the University of Chicago. In 1955 he served as scientific attaché at the U.S. embassy in London.

Mullis, Kary B., in full KARY BANKS MULLIS (b. Dec. 28, 1944, Lenoir, N.C., U.S.), American biochemist, cowinner of the 1993 Nobel Prize for Chemistry for his invention of the polymerase chain reaction (PCR), a simple technique that allows a specific stretch of DNA to be copied billions of times in a few hours.

After receiving a doctorate in biochemistry from the University of California, Berkeley, in 1973, Mullis held research posts at various universities. In 1979 he joined Cetus Corp., a California biotechnology firm, where he carried out his prize-winning research. From 1986 to 1988 he was director of molecular biology for Xytronyx, Inc., in San Diego, Calif.; thereafter he worked as a freelance consultant.

Mullis developed PCR in 1983. Earlier methods for obtaining a specific sequence of DNA in quantities sufficient for study were difficult, time-consuming, and expensive. PCR uses four ingredients: the double-stranded DNA segment to be copied, called the template DNA; two oligonucleotide primers (short segments of single-stranded DNA, each of which is complementary to a short sequence on one of the strands of the template DNA); nucleotides, the chemical building blocks that make up DNA; and a polymerase enzyme that copies the template DNA by joining the free nucleotides in the correct order. These ingredients are heated, causing the template DNA to separate into two strands. The mixture is cooled, allowing the primers to attach themselves to the complementary sites on the template strands. The polymerase is then able to begin copying the template strands by adding nucleotides onto the end of the primers, producing two molecules of double-stranded DNA. Repeating this cycle increases the amount of DNA exponentially: some 30 cycles, each lasting only a few minutes, will produce more than a billion copies of the original DNA sequence.

PCR has extremely wide applications. In medical diagnostics the technique made it possible to identify the causative agent of a bacterial or viral infection directly from a very small sample of genetic material; it was also used to screen patients for genetic disorders such as sickle cell anemia and Huntington's chorea. Evolutionary biologists employed PCR to study minute amounts of DNA extracted from the fossil remains of ancient species, and forensic scientists used it to identify crime suspects or victims from traces of blood, semen, or strands of hair left at a crime scene. The technique was also an important tool in gene sequencing.

mullite, any of a type of rare mineral consisting of aluminum silicate ($3Al_2O_3 \cdot 2SiO_2$). It is formed upon firing aluminosilicate raw materials and is the most important constituent of ceramic whiteware, porcelains, and high-temperature insulating and refractory materials. Compositions, such as mullite, having an alumina-silica ratio of at least 3:2 will not melt below 1,810° C (3,290° F), whereas those with a lower ratio partially melt at temperatures as low as 1,545° C (2,813° F).

Natural mullite was discovered as white, elongated crystals on the Island of Mull, Inner Hebrides, Scot. It has been recognized only in fused argillaceous (clayey) enclosures in intrusive igneous rocks, a circumstance that suggests very high temperatures of formation. For mineralogic properties, *see* silicate mineral (table).

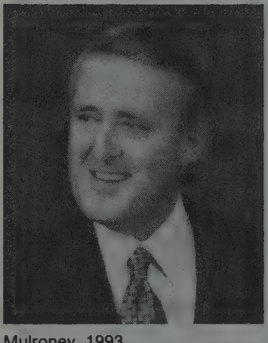
Mulroney, Brian, in full MARTIN BRIAN MULRONEY (b. March 20, 1939, Baie-Comeau, Que., Can.), Canadian politician, leader of the Progressive Conservative Party of Canada (1983–93), and prime minister of Canada from 1984 to 1993.

Born the son of an electrician in a paper-and-pulp town northeast of Quebec city, Mulroney grew up bilingual in English and French and received a B.A. (1959) from Saint Francis Xavier University, Antigonish, N.S., and a law degree (1962) from Laval University, Quebec city. In 1965 he began practicing law in Montreal, becoming a labour specialist. In 1974 he gained local celebrity as a member of the royal Cliche Commission investigating crime in Quebec's construction industry. Always active in politics, he made a bid in 1976 for the leadership of the Progressive Conservatives but lost to Joe Clark. In 1977 he was chosen president of the Iron Ore Co. of Canada.

When Mulroney won election as leader of the Progressive Conservative Party at its convention in June 1983, he had never run for or been elected to public office, but he offered the public a new face from French-speaking Quebec, where the Tories had traditionally been weak. He became prime minister in 1984 in a landslide victory of the Progressive Conservatives over the Liberals and was reelected in 1988.

As prime minister Mulroney sought closer cooperation with the United States on such bilateral issues as trade policies and measures to deal with acid rain in North America. During the early years of his administration Canada's economic growth was strong, job creation was high, and inflation was kept under control. His government pursued deregulation of key industries and reform of the tax structure, though a steep federal tax on goods and services introduced in 1991 was widely unpopular.

Mulroney's political success was in part forged by his creation of a coalition of Quebec nationalists and western conservatives, and his terms were marked by his continuing efforts to unify the country while recognizing Quebec's status as a "distinct society." In 1987 he negotiated the Meech Lake accord on constitutional revision, but he was unable to obtain ratification from all 10 provinces before the deadline expired in 1990. A second attempt resulted in the Charlottetown accord of 1992; these were accepted by all the provincial premiers but were defeated in a popular referendum later that year. Early in 1993 Mulroney announced his retirement from politics; he was succeeded as party leader and prime minister by Kim Campbell that June.



Mulroney, 1993
Rick Friedman/Black Star

Multān, city, south-central Punjab province, east-central Pakistan. It is built on a mound just east of the Chenāb River.

The chief seat of the Malli, Multān was subdued by Alexander the Great in 326 BC and fell to the Muslims about AD 712; for three centuries it remained the outpost of Islām in India. In the 10th century it became a centre of the Qarmaṭian heretics. The commercial and military key to the southern route into India, it suffered several sacks and sieges over the centuries. It was subject to the Delhi sultanate and the Mughal Empire and was then captured by the Afghans (1779), the Sikhs (1818), and the British (1849). Formerly called Kashtpur, Hanspur Bāgpur, Sanb (or Sanābpur), and finally Mulasthān, it derives its name from that of the idol of the sun god temple, a shrine from the pre-Muslim period.

Multān was constituted a municipality in 1867. A commercial and industrial centre, it is connected by road and rail with Lahore and Karāchi and by air with Karāchi, Quetta, and Faisalābād. Industries include fertilizer, soap, and glass factories; foundries; cotton, woolen, and silk textile mills; flour, sugar, and oil mills; and a large thermal-power station. It is noted for its handicrafts (ceramics and camel-skin work) and cottage industries. There are hospitals, public gardens, and several colleges affiliated with the University of the Punjab. The Bahauddin Zakariya University was founded in 1975 as the University of Multān. Large, irregular suburbs have grown outside the old walled town, and satellite towns have been set up. The numerous shrines within the old city offer impressive examples of workmanship and architecture. The Shams-e Tabriz shrine is built almost entirely of sky-blue engraved glazed bricks. That of Shāh Rukn-e ʿAlam (Tughluq period) has one of the biggest domes in Asia. The shrine of Sheikh Yūsuf Gardēz is a masterpiece of the Multāni style. Other shrines include the Pahlādpurī Temple and the ʿĪdgāh Mosque (1735). Pop. (1981) city, 732,070; metropolitan area, 1,467,000.

The ʿĪdgāh Mosque, Multān, Pak.
Robert Harding Picture Library

Multatuli, pseudonym of EDUARD DOUWES DEKKER (b. March 2, 1820, Amsterdam, Neth.—d. Feb. 19, 1887, Nieder-Ingelheim, Ger.), one of The Netherlands' greatest writers, whose radical ideas and freshness of style eclipsed the mediocre, self-satisfied Dutch literature of the mid-19th century.

In 1838 Multatuli went to the Dutch East Indies, where he held a number of government posts until 1856, when he resigned because, as assistant commissioner of Lebak, Java, he was not supported by the colonial government in his attempts to protect the Javanese from their own chiefs. He returned to Europe.

Multatuli became internationally known with his most important work, the novel *Max Havelaar* (1860). Partly autobiographical, it concerns the vain efforts of an enlightened official in Indonesia to expose the Dutch exploitation of the natives. The frame structure of the novel enabled him both to plead for justice in Java and to satirize unsparingly the Dutch middle-class mentality. The conversational style and type of humour were far in advance of Multatuli's time, and the book long remained a solitary phenomenon in The Netherlands.

Apart from *Minnebrieven* (1861; "Love Letters"), a fictitious romantic correspondence between Multatuli, his wife, and Fancy, his ideal soul mate, his main work was *Ideën,* 7 vol. (1862–77; "Ideas"), in which he gives his anachronistically radical views on woman's position in society and on education, national politics, and other topics. Included in the *Ideën* is his autobiographical novel *Woutertje Pieterse,* an early work of realism.

multicellular organism, an organism composed of many cells, which are to varying degrees integrated and independent. The development of multicellular organisms is accompanied by cellular specialization and division of labour; cells become efficient in one process and are dependent upon other cells for the necessities of life.

Specialization in single-celled organisms exists at the subcellular level; *i.e.,* the basic functions that are divided among the cells, tissues, and organs of the multicellular organism are collected within one cell. Unicellular organisms are sometimes grouped together and classified as the kingdom Protista. *See* protist.

multilith, also called LITHOGRAPH, offset duplicating process that requires either chemically fixing copy on a metal sheet or preparing a paperlike master copy by typing, printing, or drawing (*see* lithography; offset printing).

multinational corporation (MNC), also called TRANSNATIONAL CORPORATION, any corporation that is registered and operates in more than one country at a time. Generally the corporation has its headquarters in one country and operates wholly or partially owned subsidiaries in one or more other countries. The subsidiaries are responsible to central headquarters.

In economic terms, a firm's advantages in establishing a multinational corporation include both vertical and horizontal economies of scale (*i.e.,* reductions in cost that are a result of an expanded level of output) and the resulting power of monopoly. Technical expertise, experienced personnel, and tested strategies usually can be transferred readily from country to country. Critics of the multinational corporation usually view it as an economic and, often, political means of foreign domination. Developing countries, with a narrow range of exports (often of primary goods) as their economic base, are particularly vulnerable. Monopolistic practices and disruption of more traditional means of economic growth are among the risks that face host countries.

multiple birth, in mammalogy, the delivery of more than one offspring in a single birth event. In most mammals the litter size is fairly constant and is roughly correlated with, among other features, body size, gestation period, life span, type of uterus, and number of teats. For example, a large mammal with a normal pregnancy of more than 150 days, a life span of more than 20 years, a simple (or unicornuate) uterus, and two breasts rarely bears more than one young (a singleton) at a birth. The great majority of primates, humans included, fit into this category; multiple births among them are exceptional and occur with decreasing frequency from twins on.

Twins and twinning. Twinning refers to the process that leads to the production of more than one offspring at one birth. In humans the most frequent type of twinning results in the birth of two babies (twins) at once, although repetition of twinning may lead to triplets, quadruplets, or other multiples of one.

The two major types of twins are identical twins and fraternal twins. Identical twins are two individuals that have developed from a single egg fertilized by a single sperm. This fertilized egg is called a zygote. At a relatively early stage in its growth, the zygote splits into two separate cell masses which go on to become embryos; these embryos are genetically identical to each other and are always of the same sex. Three-fourths of such embryo pairs share a common placenta. Since they both developed from a single zygote, such twins are called monozygotic (MZ) twins. A zygote's atypical separation into two independent embryonic structures can occur at any of several growth stages. Its incomplete or late division into two cell masses results in Siamese twins.

Fraternal twins develop from two separate eggs that have been fertilized by two separate sperms. Such egg pairs stem from multiple ovulations in the same cycle. Each egg develops singly, is fertilized singly, and forms its own individual placenta. Since fraternal twins develop from different zygotes, they are called dizygotic (DZ) twins. DZ twins may be of the same sex or of different sexes, and they are not genetically identical to one another.

The occurrence of DZ twinning varies among racial groups: multiple births are most common among people of African descent; less common among those of European descent; and least common among people of Asian descent. DZ twinning is most common in older mothers (up to about 40 years of age) and tends to recur in families having a history of multiple births, indicating that a hereditary factor may be involved. MZ twinning, on the other hand, occurs randomly in all races and follows no discernible genetic pattern; it tends to occur more frequently in older mothers, however.

How does one determine whether twins are identical (MZ) or fraternal (DZ)? First, identical twins invariably must be of the same sex, the same blood groups, and the same haptoglobin types (haptoglobin is a blood serum protein); DZ twins may be the same in these regards, but more usually there is some difference. If any one of these three characters differs between twins, the twins are dizygotic.

MZ twins usually show a striking physical resemblance to one another, while fraternal twins bear the resemblance of ordinary siblings. It should be noted that even though hereditary characteristics such as eye colour and hair colour and texture are the same in MZ twins, these traits as well as the majority of physical characteristics may be modified during embryonic development. Identical twins may therefore not truly be "identical"; the correspondence between such twins is closer to what would be expected between the right and left sides of a single individual, which vary slightly from one another.

In the United States, Canada, and Great Britain about 1 out of every 83.4 births is a twin birth. Reported frequencies throughout the world vary from about 1 in 70 to 1 in 145 births; however, source records from many areas are unreliable. In North America DZ twins are more frequent than MZ twins, the relative proportions being 71.8 to 28.2; similar proportions hold among other populations of European origin. Excluding the use of fertility drugs, approximate figures for the frequency of multiple births are 1 in 80 births for twins, 1 in 6,400 for triplets, 1 in 512,000 for quadruplets, 1 in 40,960,000 for quintuplets, and so on.

Other multiple births. As with twins, the other types of multiple births may or may not be monozygotic. Any combination may occur; *e.g.,* triplets may be derived from a single zygote (MZ triplets); from two zygotes, one of which divided to produce MZ twins while the other developed as a singleton (the three constituting DZ triplets); or from three separate zygotes (trizygotic, or TZ, triplets).

Similarly, quadruplets may originate from one up to four zygotes, and quintuplets may derive from one to five zygotes. After being carefully studied, the Canadian Dionne quintuplets (born in 1934) were shown to be a one-zygote set.

Since the 1960s, an increasing number of sets of quintuplets, sextuplets, and even septuplets have been born; this unprecedented phenomenon stems from use by the female of fertility drugs, which cause the simultaneous ovulation of many eggs. The first confirmed birth of octuplets was reported from Mexico City in March 1967; none of the four boys and four girls born prematurely survived more than 14 hours. The first recorded set of nonuplets was born June 13, 1971, when an Australian woman gave birth to five boys and four girls (two boys were stillborn). The remaining seven infants died within a week.

Twin studies. Because MZ twins carry identical genes, they have been used extensively in medical and psychological research. By comparing sets of MZ twins to carefully matched control sets of DZ twins (the "twin method"), researchers have attempted to elucidate the relative importance of heredity versus environment in the development of certain diseases, in the formation of the personality, and in intelligence. Such studies have, for example, demonstrated a strong genetic component in the development of schizophrenia, depression, and obesity, as well as in the susceptibility to such infectious diseases as tuberculosis.

Twin studies, especially those that have involved identical twins who have been reared apart, have provided intriguing (but not conclusive) evidence on the importance of heredity in establishing the personality and in determining intelligence. Because of the unique value of twin studies, many nations keep registries of twins.

Multiple Mirror Telescope (MMT), one of the world's largest astronomical telescopes, located on top of 2,600-metre- (8,530-foot-) high Mount Hopkins, 60 km (37 miles) south of Tucson, Ariz. It is a prototype for large optical telescopes of the 15- to 25-metre (590- to 980-inch) class. The MMT combines the light collected by six 180-centimetre- (70-inch-) diameter telescopes into a single image. It thus has the light-gathering power of a single 450-centimetre (176-inch) telescope. Because of many technical innovations, the construction of the MMT cost substantially less than that of a conventional telescope of comparable size. Completed in 1979, the MMT is jointly owned and operated by the Smithsonian Institution and the University of Arizona.

multiple myeloma, also called PLASMA CELL MYELOMA, or MYELOMATOSIS, malignant tumours of the bone marrow in multiple sites that usually occur during middle age or later. Myelomas are slightly more common in males and affect mostly the flat bones (*e.g.,* ribs, sternum, pelvis, shoulder blades) and vertebrae. The disease occurs when B lymphocytes or their precursors multiply into clones of cancerous plasma cells that develop into tumours. These tumours produce large quantities of an abnormal antibody called myeloma protein (*q.v.*), which has no infection-fighting capability and replaces most healthy antibodies in the blood. Bone destruction frees calcium into the circulation, and the calcium may be redeposited in abnormal places such as the kidneys. Symptoms include pain, anemia, weakness, susceptibility to infection, a tendency to hemorrhage, shortness of breath, and kidney insufficiency. Bone fractures may occur, and neurological symptoms may follow the collapse of affected vertebrae. The disease is progressive, and prognosis is poor. In the presence of multiple lesions, only symptomatic treatment is possible; when only one lesion is present, chemotherapy, radiation, or surgery may arrest or cure the disease.

multiple personality, a rare mental disorder in which two or more independent and distinct personality systems develop in the same individual. Each of these personalities may alternately inhabit the person's conscious awareness to the exclusion of the others. In some cases all of the personalities remain mutually unaware of the others' existence. In a more common form of the disorder, there is one personality that basically dominates the person's conscious awareness. This personality cannot remember what happens during the time a subordinate personality is in control (amnesia), but a subordinate personality may be aware of the dominant personality's existence and actions and may even comment upon and criticize the dominant personality as if it were another person. Usually the various personalities markedly differ from one another in outlook, temperament, and body language and give themselves different first names. The various personalities may also exhibit different handwriting and electroencephalogram readings and perform differently on projective tests.

This condition is extremely rare, and only a few hundred cases have been reported. Multiple personality is widely viewed as resulting from dissociative mental processes—*i.e.,* the splitting off from conscious awareness and control of thoughts, feelings, memories, and other mental components in response to situations that are painful, disturbing, or somehow unacceptable to the person experiencing them. The formation of multiple personalities can thus be seen as a way of coping with or escaping from inner conflict, which in turn is frequently triggered by some trauma experienced early in life, such as being abused as a child.

Treatment is aimed at integrating the disparate personalities back into a single and unified personality. To do this, the dominant personality must gradually be made aware of the existence of the others, a process that is usually possible only after the trauma that originally caused the dissociation is brought to conscious awareness and thus defused.

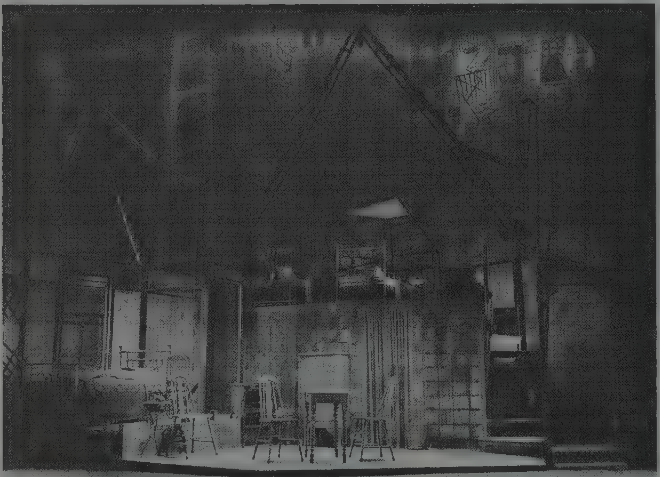
multiple proportions, law of, statement that when two elements combine with each other to form more than one compound, the weights of one element that combine with a fixed weight of the other are in a ratio of small whole numbers. For example, there are five distinct oxides of nitrogen, and the weights of oxygen in combination with 14 grams of nitrogen are, in increasing order, 8, 16, 24, 32, and 40 grams, or in a ratio of 1, 2, 3, 4, 5. The law was announced (1804) by the English chemist John Dalton, and its confirmation for a wide range of compounds served as the most powerful argument in support of Dalton's theory that matter consists of indivisible atoms.

multiple sclerosis (MS), a disease of the brain and spinal cord caused by an unknown agent that gradually destroys the myelin covering, or sheath, of nerve fibres, resulting in a temporary interruption or disordered transmission of nerve impulses, particularly in pathways concerned with vision, sensation, and the use of limbs. The patches of demyelinated nerve tissue produced by the disease eventually may disrupt impulse transmission to the point of permanent paralysis.

Multiple sclerosis has a worldwide distribution but occurs mainly in the Northern Hemisphere. Most cases are diagnosed between the ages of 20 and 40. The onset of multiple sclerosis is usually marked by the temporary appearance of the following symptoms, either alone or in combination: weakness or trembling of a limb or extremity while in use, mistiness or loss of vision, disturbances of sensation, unsteadiness in walking, giddiness, double vision, and defective control of the bladder. These early symptoms tend to clear up (remission) but then usually recur at intervals of months or years. The symptomatic attacks gradually become more severe, and some symptoms afflict the patient permanently. Eventually the impairment of motor control develops into complete paralysis. The disease is seldom rapidly fatal, and the average duration of life after onset is about 25 years, or about 5 years after complete incapacitation. In some people the disease takes an acute form, in which symptoms quickly worsen over months rather than years.

The cause of multiple sclerosis remains uncertain, and, thus, treatment has been unsatisfactory. Corticosteroids are often used to ease the symptoms. Following a relapse, a period of rest in bed and the avoidance of overfatigue and mental stress are advised. Research has suggested that MS may be triggered by exposure to a virus to which the immune system reacts faultily many years later by attacking the myelin sheaths, but attempts to isolate a living microorganism as a cause of the disease have failed.

multiple setting, also called SIMULTANEOUS SETTING, French DÉCOR SIMULTANÉ, staging technique used in medieval drama, in which all the scenes were simultaneously in view, the various locales being represented by small booths known as mansions, or houses, arranged around an unlocalized acting area, or *platea.* To change scenes, actors simply moved from one mansion to another; by convention, the audience regarded the *platea* as part of the mansion in use and ignored the other booths.



Multiple stage setting designed by Jo Mielziner for Arthur Miller's *Death of a Salesman,* 1949, in which several rooms are visible simultaneously

Eileen Darby—Graphic House, Inc.

Multiple setting had its beginnings in liturgical drama, in which the performers, usually members of the clergy, indicated changes in scene by moving from place to place in the church. In the 12th century the plays were moved out of the churches into churchyards and marketplaces, and the settings became increasingly elaborate, with booths that quite graphically represented such locales as palaces, temples, city gates, and even ships at sea. Heaven and hell were represented by mansions at either end of the stage. The most elaborate and ingenious mansion was usually the hellmouth, a booth in the shape of a monster's jaws, from which smoke and fireworks issued and actors dressed as devils appeared.

Multiple setting largely died out during the Renaissance, when dramas began to be acted in the more restricted space of indoor theatres, and movable scenery was perfected. The technique of multiple setting has been revived, however, for many plays in the 20th century. It is extremely useful for simultaneous indoor-outdoor, upstairs-downstairs, geographically separated, and dream scenes. Multiple settings were used to great advantage in staging some of the important plays of Eugene O'Neill, Arthur Miller, and Tennessee Williams.

multiple souls, widely distributed notion, especially in central and northern Asia and Indonesia, that an individual's life and personality are made up of a complex set of psychic interrelations. In some traditions the various souls are identified with the separate organs of the body; in others they are related to character traits. Each of the different souls making up a single individual has a different destiny after death. Among many northern Asian peoples, for example, one soul remains with the corpse, one soul descends to the underworld, and one soul ascends to the heavens.

The most famous example of multiple souls is the belief of the Apapocuva Guaraní of Brazil that a gentle vegetable soul comes, fully formed, from the dwelling place of the gods and joins with the infant at the moment of birth. To this is joined, shortly after birth, a vigorous animal soul. The type of animal decisively influences the recipient's personality: a gentle person has received a butterfly's soul; a cruel and violent man, the soul of a jaguar. Upon death, the vegetable soul enters paradise, and the animal soul becomes a fierce ghost that plagues the tribe.

multiplexing, simultaneous electronic transmission of two or more messages in one or both directions over a single transmission path, with signals separated in time or frequency. In time-division multiplexing, different time intervals are employed for different signals. Two or more different signals may be transmitted in time sequence: the instantaneous amplitude of each signal is sampled and transmitted in sequence. When all signals have been sampled, the process is repeated. The sampling process is carried out rapidly enough to avoid loss of essential information in the signal.

In frequency-division multiplexing, each message is identified with a separate subcarrier frequency; all of these subcarriers are then combined to modulate the carrier frequency. For wire transmission, the modulated subcarriers may be transmitted directly without the introduction of a carrier frequency.

The subcarriers are separated at the receiver terminal by frequency selection and the original message signal recovered from the subcarrier.

multiplier, in economics, numerical coefficient showing the effect of a change in total national investment on the amount of total national income; it equals the ratio of the change in total income to the change in investment.

If, for example, the total amount of investment in an economy is increased by $1,000,000, a chain reaction of increases in consumption expenditures is set off. Producers of raw materials that are used on directly affected investment projects and workers employed in such projects receive the $1,000,000 as increases in their incomes. If they spend on the average $^{3}/_{5}$ of that additional income, $600,000 will be added to the incomes of others. At this point in the process, total income will have been raised by $(1 \times \$1{,}000{,}000) + (^{3}/_{5} \times \$1{,}000{,}000)$, or the amount of the initial expenditure on investment plus the additional expenditure on consumption.

It will continue to increase as the producers of the additional consumption goods realize an increase in their incomes, of which they in turn spend $^{3}/_{5}$ on consumption goods. The increase in total income will then be $(1 \times \$1{,}000{,}000) + (^{3}/_{5} \times \$1{,}000{,}000) + (^{3}/_{5} \times {}^{3}/_{5} \times \$1{,}000{,}000)$. The process continues indefinitely; the amount by which total income increases may be computed by means of the algebraic formula for such progressions. In this case it equals $1/\,(1 - {}^{3}/_{5})$, or 2.5. This means that a $1,000,000 increase in investment has effected a $2,500,000 increase in total income.

The concept of the multiplier process became important in the 1930s when the British economist J.M. Keynes suggested it as a means of measuring the amount of government spending needed to compensate for a shortage of private investment in reaching a level of income at which full employment would prevail. The basic concept has since been applied to the cumulative effect of changes in many other variables on total income, such as changes in imports.

multiprocessing, in computing, a mode of operation in which two or more processors in a computer simultaneously process two or more different portions of the same program (set of instructions). Multiprocessing is typically carried out by two or more microprocessors, each of which is in effect a central processing unit on a single tiny chip. Mainframe computers combine hundreds or even thousands of such microprocessors to interpret and execute instructions. (Uniprocessor computers, by contrast, employ a single central processor to handle all or most tasks.)

The primary advantage of a multiprocessor computer over a uniprocessor system is speed, and thus the ability to manage larger amounts of information. Because each processor in such a system is assigned to perform a specific function, it can perform its task, pass the instruction set on to the next processor, and begin working on a new set of instructions. For example, different processors may be used to manage memory storage, data communications, or arithmetic functions. Or a larger processor might utilize "slave" processors to conduct miscellaneous housekeeping duties, such as memory management. Multiprocessor systems are most commonly used in mainframes and minicomputers, as opposed to personal computers, which incorporate uniprocessor architecture.

multiringed basin, any of a class of geologic features that have been observed on various planets and satellites in the solar system. A multiringed basin typically resembles a bull's-eye and may cover an area of many thousands of square kilometres. The outer rings of the basins are clifflike scarps that face inward. Because of the gradation of smaller examples into ordinary craters and because of the apparent ejecta-blanket patterns of radially striated terrain surrounding them, multiringed basins are believed to be giant impact features. The rings probably were formed as part of the crater-forming process during impact, although some hypotheses suggest that they were formed, or were enhanced, by post-impact collapse. Transitional structures between bowl-shaped craters and multiringed basins include craters with central peaks and larger craters with central rings of peaks. Partly owing to the unfortunate placement, relative to the Moon's visible face, of the most prominent lunar examples, multiringed basins were only slowly recognized as coherent geologic features by geologists and astronomers.

multitasking, the running of two or more programs (sets of instructions) in one computer at the same time. Multitasking is used to keep all of a computer's resources at work as much of the time as possible. It is controlled by the operating system (*q.v.*), which loads programs into the computer for processing and oversees their execution until they are finished.

Multitasking involves overlapping and interleaving the execution of several programs. This is often achieved by capitalizing on the difference between a computer's rapid processing capacity and the slower rates of its input/output devices. While the computer is reading data from a magnetic disk at a fairly limited rate, for example, its powerful central processor can execute at high speed another program that involves extensive calculations but very little input. Operating systems coordinate the competing demands of various programs in a variety of ways. Two programs can be executed on a small computer using a foreground/background system, in which the computer executes the instructions of one program only in between the times it devotes to running another program of higher priority. Such a system makes use of idle times in some tasks, such as the minute delays between keyboard entries, to execute instructions in the background program. In many multitasking operations, a computer's microprocessors switch their attention back and forth between different programs in fractions of seconds.

multituberculate, any member of an extinct group of small, superficially rodentlike mammals that existed from the Late Jurassic Epoch (about 163 to 144 million years ago) of the Mesozoic Era through the early part of the Cenozoic Era (the last 66.4 million years of Earth history). During most of this span, they were by far the most abundant mammals, but relatively little evolutionary diversification occurred throughout their long history. These herbivores were usually the size of mice, though the largest approached beaver size. The distinguishing fossil characteristic of multituberculates was their molar teeth, which had 2 or 3 longitudinal rows of cusps, 5 or 6 cusps in primitive forms, and up to 30 in advanced genera. They had a single pair of long lower incisors and possibly one to three pairs of upper incisors. In most genera the anterior lower premolars were large shearing teeth. The multituberculates are not closely related to any other mammals. They apparently arose from the mammallike reptiles and did not give rise to any other types.

Multnomah Falls, waterfalls on a short tributary of the Columbia River that rises in the Larch Mountains in northwestern Oregon, U.S. The falls are located near the Columbia River Highway about 9 miles (14 km) west-southwest of Bonneville. The scenic upper and lower falls plunge into the Columbia River Gorge and have a combined height of 850 feet (260 m), with a single drop of 620 feet (190 m), one of the country's highest.

Mum (people): *see* Bamum.

Mumford, Lewis (b. Oct. 19, 1895, Flushing, N.Y., U.S.—d. Jan. 26, 1990, Amenia, N.Y.), American architectural critic, urban planner, and historian who analyzed the effects of technology and urbanization on human societies throughout history.

Mumford studied at the City College of New York and at the New School for Social Research. While a student he was influenced by the writings of Patrick Geddes, who was one of the pioneers of modern urban planning. Mumford became an associate editor of the *Dial* (1919) and wrote architectural criticism and urban commentary for *The New Yorker* magazine from 1931 to 1963.

Mumford's early writings, both in periodicals and in books, established him as an authority on American architecture, art, and urban life as interpreted within their larger social context. His book *Sticks and Stones* (1924) is an insightful historical account of American architecture. *The Golden Day* (1926; reprinted 1934, 1957) and *The Brown Decades: A Study of the Arts in America, 1865–1895* (1931) are more general studies of the origins and development of American culture. The four books in Mumford's "Renewal of Life" series are: *Technics and Civilization* (1934), *The Culture of Cities* (1938), *The Condition of Man* (1944), and *The Conduct of Life* (1951). In these works Mumford criticized the dehumanizing tendencies of modern technological society and urged that it be brought into harmony with humanistic goals and aspirations. One of Mumford's key works is *The City in History* (1961), a sweeping historical study of the city's role in human civilization.

Mumford taught and held numerous research positions. He received the U.S. Medal of Freedom (1964) and was decorated Knight of the Order of the British Empire (1943).

Among Mumford's late works is *The Myth of the Machine,* 2 vol. (1967–70), a harshly critical historical reassessment of technology's role in human development. He wrote several autobiographical works, including *My Work and Days: A Personal Chronicle* (1979).

BIBLIOGRAPHY. Donald L. Miller, *Lewis Mumford: A Life* (1989), is an extensive analytical biography. David R. Conrad, *Education for Transformation: Implications in Lewis Mumford's Ecohumanism* (1976), explores Mumford's philosophical views; and the literary background of his social reformism is outlined in Lewis F. Fried, *Makers of the City* (1990).

mumming play, also called MUMMERS' PLAY, traditional dramatic entertainment, still performed in a few villages of England and Northern Ireland, in which a champion is killed in a fight and is then brought to life by a doctor. It is thought likely that the play has links with primitive ceremonies held to mark important stages in the agricultural year. The name has been connected with words such as mumble and mute; with the German *mumme* ("mask," "masker"); and with the Greek *mommo* (denoting a child's bugbear, or a frightening mask).

Mummers were originally bands of masked persons who during winter festivals in Europe paraded the streets and entered houses to dance or play dice in silence. "Momerie" was a popular amusement between the 13th and 16th century. In the 16th century it was absorbed by the Italian carnival masquerading (and hence was a forerunner of the courtly entertainment known as masque).

It is not known how old the mumming play is. Although contemporary references to it do not begin to appear until the late 18th century, the basic narrative framework is the story of St. George and the Seven Champions of Christendom, which was first popularized in England toward the end of the 16th century. It is possible that there was a common (lost) original play, which widely separated communities in England, Ireland, and Scotland modified to their own use. The plot remained essentially the same: St. George, introduced as a gallant Christian hero, fights an infidel knight, and one of them is slain. A doctor is then presented, who restores the dead warrior to life. Other characters include a presenter, a fool in cap and bells, and a man dressed in woman's clothes. Father Christmas also appears. It is likely that the basic story of death and resurrection was grafted onto an older game that stemmed from primitive ritual.

Mummius, Lucius (fl. mid-2nd century BC), Roman statesman and general who crushed the uprising of the Achaean League against Roman rule in Greece.

As praetor in 153, Mummius defeated the rebellious Lusitanians in southwestern Spain; the following year he celebrated a triumph at Rome. As consul in 146, he was appointed commander of the war against the Achaean League. He defeated the Greek forces at Leucopetra on the Isthmus of Corinth and captured and destroyed Corinth. The Roman Senate then dissolved the Achaean League. Mummius' indifference to works of art and ignorance of their value is shown by his well-known remark to those who contracted for the shipment of the treasures of Corinth to Rome, that "if they lost or damaged them, they would have to replace them."

mummy, body embalmed or treated for burial with preservatives after the manner of the ancient Egyptians. The process varied from age to age in Egypt, but it always involved removing the internal organs (though in a late period they were replaced, after treatment), treating the body with resin, and wrapping it in linen bandages. (*See* embalming.) Among the many other peoples who practiced mummification were the people living along the Torres Strait, between Papua New Guinea and Australia, and the Incas of South America.

There was a widespread belief that Egyptian mummies were prepared with bitumen (the word comes from the Arabic *mūmiyah,* "bitumen"), which was supposed to have medicinal value. Throughout the Middle Ages "mummy," made by pounding mummified bodies, was a standard product of apothecary shops. In course of time it was forgotten that the virtue of mummy lay in the bitumen, and spurious "mummy" was made from the bodies of felons and suicides. The traffic in mummy continued in Europe until the 18th century.

mumps, also called EPIDEMIC PAROTITIS, acute contagious disease caused by a virus and characterized by inflammatory swelling of the salivary glands. It frequently occurs as an epidemic and most commonly affects young persons who are between 5 and 15 years old.

The incubation period is about 17–21 days after contact; danger of transfer begins one week before the affected person feels sick and lasts about two weeks. Mumps generally sets in with symptoms of a slightly feverish cold, soon followed by swelling and stiffening in the region of the parotid salivary gland in front of the ear. The swelling rapidly increases and spreads toward the neck and under the jaw, involving the numerous glands there. The condition is often found on both sides. Pain is seldom severe, nor is there much redness or any tendency to discharge pus; there is, however, interference with chewing and swallowing. After four or five days the parts return to their normal condition.

During convalescence in patients past puberty, there occasionally occur swelling and tenderness in other glands, such as the testicles in males (orchitis) and the breasts (mastitis) or ovaries (oophoritis) in females, and, rarely, involvement of the pancreas, but these are of short duration and usually of no serious significance. The testicles may become atrophied, but sterility from this cause is very rare. Meningoencephalitis (inflammation of the brain and its membranous covering) is a fairly common concomitant of mumps, but the outlook for recovery is favourable.

Mumps itself requires no special treatment; a single attack usually confers lifelong immunity. Prevention can be attained through immunization with a vaccine made from attenuated (weakened) live mumps virus. This vaccine is administered after the age of one year, often in combination with measles and rubella vaccines.

Mun (people): *see* Mon.

Mun, Thomas (baptized June 17, 1571, London, Eng.—d. *c.* July 21, 1641), English writer on economics who gave the first clear and vigorous statement of the theory of the balance of trade.

Mun came into public prominence during the economic depression of 1620. Many people held the East India Company responsible for this economic dislocation because the company exported £30,000 in bullion on each voyage to finance its trade. Although the royal charter stipulated that the company had to import an equal amount of bullion within six months, it was charged that the company imported Indian goods valued in excess of British exports to the Indies.

In *A Discourse of Trade, from England unto the East Indies* (1621), Mun argued that so long as England's total exports exceeded its total imports, the export of bullion was not harmful. He pointed out that the money earned on the sale of reexported East Indian goods was in excess of the amount of originally exported bullion with which those goods were purchased. He was a member of the committee of the East India Company and of the standing commission on trade, appointed in 1622. Mun developed these ideas in his most important work, *England's Treasure by Forraign Trade,* published posthumously in 1664.

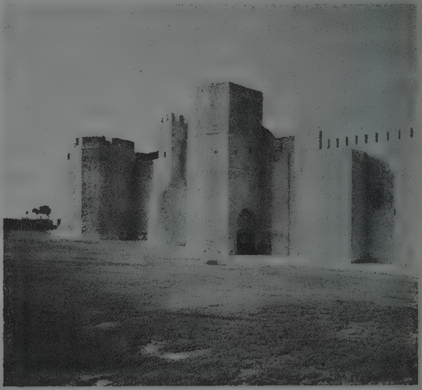
Mun River, Thai MAE NAM MUN, main river system of the Khorat Plateau, in eastern Thailand. The Mun rises in the San Kamphaeng Range northeast of Bangkok and flows east for 418 miles (673 km), receiving the Chi River, its main tributary, and entering the Mekong River at the Laotian border. Nakhon Ratchasima and Ubon Ratchathani are the chief towns on its banks. The river is seasonally navigable below Ubon Ratchathani and is used for irrigation.

Muna Island, Indonesian PULAU MUNA, Dutch MOENA EILAND, island and *kabupaten* (regency), Sulawesi Tenggara *provinsi* ("province"), Indonesia. The island lies in the Flores Sea south of the southeastern arm of Celebes. With an area of 658 square miles (1,704 square km), it has a hilly surface, rising to 1,460 feet (445 m). The north and northeast have teak forests. The Muna, a Muslim people speaking an Austronesian language, practice a simple agriculture, raising rice and tubers. Their other food sources are sago and sea cucumber. The hoglike babirusa and the marsupial cuscus are found on the island. The main town and principal port is Raha, on the northeastern coast across the Strait of Butung from the neighbouring island of Butung to the east. Pop. (1980) 174,057.

Munakata Shikō (b. Sept. 5, 1903, Aomori, Japan—d. Sept. 13, 1975, Tokyo), Japanese woodblock artist whose vivid works are known for their bold, random, and vigorous cutting.

Munakata, the son of a blacksmith, showed an avid interest in art from childhood, despite limited schooling. In 1924 he went to Tokyo, studied woodblock printing with Hiratsuka Un'ichi, and, after several years, developed his own style, preferring to call his works *banga* ("panel pictures") instead of *hanga* ("woodblock prints"). Munakata's style was influenced by fellow artists involved in the revival of Japanese folk crafts and by his growing fascination with Buddhism. In 1956 he became the first Japanese winner of the top prize at the Biennale at Venice. In 1970 he received Japan's Order of Culture.

Munastīr, al-, also spelled MONASTIR, Latin RUSPINUM, city, eastern Tunisia. It lies at the tip of a small peninsula protruding into the Mediterranean Sea between the Gulf of Hammamet and the Bay of al-Munastīr. The ruins of Ruspinum, a Phoenician and Roman settlement, are 3 miles (5 km) to the west of the city. Al-Munastīr is now a port and, with adjacent Ṣaqānis (Skanes), forms a fashionable beach resort complex that is served by an international airport. Its industries include textile milling (especially wool) and the manufacture of salt, soap, and olive oil. The city has a noted ribat (monastery-fortress), founded in AD 180, to which it owes its name; several old mosques; and a modern mosque, completed in 1968 and dedicated to Tunisia's first president, Habib Bourguiba, who was born in al-Munastīr. Pop. (1989 est.) 47,807.



The ribat (monastery-fortress) in al-Munastir, Tunisia

Picturepoint, London

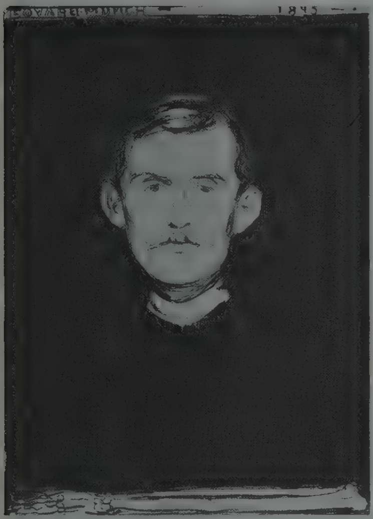
Munch, Charles (b. Sept. 26, 1891, Strassburg, Ger. [now Strasbourg, France]—d. Nov. 6, 1968, Richmond, Va., U.S.), conductor known for his interpretations of works by Johannes Brahms, Claude Debussy, and Maurice Ravel.

After studying violin in Paris and Berlin, he became professor of violin at the Strasbourg Conservatoire, leader of the Strasbourg Orchestra (1919–25), and later leader of the Gewandhaus Orchestra at Leipzig. He appeared as conductor of the Straram Orchestra in Paris in 1932 and in 1935 helped found the Paris Philharmonic Orchestra. As its conductor (1935–38) he gave much attention to the performance of modern French works. He conducted the Boston Symphony Orchestra from 1949 to 1962, directing 39 world and 17 U.S. premieres. From 1951 to 1962

Charles Munch

By courtesy of the Boston Symphony Orchestra he directed the Berkshire Music Center at Tanglewood, near Lenox, Mass. He wrote an autobiography, *I Am a Conductor* (Eng. trans. by L. Burkat, 1955).

Munch, Edvard (b. Dec. 12, 1863, Löten, Nor.—d. Jan. 23, 1944, Ekely, near Oslo), Norwegian painter and printmaker whose intensely evocative treatment of psychological themes greatly influenced German Expressionism in the early 20th century. His painting "The Scream" (1893) can be seen as a symbol of modern man's spiritual anguish.



Edvard Munch, self-portrait, lithograph, 1895; in the Albertina, Vienna

By courtesy of the Albertina, Vienna

Early years. Munch was born into a middle-class family that was plagued with ill health. His mother died when he was 5, his eldest sister when he was 14, both of tuberculosis—the latter event being recalled in his first masterpiece, "The Sick Child" (1885–86). Munch's father and brother also died when he was still young, while another sister developed mental illness. "Illness, insanity and death," as he said, "were the black angels that kept watch over my cradle and accompanied me all my life."

Munch showed a flair for drawing at an early age but received little formal training. An important factor in his artistic development was the Christiania Bohème, a circle of writers and artists in Christiania, as Oslo was then called. Its members were characterized by a belief in free love and a general opposition to bourgeois narrow-mindedness. One of the older painters in the circle, Christian Krohg, gave Munch both instruction and encouragement. But Munch soon outgrew the prevailing naturalist aesthetic in Christiania, partly as a result of his assimilation of French Impressionism after a trip to Paris in 1889 and his contact with the work of the Postimpressionist painters Paul Gauguin and Henri de Toulouse-Lautrec from about 1890.

Artistic maturity. Munch's own deeply original style crystallized in about 1892. The flowing, tortuous use of line in his new paintings was similar to that of contemporary Art Nouveau, but Munch used line not as decoration but as a vehicle for profound psychological revelation. The outraged incomprehension of Norwegian critics was echoed by their counterparts in Berlin when Munch exhibited a large number of his paintings there in 1892 at the invitation of the Union of Berlin Artists. The violent emotionalism and unconventional imagery of his paintings created a bitter controversy. The scandal, however, helped make his name known throughout Germany, from where his reputation spread internationally. Munch lived mainly in Berlin in 1892–95 and then in Paris in 1896–97, and he continued to move around extensively until he settled in Norway in 1910.

Paintings of love and death. At the heart of Munch's achievement is his series of paintings on love and death. Its original nucleus was formed by six pictures exhibited in 1893, and the series had grown to 22 works by the time it was first exhibited under the title "Frieze of Life" at the Berlin Secession in 1902. Munch constantly rearranged these paintings, and if one had to be sold, he would make another version of it. Thus in many cases there are several painted versions, in addition to prints based on the same images. Though the Frieze draws deeply on personal experience, its themes are universal: it is not about particular men or women but about man and woman in general, and about the human experience of the great elemental forces of nature. Seen in sequence, an implicit narrative emerges of love's awakening, blossoming, and withering, followed by despair and death.

Love's awakening is shown in "The Voice" (1893), where on a summer night a girl standing among trees is summoned more by an inner voice than by any sounds from a boat on the sea behind her. Compositionally, this is one of several paintings in the Frieze in which the winding horizontal of the coastline is counterpoised with the verticals of trees, figures, or the pillarlike reflection across the sea of sun or moon. Love's blossoming is shown in "The Kiss" (1892), in which the faces of the kissing man and woman melt so completely into each other that neither retains any individual features. An especially powerful image of the surrender, or transcendence, of individuality is "Madonna" (1894–95), which shows a naked woman with her head thrown back in ecstasy, her eyes closed, and a red halo-like shape above her flowing black hair. This may be understood as the moment of conception, but there is more than a hint of death in the woman's beautiful face. In Munch's art, woman is an "other" with whom union is desperately desired, yet feared because it threatens the destruction of the creative ego.

Munch's acute awareness of the suffering caused by love is clear from such titles as "Melancholy" (*c.* 1892–93), "Jealousy" (1894–95), and "Ashes" (1894). If isolation and loneliness, always present in his work, are especially emphasized in these pictures, they are equally so in "Death in the Sick Room" (1893–95), one of many paintings about death. Here the focus is not on the dying child, who is not even visible, but on the living, each wrapped in their own experience of grief and unable to communicate or offer each other any consolation. The picture's power is heightened by the claustrophobically enclosed space and by the steeply rushing perspective of the floor.

The same type of dramatic perspective is used in "The Scream," or "The Cry" (1893), which is almost certainly Munch's most famous painting. It depicts a panic-stricken creature, simultaneously corpselike and reminiscent of a sperm or fetus, whose contours are echoed in the swirling lines of the blood-red sky. In this painting anxiety is raised to a cosmic level, ultimately related to that intuition of death and the void which was to be central to Existentialism.

Munch's massive output of graphic art—consisting of etchings, dry point, lithographs, and woodcuts—began in 1894. The principal attraction of printmaking was that it enabled him to communicate his message to a much larger number of people, but it also afforded him exciting opportunities for experimentation. Munch's prints closely resemble his paintings in both style and subject matter. Munch's art had evident affinities with the poetry and drama of his day, and interesting comparisons can be made with the work of the dramatists Henrik Ibsen and August Strindberg, both of whose portraits he painted.

Later years. Munch suffered a nervous breakdown in 1908–09, and afterward his art became more positive and extroverted but hardly ever regained its previous intensity. Among the few exceptions is his haunting "Self-Portrait: The Night Wanderer" (*c.* 1930), one of a long series of self-portraits he painted throughout his life. An especially important commission, which marked the belated acceptance of his importance in Norway, was for the Oslo University Murals (1909–16), the centrepiece of which was a vast painting of the sun, flanked by allegorical images. Both landscapes and men at work provided subjects for Munch's later paintings. This increased emphasis on the outside world may well have reflected a greater personal maturity, but artistically Munch was no longer in the vanguard. It was principally through his work of the 1890s, in which he gave form to mysterious and dangerous psychic forces, that he made such a crucial contribution to modern art. Munch bequeathed his estate and all the paintings, prints, and drawings in his possession to the city of Oslo, which erected the Munch Museum in 1963. Many of his finest works are in the National Gallery (Nasjonalgalleriet) in Oslo.

Assessment. Munch was a leader in the revolt against the hollow naturalism of 19th-century academic painting. The legacy that he bequeathed to Expressionism and to modern art in general lay particularly in his sense of art's purpose. In his best work, he bared his soul to an extraordinary degree, but it was precisely this intensity of self-exploration that made possible the authentic creation of an art addressing universal aspects of human experience. Munch was heir to the traditional mysticism and anxiety of northern European art, which he re-created in a highly personal art of the archetypal and symbolic. His work speaks to the typically modern situation of the individual who has been cut dizzyingly free from the restrictions and comforts of any generally accepted system of belief. (G.Wa.)

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Munch, Peter Andreas (b. Dec. 15, 1810, Christiania [now Oslo], Nor.—d. May 25, 1863, Rome, Papal States [Italy]), historian and university professor who was one of the founders of the Norwegian nationalist school of historiography.

Writing during the period of romantic nationalism, Munch, along with Jakob Rudolf Keyser, promoted the idea that the Norwegians, as opposed to the Danes and Swedes, arrived in Scandinavia from the north and thus represented the pure Nordic racial type; and that the Old Norse language was a product of Norwegian, and not general Scandinavian, culture. A lifetime of scholarship failed to prove the first idea but established the second beyond doubt. Munch's work influenced the philologist Ivar Aasen in his efforts to rehabilitate the Norwegian language and cleanse it of its Danish elements. Munch's multivolume *Det norske Folks Historie* (1852–63; "History of the Norwegian People") inspired many Norwegian artistic and literary works, among them Ibsen's *Peer Gynt.*

Munch, Peter Rochegune (b. July 25, 1870, Redsted, Den.—d. Jan. 12, 1948, Copenhagen), historian and politician who as Danish foreign minister in the 1930s attempted to maintain Danish neutrality and independence during World War II.

After a career as a historian of modern Europe, Munch entered the Danish Parliament in 1909 as a member of the Radical Party. In the same year he became minister of the interior in the Radical government of C.T. Zahle (1909–10). In the second Zahle government (1913–20) he served as minister of defense. While he was foreign minister in the Social Democratic–Radical government of Thorvald Stauning (1929–42), Munch's most difficult task was to induce Adolf Hitler to recognize the 1920 border between Denmark and Germany, traversing the ethnically mixed area of Schleswig. Although he failed in this undertaking, he succeeded in avoiding an open breach with Germany. At the time the Germans occupied Denmark in 1940, Munch was made a public scapegoat and resigned his post.

München-Gladbach (Germany): *see* Mönchengladbach.

Münchhausen, Baron, German in full KARL FRIEDRICH HIERONYMUS, FREIHERR (Baron) VON MÜNCHHAUSEN (b. May 11, 1720, Bodenwerder, Hanover [Germany]—d. Feb. 22, 1797, Bodenwerder), German storyteller, some of whose tales were the basis for *The Adventures of Baron Munchausen.*

Münchhausen served with the Russians against the Turks and retired to his estates as a country gentleman in 1760. He became famous around Hanover as a raconteur of extraordinary tales about his life as a soldier, hunter, and sportsman. A collection of such tales appeared in *Vademecum für lustige Leute* (1781–83; "Manual for Merry People"), all of them attributed to the baron, though several can be traced to much earlier sources.

Münchhausen, however, was launched as a "type" of tall-story teller by Rudolf Erich Raspe (*q.v.*), who used the earlier stories as basic material for a small volume published (anonymously) in London in 1785 under the title *Baron Munchausen's Narrative of His Marvellous Travels and Campaigns in Russia.* Later and much enlarged editions, none of them having much to do with the historical Baron Münchhausen, became widely known and popular in many languages. They are generally known as *The Adventures of Baron Munchausen,* and the English edition of 1793 is now the usual text.

Muncie, city, seat of Delaware county, eastern Indiana, U.S. It lies along the White River, 60 miles (96 km) northeast of Indianapolis. Muncie is the average American town described in the classic sociological study *Middletown,* published in 1929 by Robert S. and Helen M. Lynd. The name (originally Munseetown) commemorates the Munsee clan of Delaware Indians who once lived there. The town was founded in 1827, when Goldsmith C. Gilbert, a trader, donated land for the county seat. The first railroad (1852) and the discovery of natural gas (1886) contributed to the city's growth. Although gas production failed in the late 1890s, the city continued to grow. It is now a trading and industrial centre. Muncie is the seat of Ball State University (1918), named for the Ball family whose factory there for years produced glass jars and fittings for home canning and other products. The Lynd studies (*Middletown in Transition* appeared in 1937) were at first resented; since that time, however, Muncie has come to be proud of its "typical American" title. Inc. town, 1847; city, 1865. Pop. (1999 est.) city, 66,916; Muncie MSA, 115,472.

Munda, any of several more or less distinct tribal groups inhabiting a broad belt in central and eastern India and speaking various Munda languages of the Austroasiatic stock. They numbered approximately 9,000,000 in the late 20th century. In the Chota Nāgpur Plateau in southern Bihār, adjacent parts of West Bengal and Madhya Pradesh, and the hill districts of Orissa, they form a numerically important part of the population.

Munda history and origins are matters of conjecture. The territory they now occupy was until recently difficult to reach and remote from the great centres of Indian civilization; it is hilly, forested, and relatively poor for agriculture. It is believed that the Munda were once more widely distributed but retreated to their present homelands with the advance and spread of peoples having a more elaborate culture. Nevertheless, they have not lived in complete isolation and share (with some tribal variation) many culture traits with other Indian peoples. Most Munda peoples are agriculturists. Along with their languages, the Munda have tended to preserve their own culture, although the government of India encourages their assimilation to the larger Indian society.

Munda languages, any of several Austroasiatic languages spoken by about 9,000,000 people (the Munda) in northern and central India. Some scholars divide the languages into two subfamilies: the North Munda (spoken in the Chota Nāgpur Plateau of Bihār, Bengal, and Orissa) including Korkū, Santhālī, Muṇḍārī, Bhumij, and Ho; and the South Munda (spoken in central Orissa and along the border between Andhra Pradesh and Orissa). The latter family is further split into Central Munda, including Khaṛiā and Juāṅg, and Korāput Munda, including Gutob, Remo, Sora (Savara), Juray, and Gorum. The classification of these languages is controversial.

North Munda (of which Santhālī is the chief language) is the more important of the two groups; its languages are spoken by about nine-tenths of Munda speakers. After Santhālī, the Muṇḍārī and Ho languages rank next in number of speakers, followed by Korkū and Sora. The remaining Munda languages are spoken by small, isolated groups of people.

Characteristics of the Munda languages include three numbers (singular, dual, and plural), two gender classes (animate and inanimate) for nouns, and the use of either suffixes or auxiliaries for indicating the tenses of verb forms. In Munda sound systems, consonant sequences are infrequent, except in the middle of a word. Except in Korkū, where syllables show a distinction between high and low tone, accent is predictable in the Munda languages.

Munda, Battle of (45 BC), conflict that ended the ancient Roman civil war between the forces of Pompey the Great and those of Julius Caesar. The late Pompey's sons, Gnaeus and Sextus, had seized Córdoba in Spain, and Caesar came with an army to end the revolt. A tactical shift of troops by Gnaeus was misunderstood by the rest of his army. Thinking a retreat had begun, they broke, and Caesar won the war.

Munday, Anthony (b. 1560?, London, Eng.—buried Aug. 9, 1633, London), English poet, dramatist, pamphleteer, and translator.

In 1578 Munday was abroad, evidently as a secret agent sent to discover the plans of English Catholic refugees in France and Italy. On his return he renewed his connection with the stage. After 1579 his writings included popular ballads, some original lyrics, translations of French and Spanish romances, and prose pamphlets, but only two plays.

In 1581–82 Munday was prominent in the capture and trials of the Jesuit emissaries (many of whom he had known at Rome) who followed the martyr Edmund Campion to England. Critics have found his *English Romayne Lyfe* (1582) to be a detailed and entertaining, though hostile, description of life and study in the English College at Rome.

Little is known about Munday's career as actor and playwright. His *Fedele and Fortunio* (1584 at latest), an adaptation of Luigi Pasqualigo's *Il Fedele,* played at court and was printed in 1585. *John a Kent and John a Cumber,* his earliest surviving play, was probably written before the middle of 1589. He was apparently the only early Elizabethan dramatist whose popularity continued after William Shakespeare's rise in the mid-1590s.

Mundell, Robert A., in full ROBERT ALEXANDER MUNDELL (b. Oct. 24, 1932, Kingston, Ont., Can.), Canadian-born economist who received the Nobel Prize in Economic Sciences in 1999 for his work on monetary dynamics and optimum currency areas.

Mundell attended the University of British Columbia (B.A., 1953), the University of Washington (M.A., 1954), the London School of Economics, and the Massachusetts Institute of Technology (Ph.D., 1956). He was a postdoctoral fellow in political economy at the University of Chicago (1956–57), where he later served as a professor of economics (1966–71) and as an editor of the *Journal of Political Economy.* In 1974 he joined the faculty of Columbia University, New York City.

In the early 1960s, while working in the research department of the International Monetary Fund (*q.v.*), Mundell began his macroeconomic analysis of exchange rates and their effect on monetary policies. In 1961 he theorized that a single currency would be viable in an economic region, or optimum currency area, in which there was free movement of labour and trade. His theories played a key role in the creation of the euro (*q.v.*), the single currency adopted by 11 members of the European Union on Jan. 1, 1999.

Müneccimbaşı, Ahmed Dede (b. 1631, Salonika, Macedonia [now Thessaloníki, Greece]—d. Feb. 27, 1702, Mecca, Arabia [now in Saudi Arabia]), Ottoman astrologer, writer, and historian.

After 15 years with the Mawlawī dervishes, Müneccimbaşı took up astronomy and astrology and in 1665 became the *müneccimbaşi* (court astrologer) for Sultan Mehmed IV. Falling out of favour with the court in 1687, he was exiled to Egypt and went to Medina and Mecca, where he spent the rest of his life.

Müneccimbaşı's great work, written in Arabic, was titled *Jāmiʿ al-duwal* ("The Compendium of Nations"). *Sahaif-ül-Ahbar...* ("The Pages of the Chronicle"), a Turkish summary translation made by the poet Ahmed Nedin, is the only published version. The work is a universal history that starts with Adam and ends in the year 1672. It covers in detail the Muslim dynasties, but it also treats pre-Muslim and non-Muslim dynasties. The work also touches upon dynasties never before dealt with by Islāmic historiographers, such as the Babylonians, the Seleucids, and the Assyrians. Müneccimbaşı also wrote commentaries on the Qurʾān, translated the works of Persian writers, and composed a *Dīvān* ("Collected Poems") in Turkish on mystical themes under the pen name of Âşık.

Mungir (India): *see* Monghyr.

Mungo, SAINT: *see* Kentigern, Saint.

Muni, Paul, original name MUNI WEISENFREUND (b. Sept. 22, 1895, Lemberg, Austria [now Lviv, Ukraine]—d. Aug. 25, 1967, Santa Barbara, Calif., U.S.), Austrian-born American stage and film actor.

Born to a family of Polish-Yiddish actors, Muni began his stage career at age 12 after the family had emigrated to the United States (1902). Though eventually prominent in American and European Yiddish theatre, he waited until 1926 to appear in his first English-speaking role on Broadway, in *We Americans.* After several other roles had established him as a stage star, he began his film career with *The Valiant* in 1929, and later that year he played seven roles in *Seven Faces.* His other early roles included lead parts in *Scarface* (1932) and *I Am a Fugitive from a Chain Gang* (1932).

Muni alternated between Broadway and Hollywood throughout his career. He is best remembered for dramatic roles in such films as *The Good Earth* (1937), *The Life of Emile Zola* (1937), and *Juarez* (1939). For his performance in the title role of *The Story of Louis Pasteur* (1936), he received an Academy Award. His last triumph on Broadway was in *Inherit the Wind* (1955), for which he won an Antoinette Perry Award, and his final film was *The Last Angry Man* (1959).

munia, any of several small, finchlike Asian birds of the mannikin and waxbill (*qq.v.*) groups (family Estrildidae, order Passeriformes). The black-headed munia, or chestnut mannikin (*Lonchura malacca,* including *atricapilla* and *ferruginosa*), is a pest in rice fields from India to Java and the Philippines; as a cage bird it is often called tricolour nun. Others kept as pets include the white-headed munia (*L. maja*) of Thailand to Java and the green munia, or green tiger finch (*Amandava formosa*), of India. The white-throated munia is also called silverbill, as are other birds with silver bills. For red munia, *see* avadavat.

Munich, German MÜNCHEN, capital and largest city of the *Land* (state) of Bavaria and the third largest city in Germany (after Berlin and Hamburg). Munich is by far the largest city in southern Germany. It lies about 30 miles (48 km) north of the edge of the Alps and along the Isar River, which flows through the middle of the city.

Munich, or München ("Home of the Monks"), traces its origins to the Benedictine monastery at Tegernsee, which was probably founded in AD 750. In 1157 Henry the Lion, duke of Bavaria, granted the monks the right to establish a market where the road from Salzburg met the Isar River. A bridge was built across the Isar the following year, and the marketplace was fortified.

In 1255 Munich became the home of the Wittelsbach family, which had succeeded to the duchy of Bavaria in 1180. For more than 700 years the Wittelsbachs would be closely connected with the town's destiny. In the early 14th century the first of the Wittelsbach line of Holy Roman emperors, Louis IV, called "the Bavarian," expanded the town to the size at which it remained up to the end of the 18th century. Under the Bavarian elector Maximilian I (1597–1651), a powerful and effective ruler, Munich increased in wealth and size and prospered until the Thirty Years' War. It was occupied by the Swedes under Gustavus Adolphus in 1632, and in 1634 a plague epidemic killed off one-third of its population.

The third Wittelsbach who left his mark on the community was Louis I, king of Bavaria from 1825 to 1848. It was he who planned and created modern Munich, and it was his architects who established the city's characteristic appearance in the public buildings they designed. The 19th century was Munich's greatest period of growth and development. Protestants became citizens for the first time in what had been until then a purely Roman Catholic town. The city's population of 100,000 in 1854 grew to 500,000 by 1900. Munich's cultural importance in Europe was enhanced when Louis II, by his championing of the composer Richard Wagner, revived its fame as a city of music and the stage.

The rule of the Wittelsbach dynasty finally ended with the abdication of Louis III in November 1918, and in the aftermath of World War I, Munich became a hotbed of right-wing political ferment. It was there that Adolf Hitler joined the National Socialist (Nazi) Party and became its leader. The beer cellar where he held meetings that led to the *Putsch* ("rising") against the Bavarian authorities in November 1923 can still be seen. In World War II Munich suffered heavily from Allied bombing raids, which destroyed more than 40 percent of its buildings.

The old town, clustered around the ancient crossroads of the marketplace in the Marienplatz, has increasingly become a business centre and has lost much of its ancient character. Among the old buildings that still stand are three of the seven town gates—Karls, Sendlinger, and Isar, all dating from the 14th century. Other medieval buildings include Munich's cathedral, the Church of Our Lady (Frauenkirche; built 1468–88), whose massive cupola-capped towers are conspicuous landmarks; and the Old Town Hall (1470–80) in the Marienplatz. Nearby is St. Peter's Church (1169), Munich's oldest church, which was completely destroyed in World War II but subsequently rebuilt in its original form. The former arsenal of the town at Jakobsplatz is now the municipal museum.

The oldest of the Wittelsbach residences, the Alter Hof ("Old Court"), has retained its medieval appearance. The present Residenz ("Residence") dates from the 16th century, but the style of every period up to the 19th century was tried out on it with superb effect; the building was destroyed in World War II but has been reconstructed. Another survival from this early period is St. Michael's Church (1583–97), which is considered to be the most important Renaissance church in Germany and one of the most beautiful in central Europe.

Despite these older buildings, the old town is predominantly Baroque and Rococo. Italian models inspired the late 17th-century Theatine Church, the early 18th-century Trinity Church (Dreifaltigkeitskirche), and an 18th-century Marianist church, the Bürgersaal. St. Michael's Church at Berg am Laim, the Asam Church (also called St. John of Nepomuk Church), and the Cuvilliés Theatre at the Residenz were completed between 1746 and 1777. The last-named structure, a magnificent Rococo theatre built for the Wittelsbach court, was destroyed in World War II, but much of its interior decoration was saved, and the theatre was reconstructed. Outside the town walls were built summer castles: Schleissheim and Nymphenburg, the latter with its hunting lodge, the Amalienburg Pavilion, a Rococo masterpiece. Several palaces built by the Bavarian landed gentry and court nobility at the same time also survive. The New Town Hall (built 1867–74) was enlarged during the turn of the century.

Munich received the first great impetus to expand beyond the old town from the magnificent building program undertaken by Louis I in the 19th century. Between the Victory Gate (Siegestor) and the Hall of Generals (Feldherrnhalle), he had the monumental Ludwigstrasse built, along which he constructed the state library, the Ludwigs Church, and the University of Munich. Other projects commissioned by Louis were the King's Square (Königsplatz) with the Glyptothek ("Sculpture Gallery"), a museum that houses a collection of ancient and modern sculpture; the Propyläen, a magnificent gateway in the style of the Propylaea at Athens, Greece; and the Alte Pinakothek ("Old Picture Gallery"), which contains one of Europe's great collections of paintings. Louis's son Maximilian II (reigned 1848–64) built the broad Maximilienstrasse and the Maximilianeum, which now houses the Bavarian Parliament (Landtag).

In the past Munich suffered economically because of its distance from seaports and from the coal mines of the Ruhr region. But this situation improved when fuels other than coal came into general use. Munich shifted from heavy to light industry, to the manufacture, for example, of precision instruments and optical and electrical appliances, as well as the production of food, cosmetics, and clothing. The city has several of the largest breweries in Germany and is famous for its beer and its annual Oktoberfest celebration. Munich is a major tourist destination and a convention centre. Book publishing and printing and television production are also important. The city is a centre of the banking and financial industry and also has one of the largest wholesale markets in Europe for fruit, vegetables, and animal produce.

Munich is connected by rail to all the main cities of Germany and Austria, and *Autobahnen* (expressways) from Stuttgart, Nürnberg, and Salzburg converge on the city. Franz Josef Strauss Airport, located 17 miles (27 km) northeast of Munich, opened in 1992. A modern subway has been built in the city.

The University of Munich was moved from Landshut to Munich in 1826 by Louis I. Among the city's other important educational establishments are the Technical University of Munich, founded in 1868, and academies of art, music, philosophy, military studies, and film and television.

Munich has long been a centre for the arts. Music, especially opera, has flourished. In addition to the Bavarian State Opera Company and the Munich Philharmonic and other orchestras, there are the Bavarian State Dramatic Company and numerous private theatres. Important libraries include the Bavarian State Library, the University Library, and the library of the Deutsches Museum (a science library).

Munich has some outstanding museums and art galleries. The Alte Pinakothek houses the art treasures accumulated by the Wittelsbach family since the 16th century. Its collections of

Munich, with (left) the twin towers of the Church of Our Lady, and (right) the New Town Hall

Camerique—H. Armstrong Roberts

Renaissance-era German and Dutch paintings and Flemish Baroque paintings are especially strong, with many masterpieces by Albrecht Dürer, Peter Paul Rubens, and Anthony Van Dyck. In addition to the Alte Pinakothek and the Glyptothek, there are the Neue Pinakothek ("New Picture Gallery"), which houses Munich's main collection of 19th- and 20th-century art; the Bavarian National Museum, which contains German art and applied art since the Middle Ages; and the Residenz Museum, which has paintings, sculpture, furniture, and ceramics. The Deutsches Museum on an island in the Isar River is a huge and comprehensive museum of science, engineering, and technology. There are also the State Gallery of Modern Art and numerous small art galleries. Pop. (1995 est.) city, 1,244,676.

Munich, University of, in full LUDWIG MAXIMILIAN UNIVERSITY OF MUNICH, German LUDWIG-MAXIMILIANS UNIVERSITÄT MÜNCHEN, autonomous coeducational institution of higher learning supported by the state of Bavaria in Germany. It was founded in 1472 at Ingolstadt by the duke of Bavaria, who modeled it after the University of Vienna. During the Protestant Reformation, Johann Eck made the university a centre of Roman Catholic opposition to Martin Luther. In 1799 schools of economics and political science were established, and the following year King Maximilian Joseph moved the school to Landshut, giving it the name Ludwig Maximilian. The dukes of Bavaria continued their strong support for the school, and in 1826 King Louis I moved it to Munich. A technical school with courses in agriculture and forestry was founded in 1868. The university's faculty of Catholic theology continues to be influential, although a faculty of Protestant theology has been added. Affiliated with the University of Munich are more than 200 constituent institutes, seminars, and clinics.

Munich agreement (Sept. 30, 1938), settlement reached by Germany, Great Britain, France, and Italy that permitted German annexation of the Sudetenland in western Czechoslovakia. After his success in absorbing Austria into Germany proper in March 1938, Adolf Hitler looked covetously at Czechoslovakia, where about 3,000,000 people in the Sudeten area were of German origin. It became known in May 1938 that Hitler and his generals were drawing up a plan for the occupation of Czechoslovakia. The Czechoslovaks were relying on military assistance from France, with which they had an alliance. The Soviet Union also had a treaty with Czechoslovakia, and it indicated willingness to cooperate with France and Great Britain if they decided to come to Czechoslovakia's defense, but the Soviet Union and its potential services were ignored throughout the crisis.

As Hitler continued to make inflammatory speeches demanding that Germans in Czechoslovakia be reunited with their homeland, war seemed imminent. Neither France nor Britain felt prepared to defend Czechoslovakia, however, and both were anxious to avoid a military confrontation with Germany at almost any cost. In mid-September, Neville Chamberlain, the British prime minister, offered to go to Hitler's retreat at Berchtesgaden to discuss the situation personally with the Führer. Hitler agreed to take no military action without further discussion, and Chamberlain agreed to try to persuade his Cabinet and the French to accept the results of a plebiscite in the Sudetenland. The French premier, Édouard Daladier, and his foreign minister, Georges Bonnet, then went to London, where a joint proposal was prepared stipulating that all areas with a population that was more than 50 percent Sudeten German be returned to Germany. The Czechoslovaks were not consulted. The Czechoslovak government initially rejected the proposal but was forced to accept it reluctantly on September 21.

On September 22 Chamberlain again flew to Germany and met Hitler at Godesberg, where he was dismayed to learn that Hitler had stiffened his demands: he now wanted the Sudetenland occupied by the German army and the Czechoslovaks evacuated from the area by September 28. Chamberlain agreed to submit the new proposal to the Czechoslovaks, who rejected it, as did the British Cabinet and the French. On the 24th the French ordered a partial mobilization: the Czechoslovaks had ordered a general mobilization one day earlier.

In a last-minute effort to avoid war, Chamberlain then proposed that a four-power conference be convened immediately to settle the dispute. Hitler agreed, and on September 29, Hitler, Chamberlain, Daladier, and the Italian dictator Benito Mussolini met in Munich, where Mussolini introduced a written plan that was accepted by all as the Munich agreement. (Many years later it was discovered that the so-called Italian plan had been prepared in the German Foreign Office.) It was almost identical to the Godesberg proposal: the German army was to complete the occupation of the Sudetenland by October 10, and an international commission would decide the future of other disputed areas. Czechoslovakia was informed by Britain and France that it could either resist Germany alone or submit to the prescribed annexations. The Czechoslovak government chose to submit.

Before leaving Munich, Chamberlain and Hitler signed a paper declaring their mutual desire to resolve differences through consultation to assure peace. Both Daladier and Chamberlain returned home to jubilant, welcoming crowds relieved that the threat of war had passed, and Chamberlain told the British public that he had achieved "peace with honour. I believe it is peace in our time." Chamberlain's policies were discredited the following year, when Hitler annexed the remainder of Czechoslovakia in March and then precipitated World War II by invading Poland in September. The Munich agreement became a byword for the futility of appeasing expansionist totalitarian states, although it did buy time for the Allies to increase their military preparedness.

Munich Putsch (1923): *see* Beer Hall Putsch.

municipality, in the United States, urban unit of local government. A municipality is a political subdivision of a state within which a municipal corporation has been established to provide general local government for a specific population concentration in a defined area. A municipality may be designated as a city, borough, village, or town, except in the New England states, New York, and Wisconsin, where the name town signifies a subdivision of the county or state by area. The municipality is one of several basic types of local government, the others being counties, townships, school districts, and special districts.

Municipal corporations are organized under the applicable state constitution and laws, with powers of government expressly or implicitly conferred by that constitution and laws, and also by charter. Within the municipality, these powers are exercised by a governing body elected by the people. A municipality is basically the response of the state government to the need for certain public services (*i.e.,* waste disposal, police and fire protection, water supply, health services) in addition to what is available from the county or other local governments in the area.

In many European countries the law provides for types of local government units to which the term municipality may be applied—as in France (*commune*), Italy (*comune*), the Low Countries (*gemeente*), and most of the Scandinavian countries. Several other European countries, notably Great Britain and Germany, have a diversified system of local government in which several different categories exist. In Great Britain the term municipality is in general used only for the large boroughs (municipal corporations).

municipio, in the Iberian Peninsula and Latin America, a local civil administrative subdivision recognized by the national government. It may comprise one village or community, as is usual in Guatemala, or it may comprise a number of separate communities, as is usual in Mexico. A *municipio* of several villages always has a head village, or *cabecera,* in which is centred the national government's local offices and the Roman Catholic local hierarchy. It also commonly serves as a social centre for the province, region, or district.

municipium, plural MUNICIPIA, in antiquity, a community incorporated into the Roman state after the dissolution of the Latin League. Initially, inhabitants of such municipalities were considered Roman citizens without voting rights. As the Italian provinces were incorporated into the Roman state, residents of the *municipia* were registered in the tribes and accorded full political rights. These cities maintained a certain amount of autonomy, for they were permitted to retain their own governments as well as their local magistrates, who had limited judicial and financial powers. However, the *municipia* remained under the jurisdiction of Rome in matters of foreign policy, and they supplied Rome with troops and were not permitted to mint money. Eventually all Latin and Italian communities became *municipia* of Roman citizens.

The *municipium* system prevailed largely in Latin-speaking provinces but seldom occurred in the north or in the Greek-speaking eastern provinces. The chief sources of income for the *municipia* were donations from wealthy *municipes* (citizens of *municipia*), export and import taxes, and revenue from city lands. In the provincial *municipia* the local aristocracy constituted a council (*see* decurio) that supervised local politics and finances, thus subordinating the powers of the magistrates.

Munk, Kaj, in full KAJ HARALD LEININGER MUNK (b. Jan. 13, 1898, Maribo, Den.—d. Jan. 4, 1944, near Silkeborg), Danish playwright, priest, and patriot who was a rare exponent of religious drama with a strong sense of the theatre. He revived the "heroic" Shakespearean and Schillerian drama with writing whose passionate quality is not often found among Danish writers.

Munk studied at the University of Copenhagen, where he began his first produced play, *En idealist* (1928; Eng. trans. *Herod the King*). This was originally misunderstood by the critics, although it was acclaimed 10 years later.

Kaj Munk

By courtesy of the Royal Danish Ministry for Foreign Affairs, Copenhagen

In 1931 his *Cant* (on the rise and fall of Anne Boleyn) was a success, and *Ordet* (1932; *The Word*), a miracle play set among Jutland peasants, established him as Denmark's leading dramatist. *Ordet* later was made into a motion picture by the Danish director Carl Dryer. For his principal character, Munk often chose a dictator, or "strong man," whom he showed struggling in vain against God. *En idealist, Ordet,* and *Han sidder ved smeltediglen* (1938; *He Sits at the Melting-Pot*), a drama of Adolf Hitler's Germany, are his three best plays, though several others, such as *Cant, Kærlighed* (1926), and *I Brændingen* (1929), remain popular.

Five Plays, with preface and translations, was published in 1953. Munk was a conscientious and much-loved parish priest, and during World War II his outspoken sermons drew large numbers of persons to the ranks of the Resistance and led to his being killed by the Nazis.

Munkács (Ukraine): *see* Mukachovo.

Munkar and Nakīr, in Islāmic eschatology, two angels who test the faith of the dead in their tombs. After death, the deceased is placed upright in the grave by Munkar and Nakīr and asked to identify Muḥammad. The righteous will know that he is the messenger of God (*rasūl Allāh*) and be allowed to rest in peace until the Judgment Day. Infidels and sinners, however, not being able to reply, will be beaten by the two angels every day except Friday for as long as God deems necessary.

Munn v. Illinois (1877), case in which the U.S. Supreme Court upheld the power of government to regulate private industries.

The case developed as a result of the Illinois legislature's responding in 1871 to pressure from the National Grange, an association of farmers, by setting maximum rates that private companies could charge for the storage and transport of agricultural products. The Chicago grain warehouse firm of Munn and Scott was subsequently found guilty of violating the law but appealed the conviction on the grounds that the Illinois regulation represented an unconstitutional deprivation of property without due process of law.

The Supreme Court heard the appeal in 1877. Chief Justice Morrison Remick Waite spoke for the majority when he said that state power to regulate extends to private industries that affect the public interest. Because grain storage facilities were devoted to public use, their rates were subject to public regulation. Moreover, Waite declared that even though Congress alone is granted control over interstate commerce, a state could take action in the public interest without impairing that federal control.

Munn v. *Illinois,* one of the Granger cases (*see* Granger movement), was a watershed in the struggle for public regulation of private enterprise. Later court decisions, however, sharply curtailed the government's power to regulate business.

Münnich, Burkhard Christoph, Count (Graf) **von,** Russian BURKHARD KRISTOF MINIKH (b. May 9 [May 19, New Style], 1683, Neuenhuntorf, Oldenburg, Den.—d. Oct. 16 [Oct. 27], 1767, Tartu, Russia), military officer and statesman who was one of the major political figures in Russia during the reign of Empress Anna (reigned 1730–40) and who led the Russian Army to victory in the Russo-Turkish War of 1736–39.

After service in the French and Polish-Saxon armies, Münnich entered the service of Peter I the Great of Russia in 1721 and participated in the construction of the Ladoga Canal. In 1728 he was given the title of count and was appointed commander in chief of the Russian Army by Peter II. Subsequently, Münnich was made a field marshal and president of the war council (1732) by Anna (Ivanovna), whose government was dominated by German advisers. During the War of the Polish Succession (1733–35), Münnich captured Gdańsk (1734), and then, after persistently advocating an aggressive policy toward the Ottoman Empire, he led the Russian Army into the Crimea and Moldavia to fight the Turks. Despite complications resulting from fighting a war at a great distance from the political centre of Russia, Münnich conquered Perekop, Ochakov, and Azov (1736–38), won a major victory at Stavuchany near Khotin in northern Bessarabia (1739), and earned a reputation for being an outstanding military leader.

At the conclusion of the war (September 1739), he returned to St. Petersburg and resumed his influential position in the government. But when Anna died (Oct. 17 [Oct. 28], 1740), leaving her throne to her infant grandnephew Ivan VI and naming her favourite and chief adviser Ernst Johann Biron as regent, Münnich feared that Biron's widespread unpopularity would cause the entire ruling German clique to lose power. He, therefore, arrested Biron in the middle of the night of Nov. 8–9 (Nov. 19–20), 1740, and sent him to Siberia. Münnich made Ivan's mother, Anna Leopoldovna, regent and personally assumed the role of first minister. A year later, however, he and Anna Leopoldovna were deposed by Elizabeth, daughter of Peter the Great, and Münnich was exiled to Siberia. After Peter III released him in 1762, he served Catherine II the Great as director general of the Baltic ports.

Munonye, John (b. April 28, 1929, Akokwa, East Central state, Nigeria), African educator and novelist known for his ability to present the vitality of the contemporary Nigerian scene.

Munonye was educated at Christ the King College in Onitsha (1943–47) and did his university work at Ibadan, graduating in 1952. He was then employed by the Nigerian Ministry of Education as an inspector of education, became principal of the Advanced Teaching Training College at Owerri, and served as chief inspector for Eastern Nigeria. In 1977 he left the education ministry to teach and devote more time to writing.

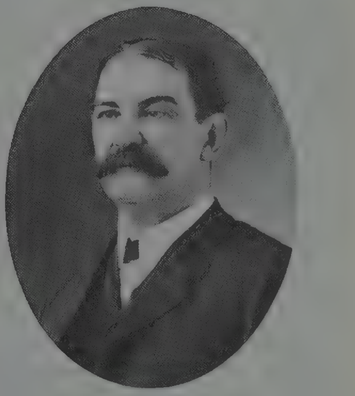
Munonye's first novel, *The Only Son* (1966), describes the separation of a mother from her son because of religious differences. *Obi* (1969) is the sequel to *The Only Son;* this novel broadens the theme to an extended family and the clash between African traditions and European beliefs. In both books the family emerges as a powerful force that acts as a buttress in times of turmoil. In *Oil Man of Obange* (1971) the protagonist abandons the traditional life in search of a Western education for his children and the religious life of the church, only to be plagued by constant misfortune and finally his own death. *A Wreath for the Maidens* (1973) deals with friendship and the impact of the civil war in Nigeria. Munonye introduced a somewhat lighter theme in *A Dancer of Fortune* (1974), a satire of modern Nigerian business, and returned to the family of his first two novels in *Bridge to a Wedding* (1978).

Muñoz Marín, Luis (b. Feb. 18, 1898, San Juan, P.R.—d. April 30, 1980, San Juan), statesman who served four four-year terms as the elected governor of Puerto Rico. Early in his career he advocated independence for the island but later worked for its social and economic progress under U.S. guidance.

Muñoz Marín, son of the publisher-patriot Luis Muñoz Rivera, was educated in the United States, where his father served as resident commissioner (1910–16). After serving as secretary to the commissioner (1916–18), studying law, and writing two books, he returned to Puerto Rico (1926) and edited the newspaper *La Democracia,* founded by his father. Elected to the Puerto Rican Senate (1932), he aligned himself with the radicals in advocating complete independence from the United States. As a result, he was expelled from the Liberal Party (1937). In 1938 he organized the Popular Democratic Party, which won its first victory in 1940 and made Muñoz Marín president of the Senate, a post he held until 1948.

Changing his mind about independence, Muñoz Marín worked closely with the U.S.-appointed governor, Rexford G. Tugwell, to improve housing, farming, and industrial conditions. His Operation Bootstrap was successful as a program for rapid economic growth. When the U.S. granted Puerto Rico the right to elect its own governor (1948), Muñoz Marín was overwhelmingly elected and then reelected in 1952, 1956, and 1960. During his governorship, he achieved a lifelong goal in changing Puerto Rico's status to that of a commonwealth. In December 1963 he received the U.S. Presidential Medal of Freedom. He refused to run for a fifth term as governor in 1964, stepping aside to serve once again in the Senate of Puerto Rico.

Muñoz Rivera, Luis (b. July 17, 1859, Barranquitas, P.R.—d. Nov. 15, 1916, Santurce), statesman, publisher, and patriot who devoted his life to obtaining Puerto Rico's autonomy, first from Spain and later from the United States.



Muñoz Rivera

By courtesy of the Organization of American States

In 1889 Muñoz Rivera founded the newspaper *La Democracia,* which crusaded for Puerto Rican freedom from Spanish domination. He became a leader of the autonomist parties, and in 1897 he was instrumental in obtaining Puerto Rico's charter of home rule from Spain. He soon became secretary of state and later president of the first autonomist Cabinet. He resigned in 1899 after the United States put an end to Puerto Rico's short-lived home rule.

Spending the remainder of his life primarily in the United States, Muñoz Rivera continually advocated the cause of Puerto Rico's independence. He published a magazine in New York City to acquaint North Americans with the plight of his homeland. In 1910 he became Puerto Rico's resident commissioner in Washington, D.C. He died just before passage of the Jones Bill, for which he had fought and which gave Puerto Rico a large measure of self-government. Muñoz Rivera's son Luis Muñoz Marín was governor of Puerto Rico from 1949 to 1965.

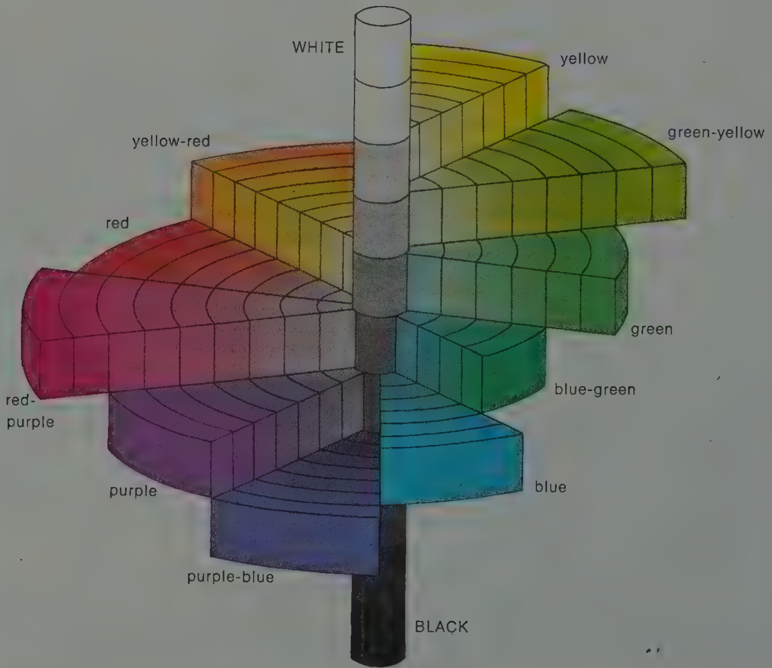
Munro, H.H., in full HECTOR HUGH MUNRO, pseudonym SAKI (b. Dec. 18, 1870, Akyab, Burma [Myanmar]—d. Nov. 14, 1916, near Beaumont-Hamel, Fr.), Scottish writer and journalist whose stories depict the Edwardian social scene with a flippant wit and power of fantastic invention used both to satirize social pretension, unkindness, and stupidity and to create an atmosphere of horror.

Born the son of an officer in the Burma police, Munro was sent at the age of two to live with his aunts near Barnstaple, north Devon. He later took revenge on their strictness and lack of understanding by portraying tyrannical aunts in many of his stories about children. Educated at Exmouth and at Bedford grammar school, in 1893 he joined the Burma police but was invalided out. Turning to journalism, he wrote political satires for the *Westminster Gazette* and in 1900 published *The Rise of the Russian Empire*, a serious historical work.

After acting as foreign correspondent for *The Morning Post* in the Balkans, Russia, and Paris, in 1908 he settled in London, writing short stories and sketches: *Reginald* (1904), *Reginald in Russia* (1910), *The Chronicles of Clovis* (1912), and *Beasts and Super-Beasts* (1914). Written in a style studded with epigrams and with well-contrived plots often turning on practical jokes or surprise endings, his stories reveal a vein of cruelty in their author and a self-identification with the *enfant terrible*. Among his most frequently anthologized works are "Tobermory," "The Open Window," "Sredni Vashtar," "Laura," and "The Schartz-Metterklume Method." His novel *The Unbearable Bassington* (1912) describes the adventures of a fastidious and likable but maladjusted hero, in a manner anticipating that of the early Evelyn Waugh. Munro was killed in action in World War I.

Munsell colour system, method of designating colours based on a colour arrangement scheme developed by the American art instructor and painter Albert H. Munsell. It defines colours by measured scales of hue, value, and chroma, which correspond respectively to dominant wavelength, brightness, and strength or purity. The system is used internationally for specifying opaque colours of dyed or pigmented surfaces.

Munsell introduced his system in 1913 with the publication of the *Atlas of the Munsell Color System,* which featured 15 colour charts consisting of several hundred colour chips arranged according to the three characteristics of hue, value, and chroma. After Munsell's death in 1918, the Munsell Color Company, Inc., carried on his work, publishing a new edition of the *Atlas* under the title *Munsell Book of Color* (1929). A three-dimensional representation of the Munsell system, sometimes called the Munsell colour tree, is shown in the figure.



Munsell colour tree

Munsey, Frank Andrew (b. Aug. 21, 1854, Mercer, Maine, U.S.—d. Dec. 22, 1925, New York City), newspaper and magazine publisher, a dominant figure in the trend toward journalistic consolidation in the United States.

Munsey

By courtesy of the Library of Congress, Washington, D.C.

Viewing his publications purely as moneymaking enterprises, Munsey administered them in detail, maintained an inoffensive and colourless editorial policy, and acquired numerous papers in order to suppress them in favour of stronger competitors also owned by him.

After managing a telegraph office in Augusta, Maine, he went to New York City in 1882 and immediately founded the *Golden Argosy,* a magazine for children. Six years later it was renamed the *Argosy Magazine* and converted into an adult magazine. *Munsey's Magazine* (founded 1889; called *Munsey's Weekly* until 1891) was the first cheap (originally ten cents a copy) general-circulation, illustrated magazine in the United States. His most important newspaper purchases were the *Baltimore News* (1908) and several papers in New York City: the *Star* (1891), the *Press* (1912), *The Sun* and the *Evening Sun* (1916), the *Herald* and its associate, the *Evening Telegram* (1920), and *The Globe* (1924). Between 1916 and 1924 some of these papers disappeared in a series of profitable mergers. On his death most of his fortune (estimated at $20,000,000) went to the Metropolitan Museum of Art, New York City.

Munshi Abdullah bin Abdul Kadir: *see* Abdullah bin Abdul Kadir.

Münster, *Regierungsbezirk* (administrative district), northwestern North Rhine-Westphalia *Land* (state), northwestern Germany. Münster is bordered by The Netherlands to the west, Lower Saxony *Land* to the north, and Detmold district to the east, Arnsberg to the south, and Düsseldorf to the southwest. The district occupies an area of 2,663 square miles (6,897 square km) and is coextensive with the northwestern portion of the historic region of Westphalia (*q.v.*). Münster *Regierungsbezirk* takes its name from the name of the second largest city and administrative seat of the district.

The heavily industrialized Ruhr urban complex and the immense Ruhr bituminous coalfield extend into southern Münster between the Emscher valley (south) and Lippe River (north). Three cities in the Ruhr complex of Münster—Gelsenkirchen, the largest city in the district, Recklinghausen, and Bottrop—have populations of more than 100,000 inhabitants. Population densities in these urban areas often exceed 5,200 persons per square mile (2,000 per square km). A varied industrial structure exists, based largely on coal mining, iron and steel processing, glassworks, chemical plants, and electrical power plants.

The wide expanse of the Münsterland lowlands, occupying more than three-quarters of the district's total land area, is situated between the Ruhr region and the Teutoburger Wald (Teutoburg Forest) escarpment near the northeastern border. The lowlands average between 160 and 330 feet (50 and 100 m) above sea level and are fairly level. Only a few groups of low sandstone and limestone hills, including the Baumberge, Haard, and Beckumer Berge, rise between 330 and 650 feet to break the lowland landscape. Due to the proximity of limestone, clay, and Ruhr coal, the Beckumer Berge has become a major centre of the German cement industry. In central Münsterland fertile clay soils and high rainfall support ideal livestock-grazing pastures; the region is the Ruhr's largest supplier of fresh dairy products, meat, and bacon. Lands to the north and west, however, are covered by less productive glacial-outwash sands and patches of marshland and heath. Here a number of smaller cities, including Bocholt, Rheine, and Mesum, have developed textile and clothing industries. The heart of the lowland basin is the city of Münster, a service centre and important traffic junction located on the 168-mile- (270-km-) long Dortmund-Ems-Kanal. The canal traverses central Münsterland from north to south, providing a navigable waterway from the Ruhr region to the North Sea.

The Westphalians of Münster *Regierungsbezirk* are descendants of the western Saxons and speak a Low German dialect. More than two-thirds of the people are Roman Catholics and about one-third are Protestants. The predominant rural settlement pattern is one of widely scattered or loosely grouped farms surrounded by oak groves, forest plots, and hedged fields. Farmhouses tend to be large and often have belonged to the same family for centuries. Many old moated castles, including those of Nordkirchen, Raesfeld, and Gemen, and manor houses of the nobility have been preserved. Higher education in the district is centred at Westfälische Wilhelms University in Münster. Pop. (1989 est.) 2,408,271.

Münster, city, North Rhine-Westphalia *Land* (state), western Germany, on the small Münster-Aa River and the Dortmund-Ems Canal.

The community was first mentioned as Mimigernaford ("Ford over the Aa") when Liudger (Ludger), a missionary sent by Charlemagne, founded a bishopric there in 804. It was renamed Münster in 1068 and was chartered in 1137. Münster's favourable position at the intersection of long-distance trade routes and its wool trade with England gave it early economic importance and contributed to its influential position in the Hanseatic League in the 13th and 14th centuries. The Anabaptists, who constituted the radical wing of the Reformers, proclaimed their "kingdom of a thousand years" there in 1534. In 1535 Münster was captured, and in 1536 the Anabaptists' "king," John of Leiden (Jan Beuckelson), was executed with two of his accomplices; the iron cages in which their bodies were publicly exhibited still hang in the Gothic tower of St. Lambert's Church. A neutralized Münster was the scene of the peace congress (1645–48) that resulted in the Treaty of Westphalia. In 1815 Münster became the capital of Prussian Westphalia.

Former episcopal palace, now the Westphalian Wilhelm University of Münster, Ger.
K. Praedel—ZEFA

The city suffered widespread destruction in World War II, but most of its historic buildings have been restored or rebuilt, including the gabled houses and arcades of the Prinzipalmarkt, the Gothic town hall (1335) with its Friedenssaal ("Peace Hall"), the cathedral (1225–65), and several churches—St. Ludger's, St. Lambert's, the Church of Our Lady, St. Martin's, and St. Maurice's (all 13th–15th century). The work of Johann Conrad Schlaun, a Westphalian architect of the Baroque period, is evident in the Westphalian Wilhelm University of Münster (founded 1780, a full university from 1902; in the 18th-century an episcopal palace), the bailiff's high court, and several churches. Notable modern structures include the state Chamber of Commerce building, municipal administrative offices, the theatre, the railway station (1956), and the Münsterland Hall.

The centre of Westphalian culture, Münster has several cultural and scientific museums, as well as technical institutes and schools for the arts. The city's industries include the manufacture of machinery and textiles. Münster is also the centre of the Westphalian cattle-breeding market. Pop. (1993 est.) 267,072.

Munster, Old Irish MUMA, the southwestern province of the Republic of Ireland, comprising the counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford. It was historically one of the "fifths" (ancient provinces, or kingdoms) of Ireland. Geographically, the area is divided by the Sliabh Luachra Mountains into Desmond to the south and Thomond to the north. The power of the kingdom originally lay in the south, where the ruling Érainn clan had their chief fortress at Temuir Érann in the Ballyhoura Hills. Inroads into northern Munster made by the neighbouring men of Leinster were fought off by a people known as the Eoghanachta, who became rulers of Munster from about AD 400. They later unsuccessfully challenged the Leinster high kings and in the 10th century failed to defend their own land against Viking raiders who settled in Waterford and Limerick. After the Anglo-Norman invasion of the mid-12th century, the feudal families of Fitzgerald, earls of Desmond, and of Butler, earls of Ormonde, became all-powerful in the province.

Münster, Sebastian (b. Jan. 20, 1488, Ingelheim, electorate of Mainz [Germany]—d. May 23, 1552, Basel, Switz.), German cartographer, cosmographer, and Hebrew scholar whose *Cosmographia* (1544; "Cosmography") was the earliest German description of the world and a major work in the revival of geographic thought in 16th-century Europe.

Appointed professor of Hebrew at the University of Basel in 1527, Münster edited the Hebrew Bible, 2 vol. (1534–35), which was accompanied by a literal Latin translation and a number of annotations. In 1540 he published a Latin edition of Ptolemy's *Geographia,* illustrated with 27 woodcut maps after Ptolemy and 21 of Münster's own design. Of about 40 editions of the *Cosmographia* printed in Germany, the 1550 edition, containing portraits, city views, and costume illustrations, is the most valued. His other works include *Dictionarium trilingue* (1530; "Trilingual Dictionary"), in Latin, Greek, and Hebrew, and *Mappa Europae* (1536; "Map of Europe").

Münster, detail from an engraving, about 1550
Historia-Photo

Münster cheese, Münster also spelled MUENSTER, semisoft cow's-milk cheese that originated in a monastery in Alsace. Though noted for its pungent earthy aroma when ripe, Münster is considerably milder as a young cheese. It is customarily flavoured with wild cumin and formed into disks, approximately 8 inches (20 cm) in diameter and 2 inches (5 cm) thick. The exterior is dyed orange, and the interior attains a rich, creamy gold colour as it ripens. Münster oozes but, in spite of its softness, is never runny. Many countries now make Münster cheese, notably Germany, the Scandinavian countries, and the United States. Most such imitations are quite bland in character and pale in colour. German Münster is closest to the original.

Münsterberg, Hugo (b. June 1, 1863, Danzig, Prussia [now Gdańsk, Poland]—d. Dec. 16, 1916, Cambridge, Mass., U.S.), German-American psychologist and philosopher who was interested in the applications of psychology to law, business, industry, medicine, teaching, and sociology.

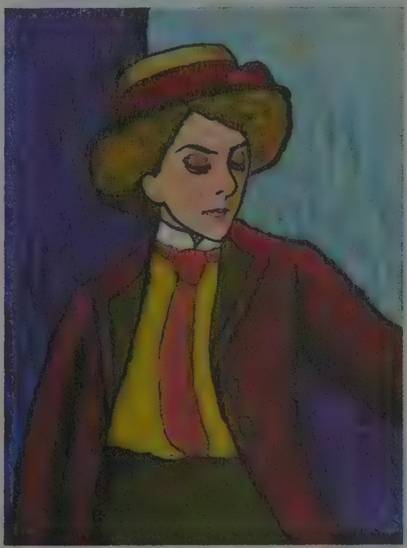
Münsterberg took his Ph.D. in 1885 and his M.D. at the University of Heidelberg in 1887. After his appointment as an instructor at the University of Freiburg, where he established a psychological laboratory, he began publishing *Beiträge zur experimentellen Psychologie* (1889–92; "Contributions to Experimental Psychology"). His work was criticized by German colleagues but won the approval of the American psychologist William James, who invited him to be a visiting professor at Harvard University (1892–95). Münsterberg returned to the United States permanently in 1897 to direct the Harvard psychological laboratory, and he became increasingly absorbed with the application of psychology to a number of different areas, including psychic research. He is sometimes credited with being the founder of applied psychology. His works include *Psychology and the Teacher* (1909), *Psychology and Industrial Efficiency* (1913), and *Psychology: General and Applied* (1914).

Münsterberg
By courtesy of Harvard University Archives

Münsterland, lowland region, North Rhine–Westphalia *Land* (state), northwestern Germany. It extends between the Emsland (north), the Teutoburg Forest (east), the Lippe River (south), and the Lower Rhine River and the Dutch-German border (west). The region was the territory ruled by the bishops of Münster (until 1803). It is predominantly agricultural, and, with the exception of Münster in the centre, there are no large cities except on its outer fringes. Wild horses roam the Merfelder Swampland, near Dülmen, in the west-central part of the region.

Münter, Gabriele (b. Feb. 19, 1877, Berlin, Ger.—d. May 19, 1962, Murnau, W.Ger.), German painter closely affiliated with the abstractionist group Der Blaue Reiter ("The Blue Rider"), although her emotive, colouristic works were influenced most strongly by the Postimpressionists and the Fauves.

Münter studied the piano throughout her youth but in 1902 entered the Phalanx School of art in Munich, where within a year she became the student and companion of Wassily


"Portrait of a Young Woman," oil on canvas by Gabriele Münter, 1909
Milwaukee Art Museum, gift of Mrs. Harry Lynde Bradley

Kandinsky. The two traveled widely, settling in Murnau in 1908.

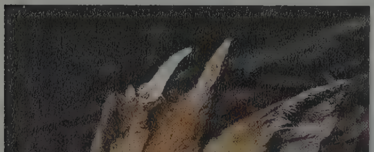
Münter exhibited paintings at the Der Blaue Reiter exhibitions of 1911 and 1912. While sharing the group's characteristic intensity of colour and expressiveness of line derived in part from folk painting, her still lifes, figures, and landscapes remained uniquely representational. Notable works include "Portrait of a Young Woman" (1909) and "Red Cloud" (1911).

Munthe, Axel Martin Fredrik (b. Oct. 31, 1857, Oskarshamn, Sweden—d. Feb. 11, 1949, Stockholm), Swedish physician, psychiatrist, and writer whose book *The Story of San Michele* (1929), an account of his experiences as a doctor in Paris and Rome and in semiretirement at the villa of San Michele on Capri, achieved immense popularity in its original English version and in many translations. Its lasting success may be attributed to its intimate revelation of an unusually vital personality and its sympathetic description of suffering.

Munthe studied at Uppsala, Montpellier, and Paris, where he worked under Jean-Martin Charcot, the pioneer neurologist. After practicing in Paris and Italy (where he was awarded a gold medal for his work during the Messina earthquake), he became in 1908 physician-in-ordinary to the Swedish royal family. His other books of reminiscences, *Memories and Vagaries* (1898) and *Letters From a Mourning City* (1887), never achieved the success of *San Michele.*

muntjac, also called BARKING DEER, any of about seven species of small- to medium-sized Asiatic deer that make up the genus *Muntiacus* in the family Cervidae (order Artiodactyla).

Called barking deer because of their cry, muntjacs are solitary and nocturnal, and they usually live in areas of thick vegetation. They are native to India, Southeast Asia, and southern China, and some have become established in parts of England and France. Fea's muntjac (*M. feae*), of Myanmar (Burma) and Thailand, is an endangered species.



Chinese muntjac (*Muntiacus reevesi*)

Kenneth W. Fink—Root Resources

Most species of muntjac stand 40–65 cm (15–25 inches) high at the shoulder and weigh 15–35 kg (33–77 pounds). Depending on the species, they range from grayish brown or reddish to dark brown. Males have tusklike upper canine teeth that project from the mouth and can be used to inflict severe injuries. The short antlers have one branch and are borne on long bases from which bony ridges extend onto the face (hence another common name, rib-faced deer); the female has small knobs in place of antlers.

A previously unknown species of muntjac was discovered in the Vu Quang Nature Reserve of northern Vietnam in 1993–94. It was named the giant muntjac because it appears to be larger than other species, with an estimated weight of 40–50 kg.

Müntzer, Thomas, Müntzer also spelled MÜNZER, or MONCZER, Latin THOMAS MONETARIUS (b. sometime before 1490, Stolberg, Thuringia [Germany]—d. May 27, 1525, Mühlhausen), leading German radical Reformer during the Protestant Reformation, and the leader of the abortive Peasants' Revolt in Thuringia in 1524–25. A controversial figure in life and in death, Müntzer is regarded as a significant force in the religious and social history of modern Europe. Marxists in the 20th century viewed him as a precursor in the struggle for a classless society.

Early life and career. Thomas Müntzer was the son of a burgher in Stolberg in the Harz Mountains. Of his childhood and youth very little is known. His name appears in the 1506 register of the University of Leipzig, and in 1512 he attended the University of Frankfurt an der Oder, later earning the academic ranks of master of arts and bachelor of theology. Müntzer became a linguistic specialist in Latin, Greek, and Hebrew and an accomplished scholar of ancient and humanistic literature—particularly the Old and New Testaments. He was an assistant teacher in Halle (Saale) in 1513 and a clergyman as well as a teacher in Aschersleben in 1514 and 1515. In these capacities he represented the middle class in its striving for church reforms. He initiated various secret alliances in order to achieve the reforms.

From 1516 to 1517 Müntzer worked as a prior at Frohse monastery at Aschersleben; in 1517–18 he taught at the Braunschweig Martineum (city secondary school) until, in 1518, he was attracted to Martin Luther and his ideas of reform. The designation Martinian was first applied to Müntzer in 1519 after he spoke out against the Franciscan monastic order, the Roman Catholic ecclesiastical hierarchy, and the veneration of the saints. He early showed himself to be an independent thinker. After occasional participation in debates between Luther and the German theologian Johann Eck in Leipzig, he pursued intensive literary studies at the monastery of Beuditz at Weissenfels (1519–20). There he developed, especially under the influence of mysticism, his own view of the Reformation. From an action-hungry conspirator in local burgher plots he became a reformer who began to see the work inaugurated by Luther as a fundamental change in both ecclesiastical and secular life, and therefore as a revolution. He henceforth judged Luther's position by this criterion.

In Zwickau (1520–21) Müntzer prospered as a pastor in the socially tense condition that existed between the upper classes and early miners' guilds. In this work he sided with the common people, who seemed to him to be the executors of the divine law and will on earth. More and more he found himself opposed to Roman Catholic practices as well as to the reform concepts of the Lutherans. He increasingly adopted the sectarian view that true authority lay in the inner light given by God to his own, rather than in the Bible, a view taught by Nikolaus Storch, a leader of a radical reform group known as the "Zwickau prophets." Driven away from Zwickau, Müntzer sought on trips to Saaz (Žatec) and Prague (1521) to win to his viewpoint the Taborites, a Bohemian group that followed the teaching of Jan Hus, a 15th-century reformer. Müntzer became fully aware of his opposition to Luther in 1522 at Nordhausen, where, in a struggle against Luther's supporters, his theological differences of opinion with them became more pronounced. For the first time it was the Lutherans who were to effect his expulsion from a city.

Müntzer's reform movement. Although he began his religious revolt by following Luther's theological doctrines, Müntzer soon went his own way. Believing that teachings came from the spirit, he placed them in opposition to the Lutheran doctrines of justification (justification by faith alone) and of the authority of Scripture (Scripture as the exclusive source of divine truth). As an exponent of the supremacy of the inner light of the Holy Spirit as against the authority of Scriptures, Müntzer was said by Luther to have swallowed the Holy Spirit, "feathers and all."

The revolutionary aspect of Müntzer's theology lay in the link he made between his concept of the inevitable conquest of the anti-Christian earthly government and the thesis that the common people themselves, as the instruments of God, would have to execute this change. He believed that the common people, because of their lack of property and their unspoiled ignorance, would disclose the will of God.

Müntzer arrived in Halle at the end of 1522. By his preaching in Glaucha, he won numerous disciples. Here he may also have met his later wife, the nun Ottilie von Gersen. From this union there were two children. Before Easter of 1523, Müntzer found employment as pastor of a Saxon community in Allstedt, near the Mansfeld mining area. His most important religious, liturgical, and political writings originated here. They included *German Church Office, German-Protestant Mass, Protestation or Defense . . . Regarding the Beginning of the True Christian Faith and Baptism, Of Written Faith,* and *Precise Exposure of False Belief.* Here, too, he drafted a speech, "Motivation for Defense," and delivered his "Princes' Sermon," in which he unsuccessfully tried to mold those princes of Saxony who were inclined toward Reformation principles into a league for resistance against what he called the anti-Christian nobility and for the protection of his own preaching. Built upon the idea of "Christian unification" and also as a self-defense organization, the Allstedt alliance originated in 1524 and remained the centre of his doctrine until the fall of 1524, when he left Allstedt.

The Peasants' Revolt. In Mühlhausen he organized the working classes into a group called the "Eternal Covenant of God" and lent a resolute character to the inner-state movement (based on the rule of the elect who are known by their inner experience of conversion) that had lasted since 1523. After another expulsion he went to Nürnberg, where his main political writings were published. He then went on to Hegau and Klettgau, the area where the Peasants' Revolt (an abortive revolt in 1524–25 against the nobles over rising taxes, deflation, and other grievances) was beginning, and stayed through the winter in Griessen.

His experience with the rising insurrection impelled him to go back to Mühlhausen, which became the centre of the middle German revolt (after the overthrow of the governing council and the formation of what the insurgents called an "eternal council" in March 1525). Following Müntzer's dogmatic program, the common people triumphed in April–May 1525 over the religious and civil authorities. Cities and even some of the lesser nobility joined the alliance. Müntzer and his followers lent determination and consistency to the revolt. They were not, however, capable of overcoming the local and regional narrow-mindedness of the people. In the Battle of Frankenhausen, May 15, 1525, they were defeated by the superior strength of the princes.

Out of egoistical, material, and provincial motives, Müntzer dismissed resistance to his movement as a revolt against God. He believed that only if the common people were to realize the law of God within themselves, and place group interests above those of the individual, would they be capable of demonstrating the will of God externally for the transformation of society. Müntzer's work was mainly concerned with the religious and ethical training of the peasants, but in expecting them to comprehend his concept of a future society without social and legal distinctions, he demanded too much. During the rebellion, Müntzer tried to relate the battle of the peasants, tradesmen, and commoners about immediate concerns with that of the liberation of all Christendom and adapted himself to the various groups' everyday concerns. The collapse of the revolt seemed to him the judgment of God on the as yet unpurified people but not synonymous with the defeat of his idea of a new society. Müntzer was taken prisoner and tortured and on May 27, at the princes' camp at Mühlhausen, was tried and executed. (M.Be./Ed.)

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Munufia (Egypt): *see* Minūfīyah, Al-.

Münzer, Thomas: *see* Müntzer, Thomas.

Munzinger, Werner (b. April 21, 1832, Olten, Switz.—d. Oct. 27, 1875, near Lake Assal (Ausa), Abyssinia [now Djibouti]), Swiss linguist and explorer particularly noted for his travels in what is now Eritrea.

Munzinger studied natural science, Oriental languages, and history in Bern, Munich, and Paris and then went to Egypt to study Arabic further. Later, as leader of a trading expedition, he went to various parts of the Red Sea, establishing headquarters at Mitsiwa, in northern Abyssinia (now Massawa, Eritrea) on the Red Sea. In 1855 he moved to Keren and explored the surrounding territory during the next six years. In 1861 he joined an expedition under Theodor von Heuglin to central Africa but left the expedition in November in northern Abyssinia, proceeding along the Gash and Atbara rivers to Khartoum (now in The Sudan). Thence, having in the meantime succeeded Heuglin as leader of the expedition, in 1862 he traveled to Kordofan (Sudan), failing, however, in his attempt to reach Darfur and Wadai. After a short stay in Europe in 1863, Munzinger returned to the north and northeast borderlands of Abyssinia, and in 1865, the year of the annexation of Mitsiwa by Egypt, he was appointed British consul at that town. He rendered valuable aid to the Abyssinian expedition of 1867–68, among other things exploring the almost unknown Afar country (now Djibouti). In 1868 Munzinger was appointed French consul at Mitsiwa and in 1871 was given the title of bey and made governor of that town by the khedive Ismail. In 1870, with Captain S.B. Miles, Munzinger visited southern Arabia.

As governor of Mitsiwa he annexed to Egypt two provinces of northern Abyssinia, and in 1872 he was made pasha and governor-general of the eastern Sudan. It is believed that it was on his advice that Ismail sanctioned the Abyssinian enterprise, but in 1875 the command of the Egyptian troops in northern Abyssinia was taken from Munzinger, who was selected to command a small expedition intended to open up communication with Menilek II, king of Shewa (Shoa), a potential ally of Egypt. Munzinger left the Gulf of Tadjura for Ankober with a force of 350 men and an envoy from Menilek. On reaching Lake Assal, the expedition was attacked during the night, and Munzinger, with his wife and nearly all his companions, was killed.

muon, subatomic particle similar to the electron but 207 times heavier; it has two forms, the negative muon and its positive antiparticle. Discovered in 1936, the muon, because of its mass, was at first thought to be the particle predicted by the Japanese physicist Yukawa Hideki (1935) to explain the strong interaction that binds protons and neutrons together in atomic nuclei. It has since been discovered, however, that a muon never reacts with nuclei or other particles through the strong interaction; rather, it decays by the weak interaction into an electron and two kinds of neutrinos. Because muons are charged, before decaying they lose energy by knocking electrons out of atoms (ionization). At high particle velocities close to the speed of light, ionization dissipates energy in relatively small amounts, so muons in cosmic radiation are extremely penetrating and can travel thousands of metres below the Earth's surface.

Muong, ethnic minority in Vietnam, located in the mountainous area southwest of Hanoi. Considered the only surviving descendants of the early Vietnamese, the Muong, unlike the lowland northern Vietnamese, have been little influenced by the Chinese. They staged unsuccessful rebellions against the French-ruled Vietnamese in 1822, 1833, and in the 1880s. Their language, called Muong, is a subset of the Vietic branch of Mon-Khmer, a language family of Austroasiatic stock. They numbered about 1,100,000 in the late 20th century.

The Muong social structure is patrilineal and has as its foundation the extended family; only males own property. Originally, the Muong had an organized feudal system of landed nobility (including a headman for territorial units) and a peasant class. Although the upper classes still have some privileges over the peasant class, today private ownership of land has gradually replaced ownership by the nobility.

The Muong economic base is agrarian; wet rice is grown on terraced land, and dry rice is also cultivated. They raise pigs, oxen, buffalo, and chickens; hunting is done in order to provide meat for festivals. The Muong gather wood and cinnamon for trade. They live in clusters of 10–25 houses, portions of which are used to hold animals and store crops. A number of their towns have become trading centres. The Muong practice a religious animism, worshiping ancestral and supernatural spirits, many of which are also recognized by the northern Vietnamese.

muonium, short-lived quasi-atom composed of a positive muon (an antiparticle), as nucleus, and an ordinary negative electron. It is formed when a positive muon captures an atomic electron after being slowed down in matter. Muoniums form a few compounds with gases such as nitrogen dioxide and ethylene. Muonium research throws some light on the puzzling nature of muons (essentially heavy electrons) and their relation to ordinary electrons.

Muqannaʿ, al- (Arabic: "The Veiled One"), byname of HĀSHIM IBN ḤĀKIM (d. 779), religious leader, originally a fuller (cloth processor) from Merv, in Khorāsān, who led a revolt in that province against the ʿAbbāsid caliph al-Mahdī. Preaching a doctrine combining elements of Islām and Zoroastrianism, al-Muquannaʿ carried on warfare for about three years in the field and for two years longer in his fortress of Sanam before he was eventually defeated and committed suicide. He was the hero of the narrative poem *Lalla Rookh* (1817) by Thomas Moore.

Muqayyar, Tall al-, also spelled TELL EL-MUQAYYAR (Mesopotamian site): *see* Ur.

Muqdisho (city, Somalia): *see* Mogadishu.

Muqi: *see* Mu-ch'i.

Muqtafī, al- (b. April 1096, Iraq—d. 1160, Iraq), ʿAbbāsid caliph during the later years of Seljuq influence in Iraq.

Al-Muqtafī became caliph in 1136 and soon embarked upon a policy of strengthening his political authority vis-à-vis the Seljuqs, whose princes at the time were feuding among themselves. Consequently, he was able to annex one district in Iraq after another. In 1156 he recognized the Seljuq prince Sulaymānshāh as sultan, provided that the latter would respect al-Muqtafī's autonomy in Iraq. Al-Muqtafī even supported him in some military campaigns, but, when Sulaymānshāh was defeated by his rival Muḥammad, al-Muqtafī himself was besieged in Baghdad by Muḥammad's forces. The siege was lifted after several months, and al-Muqtafī thereafter was able to control military and political affairs in Iraq and the surrounding regions.

Mura, South American Indian people of the Amazon tropical forest of western Brazil. The Mura originally inhabited the right bank of the lower Madeira River near the mouth of the Jamari River. Contact with whites led them to adopt guerrilla tactics; they spread downstream to the Purus River, raiding sedentary farmers along the way. By 1774 the Mura expansion had been countered by a local Brazilian campaign of extermination. In 1786, weakened by disease and by losses suffered at the hands of the aggressive Mundurukú, the Mura made peace with the whites.

The Mura are primarily fishermen of the rivers, admired for their skill. Their villages are very small, without much organization. A family spends much of its time in its canoe. The Mura are fast approaching extinction as an ethnic population. They now speak Portuguese, and few of them remember the Mura language. They are nominally Christian, but their rituals include the use of a narcotic made from the parica tree, flagellation rites, and shamanism.

murābiṭ (Islām): *see* marabout.

Murābiṭūn, al- (Berber confederation): *see* Almoravids.

Murad, also spelled AMURATH, name of Ottoman sultans grouped below chronologically and indicated by the symbol •.

• Murad I (b. 1326?—d. June 20/28 or August 28, 1389, Kosovo, Serbia), Ottoman sultan who ruled from 1360 to 1389. Murad's reign witnessed rapid Ottoman expansion in Anatolia and the Balkans and the emergence of new forms of government and administration to consolidate Ottoman rule in these areas.

Murad ascended the throne in succession to his father, Orhan. Shortly after Murad's accession, his forces penetrated western Thrace and took Adrianople and Philippopolis and forced the Byzantine emperor John V Palaeologus to become a vassal. Adrianople was renamed Edirne, and it became Murad's capital. In 1366 a crusade commanded by Amadeus VI of Savoy rescued the Byzantines and occupied Gallipoli on the Dardanelles, but the Turks recaptured the town the next year. In 1371 Murad crushed a coalition of southern Serbian princes at Chernomen on the Maritsa River, took the Macedonian towns of Dráma, Kavála, and Seres (Sérrai), and won a significant victory over a Bulgarian-Serbian coalition at Samakow (now Samokovo). These victories brought large territories under direct Ottoman rule and made the princes of northern Serbia and Bulgaria, as well as the Byzantine emperor, Murad's vassal.

In the 1380s Murad resumed his offensive in the west. Sofia was taken in 1385 and Niš in 1386. Meanwhile, in Anatolia, Murad had extended his power as far as Tokat and consolidated his authority in Ankara. Through marriage, purchase, and conquest he also acquired territories from the principalities of Germiyan, Tekke, and Hamid. A coalition of Turkmen principalities led by the Karaman was formed to stem Ottoman expansion, but it was defeated at Konya (1386).

In 1387 or 1388 a coalition of northern Serbian princes and Bosnians stopped the Ottomans at Pločnik, but in 1389 Murad and his son Bayezid (later Bayezid I) defeated them at the Battle of Kosovo, although Murad was killed by a Serbian noble who pretended to defect to the Ottoman camp.

Murad I, detail of a miniature painting, 16th century; in the Topkapı Palace Museum, Istanbul
Sonia Halliday Photographs

Under Murad I the seeds of some of the basic Ottoman imperial institutions were sown. The administrative military offices of *kaziasker* (military judge), *beylerbeyi* (commander in chief), and grand vizier (chief minister) crystallized and were granted to persons outside the family of Osman I, founder of the dynasty. The origins of the Janissary corps (elite forces) and the *devşirme* (child-levy) system through which the Janissaries were recruited are also traced to Murad's reign.

• **Murad II** (b. June 1404, Amasya, Ottoman Empire [now in Turkey]—d. Feb. 3, 1451, Edirne), Ottoman sultan (1421–44 and 1446–51) who expanded and consolidated Ottoman rule in the Balkans and pursued a policy of restraint in Anatolia.

Early in his reign, Murad had to overcome several claimants to the Ottoman throne who were supported by the Byzantine emperor Manuel II Palaeologus and by many of the Turkmen principalities in Anatolia. By 1425 Murad had eliminated his rivals, had reestablished Ottoman rule over the Turkmen principalities of western Anatolia, and had once again forced Byzantium to pay tribute. He then turned his attention to the Balkans. In 1430, after a five-year struggle, he captured Salonika (modern Thessaloníki), in northern Greece, which had been under Venetian control. At first the Ottoman armies were successful against a Hungarian-Serbian-Karaman alliance; but after 1441, when the alliance expanded to include German, Polish, and Albanian forces, the Ottomans lost Niš and Sofia (1443) and were soundly defeated at Jalowaz (1444). After signing a peace treaty at Edirne (June 12, 1444), Murad abdicated in favour of his 12-year-old son, Mehmed II.

Murad II, detail of a miniature painting, 16th century; in the Topkapı Palace Museum, Istanbul
Sonia Halliday Photographs

European powers, under the auspices of Pope Eugenius IV, soon broke the truce; and Murad, leading the Ottoman army, inflicted a severe defeat on the Christian forces at Varna in November 1444. Under pressure from court notables and faced with external threats, Murad reassumed control of the state in 1446. In 1448 he defeated the Hungarians at the second Battle of Kosovo (October 17).

In Anatolia, Murad pursued a policy of caution because of the westward advance of the Timurid Shāh Rokh, who posed as protector of the Turkmen principalities. The Ottomans gained suzerainty over the Turkmen rulers in the Çorum-Amasya region and in western Anatolia, but the principality of Karaman, which through its alliances with the Balkan Christian rulers was a major threat to the Ottomans, was left autonomous.

During Murad's reign the office of grand vizier (chief minister) came to be dominated by the Çandarlı family. The Janissary corps (elite forces) gained in prominence, and the hereditary Turkish frontier rulers in the Balkans often acted independently of the sultan.

• **Murad III** (b. July 4, 1546, Manisa, Ottoman Empire [now in Turkey]—d. Jan. 15/16, 1595, Constantinople [now Istanbul]), Ottoman sultan in 1574–95 whose reign saw lengthy wars against Iran and Austria and social and economic deterioration within the Ottoman state.

Externally Murad continued the military offensive of his predecessors. He took Fez (now Fès, Mor.) from the Portuguese in 1578. He fought an exhausting war against Iran (1578–90), which extended his rule over Azerbaijan, Tiflis (now Tbilisi, Georgia), Nahāvand, and Hamadān (now in Iran). In Europe he began a long war against Austria (1593–1606), which saw an alliance in 1594 of the Ottoman vassal rulers of Moldavia, Transylvania, and Walachia with Austria in defiance of Ottoman authority.

Murad came under the influence of the women in his harem and of his courtiers, and he ignored the advice of the brilliant grand vizier (chief minister) Mehmed Sokollu, who was assassinated in 1579. Under Murad, nepotism, heavy taxes necessitated by the long wars, and inflation, aggravated by the influx of cheap South American silver from Spain, all contributed to the decline of the major Ottoman administrative institutions. The *tımar* (fief) system suffered dislocation when the peasants, because of high taxes, were forced to leave their lands. The highly effective Janissary corps (elite forces), because of a policy of indiscriminate recruitment, degenerated into a body of ruffians that threatened the urban and rural populations.

• **Murad IV,** in full MURAD OGLU AHMED I (b. July 27, 1612, Constantinople, Ottoman Empire [now Istanbul, Tur.]—d. Feb. 8, 1640, Constantinople), Ottoman sultan from 1623 to 1640 whose heavy-handed rule put an end to prevailing lawlessness and rebelliousness and who is renowned as the conqueror of Baghdad.

Murad, who came to the throne at age 11, ruled for several years through the regency of his mother, Kösem, and a series of grand viziers. Effective rule, however, remained in the hands of the turbulent *sipahiyan* (quasi-feudal cavalries) and the Janissaries, who more than once forced the execution of high officials. Corruption of government officials and rebellion in the Asiatic provinces, coupled with an empty treasury, perpetuated the discontent against the central government.

Embittered by the excesses of the troops, Murad was determined to restore order both in Constantinople and in the provinces. In 1632 the *sipahiyan* had invaded the palace and demanded (and got) the heads of the grand vizier and 16 other high officials. Soon thereafter Murad gained full control and acted swiftly and ruthlessly. He suppressed the mutineers with a bloody ferocity. He banned the use of tobacco and closed the coffeehouses and the wineshops (no doubt as nests of sedition); violators or mere suspects were executed.

In his foreign policy Murad took personal command in the continuing war against Iran and set out to win back territories lost to Iran earlier in his reign. Baghdad was reconquered in 1638 after a siege that ended in a massacre of garrison and citizens alike. In the following year peace was concluded.

Murad IV, detail of a miniature painting, 19th century; in the Topkapı Palace Museum, Istanbul
Sonia Halliday Photographs

A man of courage, determination, and violent temperament, Murad did not follow closely the precepts of the Sharīʿah (Islāmic law) and was the first Ottoman sultan to execute a *shaykh al-islām* (the highest Muslim dignitary in the empire). He was able to restore order, however, and to straighten out state finances. Murad's untimely death was caused by his addiction to alcohol.

• **Murad V** (b. Sept. 21, 1840, Constantinople, Ottoman Empire [now Istanbul, Tur.]—d. Aug. 29, 1904, Constantinople), Ottoman sultan from May to August 1876, whose liberal disposition brought him to the throne after the deposition of his autocratic uncle Abdülaziz.

A man of high intelligence, Murad received a good education and was widely read in both Turkish and European literature. In 1867 he accompanied Abdülaziz on his European tour and made a favourable impression; during the tour he secretly contacted exiled nationalist-liberal Young Turks, for which Abdülaziz placed him under close surveillance.

Upon Abdülaziz' deposition by a group of ministers led by Midhat Paşa, the great advocate of constitutional government, Murad was brought to the throne. The new sultan was determined to introduce constitutional reforms, but, under the impact of Abdülaziz' suicide and the murder of some of his key ministers, Murad suffered mental collapse. After declaration by Turkish and foreign doctors that his illness was incurable, Murad was deposed by the same men who had brought him to the throne. During the reign (1876–1909) of his brother Abdülhamid II, several attempts to restore him to the throne failed, and he spent

The remaining years of his life confined in the Çiragan Palace.

Murad PASHA (Polish military officer): *see* Bem, Józef Zachariasz.

Murad, Ferid (b. Sept. 14, 1936, Whiting, Ind., U.S.), American pharmacologist, who, along with Robert F. Furchgott and Louis J. Ignarro, was awarded the 1998 Nobel Prize in Physiology or Medicine for the discovery that nitric oxide (NO) acts as a signaling molecule in the cardiovascular system. Their combined work uncovered an entirely new mechanism for how blood vessels in the body relax and widen.

Murad received an M.D. and a Ph.D. from Western Reserve University (later Case Western Reserve University) in 1965. In addition to his clinical practice, he taught pharmacology at several institutions, including Stanford University (1981–89) and Northwestern University (1988). In 1997 he began teaching at the medical school of the University of Texas, Houston.

In 1977 Murad showed that nitroglycerin and several related heart drugs induce the formation of nitric oxide and that the colourless, odourless gas acts to increase the diameter of blood vessels in the body. Furchgott and Ignarro built on this work. About 1980 Furchgott demonstrated that cells in the endothelium, or inner lining, of blood vessels produce an unknown signaling molecule, which he named endothelium-derived relaxing factor (EDRF). This molecule signals smooth muscle cells in blood vessel walls to relax, dilating the vessels. Ignarro's research, conducted in 1986 and done independently of Furchgott's work, identified EDRF as nitric oxide. These discoveries had the potential to unlock new approaches for understanding and treating diseases.

mural, a painting applied to and made integral with the surface of a wall or ceiling. The term may properly include painting on fired tiles but ordinarily does not refer to mosaic decoration unless the mosaic forms part of the overall scheme of the painting.

Mural painting is inherently different from all other forms of pictorial art in that it is organically connected with architecture. The use of colour, design, and thematic treatment can radically alter the sensation of spatial proportions of the building; in this sense mural is the only form of painting that is truly three-dimensional, since it modifies and partakes of a given space. Byzantine mosaic decoration evinced the greatest respect for organic architectural form. The great artists of the Renaissance, on the other hand, attempted to create an illusionistic feeling for space; and the masters of the subsequent Baroque period obtained such radical effects as to seem to dissolve almost entirely the walls or ceilings. A second characteristic of mural painting is its broad public significance. The mural artist must conceive pictorially a social, religious, or patriotic theme on the appropriate scale in reference both to the structural exigencies of the wall and to the idea expressed.

In the history of mural painting many techniques have been used. In classical Greco-Roman times the most common medium was encaustic, in which colours are ground in a molten beeswax binder (or resin binder) and applied while hot. Tempera painting was also practiced from the earliest known times; the binder was an albuminous medium such as egg yolk or egg white diluted in water. In 16th-century Europe, oil paint on canvas came into general use for murals. Yet oil paint is the least satisfactory medium for murals: it lacks both brilliance of colour and surface texture, many pigments are yellowed by the binder or are affected by atmospheric conditions, and the canvas itself is subject to rapid deterioration.

The Romans used mural painting to an extraordinary extent. In Pompeii and Ostia the walls and ceilings of almost all buildings, public and private, were painted in unified, inventive decorative schemes that encompassed a wide range of pictures. However, at no other time before or since has mural decoration received a higher degree of creative concentration than during the Renaissance. A continuously inventive spirit and inquiring mind, a wealth of support from patrons, and an ever-awakening attitude toward new creative possibilities are characteristics of this remarkable age. The centres of activity were the various cities and the rival personalities and families who dominated each area.

In Florence, undoubtedly the most important centre, the development reveals an emphasis on specific problems of form. It began with the concentration on the monumental figure by Masaccio, whereby the solidly built forms in a three-dimensional space are closely integrated by gesture and light and shade. The skill developed by succeeding artists such as Paolo Uccello, Piero della Francesca, and Melozzo da Forlì. The grandiose frescoes of Luca Signorelli (chapel of San Brizio, Orvieto) reveal the concentration on anatomy and the well-modeled structure of many nude figures to achieve greater strength and articulation. This then becomes the point of departure for the great art of Michelangelo.

Mural decoration in the Brancacci Chapel, Santa Maria del Carmine, Florence; wall frescoes started by Masolino and Masaccio in 1425 and finished by Filippino Lippi in 1484.

SCALA—Art Resource/EB Inc.

A second tradition is the more conservative and Gothic one exemplified by the pure and mystic expression of Fra Angelico (San Marco, Florence). A third tradition is a kind of romantic realism found in the frescoes by Fra Filippo Lippi (the cathedral at Prato) and Benozzo Gozzoli (Medici Palace chapel, Florence). Both of these reveal an awareness of the artistic problems of Masaccio but also a new interest in nature and its realistic representation. Finally, these heterogeneous elements are combined into a highly sensitive and decorative style during the last quarter of the 15th century, particularly in the frescoes of Domenico Ghirlandajo and Sandro Botticelli.

The High Renaissance (1500–30) is dominated by great individuals whose spectacular projects were often left unfinished or completed by pupils. Leonardo da Vinci's rich genius is best demonstrated in the dramatic movement of figures and tensely psychological interpretation of content shown in the "Battle of Anghiari" in the Palazzo Vecchio of Florence (destroyed but known through partial copies) and the famous "Last Supper" (Santa Maria delle Grazie in Milan).

Michelangelo, more intense and deeply religious than Leonardo, sought to channel his expression through the human figure alone. Thus the dramatic movement of the figure carries the total design of his first mural (the "Battle of Cascina") for the Palazzo Vecchio of Florence (lost but known through drawings and engravings). The Sistine Chapel ceiling reveals increasing concentration on the figure, and the later "Last Judgment" on the end wall in the same room shows greater interest in the movement of larger figure masses in space with considerable dramatic freedom and intensity.

Raphael represents the most perfect balance and integration of all the problems of form, space, and decorative unity that had been experimented with through the preceding century. Perfection of form is identified with the juxtaposition of the "Disputation on the Holy Sacrament" and the "School of Athens" in the Stanza della Segnatura (Vatican). Correggio is the last of the High Renaissance mural painters. His frescoes in the cathedral and the church of San Giovanni Evangelista in Parma reflect the transition to Mannerism.

Two factors condition the development of mural decoration in the Baroque style of the 17th century. One is the enormous building enthusiasm engendered by the Counter-Reformation. The other is the importance given to palaces and homes of the ruling aristocracy as the centres of cultural life. The roots of the style are to be found again in the work of the Renaissance masters but as interpreted and taught by the new institution of the Academy (*e.g.,* that of the Carracci at Bologna, Italy, and the French Academy). Its development can be followed from the allegorical decoration of the Palazzo Farnese in Rome by Annibale Carracci to the increasingly elaborate wall and ceiling frescoes of Domenichino, Pietro da Cortona, and Andrea Pozzo whereby the dramatic movement of foreshortened figures and perspective blends with the architecture to achieve a total unified and endless illusion of space.

The most prolific and indeed most important Baroque artist from the decorative point of view is Peter Paul Rubens, whose designs for tapestries, historical paintings (the Marie de Médicis series in the Luxembourg Palace, now in the Louvre), and decorations for the Jesuit churches in Antwerp and the Banqueting hall, Whitehall, London, reflect both the universality of his productive genius and his international acceptance.

In late 18th- and 19th-century Europe there was hardly any further development in style or technique. In the 20th century, however, mural decoration reemerged strongly in three major phases. One is the more abstract and expressionistic form stemming from the experimental easel painting of the Cubist and Fauve groups in Paris and developing into the large projects of Pablo Picasso (Unesco, Paris), Henri Matisse (chapel at Vence, Fr.), Fernand Léger, Joan Miró, and Marc Chagall (decorations of the Paris Opéra and Lincoln Center, New York City). The second is that which developed out of the revolutionary movement in Mexico with the remarkable series of frescoes by José Clemente Orozco, Diego Rivera, David Alfaro Siqueiros, and Rufino Tamayo. With the ensuing acceptance of 20th-century concepts of design and structure in architecture, the new large-scale use of mosaics became a distinctive feature (*e.g.,* the National Autonomous University of Mexico). A third phase was the short-lived American mural movement of the 1930s developed under U.S. federal sponsorship. The wide geographic distribution of the work in U.S. public buildings and the freedom given to both individual and experimental modes of expression as well as to the interpretation of social and political problems provided an artistic impetus to mural decoration. Examples are murals of Ben Shahn, Boardman Robinson, Thomas Hart Benton, Reginald Marsh, and John Steuart Curry.

Murano, island, north of Venice, in Veneto region, northeastern Italy, with an area of 1,134 acres (459 hectares) in the Laguna Veneta (Venice Lagoon). It was founded between the 5th and the 7th century, and it experienced its major development after 1291, when glass furnaces were moved there from Venice. Murano became the manufacturing centre for Venetian glass, exported in large quantities to all of Europe. It reached its high point in the 16th century, when it had more than 30,000 inhabitants; glassmaking continues but on a considerably reduced scale. A record of this aspect of Murano's history is found in the Museum of Glass Art in the Giustinian Palace.

The basilica of Saints Maria e Donato, Murano, Italy
Marzari—SCALA from Art Resource/EB Inc.

The most important building in Murano is the basilica of Saints Maria e Donato. In its present state it dates from the 13th century, having been rebuilt several times since its founding in the 7th century. Notable for the beautiful external architecture of the apse, it contains a spring-beam roof and most of the original floor. The mosaic in the apse showing the Virgin Mary against a gold background is 13th-century Byzantine. The church of San Pietro Martire, founded in the 14th century (rebuilt 1509), contains paintings by Giovanni Bellini, Paolo Veronese, and Tintoretto. Pop. (latest census) 6,966.

Murasaki Shikibu (*c.* 978, Kyōto—d. *c.* 1014, Kyōto), court lady who was the author of the *Genji monogatari* (*The Tale of Genji*), generally considered the greatest work of Japanese literature and thought to be the world's oldest full novel.

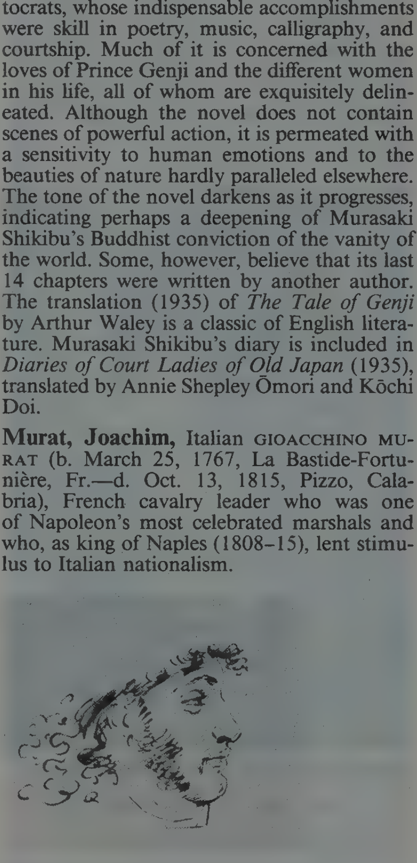
Murasaki Shikibu, wood-block print by an unknown artist
By courtesy of the International Society for Educational Information, Tokyo

Her real name is unknown; it is conjectured that she acquired the sobriquet of Murasaki from the name of the heroine of her novel. The main source of knowledge about her life is the diary she kept between 1007 and 1010. This work possesses considerable interest for the delightful glimpses it affords of life at the court of the empress Jōtō mon'in, whom Murasaki Shikibu served.

Some critics believe that she wrote the entire *Tale of Genji* between 1001 (the year her husband, Fujiwara Nobutaka, died) and 1005, when she began serving at court. More probably, however, the composition of this extremely long and complex novel extended over a much greater period and was not finished until about 1010.

The Tale of Genji captures the image of a unique society of ultrarefined and elegant aristocrats, whose indispensable accomplishments were skill in poetry, music, calligraphy, and courtship. Much of it is concerned with the loves of Prince Genji and the different women in his life, all of whom are exquisitely delineated. Although the novel does not contain scenes of powerful action, it is permeated with a sensitivity to human emotions and to the beauties of nature hardly paralleled elsewhere. The tone of the novel darkens as it progresses, indicating perhaps a deepening of Murasaki Shikibu's Buddhist conviction of the vanity of the world. Some, however, believe that its last 14 chapters were written by another author. The translation (1935) of *The Tale of Genji* by Arthur Waley is a classic of English literature. Murasaki Shikibu's diary is included in *Diaries of Court Ladies of Old Japan* (1935), translated by Annie Shepley Ōmori and Kōchi Doi.

Murat, Joachim, Italian GIOACCHINO MURAT (b. March 25, 1767, La Bastide-Fortunière, Fr.—d. Oct. 13, 1815, Pizzo, Calabria), French cavalry leader who was one of Napoleon's most celebrated marshals and who, as king of Naples (1808–15), lent stimulus to Italian nationalism.


Murat, detail of a drawing by Antoine-Jean Gros; in the École des Beaux-Arts, Paris
Cliche Musees Nationaux, Paris

The son of an innkeeper, he studied briefly for a career in the church but enlisted in a cavalry regiment in 1787 and, when war broke out in 1792, won rapid promotion. In October 1795 he was on hand in Paris at the moment that Napoleon Bonaparte was entrusted with the mission of suppressing a royalist insurrection; Murat's contribution in bringing up cannon won him a place as aide-de-camp to Bonaparte for the Italian campaign of 1796–97. In Italy and later in Egypt (1798–99) he established his reputation as a gifted and daring leader of cavalry, and he again served his chief well in the coup d'état of 18 Brumaire (Nov. 9, 1799), by which Bonaparte seized power as first consul. Murat's reward was the hand of Napoleon's youngest sister, Caroline.

In the Italian campaign of 1800 Murat helped win the decisive Battle of Marengo, and in 1801 he rapidly concluded the campaign against Bourbon-ruled Naples by imposing the Armistice of Foligno. As governor of Paris in 1804, he was included among the first generals promoted to the rank of marshal after Napoleon's coronation as emperor on December 2. In 1805 he played a conspicuous role in the Austerlitz campaign, helping to pin the Austrian Army in Ulm, where it was forced to surrender, and defeating Austrian and Russian cavalry on the field of Austerlitz. At Jena in 1806 his energetic pursuit completed destruction of the Prussian Army, and at Eylau in 1807 his headlong charge saved a desperate tactical situation.

Rewarded with the title of grand duke of Berg and Clèves, Murat began to have dreams of sovereignty, and when he was sent to act as Napoleon's lieutenant in Spain he tried to gain possession of the unoccupied Spanish throne. His intrigues led instead to Spanish opposition and a rising in Madrid that, though quelled (May 2, 1808), ended his hopes. Though Napoleon gave the Spanish throne to his brother Joseph, he rewarded Murat with Joseph's former place as king of Naples, under the name Joachim-Napoléon (or Gioacchino-Napoleone, in Italian).

In Naples Murat not only satisfied his own vanity by a lavish court display but also carried out important reforms, breaking up the vast landed estates and introducing the democratic Code Napoléon. The administration was opened to advancement by merit, cotton growing was encouraged, and effective measures were taken against the chronic Neapolitan brigandage. Murat even foresaw the unification of Italy, a development at whose head he sought to place himself through the encouragement of secret societies that eventually played a major role in the Risorgimento.

In 1812 Murat took part in Napoleon's Russian campaign and once more distinguished himself at Borodino; but, left in charge of the shattered Grand Army during the retreat from Moscow, he abandoned it to try to save his kingdom of Naples. In 1813 he wavered between loyalty to Napoleon and negotiation with the Allies. The Austrians signed a treaty with him, but the former Bourbon rulers of Naples raised objections, and his situation was in doubt when Napoleon returned to France in 1815. He then staked his hopes on an appeal to Italian nationalism, but his Neapolitans were defeated by the Austrians at Tolentino, and he was forced to flee to Corsica. In October he made a last, hopeless attempt to recover Naples virtually unaided and was taken prisoner and shot.

Murat left two sons and two daughters. The eldest son, Napoléon-Achille (1801–47), went to the United States in 1821, took U.S. citizenship, and died in Florida. The younger son, Napoléon-Lucien-Charles (1803–78), went to the United States in 1825 but returned to France in 1848 and was recognized as a prince by Napoleon III, with the title of Prince Murat, under the Second Empire. From him descended the princely house of Murat surviving into the 20th century.

Murat River, also spelled MURAD RIVER, Turkish MURAT NEHRİ, river, the major headstream of the Euphrates. In antiquity it was called Arsanias. The river rises north of Lake Van near Mount Ararat, in eastern Turkey, and flows westward for 449 miles (722 km) through a mountainous region to unite with the Karasu Çayı and form the Upper Euphrates near Malatya. Turkey's largest dam, the Keban, west of Elâzığ, completed in 1974, is designed to provide electric power and aid flood control and the irrigation of additional cropland. Agriculture in the valley consists primarily of the cultivation of grains, fruits, vegetables, and cotton.

Muravyov, Mikhail Nikolayevich, Graf (Count), Muravyov also spelled MURAVIËV, or MURAVIEV (b. April 19 [April 7, old style], 1845, Grodno, Russia—d. June 21 [June 8, old style], 1900, St. Petersburg), Russian diplomat and statesman who at the end of the 19th century directed Russia's activities in the Far East and played a major role in developments leading to the outbreak of the Russo-Japanese War (1904–05).

Muravyov was the grandson of Mikhail Nikolayevich Muravyov, known as the "hangman of Wilno" for his brutal suppression of the Polish uprising of 1863 in the Lithuanian provinces, and the son of the governor of Grodno. Mikhail Nikolayevich entered the Russian foreign ministry in 1864. After serving in various legations throughout Europe, he was appointed Russian minister to Denmark (1893) and then minister of foreign affairs (1896).

An advocate of Russian expansion into Manchuria, Muravyov recommended that the Russian navy seize Port Arthur (now Lü-shun) and Dalny (now Lü-ta) on the Liaotung Peninsula. He then concluded an agreement with China (March 1898) that gave Russia control of the entire peninsula for 25 years and also allowed Russia to build a railroad from Port Arthur to the Chinese city of Harbin, which was connected with the Russian port of Vladivostok (and with the Trans-Siberian Railroad) by the Russian-operated Chinese Eastern Railroad. Russia's gains in southern Manchuria antagonized both Great Britain and Japan. Muravyov improved relations with Great Britain by concluding an agreement (April 1899) in which the two nations defined and recognized their respective spheres of influence in China. By order of the Russian emperor Nicholas II, Muravyov also called for the convocation of a disarmament conference (Jan. 11, 1899), which assembled at The Hague (May–July 1899), but he was unable to control the increasingly hostile conflict developing between Russia and Japan, which, after his death, erupted into the Russo-Japanese War.

Muravyov, Nikolay Nikolayevich, COUNT (Graf) AMURSKY, Muravyov also spelled MURAVIEV (b. Aug. 11 [Aug. 23, New Style], 1809, St. Petersburg, Russia—d. Nov. 18 [Nov. 30], 1881, Paris, France), Russian statesman and explorer whose efforts led to the expansion of the Russian Empire to the Pacific. In 1860 he planted the Russian flag at what was to become the port of Vladivostok.

A lieutenant general in the Russian army, Muravyov was appointed governor-general of eastern Siberia in 1847. Despite the opposition of many in the tsarist government who feared the reaction of the Chinese, he vigorously pursued the exploration and settlement of Siberia north of the Amur River. In the period 1854–58 he led a number of expeditions down the Amur, during the last of which, having obtained plenipotentiary powers from the tsar, he concluded the Treaty of Aigun with China (1858). This pact recognized the Amur as the boundary between Russia and China and greatly expanded Russian territory in Siberia. For his role Muravyov was granted the title of Count Amursky. The peninsula on which Vladivostok lies still bears his name.

Muravyov proposed the construction of a trans-Siberian railway several decades before its accomplishment. He also suggested that Alaska be ceded to the United States.

Muravyov-Apostol, Sergey Ivanovich, Muravyov-Apostol also spelled MURAVEV-APOSTOL (b. Sept. 28 [Oct. 9, New Style], 1796, St. Petersburg, Russia—d. July 13 [July 25], 1826, St. Petersburg), Russian army officer and republican, executed for his leading role in the Decembrist (Dekabrist) uprising of 1825–26.

The son of a diplomat and writer, Muravyov-Apostol graduated from the St. Petersburg Institute of Railway Engineers and fought against the French invasion of Russia in 1812 and in subsequent foreign campaigns. He was among the founders of the Union of Salvation and was a company commander in the Semenovskoye Guards regiment at the time of its uprising in 1820, after which he was transferred to the regiment at Chernigov (now Chernihiv, Ukraine).

In 1822 he was recruited to the radical, antimonarchical Southern Society of the Decembrist movement, in which he played an active role thenceforth. He soon became head of its Vasilkov council and was instrumental, along with M.P. Bestuzhev-Ryumin, in its merger with the Society of United Slavs in 1825. He participated in a number of plans for uprisings by the military during 1823–25 and, by late 1825, had come to advocate the assassination of the tsar.

In November 1825 he was appointed director of the Southern Society, and by December 20 he was planning a military uprising in southern Russia when he learned of the defeat of the Northern Society's revolt on December 14. He organized and led the December 29 rebellion of about 1,100 officers and troops of the Chernigov regiment, who were crushed by loyal government forces on Jan. 3, 1826. During the battle Muravyov-Apostol was seriously wounded, and he was later one of the five Decembrist leaders to be hanged.

Murayama Tomiichi (b. March 23, 1924, Ōita, Japan), politician who in 1994–96 was the first Socialist prime minister of Japan since 1948.

One of 11 children born to a fisherman, Murayama graduated from Meiji University in Tokyo in 1946 and then returned to Ōita, where he became an activist in the local fishermen's union. Most of his subsequent political career was spent in relative obscurity. He won election to the Ōita city assembly in 1955 and moved up to a seat in the Ōita prefectural assembly in 1963. He was elected to the lower house of the Diet (parliament) in 1972 as a member of the Japan Socialist Party (JSP) and was successively reelected thereafter. Murayama first gained national recognition when, as a compromise candidate, he became the leader of the Social Democratic Party of Japan (SDJP; the party's new official name in English from 1991) in 1993.

The SDJP was a member of a seven-party coalition that came to power in 1993 and ended almost three decades of uninterrupted rule by the Liberal Democratic Party (LDP). In April 1994, however, Murayama abruptly withdrew his party's support from Hata Tsutomu, the second prime minister elected by the coalition. When Hata resigned two months later, Murayama succeeded him as prime minister on June 29 on the strength of an unprecedented alliance between the SDJP and the LDP. Murayama helped hold the fragile new coalition together, but he never had a firm grasp on power. On Jan. 5, 1996, he resigned and was succeeded six days later by Hashimoto Ryūtarō of the LDP.

Murchison, Sir Roderick Impey (b. Feb. 19, 1792, Tarradale, Ross-shire, Scot.—d. Oct. 22, 1871, London, Eng.), geologist who first established the geologic sequence of Early Paleozoic strata (408 to 540 million years old).

Murchison joined the Geological Society of London in 1825 and in the following five years explored Scotland, France, and the Alps and collaborated alternately with the British geologists Adam Sedgwick and Charles Lyell.

In 1831 he was elected president of the Geological Society, after serving as secretary for five years. In that same year he began his studies of the Early Paleozoic rocks in South Wales. His findings were embodied in the monumental work *The Silurian System* (1839). Following the establishment of the Silurian System, Murchison and Sedgwick founded the Devonian System, based on their research of the geology of southwestern England and the Rhineland. Murchison then went on an expedition to Russia and wrote, with others, *The Geology of Russia in Europe and the Ural Mountains* (1845). In 1841 he proposed the establishment of the Permian System (strata 245 to 286 million years old), based upon his Russian explorations.

Murchison
The Mansell Collection

Knighted in 1846, Murchison was appointed director general of the Geological Survey of Great Britain and director of the Royal School of Mines and the Museum of Practical Geology, London, in 1855. He prepared successive editions of his work *Siluria* (1854; 5th ed. 1872), which presented the main features of the original *Silurian System* together with information on new findings. In addition, he fought unsuccessfully against the splitting of his original Silurian System into three parts: the Cambrian Period (540 to 505 million years ago), the Ordovician Period (505 to 438 million years ago), and the Silurian Period (438 to 408 million years ago).

In 1871 he founded a chair of geology and mineralogy at the University of Edinburgh, and in his will he provided for the establishment of the Murchison Medal and Geological Fund to be awarded annually by the Geological Society.

Murchison Falls (Uganda): *see* Kabarega Falls.

Murchison River, ephemeral river in Western Australia, rising north of Meekatharra on Peak Hill in the Robinson Ranges and fed by its tributaries, the Sandford and Roderick. It flows sporadically (chiefly in winter) west, south, and again west to enter the Indian Ocean at Kalbarri, north of Geraldton, after

Hawke Head Lookout on the Murchison River, Western Australia
J. Yates—Shostal

a course of 440 miles (710 km). The explorer George Grey reached the river in 1839 on a forced march from Shark Bay to the Swan River and named it for the British scientist Sir Roderick Murchison. Its estuarine mouth, blocked by reefs, is a good fishing ground. The North West Coastal Highway crosses the river at Galena.

In 1891 the stream gave its name to one of Australia's richest goldfields. The original find was followed by the East Murchison (1895) and Peak Hill (1897) fields. Some gold is still mined, and sheep are raised. Kalbarri serves tourists visiting Kalbarri National Park on the lower Murchison, where the river cuts a scenic gorge (the Loop) through the coastal range.

Murcia, independent Muslim (Moorish) kingdom centred on the city of Murcia (Arabic: Mursīyah), Spain. It came into being on two occasions: first in the 11th century, following the disintegration of the Spanish Umayyad caliphate; and again in the 12th century, as part of the Spanish Muslim reaction against the rule of the North African Almoravids. The kingdom's first ruler, ʿAbd ar-Raḥmān ibn Ṭāhir, declared himself independent in 1063, though to preserve the fiction of the unity of the Umayyad caliphate he took the title not of king (*malik*) but of minister (*ḥājib*).

For a time Murcia played an intermediary role between the Almoravids and the Castilians, but in the end religious sympathies inclined it to the Almoravids. Then the Almoravid caliph Yūsuf ibn Tāshufīn, who had brought the quarreling states of Muslim Spain under his control, took possession of Murcia in 1092, incorporating it into his empire. General discontent under the Almoravids led to a rising under Abu Jaʿfar ibn Hud in 1144 and the reestablishment of Murcian independence. The kingdom was then united with Valencia.

After 1168 Murcia came under the rule of the North African Almohads. In spite of this, it retained an autonomous administrative system that was conserved by the Christian Castilians when they took possession of the territory, almost without a struggle, in 1243.

Murcia, *comunidad autónoma* ("autonomous community") and historical region of southeastern Spain that is coextensive with the *provincia* of Murcia. The *comunidad autónoma* was established under the statute of autonomy of 1982.

Castile annexed the kingdom of Murcia in 1243, thereby securing access to the Mediterranean and challenging the southern expansion of the crown of Aragon. Castile ceded part of Murcia to the kingdom of Valencia in 1304, and the remaining territory was divided into the *provincias* of Murcia and Albacete in 1833.

The Baetic Mountains in the southern portion of Murcia border the Mediterranean and decline eastward into the plain of Cartagena. The tableland of Jumilla and Yecla rises in the northern portion of Murcia. To the west is the Subbetic range. The Segura River runs northwest to southeast through the centre of Murcia, irrigating the rich farmland, or huerta (orchard land), in the valleys of the Baetic Mountains. Annual precipitation over the region is very low, ranging from 7 inches (170 mm) around Cape Tiñoso to 11 inches (280 mm) in Cartagena. Temperatures are high and show relatively little seasonal variation.

Intensive irrigation supports a dense population in the huerta around the city of Murcia, with a large portion of that city's population dispersed among satellite farming communities. *Minifundios,* or small farms, predominate in the huerta, while the growth of small-scale industries in the towns has allowed many underemployed agricultural workers to work part-time in the factories. The population of the ports of Cartagena, Mazarrón, and Aguilas has grown with the development of shipping and mining along the coastal plain. The population of the plain of Cartagena is sparse, and the isolated farmsteads and small villages are located where there is water. Emigration from the *provincia* has been considerable since 1900.

About one-half of the land under cultivation is dry-farmed, but this is gradually losing ground to irrigated farming. The principal crops of the irrigated huerta are grain, olives, grapes, oranges, lemons, and apricots.

The food-processing industry is concentrated along the Segura River and has absorbed some of the surplus workforce from the surrounding huerta. Cartagena has emerged as an industrial centre of the first order, exploiting the coast's resources of lead, zinc, and salt. A petrochemical complex at Escombreras has established Cartagena as one of Europe's leading petrochemical centres. The service sector has benefited from the development of tourism along the coast.

The dialect in the countryside is called Panocho, and it reflects Arab, Catalan, and Aragonese influences. The traditional farmstead of the Murcian huerta is the *barraca* built of crude bricks and reeds and decorated with jasmines and geraniums. Area 4,368 square miles (11,314 square km). Pop. (1998 est.) 1,115,068.

Murcia, city, capital of Murcia *provincia* and *comunidad autónoma* ("autonomous community"), southeastern Spain. It lies at the confluence of the Segura and Guadalentín (Sangonera) rivers in a fertile, irrigated area known as the huerta (orchard land), northeast of Granada city. The site was settled before the Roman occupation of southern Spain in the 3rd century BC, but its name even during the Roman rule is unknown, although some have tentatively identified it with the Roman town Vergilia. As Mursīyah it was first mentioned in the histories and chronicles of the Muslims. According to the Arab geographer Yāqūt, it was founded in 825 by the Umayyad emir of Córdoba, ʿAbd ar-Raḥmān II, who made it a provincial capital. After the fall of the caliphate of Córdoba in 1031, the city came under the control of Almería and then of Valencia, until in 1063 its ruler, ʿAbd ar-Raḥmān ibn Ṭāhir, declared the kingdom of Murcia independent.

The Segura River divides the city into an older, northern sector and a more modern, southern sector. The 14th-century Gothic-style Cathedral of Santa María was restored in the 18th century. It contains the fine chapel of the Vélez family (1507). In the Hermitage of Jesus (Ermita de Jesús) are the majority of the Passion sculptures of Francisco Salcillo, which attract many visitors during Holy Week. The University of Murcia was founded in 1915.

Murcia is a communications and agricultural-trade centre for the surrounding areas along the Segura River. Flour is also processed. The city's silk industry, which dates from Moorish times, still exists. Murcia's manufactures include woolen, linen, and cotton goods; saltpetre; leather; aluminum products; furniture; and hats. Pop. (1998 est.) 349,040.

Santa María Cathedral in Cardenal Belluga Square, Murcia, Spain

FISA

murder, in criminal law, the unjustified killing of one person by another, usually distinguished from the crime of manslaughter by the element of malice aforethought. *See* homicide.

Murdoch, Dame Iris, in full DAME JEAN IRIS MURDOCH, married name MRS. J.O. BAYLEY (b. July 15, 1919, Dublin, Ire.—d. Feb. 8, 1999, Oxford, Oxfordshire, Eng.), British novelist and philosopher noted for her psychological novels that contain philosophical and comic elements.

After an early childhood spent in London, Murdoch went to Badminton School, Bristol, and from 1938 to 1942 studied at Somerville College, Oxford. Between 1942 and 1944 she worked in the British Treasury and then for two years as an administrative officer with the United Nations Relief and Rehabilitation Administration. In 1948 she was elected a fellow of St. Anne's College, Oxford.

Iris Murdoch

Cecil Beaton—Camera Press

Murdoch's first published work was a critical study, *Sartre, Romantic Rationalist* (1953). This was followed by two novels, *Under the Net* (1954) and *The Flight from the Enchanter* (1956), that were admired for their intelligence, wit, and high seriousness. These qualities, along with a rich comic sense and a gift for analyzing the tensions and complexities in sophisticated sexual relationships, continued to distinguish her work. With what is perhaps her finest book, *The Bell* (1958), Murdoch began to attain wide recognition as a novelist. She went on to a highly prolific career with such novels as *A Severed Head* (1961), *The Red and the Green* (1965), *The Nice and the Good* (1968), *The Black Prince* (1973), *Henry and Cato* (1976), *The Sea, The Sea* (1978), *The Philosopher's Pupil* (1983), *The Good Apprentice* (1985), *The Book and The Brotherhood* (1987), and *The Message to the Planet* (1989). Murdoch's last novel, *Jackson's Dilemma* (1995), was not well received; some critics attributed the novel's flaws to the Alzheimer's disease with which she had been diagnosed in 1994. Murdoch's husband, the novelist John Bayley, chronicled her struggle with the disease in his memoir, *Elegy for Iris* (1999).

Murdoch's novels typically have convoluted plots in which innumerable characters representing different philosophical positions undergo kaleidoscopic changes in their relations with each other. Realistic observations of 20th-century life among middle-class professionals are interwoven with extraordinary incidents that partake of the macabre, the grotesque, and the wildly comic. The novels illustrate Murdoch's conviction that although human beings think they are free to exercise rational control over their lives and behaviour, they are actually at the mercy of the unconscious mind, the determining effects of society at large, and other, more inhuman, forces. In addition to producing novels, Murdoch wrote plays, verse, and works of philosophy and literary criticism.

Murdoch, James Edward (b. Jan. 25, 1811, Philadelphia, Pa., U.S.—d. May 19, 1893, Cincinnati, Ohio), one of the foremost American actors of the 19th century.

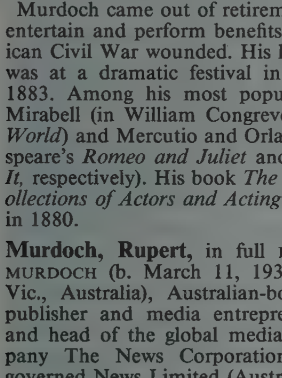
After performing with amateur groups in Philadelphia, Murdoch made his successful debut at the Chestnut Street Theatre, Philadelphia, in *Lovers' Vows* by August von Kotzebue. Following an unsalaried season with the company, he traveled about North America, playing with various companies. In 1832, when he was emerging as an important actor, he mistakenly took arsenic for medicine and was a semi-invalid thereafter.

For the next 60 years Murdoch was on the stage irregularly, yet he managed to establish a reputation and was highly regarded during the 19th century as both a tragedian and a comedian. In 1833 he played again at the Chestnut Street Theatre, with Fanny Kemble, one of England's leading actresses, who was then on tour in the United States. Twenty years later he performed with Joseph Jefferson, one of the outstanding figures of the American stage, in Richard Brinsley Sheridan's masterpiece *The School for Scandal;* in such plays Murdoch was considered to be the finest light comedian of his day. His appearance at the new Metropolitan Theatre, San Francisco, about that same time helped the establishment of fine theatre on the West Coast. He appeared in England in 1856, and his successful performances at the Haymarket Theatre, London, were noted in the *Autobiography* of Jefferson, who paid him great tribute. His style was marked by superb elocution, finesse, and naturalness.

Murdoch came out of retirement in 1861 to entertain and perform benefits for the American Civil War wounded. His last appearance was at a dramatic festival in Cincinnati in 1883. Among his most popular roles were Mirabell (in William Congreve's *Way of the World*) and Mercutio and Orlando (in Shakespeare's *Romeo and Juliet* and *As You Like It,* respectively). His book *The Stage; or, Recollections of Actors and Acting* was published in 1880.

Murdoch, Rupert, in full KEITH RUPERT MURDOCH (b. March 11, 1931, Melbourne, Vic., Australia), Australian-born newspaper publisher and media entrepreneur, founder and head of the global media holding company The News Corporation Ltd., which governed News Limited (Australia), News International (U.K.), and News America Holdings Inc. (U.S.). Murdoch's corporate interests centred on newspaper, magazine, book, and electronic publishing; television broadcasting; and film and video production, principally in the United States, the United Kingdom, and Australia.

The son of Sir Keith Murdoch (1886–1952), a famous Australian war correspondent and publisher, Murdoch studied at Worcester College, Oxford (M.A., 1953), and briefly worked as an editor on Lord Beaverbrook's London *Daily Express,* where he first gained practical experience in the sensationalist journalism that would be a major influence early in his career as a publisher. His father having died, he returned to Australia in 1954 to take over his inheritance, the *Sunday Mail* and *The News,* both of Adelaide; he quickly converted the latter into a paper dominated by news of sex and scandal, often writing its banner headlines himself. *The News*'s circulation soared, and he then went about instituting similar changes in papers that he bought in Sydney, Perth, Melbourne, and Brisbane.



Rupert Murdoch, 1978

UPI/Bettmann

By the time that Murdoch acquired his first British newspaper in 1969—the *News of the World* of London—he had put together a proven formula for boosting circulation, which entailed an emphasis on crime, sex, scandal, and human-interest stories with boldface headlines, prolific sports reporting, and outspokenly conservative editorializing. This formula was successful with both the *News of the World* and *The Sun,* a London daily that he acquired the following year.

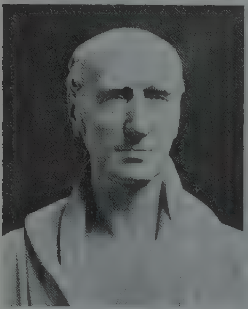
In 1973 Murdoch entered the American newspaper business by purchasing two San Antonio, Texas, dailies, one of which—the *San Antonio News* (later the *Express-News*)—he transformed into a sex-and-scandal sheet that soon dominated the city's afternoon market. In 1974 he introduced a national weekly sensationalist tabloid, the *Star,* and in 1976 he purchased the afternoon tabloid *New York Post,* but in the late 1980s he sold both, profitably. He also purchased the Boston *Herald American* from the Hearst Corporation in 1982 and changed the name to the *Boston Herald* (sold 1994). He bought *TV Guide* in 1988. Overall in the 1980s and '90s he bought and later sold a number of American publications—such as the *Chicago Sun-Times,* the New York City *Village Voice,* and *New York* magazine. Among Murdoch's diverse publications were a number of more conventional and respected newspapers, such as *The Times* of London and the *Sunday Times* (both acquired in 1981) and the *Australian* (a national daily that he established in 1964). Murdoch took residence in the United States in 1974 and became a naturalized U.S. citizen in 1985, based in New York City.

In the 1980s and '90s Murdoch amassed major holdings in other communications ventures, including radio and television stations and video, film, and record companies, as well as book publishing. In 1985 he acquired Twentieth Century-Fox Film Corporation and bought several independent American television stations from Metromedia, Inc., consolidating both these ventures into a new company, Fox, Inc. He bought the Australian news group The Herald and Weekly Times Ltd. in 1987. He thereafter purchased a number of book-publishing companies—including, in the United States, the prestigious Harper & Row Publishers (1987), the religious publisher Zondervan (1988), and the giant textbook and trade publisher Scott, Foresman & Company (1989), and, in the United Kingdom, the venerable William Collins PLC (1989); these companies and some operations in Australia and New Zealand were merged in 1990 as HarperCollins Publishers. In Britain in 1989 Murdoch inaugurated Sky Television, a four-channel satellite service, which merged with the rival British Satellite Broadcasting in 1990 to become British Sky Broadcasting.

This heady expansion burdened Murdoch's international media conglomerate with a heavy debt, which he reduced by selling off *New York, Seventeen,* the *Daily Racing Form,* and several other American magazines. In 1993 he purchased Star TV, a pan-Asian television service based in Hong Kong, as part of his plan to build a global television network. In 1995 the News Corporation entered into a partnership with MCI Communications Corporation, a major provider of long-distance telecommunications services in the United States.

Murdock, William (b. Aug. 21, 1754, Old Cumnock, Ayr, Scot.—d. Nov. 15, 1839, Birmingham, Warwickshire, Eng.), Scottish inventor, the first to make extensive use of coal gas for illumination and a pioneer in the development of steam power.

In 1777 Murdock entered the engineering firm of Matthew Boulton and James Watt in their Soho works at Birmingham and about two years later was sent to Cornwall to superintend the fitting of Watt's steam engines. At his home in Redruth, Cornwall, he experimented in distilling coal and in 1792 lighted his cottage and offices with coal gas. After returning to Birmingham about 1799, he perfected further practical methods for making, storing, and purifying gas.



William Murdock, bust by an unknown artist; in the Science Museum, London

By courtesy of the Science Museum, London

Murdock also made important improvements in the steam engine. He was the first to devise an oscillating engine, of which he made a model about 1784; in 1786 he was busy with a steam carriage or road locomotive that was unsuccessful; and in 1799 he invented the long D slide valve. He is generally credited with devising the so-called Sun-and-planet motion, a means of making a steam engine give continuous revolving motion to a shaft provided with a flywheel. Watt, however, patented this motion in 1781. Murdock also experimented with compressed air and in 1803 constructed a steam gun. He retired from business in 1830.

Mureş, *judeţ* (county), north-central Romania, occupying an area of 2,585 square miles (6,696 square km). The eastern Carpathian Mountains, including the Călim and Gurghiu ranges, rise above settlement areas in the valleys. The Mureş River and its tributaries flow southwestward through the district. Tîrgu Mureş, a cultural and industrial centre, is the district capital. Its manufactures include machinery, chemicals, and plastics. Several towns produce timber, building materials, textiles, and leather goods. A chemical factory operates in Tîrnăveni, and machinery is assembled in Reghin. There are reserves of natural gas in the surrounding area. Reghin, a former Dacian settlement, is known for its production of wooden musical instruments and small boats. The town is noted for its 14th–15th-century church. Brîncoveneşti village, built on the location of a Roman castrum, contains a 14th-century castle, altered in the 16th century. Suseni village is an area of archaeological investigation. Agricultural activities in the district consist of vineyard and orchard cultivation. A district museum and a zoological museum, exhibiting a collection of owls from the Ural Mountains and North American birds, are located in Reghin. Oak trees dating from the 15th century are found in a nature reserve near Reghin. Tîrgu Mureş is a centre for air, highway, and rail connections. Pop. (1992 prelim.) 607,300.

Mureş River, Hungarian MAROS, river, rising in the Giurgeu Range in the Eastern Carpathian Mountains, east-central Romania. It cuts a gorge between the Căliman and Gurghiu ranges, crosses the Transylvanian Basin southwestward, and then cuts across the Western Carpathians between the Poiana Ruscăi and the Bihoru mountains and emerges onto the Tisa Plain to join the Tisa (Tisza) River at Szeged, Hung., after a course of about 450 miles (725 km). The Mureş is the most important tributary of the Tisa with respect to quantity of water. The large area of its basin, its length, and its diagonal cut across the Transylvanian Basin make it a significant traffic route. The river is navigable for small craft below Deva and is followed by road and rail arteries; several important cities and towns lie along its course.

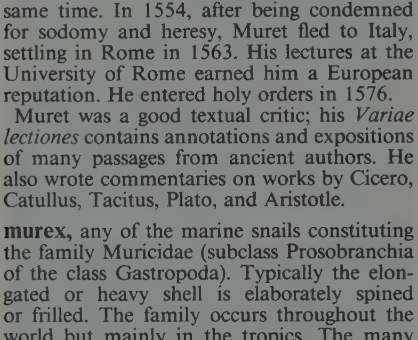
Muret, Marc-Antoine de, also called MARCUS ANTONIUS MURETUS (b. April 12, 1526, Muret, near Limoges, France—d. June 4, 1585, Rome [Italy]), French humanist and classical scholar, celebrated for the elegance of his Latin prose style.

From age 18 Muret taught classics at various schools. In the early 1550s he lectured on philosophy and civil law in Paris. He became intimate with the poets of La Pléiade, and in 1553 he published a commentary on Pierre de Ronsard's *Les Amours. Juvenilia,* a collection of Muret's own poems, many of them on erotic themes, was published at about the same time. In 1554, after being condemned for sodomy and heresy, Muret fled to Italy, settling in Rome in 1563. His lectures at the University of Rome earned him a European reputation. He entered holy orders in 1576.

Muret was a good textual critic; his *Variae lectiones* contains annotations and expositions of many passages from ancient authors. He also wrote commentaries on works by Cicero, Catullus, Tacitus, Plato, and Aristotle.

murex, any of the marine snails constituting the family Muricidae (subclass Prosobranchia of the class Gastropoda). Typically the elongated or heavy shell is elaborately spined or frilled. The family occurs throughout the world but mainly in the tropics. The many muricids that live in rocky shallows are called rock shells, or rock whelks.

The animal feeds by drilling a hole in the shell of another mollusk and inserting its long proboscis. Most species exude a yellow fluid that, when exposed to sunlight, becomes a purple dye. The dye murex (*Murex brandaris*) of the Mediterranean was once a source of royal Tyrian purple. Another example of the most important genus is the 15-centimetre (6-inch) Venus comb (*M. pecten*), a white, long-spined species of the Indo-Pacific region. The oyster drill (*Urosalpinx cinerea*) and dwarf tritons (genus *Ocenebra*) are pests in oyster beds.



Oyster drill (*Urosalpinx cinerea*)
Grant Heilman

Murfree, Mary Noailles (writer): *see* Craddock, Charles Egbert.

Murfreesboro, city, seat (1811) of Rutherford county, central Tennessee, U.S., on the West Fork of Stones River, 30 miles (48 km) southeast of Nashville. It was established in 1811 on a land tract donated by a Revolutionary War soldier, Colonel William Lytle, and was later named for a friend, Colonel Hardy Murfree. From 1819 to 1825 Murfreesboro served as the state capital. One of the most bitter encounters of the American Civil War took place 3 miles northwest of the city (Dec. 31, 1862–Jan. 2, 1863), in which Union forces under General William S. Rosecrans won a strategic victory over Confederates under General Braxton Bragg. Stones River National Battlefield commemorates the battle.

Dairy and beef cattle are raised in the area, which is also noted for Tennessee Walking Horses, gaited horses, ponies, and racehorses. Dairy foods are processed. Manufactures include electric heating elements, electric motors, furniture, and cedar woodenware. Inc. 1817. Pop. (1992 est.) 46,273.

Murfreesboro, Battle of (American Civil War): *see* Stones River, Battle of.

Murgab River (Afghanistan and Turkmenistan): *see* Morghāb River.

Murger, Henri, in full LOUIS-HENRI MURGER (b. March 27, 1822, Paris, France—d. Jan. 28, 1861, Paris), French novelist who was among the first to depict bohemian life.

The son of a concierge and a tailor, Murger left school at 13. Later he became secretary to Count Aleksey Tolstoy and was able to improve his education. He began writing poems and became part of the bohemian life in Paris, but he was often destitute and his health deteriorated. Both the gaiety and tragedy of his circumstances are reflected in his best-known work, *Scènes de la vie de bohème* ("Scenes of Bohemian Life"), in which he himself figures as Rodolfe. Published in separate episodes (1847–49), its success enabled Murger to live and write in greater comfort. The work is the basis of Giacomo Puccini's opera *La Bohème.*

Muri, town and traditional emirate, northwestern Taraba state, eastern Nigeria. Originally part of the 17th-century Jukun kingdom called Kororofa, the region now known as Muri emirate was conquered in the 1804 jihad (holy war) conducted by the Fulani people. By 1817 Hamman Ruwa, a brother of the emir of Gombe, an emirate to the north, had consolidated Fulani control over the non-Muslim peoples of the area and placed his territory under Gombe's jurisdiction. After Ruwa was put to death in 1833 by Gombe's Emir Buba Yero, the Fulani of the region requested independence from Gombe. Thus founded as an independent emirate in 1833, Muri, which was also known as the Hammaruwa kingdom, was ruled by Ruwa's descendants from Muri town (often called Hammaruwa) until 1893. Throughout this period, the kingdom paid tribute in slaves to the sultan of Sokoto (the capital of the Fulani empire, 464 miles [747 km] west-northwest).

Although Emir Muhammadu Nya signed a treaty in 1885 permitting the British Royal Niger Company (1886) to build a trading post at Ibi (104 miles [167 km] southwest of Muri town), troubles with the company and the non-Muslim Jibu people led him to place the emirate under the short-lived (1892–93) French protectorate of Muri. Emir Nya also moved the emirate headquarters in 1893 to Jalingo (40 miles [64 km] east-southeast), a war camp from which he sent sorties against the Mumuye people. The British established firm control over the region in 1900, and Muri emirate was incorporated as the Lau division of Muri province (1900–26). Although Lau town (27 miles [43 km] east) served as the emir's residence to 1910, and Mutum Biyu (Biu, 42 miles [68 km] south) to 1917, Jalingo has been the seat of the emir since 1917. Muri became part of Muri division in 1915; in 1976 it was assigned to Gongola state, and it became part of the newly formed Taraba state in 1991.

The area around Muri town is now mainly inhabited by the Mumuye, Fulani, Wurkum, and Jukun peoples; but there is also a sizable group of Hausa traders. Most of its inhabitants are engaged in farming—staple foods are sorghum and millet—and in raising cattle, sheep, and goats. Cotton and peanuts (groundnuts) are the chief cash crops cultivated in the north, and soya beans and yams are important in the south. There is considerable fishing along the Benue River. There is lead mining around Zurak, 21 miles (34 km) west of Muri town. The town is linked by local road to Zurak and Karīm Lamido towns and is served by the Benue River port of Nuzu, 11 miles (18 km) east-southeast. Pop. (1991 est.) town, 56,570.

Muridae, large family of rodents (order Rodentia) containing about 100 genera and more than 400 living species, among them the common household rats and mice (*Rattus* and *Mus*). The family, known collectively as the Old World rats and mice, is basically Asian, but the household rats and mice have been introduced almost worldwide by human beings. For well-known or economically important members of the family, *see* bandicoot rat; cloud rat; field mouse; harvest mouse; mouse; pouched rat; rat; spiny mouse; water rat.

Murieta, Joaquín (baptized 1830, Alamos, Sonora, Mex.?—d. 1853, California, U.S.?), legendary bandit who became a hero of the Mexican-Americans in California. Facts of his life are few and elusive, and some historians consider him a mythic figure.

A Joaquín Murieta was recorded as baptized in Sonora, Mex., in 1830; while still a teenager, he migrated with his wife to California (1848). In the Gold Rush he tried prospecting, as did thousands of other immigrant Sonorans. The Yankee miners pressed the legislature in Sacramento in 1850 to pass the Greaser Act (its official title) and the Foreign Miners Act in an attempt to drive out the Mexicans. According to legend, Murieta—or several "Murietas"—responded by leading bands of outlaws that raided up and down the San Joaquin and Sacramento valleys, robbing gold miners and holding up stages. The governor offered rewards for his capture, dead or alive, and in June 1853 a visiting Texas Ranger, Harry Love, brought in the head of a Mexican preserved in a jar, claiming it to be that of Murieta. Although the raids did end, rumours persisted that Murieta lived on—returning, by one account, to Sonora, where in the late 1870s he died and was buried in a Jesuit cemetery in the village of Cucurpe.

Murillo, Bartolomé Esteban (baptized Jan. 1, 1618, Seville, Spain—d. April 3, 1682, Seville), the most popular Baroque religious painter of 17th-century Spain, noted for his idealized, sometimes precious manner. Among his chief patrons were the religious orders, especially the Franciscans, and the confraternities in Seville and Andalusia.

Among Murillo's earliest works is the "Virgin of the Rosary" (*c.* 1642; Archbishop's Palace, Seville). In the vestigial style of his artistically conservative Sevillian master, Juan del Castillo, this early work combines 16th-century Italian Mannerism and Flemish realism. The 11 paintings that originally hung in the small cloister of San Francisco in Seville—*e.g.,* the "Ecstasy of St. Diego of Alcalá" (1646; Louvre)—are executed in the more contemporary naturalistic style of the Sevillian school,

"The Two Trinities," oil on canvas by Bartolomé Esteban Murillo, *c.* 1681; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

established by Velázquez and continued by Zurbarán. That series is characterized by realism and tenebrism (contrasting light and shade) and use of commonplace models, with an emphasis on genre or scenes of everyday life.

In the 1650s a striking transformation of style occurred, usually attributed to a visit to Madrid, where Murillo undoubtedly met Velázquez and studied the works of Titian, Rubens, and Van Dyck in the royal collections. The softly modelled forms, rich colours, and broad brushwork of the 1652 "Immaculate Conception" (Seville) reflect direct visual contact with the art of the 16th-century Venetians and the Flemish Baroque painters. The "St. Leandro" and "St. Isidoro" (1655; sacristy of Seville Cathedral) are even further removed from the simple naturalism of his earlier Franciscan saints. These seated figures, more than life size, are in the grand manner of Baroque portraiture, which had become fashionable at the Spanish court.

The "Vision of St. Anthony" (1656; Seville Cathedral), one of Murillo's most celebrated pictures, is an early example of his so-called "vaporous" style, which was derived from Venetian painting. In 1660 Murillo was one of the founders and first president of the Academy of Painting in Seville. During the two following decades he executed several important commissions, generally representing dramatized genre on a grand scale. From 1678 onward Murillo worked on another series of paintings, for the Hospicio de Venerables Sacerdotes in Seville, which included the celebrated "Soult Immaculate Conception" (1678; Louvre). Murillo's late style is exemplified by his unfinished works for the Capuchin church at Cádiz and the "Two Trinities" (popularly known as the "Holy Family"). The often mystical significance of his subjects is countered by the idealized reality of his figures based on familiar human archetypes, with natural gestures and tender, devout expressions, creating an effect of intimate rather than exalted religious sentiment.

Murillo had many pupils and innumerable followers. His paintings were copied and imitated throughout Spain and its empire. He was the first Spanish painter to achieve widespread European fame, and until the 19th century he was the only Spanish artist whose works were extensively known outside the Hispanic world.

Murillo, Gerardo (painter): *see* Atl, Doctor.

Muris, Jean de (b. *c.* 1290, Normandy?—d. *c.* 1351, Paris), French philosopher and mathematician who was a leading proponent of the new musical style of the 14th century. In his treatise *Ars novae musicae* (1319; "The Art of the New Music") he enthusiastically supported the great changes in musical style and notation occurring in the 14th century and associated with the composer and theorist Philippe de Vitry, whose book, *Ars Nova* (1320; "The New Art"), gave its name to the style of 14th-century music.

De Muris was long believed to be the author of the important treatise *Speculum Musices*, an attack on these innovations now known to be by Jacques de Liège. De Muris, who taught at the Sorbonne, knew many of the great composers of his day and corresponded with De Vitry. Apparently he composed no music. In his treatise, translated in part in W.O. Strunk's *Source Readings in Music History* (1950), he argues for the acceptance of divisions and subdivisions of musical metre, which were not recognized in earlier music theory but became common in musical practice and notation.

Murji'ah (Arabic: Those Who Postpone), English MURJITES, one of the earliest Islāmic sects to believe in the postponement (*irjāʾ*) of judgment on committers of serious sins, recognizing God alone as being able to decide whether or not a Muslim had lost his faith.

The Murji'ah flourished during the turbulent period of Islāmic history that began with the murder of ʿUthmān (third caliph) in AD 656, and ended with the assassination of ʿAlī (fourth caliph) in AD 661 and the subsequent establishment of the Umayyad dynasty (ruled until AD 750). During that period the Muslim community was divided into hostile factions, divided on the issue of the relationship of *islām* and *īmān*, or works and faith. The most militant were the Khawārij (Kharijites), who held the extreme view that serious sinners should be ousted from the community and that *jihād* ("holy war") should be declared on them. This led the adherents of the sect to revolt against the Umayyads, whom they regarded as corrupt and unlawful rulers.

The Murji'ah took the opposite stand, asserting that no one who once professed Islām could be declared *kāfir* (infidel), mortal sins notwithstanding. Revolt against a Muslim ruler, therefore, could not be justified under any circumstances. The Murji'ah remained neutral in the disputes that divided the Muslim world and called for passive resistance rather than armed revolt against unjust rulers. This point of view was blessed and encouraged by the Umayyads, who saw the political quietism and religious tolerance of the Murji'ah as support for their own regime. The Murji'ah, however, regarded their tolerance of the Umayyads as based only on religious grounds and on recognition of the importance of law and order.

The Murji'ah were the moderates and liberals of Islām, who emphasized the love and goodness of God and labelled themselves *ahl al-waʿd* (the adherents of promise). To them external actions and utterances did not necessarily reflect an individual's inner beliefs. Some of their extremists, such as Jahm ibn Ṣafwān (d. AD 746), regarded faith as purely an inward conviction, thus allowing a Muslim outwardly to profess other religions and remain a Muslim, since only God could determine the true nature of his faith.

Murmansk, *oblast* (province), northwestern Russia, with an area of 55,950 sq mi (144,900 sq km) occupying the Kola Peninsula between the White and Barents seas. Its upland blocks and mountain massifs, rising to 3,907 ft (1,191 m) in the Khibiny Mountains, are covered by tundra in the north and swampy forest, or taiga, in the south. The economy is dominated by mineral exploitation, principally apatite, nepheline, iron, and nickel; fishing is important along the coasts. Its administrative centre is Murmansk. Pop. (1991 est.) 1,159,000.

Murmansk, formerly (until 1917) ROMANOVNA-MURMANE, seaport and centre of Murmansk *oblast* (administrative region), northwestern Russia, lying 125 mi (200 km) north of the Arctic Circle, and on the eastern shore of Kola Bay, 30 mi from the ice-free Barents Sea. The town, founded in 1915 as a supply port in World War I, was a base for the British, French, and American expeditionary forces against the Bolsheviks in 1918. In World War II Murmansk served as the main port for Anglo-American convoys carrying war supplies to the U.S.S.R. through the Arctic Ocean. The town is now an important fishing port, and its fish-processing plant is one of the largest in Europe. Murmansk's ice-free harbour makes it Russia's only port with unrestricted access to the Atlantic and world sea routes. From December to May it replaces icebound St. Petersburg as the major port of the northwest. Murmansk is connected by railroad with St. Petersburg and Moscow and the mining and industrial centres of Monchegorsk and Kirovsk. Education and research establishments include a teacher-training institute and a research institute of marine fisheries and oceanography. Murmansk (probably from the local Saami word *murman* meaning "the edge of the earth") is the largest town in the world north of the Arctic Circle. Pop. (1991 est.) 472,900.

Harbour at Murmansk, Russia

Bavaria-Verlag/IDF

Murmi (people): *see* Tamang.

murmur (phonetics): *see* vocal fry.

Murnau, F.W., pseudonym of FRIEDRICH WILHELM PLUMPE (b. Dec. 28, 1889, Bielefeld, Ger.—d. March 11, 1931, Hollywood), German motion-picture director who revolutionized the art of cinematic expression by using the camera subjectively to interpret the emotional state of a character.

He was educated at the universities of Heidelberg and Berlin, where he was greatly influenced by the theatrical innovations of Max Reinhardt, the famous German stage director. During World War I service, Murnau assisted in the making of propaganda films. After the war he made a number of films, including *Der Januskopf* (1920; *Janus Faced,* or *Dr. Jekyll and Mr. Hyde,* based on the story by Robert Louis Stevenson); *Schloss Vogelöd* (1921; "Vogelod Castle," *The Haunted Castle*); and *Der* *brennender Acker* (1922; *The Burning Acre*), in which he employed close-ups to further the action. All contained the beginnings of an Expressionist style and his initial experimentation with the camera. Murnau's first important picture was *Nosferatu* (1922), an early film treatment of the vampire legend that incorporated technical effects such as negative images, showing white trees against a black sky.

Der letzte Mann (1924; *The Last Laugh*), a collaboration between Murnau and the creative scriptwriter Carl Mayer, established his reputation as one of the foremost German directors. The film traces the vicissitudes of an aging doorman who is emotionally shattered after his hotel fires him but who is fortuitously rewarded in the end. *Der letzte Mann*'s mobile camera style and interpretive use of the camera to record the emotions of the aging doorman made an international impact on the cinema. The camera moved through city streets, crowded tenements, and hotel corridors, playing an integral role in the film by recording people and incidents through a limited point of view.

Murnau's next two films, *Tartüff* (1925) and *Faust* (1926), were followed by the Hollywood-made films *Sunrise* (1927), *Four Devils* (1928), and *City Girl* (1930). His final film was *Tabu* (1931), an idyllic study of the South Seas, codirected with Robert Flaherty, the pioneer documentary filmmaker.

Murom, city, Vladimir *oblast* (province), western Russia. Murom lies along the Oka River. It is one of the oldest Russian towns and was first mentioned in the chronicles of 862. Surviving historic buildings include the Trinity and Annunciation monasteries and the churches of the Resurrection and Transfiguration, all from the 17th century. The contemporary city has engineering, textile, and sawmilling industries. Pop. (1997 est.) 126,000.

Muromachi period, also called ASHIKAGA PERIOD, in Japanese history, period of the Ashikaga shogunate (1338–1573). It was named for a district in Kyōto, where the first Ashikaga shogun, Takauji, established his administrative headquarters. Although Takauji took the title of shogun for himself and his heirs, complete control of Japan eluded him.

The most successful of the Ashikaga rulers, the third shogun Yoshimitsu, managed to eliminate his rivals and settle a long-standing split in the imperial line, creating an era of stability that lasted several decades. A later succession dispute within the Ashikaga, however, led to the Ōnin War (1467–77) and was followed by a century of military struggle known as "the age of the country at war" (*sengoku jidai*).

In spite of the political disorder, the Muromachi period witnessed great cultural growth, particularly under the influence of Zen Buddhism. The uniquely Japanese arts of the tea ceremony, flower arranging, and nō drama were developed, while the Sung style of ink painting (*sumi-e,* or *suiboku-ga*) reached its height. In architecture simplicity and austerity were the general rule. Both the Golden Pavilion (Kinkakuji) and Silver Pavilion (Ginkakuji) in Kyōto were constructed as shogunal retreats during the Muromachi period.

Consult the INDEX *first*

Muroran, city, southern Hokkaido, Japan, on Cape Chikyū at the entrance to Uchiura Bay. After 1906 it began to grow from a village to a company town, producing steel and iron products. In 1982 Muroran succeeded in securing its water supply system from the company. It became the major heavy industrial centre (by value) on Hokkaido. The port also handles coal, machinery, wood, pulp, and marine products. The city houses a university. Muroran is connected by rail to other Hokkaido cities. Pop. (1995) 109,766.

Murphy, Frank, original name WILLIAM FRANCIS MURPHY (b. April 13, 1890, Harbor Beach, Mich., U.S.—d. July 19, 1949, Detroit, Mich.), associate justice of the Supreme Court of the United States from 1940 until his death, noted for his militant defense of individual liberties and civil rights and for his insistence on doing substantial justice irrespective of legal technicalities.

Murphy studied at the University of Michigan (LL.B., 1914) and, after serving in the war, held several elective posts in the 1920s. As mayor of Detroit (1930–33), he gained national prominence for his efforts to aid the unemployed. Appointed by President Franklin D. Roosevelt, he served as governor-general (1933–35) and U.S. high commissioner (1935–36) in the Philippines, where he supported the independence movement. As governor of Michigan (1937–38), he earned the admiration of organized labour and the hatred of some industrialists (who brought about his defeat for reelection) by refusing to employ troops to break sit-down strikes by automobile workers. While serving as U.S. attorney general (1939–40), he established the Civil Rights Unit (now Division) of the Department of Justice.

Frank Murphy

By courtesy of the Library of Congress, Washington, D.C.

Perhaps Murphy's most notable judicial opinion was his dissent in *Korematsu* v. *United States,* 323 U.S. 214 (1944), in which he denounced as "legalization of racism" the government's wartime internment of Japanese-American residents of the West Coast. His dissent in *Wolf* v. *Colorado,* 338 U.S. 25 (1949), in which the court held that illegally seized criminal evidence was admissible in state (though not in federal) courts, was vindicated when a later court overruled the *Wolf* decision (*Mapp* v. *Ohio,* 1961).

Murphy, Gerald; and Murphy, Sara, in full respectively GERALD CLERY MURPHY and SARA SHERMAN MURPHY, née WIBORG (respectively b. March 25, 1888, Boston, Mass., U.S.—d. Oct. 17, 1964, East Hampton, N.Y.; b. Nov. 7, 1883, Cincinnati, Ohio—d. Oct. 10, 1975, Arlington, Va.), wealthy American expatriates in Paris and Antibes, Fr., during the 1920s and early '30s who befriended and hosted such artists and writers as F. Scott Fitzgerald, Ernest Hemingway, John Dos Passos, Archibald MacLeish, Dorothy Parker, Pablo Picasso, Fernand Léger, Igor Stravinsky, and Cole Porter. Fitzgerald's novel *Tender Is the Night* (1934) was dedicated to the couple, and its main characters, Dick and Nicole Diver, were, in the early parts, patterned on the Murphys' gracious way of life.

The couple moved to Europe in 1921, taking a flat in Paris. Three years later they settled into Villa America, their home in Antibes, where they received guests and gave parties. Gerald became a creditable painter and stage designer, painting sets for Serge Diaghilev's ballets and a Cole Porter ballet, *Within the Quota* (1923). Both Gerald and Sara had a passionate interest in the currents of art, literature, and music of the period, and their home became something of a salon.

In 1933 they returned permanently to America (their eldest son having contracted tuberculosis, from which he died in 1937; another son died suddenly in 1935 of meningitis). Gerald took over his family's Mark Cross business, a New York leather goods and specialty store, which was nearly bankrupted by the Great Depression, and restored it, expanding its specialty and import items. He retired in 1956.

Murphy, Isaac Burns (b. 1861, Fayette County, Ky., U.S.—d. Feb. 12, 1896, Lexington), American jockey who was the first to be elected to the National Museum of Racing's Hall of Fame in Saratoga Springs, N.Y.; he is one of only two African American jockeys to receive this honour (the other is Willie Simms, *q.v.*).

Murphy began racing in 1875 and was one of the first jockeys to pace his mount for a charge down the homestretch—a technique soon described as the "grandstand finish." His win of the Travers Stakes at Saratoga Springs in 1879 catapulted him to national fame. He rode in the Kentucky Derby 11 times and was the first three-time winner, in 1884, 1890, and 1891. In 1884 he won the first American Derby in Chicago, Ill., the most prestigious race of the era. He won this race again in 1885, 1886, and 1888. Murphy's career winning percentage of 34.5 has never been equaled.

Even though Murphy rode before jockeys received a share of the winnings, he was the highest-paid athlete in America, earning close to $20,000 a year at his peak in the late 1880s. By the mid-1890s, however, his ongoing battles with weight gain and alcoholism had severely curtailed his career.

Murphy, William P(arry) (b. Feb. 6, 1892, Stoughton, Wis., U.S.—d. Oct. 9, 1987, Brookline, Mass.), American physician who with George R. Minot in 1926 reported success in the treatment of pernicious anemia with a liver diet. Their discovery culminated in 1948 in vitamin B_{12} therapy, by which a previously fatal disorder became treatable. The Minot–Murphy research was suggested by George H. Whipple's demonstration that liver is essential for blood formation in animals. In 1934 the Nobel Prize for Physiology or Medicine was awarded jointly to the three.

Murphy received his M.D. from Harvard University (1920). He joined the staff of Peter Bent Brigham Hospital in Boston in 1923, becoming consultant in hematology in 1958. From 1923 to 1958, when he became lecturer emeritus, he also taught at Harvard. His textbook *Anemia in Practice* was published in 1939.

Murray, EARLS OF: *see* Moray, Earls of.

Murray, Lord George (b. Oct. 4, 1694, Huntingtower, Perth, Scot.—d. Oct. 11, 1760, Medemblik, Neth.), Scottish Jacobite, one of the ablest of the generals who fought for Charles Edward, the Young Pretender, the Stuart claimant to the English throne, in the Jacobite rebellion of 1745–46.

Murray joined the English army in 1711 but aided the Jacobites in their unsuccessful rebellion of 1715. When Charles Edward invaded Scotland in 1745, Murray became a lieutenant general in the Jacobite army. He was largely responsible for the overwhelming Jacobite victory at Prestonpans, East Lothian, on September 21, and he skillfully directed the Jacobite retreat from Derby, Derbyshire, into Scotland in December. On Jan. 17, 1746, Murray defeated an English army at Falkirk, Stirling. He opposed Charles Edward's decision to make a stand at Culloden, complaining of the physical terrain; after the Jacobite forces were defeated there on April 16, Murray withdrew to Ruthven. The Pretender then abandoned the enterprise and dismissed him. Murray escaped to the European continent, where he died.

Murray, George Redmayne (b. June 20, 1865, Newcastle-upon-Tyne, Northumberland, Eng.—d. Sept. 21, 1939, Mobberley, Cheshire), English physician who pioneered in the treatment of endocrine disorders. He was one of the first to use extractions of animal thyroid to relieve myxedema (severe hypothyroidism) in humans.

Murray, the son of a prominent physician, William Murray, received clinical training at University College Hospital, London. He was awarded both his M.B. (1889) and M.D. (1896) by the University of Cambridge. Determined to pursue a career in experimental medicine, Murray in 1891 became pathologist to the Hospital for Sick Children in Newcastle. He also lectured in bacteriology and comparative anatomy at Durham University. From 1893 to 1908 he was Heath professor of comparative pathology at Durham. Appointed to the chair of medicine at Manchester University, he remained there to the end of his career.

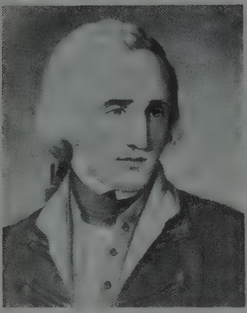
In 1891 Murray published his most important research, a report in the *British Medical Journal* on the effectiveness of sheep thyroid extract in treating myxedema in humans. Thyroid deficiency had been recognized as the cause of myxedema in the 1880s, and several researchers had established that an animal could survive the usually fatal effects of thyroidectomy if part of the excised thyroid gland was transplanted to another body location. Sir Victor Horsley, a colleague of Murray's, later suggested that part of a sheep's thyroid could be transplanted into human patients to relieve myxedema. Murray surmised, however, that a hypodermic injection of thyroid extract could more effectively be used to correct myxedema in humans, and he was completely successful in his first such attempt at treatment. Subsequent tests substantiated his approach.

Murray, (George) Gilbert (Aimé) (b. Jan. 2, 1866, Sydney, N.S.W., Australia—d. May 20, 1957, Oxford, Oxfordshire, Eng.), British classical scholar whose translations of the masters of ancient Greek drama—Aeschylus, Sophocles, Euripides, and Aristophanes—brought their works to renewed popularity on the contemporary stage.

Murray became professor of Greek at Glasgow University at age 23 and in 1908 regius professor of Greek at the University of Oxford, where he remained until his retirement in 1936. Between 1904 and 1912 he personally directed many of the productions that made Greek theatre once more a living art. By translating into rhymed rather than blank verse, he attempted to revive the rhythmic quality of Greek poetry. Murray also applied insights from the emergent science of anthropology to his other scholarly studies, thus broadening the understanding of Homer and of the older forms of Greek religion. His many works in this vein include *The Rise of the Greek Epic* (1907) and *Five Stages of Greek Religion* (2nd ed.; revised and enlarged, 1925).

Murray, James (b. Jan. 21, 1721, Ballencrieff, East Lothian [now in Lothian region], Scot.—d. June 18, 1794, near Battle, Sussex, Eng.), British soldier who was military and civilian governor of Quebec in 1760–68.

Murray joined the army in 1740 and served in the West Indies and Europe. Sent to North America in 1757 as a lieutenant colonel during the Seven Years' War, in 1758 he commanded a brigade during the successful British siege of Louisbourg, in what is now Nova Scotia, under Lord Amherst. He was one of General James Wolfe's three brigadiers in the British expedition against Quebec in 1759. After the British captured the city, Murray was made its military governor. When the French capitulated in 1760, he became military governor of Quebec district; he became the first civil governor of Quebec after its formal cession to Great Britain in 1763.



James Murray, detail of a portrait by an unknown artist

By courtesy of the Archives Nationales du Quebec

As governor, Murray opposed repressive measures against French-Canadians, and his conciliatory policy led to charges against him of partiality. Although exonerated, he left his post in 1768 and was appointed governor of Minorca in 1774. He surrendered to French and Spanish troops there in 1782, for which he was court-martialed in England; after being acquitted, he was made a general.

Murray, Sir James (Augustus Henry) (b. Feb. 7, 1837, Denholm, Roxburghshire [now in Borders region], Scot.—d. July 26, 1915, Oxford, Oxfordshire, Eng.), Scottish lexicographer and first editor (from 1879) of *A New English Dictionary on Historical Principles,* now known as *The Oxford English Dictionary.* He was knighted in 1908.

Murray was a grammar-school teacher from 1855 to 1885, during which time he also wrote a famous article on the English language for *Encyclopædia Britannica* (1878) and served as president of the Philological Society (1878–1880, 1882–1884). He undertook the editing of a vast dictionary that was intended as an inventory of words used in English from the mid-12th century and, in some instances, from earlier dates. Construction of the dictionary was to be grounded on strict historical and descriptive principles, and each definition was to be accompanied by an example, including date, of usage. The first section, A–Ant, appeared in 1884, printed at the Clarendon Press, Oxford. From 1885 until his death, Murray lived at Oxford, working with a staggering volume of materials and completing about half of the dictionary, sections A–D, H–K, O, P, and T. It was his organization that made completion of the great undertaking possible.

Murray, Sir John (b. March 3, 1841, Cobourg, Ont., Can.—d. March 16, 1914, near Kirkliston, West Lothian [now in Lothian region], Scot.), Scots naturalist and one of the founders of oceanography, whose particular interests were ocean basins, deep-sea deposits, and coral-reef formation.

In 1868 Murray began collecting marine organisms and making a variety of oceanographic observations during an expedition to the Arctic islands of Jan Mayen and Spitsbergen, off Norway. Murray did much to organize the *Challenger* Expedition (1872–76), which made extremely valuable contributions in charting, surveying, and biological investigation, and he helped outfit it with equipment for conducting oceanographic studies. As a naturalist with the expedition, he was placed in charge of the biological specimens collected. Kept at Edinburgh, they attracted the attention of marine biologists from around the world for 20 years.

After the death of the expedition's leader, Sir Wyville Thomson (1882), Murray completed the publication of the 50-volume *Report on the Scientific Results of the Voyage of H.M.S. Challenger* (1880–95). He also directed biological investigations of Scottish waters (1882–94), surveyed the depths of Scottish lakes (1906), and took part in a North Atlantic oceanographic expedition (1910). He was knighted in 1898. His writings include the paper "On the Structure and Origin of Coral Reefs and Islands" (1880) and, with Johan Hjort, *The Depths of the Ocean* (1912).

Murray (of Broughton), Sir John, BARONET (b. 1718—d. Dec. 6, 1777, Cheshunt, Hertfordshire, Eng.), Scottish Jacobite, secretary to Prince Charles Edward (the Young Pretender) during the rebellion of 1745–46. He damaged the rebels' cause by his nervous collapse in March 1746 and later by his incrimination of other leading supporters of the Stuart claim to the British throne.

Murray was educated at the universities of Edinburgh and Leiden and became involved with the Jacobites in 1738. He returned to Scotland as an official Jacobite agent in 1741, but his work there was complicated by the overly optimistic reports that led to the abortive French invasion of Scotland in February 1744. Charles Edward nevertheless pressed on with his own plans, and Murray served him efficiently during the rebellion until his health broke down in March 1746, to the detriment of the rebels' commissariat. Subsequently Murray was accused, possibly unjustly, of fomenting trouble between Charles Edward and Lord George Murray during the campaign.

Brought to trial, he turned king's evidence, but most of the evidence that he gave the crown was aimed at those who, in his judgment, had failed the Jacobite cause. Lord Lovat, although incriminated by Murray, was not condemned and executed on his evidence alone. Murray was pardoned in 1748, but his later life was miserable. Shunned as a traitor, even by his wife, he became deranged. On the death of his uncle in 1770, Murray inherited the baronetcy, which, on his own death seven years later, passed to his eldest son, David.

Murray, Joseph E(dward) (b. April 1, 1919, Milford, Mass., U.S.), American surgeon who in 1990 was co-winner (with E. Donnall Thomas) of the Nobel Prize for Physiology or Medicine for his work in lifesaving organ- and tissue-transplant techniques.

Murray received a bachelor of arts degree (1940) from Holy Cross College, Worcester, Mass., and a medical degree (1943) from Harvard Medical School, Cambridge, Mass. He completed his surgical residency at Peter Bent Brigham Hospital (later Brigham and Women's Hospital), Boston, where he began his prizewinning research. From 1964 to 1986 he served as chief plastic surgeon at Brigham, and from 1972 to 1985 he was chief plastic surgeon at Children's Hospital Medical Center, Boston. He also became professor of surgery at Harvard Medical School in 1970.

While grafting skin on wounded soldiers during World War II, Murray observed that grafts were compatible only between identical twins. Thinking that such might be the case for transplanted internal organs as well, he experimented with kidney transplants in dogs. In 1954 he performed a kidney transplant for an individual whose genetically identical twin volunteered to donate a kidney; the recipient survived for several years. Murray continued to search for ways of suppressing a patient's immune system to keep it from rejecting genetically foreign parts. With the use of immunosuppressive drugs, in 1962 he performed the first successful kidney transplant using a kidney from a donor unrelated to his patient. Eventually he was able to successfully transplant a kidney from a cadaver.

Murray, Philip (b. May 25, 1886, Blantyre, Lanark, Scot.—d. Nov. 9, 1952, San Francisco), American labour leader who organized the United Steelworkers of America (USWA) from 1936 and played a prominent part in the Congress of Industrial Organizations (CIO) through its early years, serving as its president from 1940 until his death.

Philip Murray, 1945
By courtesy of the United Steelworkers of America

Emigrating to the United States from his native Scotland in 1902, Murray became a coal miner in Pennsylvania and joined the United Mine Workers of America (UMWA). A member of the union's international board from 1912, he served as vice president from 1920 to 1942. In 1936, when John L. Lewis, UMW president, became the first president of the newly formed CIO, he gave Murray the responsibility for creating an industry-wide steelworkers' union. Murray was chairman of the Steelworkers Organizing Committee until 1942, when he became president of its successor, the USWA, which in his lifetime grew to include 2,500 local unions. Earlier, on Nov. 22, 1940, he had replaced Lewis as CIO president.

Although Murray otherwise supported the U.S. effort in World War II, he opposed President Franklin D. Roosevelt's plan (proposed in 1944 but never put into effect) for compulsory civilian labour in war industries. In 1949–50 he forced the expulsion of several Communist-dominated unions from the CIO.

Murray, William (British chief justice): *see* Mansfield (of Caen Wood), William Murray, 1st earl of.

Murray Bridge, town, southeastern South Australia, on the Murray River, 52 miles (84 km) by road southeast of Adelaide. Originally a stop for cattle drovers, the town was organized in 1860 as the Hundred of Mobilong and grew as a river port. A bridge spanned the Murray in 1879, and the town of Mobilong was laid out in 1883. A rail span crossed the river in 1886. In the early 1900s, swamps along the river were drained for farming, and the region now yields wheat, fruits, dairy produce, vegetables, sheep, pigs, and poultry. Proclaimed a municipality in 1924, the community was renamed Murray Bridge. It is now a food-processing centre, with some light manufactures, one of Australia's largest dairy factories, and resort facilities. Pop. (1986 prelim.) 11,893.

Murray Grey, breed of Australian beef cattle first bred in 1905 in the Murray River valley on the border between New South Wales and Victoria. Its characteristic colour is grey, and the breed is known for its calving and milking ability, its gentle temperament, and its rapid natural growth rate. Murray Greys are naturally polled (hornless) and have proved adaptable (in part because of their dark skin pigmentation) to a number of climates. The breed has also been successfully crossed with Herefords, Bos Indicus, Shorthorns, Angus, Holstein-Friesians, and other breeds. Murray Greys have been exported to New Zealand, Canada, the United States, the United Kingdom, China, and Japan. The Murray Grey Beef Cattle Society was founded in 1962.

Murray River, principal river of Australia, flowing 1,609 miles (2,589 km) across southeastern Australia from the Snowy Mountains to the Great Australian Bight of the Indian Ocean. Although it has a total catchment area of 414,253 square miles (1,072,905 square km), its average annual discharge is only 31 cubic feet (0.89 cubic m) per second, and in places it has dried up on at least three occasions. Named after Colonial Secretary Sir George Murray, the river rises on The Pilot (a mountain), near Mount Kosciusko in southeastern New South Wales. It flows west and northwest, passes through Hume Reservoir above Albury, and forms most of the boundary between New South Wales and Victoria. At Morgan, S.Aus., it bends sharply southward to flow through Lake Alexandrina to Encounter Bay on the Great Australian Bight. For most of its course through South Australia (250 miles [400 km]), the river is bordered by a narrow floodplain and flows between cliffs 100 feet (30 m) high. Its upper 200 miles (320 km) cut through mountainous terrain. The central section, however, lies on a broad and mature floodplain, with the Riverina plains of New South Wales to the north and the plains of northern Victoria to the south. Its principal tributaries are the Darling River, Murrumbidgee River, Mitta Mitta, Ovens, Goulburn, Campaspe, and Loddon rivers.

The Murray Valley is of immense economic significance, lying across the great wheat–sheep belt in its climatically most reliable section. During the second half of the 19th century, river shipping was of great importance, but, with growing competition from railways and demand for irrigation water (first used at Mildura, 1886), navigation practically ceased. The valley has by far the most considerable irrigation (more than 1,000,000 acres [400,000 hectares]) of the continent. Its chief products are cattle, sheep, grains, fruit, and wine. In 1915 the River Murray Commission, comprising representatives from the three state governments and the commonwealth, was established to regulate utilization of the river's waters. The largest reservoirs are the Dartmouth on the Mitta Mitta River and the Hume on the Murray. Dartmouth's dam, 180 m (591 feet) high, is the highest dam in the southern hemisphere. The multipurpose Snowy Mountains scheme (completed in 1974), increased the amount of water available for irrigation and generated large quantities of electrical power for peak load periods. Irrigation, however, led to serious salinity problems, so much so that Adelaide (which is almost completely dependent on the Murray for its water supply) on occasion has received water that, by World Health Organization (WHO) criteria, is unfit for drinking. The problem of Murray salinity has been recognized as of national significance to Australia. Principal towns in the Murray Valley are Albury, Echuca, Swan Hill, Mildura, Renmark, and Murray Bridge.

Murray River near Tintalba, New South Wales
Picturepoint, London

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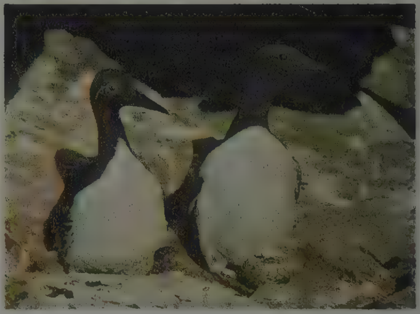
murre, any of certain black and white seabirds comprising the genus *Uria* of the auk family, Alcidae. In British usage the two species of *Uria* are called guillemots, along with *Cepphus* species. Murres are about 40 cm (16 inches) long. They nest in vast numbers on sheer cliffs, each pair laying a single egg. The chick matures rapidly; when half-grown it enters the sea, in parental company, to escape marauding gulls and skuas. In autumn the birds travel south by swimming.

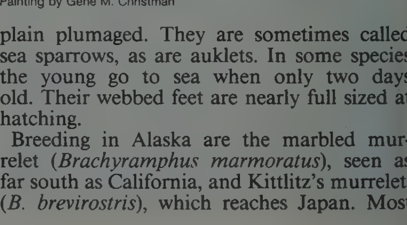


Common murres (*Uria aalge*), ringed phase at left
R.J. Tulloch—Bruce Coleman Inc./EB Inc.

The common murre (*U. aalge*) breeds from the Arctic Circle south to Nova Scotia, California, Portugal, and Korea. Atlantic populations include the so-called bridled, or ringed, murre, a mutation that shows, in breeding season, a ring around the eye and a thin, white stripe behind the eye. This characteristic is nearly absent in murres of Portugal but increases toward the northwest and is seen in 70 percent of Icelandic murres. Beyond Iceland, bridling is uncommon, and it does not occur in Pacific populations.

The thick-billed, or Brünnich's, murre (*U. lomvia*), with a somewhat heavier beak, often nests farther north, to Ellesmere Island and other islands within the Arctic Circle, where the common murre is absent. There is some overlap in breeding grounds, however, and the two species nest in common on some islands.

murrelet, any of six species of small diving birds belonging to the auk family, Alcidae (order Charadriiformes). Murrelets are about 20 cm (8 inches) long, thin billed and, in winter, plain plumaged. They are sometimes called sea sparrows, as are auklets. In some species the young go to sea when only two days old. Their webbed feet are nearly full sized at hatching.



Marbled murrelet (*Brachyramphus marmoratus*)
Painting by Gene M. Christman

Breeding in Alaska are the marbled murrelet (*Brachyramphus marmoratus*), seen as far south as California, and Kittlitz's murrelet, (*B. brevirostris*), which reaches Japan. Most southerly is Xantus's murrelet (*Endomychura hypoleucus*), which nests on the hot coast of Baja California and (like some gulls of the region) travels north in winter.

Mürren, Alpine village, Bern canton, south central Switzerland, situated high above the Lauterbrunnen Valley in the Bernese Oberland (highland), opposite the Jungfrau (13,642 ft [4,158 m]). It is the highest village in the canton (elevation 5,450 ft) that is inhabited all the year round. A noted health and international winter-sports resort, it is also a ballooning centre with an annual international ballooning week. The Kandahar Ski Club was founded there in 1924. Since 1891 the main access has been by a mountain railway from Lauterbrunnen. The Schilthorn cableway began operation in 1967.

Mürren, Switz., with the north face of Eiger, a peak in the Bernese Alps

Ewing Galloway

Murrow, Edward (Egbert) R(oscoe) (b. April 25, 1908, Greensboro, N.C., U.S.—d. April 27, 1965, Pawling, N.Y.), radio and television broadcaster who was the most influential and esteemed figure in American broadcast journalism during its formative years.

Murrow graduated from Washington State College (now University), Pullman. He served as president of the National Student Association (1929–31) and then worked to bring German scholars displaced by Nazism to the United States. He joined the Columbia Broadcasting System (CBS) in 1935 and was sent to London in 1937 to head the network's European Bureau. Murrow's highly reliable and dramatic eyewitness reportage of the German occupation of Austria and the Munich Conference in 1938, the German takeover of Czechoslovakia in 1939, and the Battle of Britain during World War II brought him national fame and marked radio journalism's coming of age.

After the war Murrow became CBS vice president in charge of news, education, and discussion programs. He returned to radiobroadcasting in 1947 with a weeknight newscast. With Fred W. Friendly he produced *Hear It Now,* an authoritative hour-long weekly news digest, and moved on to television with a comparable series, *See It Now.* Murrow was a notable force for the free and uncensored dissemination of information during the American anti-Communist hysteria of the early 1950s. In 1954 he produced a notable exposé of the dubious tactics of Sen. Joseph McCarthy, who had gained prominence with flamboyant charges of Communist infiltration of U.S. government agencies. Murrow also produced *Person to Person* (1953–60) and other television programs. He was appointed director of the U.S. Information Agency in 1961 by Pres. John F. Kennedy.

A biography, A.M. Sperber's *Murrow: His Life and Times,* appeared in 1986.

Murrumbidgee River, major right-bank tributary of the Murray River, rising on the western slope of the Eastern Highlands (20 mi [32 km] north of Kiandra), in southeastern New South Wales, Australia. It flows at first southeastward and then, after a remarkable fishhook bend, directly northward through the Australian Capital Territory. At Yass it trends westward, being joined by the Lachlan between Maude and Balranald, and enters the Murray 140 mi from the Victoria border, after a course of 1,579 mi. Seen at its junction with the Hume by Charles Sturt (1829–30), and traversed (1836) in much of its course by Major Mitchell, the river, whose Aboriginal name means "big water," or "overflowing," is among the westernmost perennial streams of Australia.

The river's drainage basin occupies 32,440 sq mi (84,020 sq km), and the Murrumbidgee Irrigation Area, roughly around the mid-course and its adjoining plains, is a highly organized and productive undertaking involving more than 1,000 sq mi of farmland. Established in 1912, the irrigation project was expanded to include the resettlement of former soldiers after World War I. It supports livestock pastures, grapes, citrus fruits, wheat, and cotton, and its rice yields are among the world's highest. Chief sources of irrigation water are the Burrinjuck and Berembed reservoirs. Water is also diverted across the divide into the Murrumbidgee's headstreams as part of the complex Snowy Mountains irrigation–hydroelectric development scheme. Important valley towns include Canberra (the federal capital), Yass, Wagga Wagga, Narrandera, Hay, and Balranald.

Murry, John Middleton (b. Aug. 6, 1889, London—d. March 13, 1957, Bury St. Edmunds, Suffolk, Eng.), English journalist and critic whose romantic and biographical approach to literature ran counter to the leading critical tendencies of his day. He wrote at least 40 books and a large body of journalistic works in which his pronounced—though changeable—views on social, political, and religious questions were constantly before the public.

He was the husband of short-story writer Katherine Mansfield and a close associate of D.H. Lawrence, both of whom influenced his development as a writer. During World War I the Murrys and Lawrences were neighbours in Cornwall, and something of the relationship between the two couples appears in Lawrence's *Women in Love.* Murry also appears, harshly lampooned, as the character Burlap in Aldous Huxley's *Point Counter Point.*

Murry began his career as editor of *Rhythm* while at Brasenose College, Oxford. He was editor of *Athenaeum* (1919–21) and founding editor of *Adelphi* (1923–48), both literary magazines. Among his numerous critical works are studies of Mansfield (*Katherine Mansfield and Other Literary Portraits,* 1949) and Lawrence (*Son of Woman, the Story of D.H. Lawrence,* 1931), as well as several works on Keats. Murry's autobiography, *Between Two Worlds* (1935), is strikingly revealing about his own life. A large selection of his letters to Mansfield, edited by C.A. Hankin, was published in 1983.

Mursa, Battle of (Sept. 28, AD 351), defeat of the usurper Magnentius by the Roman emperor Constantius II. The battle entailed losses on both sides that severely crippled the military strength of the Roman Empire; it is known as the bloodiest battle of the century. It was also the first defeat of Roman legionaries by heavy cavalry.

In 350, having deposed the emperor Constans in the western provinces and the self-proclaimed emperor Nepotanius in Rome, Magnentius failed to gain Constantius' recognition in the eastern provinces. Constantius organized Germans on the Rhine frontier but was defeated in 351 at Atrans (modern Trojane, Slovenia). Magnentius, refusing Constantius' offer of compromise and suffering setbacks at Siscia (modern Sisak, Croatia) and Sirmium (modern Sremska Mitrovica, Yugos.), pursued Constantius to Mursa (modern Osijek, Croatia). Constantius' army was outnumbered, but after prolonged fighting his cavalry routed Magnentius' right wing, and soon his victory was complete. Losses suffered by the victors (30,000) exceeded those of the routed force (24,000), however.

Murshidābād, city and district, West Bengal state, northeastern India. The city, lying just east of the Bhāgīrathi River, is an agricultural trade and silk-weaving centre. Originally called Makhsudābād, it was reputedly founded by the Mughal emperor Akbar in the 16th century. In 1704 the nawab Murshid Qulī Khān (following Aurangzeb's orders) transferred the capital there from Dacca (now Dhākā) and renamed the city Murshidābād. It continued to be the capital under the British until 1790 and is still the seat of the prominent descendants of the nawabs of Bengal.

Of historic interest are Nizāmat Kila (the palace of the nawabs), built in the Italianate style in 1837; Pearl Lake (Moti Jhīl) just to the south, with Murādbāgh Palace; and Khushbāgh Cemetery, containing the tombs of ʿAlī Vardī Khān, the last great nawab, and Siraj-ud-Dawlah, his grandnephew, who was defeated by the British at the Battle of Plassey. Constituted a municipality in 1869, Murshidābād has eight colleges affiliated with the University of Calcutta.

Murshidābād district (2,062 sq mi [5,341 sq km]) comprises two distinct regions separated by the Bhāgīrathi River (*q.v.*). To the west lies the Rārh, a high, undulating continuation of the Choṭa Nāgpur plateau. The eastern portion, the Bagri, is a fertile, low-lying alluvial tract, part of the Ganges Delta. The district is drained by the Bhāgīrathi and Jalangi rivers and their tributaries. Rice, jute, legumes, oilseeds, wheat, barley, and mangoes are the chief crops in the east; extensive mulberry cultivation is carried out in the west. District headquarters are in Baharampur (*q.v.*). The district became part of the Gaur kingdom in 1197 and passed to the British East India Company in the 18th century. Pop. (1991 prelim.) city, 30,339; district, 4,734,278.

Mursilis I, also spelled MURSHILISH (fl. 16th century BC) Hittite king during the Old Kingdom (reigned *c.* 1620–*c.* 1590 BC).

Mursilis was the adopted heir of his grandfather, Hattusilis I, whom he succeeded on the throne. He first continued his predecessor's campaigns in northern Syria, destroying Aleppo and delivering the final blow to Mari. He then turned eastward, and by raiding Babylon he put an end to the Amorite dynasty there. This event, recorded in Babylonian sources, firmly linked Hittite chronology with that of Babylonia. Mursilis also fought the Hurrians on the upper Euphrates River and returned to his capital, Hattusas (modern Boğazköy, in Turkey), with rich booty and many captives. Soon after his return, however, he was killed in a palace conspiracy planned by his brother-in-law Hantilis.

Mursilis II, also spelled MURSHILISH (fl. 14th century BC), Hittite king during the New Kingdom (reigned *c.* 1346–*c.* 1320 BC).

Son of the great Hittite conqueror Suppiluliumas, Mursilis succeeded his father after the brief reign of his older brother Arnuwandas III. Mursilis renewed the allegiance of North Syria, particularly Carchemish (controlled by his brother Shar-Kushukh) and the kingdom of Amurru; he also conducted a successful campaign against the western kingdom of

Arzawa, one of the main threats to the Hittite realm. Chronic trouble with the Kaska in the north necessitated almost annual pacification operations (10 in all), and the region of Azzi-Hayasa (east of the Kaska) also had to be reconquered by Mursilis in a number of campaigns. A prolific personal annalist, Mursilis also edited an account of his father's exploits; his detailed descriptions of his own campaigns have yielded valuable information about Hittite military strategy.

Murtına, also spelled MURTANA (Turkey): *see* Perga.

Murugaṉ, chief deity of the ancient Tamils of South India, later identified in part with the Hindu god Skanda. He probably originated as a fertility god, and his worship is said to have included orgiastic dancing. He is described as joining his fierce mother, Koṟṟavai, in cannibal feasts on the battlefield, a practice that authorities use to explain his association with the North Indian war god Skanda. His favourite weapon was the trident or spear, and his banner carried the emblem of a wild fowl. The *Tirumurukārruppaṭai*, a "guide to the worship of the god Murugaṉ," is a description of the chief shrines of the god that the worshiper is encouraged to visit; it was probably written prior to the 7th century AD. *See also* Skanda.

Mururoa, atoll at the southeastern tip of the Tuamotu Archipelago, French Polynesia, in the central South Pacific, 700 miles (1,125 km) southeast of Tahiti. Formerly uninhabited and used to grow coconuts, the island was ceded to France in 1964. Since 1966 it has been the site of a number of French nuclear weapons tests conducted through the Pacific Experimentation Centre; the first explosion took place July 3, 1966. After 1975 the tests were conducted underground. International concern over the fracturing of the rock of Mururoa caused France to announce that, in the future, its more powerful blasts would be carried out under the lagoon of the island of Fangataufa, south of Mururoa.

Mururoa is served by a jet airstrip on Hao, about 170 miles (275 km) away, and by a rear base at Papeete. About half of the island's population, which numbered about 3,000 in 1985, is military.

Murut, least numerous of the indigenous ethnic groups of Indonesian Borneo, living mostly in the hilly southwestern uplands of northeastern Malaysia and speaking a distinctive Austronesian language also called Murut. Of Proto-Malay stock, their prehistoric ancestors migrated from Asia. The Murut were historically headhunters living in longhouse settlements on hilltops for defense; they were gradually displaced into the interior by immigrant settlers. The Murut Rebellion in 1915 was a protest against British colonial indifference. After the large influx of Japanese in 1921–31, the Murut lost many members to a form of malaria against which they had no resistance. They numbered about 34,300 in 1980. Practicing slash-and-burn agriculture, they cultivate dry rice, corn (maize), and sweet potatoes. The nuclear family is the main kin group. Many Murut have entered the labour market to raise the traditional dowry for their daughters. Their traditional religion includes some elements of totemism.

Murwāra, town, Madhya Pradesh state, central India, just south of the Katnī River. Sometimes called Katni, the town is a rail junction and a leading trade centre. Major industries include rice and flour milling, fuller's-earth processing, and various manufactures. Important bauxite and limestone works are nearby. Murwāra was constituted a municipality in 1874 and has an industrial school. Pop. (1981) town, 77,862; metropolitan area, 123,017.

Murwillumbah, coastal town, northeastern New South Wales, Australia, 20 miles (32 km) above the mouth of the Tweed River, near the Queensland border. It was surveyed in 1872, but development was slow until the town was reached in 1894 by a rail extension from Lismore. Murwillumbah, an Aboriginal term meaning either a "good campsite" or "place of many possums," has had a history marked by disaster. It was destroyed by fire in 1907 and ravaged by floods in 1947, 1954, and 1956. On the Pacific Highway, it is a processing and service centre for a district of banana, sugarcane, and dairy farming. A banana festival is celebrated in August-September. Pop. (1986) including Harden, 2,045.

Murzuk (Libya): *see* Marzūq.

Mürzzuschlag, town, *Bundesland* (federal state) Steiermark, east-central Austria, at the junction of the Fröschnitz and Mürz rivers, northeast of Bruck an der Mur. First mentioned in 1227, it was chartered in 1318 and has been an ironworking centre since the 14th century. It has medieval houses and a former Cistercian abbey with a church from 1496 and beautiful cloisters. An Alpine summer and winter resort of the Semmering region, Mürzzuschlag is a noted skiing centre. Pop. (1981) 10,774.

Muş, city, eastern Turkey, lying at the mouth of a gorge on the slopes of Kurtik Mountain, at the south side of a wide plain in the Murat River valley. The surrounding hills are covered with vineyards and oak scrub. The castle (now in ruins) and the town were reputedly founded by the Armenian king Mushel I Mamikonian in the 6th century. Later called Tarun by the Arabs, the town came under Ottoman domination in 1515. The major part of Muş was destroyed by an earthquake in 1966. The city lies on the Elâzığ-Tatvan railway and is linked by road to Erzurum (85 miles [137 km] north), Bitlis (east-southeast), and Bingöl (northwest).

The surrounding region is rugged, with small basins of scarce arable land. It has a large Kurdish population. Pop. (1985) 42,159.

Mus, Paul (b. 1902?, Bourges, Fr.—d. Aug. 9, 1969, Avignon), French scholar of Southeast Asian civilizations, especially Vietnamese society and culture.

Taken to Vietnam as a small child, Mus grew up in Hanoi, where he attended high school with upper-class Vietnamese students, forming a keen perception of Vietnamese life that is reflected in his writings. At the University of Paris he became an accomplished Southeast Asian scholar, then returned to Hanoi in 1927 as a secretary and librarian with the Research Institute of the French School of the Far East until 1940. He participated in archaeological expeditions and explored the ruins of the ancient kingdom of Champa, in southernmost Vietnam; his book *Barabudur* (1935), a treatise on the origins of Buddhism and the Hindu-based cultures of Southeast Asia, resulted from those investigations.

Late in World War II, Mus joined a British intelligence unit in India. His mission was to return to Vietnam and develop resistance there against the Japanese; he landed by parachute in the Hanoi area in 1945, shortly before the Japanese completely routed the last remnants of the French administration. He fled to Dien Bien Phu, whence he escaped to China.

Upon his return to Vietnam in September, after the war, as political adviser to General Philippe Leclerc, he was sent to negotiate with Ho Chi Minh, who had proclaimed an independent Vietnam in the north. The inflexible terms Mus offered Ho proved unacceptable, and the guerrilla war continued. Mus returned to Paris, where he was appointed director of the French School for Overseas Administration and also professor at the Collège de France.

Mus became a visiting lecturer at Yale University in 1950 and two years later a full professor of Southeast Asian civilizations. In his *Viet-Nam: sociologie d'une guerre* (1952; "Vietnam: Sociology of a War"), he tried to communicate his understanding of the Vietnamese to the French, who were still engaged in the French Indochina War. He strongly influenced the large group of young Southeast Asian scholars that emerged in the United States. With John McAlister he wrote *The Vietnamese and Their Revolution* (1970).

Musa, mother and wife of Phraates V (*q.v.*), king of Parthia.

Musa (goddess): *see* Muse.

Mūsā, also spelled MOUSA, also called KANKAN MŪSĀ (d. 1332/37?), *mansa* (emperor) of the West African empire of Mali from 1307 (or 1312). Mansa Mūsā left a realm notable for its extent and riches (he built the Great Mosque at Timbuktu), but he is best remembered in the Middle East and Europe for the splendour of his pilgrimage to Mecca (1324).

Pilgrimage to Mecca. Mansa Mūsā, either the grandson or the grandnephew of Sundiata, the founder of his dynasty, came to the throne in 1307. In the 17th year of his reign (1324), he set out on his famous pilgrimage to Mecca. It was this pilgrimage that awakened the world to the stupendous wealth of Mali. Cairo and Mecca received this royal personage, whose glittering procession, in the superlatives employed by Arab chroniclers, almost put Africa's sun to shame. Traveling from his capital of Niani on the Upper Niger River to Walata (Oualâta, Mauritania) and on to Tuat (now in Algeria) before making his way to Cairo, Mansa Mūsā was accompanied by an impressive caravan consisting of 60,000 men including a personal retinue of 12,000 slaves, all clad in brocade and Persian silk. The emperor himself rode on horseback and was directly preceded by 500 slaves, each carrying a gold-adorned staff. In addition, Mansa Mūsā had a baggage train of 80 camels, each carrying 300 pounds of gold.

Mansa Mūsā's prodigious generosity and piety, as well as the fine clothes and exemplary behaviour of his followers, did not fail to create a most favourable impression. The Cairo that Mansa Mūsā visited was ruled over by one of the greatest of the Mamlūk sultans, Al-Malik an-Nāṣir. The black emperor's great civility notwithstanding, the meeting between the two rulers might have ended in a serious diplomatic incident, for so absorbed was Mansa Mūsā in his religious observances that he was only with difficulty persuaded to pay a formal visit to the sultan. The historian al-'Umarī, who visited Cairo 12 years after the emperor's visit, found the inhabitants of this city, with a population estimated at one million, still singing the praises of Mansa Mūsā. So lavish was the emperor in his spending that he flooded the Cairo market with gold, thereby causing such a decline in its value that, some 12 years later, the market had still not fully recovered.

Rulers of West African states had made pilgrimages to Mecca before Mansa Mūsā, but the effect of his flamboyant journey was to advertise both Mali and Mansa Mūsā well beyond the African continent and to stimulate a desire among the Muslim kingdoms of North Africa, and among many of European nations as well, to reach the source of this incredible wealth.

Conquest of Songhai kingdom. Mansa Mūsā, whose empire was one of the largest in the world at that time, is reported to have observed that it would take a year to travel from one end of his empire to the other. While this was probably an exaggeration, it is known that during his pilgrimage to Mecca, one of his generals, Sagmandia (Sagaman-dir), extended the empire by capturing the Songhai capital of Gao. The Songhai kingdom measured several hundreds of miles across, so that the conquest meant the acquisition of a vast territory. The 14th-century traveller Ibn Baṭṭuṭa noted that it took about four months to travel from the northern borders of the Mali empire to Niani in the south.

The Emperor was so overjoyed by the new acquisition that he decided to delay his return to Niani and to visit Gao instead, there to receive the personal submission of the Songhai king and take the King's two sons as hostages. At both Gao and Timbuktu, a Songhai city almost rivalling Gao in importance, Mansa Mūsā commissioned Abū Isḥāq as-Sāḥilī, a Granada poet and architect who had travelled with him from Mecca, to build mosques. The Gao mosque, built of burnt bricks, which had not, until then, been used as a material for building in West Africa, was still being admired as late as the 17th century.

Under Mansa Mūsā, Timbuktu grew to be a very important commercial city having caravan connections with Egypt and with all other important trade centres in North Africa. Side by side with the encouragement of trade and commerce, learning and the arts received royal patronage. Scholars who were mainly interested in history, Qurʾānic theology, and law were to make the mosque of Sankore in Timbuktu a teaching centre and to lay the foundations of the University of Sankore. Mansa Mūsā probably died in 1332.

Assessment. The organization and smooth administration of a purely African empire, the founding of the University of Sankore, the expansion of trade in Timbuktu, the architectural innovations in Gao, Timbuktu, Niani, and indeed, throughout the whole of Mali and in the subsequent Songhai Empire are all testimony to Mansa Mūsā's superior administrative gifts. In addition, the moral and religious principles he had taught his subjects endured after his death. (J.C. de G.-J.)

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Mūsā, Jabal (Sinai, Egypt): *see* Sinai, Mount.

Musaceae, the banana family of plants (order Zingiberales), consisting of 2 genera, *Musa* and *Ensete,* with about 50 species native to Africa, Asia, and Australia. The common banana (*M. sapientum*) is a subspecies of the plantain (*M. paradisiaca*). Both are important food plants.

The slender or conical false trunk of Musaceae herbs may rise to 15 metres (50 feet). The "trunk" is formed by the leaf sheaths of the spirally arranged leaves, which form a crown at the top. The large leaves may be up to three metres long and half a metre wide. The prominent midrib of the leaf is joined at right or slightly oblique angles with parallel veins. When the plant grows in an unsheltered place, wind and rain easily tear the leaves between the veins, giving the leaves a fringed or ragged appearance. The large, leathery bracts (leaflike structures) are red to purple. The yellow flowers have five fertile stamens and are rich in nectar.

Some species of wild bananas, such as *M. coccinea,* have ornamental scarlet flowers but inedible fruit. *M. textilis* from the Philippines furnishes Manila hemp, also called abaca fibre. The genus *Ensete* of Africa produces no edible bananas, but the flower stalk of one species, *E. ventricosa,* is edible after cooking. Species of *Ensete* are distinguished from those of *Musa* by their larger seeds. *See also* abaca; banana; plantain.

musaf, also spelled MUSAPH (Hebrew: "additional sacrifice"), in Jewish liturgy, the "additional service" recited on the sabbath and on festivals in commemoration of the additional sacrifices that were formerly offered in the Temple of Jerusalem (Numbers 28, 29). The *musaf,* which usually follows the recital of the morning prayers (*shaḥarit*) and the reading of the Torah, is an added *ʿamida* (a type of blessing, recited standing), first recited privately by each worshipper, then repeated aloud by the official reader. Elements of the *musaf* vary, depending on the festival that is being celebrated and on the rite that is followed by the congregation.

Musandam Peninsula, Arabic RAʾS MUSANDAM, peninsula, northeastern extension of the Arabian Peninsula, separating the Gulf of Oman on the east from the Persian Gulf on the west to form the Strait of Hormuz to the north. The Ruʾūs al-Jibāl (the Mountaintops), the northernmost extremity of the al-Gharbī al-Ḥajar (Western Hajar mountains), occupy the northern tip of the Musandam Peninsula; this area is a part of Oman, and is separated from the rest of the country (to the south) by the United Arab Emirates. The peninsula is generally about 22 mi (35 km) wide. The Khawr (channel) ash-Shamm (also called Elphinstone Inlet) and the Ghubbat (bay) al-Ghazīrah (Malcom Inlet) deeply incise the coastline from west and east a few miles south of the Strait of Hormuz and come within several hundred yards of bisecting the peninsula. The Khawr ash-Shamm is about 10 mi long and is bordered by cliffs that rise to heights of 3,000 to 4,000 ft (900 to 1,200 m). The highest elevation on the mountainous peninsula is 6,847 ft at Jabal (mount) al-Ḥarīm. The mountains slope steeply seaward forming an extremely rugged and rocky coast that makes Musandam a hazard to navigation. Wadi beds, where sporadic rains have carved deep ravines, are fertile with vegetation and the lower mountain slopes are covered with wild olive trees; juniper trees grow at the summits. Dates and vegetables are the main crops on the peninsula.

The peninsula is mainly inhabited by the Shihuh, who are fishermen and herdsmen and are probably descended from the original inhabitants of northern Oman, pushed into the mountains by successive Muslim and Portuguese invasions. Fishing is the peninsula's main industry with packing plants at al-Khaṣab and Bayʿah. There are reserves of petroleum off the western coast of the Musandam Peninsula. Communication is mostly by sea, since no roads cross the forbidding terrain. The Sultanate of Oman has created the Musandam Development Committee for building fishing jetties, construction of the Khaṣab dam and food storage, and undertaking the Bayʿah power expansion project during the Second Development Plan (1981–85). The main population centre is the oasis town of Dibā on the peninsula's southeastern coast.

musaph (Judaism): *see* musaf.

Musar, a religious movement among Orthodox Jews of Lithuania during the 19th century that emphasized personal piety as a necessary complement to intellectual studies of the Torah and Talmud. Though the Hebrew word *musar* means "ethics," the movement was not directed primarily toward exposition of ethical principles or study of personal virtues but rather toward molding the lives of rabbinic students along pietistic lines. Rabbi Israel Salanter, later Israel Lipkin, who initiated the movement as head of the yeshiva at Vilnius, thus drew a distinction between intellectual knowledge and personal behaviour.

The establishment of "Musar houses," where devout persons could join scholars in daily meditation and exercises of piety, helped to popularize the movement and guarantee its continued influence. The Musar literature that Salanter and others collected and reprinted was used to foster peace of mind, humility, tolerance, thoughtful consideration of others, self-examination, and purity of mind. Yeshivas throughout the world have since made Musar readings part of their standard curriculum.

Musashino, city, Tokyo Metropolis (*to*), Honshu, Japan, bordered (east) by Tokyo city. Kichijōji, the centre of the city, was founded in 1659 in the Kichijō-ji *shinden* (newly developed rice fields of Kichijō Shrine). Musashino grew as a farming village and was served by a railway station on the Chūō Main Line.

Its rural character did not change until after the destructive Kantō earthquake of 1923, when Musashino became a residential suburb of Tokyo. The munitions factories established in the city during World War II were later replaced by electrical machinery plants. Pop. (1983 est.) 138,606.

Muṣaṣir, also spelled MUṢRI, or MUSSASSIR, ancient city probably located near the upper Great Zab River between Lake Urmia and Lake Van in what is now Turkey. Muṣaṣir was particularly important during the first half of the 1st millennium BC and is known primarily from reliefs and inscriptions of the Assyrian king Sargon II, who captured it in 714. According to the inscription, Sargon first plundered the palace storerooms of Urzana, king of Muṣaṣir, and then seized the even richer contents of the temple of the god Haldi.

Sargon's list, which describes the confiscated treasure in detail, is especially valuable for a study of the artistic and cultural development of the region. In addition, Sargon's relief portrays the Muṣaṣir temple, which scholars now believe is the oldest known temple with a pediment and a colonnade—elements that were widely used in Anatolia but apparently foreign to Mesopotamian temple architecture.

Musäus, Johann Karl August (b. March 29, 1735, Jena, Saxony—d. Oct. 28, 1787, Weimar), German satirist and writer of fairy tales, remembered for his graceful and delicately ironical versions of popular folktales.

Musäus studied theology at Jena but turned instead to literature. His first book, *Grandison der Zweite,* 3 vol. (1760–62), revised as *Der deutsche Grandison* (1781–82; "The German Grandison"), was a satire of Samuel Richardson's hero Sir Charles Grandison, who had many sentimental admirers in Germany. In 1763 Musäus was made master of the court pages at Weimar and later (1770) became professor at the Weimar Gymnasium.

A second book, *Physiognomische Reisen,* 4 vol. (1778–79; "Physiognomical Travels"), a satire on Johann Lavater's work linking physiognomy to character, had many enthusiasts in Europe. His *Volksmärchen der Deutschen,* 5 vol. (1782–86; "Fairy Tales of the Germans"), because it is written in a satirical vein, is not considered genuine folklore.

Musayʿīd, also called UMM SAʿĪD, town and port, Qatar, on the east coast of the Qatar Peninsula, in the Persian Gulf. It was established in 1949 as a tanker terminal by the Qatar Petroleum Company on an inhospitable, previously uninhabited site, along the *sabkhah* (salt flat) terrain characteristic of the coast.

Qatar's onshore petroleum fields, the Dukhān formations, lie on the opposite (west) coast of the peninsula, along the Dawḥat Salwa, the bay separating Qatar from the main landmass of Arabia. Because coral reefs at the mouths of the bay prevented access by oceangoing tankers, the company laid a pipeline, 49 mi (79 km) long, in the 1940s across the peninsula to Musayʿīd, where tank farms and an artificial deepwater port were built. The main administrative and engineering headquarters of the company are also located there.

Musayʿīd, the only deepwater port in Qatar for more than 20 years, handled not only the export of oil but the import of basic construction and industrial equipment, as well as consumer goods. These imports, financed by petroleum revenues, were used in the conversion of the country from the economic level of subsistence to that of a modern industrial and commercial state. The opening of the deepwater port at the capital city of Doha in the early 1970s lessened dependence on Musayʿīd as a general port. Modern industrial development there includes a plant producing ammonia and nitrogen fertilizers and a fully automated flour mill. Pop. (1997) 7,424.

Muscat, Arabic MASQAṬ, town, capital of Oman, located on the Gulf of Oman coast. The town long gave its name to the country, which was called Muscat and Oman until 1970. Situated on a cove surrounded by volcanic mountains, the town is connected by road to the west and the south. In 1508 the Portuguese gained control of Muscat and the adjacent coast. Until driven out in 1650, they maintained a trading post and naval base there. Two 16th-century Portuguese forts overlook the town. Muscat's old wall, as well as some of its gates, still stand. The town's unusual architecture shows Arab, Portuguese, Persian, Indian, African, and modern Western influences. The sultan's Indian-style palace is built at the edge of the sea. Muscat is the site of a national museum. Commercial activity is centred around Maṭraḥ, just to the west. Pop. (1993) 40,856.

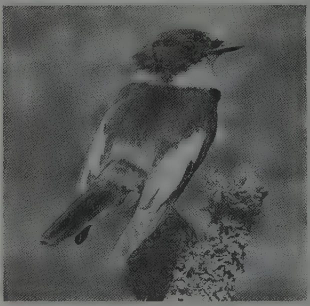
Old Portuguese fort in Muscat harbour, Oman

Kofod—FPG/EB Inc.

Muscatine, city, seat (1836) of Muscatine county, eastern Iowa, U.S., on the Mississippi River, 32 mi (51 km) southwest of Davenport. Founded as a trading post in 1833, it was first called Bloomington but was renamed (1850), probably for the Mascoutin Indians whose name means "burning island" or "fiery nation." Muscatine Island, nearby, is noted for its experimental farm (operated by Iowa State University) and for its melons and vegetables. Industry is diversified and includes the manufacture of plastics, metal products, and food processing. The city's once distinctive pearl button industry (using mussel shells from the Mississippi) has declined since the advent of plastics. Fairport National Fish Hatchery is 8 mi east. Muscatine Community College opened in 1929. Inc. town, 1839; city, 1851. Pop. (2000) 22,697.

Musci (plant class): *see* moss.

Muscicapidae, songbird family that traditionally included the Old World flycatchers and monarch flycatchers (sometimes also the whistlers and fantails) but now is often broadened to include the thrushes, Old World warblers, babblers, and several smaller groups, in addition to the flycatchers. Thus considered, the family contains some 1,400 species, roughly one-fourth of the order Passeriformes, or perching birds. Members of this group share a number of anatomical features, including the presence of a well-developed 10th primary feather in the wing and adaptations for insect eating. Muscicapid taxonomy is controversial, chiefly because the subgroups intergrade and because no character is taxonomically useful throughout the wide family. A number of the subgroups are frequently ranked as families in their own right, especially the thrushes (*q.v.*; Turdidae), warblers (*q.v.*; Sylviidae), and babblers (*q.v.*; Timaliidae). Even when considered in the narrow sense, the family Muscicapidae presents many problems, for authorities disagree on which of the flycatching groups should be included.



Pied flycatcher (*Muscicapa hypoleuca*)

John Markham

The broader meaning of the family was adopted by the editors who continued the authoritative *Check-List of Birds of the World,* following the death of the original author, James L. Peters. This checklist recognizes the following subfamilies:

Turdinae (thrushes)
Orthonychinae (rail-babblers)
Timaliinae (typical babblers)
Panurinae (parrotbills)
Picathartinae (rockfowl)
Polioptilinae (gnatwrens and gnatcatchers)
Sylviinae (warblers)
Malurinae (fairy wrens)
Muscicapinae (typical flycatchers)
Platysteirinae (wattle-eyes)
Monarchinae (monarch)
Pachycephalinae (whistlers).

muscle, contractile tissue found in animals, the function of which is to produce motion.

A brief treatment of muscles follows. For full treatment, *see* MACROPAEDIA: Muscles and Muscle Systems.

For a depiction of the structures that make up the human muscle system, shown in relation to other parts of the gross anatomy, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

It is by the action of muscles that animals are able to move about, digest food, focus eyes, circulate blood, and maintain body warmth, as well as perform other physiological functions. Among the higher animals, all muscles fall more or less into one of three classifications: striated, cardiac, and smooth. A more general classification applicable to all muscle-bearing creatures divides contractile tissue into phasic (which responds quickly to stimulation) and tonic (which responds gradually to stimulation).

Striated muscle, so-called because the organization of its fibres makes it appear striped when viewed under a microscope, gives power of movement, maintains the posture of higher animals, and accounts for a large percentage of their body weight. It is also called skeletal muscle since most striate muscles are attached to the skeleton at both ends by tendons (somewhat elastic tissues), and their primary function is to operate the skeleton as a system of levers. Animals have voluntary control over their striate muscles through their central nervous systems.

Striate muscle tissue consists of filaments of two different diameters (wide and narrow) which run parallel to the long axis of the muscle and are bundled in cords which make up multinuclear cells called myofibrils. Muscular contraction does not reflect contraction of the individual filaments of striated muscle, none of which spans the entire length of the muscle, but rather a sliding of the thin filaments between the thick filaments. A muscle will contract if the force generated in its tissues is greater than the force resisting it, in which case it is said to be in isotonic condition; if the resistance to contraction equals the force generated in the muscle tissues, the muscle will not contract (isometric condition) although the tension will be increased; too great a resistance will stretch the muscle fibres.

The amount of force generated in a striate muscle depends on the length of the muscle and the amount of stimulation. Physiologically, stimulation of a striate muscle cell is initiated by an electrical impulse, which is transmitted from one of the motor nerves which innervate the striate muscle tissue, across a synapse (juncture between neurons) which occupies the area between the nerve membrane and the muscle cell membrane. A chemical reaction involving the proteins of the muscle tissue is induced by the electrical impulse and is the immediate mechanism of muscular force generation. The chemical reaction is accompanied by a release of heat, which is used to maintain body temperature; thus, muscles tend to tighten in cold atmospheres and shivering, the rapid alternating contraction and relaxation of muscle, generates a great deal of heat within the tissue. After each stimulation of muscle fibre there is a refractory period during which the fibre will not respond to further stimulation; however, repeated stimulation at a particular rate will produce a state of continuous contraction (tetanus response). Located in the muscle tissues are sensory organs called stretch receptors, which provide for close regulation and adjustment of muscular activity by feeding back to the central nervous system information about the state of the muscle, its speed, and degree of contraction at a given time.

The fibres (myocardial cells) of the cardiac muscle, the muscle of the heart, are branched and arranged together in a netlike array. Heart contraction (systole) is activated within the muscle tissue itself, beginning with an electrical impulse generated in an area of the organ called the pacemaker. From there (in a mammalian heart) it spreads first to the atria (chambers for receiving blood) and then to the ventricles (pumping chambers). The membranes of myocardial cells pass electrical current with little resistance, so that one impulse from the pacemaker causes the organ to contract essentially as a unit. Vagus nerves and sympathetic nerves connect the heart to the central nervous system, serving respectively to slow down or speed up the heart rate; however, only the pacemaker can initiate heartbeat.

The muscles found in the digestive and reproductive organs of vertebrates, the feet of mollusks, and the body walls of annelids (worms) are smooth. Whereas striate muscle is generally voluntary and phasic, smooth muscle is generally involuntary and tonic. Smooth muscle is more varied in its forms and characteristics than is striated muscle. In vertebrates, smooth muscle is either visceral (where the cells of the muscle are self-activating and may operate more or less collectively) or multicellular (where individual cells respond to stimulations from separate nerve endings). Cells of these muscles are most commonly spindle-, ribbon-, or rod-shaped. Clams, oysters, and scallops possess smooth catch muscles that can remain contracted for weeks at a time. Insects fly by the use of smooth asynchronous muscles, so called because the rate of alternating contractions and relaxations of these wing muscles is greater (up to 1,000 cycles per second in gnats) than the rate of nerve impulse stimulations to the muscle.

In primitive life forms, such as the jellyfish, contractile tissues develop from the cells of the epithelial (surface, or skin) layer. Mammalian muscle, however, develops from the mesoderm, or middle layer, of the embryo. Muscles evolved from simple contractile systems as life functions became more complex, and well-developed muscle tissue is held by all life forms above jellyfish in the evolutionary scale. Among the higher animals, evolution has been characterized by increasing control of the central nervous system over muscular activity.

The voluntary muscles of humans are subject to various disorders, symptoms of which include weakening, atrophy, pain, and twitching. A number of systemic diseases, *e.g.,* dermatomyositis and polymyositis, may cause inflammation of muscles. Muscular dystrophies are hereditary developmental diseases. Myasthenia gravis, a condition in which transmission of nerve impulses to muscles is incomplete, is an autoimmune disease.

Muscle Shoals, section of the Tennessee River, in Colbert and Lauderdale counties, northwestern Alabama, U.S.; it was formerly a navigation hazard but is now submerged by dams. Mussels were abundant in the area, and the name given to the shoals is probably a variation in the spelling of mussel. Flinty, jagged rocks occurred near the surface, and rapids resulted from the fact that the fall of the river was about 130 feet (40 m) in 37 miles (60 km). The worst of the shoals and other obstructions in the "great bend" of the river lay to the east of the cities of Sheffield and Florence.

With the advent of steamboating in the early 1800s, the Tennessee River became a major channel of transportation extending from Knoxville, Tenn., to the Ohio River in Kentucky, which connects with the Mississippi River. For 100 years, however, the shoals defied repeated efforts to make them safe for navigation. Canals, completed in 1836 and in 1890, proved unsuccessful.

Concerned with ensuring the supply of nitrates (which were used to make munitions) following the outbreak of World War I, the U.S. Congress authorized (1916) the construction of two nitrate-manufacturing plants and a dam for electric power as a national defense measure. President Woodrow Wilson chose Muscle Shoals as the site of the dam, which was later named for him. From 1921 to 1933 a national controversy over public versus private ownership of these facilities raged. The argument was finally resolved when the Muscle Shoals properties were turned over to the Tennessee Valley Authority (TVA).

The later completion of Wheeler Dam, 16 miles (26 km) above Wilson, and Pickwick Landing Dam, 52 miles (84 km) below Wilson, completely eliminated the hazardous rapids. The city of Muscle Shoals developed from the TVA complex centred in the Wilson Dam area.

muscle tumour, abnormal tissue growth located in or originating from muscle tissue. Tumours may either arise in muscle tissue or spread to it. Three major tumour types may appear; they are known as leiomyomas, rhabdomyomas, and rhabdomyosarcomas.

The leiomyoma is a tumour of smooth muscles (such as those in the walls of the intestines and of blood vessels). It is most frequently located in the uterus (womb). Leiomyomas have been found in the ovaries, the fallopian tubes, the alimentary canal, the bladder, and the ureters. The tumour is hard or firm, encapsulated, and easily removed. Although part of the tumour has been known to become malignant, it usually does not spread, nor does it recur once it is removed.

The rhabdomyoma is a tumour of striated (striped) muscles. Its most common location is the heart. Some forms of the tumour do spread: metastases (secondary tumours at distant sites) have been found in the uterus, the bladder, the prostate, the esophagus, the digestive tract, the sex glands, and the kidneys. The tumour is soft and may be in nodes, flat masses, round clusters, or polyps. Sometimes it is closely contained in the tissue, and at other times it may be diffuse and difficult to remove. Rhabdomyomas of the heart grow in the wall and may project into the heart cavities. Rhabdomyomas affecting other parts of the body commonly involve both the smooth and the striated muscles. Many of these mixed tumours are likely to be malignant and may grow to great proportions. Tumours of this type appearing in the uterus, the vagina, or the prostate are large and polyp-shaped masses that protrude from these structures. In the prostate they may obstruct the bladder and tend to invade the adjacent pelvic tissue.

The rhabdomyosarcoma is extremely malignant; it arises in the skeletal muscles of the body. Most tumours of this type are located in the leg or arm muscles. The rhabdomyosarcoma usually recurs even after amputation of the involved extremity. The tumour itself is generally the only clinical symptom. It appears most often in the fifth to sixth decade of life and has usually grown for 10 or more years before it is discovered.

muscovite, also called COMMON MICA, POTASH MICA, or ISINGLASS, an abundant silicate mineral that contains potassium and aluminum. Muscovite is the most common member of the mica group. Because it occurs in thin, transparent sheets, it was used in Russia for window panes and became known as Muscovy glass (isinglass), hence its name. Muscovite typically occurs in metamorphic rocks, particularly gneisses and schists, where it forms crystals and plates. It also occurs in granites, in fine-grained sediments, and in some highly siliceous rocks. Large crystals of muscovite are often found in veins and pegmatites. One crystal mined near Nellore, India, measured 3 m (10 feet) in diameter and 5 m (15 feet) in length and weighed 85 tons.

Muscovite is usually colourless but may be light grey, brown, pale green, or rose red in colour. The crystals are tabular with a hexagonal or pseudo-hexagonal outline; they are commonly lamellar and occur in aggregates. Muscovite is economically important because its low iron content makes it a good electrical and thermal insulator. Fine-grained muscovite is called sericite, or white mica. For chemical formula and detailed physical properties, *see* mica (table).

Muscovy: *see* Moscow, Grand Principality of.

Muscovy Company, also called RUSSIA COMPANY, body of English merchants trading with Russia. The company was formed in 1555 by the navigator and explorer Sebastian Cabot and various London merchants and was granted a monopoly of Anglo-Russian trade. It was the first English joint-stock company in which the capital remained regularly in use instead of being repaid after every voyage. In 1553 Sir Hugh Willoughby and Richard Chancellor had sailed to seek out a Northeast Passage to China and the East Indies (Indonesian archipelago). Willoughby's ship was lost, but Chancellor reached Arkhangelsk (Archangel) on the White Sea and established trade links with Moscow.

The original aim of the Muscovy Company was to exploit these contacts, as well as to continue the search for the Northeast Passage. About 1630 the company ceased to function on a joint-stock basis and became a regulated company, in which, subject to various rules, merchants traded on their own account. Exports to Russia included woolen cloth, metals, and Mediterranean goods; the English traders brought back, through Arkhangelsk, hemp, tallow, cordage, and other Russian products. Although the tsar Alexis ended the company's privileges in 1649, and at home it lost its monopoly of the Russian trade in 1698, it survived as an influential City of London institution and shared in the 18th-century revival of Anglo-Russian trade.

muscular dystrophy, inherited disease that causes increasing weakness in muscle tissue. The muscles affected are the skeletal muscles and, occasionally, the muscles of the heart. Of the several types of dystrophy, the more common are Duchenne's, facioscapulohumeral (dystrophy related to the face, the shoulder blade, and the upper arm), Becker's, limb-girdle, and myotonic dystrophy (*see* myotonia). In all of these the muscle tissue seems to be affected in a random fashion. There is usually early evidence of degeneration and then regeneration of some muscle fibres. Those that regenerate become larger than normal, and eventually the muscles are totally replaced by fibrous scar tissue and fat.

Duchenne's muscular dystrophy is the most common of the dystrophies. It occurs in one of every 3,300 male births. It is a sex-linked disorder, meaning that it strikes males almost exclusively. The disease is caused by a defective gene on the 23rd, or X, chromosome. Most females who carry the genetic defect are unaffected, but they have a 50 percent probability of passing the disease to each of their sons. There are no obvious symptoms in the first year of life. When the child begins to walk there are minor abnormalities in his gait: he tends to waddle and to walk on the toes and has difficulty in getting up once he has fallen and in raising his knees, which prevents running. The symptoms become more obvious as the child ages; by the age of five years there is enlargement of the calf muscles, difficulty in getting up, inability to run, and disappearance of a normal knee or ankle jerk. Stairs eventually become impossible to climb, and by early adolescence the child is unable to walk. The muscle wasting progresses upward from the child's legs, and the arms are eventually affected. Ultimately the muscle wasting affects the muscles of the diaphragm; breathing becomes shallow and pulmonary infections become a constant hazard. Infections or respiratory failure usually bring about death before the age of 20. Researchers have developed genetic markers that can reliably detect the Duchenne's gene in female carriers and in affected male fetuses.

Becker's dystrophy has symptoms much the same as Duchenne's but begins in later childhood or adolescence and is generally not so devastating. Some victims can function well into adult life with certain limitations.

Limb-girdle dystrophy (dystrophy of the pelvic or the shoulder muscles) affects both sexes. The first symptoms are manifest in the pelvic region, starting in late childhood. There are frequent falls, difficulty in climbing, and a waddling gait.

Facioscapulohumeral dystrophy starts in adolescence. The affected person may be mildly affected or may be totally disabled. The first symptom may be difficulty in raising the arms. Weakness can also affect the legs and pelvic girdle. The main effect on the facial muscles is difficulty in closing the eyes.

There is no specific treatment for muscular dystrophy. Physical therapy, exercises, splints, braces, and corrective surgery may help.

Muse, Greek MOUSA, or MOISA, Latin MUSA, in Greco-Roman religion and mythology, any of a group of sister goddesses of obscure but ancient origin, the chief centre of whose cult was Mount Helicon in Boeotia, Greece. Allegedly they came from Pieria in Macedonia, but this attribution may be a misunderstanding, the real Pieria being somewhere in Greece. Very little is known of their cult, but they had a festival every four years at Thespiae, near Helicon, and a contest (*Museia*), presumably—or at least at first—in singing and playing. They probably were originally the patron goddesses of poets (who in early times were also musicians, providing their own accompaniments), although later their range was extended to include all liberal arts and sciences—hence, their connection with such institutions as the Museum (*Mouseion,* seat of the Muses) at Alexandria, Egypt. There were nine Muses as early as Homer's *Odyssey,* and Homer invokes either a Muse or the Muses collectively from time to time. Probably, to begin with, the Muses were one of those vague collections of deities, undifferentiated within the group, which are characteristic of certain, probably early, strata of Greek religion.

Differentiation is a matter rather of mythological systematization than of cult and began with the 8th-century-BC poet Hesiod, who mentioned the names of Clio, Euterpe, Thalia, Melpomene, Terpsichore, Erato, Polymnia (Polyhymnia), Urania, and Calliope, who was their chief. Their father was Zeus, and their mother was Mnemosyne ("Memory"). Although Hesiod's list became canonical in later times, it was not the only one; at both Delphi and Sicyon there were but three Muses, one of whom in the latter place bore the fanciful name Polymatheia ("Much Learning"). All the Hesiodic names are significant; thus Clio is approximately the "Proclaimer," Euterpe the "Well Pleasing," Thalia the "Blooming," or "Luxuriant," Melpomene the "Songstress," Erato the "Lovely," Polymnia "She of the Many Hymns," Urania the "Heavenly," and Calliope "She of the Beautiful Voice." Because dancing was a regular accompaniment of song, it is not remarkable that Hesiod called one of his nine the "Whirler of the Dance," Terpsichore.

The Muses are often spoken of as unmarried, but they are repeatedly referred to as the mothers of famous sons, such as Orpheus, Rhesus, Eumolpus, and others connected somehow either with poetry and song or with Thrace and its neighbourhood, or both. In other words, all their myths are secondary, attached for one reason or another to the original vague and nameless group. Hence there is no consistency in these minor tales—Terpsichore, for example, is named as the mother of several different men by various authors and Orpheus generally is called the son of Calliope but occasionally of Polymnia.

Statues of the Muses were a popular decoration in long galleries and similar places; naturally, sculptors did not make them all alike but gave each a different attribute, such as a lyre or scroll. This may have contributed to the fanciful distribution of individual Muses among the different arts and sciences, especially in Roman times. The lists that have come down are all late and disagree with one another. A common but by no means a definitive list is the following:

Calliope: Muse of heroic or epic poetry (often holding a writing tablet).

Clio: Muse of history (often holding a scroll).

Erato: Muse of lyric and love poetry (often playing a lyre).

Euterpe: Muse of music or flutes (often playing flutes).

Melpomene: Muse of tragedy (often holding a tragic mask).

Polymnia: Muse of sacred poetry or of the mimic art (often shown with a pensive look).

Terpsichore: Muse of dancing and choral song (often shown dancing and holding a lyre).

Thalia: Muse of comedy (often holding a comic mask).

Urania: Muse of astronomy (often holding a globe).

Muset, Colin (poet): *see* Colin Muset.

musette, small, elegant bagpipe that was fashionable in French court circles in the 17th and 18th centuries. The bagpipe was bellows-blown, with a cylindrical double-reed chanter beside which the instrument-maker Jean Hotteterre, about 1650, placed a short stopped chanter with six keys giving notes above the main chanter compass.

Musette, late 17th or 18th century; in the Pitt-Rivers Museum, Oxford

By permission of the Pitt-Rivers Museum, Oxford

The musette employed a "shuttle" drone: a short cylinder with about 12 narrow channels variously connected in series to supply four drones, each sounded with a double reed and tuned or silenced by slider keys moving in the slots through which the bores vented to the exterior. The bag was typically covered with silk or velvet, and the pipes were of ivory.

museum, institution that preserves and interprets objects for cultural and educational purposes.

A brief treatment of museums follows. For full treatment, *see* MACROPAEDIA: Museums.

Museums originated with people's interest in collecting and accumulating precious, beautiful, and curious objects. The oldest such collections were privately financed, made by the wealthy or by the church. The cathedral treasuries founded in the European Middle Ages and the great picture collections of Renaissance Italy and 17th- and 18th-century France and England are examples. Since the middle of the 19th century, most museums have become publicly accessible institutions, even though many still rely on private funds. Their emphasis since World War II has expanded from a scholarly and conservationist outlook to one in which education and mass communication have become important concerns.

Traditionally, museums displayed as many objects from their collections as possible, in plain and often drab display cases or hung on walls from floor to ceiling, with the aim of making as much as possible visible to a scholarly public. Little attention was devoted to making a display attractive, informative, or entertaining. Objects were classified in a scientific manner, and storage and display were ends in themselves. Since the mid-20th century, however, aesthetic concerns have increasingly influenced display techniques, and, in turn, museum architecture has attached greater importance to flexibility of space, availability of sophisticated climate-control systems, and the use of both natural and artificial lighting facilities to create varied effects.

As museums have evolved architecturally from the templelike treasure houses of the 19th and early 20th centuries into centres for education and recreation, so the problems of preservation and interpretation have widened to encompass such social and economic aspects as security, insurance, public relations, fund-raising, and financial management. Museums still play important roles in scholarship, and many museums maintain research facilities and libraries for staff and outside scholars to study and publish information based on objects in the museum.

Museums may have general or specialized collections. Accordingly, they may be classified broadly as general museums, natural history and natural science museums, science and technology museums, history museums, and art museums. General museums have multidisciplinary collections that may be as diverse as natural history and art. Reflecting the encyclopaedic origins of the modern museum, they are likely to have been founded earlier than the mid-20th century. Many were built by local and regional governments in order to promote civic pride and to provide educational opportunities.

Museums of natural history and natural science are concerned with the natural world, both past and present—including the earth sciences. Well-known examples include the Natural History Museum in London, the Smithsonian's National Museum of Natural History in Washington, D.C., and the American Museum of Natural History in New York City; these institutions are also major centres of taxonomic research.

The most famous museums of science and technology include London's Science Museum, the Deutsches Museum (German Museum) in Munich, the Museum of Science and Industry in Chicago, and the more specialized National Air and Space Museum in Washington, D.C. Such museums may deal with the history of science or its application, and many have pioneered displays in which visitors can participate in demonstrations and experiments, often with imaginative uses of models and machines that are especially popular with children.

History museums may document a period or event in history, a particular place or person, or an archaeological site. Examples of major museums of history include the Museum of London, the Museum of the City of New York, the National Museum at Budapest, the Central Lenin Museum in Moscow, and the Museum of the History of France at Versailles. There are also major specialist museums, such as the National Maritime Museum at Greenwich, London, or the Australian War Memorial in Canberra. Hundreds of small historical museums exist throughout the world.

Art museums include not only institutions that house collections of painting, sculpture, and the decorative arts but also institutions devoted to film, theatre, music, and costume. Many of the world-famous art museums are housed in buildings that are themselves historic monuments—*e.g.,* the Louvre in Paris, the Prado in Madrid, the Hermitage in St.

Petersburg, and the Uffizi in Florence. Most of the art museums built as such in the 19th and early 20th centuries were designed in a neoclassical, monumental style—*e.g.,* the National and Tate galleries in London, the Metropolitan Museum of Art in New York City, and similar structures in Chicago, Detroit, and Philadelphia. Since World War II much variety has emerged in museum architecture with such buildings as Frank Lloyd Wright's Guggenheim Museum in New York City and Renzo Piano and Richard Rogers' Pompidou Centre in Paris.

Museum, also called ALEXANDRIAN MUSEUM, or MUSEUM OF ALEXANDRIA, Greek MOUSEION, ancient centre of classical learning at Alexandria in Egypt. A research institute that was especially noted for its scientific and literary scholarship, the Museum was built near the royal palace either by Ptolemy II Philadelphus about 280 BC or by his father Ptolemy I Soter (reigned 323–285/283 BC). The best surviving description of the Museum is by the Greek geographer and historian Strabo, who mentions that it was a large complex of buildings and gardens with richly decorated lecture and banquet halls linked by porticos, or colonnaded walks. It was organized in faculties with a president-priest at the head; the salaries of the scholars on the staff were paid by the Egyptian king and later by the Roman emperor. The renowned Library of Alexandria formed a part of the Museum. In AD 270 the buildings of the Museum were probably destroyed by Zenobia, the queen of Palmyra, although the educational and research functions of the institution seem to have continued until the 5th century. *See also* Alexandria, Library of.

Museum and Picture Gallery, art museum in Vadodara (Baroda), Gujarāt state, India. It was founded by the Maharaja Gaekwar of Baroda in 1894 as a representative collection of masterpieces. The building was constructed between 1908 and 1914, and the gallery formally opened in 1921. The museum displays European paintings, especially English portraits by George Romney and examples from the schools of Sir Joshua Reynolds and Sir Peter Lely, and also Indian miniatures, sculpture, folk art, scientific exhibits, and ethnography. Works by Italian, Spanish, Dutch, and Flemish artists are also included.

Museum of ———: *see under* substantive word (*e.g.,* Modern Art, Museum of).

Musgrave, Story, in full FRANKLIN STORY MUSGRAVE (b. Aug. 19, 1935, Boston, Mass., U.S.), American astronaut and physician who made six flights into space.

After serving in the Marine Corps, Musgrave earned an impressive list of academic credentials, including bachelor's or master's degrees in mathematics, operations analysis, chemistry, literature, and physiology, as well as a medical degree from Columbia University (1964). In 1967, as an expert on cardiovascular and exercise physiology, he was picked by the National Aeronautics and Space Administration (NASA) as one of a group of scientist-astronauts to serve on future space missions. While training as a jet pilot, he began designing space suits, life-support systems, and other equipment used for extravehicular activity (*i.e.,* space walks) on NASA missions, a field in which he eventually became preeminent.

Musgrave's first space mission was on STS-6, the maiden flight of the *Challenger* space shuttle, in April 1983. He then served as flight engineer on the crew of Spacelab-2 in July 1985, a mission that performed astronomical research. He was a mission specialist on STS-33 (November 1989), STS-44 (November 1991), and STS-80 (November–December 1996). His most important mission came in December 1993, when, as payload commander on STS-61, he led the crew in a successful effort to repair the faultily constructed Hubble Space Telescope. Musgrave also served as capsule communicator (*i.e.,* the ground-based communicator with crews in space) for many Skylab and space shuttle missions, and he published many scientific papers on aerospace medicine, exercise physiology, and other subjects.

Musgrave, Thea (b. May 27, 1928, Barnton, Edinburgh, Scot.), British composer, best known for her concertos, operas, and choral and other vocal works.

Musgrave studied for three years at the University of Edinburgh, taking premedical courses in preparation for a career in medicine; at the same time, however, she took basic courses in music at the university and eventually received a bachelor of music degree (1950). From 1950 to 1954 she studied in Paris, chiefly under Nadia Boulanger. In 1953 her first commission, *Suite o' Bairnsangs* (for voice and piano), was performed in Braemar, Scot., followed the next year by a Scottish BBC performance of *Cantata for a Summer's Day.* These and other early works were chiefly diatonic and suggestive of Scottish or medieval themes. Soon she turned to chromaticism and, later, serialism, producing a *Piano Sonata* (1956), a *String Quartet* (1958), and other chamber works.

In the 1960s she continued to compose chamber works and vocal pieces but also turned to larger works, culminating in the three-act opera *The Decision* (first performed 1967), a drama on the ordeal of an entrapped miner, told in abstract instrumental terms. From then on, she wrote mainly on commission, staging a variety of operas, among them *The Voice of Ariadne* (1974), *Mary, Queen of Scots* (1977), *Harriet, the Woman Called Moses* (1984), and *Simón Bolívar* (1955). Her ballets include *Beauty and the Beast* (1969) and *Orfeo* (1975). Much of her music in the 1970s added electronic sounds to her texts, especially using prerecorded electronic tapes. During the 1970s she also began conducting many of her works with orchestras in Scotland and the United States.

Musgrave Ranges, series of granite hills, northwestern South Australia, running parallel to the Northern Territory border for 130 miles (210 km). Their bare rock surfaces rise to numerous peaks exceeding 3,500 feet (1,100 m), including Mount Woodroffe (4,708 feet [1,435 m]), the state's highest point. Sighted in 1873 by the English explorer William C. Gosse and crossed in that year by Gosse and Ernest Giles, the hills were named for Sir Anthony Musgrave, then lieutenant governor of South Australia. In the mid-1980s much of the area was the subject of an Aboriginal land-rights claim, the ranges having been traditionally a place of initiation for the Pitjantjatjara Aborigines.

mushāhadah (Arabic: "witnessing," or "viewing"), also called SHUHŪD ("witnesses"), in Ṣūfī (Muslim mystic) terminology, the vision of God obtained by the illuminated heart of the seeker of truth. Through *mushāhadah,* the Ṣūfī acquires *yaqīn* (real certainty), which cannot be achieved by the intellect or transmitted to those who do not travel the Ṣūfī path. The Ṣūfī has to pass various ritual stages (*maqām*) before he can attain the state of *mushāhadah,* which is eventually given to him only by an act of sheer grace of God. *Mushāhadah,* therefore, cannot be reached through good works or *mujāhadah* (struggle with the carnal self). Further, it is bestowed by God upon whom he pleases.

Mushāhadah is the goal of every Ṣūfī who aspires to the ultimate vision of God; its opposite, *ḥijāb* (veiling of the divine face), is the most severe punishment that a Ṣūfī can imagine. Ṣūfīs regard their life before attaining *mushāhadah* as having been wasted. According to one anecdote, when the famous mystic Bāyazīd al-Besṭāmī (d. 874) was asked how old he was, he replied "four years." When asked for an explanation, he answered, "I have been veiled from God by this world for seventy years, but I have seen Him during the last four years; the period in which one is veiled does not belong to one's life."

Mushanokōji Saneatsu, Mushanokōji also spelled MUSHAKŌJI (b. May 12, 1885, Tokyo, Japan—d. April 9, 1976, Tokyo), Japanese writer and painter noted for a lifelong philosophy of humanistic optimism.

The eighth child of an aristocratic family, Mushanokōji went to the Peers School and entered Tokyo Imperial University (now University of Tokyo) in 1906. He left without graduating to join his writer friends Shiga Naoya, Arishima Takeo, and Satomi Ton in founding the influential literary journal *Shirakaba* ("White Birch"). His reading of Leo Tolstoy and the Bible influenced the development of his humanitarian ideology. His early writings, of which *Omedetaki hito* (1911; "The Good-Natured Person") is an example, are characterized by a bursting self-confidence. He was praised by the novelist Akutagawa Ryūnosuke for having "opened a window" to let light into a literary world dominated by dreary naturalist writing. He was the author of *Ai to shi* (1939; *Love and Death*), *Aiyoku* (1926; *The Passion*), and plays such as *Aru katei* (1910; *A Family Affair*), *Washi mo shirani* (1914; *I Don't Know Either*), and *Daruma* (*Bodhidharma,* 1962). He also wrote poetry. Mushanokōji bought land in southern Japan and in 1918 founded Atarashiki Mura ("New Village"), an experiment in communal living that ultimately failed. In later years he turned to painting but continued to make pronouncements affirming his optimism and his faith in humanity.

Mushin, town, Lagos state, southwestern Nigeria. Mushin is a suburb of Lagos city, and its inhabitants are mostly Yoruba people. Continuing expansion from 1950 led to problems of overcrowding, inadequate housing, and poor sanitation. Mushin is the site of a large industrial estate. Commercial enterprises include spinning and weaving cotton, shoe manufacturing, bicycle and motorized-cycle assembly, and the production of powdered milk. Agricultural produce is brought for sale in the large central market. The town is served by secondary schools and has a hospital. Mushin lies on the railway from Lagos and at the intersection of roads from Lagos, Shomolu, and Ikeja. Pop. (1995 est.) 324,900.

mushrabīyah (Islāmic architecture): *see* moucharaby.

mushroom, the conspicuous umbrella-shaped fruiting body (sporophore) of certain fungi, typically of the order Agaricales (*q.v.*) in the class Basidiomycetes (*q.v.*) but also of some other groups. Popularly, the term mushroom is used to identify the edible sporophores; the term toadstool is often reserved for inedible or poisonous sporophores. There is, however, no scientific distinction between the two names, and either can be properly applied to any fleshy fungus fruiting structure. In a very restricted sense, mushroom indicates the common edible fungus of fields and meadows (*Agaricus campestris,* or *Psalliota campestris*). A very closely related species, *A. bisporus,* is the mushroom grown commercially and seen in markets.

Umbrella-shaped sporophores are found chiefly in the agaric family (Agaricaceae), members of which bear thin, bladelike gills on the undersurface of the cap from which the spores are shed. The sporophore of an agaric consists of a cap (pileus) and stalk (stipe). The sporophore emerges from an extensive underground network of threadlike strands (mycelium). An example of an agaric is the honey mushroom (*Armillaria mellea*). Mushroom mycelia may live hundreds of years or die in a few months, depending on the available food supply. As long as nourishment is available and temperature and moisture are suitable, a mycelium will produce a new crop of sporophores each year during its fruiting season.

Honey mushroom (*Armillaria mellea*)
H.R. Allen from the Natural History Photographic Society—EB Inc

Fruiting bodies of some mushrooms occur in arcs or rings called fairy rings. The mycelium starts from a spore falling in a favourable spot and producing strands (hyphae) that grow out in all directions, eventually forming a circular mat of underground hyphal threads. Fruiting bodies, produced near the edge of this mat, may widen the ring for hundreds of years.

A few mushrooms belong to the family Boletaceae (*q.v.*), which bear pores in an easily detachable layer on the underside of the cap. The agarics and boletes include most of the forms known as mushrooms. Other groups of fungi, however, are considered to be mushrooms, at least by laymen. Among these are the hydnums or hedgehog mushrooms, which have teeth, spines, or warts on the undersurface of the cap (*e.g., Dentinum repandum, Hydnum imbricatum*) or at the ends of branches (*e.g., Hydnum coralloides, Hericium caput-ursi*). The polypores, shelf fungi, or bracket fungi (order Polyporales; *q.v.*) have tubes under the cap as in the boletes, but they are not in an easily separable layer. Polypores usually grow on living or dead trees, sometimes as destructive pests. Many of them renew growth each year and thus produce annual growth layers by which their age can be estimated. Examples include the dryad's saddle (*Polyporus squamosus*), the beefsteak fungus (*Fistulina hepatica*), the sulfur fungus (*Polyporus sulphureus*), the artist's fungus (*Ganoderma applanatum*), and species of the genera *Fomes* and *Trametes*. The clavarias, or club fungi (*e.g., Clavaria, Ramaria*), are shrublike, clublike, or coral-like in growth habit. One club fungus, the cauliflower fungus (*Sparassis crispa*), has flattened clustered branches that lie close together, giving the appearance of the vegetable cauliflower. The cantharelloid fungi (*Cantharellus* and its relatives) are club-, cone-, or trumpet-shaped mushroom-like forms with an expanded top bearing coarsely folded ridges along the underside and descending along the stalk. Examples include the highly prized edible chanterelle (*C. cibarius*) and the horn-of-plenty mushroom (*Craterellus cornucopioides*). Puffballs (order Lycoperdales; *q.v.*), stinkhorns (*q.v.*), earthstars (a kind of puffball), and bird's nest fungi are usually treated with the mushrooms. The morels (*Morchella, Verpa*) and false morels or lorchels (*Gyromitra, Helvella*) of the class Ascomycetes (*q.v.*) are popularly included with the true mushrooms because of their shape and fleshy structure; they resemble a deeply folded or pitted conelike sponge at the top of a hollow stem. Some are among the most highly prized edible fungi (*e.g., Morchella esculenta*). Another group of Ascomycetes includes the cup fungi (*see* cup fungus), with a cuplike or dishlike fruiting structure, sometimes highly coloured.

Other unusual forms, not closely related to the true mushrooms, but often included with them, are the jelly fungi (*Tremella* species), the ear fungus or Jew's ear (*Auricularia auricula-judae*), and the edible truffle (*q.v.*).

Mushrooms have insignificant nutritive value. Their chief worth is as a specialty food of delicate, subtle flavour and agreeable texture. By fresh weight, the common commercially grown mushroom is more than 90 percent water, less than 3 percent protein, less than 5 percent carbohydrate, less than 1 percent fat, and about 1 percent mineral salts and vitamins.

Poisoning by wild mushrooms is common and may be fatal or produce merely mild gastrointestinal disturbance or slight allergic reaction. It is important that every mushroom intended for eating be accurately identified (*see* mushroom poisoning).

mushroom fly: *see* fungus gnat.

mushroom poisoning, also called TOADSTOOL POISONING, toxic, sometimes fatal, effect of eating poisonous mushrooms (toadstools). There are some 70 to 80 species of mushrooms that are poisonous to man; many of them contain toxic alkaloids (muscarine, agaricine, phalline).

Among the mushrooms that most commonly cause poisoning are *Amanita muscaria, A. phalloides,* and the related destroying angels. The ingestion of *A. muscaria* (fly agaric), which contains muscarine and other toxic alkaloids, is soon followed by nausea, vomiting, diarrhea, excessive salivation, perspiration, watering of the eyes, slowed and difficult breathing, dilated pupils, confusion, and excitability. Illness usually begins within six hours after eating the mushrooms, and recovery takes place within 24 hours.

A. phalloides, the death cap, or death cup, is far deadlier than the muscarine type; it contains heat-stable peptide toxins, phalloidin and two amanitins, that damage cells throughout the body. Within 6 to 12 hours after eating the mushrooms, violent abdominal pain, vomiting, and bloody diarrhea appear, causing rapid loss of fluid from the tissues and intense thirst. Signs of severe involvement of the liver, kidneys, and central nervous system soon appear; these effects include a decrease in urinary output and a lowering of blood sugar. This condition leads to coma, which, in more than 50 percent of the incidents, results in death.

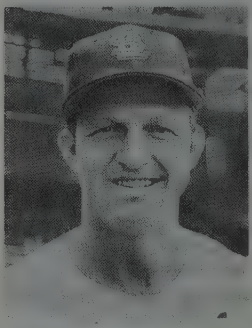
The species *Gyromitra (Helvella) esculenta* contains a toxin that is ordinarily removed during cooking, but a few persons are highly susceptible to it. The chemical nature of the toxin has not been determined, but it is a source of monomethylhydrazine, which affects the central nervous system and induces hemolytic jaundice.

Some victims of severe *Amanita* poisoning have been successfully treated with a combination of thioctic acid, glucose, and penicillin or by passing the blood through a charcoal filter. Prevention rests upon the avoidance of ingestion of all wild mushrooms.

mushroom rock: *see* perched rock.

Musi River, Dutch MOESI RIVIER, main stream of southern Sumatra, Indonesia, about 325 mi (525 km) long and draining an area of 24,500 sq mi (63,500 sq km). It rises near Gunung (mount) Kaba (6,355 ft [1,937 m]) in the Pegunungan (mountains) Barisan and flows first south-southeast, then northeast, breaking through the mountains in the upper Palembang district to enter the Tertiary hill zone at Tebingtinggi. In the rainy season the river is navigable upstream as far as the Air (river) Rawas, some 200 mi from the sea. The Musi joins the Ogan and Komering rivers near Palembang, 50 mi downstream from which it passes through a large delta before entering the Selat (strait) Bangka. It has depth enough for ocean vessels below Palembang.

Musial, Stan, byname of STANLEY FRANK MUSIAL, also called STAN THE MAN (b. Nov. 21, 1920, Donora, Pa., U.S.), U.S. professional baseball player who, in his 22-year playing career with the St. Louis Cardinals, won seven National League batting championships and established himself as one of the game's greatest hitters. He retired after the 1963 season with a career batting average of .331. At the time of his retirement, his totals of times at bat (10,972), hits (3,630; surpassed in 1981 by Pete Rose), and runs scored (1,949) were second only to those of Ty Cobb, and his total of runs batted in (1,951) was exceeded only by Babe Ruth and Lou Gehrig; all were records for the National League. (Later, Hank Aaron set new records for times at bat, runs scored, and runs batted in.) Musial set a major league record with 1,377 extra-base hits. From 1952 to 1957 he played in 895 consecutive games, a league record until 1969.


Musial
Pictorial Parade—EB Inc.

A left-handed batter and thrower, Musial began his professional career as a pitcher but developed a sore arm and switched to the outfield while still in the minor leagues. In the 1940s, Musial, Terry Moore, and Enos Slaughter formed one of the finest offensive and defensive outfield combinations in baseball history. Musial also proved adept at playing first base. When his career as a player ended, he became an executive of the Cardinals. In 1969 he was elected to the Baseball Hall of Fame.

Known for his unfailing graciousness, Musial became one of the most popular U.S. professional athletes.

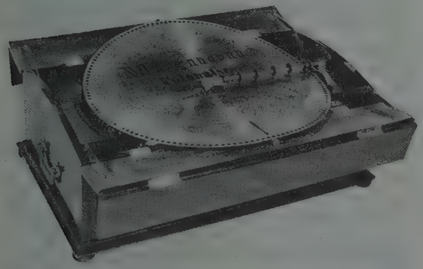
music, the art concerned with combining vocal or instrumental sounds for beauty of form or emotional expression, usually according to cultural standards of rhythm, melody, and, in most Western music, harmony. Other major components of musical sound include tone, timbre (tone colour), and texture (instrumentation). Although music involves sounds of all kinds and although there are no sounds that can be described as inherently unmusical, musicians in each culture have tended to restrict the range of sounds that they will admit.

Music is treated in a number of articles in the

MACROPAEDIA. For the history and principal treatments of the subject, *see* Music, History of Western; African Arts; Central Asian Arts; East Asian Arts; Islāmic Arts; Oceanic Arts; South Asian Arts; Southeast Asian Arts. For various aspects of music, *see* Folk Arts; Music, Art of; Musical Forms and Genres; Musical Instruments.

For a description of the place of music in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Six, Division II, Section 624.

music box, mechanical musical instrument sounded when a revolving brass cylinder with properly spaced pins (small projections) plucks graduated steel tongues cut in a comb or flat plate. Harmonics (component tones contributing to the characteristic sound) are generated in the solid steel back of the comb. A spring and clockwork move the cylinder, and a fly regulator governs the rate.



German music box, with disk in playing position, from Leipzig, *c.* 1900

By courtesy of the Musical Wonder House, Wiscasset, Maine; photograph, John Spinks

The music box was probably invented about 1770 in Switzerland. It was a popular domestic instrument until displaced by the phonograph and player piano. Large models were sometimes made, the teeth being plucked by projections on the lower side of a brass disk about 2.5 feet (75 cm) in diameter. The disks could be changed to allow different selections, as could the cylinders on some instruments of the other type. The music box is one of several idiophones (instruments the sounding parts of which are resonant solids) that are plucked rather than vibrated by percussion.

music drama, type of serious musical theatre, first advanced by Richard Wagner in his book *Oper und Drama* (1850–51; "Opera and Drama"), that was originally referred to as simply "drama." (Wagner himself never used the term music drama, which was later used by his successors and by critics and scholars.) This new type of work was intended as a return to the Greek drama as Wagner understood it—the public expression of national human aspirations in symbolic form by enacting racial myths and using music for the full expression of the dramatic action. Wagner's emphasis on opera as drama merely resumed and developed the ideas of Claudio Monteverdi and Christoph Gluck. He envisaged the disappearance of the old type of opera, with its libretto provided by a hack versifier, as an opportunity for the composer to make a "set piece" opera out of purely musical forms separated by a recitative.

Briefly put, the new art form would be created by a single artist, who would write a poetic drama that should find full expression when it was set to a continuous vocal-symphonic texture. This texture would be woven from basic thematic ideas, or leitmotivs ("leading motives"); these would arise naturally as expressive vocal phrases sung by characters at crucial emotional points of the drama and then be developed by the orchestra as "reminiscences" in accordance with the expressive need of the dramatic and psychological development of the action. This conception found full embodiment in *Der Ring des Nibelungen,* a cycle of four operas first performed in 1876; the only variation from Wagner's theory was that the leading motives did not always arise as vocal utterances but were often introduced by the orchestra to portray characters, emotions, or events.

Consult the INDEX *first*

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music festival, usually a series of performances at a particular place and inspired by a unifying theme, such as national music, modern music, or the promotion of a prominent composer's works. It may also take the form of a competition for performers or composers.

Series of religious services associated with a given feast early established the idea of the music festival in the church. The term festival in its modern sense, however, was first used in England. The Festival of the Sons of the Clergy, originally an annual charity sermon, was first given at St. Paul's Cathedral, London, in 1655; it took on a musical character in 1698. The famed Three Choirs Festival was established in 1724 (an earlier form existed in 1715) and continues to take place annually and in rotation at the cathedral cities of Gloucester, Worcester, and Hereford. Harp festivals were held in Ireland toward the end of the 18th century.

Festivals of secular music in England came into being in the 18th century; the first devoted to George Frideric Handel was held in 1784 in Westminster Abbey, London. Handel festivals continued almost without interruption well into the 20th century, including the triennial Handel Festivals held at the Crystal Palace, near London, from 1857 until the building burned in 1936. The Birmingham Festival (1768, triennial from 1769 until 1912) was originally devoted to Handel's music but was extended to include that of other composers in the 1800s. During the 18th and 19th centuries, festivals, mostly choral, were developed in various cities in England; they include the Leeds Festival (triennial). The Glyndebourne Festival (for opera) was established in 1934 in Sussex, and the Edinburgh International Festival of Music and Drama was inaugurated in 1947; the Cheltenham Festival, initiated in 1945, is devoted to modern music.

In the United States, several large-scale choral festivals on the English model were held in the 19th century. In 1869 and 1872 the celebrated bandmaster Patrick Gilmore organized two Peace Jubilee festivals, featuring choirs of 20,000 and orchestras of 1,000, plus artillery firing and bells. Annual chamber-music festivals, performing specially commissioned works, were established by Elizabeth Sprague Coolidge (Pittsfield, Mass., 1918), and more specialized ones followed in the 20th century. In 1937 the conductor Serge Koussevitzky inaugurated the Berkshire Festival at Tanglewood, near Lenox, Mass. The annual Newport, R.I., jazz festival (1954) also became prominent. Many rock-music festivals were held in the 1960s and '70s. In Puerto Rico the Spanish cellist Pablo Casals established a noted festival in 1957. Other Latin-American festivals have been held in Caracas, Venez.; Santiago, Chile; and Buenos Aires, Arg.

Numerous festivals were held annually in German cities during the 19th century. The Bayreuth Festival was inaugurated by the German composer Richard Wagner in 1876 to present his operas and music dramas in a specially built opera house. In Salzburg, Austria, Wolfgang Amadeus Mozart's birthplace, the first Mozart festival was held in 1877. Later including works by many composers, it became an annual summer event from 1920. Especially important among European opera festivals is that held in Munich (established 1901), devoted mainly to the work of Mozart, Richard Strauss, and Wagner. Other prominent European festivals include the Maggio Musicale Fiorentino (Florence Musical May), held annually from 1933; the Spoleto, Italy, festival, inaugurated by the composer Gian Carlo Menotti (1958); and the festivals held at Besançon and Aix-en-Provence, Fr., from 1948. Adventurous modern works, including electronic music, are heard each summer at the Darmstadt, Ger., festivals (1946).

The International Society for Contemporary Music promotes modern works of novel nature; formed in 1922, it has held summer festivals in various European and U.S. cities. The first festival of music and drama at Ōsaka, Japan, was held in 1958.

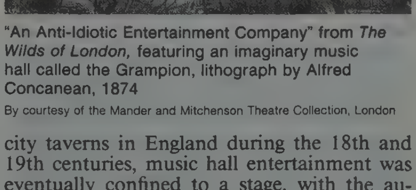
Contests of artistic skill, including music, are ancient; musical competitions were part of the 6th-century-BC Pythian Games at Delphi. The eisteddfod in Wales—originally a festival for bards (poet-singers), but now including other arts—had its beginnings in the 12th century or earlier, and in the 12th century the troubadours held musical competitions, the *puys,* at Puy Notre Dame, near Saumur, in France. The song contest organized by the Meistersingers at Wartburg, Ger., dates from the 13th century.

In 18th-century England local singing competitions were held by groups of singers at taverns. In the 19th century, singing and brass-band competitions between amateur musicians became popular and were adjudicated by prominent figures.

In the United States in 1790, singers from Dorchester and Stoughton, Mass., competed at Dorchester. Similar amateur activity among students was later encouraged; and in the 20th century, band, choral, and orchestral competitions among schools and colleges were organized on a large scale.

In the 20th century a new form of international competition was organized to promote the careers of professional performers. Such competition festivals include the Chopin International Competition for Pianists (begun 1927, Warsaw); the Queen Elisabeth of Belgium prize for violinists, pianists, and composers (begun 1937, Brussels); and the Tchaikovsky competition for pianists, violinists, and cellists (begun 1958, Moscow).

music hall and variety, popular entertainment that features successive acts starring singers, comedians, dancers, and actors and sometimes jugglers, acrobats, and magicians. Derived from the taproom concerts given in city taverns in England during the 18th and 19th centuries, music hall entertainment was eventually confined to a stage, with the audience seated at tables; liquor sales paid the expenses. To discourage these entertainments, a licensing act was passed in 1751. The measure, however, had the contrary effect; the smaller taverns avoided obtaining licenses by forming music clubs, and the larger taverns, reacting to the added dignity of being licensed,



"An Anti-Idiotic Entertainment Company" from *The Wilds of London,* featuring an imaginary music hall called the Grampion, lithograph by Alfred Concanean, 1874

By courtesy of the Mander and Mitchenson Theatre Collection, London expanded by employing musicians and installing scenery. These eventually moved from their tavern premises into large plush and gilt palaces where elaborate scenic effects were possible. "Saloon" became the name for any place of popular entertainment; "variety" was an evening of mixed plays; and "music hall" meant a concert hall that featured a mixture of musical and comic entertainment.

During the 19th century the demand for entertainment was intensified by the rapid growth of urban population. By the Theatre Regulations Act of 1843, drinking and smoking, although prohibited in legitimate theatres, were permitted in the music halls. Tavern owners, therefore, often annexed buildings adjoining their premises as music halls. The low comedy of the halls, designed to appeal to the working class and to men of the middle class, caricatured events familiar to the patrons—*e.g.,* weddings, funerals, seaside holidays, large families, and wash day.

The originator of the English music hall as such was Charles Morton, who built Morton's Canterbury Hall (1852) in London. He developed a strong musical program, presenting classics as well as popular music. Some outstanding performers were Albert Chevalier, Gracie Fields, Lillie Langtry, Harry Lauder, Dan Leno and Vesta Tilley.

The usual show consisted of six to eight acts, possibly including a comedy skit, a juggling act, a magic act, a mime, acrobats, a dancing act, a singing act, and perhaps a one-act play.

In the early 20th century music halls were dwarfed by large-scale variety palaces. London theatres, such as the Hippodrome, displayed aquatic dramas, and the Coliseum presented reenactments of the Derby and chariot races of ancient Rome. These were short-lived, but other ambitious plans kept variety prosperous after the real music hall had been killed by the competition of the cinema.

Celebrities such as Sarah Bernhardt, Sir George Alexander, and Sir Herbert Beerbohm Tree put on one-act plays or the last acts of plays; musicians such as Pietro Mascagni and Sir Henry Wood gave performances with their orchestras; popular singers of the 1920s, such as Nora Bayes and Sophie Tucker, elicited great enthusiasm; Diaghilev's ballet, at the height of its fame, appeared in 1918 at the Coliseum on a program that included comedians and jugglers.

The advent of the talking motion picture in the late 1920s caused variety theatres throughout Great Britain to be converted into cinemas. To keep comedians employed, a mixture of films and songs called cine-variety was introduced, and there were attempts to keep theatres open from noon to midnight with nonstop variety. The Windmill Theatre near Piccadilly Circus, London, was notable among the few survivors that remained after World War II from what had been hundreds of music halls. The American equivalent of the British music hall is vaudeville. *See also* vaudeville.

music synthesizer, also called ELECTRONIC SOUND SYNTHESIZER, machine that electronically generates and modifies sounds, frequently with the use of a digital computer. Synthesizers are used for the composition of electronic music and in live performance.

The intricate apparatus of the sound synthesizer generates wave forms and then subjects them to alteration in intensity, duration, frequency, and timbre, as selected by the composer or musician. Synthesizers are capable of producing sounds far beyond the range and versatility of conventional musical instruments.

The first electronic sound synthesizer, an instrument of awesome dimensions, was developed by the American acoustical engineers Harry Olson and Herbert Belar in 1955 at the Radio Corporation of America (RCA) laboratories at Princeton, N.J. The information was fed to the synthesizer encoded on a punched paper tape. It was designed for research into the properties of sound and attracted composers seeking to extend the range of available sound or to achieve total control of their music.

During the 1960s, synthesizers of more compact design were produced—first the Moog, and others soon after, including the Buchla and Syn-Ket, the last approximately the size of an upright piano. Most synthesizers have had piano-like keyboards, although other types of performing mechanisms have been used. The Moog III, developed by the American physicist Robert Moog, had two five-octave keyboards that controlled voltage changes (and thus pitch, timbre, attack, decay of tone, and other aspects of sound), allowing the composer or musician an almost infinite variety of tonal control. This type of analogue technology became the basis of both modular and portable synthesizers mass-produced in the 1960s and '70s. A notable use of the Moog was in Alwin Nikolais' television ballet *The Relay.* The Buchla synthesizer, developed by the American scientist Donald Buchla, was activated by a "keyboard" that was a touch-sensitive metal plate without movable keys, somewhat comparable to a violin fingerboard. It was used in such works as Morton Subotnick's *Silver Apples of the Moon* (1967) and *The Wild Bull* (1968).

Moog electronic sound synthesizer
Allen H. Kelson

The aforementioned synthesizers used subtractive synthesis—removing unwanted components from a signal containing a fundamental tone and all related overtones (sawtooth-wave signals). The harmonic-tone generator developed by James Beauchamp at the University of Illinois, in contrast, used additive synthesis—building tones from signals for pure tones, *i.e.,* without overtones (sine-wave signals)—and offered certain advantages in the nuances of tone colours produced.

During the late 1970s and 1980s much more compact synthesizers using microcomputers and a variety of digital synthesis techniques—such as whole-sound sampling (the digital recording of sounds), Fourier synthesis (the specification of individual harmonics), and FM (frequently modulation) synthesis using sine waves—were developed. Notable among these instruments were the Fairlight CMI, New England Digital's Synclavier II, and Yamaha's series of FM synthesizers.

musica ficta, also called MUSICA FALSA, in medieval and Renaissance music, insertion, for theoretical or aesthetic reasons, of unnotated chromatic notes (notes not belonging to the mode of a piece) into music during performance—that is, the addition by performers of unwritten sharps and flats. This practice was responsible for the introduction of accidentals (sharps, flats, naturals) into musical notation. It also influenced the evolution of the major and minor keys on which most Western music came to be based, for it modified the medieval church modes to resemble the major and minor scales.

Musica ficta occurs both in the purely melodic music of plainchant and in polyphony, or many-voiced music. While the rules of its usage are known, medieval and Renaissance music theorists disagreed about details; their views lagged behind changes in performance practice, and modern scholars differ in their opinions as to how extensively the practice was carried out. Musical manuscripts offer some clues, but accidentals were frequently omitted, for they were often considered an insult to the performer. Consequently, two modern editions of the same Renaissance piece may show slight differences in their notation of the musica ficta for the modern performer. In modern editions the editorial insertions of musica ficta are indicated by small accidental signs placed above the notes affected.

Certain rules of musica ficta are believed to have been commonly applied. Generally, the tritone, for example, f–b, was avoided both in melodies and between the voices of polyphonic music, with, in this case, F♯ or B♭ substituted as appropriate. The "leading tone" was often used: the seventh tone of the mode was raised a half step (for example, F might become F♯) when it led, or ascended, to the final note of the mode (in this case, G). For purely aesthetic reasons, an upper neighbour note might be altered (for example, a–b–a might become a–b♭–a). Other rules were applied in other instances. For example, the final chord of a piece was altered if it would not otherwise be a major triad (*e.g.,* the chord, or triad, c–e♭–g became c–e–g), considered a more appropriate conclusion to a composition.

musical, also called MUSICAL COMEDY, theatrical production that is characteristically sentimental and amusing in nature, with a simple but distinctive plot, and offering music, dancing, and dialogue.

The antecedents of the musical can be traced to a number of 19th-century forms of entertainment including the music hall, comic opera, burlesque, vaudeville, variety shows, pantomime, and the minstrel show. These early entertainments blended the traditions of French ballet, acrobatics, and dramatic interludes. In September 1866 the first musical comedy, *The Black Crook,* opened in New York City. It was later described as a combination of French Romantic ballet and German melodrama, and it attracted patrons of opera and serious drama, as well as those of burlesque shows. In the late 1890s the British showman and entrepreneur George Edwardes brought his London Gaiety Girls to New York City, calling his production musical comedy to distinguish it from his previous burlesques.

Much of American popular music of the first decades of the 20th century was written by European immigrants, such as Victor Herbert, Rudolf Friml, and Sigmund Romberg. They brought a form of operetta to the United States that was, in every sense, the generic source for musical comedy; it was sentimental and melodious and established a tradition of the play based on musical numbers and songs. Romberg's works, such as *The Student Prince* (1924) and *The Desert Song* (1926), were also made into successful motion pictures. George M. Cohan ushered in the heyday of musical comedy with his productions; they introduced such memorable songs as "You're a Grand Old Flag," "Give My Regards to Broadway," and "Over There."

During the 1920s and '30s, musical comedy entered its richest period. Jerome Kern working with Guy Bolton and P.G. Wodehouse, wrote a number of outstanding comedies. George and Ira Gershwin teamed up to write *Oh, Kay!* (1926), *Funny Face* (1927), *Strike Up the Band* (1930), and others. Cole Porter wrote timeless and sophisticated compositions for such musicals as *Anything Goes* (1934) and *Dubarry Was a Lady* (1939). Other notable composers and lyricists of this period were Richard Rodgers and Oscar Hammerstein II, Harold Arlen, Jule Styne, and Vincent Youmans.

The genre had taken a new turn with the production in 1927 of *Show Boat* (music by Kern, book and lyrics by Hammerstein); it was the first musical to provide a cohesive plot and initiate the use of music that was integral to the narrative, a practice that did not fully take hold until the 1940s. Based on a novel by Edna Ferber, the musical presented a serious drama based on American themes incorporating music that was derived from American folk melodies and spirituals.

Later musicals that were as tightly constructed as *Show Boat* were Rodgers and Hammerstein's *Oklahoma!* (1943), *Carousel* (1945), and *South Pacific* (1949). Alan Jay Lerner and Frederick Loewe also wrote a number of highly successful musicals, notably *Brigadoon* (1947) and *My Fair Lady* (1956). They also collaborated on the motion-picture musical *Gigi* (1958), and four of their theatrical works were later made into motion pictures. Leonard Bernstein wrote *West Side Story* (1957, with Stephen Sondheim), a conversion of the setting and elements of Shakespeare's *Romeo and Juliet* to mid-20th-century New York City.

Musicals as they were known from the 1930s to the 1950s began to decline in the late 1960s. By then, musicals had begun to diverge in many different directions: rock and roll, operatic styling, extravagant lighting and staging, social comment, nostalgia, pure spectacle. The first notable example of the rock musical was *Hair* (1967), which found its social dissent in a combination of loud music, stroboscopic lighting, youthful irreverence, and nudity. In a few cases, rock music was combined with biblical stories, as in *Godspell* (1971) by Stephen Swartz and *Jesus Christ Superstar* (1971) by Andrew Lloyd Webber and Tim Rice. Other notable later musicals include Stephen Sondheim's *Company* (1970) and *Sweeney Todd* (1979), Marvin Hamlisch and Edward Kleban's *A Chorus Line* (1975), and Lloyd Webber's *Evita* (1978), *Cats* (1981) and *The Phantom of the Opera* (1986).

musical bow, stringed musical instrument found in most archaic cultures as well as in many in the present day. It consists of a flexible stick 1.5 to 10 feet (0.5 to 3 m) long, strung end to end with a taut cord that the player plucks or taps to produce a weak fundamental note. The player may produce other notes by stopping the string with finger and thumb; by lightly touching the string to produce faint-sounding overtones; by tying the string to the stick to form two taut segments; or, on a mouth bow, by using the mouth as a resonator, varying its cavity in order to isolate overtones. In a gourd bow a truncated gourd attached to the stick serves as a resonator. Other musical bows may have separate resonators, such as a gourd or pot.

musical composition, the act of conceiving a piece of music, the art of creating music, or the finished product. These meanings are interdependent and presume a tradition in which musical works exist as repeatable entities. Composition is thus necessarily distinct from improvisation, though in the second half of the 20th century, audiences have sometimes been confronted with "compositions" consisting more or less of improvisation.

A brief treatment of musical composition follows. For full treatment, *see* MACROPAEDIA: Music, The Art of.

Although it is possible for music to be composed without being notated (*e.g.,* much Balinese music), in Western civilization musical composition refers to the finished work primarily, as fixed by a complex system of graphic notation or by sound recordings. Throughout the Middle Ages, European music was communicated orally and received stimuli from various oral traditions even after musical notation (*q.v.*) began developing.

The beginning of music publishing in the 16th century gave impetus to fixed notation, but even Johann Sebastian Bach felt it quite natural to adapt works from one performance to another, and it was only at the end of the 18th century that publication began to give a definite form to most created music. Significantly, it was also at this time that the standard genres were developed: the symphony, the string quartet, the solo concerto, and the art song.

If the notion of composition has thus grown increasingly definitive in line with developments in publishing and recording, the mental processes involved in composition remain obscure. There are countless anecdotes about composers conceiving works in imagination before writing down a note (Wolfgang Amadeus Mozart, Sir Edward Elgar), hearing works in dreams (Igor Stravinsky, Karlheinz Stockhausen), or responding to angelic dictation (Palestrina, George Frideric Handel). In most cases, however, the creation of a musical work would seem to come about through the dialogue of imagination with the more tangible realm of notation, or practical performance, or both. Many composers, among them Stravinsky, have found it almost impossible to compose without a piano at hand to test the result at every stage, and, though some have not found this to be necessary, the evidence suggests that composition nearly always involves trial in the form of sketches.

Composition, at the most fundamental level, involves the ordering of pitched sounds in time and space—combining melody, harmony, and rhythm into a purposeful whole. Pitch relationships are known as intervals.

Melody, as it is known in Western music, consists of a series of single notes deliberately arranged in a pattern and chosen from a pre-existing series that has been handed down by tradition or is accepted as a convention. It need not be in a regular rhythm, but it is impossible for it to be entirely unrhythmical, since notes have duration in time and some are likely to be shorter than others. The presence of a pre-existing series, which is called a scale, is characteristic of the music of more developed cultures.

Harmony's influence on a composition as a whole can be even more far-reaching than that of melody. The length of a melody is limited by practical considerations: the ear cannot grasp it if it is extended beyond a reasonable limit. When it has had its say it must either give place to something else or be subjected to variation or development. Harmony, the sounding of two or more notes simultaneously and their movement to other chords, does not have to be tailored in this way; though its progress over a long stretch must be logical, the ear tends rather to hear it in sections and then to link the sections together.

Rhythm, the element of time in music, is not the same as metre, which, as in poetry, is a regular pulse. Just as the accents in poetry do not necessarily coincide with the beats of the metre, so in music—though the listener will be aware of a regular pulse, if only subconsciously—there is no reason for the rhythm to be tied to it. In fact there is far more freedom in music than in poetry because of the opportunity of introducing shorter note values than would be possible within the framework of metrical verse.

The composer can use the tone qualities of instruments or voices to give colour, and the treatment of harmony will necessarily be affected, to some extent, by the performance instrument; *e.g.,* a dissonance that is relatively mild on the piano may sound unpleasantly harsh on the organ. Orchestral colour may be a vital element in the structure of the composition. The composer may pass the individual notes of a melody from one instrument to another or write an elliptical harmony that leaves the listener to imagine the missing link. But whatever method or idiom the composer uses, he must work with the basic elements of melody, harmony, and rhythm.

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musical expression, that element of musical performance which is something more than mere notes. Western music is notated on a system that specifies pitch and the relative lengths of notes. Factors such as speed or dynamics are usually indicated only by words or abbreviations. Similarly, directions to the performer regarding technique, often with particular musical consequences, are mostly expressible by words. But the finer musical points are more difficult to indicate and must eventually stem from the performer himself or from a performance tradition with which he is familiar.

In European music before the 19th century, as in jazz and much non-Western music, the performer's responsibility included not only the nuances but also often the notes themselves. Thus, in much 17th- and 18th-century music, the composer notated only the main structural notes of the solo part, leaving the performer to improvise ornamental figuration. He was expected to introduce specific ornaments, such as trills and slides, and in many cases to modify substantially the notated rhythm. Similarly, the accompanist, provided only with a thorough bass, an accompaniment notated only as a bass melody line and figures signifying chords, was expected to supply the accompaniment in the correct style. Clues to this correct style ranged from the title of the piece to the tempo indication to the kinds of note values employed.

Instructions for the speed, or tempo, of a performance have the longest history. As early as the 9th century, plainsong manuscripts had the signs "c" (*celeriter,* "quick") and "t" (*trahere,* "slow"), but such indications were exceptional, for the musical repertory was well known to the performers, and written sources served purely for reference purposes. Only from the 16th century do frequent directions for tempo occur, mostly in collections having a wide variety of musical forms and styles, *e.g.,* the *vihuela* (guitar-shaped lute) publications of the Spaniard Luis Milán or the lute books of the German Hans Neusidler. Such early, often long-winded directions led to later, more methodical indications of tempo, achieved at first by defining the type of piece. Thus, "pavane" indicated a type of dance but also that the piece was to be played in a stately and subdued fashion. In the 18th century other dance titles, such as allemande, gavotte, and courante, gave precise information as to speed and style of performance. The 17th century saw the introduction of the Italian terms that have been in use ever since, often imprecise in meaning, but running roughly hierarchically from slow to fast as follows: adagissimo, adagio, lento, andante, andantino, allegretto, allegro, presto, prestissimo.

Dynamics are expressed more simply and directly. The Venetian Giovanni Gabrieli (1556?–?1612) introduced the words piano (soft) and forte (loud) into his scores; they became the basis of a system running from pianissimo (*pp*) to fortissimo (*ff*), with softer and louder extensions possible. Sforzato (*sfz*) means a sudden sharp accent, and sforzando (*sf*), a slight modification of this. Increases and decreases in loudness are indicated graphically as < and > but can also be written as crescendo (*cresc.*) and diminuendo (*dim.*).

More technical instructions, although often in Italian, frequently appear in some other language. These include directives for the insertion or removal of mutes (*con sordino; senza sordino*), the retuning of a string (*scordatura*), raising the bell of a wind instrument into the air (usually in German music, *Schalltrichter auf!*), and other actions.

The expression of nuance and feeling is immensely difficult to indicate directly. *Mit Empfindung* ("sensitively"), *espressivo,* and *expressif* appear in abundance in late 19th-century scores and are usually self-explanatory. Although many composers, particularly in the 20th century, put indications of expression into their scores in their own languages, Italian remains the dominant language for such indications, if only because it has provided an international vocabulary taught to the musician along with the basic principles of notation.

musical film, motion picture consisting of a plot integrating musical numbers. Although usually considered an American genre, musical films from Japan, Italy, France, Great Britain, and Germany have contributed to the development of the type. The first musical film, *The Jazz Singer* (1927), starring Al Jolson, introduced the sound era of motion pictures. It was followed by a series of musicals hastily made to capitalize on the novelty of sound. One of the few outstanding films of this early period was *Broadway Melody* (1929), which won the Academy Award for best picture of 1928–29.

In the early 1930s the German director G.W. Pabst presented a serious musical film, *The Threepenny Opera* (1931; *Die Dreigroschenoper*), from the ballad opera by Bertolt Brecht and Kurt Weill. The most popular films of this period, though, were the extravagantly imaginative U.S. films of Busby Berkeley (1895–1976), a former Broadway dance director who presented elaborately staged dance sequences within the framework of well-worn stories. The Berkeley spectaculars such as the Gold Diggers productions (1933–37), *Footlight Parade* (1933), and *Forty-second Street* (1933) often starred Joan Blondell, Ruby Keeler, or Dick Powell, all of whom became well-known musical performers.

The films of the singing or dancing teams of the mid-1930s—including Fred Astaire and Ginger Rogers (*The Gay Divorcee,* 1934; *Top Hat,* 1935; and others) and Nelson Eddy and Jeanette MacDonald (*Naughty Marietta,* 1935; *Rose Marie,* 1936; and others)—gradually came to replace the Berkeley spectacles in popularity.

The musicals of the late '30s and early '40s, including *The Wizard of Oz* (1939), *Babes on Broadway* (1941), *Meet Me in St. Louis* (1944), all starring Judy Garland; *Cover Girl* (1944), starring Gene Kelly and Rita Hayworth; and the sentimental *Going My Way* (1944), starring the popular singer Bing Crosby, showed evidence of the trend toward greater unification of plot and music. Well-remembered films from the immediate post-World War II period are *Easter Parade* (1948); *An American in Paris* (1951) and *Singin' in the Rain* (1952), both starring Gene Kelly; and *Kiss Me, Kate* (1953).

By the mid-1950s the demand for original musical films was declining, although film adaptations of a number of Broadway hits such as *Oklahoma!* (1955), *Guys and Dolls* (1955), *South Pacific* (1958), *The King and I* (1956), *West Side Story* (1961), *My Fair Lady* (1964), *The Sound of Music* (1965), *Camelot* (1967), and *Hello, Dolly!* (1969) were great box office successes.

There was also a growing subtlety in musicals, as in the French film *The Umbrellas of Cherbourg* (1964; *Les Parapluies de Cherbourg*); a tendency to use the musical to exploit the appeal of a popular singing star, as in the many films of Elvis Presley; and experimentation with the merging of innovative popular music and filmmaking techniques, as in the pictures of the English singing group the Beatles. In the late 1960s and early '70s the musical suffered a decline in both popularity and artistry, despite the occasional success of such films as Bob Fosse's *Cabaret* (1971). More recently it has been the music itself—rock, disco, or classical—that has inspired the production of such films as *Saturday Night Fever* (1978), *Grease* (1978), *Flashdance* (1983), and *Amadeus* (1984). *See also* musical.

musical instrument, transposing: *see* transposing musical instrument.

musical notation, written, printed, or other visual representation of music. As a memory aid it helps shape a composition to a level of sophistication that would not be possible with only an oral tradition, and as communication it helps preserve music for later performance and analysis.

A brief treatment of musical notation follows. For full treatment, *see* MACROPAEDIA: Music, The Art of.

There is some evidence that the notation of music was practiced by the Egyptians from the 3rd millennium BC and by others in the Middle East in antiquity. The earliest notation that can without doubt be recognized as musical, however, dates from the 9th century AD in Europe and the 10th century in China and Japan. These notational systems were distinctly different. In the Far East, as later in India and elsewhere in Asia, music was notated with the use of characters for sounds. Rhythmic motifs could also be prescribed in a similar way. In Europe, on the other hand, the foundations were laid for a purely symbolic notation of music, which does not seem to have arisen in any other part of the world, nor was it needed. Outside Europe the teaching and learning of music was to remain an essentially oral matter, whereas within Europe musicians wanted a permanent record to take account of the growing complexity of their work.

It is not surprising, therefore, that symbolic notation should have had its origins close to those of polyphony, in Carolingian (8th- and 9th-century-AD) Europe. The earliest notation, in the form of squiggled shapes called neumes, seems to have grown from the use of accents to indicate melodic rise and fall and also from the hand movements that the leader of a choir might use to suggest the flow of the line. Gradually this notation became standardized, with a few neumes standing as symbols of single notes or turns of phrase, while the invention of the staff (the horizontal lines with their spaces on which music is written), associated with Guido of Arezzo in the middle of the 11th century, made it possible for notes to be represented by the placing of neumes on a grid of four or five lines, as in modern staff notation. At about the same time, different neumes began to be used to represent different durations, so that the notation indicated not only the pitch contour of a melody but also its rhythm.

The desire for increased precision in rhythmic notation eventually brought about the metamorphosis of the neumatic system, for, as different symbols were introduced for progressively smaller rhythmic values, there was a need to clear away the complexity of the neumes in identifying groups of two or three notes together. This change accompanied the general change in music from a concept of mode to a concept of scale, and in notational terms it became complete during the 14th and 15th centuries. The neumes survived only in the notation of plainsong, where they remain in use. By the early 16th century, notation had assumed much of its modern form, with the essential components of staff, clef (a character placed at the beginning of the staff to determine the position of the notes), time signature, and durational values, though bar lines only gradually became widespread during the 16th and 17th centuries as an aid in ensemble performance.

Since the mid-20th century, however, the conventional system of notation has been widely revised and even abandoned. New symbols have been introduced for flexible rhythmic values, pitches outside the normal chromatic scale, clusters of adjacent notes, and other unconventional musical elements. Sometimes composers have exchanged the symbolic system for graphic signs, especially in the notation of electronic music, which presents special problems in so often having nothing to do with the normal categorizations of pitch and rhythm. More relaxed, suggestive sorts of notation have also been used by composers not wishing to prescribe their music totally.

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musical societies and institutions, organizations formed for the promotion or performance of music, usually with some common factor. The German guilds of Meistersingers ("master singers") flourished from the 14th to the 16th century, and the earlier French guilds of troubadours were associated with secular music, whereas groups such as the Compagnia de Gonfalone (Rome, 1264) and the Confrérie de la Passion (Paris, 1402) were formed for the performance of sacred music. During the Renaissance in France and Italy, academies were formed for the encouragement of poetry and music, the best known being in Paris, Florence, Venice, and Bologna; Florentine Camerata were responsible for the production of the first operas.

In the 17th and 18th centuries the institution of the Collegium Musicum, deriving from an earlier institution, the Convivia Musica, was associated with German and Swiss universities; its aim was to organize public concerts. Early concert societies in London were the Academy of Ancient Music (1710), the Anacreontic Society (1766), and the Catch Club (1761). In Paris the most important concert-giving society in the 18th century was Le Concert Spirituel, founded by the French composer Anne Philidor in 1725. Its rival, the Concerts des Amateurs, was founded in 1770. In Vienna the Tonkünstler Societät was formed in 1771. Choral music was fostered by the foundation of the Singakademie (Berlin, 1791). Concert societies were also formed during the 18th century in Bergen, Nor.; Stockholm; and Copenhagen.

During the 19th century, music societies expanded considerably. They included concert societies such as the Gesellschaft der Musikfreunde ("Society of Friends of Music"), founded 1812 in Vienna; the Parisian Société Philharmonique, founded by the composer Hector Berlioz in 1850; and the Société des Concerts du Conservatoire, founded in 1828. Amateur choir societies sprang up in England during the century; the most important were the Royal Choral Society (1871) and the Bach Choir (1875).

In the mid-19th century, scholars began to publish editions of earlier composers. Societies were formed to study and perform the work of particular composers (*e.g.,* the Bach-Gesellschaft, 1850; the Purcell Society, 1876), whose music was produced in authoritative and authentic editions.

With the rise of nationalism in the middle of the 19th century, societies came into existence that promoted the printing and performance of national music. The study of folk music was allied to this, and such institutions as the International Folk Music Council came into being. The promotion of new music was fostered by such organizations as the International Society for Contemporary Music, which was formed in 1922. Musicological research was published by organizations such as the Royal Musical Association (England, 1874) and the American Musicological Society (1934). Groups such as the American Society of Composers, Authors, and Publishers (ASCAP) protect the copyrights of authors and composers. The American Society of Ancient Instruments (1922), the Society of Recorder Players (England, 1937), and other organizations promote older music.

musical variation, basic music technique consisting of changing the music melodically, harmonically, or contrapuntally. The simplest variation type is the variation set. In this form of composition, two or more sections are based on the same musical material, which is treated with different variational techniques in each section.

In Renaissance vocal music there were two principal variation techniques: contrapuntal variations following the stanzas of strophic chants; and sets of variations over a single, often quite lengthy, foundation voice in a mass or motet. In instrumental music a quite different sort of variation began to appear, one of great significance for following eras. Some of the earliest preserved instrumental music consists of dances, often in sets of two, with the second based on the same melody as the first but in a different tempo and metre.

In the early 1600s, the first years of the Baroque era, composers became increasingly enamoured of constructing works over brief, incessantly repeated melodic figures in the lowest voice of the piece. Composers of this time became more and more attracted to the unfolding of rich, flowery, expressive melodic lines over such basses. Variations over a bass were the most popular and important type of variation in the Baroque era, but composers continued to write other kinds as well. In J.S. Bach's monumental *Goldberg Variations* the lengthy theme (16 + 16 measures) is followed by 30 variations before a return to a simple reprise of the original air. The variations use a wide range of different metres and tempos. This composition is generally regarded as one of the true monuments of figural-contrapuntal variation.

A common feature of all variation types is the element of static structure, harmonically and tonally. A melody, a bass pattern, or a harmonic sequence is stated, then repeated, always in the same key or mode, usually with the same length and the same phrase and harmonic contours. Variety and climax are achieved by contrast in number of voices and texture, by the richness and complexity of melodic figuration, sometimes by changes in metre and tempo. In the mid-18th century, a major change of concept in musical structure took place. Composers became increasingly concerned with harmonic and tonal goal orientation. A composition should begin and end in the same tonality, or key. More importantly, the other keys were arranged in a hierarchy, according to the strength of their relation to one another. A composition should move from the original, or tonic, key through a series of keys. The resulting feeling of tonal movement gives a direction and forward thrust to the piece until it finally reaches the dominant key (a fifth above the tonic and the tonality with the strongest, most compulsive relationship to the tonic), where it dwells for a time before it finally goes back "home" to the tonic.

Variations for solo instruments continued to be written; familiar examples are Felix Mendelssohn's *Variations serieuses* and Ludwig van Beethoven's *Diabelli Variations.* But the two most important new directions for variation in the Classical-Romantic period were, first, toward what might be best called "ensemble variation," variations utilized as one movement in a multimovement chamber or orchestral work; and second, toward free variation, in which the theme is handled in a much freer manner than before.

Joseph Haydn was the first major figure to write numerous, successful, and well-known examples of ensemble variations. Instances occur in his *Sonata for Violin and Piano in C Major* and as the final movement of his *Hornsignal Symphony* in D major. W.A. Mozart's ensemble variations tend to be melodic variations. Examples occur in the *Sonata in F Major for Violin and Piano* and the *Clarinet Quintet*. Franz Schubert used his song "Die Forelle" ("The Trout") as the basis for melodic variations in his *Piano Quintet in A Major* (*Trout Quintet*).

But the two composers of the period who most frequently used variation techniques and adapted them most successfully to the sometimes contradictory demands of the musical style of their day were Beethoven and Johannes Brahms. The last movement of the *Ninth Symphony* illustrates Beethoven's originality and freedom in handling variation form. Among his finest variations are those in the *Third Symphony* (*Eroica*), in the *Piano Sonata in C Minor,* Opus 111, and in the *String Quartet in A Minor,* Opus 132. Brahms is more retrospective in his treatment of variation forms. Even when the theme is varied greatly he usually maintains its basic structure.

The very late 19th century and first half of the 20th century saw some additions to the variation repertory, but, beyond the technique of free variation, there developed no striking new technique or techniques. Free variation maintains the melodic relationship between theme and variations by developing small motives from the theme or transforming the theme itself by rhythmic or other changes. But the single major innovation in the technique of variation during this period developed in the works of Arnold Schoenberg and the composers who studied or were associated with him. Their most important contribution is the 12-tone, or serial, technique, which is based on the concept that a 12-tone row (a specific ordering of the 12 tones of the chromatic scale) forms the entire basis for the organization of a composition. This original row of tones may appear at original pitch or transposed to any other pitch; it may be inverted (played upside down, with rising intervals changed to descending ones and vice versa) or presented backward; it may be used to create melodies or harmonies or combinations of both; it may be fragmented. Any piece written with this technique may be considered to be a continuing set of variations on a 12-tone row.

Performers as well as composers provide musical variation. During the Baroque era a basic singing skill was the ability to ornament and embroider a melody, to add brilliant and expressive figures, runs, and trills to the tune sketched out by the composer. Performers were judged as much for their skill in embellishment as for the beauty of their voice, and each performer strove to bring a personal style to his embellishment. The most popular vocal form of the late Baroque, the da capo aria, has a first section, a second section contrasting in melody and sometimes key and tempo, then an exact repetition of the first section, which provided a showcase for the singer's ability to elaborate. Jazz is another style that emphasizes performance variation. The genius of the greatest jazz musicians shows up in their technical skill and imaginative taste in bringing a very personal style of variation to whatever they are performing.

The music of certain non-Western cultures uses variational techniques that are often different from and more organic than those in Western music.

The art music of southern India, for example, is built on the concept of a string of pieces, each a variation on a given "theme." Together they make a complete musical structure. The "theme" in this case is a raga. Conceptually more complex than a theme in Western music, the raga consists of a particular scale pattern, various melodic formulas, and melodic relationships and fragments peculiar to this raga.

A somewhat different concept of multilevel variation is found in the gamelan (orchestra) music of Indonesia. The variations are not consecutive but are simultaneous, with certain members of the orchestra improvising their own variations at the same time on the same tune. This technique, called heterophony, results in a highly complex static concept of variation, vertically organized into layers of sound.

musicology, the scholarly and scientific study of music. The German term *Musikwissenschaft* ("science of music") was first employed by F. Chrysander in 1863 in the preface to his *Jahrbücher für musikalischer Wissenschaft* ("Yearbook for Musical Knowledge"), in which he argued that musicology should be accepted as a science and that musical studies should aspire to the rigorous methodological standards of the natural sciences. It covers a wide and heterogeneous area of research and is concerned with the study not only of European and other art music but also of all folk and non-Western music. The scope of musicology may be summarized as covering the study of the history and phenomena of music, including (1) form and notation, (2) the lives of composers and performers, (3) the development of musical instruments, (4) music theory (harmony, melody, rhythm, modes, scales, etc.), and (5) aesthetics, acoustics, and physiology of the voice, ear, and hand.

The beginnings of European musicology are found in the works of the theorists of Greek antiquity, who were concerned principally with speculative philosophy and with moral and aesthetic concepts of music. The numerical theories of the Greeks were preserved by later Arab and Christian theorists, and their classification of the modes survived, though in a corrupted form, in medieval Europe.

The innovations of Guido of Arezzo (*c.* 990–1050), which included the use of the hexachord and the development of musical notation, brought about a radical change in the methods of music teaching; and subsequent theorists became increasingly concerned with the dissemination of the principles of notation and the more practical elements of music theory.

The Renaissance gave rise to the publication of a considerable number of works dealing with the aesthetics, theory, and practice of music. Detailed drawings and descriptions of the construction of musical instruments began with the manuscript treatise of Henri Arnaut de Zwolle (*c.* 1440); and, in his *De inventione et usu musicae* (*c.* 1487; "On the Discovery and Practice of Music"), Johannes Tinctoris gave an account of instruments and their function. The first printed book on musical instruments, Sebastian Virdung's *Musica getutscht* (1511; "Music Translated into German"), contains woodcuts of instruments and some indications of instrumental practice and technique.

Histories of European music first appeared in the 18th century. They include G.B. Martini's *Storia della musica,* 3 vol. (1757–81; "History of Music"), an original critical study of the music of antiquity, and *De cantu et musica sacra,* 2 vol. (1774; "On Song and Sacred Music"), by Martin Gerbert, abbot of St. Blassien. The latter work is a study of sacred music of the European Middle Ages and was used heavily by later scholars.

Modern musicology, with its practical or phenomenological as well as its historical approach to the music of the past, may be said to have started about the middle of the 19th century, when such pioneers as Samuel Wesley and Felix Mendelssohn inaugurated a widespread interest in the performance of the music of earlier composers. The 19th century also saw the publication of the *Gesellschaft* editions of George Frideric Handel and Johann Sebastian Bach, backed by the new musicological scholarship. After the turn of the century, the research of such scholars as Johannes Wolf resulted in the study of medieval systems of notation and in the transcription and publication of the works of many medieval and Renaissance masters.

The new sciences of psychology and ethnology exerted an influence on musicology, as did the study of the relation between the life and the work of a composer. The subsequent stream of biographies provided, in many cases, an increased insight into the music itself.

Toward the middle of the 20th century, musicology became part of the curriculum of many universities. Increasing specialization within the field resulted in a proliferation of journals and professional societies.

Musil, Robert, also called ROBERT, EDLER (Nobleman) VON MUSIL (b. Nov. 6, 1880, Klagenfurt, Austria—d. April 15, 1942, Geneva, Switz.), Austrian-German novelist, best known for his monumental unfinished novel *Der Mann ohne Eigenschaften* (1930–43; *The Man Without Qualities*).

Musil received a doctorate from the University of Berlin in 1908 and then held jobs as a librarian and an editor before serving in the Austrian army in World War I (1914–18). (He inherited the *Edler* title, awarded his father in 1917, but did not use it as an author.) From 1918 to 1922 Musil was a civil servant in Vienna and thereafter worked randomly as a writer and journalist. He lived in Berlin (1932–33) but returned to Vienna until the Nazi Anschluss of 1938, when he fled to Switzerland, where he lived first in Zurich and then in Geneva.

Musil began writing as a student and attracted some notice in the 1920s writing various fiction and two plays, *Die Schwärmer* (1920; *The Enthusiasts*) and *Vinzenz und die Freundin bedeutender Männer* (1924; "Vincent and the Lady Friend of Important Men"), both of which were performed in Berlin and Vienna. In 1924 he began his main work, *Der Mann ohne Eigenschaften,* a witty and urbane view of life in the glittering world of the Austro-Hungarian Empire, told from the viewpoint of Ulrich, a fictionalized Musil. The First Book was published in 1930, and part of the Second Book in 1933; a remaining portion was published posthumously in 1943.

musique concrète (French: "concrete music"), experimental technique of musical composition using recorded sounds as raw material. The technique was developed about 1948 by the French composer Pierre Schaeffer and his associates at the Studio d'Essai ("Experimental Studio") of the French radio system. The fundamental principle of musique concrète lies in the assemblage of various natural sounds recorded on tape (or, originally, on disks) to produce a montage of sound. During the preparation of such a composition, the sounds selected and recorded may be modified in any way desired—played backward, cut short or extended, subjected to echo-chamber effects, varied in pitch and intensity, and so on. The finished composition thus represents the combination of varied auditory experiences into an artistic unity.

A precursor to the use of electronically generated sound, musique concrète was among the earliest uses of electronic means to extend the composer's sound resources. The experimental use of machinery in musique concrète, the random use of ingredients, and the absence of the traditional composer-performer roles characterize the technique as a pioneering effort that led to further developments in electronic and computer-produced research in music. Compositions in musique concrète include *Symphonie pour un homme seul* (1950; *Symphony for One Man Only*) by Schaeffer and Pierre Henry and *Déserts* (1954; for tape and instruments) and *Poème électronique* (performed by 400 loudspeakers at the 1958 Brussels World's Fair), both by the French-American composer Edgard Varèse.

musique mesurée (French: "measured music"), style of late 16th-century French vocal music in which the duration of the notes reflected the metre of the poetic text. *Musique mesurée* was one of several late 16th-century attempts to emulate the unity of verse and music supposedly achieved in classical antiquity. It was associated with *vers mesurés à l'antique,* poetry written to classical quantitative metres (based on long and short syllables).

Musique mesurée was in large part the product of a circle of poets and musicians, the Academy of Poetry and Music, founded in 1570 by Jean-Antoine de Baïf, one of the members of La Pléiade, a prominent group of French poets who drew inspiration from classical literature; also associated with the academy was the principal poet of the period and the most influential member of La Pléiade, Pierre de Ronsard. To forward the cause of *musique mesurée,* the academy sponsored concerts, a number of which were attended by its patron, King Charles IX.

Songs in *musique mesurée* were generally set for five voices and were at first sung unaccompanied; instruments were later permitted. Long syllables were set to notes twice as long as short syllables; all voice parts shared the same text, so that the music moved in chords and in flexible rhythms determined by the accentuation of the text. This rhythmic freedom influenced another important genre, the *air de cour* ("court air"), part-song or solo song with lute accompaniment.

Musique mesurée imposed considerable limitations on the composer, but the technique was utilized with unusual flexibility and effectiveness by Claude Le Jeune, one of the truly masterful musicians of the period. Jacques Mauduit and Eustache Du Caurroy were also prominent composers of *musique mesurée.*

musk, substance obtained from the male musk deer and having a penetrating, persistent odour. It is used in the highest grades of perfume because of its odour characteristics, ability to remain in evidence for long periods of time, and ability to act as a fixative. Its quality varies according to the season and the age of the animal from which it is obtained. In India and parts of the Far East, aphrodisiac, stimulant, and antispasmodic effects have been attributed to musk.

Musk is obtained from the musk pod, a preputial gland in a pouch, or sac, under the skin of the abdomen of the male musk deer. Fresh musk is semiliquid but dries to a grainy powder. It is usually prepared for use in perfumes by making a tincture in pure alcohol. After standing for several months, this solution imparts character, strength, and tenacity to perfume.

The odorous principle of musk is muscone (muskone), or 3-methylcyclopentadecanone. Muscone and other compounds that produce musk odour have been synthesized and used in perfumes.

musk deer (species *Moschus moschiferus*), small, compact deer, family Cervidae (order Artiodactyla). A solitary, shy animal, the musk deer lives in mountainous regions from Siberia to the Himalayas. It has large ears, a very short tail, no antlers and, unlike all other deer, a gall bladder. Grayish brown, with long, coarse, brittle hair, the musk deer stands 50–60 cm (20–24 inches) at the shoulder, slightly higher at the rump. The male has long upper canine teeth that project downward from the mouth as tusks and has a musk-producing organ, the musk pod, on its abdomen. The musk from this organ is valued for use in perfumes and soaps.

Musk deer (*Moschus moschiferus*)

Painting by Donald C. Meighan

musk mallow, also called ABELMOSK (species *Hibiscus moschatus,* or *H. abelmoschus*), annual or biennial plant of the mallow family (Malvaceae), native to India. It grows 0.6–1.8 m (2–6 feet) tall and bears large yellow flowers with red centres. The plant is cultivated for its seeds, which are used in perfumes. The plant also yields a fibre used locally for clarifying sugar.

Musk mallow also refers to *Malva moschata,* a perennial European plant with pink or white flowers, deeply cut upper leaves, and kidney-shaped basal leaves. It has hairy black fruits.

musk-ox, plural MUSK-OXEN (species *Ovibos moschatus*), shaggy-haired Arctic ruminant of the family Bovidae (order Artiodactyla).

Musk-oxen (*Ovibos moschatus*)

Leonard Lee Rue III

Musk-oxen are stocky and have large heads, short necks, and short, stout legs. They have a musky odour. Bulls stand about 1.5 m (5 feet) at the shoulder and weigh about 400 kg (880 pounds); cows are smaller. Horns, to about 60 cm (2 feet) long in old males, are present in both sexes. In males, they are broad based and proceed sideways from the midline of the skull, dipping downward at the sides of the head and curving upward at the ends. Females and young have smaller horns. The coat of musk-oxen is of long, dark brown hair that reaches nearly to the feet, conceals the short tail, and nearly covers the small ears. Shorter hair covers the face. Underneath the shaggy coat is a thick wool, shed in summer. It is used by the Eskimos to make a fine cloth similar to cashmere or guanaco.

Musk-oxen travel in herds, often of 20 to 30 individuals. They are not aggressive but, when attacked, form a circle with the young inside and the larger animals presenting a formidable front of horns that is effective against Arctic wolves and dogs. Musk-oxen feed on grass and low-growing plants such as lichens and willows. Some authorities, considering musk-oxen as Arctic cattle, are urging their domestication in suitable areas.

In the Pleistocene Epoch (which occurred from 1,600,000 to 10,000 years ago), musk-oxen were circumpolar in distribution. They are now found in parts of northern Canada and Greenland. In 1929 a group of musk-oxen was introduced on Nunivak Island, near Alaska.

musk turtle (genus *Sternotherus*), any of several species of small freshwater turtles belonging to the family Kinosternidae. Musk turtles are named for the strong, musky odour they emit when disturbed. They are found in eastern North America, usually in quiet waters. Highly aquatic animals, they seldom emerge onto land. They take bait readily and are often caught by fishermen. Similar to small snapping turtles in appearance and pugnacious temperament, musk turtles are characterized by a small lower shell and by small, fleshy barbels on the chin. Their upper shell is oval, dull in colour, and usually about 8–13 cm (3–5 inches) long.

Stinkpot, or common musk turtle (*Sternotherus odoratus*)
Alvin E. Staffan from The National Audubon Society Collection/Photo Researchers—EB Inc.

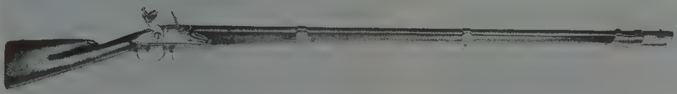
There are two or three generally recognized species of musk turtles. The stinkpot, or common musk turtle (*Sternotherus odoratus*), is an abundant form with two yellow stripes on each side of its head. It is the only member of the genus found in both the northeastern and southern United States.

Muskegon, city, seat (1859) of Muskegon county, western Michigan, U.S., on Lake Michigan at the mouth of the Muskegon River (there forming Muskegon Lake), 40 miles (64 km) northwest of Grand Rapids. It is the largest port on Lake Michigan's eastern shore, with an extensive international trade. The name is from an Indian word meaning "marshy river." Laid out in 1849 near the site of a fur trading post (established in 1812), Muskegon became a major sawmill centre and shipping point for lumber to Chicago. Destroyed by fire in 1890, the city was rebuilt, and with depletion of the forests it turned to industry, including the manufacture of tools and dies, machinery, chemicals, food products, and furniture. An Indian burial ground is in the centre of the city. Muskegon Community College (1926) and Muskegon Business College (1885) are located there. The Seaway Festival, an annual (June-July) event, honours the city's port activities. Inc. village, 1861; city, 1869. Pop. (1990) city, 40,283; Muskegon MSA, 158,983.

muskellunge (species *Esox masquinongy*), solitary and somewhat uncommon pike valued as a fighting game fish and, to a lesser extent, as a food fish. It inhabits weedy rivers and lakes of the North American Great Lakes region. Largest of the pike family (Esocidae) the muskellunge averages about 9 kg (20 pounds) in weight but may be 1.8 m (6 feet) long and weigh 36 kg (80 pounds) or more. It is recognized by the elongate body and by the absence of scales on the lower part of the cheeks and gill covers. *See also* pike.

Muskellunge (*Esox masquinongy*)
Doug Stamm—ProPhoto

musket, muzzle-loading shoulder firearm, evolved in 16th-century Spain as a larger version of the harquebus (*q.v.*). It was replaced in the mid-19th century by the breechloading rifle. Muskets were matchlocks until flintlocks were developed in the 17th century, and in the early 19th century flintlocks were replaced by percussion locks. Most muskets were muzzle-loaders. Early muskets were often handled by two persons and fired from a portable rest. Such a weapon was typically 5.5 feet (1.7 m) long and weighed about 20 pounds (9 kg). It fired a 2-ounce (57-gram) ball about 175 yards (160 m) with little accuracy. Later types were smaller, lighter, and accurate enough to hit a human-sized target at 80–100 yards (75–90 m). These weapons had calibres ranging from 0.69 to more than 0.75 inch (1.75 to more than 1.90 cm).


French Charleville musket, c. 1779
By courtesy of the West Point Museum Collections, United States Military Academy

Muskingum River, river formed by the confluence of the Tuscarawas and Walhonding rivers at Coshocton, east-central Ohio, U.S. It flows about 115 miles (185 km) south past Zanesville and McConnelsville to the Ohio River at Marietta. Licking River, which joins the Muskingum at Zanesville, is the chief tributary. A series of locks, dams, and short canals—most of them built between 1935 and 1941—control flooding and make the river navigable. The name is of Algonquin Indian origin and probably means "by the river."

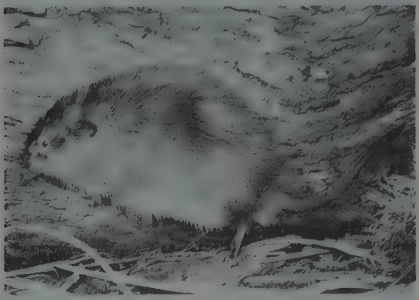
muskmelon, also called NUTMEG MELON, any of the strongly netted-rind melons of the Reticulatis group of the common melon (species *Cucumis melo*), in the gourd family, Cucurbitaceae. Muskmelons are noted for their sweet, juicy, musky-scented, orange flesh, which accounts for their ranking as probably the most important commercial melons. In North America these melons are sometimes inaccurately referred to as cantaloupe, a term that should properly be reserved for other melons, *C. melo* of the Cantalupensis group. *See also* melon.

Muskogee, city, seat (1907) of Muskogee county, east-central Oklahoma, U.S., near the confluence of the Verdigris, Grand, and Arkansas rivers, surrounded by lakes, southeast of Tulsa. Founded in 1872 on the Missouri-Kansas-Texas Railroad and named for the Muskogee (Creek) Indians, it became the agency headquarters for the Five Civilized Tribes (Cherokee, Chickasaw, Choctaw, Creek, and Seminole). Growth was stimulated by the opening of oil and gas fields in 1904. Diversified industry includes the manufacture of glass and optical machinery, steel fabrication, and food processing. In 1970, with the opening of Arkansas River navigation, Muskogee became Oklahoma's first port with access to the Gulf of Mexico. Bacone College was founded in 1880. The Five Civilized Tribes Museum (1875) is in Honor Heights Park. The city is the home of the Parkview School (for the blind). Fort Gibson (1824; reconstructed) is nearby. Inc. 1898. Pop. (1990) 37,708.

The chapel of Bacone College, Muskogee, Okla.
By courtesy of the Muskogee Chamber of Commerce

Muskoka Lakes, chain of lakes, Muskoka District, southeastern Ontario, Canada, about 80 miles (130 km) north of Toronto. They consist of the chain of lakes drained by the Muskoka River into Georgian Bay, the largest of which are Muskoka (15 miles long by 5 miles wide [24 by 8 km]), Rosseau (12 miles by 5 miles [19 by 8 km]), Joseph (12 miles by 4 miles [19 by 6 km]), and Lake of the Bays (13 miles by 6 miles [21 by 10 km]). Once an important lumbering region, the lakes have since become one of the province's major vacationing areas.

muskrat, also called MUSQUASH (species *Ondatra zibethica*), ratlike, semiaquatic rodent belonging to the family Cricetidae (order Rodentia), found over most of North America, except in areas of treeless tundra, and introduced into parts of Europe. The muskrat is a compact, heavy-bodied rodent about 30 cm (12 inches) long, not including the long, scaly tail that is flattened from side to side. The eyes and ears are small; the hind feet, used in swimming, are partially webbed and fringed with stiff bristles. The musky secretion for which the muskrat is named comes from musk sacs in the anal region. The fur, a basic commodity of the fur industry, is medium to dark blackish brown and consists of a dense, soft underfur heavily overlaid with long, stiff, glossy guard hairs.



Muskrat (*Ondatra zibethica*)

John H. Gerard

The muskrat lives in marshes, shallow lakes, and streams and shelters either in a burrow dug in a bank or in a reed-and-rush mound constructed in the water. Its food consists of a wide variety of sedges, reeds, roots—mostly of water plants—and occasional freshwater mussels, crayfish, salamanders, and fish. Feeding usually takes place at special feeding sites, usually a flat rock or island of cut reeds. One or more litters of 1 to 11 young are produced each year after three to four weeks' gestation. The muskrat sometimes damages corn or burrows into earthen structures. It is edible, and its flesh is sold as "marsh rabbit." A small, Newfoundland form is sometimes considered a distinct species, *O. obscura.*

The round-tailed muskrat, or Florida water rat (*Neofiber alleni*), is another semiaquatic member of the family Cricetidae. It resembles a small muskrat about 36 cm (14 inches) in total length but is distinguished by its round, rather than flattened, tail. It is less aquatic than the muskrat and usually lives in heavily planted, watery areas, especially bogs.

Muslim Brotherhood, Arabic AL-IKHWĀN AL-MUSLIMŪN, religio-political organization founded in 1928 at Ismā'īlīyah, Egypt, by Ḥasan al-Bannā'. It advocated a return to the Qur'ān and the Ḥadīth as guidelines for a healthy, modern Islāmic society. The brotherhood spread rapidly throughout Egypt, the Sudan, Syria, Palestine, Lebanon, and North Africa.

After 1938 the Muslim Brotherhood began to politicize its outlook. It demanded purity of the Islāmic world and rejected westernization, secularization, and modernization. The brotherhood organized a terrorist arm, and when the Egyptian government seemed to weaken in the mid-1940s, the brotherhood posed a threat to the monarchy and the ruling Wafd Party. With the advent of the revolutionary regime in Egypt in 1952, the brotherhood retreated underground. An attempt to assassinate Egyptian president Gamal Abdel Nasser in Alexandria on Oct. 26, 1954, led to the Muslim Brotherhood's forcible suppression. Six of its leaders were tried and executed for treason, and many others were imprisoned. In the 1960s and '70s the brotherhood's activities remained largely clandestine.

In the 1980s the Muslim Brotherhood experienced a renewal as part of the general upsurge of religious activity in Islāmic countries. The brotherhood's new adherents aimed to reorganize society and government according to Islāmic doctrines, and they were vehemently anti-Western. An uprising by the Muslim Brotherhood in the Syrian city of Ḥamāh in February 1982 was crushed by the government of Ḥafiz al-Assad at a cost of thousands of lives. The brotherhood revived in Egypt and Jordan in the same period, and beginning in the late 1980s it emerged to compete in legislative elections in those countries.

Muslim calendar, also called ISLĀMIC CALENDAR, dating system used in the Muslim world and based on a year of 12 months, each month beginning approximately at the time of the New Moon. The months are alternately 30 and 29 days long except for the 12th, Dhū al-Ḥijjah, the length of which is varied in a 30-year cycle intended to keep the calendar in step with the true phases of the Moon. In 11 years of this cycle, Dhū al-Ḥijjah has 30 days, and in the other 19 years it has 29. Thus the year has either 354 or 355 days. No months are intercalated, so that the named months do not remain in the same seasons but retrogress through the entire solar, or seasonal, year (of about 365.25 days) every 32.5 solar years.

Muslim ibn al-Ḥajjāj, in full ABŪ AL-ḤUSAYN MUSLIM IBN AL-ḤAJJĀJ AL-QUSHAYRĪ (b. *c.* 817, Nīshāpūr, Iran—d. 875, Naṣrābād), scholar who was one of the chief authorities on the Ḥadīth, accounts of the sayings and deeds of the Prophet Muḥammad.

Muslim traveled widely; his great work, the *Ṣaḥīḥ* ("The Genuine"), is said to have been compiled from about 300,000 traditions, which he collected in Arabia, Egypt, Syria, and Iraq. The *Ṣaḥīḥ* has been unanimously acclaimed as authoritative and is one of the six canonical collections of Ḥadīth. Muslim was careful to give a full account of the *isnāds* (links in the chain of transmission) for each tradition and to record textual variations. The collection also includes a survey on early Islāmic theology and a discussion on the Qur'ān.

Muslim League, original name ALL INDIA MUSLIM LEAGUE, political group that led the movement calling for a separate Muslim nation to be created out of the partition of British India (1947). The Muslim League was founded in 1906 to safeguard the rights of Indian Muslims. At first the league was encouraged by the British and was generally favourable to their rule, but the organization adopted self-government for India as its goal in 1913. For several decades the league and its leaders, notably Mohammed Ali Jinnah (*q.v.*), called for Hindu-Muslim unity in a united and independent India. It was not until 1940 that the league called for the formation of a Muslim state that would be separate from the projected independent nation of India. The league wanted a separate nation for India's Muslims because it feared that an independent India would be dominated by Hindus.

Jinnah and the Muslim League led the struggle for the partition of British India into separate Hindu and Muslim states, and after the formation of Pakistan in 1947 the league became Pakistan's dominant political party. In that year it was renamed the All Pakistan Muslim League. But the league functioned less effectively as a modern political party in Pakistan than it had as a mass-based pressure group in British India, and hence it gradually declined in popularity and cohesion. In the elections of 1954 the Muslim League lost power in East Pakistan (now Bangladesh), and the party lost power in West Pakistan (now Pakistan) soon afterward. By the late 1960s the party had split into various factions, and by the 1970s it had disappeared altogether.

muslin, plain-woven cotton fabric made in various weights. The better qualities of muslin are fine and smooth in texture and are woven from evenly spun warps and wefts, or fillings. They are given a soft finish, bleached or piece-dyed, and are sometimes patterned in the loom or printed. The coarser varieties are often of irregular yarns and textures, bleached, unbleached, or piece-dyed and are generally finished by the application of sizing. Grades of muslin are known by such names as book, mull, swiss, and sheeting.

The material was first made in the city of Mosul (now in Iraq), from which it derived its name. Early Indian muslins were handwoven of extremely fine handspun yarns. They were imported into Europe from India in the 17th century and were later manufactured in Scotland and England.

Musorgsky, Modest (Petrovich) (Russian composer): *see* Mussorgsky, Modest (Petrovich).

Muspelheim, Old Norse MÚSPELL, in Norse mythology, a hot, bright, glowing land in the south, guarded by Surt, the fire giant. In the beginning, according to one tradition, the warm air from this region melted the ice of the opposite region, Niflheim, thus giving form to Aurgelmir (Ymir), the father of the evil giants. Sparks from Muspelheim became the Sun, Moon, and stars. At the doom of the gods (Ragnarök), the sons of Muspelheim, led by Surt, will destroy the world by fire.

Mussato, Albertino (b. 1261, Padua, March of Verona [Italy]—d. May 31, 1329, Chioggia, Republic of Venice), Italian statesman and writer who was outstanding both as a poet and as a historian of the 14th century.

Mussato earned his living as a copyist while studying for the profession of notary. He was knighted in 1296 and, after becoming a member of the Council of Padua, was sent in 1302 as ambassador to Pope Boniface VIII. In 1311 he was a member of an embassy from Guelf (pro-papal) Padua to Emperor Henry VII in Milan, and, during a long war between Padua and Vicenza, he often served as a negotiator between Padua and the emperor. Mussato was crowned as a poet before the senate and the university of Padua in December 1315, the first poet so honoured.

Mussato's *Historia Augusta* ("Augustan History"), a chronicle of Henry VII's actions in Italy, and his *De gestis Italicorum post Henricum VII Caesarem* ("Concerning the Deeds of the Italians After Emperor Henry VII") are important sources for the history of 14th-century Italy. His Latin poems and the tragedy *Ecerinis*, modeled after Seneca's plays and based on the life of the Veronese tyrant Ezzelino da Romano, foreshadow Italian humanism.

mussel, any of numerous bivalve mollusks belonging to the marine family Mytilidae and to the freshwater superfamily Unionacea. Worldwide in distribution, they are most common in cool seas. Freshwater mussels, also known as naiads, include about 1,000 known species inhabiting streams, lakes, and ponds over most of the world.

Marine mussels are usually wedge-shaped or pear-shaped and range in size from about 5 to 15 centimetres (about 2 to 6 inches). They may be smooth or ribbed and often have a hairy covering. The shells of many species are dark blue or dark greenish brown on the outside; on the inside they are often pearly. Mussels attach themselves to solid objects or to one another by strands called byssus threads; they often occur in dense clusters. Some bur-

Atlantic ribbed mussels (*Modiolus demissus*)

Walter Dawn

row into soft mud or wood. Principal enemies of the mussel are birds (*e.g.,* herring gulls, oystercatchers, ducks) and starfishes.

Some species (*e.g.,* the blue mussel, *Mytilus edulis*) are important as food in Europe and other parts of the world and are raised commercially. *M. edulis,* which attains lengths of up to 11 cm and is usually blue or purple, has been cultivated in Europe since the 13th century. Mussels are collected from deep water by means of dredges or rakes.

The two species of the tiny zebra mussel (genus *Dreissena*) are prominent freshwater pests, known to proliferate readily and to adhere in great numbers to virtually any surface. The zebra mussel's voracious appetite tends to wipe out phytoplankton, disrupting the food chain; and its massive clustering on water-intake valves and pipes, bridge abutments, and other structures can cause severe commercial damage. The zebra mussel made its first known attack on Europe in the early 1800s, proliferated in the 20th century, and was carried (probably in ship water ballasts) to North America about 1986, eventually invading all the Great Lakes.

The capax horse mussel (*Modiolus capax*) has a bright orange-brown shell under a thick periostracum; its range in the Pacific Ocean extends from California to Peru. The Atlantic ribbed mussel (*Modiolus demissus*), which has a thin, strong, yellowish brown shell, occurs from Nova Scotia to the Gulf of Mexico. The tulip mussel (*Modiolus americanus*), from North Carolina to the Caribbean Sea, attaches itself to broken shells and rocks; its smooth, thin shell is usually light brown but sometimes has rosy or purple rays.

The yellow mussel (*Mytilus citrinus*), from southern Florida to the Caribbean, is a light brownish yellow. The hooked, or bent, mussel (*M. recurvus*), from New England to the Caribbean, attains lengths of about 4 cm and is greenish brown to purplish black. The scorched mussel (*M. exustus*), from North Carolina to the Caribbean, is bluish gray and about 2.5 cm long.

The largest family of freshwater mussels is Unionidae, with about 750 species, the greatest number of which occur in the United States. Many species also live in Southeast Asian waters.

mussel shrimp, also called SEED SHRIMP, or OSTRACOD (subclass Ostracoda), any of a widely distributed group of crustaceans resembling mussels. Mussel shrimp differ from most crustaceans in having a very short trunk that has lost its external segmentation, or divisions. Nearly all of the body is encased in a hard covering, or carapace. The 2,000 living species include marine, freshwater, and terrestrial forms.

Some 10,000 extinct species are known, fossil ostracods being known from Late Cambrian Period (about 523 to 505 million years ago) to recent times. The several extinct species are of particular stratigraphic significance in nonmarine marls, limestones, and shales, often serving as index fossils owing to their abundance, widespread geographic occurrence, and limited vertical range. Certain genera are commonly used as guides in subsurface petroleum exploration, in a manner analogous to that of foraminifera in marine strata.

Mussel shrimp are about 1 mm (about 0.04 inch) long. The largest is *Gigantocypris agassizi,* a Pacific species, which grows to 23 mm. Most mussel shrimp live on or about the sea bottom. Some feed on microorganisms and organic debris; others are predators on small invertebrates; and a few are parasitic. Most prefer shallow water, but some have been collected at depths of 2,000 m (about 6,600 feet).

Musselshell River, river, rising in the Crazy Mountains in the Gallatin and the Lewis and Clark national forests, in Meagher county, central Montana, U.S., and flowing 292 miles (470 km) east and north past Harlowton and Roundup to Fort Peck Lake, a huge reservoir dammed on the Missouri River, in northwest Garfield county. A small headstream is impounded near Martinsdale to form an irrigation reservoir. The river was named Musselshell by the explorers Meriwether Lewis and William Clark in 1805, when they found freshwater mussels on its banks.

Musset, Alfred de, in full LOUIS-CHARLES-ALFRED DE MUSSET (b. Dec. 11, 1810, Paris, Fr.—d. May 2, 1857, Paris), distinguished French Romantic poet and playwright.

Musset's autobiographical *La Confession d'un enfant du siècle* (1836; *The Confession of a Child of the Century*), if not entirely trustworthy, presents a striking picture of Musset's youth as a member of a noble family, well-educated but ruled by his emotions in a period when all traditional values were under attack. While still an adolescent he came under the influence of the leaders of the Romantic movement, Charles Nodier, Alfred de Vigny, and Victor Hugo, and produced his first work, *Contes d'Espagne et d'Italie* ("Stories of Spain and of Italy") in 1830. At the same time he became a dandy, one of the elegant Parisian imitators of "Beau" Brummell, and embarked on a life of hectic sexual and alcoholic dissipation.

After the failure of his play *La Nuit vénitienne* (1830; "The Venetian Night"), Musset refused to allow his other plays to be performed but continued to publish historical tragedies—*e.g., Lorenzaccio* (1834)—and delightful comedies—*e.g., Il ne faut jurer de rien* (1836; "It Isn't Necessary to Promise Anything"). Musset's plays are now performed regularly, while the other Romantic dramas by his contemporaries have been dropped from the standard repertory. He was elected to the French Academy in 1852.

Musset, oil painting by Charles Landelle; in the Louvre, Paris
Cliche Musees Nationaux, Paris

Above all, Musset is remembered for his poetry. He was extraordinarily versatile, writing light satirical pieces and poems of dazzling technical virtuosity as well as lyrics, such as "La Nuit d'octobre" (1837; "The October Night"), which express with passion and eloquence all his fervent and complex emotions. Though always associated with the Romantic movement, Musset often poked fun at its excesses. His *Lettres de Dupuis et Cotonet* (1836–37), for example, contain a brilliant and illuminating satire of the literary fashions of the day. A love affair with the novelist George Sand that went on intermittently from 1833 to 1839 inspired some of his finest lyrics, as recounted in his *Confession.*

Mussolini, Benito, in full BENITO AMILCARE ANDREA MUSSOLINI, byname IL DUCE (Italian: "The Leader") (b. July 29, 1883, Predappio, Italy—d. April 28, 1945, near Dongo), Italian prime minister (1922–43) and the first of 20th-century Europe's fascist dictators.

Early life. Mussolini was the first child of the local blacksmith. In later years he expressed pride in his humble origins and often spoke of himself as a "man of the people." The Mussolini family was, in fact, less humble than he alleged—his father, a part-time socialist journalist as well as a blacksmith, was the son of a lieutenant in the National Guard, and his mother was a schoolteacher—but the Mussolinis were certainly poor. They lived in two crowded rooms on the second floor of a small, decrepit palazzo; and, because the blacksmith spent much of his time discussing politics in taverns and most of his money on his mistress, the meals that were eaten by his three children were often meagre.

Mussolini
H. Roger-Viollet

Benito was a restless child who was disobedient, unruly, and aggressive. He was a bully at school and moody at home. Because the teachers at the village school could not control him, he was sent to board with the strict Salesian order at Faenza, where he proved himself more troublesome than ever, stabbing a fellow pupil with a penknife and attacking one of the Salesians who had attempted to beat him. He was expelled and sent to the Giosuè Carducci school at Forlimpopoli, from which he was also expelled after assaulting another pupil with his penknife.

He was also intelligent, and he passed his final examinations without difficulty. He obtained a teaching diploma and for a time worked as a schoolmaster but soon realized that he was totally unsuited for such work. At the age of 19, a short, pale young man with a powerful jaw and enormous, dark, piercing eyes, he left Italy for Switzerland with a nickel medallion of Karl Marx in his otherwise empty pockets. For the next few months, according to his own account, he lived from day to day, jumping from job to job.

At the same time, however, he was gaining a reputation as a young man of strange magnetism and remarkable rhetorical talents. He read widely and voraciously, if not deeply, plunging into the philosophers and theorists Immanuel Kant and Benedict de Spinoza, Peter Kropotkin and Friedrich Nietzsche, G.W.F. Hegel, Karl Kautsky, and Georges Sorel, picking out what appealed to him and discarding the rest, forming no coherent political philosophy of his own yet impressing his companions as a potential revolutionary of uncommon personality and striking presence. While earning a reputation as a political journalist and public speaker, he undertook propaganda for a trade union, proposing a strike and advocating violence as a means of enforcing demands. Repeatedly, he called for a day of vengeance; more than once he was arrested and imprisoned. When he returned to Italy in 1904, even the Roman newspapers had started to mention his name.

For some time after his return little was heard of him. He once more became a schoolmaster, this time in the Venetian Alps, north of Udine, where he lived, so he confessed, a life of "moral deterioration." But soon tiring of so wasteful a life, he returned to trade-union work, to journalism, and to extreme politics, which led yet again to arrest and imprisonment.

During a period of freedom in 1909 he fell in love with 16-year-old Rachele Guidi, the younger of the two daughters of his father's widowed mistress; she went to live with him in a damp, cramped apartment in Forlì and later married him. Soon after the marriage, Mussolini was imprisoned for the fifth time; but by then Comrade Mussolini had become recognized as one of the most gifted, and dangerous, of Italy's younger Socialists. After writing in a wide variety of Socialist papers, he founded a newspaper of his own, *La Lotta di Classe* ("The Class Struggle"). So successful was this paper that in 1912 he was appointed editor of the official Socialist newspaper, *Avanti!,* whose circulation he soon doubled; and as its anti-militarist, anti-nationalist, and anti-imperialist editor, he thunderously opposed Italy's intervention in World War I.

Soon, however, he changed his mind about intervention. Swayed by Karl Marx's aphorism that social revolution usually follows war, and persuaded that "the defeat of France would be a death-blow to liberty in Europe," he began writing articles and making speeches as violently in favour of war as previously he had condemned it. He resigned from *Avanti!* and was expelled from the Socialist Party. Financed by a publisher who favoured war against Austria, he assumed the editorship of *Il Popolo d'Italia,* in which he unequivocably stated his new philosophy: "From today onwards we are all Italians and nothing but Italians. Now that steel has met steel, one single cry comes from our hearts—*Viva l'Italia!"* It was the birth cry of Fascism. Mussolini went to fight in the war.

Rise to power. Wounded while serving with the Bersaglieri (a corps of sharpshooters), he returned home a convinced anti-Socialist and a man with a sense of destiny. As early as February 1918, he was advocating the emergence of a dictator—"a man who is ruthless and energetic enough to make a clean sweep." Three months later, in a widely reported speech at Bologna, he hinted that he himself might prove to be such a man. The following year the nucleus of a party prepared to support his ambitious idea was formed in Milan. In an office in Piazza San Sepolcro about 200 assorted republicans and anarchists, syndicalists and discontented Socialists, restless revolutionaries and discharged soldiers met to discuss the establishment of a new force in Italian politics. Mussolini called this force a Fasci di Combattimento, a group of fighters bound together by ties as close as those that secured the *fascinae* of the lictors—the symbols of ancient Roman authority. So Fascism was created and its symbol devised.

At rallies—surrounded by supporters wearing black shirts, which the labourers of the Romagna had adopted as the uniform of the anarchists—Mussolini caught the imagination of the crowds. His physique was impressive, and his style of oratory, staccato and tautophonic, was superb. His attitudes were highly theatrical, his opinions were contradictory, his facts were often wrong, and his attacks were frequently malicious and misdirected; but his words were so dramatic, his metaphors so apt and striking, his vigorous, repetitive gestures so extraordinarily effective, that he rarely failed to impose his mood.

In the summer of 1922 Mussolini's opportunity presented itself. To the dismay of the Italian people as a whole, a general strike was called. Mussolini declared that unless the government prevented the strike, the Fascists would. "Either the government will be given to us," he threatened at a gathering of 40,000 Fascists in Naples, "or we will seize it by marching on Rome." Responding to his oratory the assembled Fascists excitedly took up the cry, shouting in unison "Roma! Roma! Roma!" All appeared eager to march.

Later that day, Mussolini and other leading Fascists decided that in four days' time the Fascist militia would advance upon Rome in converging columns led by four leading party members later to be known as the Quadrumviri. Mussolini himself was not one of the four.

He was still hoping for a political compromise, and he refused to move before King Victor Emmanuel III summoned him in writing. Meanwhile, all over Italy the Fascists prepared for action, and the march on Rome began. Although it was a far less orderly affair than Fascist propaganda later suggested, it was sufficiently threatening to bring down the government. And the King, prepared to accept the Fascist alternative, dispatched the telegram for which Mussolini had been waiting.

Dictatorship. Mussolini's obvious pride in his achievement at becoming (Oct. 31, 1922) the youngest prime minister in Italian history was not misplaced. He had certainly been aided by a favourable combination of circumstances, both political and economic; but his remarkable and sudden success owed quite as much to his own personality, to native instinct and shrewd calculation, to astute opportunism, and to his unique gifts as an agitator. Anxious to demonstrate that he was not merely the leader of Fascism but also the head of a united Italy, he presented to the King a list of ministers, a majority of whom were not members of his party. He made it clear, however, that he intended to govern authoritatively. He obtained full dictatorial powers for a year; and in that year he pushed through a law that enabled the Fascists to secure a majority in the Chamber. The elections in 1924, though undoubtedly fraudulent, secured his personal power.

The Italian people welcomed his authority. They were tired of strikes and riots, responsive to the flamboyant techniques and medieval trappings of Fascism, and ready to submit to dictatorship, provided the national economy was stabilized and their country restored to its dignity. Mussolini seemed to them the one man capable of bringing order out of chaos. Soon order had been restored, the conditions of the workers had begun to improve, and ambitious programs of public works had been inaugurated; and he was accepted throughout Italy at his own evaluation as Italy's man of destiny.

Mussolini was hailed as a genius and a superman by public figures all over Europe and in the United States. His achievements were considered scarcely less than miraculous. He had transformed and reinvigorated his divided and demoralized country; he had carried out his social reforms and public works without losing the support of the industrialists and landowners; he had even succeeded in coming to terms with the papacy.

Mussolini might have remained a hero until his death had not his callous xenophobia and arrogance, his misapprehension of Italy's fundamental necessities, and his dreams of empire led him to look about for foreign conquest. His eye rested first upon Abyssinia, which, after 10 months of preparations, rumours, threats, and hesitations, Italy invaded in October 1935. Europe expressed its horror; but, having done so, did no more. Sanctions were imposed by the League of Nations; yet care was taken to ensure that the list of prohibited exports should not include any, such as oil, that might provoke a European war. Had he been faced with oil sanctions, Mussolini said, he would have had to withdraw from Abyssinia within a week. But he was faced with no such problem, and on the night of May 9, 1936, he was able to announce to an enormous, expectant crowd of about 400,000 people standing shoulder to shoulder around Piazza Venezia, in Rome, that "in the 14th year of the Fascist era" a great event had been accomplished: Italy had its empire.

Italy had also found a new ally. Intent upon his own ambitions in Austria, Adolf Hitler had actively encouraged Mussolini's African adventure, and, under Hitler's guidance, Germany had been the one powerful country in western Europe that had not turned against Mussolini. The way was now open for the Pact of Steel—a Rome–Berlin Axis and a brutal friendship between Hitler and Mussolini that was to ruin them both.

Role in World War II. While Mussolini understood that peace was essential to Italy's well-being, that a long war might prove disastrous, and that he must not "march blindly with the Germans," he was beset by fears that the Germans "might do good business cheaply" and that by not intervening he would lose his "part of the booty." His foreign secretary and son-in-law, Count Galeazzo Ciano, recorded that during a long, inconclusive discussion at the Palazzo Venezia, Mussolini at first agreed that Italy must not go to war, "then he said that honour compelled him to march with Germany."

Mussolini watched the progress of Hitler's war with bitterness and alarm, becoming more and more bellicose with each fresh German victory, while frequently expressing hope that the Germans would be slowed down, would meet with some reverse that would satisfy his personal envy and give Italy a breathing space. When Germany marched westward, however, and France seemed on the verge of collapse, Mussolini felt he could delay no longer. So, on June 10, 1940, the fateful declaration of war was made.

From the beginning the war went badly for Italy. France surrendered before there had been the opportunity for even a token victory, and Mussolini left for a meeting with Hitler, sadly aware, as Ciano put it, that his opinion had "only a consultative value." Indeed, from then on Mussolini was obliged to face the fact that he was the junior partner in the Axis alliance. Thenceforth, every time he met Hitler throughout the war, the failure of Italian arms was uppermost in his mind and, he was forced to listen while Hitler talked at interminable length about past German victories and future German plans. To make his meetings with Hitler more intolerable, the Germans kept the details of their plans concealed, presenting their allies with a fait accompli for fear that prior discussion would destroy surprise. And thus such moves as the occupation of Romania and the later invasion of the Soviet Union were undertaken by Germany without any prior warning being given to Mussolini.

It was to "pay back Hitler in his own coin," as Mussolini openly admitted, that he decided to attack Greece through Albania without advising the Germans of his plans. The result was an extensive and ignominious defeat, and the Germans were forced unwillingly to extricate him from its consequences. Hitler also had to come to his ally's help in North Africa; and the Germans began to take precautions against the likelihood of an Italian collapse. When the Allies successfully invaded Sicily in July 1943, it was obvious that collapse was imminent.

For some time Italian Fascists and non-Fascists alike had been preparing Mussolini's downfall. On July 24, at a meeting of the Fascist Grand Council—the supreme constitutional authority of the state, which had not met once since the war began—a resolution was passed by an overwhelming majority in effect dismissing Mussolini from office. Disregarding the vote as a matter of little concern and refusing to admit that his minions could harm him, Mussolini appeared at his office the next morning as though nothing had happened. That afternoon, however, he was arrested by royal command on the steps of the Villa Savoia after an audience with the king.

Imprisoned first on the Island of Ponza, then on a remoter island off the coast of Sardinia, he was eventually transported to a hotel high on the Gran Sasso d'Italia in the Abruzzi Mountains, from which his rescue by the Germans was deemed impossible. Nevertheless, by crash-landing gliders on the slopes behind the hotel, German commandos on Sept. 12, 1943, effected his escape by air to Munich.

Rather than allow the Germans to occupy and govern Italy entirely in their own interests, Mussolini agreed to Hitler's suggestion that he establish a new republican Fascist government in the north and execute those members of the Grand Council, including his son-in-law, Ciano, who had dared to vote against him. But the Repubblica Sociale Italiana thus established at Salò was, as Mussolini himself grimly admitted to visitors, no more than a puppet government at the mercy of the German command. And there, living in dreams and "thinking only of history and how he would appear in it," as one of his ministers said, Mussolini awaited the inevitable end.

As German defenses in Italy collapsed and the Allies advanced rapidly northward, the Italian Communists of the partisan leadership determined upon Mussolini's execution. Rejecting the advice of various advisers, including the elder of his two surviving sons—his second son had been killed in the war—Mussolini refused to consider flying out of the country, and he made for the Valtellina, intending to make a final stand in the mountains; but only a handful of men could be found to follow him. He tried to cross the frontier disguised as a German soldier in a convoy of trucks retreating toward Innsbruck (in Austria). But he was recognized and, together with his mistress Claretta Petacci, who had insisted on remaining with him to the end, he was shot and killed. Their bodies were hung, head downward, in the Piazza Loreto in Milan.

Mussolini's death was greeted by the great mass of the Italian people without regret. He had lived beyond his time and had dragged his country into a disastrous war, which it was unwilling and unready to fight. (C.Hi./Ed.)

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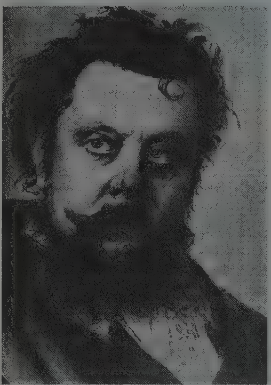
A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Mussoorie, city, northern Uttar Pradesh state, northern India. It is situated about 20 miles (32 km) north of Dehra Dūn. Mussoorie lies at an elevation of 6,932 feet (2,112 m) on a ridge of one of the Himalayan foothills amidst picturesque mountain scenery. The city is a popular summer resort for residents of Delhi and the plains of Uttar Pradesh. The climate and surroundings make Mussoorie a suitable site for several residential schools. The city also has a botanical garden and is the summer seat of various Indian government offices. The first brewery in India was established there in 1850. Pop. (1991 prelim.) 26,424.

Summer resort in Mussoorie, Uttar Pradesh, India
Harrison Forman

Mussorgsky, Modest (Petrovich), Mussorgsky also spelled MUSORGSKY, or MOUSSORGSKY (b. March 9 [March 21, New Style], 1839, Karevo, Russia—d. March 16 [March 28], 1881, St. Petersburg), Russian composer noted particularly for his opera *Boris Godunov* (final version first performed 1874), his songs, and his piano piece *Pictures from an Exhibition* (1874).

Life and career. Mussorgsky was the son of a landowner but had peasant blood, his father's grandmother having been a serf. According to his autobiographical sketch, written in 1881, Mussorgsky claimed that he learned about Russian fairy tales from his nurse. "This early familiarity with the spirit of the people, with the way they lived, lent the first and greatest impetus to my musical improvisations. . . ." His mother, herself an excellent pianist, gave Modest his first piano lessons, and at seven he could play some of Franz Liszt's simpler pieces.


Mussorgsky, portrait by Ilya Repin, 1881; in the Gosudarstvennaya Tretyakovskaya Galeriya, Moscow
The Bettmann Archive

In August 1849 his father took Modest and his other musical son, Filaret, to St. Petersburg, where Modest attended the Peter-Paul School in preparation for a military career. At the same time, mindful of Modest's musical bent, their father entrusted the boys to Anton Gerke, future professor of music at the St. Petersburg Conservatory.

In 1852 Mussorgsky entered the School for Cadets of the Guard. There, in his first year he composed his *Podpraporshchik* (*Porte-Enseigne Polka*), published at his father's expense. Although not the most industrious of students, he gave proof of tremendous curiosity and wide-ranging intellectual interests.

In 1856, by now a lieutenant, Mussorgsky joined the Preobrazhensky Guards, one of Russia's most aristocratic regiments, where he made the acquaintance of several music-loving officers who were habitués of the Italian theatre. During this same period he came to know Aleksandr Borodin, a fellow officer who was to become another important Russian composer. Borodin has provided a very vivid picture of the musician:

> There was something absolutely boyish about Mussorgsky; he looked like a real second-lieutenant of the picture books . . . a touch of foppery, unmistakable but kept well within bounds. His courtesy and good breeding were exemplary. All the women fell in love with him. . . . That same evening we were invited to dine with the head surgeon of the hospital. . . . Mussorgsky sat down to the piano and played . . . very gently and graciously, with occasional affected movements of the hands, while his listeners murmured, "charming! delicious!"

During the winter of 1856 a regimental comrade introduced Mussorgsky into the home of the Russian composer Aleksandr Dargomyzhsky. At one of the musicales there, Mussorgsky discovered the music of the seminal Russian composer Mikhail Glinka, and this quickened his own Russophile inclinations. Three years later, in June 1859, he saw the Moscow Kremlin for the first time, an important experience that represented his first "physical" communion with Russian history. Through Dargomyzhsky, Mussorgsky met another composer, Mily Balakirev, who became his teacher. Since the death of their father (in 1853), the Mussorgsky brothers had seen their poorly administered patrimony decrease substantially. With the freeing of the serfs in 1861, it vanished. Mussorgsky, having decided to devote himself to music, had quit the army three years earlier and since 1863 had been working as a civil servant in the Ministry of Communications. His distressing financial troubles date from that time, and he had to seek the help of moneylenders.

Mussorgsky achieved artistic maturity in 1866 with a series of remarkable songs about ordinary people such as "Darling Savishna," "Hopak," and "The Seminarist," and an even larger series appeared the following year. Another work dating from this time is the symphonic poem *Ivanova noch na Lysoy gore* (1867; *Night on Bald Mountain*). In 1868 he reached the height of his conceptual powers in composition with the first song of his incomparable cycle *Detskaya* (*The Nursery*) and a setting of the first act of Nikolay Gogol's *Zhenitba* (*The Marriage*).

In 1869 he began his great work *Boris Godunov* to his own libretto based on the drama by Aleksandr Pushkin. The first version, completed in December 1869, was rejected by the advisory committee of the imperial theatres on account of the plot's lack of a love interest. In response, the composer subjected the opera to a thorough revision and in 1872 put the finishing touches to the second version, adding the roles of Marina and Rangoni as well as several new episodes. The first production of *Boris* took place on Feb. 8, 1874, at St. Petersburg and was a success.

In spite of the work's success, Mussorgsky was not happy. His solitude and bitter ordeal now commenced. Having once loved a cousin who died prematurely and having remained faithful to this memory, the composer never married. In 1865, after the death of his mother, he lived with his brother, then shared a small flat with the Russian composer Nikolay Rimsky-Korsakov until 1872, when his colleague married. Left very much alone, Mussorgsky began to drink to excess, although the composition of the opera *Khovanshchina* perhaps offered some distraction (left unfinished at his death, this opera was completed by Rimsky-Korsakov). Mussorgsky then found a companion in the person of a distant relative, Arseny Golenishchev Kutuzov. This impoverished 25-year-old poet inspired Mussorgsky's two cycles of melancholy melodies, *Bez solntsa* (*Sunless*) and *Pesni i plyaski smerti* (*Songs and Dances of Death*). At that time Mussorgsky was haunted by the spectre of death—he himself had only seven more years to live. The death of another friend, the painter Victor Hartmann, inspired Mussorgsky to write the piano suite *Kartinki s vystavki* (*Pictures from an Exhibition;* orchestrated in 1922 by the French composer Maurice Ravel).

The last few years of Mussorgsky's life were dominated by his alcoholism and by a solitude made all the more painful by the total neglect of his friends, who, Balakirev included, treated him like an outcast. Nonetheless, the composer began his opera *Sorochinskaya yarmarka* (unfinished; *Sorochintsy Fair*), inspired by Gogol's tale. As the accompanist of an aging singer, Darya Leonova, Mussorgsky departed on a lengthy concert tour of southern Russia and the Crimea. On his return he tried teaching at a small school of music in St. Petersburg.

On Feb. 24, 1881, three successive attacks of alcoholic epilepsy laid him low. His friends took him to a hospital where for a time his health improved sufficiently for one of the leading Russian artists of the day, Ilya Repin, to paint a famous portrait of him. Mussorgsky's health was irreparably damaged, however, and he died within a month.

Music. Mussorgsky's importance and influence on later composers are quite out of proportion to his relatively small output. Few composers were less derivative, or evolved so original and bold a style. The 65 songs he composed, many to his own texts, describe scenes of Russian life with great vividness and insight and realistically reproduce the inflections of the spoken Russian language. Mussorgsky's operas *Boris Godunov* and to a lesser extent *Khovanshchina* display his dramatic technique of setting sharply characterized individuals against the background of country and people. His power of musical portrayal, his strong characterizations, and the importance he assigned to the role of the chorus—all expressions of his anti-Romantic convictions—establish *Boris Godunov* as a masterpiece. From a technical standpoint, Mussorgsky's unorthodox use of tonality and harmony and his method of fusing arioso and recitative provide *Boris Godunov* with a dramatic intensity that he failed to recapture in his subsequent operas.

Shortly after Mussorgsky's death, his original harmonic and instrumental style was unjustifiably criticized. Subsequently, Rimsky-Korsakov, with the well-meaning intention of purging Mussorgsky's works of what he considered to be their harmonic eccentricities and instrumental weaknesses, edited and "corrected" almost the entire output of the deceased composer; Rimsky-Korsakov's widely performed edition of *Boris Godunov* is the best known of these works. From about 1908, however, after the production of Rimsky-Korsakov's version of *Boris Godunov* at the Paris Opera, there was a growing demand for the original versions of Mussorgsky's works, which were made available beginning in 1928 in a collected edition edited by Paul Lamm. This edition displayed Mussorgsky's original orchestration for *Boris Godunov*, which is as stark and economical as his unorthodox harmony.

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mussurana, also spelled MUSURANA (*Clelia clelia*), tropical American rear-fanged snake of the family Colubridae. The mussurana preys on both rodents, which it kills with its venom, and on other snakes, which it kills by constriction. It is largely immune to the venom of members of the genus *Bothrops* (fer-de-lance and allies), its chief prey. The mussurana may be 2.1 m (about 7 feet) long. Adults are blue-black or brown, with a white belly stripe; the young are pink, with dark head and collar.

mustache, also spelled MOUSTACHE, hair grown on the upper lip by men. The wearing of mustaches, like beards, has been since antiquity a reflection of such factors as climate (local or temporal), custom, religious belief, and personal taste. It was usual in the past to make no distinction between a mustache and other facial hair such as a beard or whiskers, as these were usually worn together. As early as 2650 BC, however, Egyptian artifacts show a pencil-line mustache with no beard.

Throughout history, controversies have raged over the subject of facial hair. When clean-shaven faces were stylish, mustaches and beards were considered eccentric and often were forced by law to be shaved. The Romans considered the Gauls' wearing of mustaches with no beards to be the epitome of barbarism. In 1447 an English act was passed forcing men to shave their upper lip, but, some 400 years later, English soldiers were forbidden to shave their upper lip. The French military, the Prussian guard, and the Hussars sported the mustache in the early 19th century, but in 1838 the king of Bavaria forbade the wearing of mustaches in his military. Whenever mustaches have been sanctioned in fashionable circles, they have taken on a variety of forms. Some countries still regulate the wearing of facial hair, usually in the military services; generally, the wearing of a mustache is a matter of personal taste.

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mustache shrimp, any member of the crustacean subclass Mystacocarida, a small group of primitive, free-living marine animals. Of the few species known, the first was discovered near Woods Hole, Mass., U.S., in 1943.

The shrimp's rather tubular body includes a long abdomen; thick, bristly antennules extend about two-thirds the length of the body. The largest species, *Derocheilocaris galvarina,* which attains lengths to 0.5 mm (about 0.02 inch), occurs on the Pacific coast of South America in the intertidal zone and on sandy bottoms in shallow waters. *D. typicus* occurs on the Atlantic coast of northeastern United States. *D. remani* is found on the coasts of Europe and Africa.

Mustafa, also spelled MUSTAPHA, name of Ottoman sultans grouped below chronologically and indicated by the symbol •.

• **Mustafa I** (b. 1591, Manisa, Ottoman Empire [now in Turkey]—d. Jan. 20, 1639, Constantinople [now Istanbul]), Ottoman sultan in 1617–18 and in 1622–23, a man of weak mental faculties who was deposed from the throne in 1618 but was reinstalled in 1622 by the Janissaries (elite troops), who dethroned Osman II.

Mustafa's reign, under the influence of his mother, witnessed continuous interference of the Janissaries in the administration and a revolt in Anatolia of Abaza Mehmed Paşa, who sought to avenge Osman II's death.

• **Mustafa II,** in full MUSTAFA OGLU MEHMED IV (b. June 5, 1664, Edirne, Ottoman Empire [now in Turkey]—d. Dec. 31, 1703, Constantinople [now Istanbul]), Ottoman sultan from 1695 to 1703, whose determination to regain territories lost after the unsuccessful attempt to take Vienna in 1683 led to the continuation of the war against the Holy League (Austria, Poland, and Venice).

Mustafa II, miniature by Levnî, *c.* 1700; in the Topkapı Saray Museum, Istanbul

By courtesy of the Topkapi Saray Museum, Istanbul

Mustafa's military campaigns met with early success. After recovering the island of Chios from Venice, he made gains against Austria in 1695 and 1696. The Russians occupied Azov (at the mouth of the Don River) in 1696, however, and he was defeated by the Austrians at Senta (*see* Zenta, Battle of) in 1697. The Treaty of Carlowitz (1699) radically reduced Turkey's Balkan holdings, and the Treaty of Constantinople (1700) confirmed Russia's gains.

Internally, the continued warfare caused social and economic dislocations. Heavy taxes drove many cultivators off the land; and the government's exclusive preoccupation with Europe resulted in local revolts in eastern Anatolia and among the Arab tribes of Syria and Iraq. Disillusioned by the defeat at Senta, Mustafa left most matters of state to the leader of the Muslim hierarchy, Feyzullah, while he himself devoted his last years to hunting. A military mutiny deposed Mustafa on Aug. 22, 1703.

• **Mustafa III** (b. Jan. 28, 1717, Constantinople, Ottoman Empire [now Istanbul, Tur.]—d. Jan. 21, 1774, Constantinople), Ottoman sultan (1757–74) who attempted governmental and military reforms to halt the empire's decline and who declared a war on Russia that (after his death) culminated in a disastrous defeat.

Mustafa III, miniature; in Istanbul University Library (MS. Yildiz 8647/17)

By courtesy of Istanbul University Library

Though Mustafa and his able grand vizier, Ragib Mehmed Paşa, understood the necessity for reform, their efforts were directed toward the results, not the causes, of the Ottoman decline. They were unable to curb tax abuses, hence their fiscal reforms proved ineffective. Administrative reforms foundered on the central government's inability to extend its authority over the local rulers (*ayan*) of its provinces in Europe and Asia. Assisted by Baron François de Tott, a French artillery officer, they were more successful in their military reforms: the artillery corps was reorganized, an engineering school closed by the Janissaries in 1747 was reopened, and a school of mathematics for the navy was founded (1773).

In his foreign policy Mustafa was determined to maintain the peace established by the Treaty of Belgrade (1739). In spite of urgings by the French and by Frederick the Great of Prussia, the Ottomans were reluctant to join the European scheme of alliances and counteralliances. Later, however, Russian ambitions in Poland and in the Crimea compelled Mustafa to declare war on Russia (1768). Following a few initial unimportant successes, the Ottomans suffered a series of defeats on the Danube and in the Crimea that culminated in the destruction of the Ottoman fleet at Çeşme (1770) in the Aegean.

A poet and a scholar, Mustafa, during his years of seclusion before his accession, had studied astrology, literature, and medicine. As a sultan who failed to revive the empire, he placed his sole hope with his son Selim (later Selim III), whom he educated with utmost care but who did not become sultan until 1789.

• **Mustafa IV** (b. Sept. 8, 1779, Constantinople—d. Nov. 17, 1808, Constantinople), Ottoman sultan from 1807 to 1808 who participated in the reactionary conservative coalition that overthrew his reforming cousin, the sultan Selim III.

A fanatical and ambitious man of low intelligence, Mustafa, under the influence of the *shaykh al-islām* (head of the Muslim religious hierarchy) and the Janissaries, ended Selim's reforms and killed most of the reformers. Meanwhile Bayrakdar Mustafa Paşa of Rusçuk (modern Ruse, Bulg.), a reformist supporter, marched to Constantinople to restore Selim III. Mustafa, informed of Bayrakdar's intentions, killed Selim. He himself was immediately deposed (July 28, 1808) and lived in confinement until he was strangled on orders from his brother, who succeeded him as Mahmud II.

Mustafa, Kara: *see* Kara Mustafa Paşa.

Mustafa Kemal (Turkish statesman): *see* Atatürk, Kemal.

Mustafa Reşid Paşa: *see* Reşid Paşa, Mustafa.

mustang (horse): *see* cayuse.

Mustang (British and U.S. aircraft): *see* P-51.

Mustanṣir, al- (b. July 2, 1029, Egypt—d. Jan. 10, 1094, Cairo), eighth Fāṭimid caliph. He inherited the rule of the most powerful Muslim state of the time, but, during his reign, which was the longest of any Muslim ruler, the Fāṭimid government suffered decisive and irrevocable setbacks.

He became caliph in 1036, when he was only seven years old, and real authority had to be wielded by his father's vizier (prime minister) and, after the death of the latter, by al-Mustanṣir's mother. During this time Egypt was frequently the scene of pitched battles between bodies of soldiery, usually ethnic groups, such as the Sudanese and Turks, who supported various politicians. Al-Mustanṣir lacked the influence to shape the direction of these events, although there were times when he personally led troops in battle. By 1073 he was reduced to desperation and secretly offered military authority in Egypt to the Armenian general Badr al-Jamālī. Badr accepted but insisted that he bring his own troops with him. In a swift series of brutal actions, Badr defeated the various military factions, executed a large number of Egyptian politicians, and thus restored relative peace and prosperity. Al-Mustanṣir strengthened his relations with Badr by securing the marriage of his youngest son to Badr's daughter. He had, however, made a fateful decision, for real power now passed to Badr and after him to a series of other military commanders. Fāṭimid influence outside Egypt shrank, areas in North Africa slipped from al-Mustanṣir's control, and conditions in Syria were so chaotic that it was impossible to offer effective resistance to the Seljuq Turks, who were advancing from the east. Through most of his reign al-Mustanṣir lived in great luxury, the source of which was profitable commercial relations with Indian Ocean powers and with Constantinople.

Mustapha (Turkish personal name): *see* Mustafa.

mustard, any of several herbs belonging to the mustard family of plants, Cruciferae, or the condiment made from these plants' pungent seeds. The leaves and swollen leaf stems of mustard plants are also used, as greens, or potherbs. The principal types are white, or yellow, mustard (*Sinapis alba*), a plant of Mediterranean origin; and brown, or Oriental, mustard (*Brassica juncea*), which is of Himalayan origin. The latter species has almost entirely replaced the formerly used black mustard (*Brassica nigra*), which was unsuitable for mechanized cropping and which now occurs mainly as a troublesome introduced weed. Both white and brown mustard are grown as spring-sown annual crops whose dry seeds are harvested in early autumn. From very small seedlings, the plants grow rapidly and enter a phase of dense flowering; the blooms have an intense yellow colour. The plants reach their full height of 1.5 to 2 m (5 to 6½ feet) as their flowers fade and after numerous green seedpods have appeared on their branches. The pods of brown mustard contain up to 20 seeds each, those of white mustard contain up to 8 seeds. Mustard plants are easy and inexpensive to grow; they flourish on many different types of soil, suffer from unusually few insect pests or plant diseases, and tolerate extremes of weather without serious harm.

Field of mustard in flower in Salinas, Calif.

Thomas J. Styczynski—CLICK/Chicago

The use of mustard seeds as a spice has been known from the earliest recorded times and is described in Indian and Sumerian texts dating back to 3000 BC. Mustard plants are mentioned frequently in Greek and Roman writings and in the Bible. In the New Testament, the tiny mustard seed is a symbol of faith. Mustard seed was used medicinally by Hippocrates, among other ancient physicians. During the 20th century, the use of mustard as a spice or condiment has grown to the extent that it is by far the largest spice by volume in world trade. Mustard is unusual among spices in that it is mainly grown in the temperate regions of the world, principally on the Canadian and American Great Plains, in Hungary and in Britain, and in lesser amounts in other countries. In the main producing countries, the crop production of mustard is fully mechanized.

Mustard seeds, both white and brown, are nearly globular in shape, finely pitted, odourless when whole, and pungent-tasting. White mustard seeds are light yellow in colour and about 2.5 mm (1/10 inch) in diameter; brown mustard seeds are about the same size but are a darker yellow in colour. The seeds of both types contain similar constituents: about 30 to 40 percent vegetable oil, a slightly smaller proportion of protein, and a strong enzyme called myrosin. When dry or when ground into a flour, the seeds are odourless, but when the seed is chewed or when the flour is mixed with water, the water causes a chemical reaction between two of the constituents within mustard, an enzyme and a glucoside, and produces an oil that is not present as such in the plant. In brown mustard this action yields the volatile oil of mustard, which has a pungent, irritating odour and an acrid taste. In white mustard the result is sinalbin mustard oil, a nonvolatile oil that has very little odour but produces a sensation of heat on the tongue.

As a condiment, mustard is sold in three forms: as seeds, as dry powder that is freshly mixed with water for each serving to obtain the most aroma and flavour, and as a paste that is blended with other spices, vinegar or wine, and starch or flour to tone down the sharpness. The differing flavours of white and brown mustard are used in different condiments; the pungent brown is used in French-type paste mustards, and the white is used in milder American- or German-type pastes, while both types are used in English mustard products. Mustard is widely used as a condiment with various foods, particularly cold meats, sausages, and salad dressings. It is also used as an ingredient in mayonnaises, sauces, and pickles. Mustard plasters were formerly used in medicine for their counterirritant properties in treating chest colds.

Brown mustard, which is related to rapeseed, is grown as a source of vegetable oil and is an important crop for this purpose in northern India, Pakistan, China, southern Russia, and Kazakhstan. The oil is used for food or for industrial purposes, with the residual cake used for animal feed.

Mustaʿṣim, al- (b. 1212—d. 1258), the last ʿAbbāsid caliph in Baghdad (reigned 1242–58).

Ineffectual himself and surrounded by advisers with conflicting opinions, al-Mustaʿṣim presented no strong defense against the Mongol conqueror Hülegü, grandson of Genghis Khan. Al-Mustaʿṣim ignored several demands of Hülegü and answered others with blustering and empty threats. Finally Hülegü laid siege to Baghdad in 1258 and entered the city in February of that year. The caliph and 300 officials hurried to present their surrender and, 10 days later, were all put to death. This left Islām without a caliph for the first time in its history. Hülegü burned and plundered the city, killed many of its inhabitants, and later invaded Syria and then returned to Persia.

mustelid, any member of the family Mustelidae, fur-bearing carnivores including the weasels, skunks, badgers, and others (about 25 existing genera with about 70 species, and 47 to 73 extinct genera), characteristically possessing well-developed anal scent glands. Mustelids evolved from North American and Eurasian forms in the early Oligocene and inhabit terrestrial and aquatic regions throughout the world, except Australia and most ocean islands. Their limbs are short in relation to their usually long bodies of variable size (females are generally smaller than males). Many species are trapped or raised commercially for their pelts.

For more information on species and groups of mustelids, *see* badger; ermine; ferret; fisher; grison; marten; mink; otter; polecat; ratel; sable; skunk; stoat; tayra; weasel; wolverine; zorille.

musubi, in the Shintō religion of Japan, the power of becoming or creation. A number of deities are associated with *musubi.* In the accounts of the creation of heaven and earth in the *Kojiki* ("Records of Ancient Matters"), the three deities first named are Takami-musubi no Kami ("Exalted Musubi Deity"), who is later related to the gods of the heaven; Kami-musubi no Kami ("Sacred Musubi Deity"), related to the gods of the earth; and Ame no Minaka-nushi no Kami ("Heavenly Centre-Ruling Deity"). Some Shintō scholars hold that all Shintō deities are manifestations of Ame no Minaka-nushi no Kami.

Muswellbrook, town, eastern New South Wales, Australia, in the upper Hunter River valley. It was founded in 1827 and called Muscle Brook (after mussels found in a local stream), and its name has been further corrupted to Muswellbrook. Proclaimed a town in 1833, it became a municipality in 1870. A rail junction on the New England Highway, 70 miles (113 km) northwest of Newcastle, Muswellbrook serves a district of coal mining and farming, including vineyards. Clothing, tires, cement, and bricks are also manufactured. Pop. (1986) 9,988.

Mut, in Egyptian religion, a sky goddess and great divine mother. Mut may have originated either in the Nile River delta or in Middle Egypt. During the 18th dynasty (1539–1292 BC), she became the companion of the god Amon at Thebes, forming the Theban triad with him and with the youthful god Khons, who was said to be Mut's son. The name Mut means "mother," and her role was that of an older woman among the gods. She was associated with the uraeus (rearing cobra), lionesses, and royal crowns. She was also identified with other goddesses, principally Bastet and Sekhmet.

At Thebes the principal festival of Mut was her "navigation" on the distinctive horseshoe-shaped lake, or Isheru, that surrounded her temple complex at Karnak. Mut was usually represented as a woman wearing the double crown (of Upper and Lower Egypt) typically worn by the king and by the god Atum. She was also occasionally depicted with the head of a lioness.

Mut, wearing double crown and vulture's head on forehead, bronze statuette, c. 650–350 BC; in the Oriental Institute, the University of Chicago

By courtesy of the Oriental Institute, the University of Chicago

Muʿtaḍid, al- (d. 902), one of the greatest of the ʿAbbāsid caliphs (reigned 892–902), known especially for his ruthless skill in dealing with competing provincial dynasties, sects, and factions.

The son of al-Muwaffaq, al-Muʿtaḍid was coregent, with al-Muʿtamid, in his father's last years. He became caliph on al-Muʿtamid's death in 892, having forced him to disinherit his own son. As caliph, al-Muʿtaḍid reorganized the administration and reformed finances. He concluded a peace with the Ṭūlūnids by marrying their caliph's daughter and dealt cruelly with many other factional dynasties that had appeared, including the Dulafids, Ṣaffārids, and ʿAlids. By playing factions against each other, he increased the influence of the Hamdānids and Sāmānids. But al-Muʿtaḍid's troops were defeated by the Qarmaṭians, a schismatic sect and political movement, and he soon died. He was, according to some sources, poisoned in a palace intrigue.

mutagen, any agent capable of altering the genetic constitution of a cell by changing the structure of the hereditary material, deoxyribonucleic acid (DNA). Many forms of electromagnetic radiation (*e.g.,* cosmic rays, X rays, ultraviolet light) are mutagenic, as are a variety of chemical compounds. The effects of some mutagens are potentiated (increased) or suppressed in some organisms by the presence of certain other, nonmutagenic substances; oxygen, for example, makes cells more sensitive to the mutagenic effects of X rays.

mutʿah (Arabic: "pleasure"), in Islāmic law, a temporary marriage that is contracted for a limited or fixed period and involves the payment of money to the female partner. *Mutʿah* is referred to in the Qurʾān (Muslim scriptures) in these words: "And you are allowed to seek out wives with your wealth in decorous conduct, but not in fornication, but give them their reward for what you have enjoyed of them in keeping with your promise" (4:24). Partners who engage in *mutʿah* must do so freely and must predetermine the compensation and duration of the contract. The woman, therefore, has no claim for maintenance, and the two do not inherit from one another unless there is a previous agreement on these matters. Any children from a *mutʿah* union go with the father. No extension of the *mutʿah* is permitted, but cohabitation may be resumed if a new agreement is reached with new compensation for the woman. All Muslim legal schools agree that *mutʿah* was recognized and practiced in the Prophet Muḥammad's time. Most Sunnite Muslims, however, think the practice to have been forbidden by ʿUmar I, the second caliph, and thus to have been abrogated. In consequence, Sunnite leaders have denounced *mutʿah* as simple prostitution. The Twelver Shīʿites, in contrast, consider *mutʿah* to be still valid and defend it as a guard against prostitution or license in circumstances in which regular marriage is impossible.

Muʿtamid, al-, in full MUḤAMMAD IBN ʿABBĀD, also called MUḤAMMAD II AL-MUʿTAMID (b. 1027, Spain—d. 1095, Aghmāt, near Marrakech, Mor.), third and last member of the ʿAbbādid dynasty of Seville, and the epitome of the cultivated Muslim Spaniard of the Middle Ages—liberal, tolerant, and a patron of the arts.

At the age of 13 al-Muʿtamid commanded a military expedition that had been sent against the city of Silves. The venture was successful, and he was appointed governor of this and another district. In 1069 his father died, and al-Muʿtamid acceded to the throne of Seville. He was destined to rule in difficult times: neighbouring princes were resuming the inexorable advance that in time would bring all of Spain once again under Christian rule. Yet his first efforts were successful. In 1071 he conquered and annexed the principality of Córdoba, although his rule was not effectively secured until 1078. During that time he also brought the kingdom of Murcia under his rule.

In 1085 Alfonso VI, king of Leon and Castile, captured the city of Toledo. This was a crippling blow to Spanish Islām. Al-Muʿtamid had already been forced to pay tribute to Alfonso, and, when he dared to refuse a payment, Alfonso invaded his kingdom and sacked various towns. Soon Alfonso also began making demands for territorial concessions. Al-Muʿtamid recognized that he could not stay the Christian advance with his own resources, and, acting as leader of a number of Muslim princes, he reluctantly sought the aid of Yūsuf ibn Tāshufīn. The latter, as the reigning Almoravid sultan, had just conquered all of Morocco and had powerful military forces at his disposal. In 1086 Yūsuf crossed the Strait of Gibraltar and at Az-Zallāqah inflicted a crushing defeat upon the Christian forces. Yet he had to return to Morocco before he could follow up his victory. Al-Muʿtamid now had a respite from Christian military pressure but soon found himself again unable to defend his borders. This time he sought Yūsuf's aid in person, and in 1090 another Almoravid army invaded Spain. Now, however, Yūsuf decided to carry on the jihad ("holy war") in his own name and proceeded to dethrone those who had invited him. Seville was captured, and al-Muʿtamid was sent as a prisoner to Morocco, where he remained until his death.

Mutanabbī, al-, in full ABŪ AṬ-ṬAYYIB AḤMAD IBN ḤUSAYN AL-MUTANABBĪ (b. 915, Al-Kūfah, Iraq—d. Sept. 23, 965, near Dayr al-ʿĀqūl), poet regarded by many as the greatest of the Arabic language. He primarily wrote panegyrics in a flowery, bombastic style marked by improbable metaphors. He influenced Arabic poetry until the 19th century and has been widely quoted.

Al-Mutanabbī was the son of a water carrier who claimed noble and ancient southern Arabian descent. Owing to his poetic talent, al-Mutanabbī received an education. When Shīʿite Qarmaṭians sacked Al-Kūfah in 924, he joined them and lived among the Bedouin, learning their doctrines and Arabic. Claiming to be a prophet—hence the name al-Mutanabbī ("The Would-be Prophet")—he led a Qarmaṭian revolt in Syria in 932. After its suppression and two years' imprisonment, he recanted in 935 and became a wandering poet.

He began to write panegyrics in the tradition established by the poets Abū Tammām (d. 845) and al-Buḥturī (d. 897). In 948 he attached himself to Sayf ad-Dawlah, the Ḥamdānid poet-prince of northern Syria. During his association with Sayf ad-Dawlah, al-Mutanabbī wrote in praise of his patron panegyrics that rank as masterpieces of Arabic poetry. The latter part of this period was clouded with intrigues and jealousies that culminated in al-Mutanabbī's leaving Syria for Egypt, then ruled in name by the Ikhshīdids. Al-Mutanabbī attached himself to the regent, the black eunuch Abū al-Misk Kāfūr, who had been born a slave. But he offended Kāfūr with scurrilous satirical poems and fled Egypt in 960. He lived in Shīrāz, Iran, under the protection of the emir ʿAḍūd ad-Dawlah of the Būyid dynasty until 965, when he returned to Iraq and was killed by bandits near Baghdad.

Al-Mutanabbī's pride and arrogance set the tone for much of his verse, which is ornately rhetorical, yet crafted with consummate skill and artistry. He gave to the traditional qasida, or ode, a freer and more personal development, writing in what can be called a neoclassical style.

Mutapa, a southern African empire ruled by a line of kings known as the Mwene Matapa (*q.v.*), or Mutapa.

Mutare, formerly UMTALI, town, eastern Zimbabwe. It originated as Ft. Umtali and was built by prospectors in 1890 near the junction of the Sambi and Umtara rivers. Its name was derived from a local word meaning "metal," probably referring to the nearby ancient goldworkings. The settlement was moved twice so as to be on the railway between the national capital, Salisbury (now Harare), and Beira (Mozambique), which reached the town in 1898. It was declared a municipality in 1914.

Vumba National Park near Mutare, Zimbabwe

J. Allan Cash—EB Inc.

Mutare is picturesquely situated in the foothills of the Eastern Highlands sprawling up the sides of Christmas Pass. It has been known for its wide streets lined with flowering trees, three public parks, a museum (1954), and the Turner Memorial Library (1902). In the mid-1970s Mutare, a border town, became something of a battleground between Rhodesian troops and nationalist guerrillas operating from Mozambique. Mutare in the early 1980s resumed its role as a port of entry and the main rail and commercial centre for the productive eastern region (tea, tobacco, livestock, timber) after Zimbabwe attained independence. Industry includes automobile assembly, the manufacture of textiles, clothing, leather goods, pulp, and board, and oil refining and wattle (acacia) extraction. Tourism to the nearby national parks is an important economic factor. Pop. (1982 prelim.) 69,600.

Muʿtaṣim, al- (b. 794—d. Jan. 5, 842), eighth ʿAbbāsid caliph, a younger son of Hārūn ar-Rashīd.

Succeeding his brother al-Maʾmūn in 833, al-Muʿtaṣim was the first caliph to employ the Turkish mercenaries who later came to dominate the ʿAbbāsid dynasty. In 837 he crushed a revolt of Persian schismatics led by the rebel Bābak, who was cooperating with the Greeks. After the Byzantine emperor Theophilus had laid waste the Muslim town of Zibaṭra (known to the Byzantines as Sozopetra), al-Muʿtaṣim invaded Asia Minor, defeated Theophilus, and destroyed the fortresses of Ancyra (Ankara) and Amorium (August 838).

mutation, an alteration in the genetic material of a cell that is transmitted to the cell's offspring. Mutation may be spontaneous (the result of accidents in the replication of genetic material) or induced by external factors (*e.g.*, electromagnetic radiation and certain chemicals).

A brief treatment of mutations follows. For full treatment, *see* MACROPAEDIA: Genetics and Heredity, The Principles of.

Mutations take place in the genes, which are found in the long, chainlike molecules of deoxyribonucleic acid (DNA). The backbone of the DNA chain is composed of alternating sugar and phosphate groups. Protruding from each sugar group is one of four nitrogenous bases: adenine (A), guanine (G), thymine (T), or cytosine (C). Structurally, each DNA molecule consists of two entwined chains, linked together by bonds between the bases of one chain and those of the other. An A is always bonded to a T, and every G is paired with a C; the result is that the sequence of bases in the two strands is complementary.

The arrangement of the bases determines the genetic code of an organism. This code directs the synthesis of proteins at the cellular level. It is written in units called codons, each of which specifies a particular amino acid. (Proteins are composed of amino acids.) A codon consists of a sequence of three bases–for example, GAG or TCA. The four bases can be assembled into 64 possible codons. Because proteins are built from only 20 amino acids, most amino acids are specified by more than one codon.

Mutations occur when one base is substituted for another or when one or more bases are inserted or deleted from a gene. Substitution mutations affect only one codon, and in most cases the effect is minimal. One reason is the redundancy of the genetic code mentioned above. Because many codons mean the same thing, the altered codon might still specify the same amino acid. Furthermore, even if a mutation causes a wrong amino acid to be inserted into a protein, the change might be harmless. Most proteins consist of scores of amino acids; a change in one of these may have little or no effect on the biological properties of the protein. Also, almost all higher organisms have two sets of genes—one inherited from each parent. In such organisms, a mutated gene may be recessive and have its effect cancelled by a dominant gene.

This is not to say that substitution mutations never produce serious consequences. The protein hemoglobin, an important component of red blood cells, is made up of hundreds of amino acids. The incorporation of one wrong amino acid—the product of a single substitution mutation—results in hemoglobin that forms an abnormal sickle shape. If a person inherits this mutation from both parents, the disease sickle-cell anemia results.

Whereas only one codon is affected by a substitution mutation, base insertions and deletions alter the reading frame of the entire gene, thus changing every codon from the site of the mutation to the end of the gene. For example, assume that the end of a gene reads TAG GGC ATA ACG ATT. The insertion of an extra A in the first codon will alter the entire sequence as follows: TAA GGG CAT AAC GAT T. Because it affects many codons, a base insertion or deletion is more likely to have significant results. Even these mutations, however, may be masked by the presence of a dominant normal gene.

Mutations in humans and in other animals that reproduce sexually can be divided into two types: somatic and germinal. Somatic mutations occur in body cells (as opposed to sex cells). Such mutations can produce a localized change, *e.g.*, the streak of white (albino) sometimes found in the hair of an otherwise normal individual. All the cells descendant from the mutant body cell will carry the mutation, but it cannot be passed on to offspring. Germinal mutations, however, affect the sex cells (eggs or sperm) and can be transmitted to the individual's offspring. When germinal mutations alter an organism, the effect is usually harmful. Many genetic diseases are the result of such mutations. Harmful genes eventually may be eliminated from a population if they impair the carriers' ability to reproduce at the same rate as their fellows. A mutation will rarely produce a beneficial change. When this does occur, the percentage of organisms with this gene will increase until the mutated gene becomes the norm in the population. In this way, beneficial mutations serve as the raw material of evolution.

Mutawakkil, al- (b. March 822, Iraq—d. December 861, Sāmarrāʾ, Iraq), ʿAbbāsid caliph who, as a young man, held no political or military positions of importance but took a keen interest in religious debates that had far-reaching political importance.

When he succeeded al-Wāthiq as caliph in 847, al-Mutawakkil reverted to a position of Islāmic orthodoxy and began a persecution of all non-orthodox or non-Muslim groups. Synagogues and churches in Baghdad were torn down, while the shrine of al-Ḥusayn ibn ʿAlī (a Shīʿī martyr) in Karbalāʾ was razed, and further pilgrimages to the town were forbidden. Old regulations prescribing special dress for Christians and Jews were reinstated with new vigour.

Al-Mutawakkil was less successful in dealing with external enemies. He constantly had to dispatch expeditions to deal with rebellions in the provinces, although he suffered no important losses of territory. Warfare against the Byzantines continued its intermittent course and was likewise indecisive. Al-Mutawakkil continued the dangerous policy of depending upon Turkish soldiers, who eventually murdered him at the instigation of his eldest son, al-Muntasir, who had become estranged from him and feared to lose the succession.

Muʿtazilah (Arabic: Those Who Withdraw, or Stand Apart), English MUTAZILITES, in Islām, political or religious neutralists; by the 10th century the term came to refer specifically to an Islāmic school of speculative theology that flourished in Basra and Baghdad (8th–10th centuries AD).

The name first appears in early Islāmic history in the dispute over ʿAlī's leadership of the Muslim community after the murder of the third caliph, ʿUthmān (656). Those who would neither condemn nor sanction ʿAlī or his opponents but took a middle position were termed the Muʿtazilah.

The theological school is traced back to Wāṣil ibn ʿAṭāʾ (699–749), a student of al-Ḥasan al-Baṣrī, who by stating that a grave sinner (*fāsiq*) could be classed neither as believer nor unbeliever but was in an intermediate position (*al-manzilah bayna manzilatayn*), withdrew (*iʿtazala,* hence the name Muʿtazilah) from his teacher's circle. (The same story is told of ʿAmr ibn ʿUbayd [d. 762].) Variously maligned as free thinkers and heretics, the Muʿtazilah, in the 8th century AD, were the first Muslims to use the categories and methods of Hellenistic philosophy to derive their three major and distinctive dogmatic points.

First, they stressed the absolute unity or oneness (*tawḥīd*) of God. From this it was logically concluded that the Qurʾān could not be technically considered the word of God (the orthodox view), as God has no separable parts, and so had to be created and was not coeternal with God. Under the ʿAbbāsid caliph al-Maʾmūn, this doctrine of the created Qurʾān was proclaimed (827) as the state dogma, and in 833, a *miḥnah* or tribunal was instituted to try those who disputed the doctrine (notably the theologian Aḥmad ibn Ḥanbal); the Muʿtazilī position was finally abandoned by the caliphate under al-Mutawakkil *c.* 849. The Muʿtazilah further stressed the justice (*ʿadl*) of God as their second principle. While the orthodox were concerned with the awful will of God to which each individual must submit himself without question, the Muʿtazilah posited that God desires only the best for man, but through free will man chooses between good and evil and thus becomes ultimately responsible for his actions. So in the third doctrine, the threat and the promise (*al-wa‘d wa al-wa‘īd*), or paradise and hell, God's justice becomes a matter of logical necessity: God *must* reward the good (as promised) and *must* punish the evil (as threatened).

Among the most important Mu‘tazilī theologians were Abū al-Hudhayl al-‘Allāf (d. *c.* 841) and an-Naẓẓām (d. 846) in Basra and Bishr ibn al-Mu‘tamir (d. 825) in Baghdad. It was al-Ash‘arī (d. 935 or 936), a student of the Mu‘tazilī al-Jubbā’ī, who broke the force of the movement by refuting its teachings with the same Hellenistic, rational methods first introduced by the Mu‘tazilah. Mu‘tazilī beliefs were disavowed by the Sunnite Muslims, but the Shī‘ites accepted their premises.

Mutesa I, in full MUTESA WALUGEMBE MUKAABYA (b. *c.* 1838—d. October 1884, Nabulagala, Buganda [now in Uganda]), autocratic but progressive *kabaka* (ruler) of the African kingdom of Buganda at a crucial time in its history, when extensive contacts with Arabs and Europeans were just beginning.

Mutesa has been described as both a ruthless despot and a highly skilled politician. Although his position during his first six years in office was extremely precarious and resulted in much bloodshed, he was soon able to consolidate his kingdom into a bureaucratic autocracy in which traditional priests and clan leaders had little power but in which, at least to some extent, talent was recognized. He also reformed the military system and expanded his fleet of war canoes on Lake Victoria.

Under him Buganda's chief wealth came from raids into neighbouring states, although he made no attempt to extend his direct political control. Slaves and ivory seized on these raids or paid to Buganda as tribute were traded to Arabs for guns and cotton cloth, but Mutesa kept both this trade and the Arabs themselves under strict control. He was apparently influenced enough by Islām to observe Ramaḍān (the month of fasting observed by all Muslims) from 1867 to 1877, but, wishing to use European influence as a counterweight to an Egyptian threat from the north, he also welcomed Christian missionaries in 1877.

Mutesa II, in full SIR EDWARD FREDERICK WILLIAM DAVID WALUGEMBE MUTEBI LUWANGULA MUTESA (b. Nov. 19, 1924—d. Nov. 21, 1969, London), *kabaka* (ruler) of the East African state of Buganda (now part of Uganda) in 1939–53 and 1955–66; he was deposed in 1953 by the British and again in 1966 by Milton Obote, president of independent Uganda.

During the 1940s Mutesa, called "King Freddie" by the Western press, was essentially controlled by the British resident and his *katikiro* (prime minister) and was personally rather unpopular. In the "Kabaka crisis" of 1953, when loss of the privileged position of the kingdom of Buganda within the protectorate of Uganda seemed imminent, he had to take an unyielding stand in meetings with the governor of Uganda or completely alienate many of his increasingly suspicious and anti-British subjects. His key demands were for separation of Buganda from the rest of Uganda and a promise of independence. When he refused to communicate British formal recommendations to his Lukiko (parliament), he was arrested and deported. Buganda leaders engineered his return in 1955, ostensibly as a constitutional monarch, but one with a great deal of influence in the Buganda government.

When Uganda became independent, Prime Minister Obote first hoped to placate the Ganda by encouraging Mutesa's election as president (a nonexecutive post) in 1963. A conflict over the role and over the continued integrity of the Buganda kingdom within Uganda followed. When Mutesa tried to foment discontent between the traditionally stateless northerners and the southern "kingdom" members, Obote suspended the constitution. The conflict escalated rapidly, and Mutesa was forced to flee to Britain in 1966, where he died in exile.

Muti, Riccardo (b. July 28, 1941, Naples, Italy), Italian conductor of both opera and the symphonic repertory.

As a child Muti studied piano at the conservatory of Naples; later he spent five years at the Giuseppe Verdi Conservatory of Milan studying composition and conducting. Following a successful debut with the Italian Radio Symphony Orchestra in 1968, he appeared as a conductor with leading orchestras in Europe and the United States. He served as principal conductor of the Florence Maggio Musicale from 1969 to 1980, and he succeeded Otto Klemperer as principal conductor of the New Philharmonia (after 1977, Philharmonia Orchestra) of London in 1973. He remained principal conductor until 1979 and was music director from 1979 to 1982. In 1977 he became the principal guest conductor of the Philadelphia Orchestra and served as its music director from 1980 to 1992. Active as an opera conductor from 1970, he led the first modern uncut performance of Gioacchino Rossini's *William Tell* in Florence in 1972 and championed less-well-known works by Verdi as well as operas by Giacomo Meyerbeer and Gaspare Spontini. He became music director of La Scala in Milan in 1986. Muti's orchestral repertoire included many 20th-century works.

Muti, 1988
Steve J. Sherman

mutilation, ritual, intentional modification of the living human body for religious, aesthetic, or social reasons. *See* body modifications and mutilations.

mutiny, any overt act of defiance or attack upon military (including naval) authority by two or more persons subject to such authority. The term is occasionally used to describe nonmilitary instances of defiance or attack—such as mutiny on board a merchant ship or a rising of slaves in a state in which slavery is recognized by law or custom. Mutiny should be distinguished from revolt or rebellion, which involve a more widespread defiance and which generally have a political objective.

Mutiny was regarded as a most serious offense, especially aboard ships at sea. Because the safety of the ship was thought to depend upon the submission of all persons on board to the will of the captain, wide disciplinary powers were given to the commanding officer, including the power to inflict the death penalty without a court-martial. With the development of radio communications, however, such stringent penalties have become less necessary, and, under many current military codes, sentences for mutiny can be passed only by court-martial.

Mutis, José (Celestino Bruno) (b. April 6, 1732, Cádiz, Spain—d. Sept. 11, 1808, Bogotá [now in Colombia]), botanist who initiated one of the most important periods of botanical exploration in Spain.

Mutis, detail from an engraving
By courtesy of the Ashmolean Museum, Oxford

After receiving the bachelor's degree from the University of Seville in 1753, Mutis studied medicine at Madrid and in 1757 became physician to the royal household of Ferdinand VI. One of the first Spanish disciples of the Swedish botanist Carolus Linnaeus, Mutis studied botany in his spare time until 1760, when he was appointed physician to the viceroy of New Granada in South America. In 1764, three years after arriving in Bogotá, Mutis requested financial support to establish a botanical garden but was refused because of a lack of funds. In 1766 he took up residence in the Andes at Pamplona, where he reorganized the teaching of medicine, developed modern mining methods, and investigated the curative powers of quinine. He also taught botany and botanical drawing and cultivated plants for medicinal and agricultural uses.

With the arrival of a new viceroy in 1782, Mutis was named first botanist and astronomer of the botanical expedition of northern South America. He built a botanical garden in the town of Mariquita and assembled one of the finest botanical libraries in the New World. Along with his staff of artists, zoologists, and botanists, he assembled thousands of drawings, a collection of bird and animal skins, and a herbarium containing more than 24,000 plants. He wrote hundreds of botanical papers, but his *Flora de Bogotá o de Nueva Granada,* containing more than 6,000 illustrations, was so massive that the Spanish government could not afford to print it.

In 1791 the botanical expedition moved to Bogotá, where, some years later, it built the first conservatory in South America.

Mutrah (Oman): *see* Maṭraḥ.

Mutsuhito: *see* Meiji.

Mutswairo, Solomon M. (b. April 26, 1924, Zawu, Mazoe District, Rhodesia [now Zimbabwe]), earliest Zezuru-language novelist and most important Zezuru poet.

Mutswairo grew up in Zambia and was educated at the University College of Fort Hare, S.Af. After teaching at Goromonzi Government Secondary School, he became a headmaster in 1955 at Sanyati Baptist Mission School. He organized branches of the African Teachers' Association and started the African Language Development Association, later the Rhodesian Government Publication Bureau. Arriving in the United States on a Fulbright scholarship in 1960, Mutswairo took several master's degrees and, in 1979, a doctorate at Howard University in Washington, D.C. In July 1981 he returned to Zimbabwe.

Mutswairo's first novel, *Feso* (1956), was later banned by Rhodesian censors, but it quickly became required reading in nationalist circles because the plot seemed to be an allegory of the British-settler–Zimbabwean conflict. Mutswairo published his English version of the novel in 1974.

Mapondera: Soldier of Zimbabwe (1978), written in English, celebrates Mapondera's great efforts against both Cecil Rhodes and the Portuguese coming into Zimbabwe from the south and the east, respectively. *Chaminuka: Prophet of Zimbabwe* (1982), a novel, was also written in English. Mutswairo's other works include *Murambiwa Goredema* (1959), a novel; *Ambuyamuderere* (1967), Zezuru nursery rhymes; and *Madetembedzo Akare naMatsva* (1959 and 1962), an anthology of several Zezuru poets.

mutton, flesh of a mature ram or ewe at least one year old. *See* lamb.

Muttra (India): *see* Mathura.

Muttrah (Oman): *see* Maṭraḥ.

Mutual Economic Assistance, Council for (CMEA), byname COMECON, also called (from 1991) ORGANIZATION FOR INTERNATIONAL ECONOMIC COOPERATION, organization established in January 1949 to facilitate and coordinate the economic development of the eastern European countries belonging to the Soviet bloc. Comecon's original members were the Soviet Union, Bulgaria, Czechoslovakia, Hungary, Poland, and Romania. Albania joined in February 1949 but ceased taking an active part at the end of 1961. The German Democratic Republic became a member in September 1950 and the Mongolian People's Republic in June 1962. In 1964 an agreement was concluded enabling Yugoslavia to participate on equal terms with Comecon members in the areas of trade, finance, currency, and industry. Cuba, in 1972, became the 9th full member of Comecon. Vietnam, in 1978, became the 10th. Headquarters were established in Moscow. After the democratic revolutions in eastern Europe in 1989, the organization largely lost its purpose and power, and changes in policies and name in 1990–91 reflected the disintegration.

Comecon was formed under the aegis of the Soviet Union in 1949 in response to the formation of the Committee of European Economic Cooperation in western Europe in 1948. Between 1949 and 1953, however, Comecon's activities were restricted chiefly to the registration of bilateral trade and credit agreements among member countries. After 1953 the Soviet Union and Comecon began to promote industrial specialization among the member countries and thus reduce "parallelism" (redundant industrial production) in the economies of eastern Europe. In the late 1950s, after the formation of the European Economic Community in western Europe, Comecon undertook more systematic and intense efforts along these lines, though with only limited success.

The economic integration envisaged by Comecon in the early 1960s met with opposition and problems. A major difficulty was posed by the incompatibility of the price systems used in the various member countries. The prices of most goods and commodities were set by individual governments and had little to do with the goods' actual market values, thus making it difficult for the member states to conduct trade with each other on the basis of relative prices. Instead, trade was conducted mainly on a barter basis through bilateral agreements between governments.

Comecon's successes did include the organization of eastern Europe's railroad grid and of its electric-power grid; the creation of the International Bank for Economic Cooperation (1963) to finance investment projects jointly undertaken by two or more members; and the construction of the "Friendship" oil pipeline, which made oil from the Soviet Union's Volga region available to the countries of eastern Europe.

After the collapse of communist governments across eastern Europe in 1989–90, those countries began a pronounced shift to private enterprise and market-type systems of pricing. By Jan. 1, 1991, the members had begun to make trade payments in hard, convertible currencies. Under agreements made early in 1991, Comecon was renamed the Organization for International Economic Cooperation, each nation was deemed free to seek its own trade outlets, and members were reduced to a weak pledge to "coordinate" policies on quotas, tariffs, international payments, and relations with other international bodies.

mutual fund, also called UNIT TRUST, or OPEN-END TRUST, company that invests the funds of its subscribers in diversified securities and in return issues units representing shares in those holdings. It differs from the investment trust (*q.v.*), which issues shares in its own capital. In contrast to closed-end investment companies, which have a fixed capitalization and whose shares are bought and sold by the investor in the market, mutual funds make a continuous offering of new shares at net asset value (plus a sales charge) and redeem their shares on demand at net asset value, determined daily by the market value of the securities they hold.

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mutualism, association between organisms of two different species in which each is benefited. Mutualistic arrangements are most likely to develop between organisms with widely differing living requirements. The partnership between nitrogen-fixing bacteria and leguminous plants is an example, as is the association between cows and rumen bacteria (the bacteria live in the digestive tract and help digest the plants eaten by the cow). The associations between tree roots and certain fungi are often mutualistic (*see* mycorrhiza.)

Intestinal flagellated protozoans and termites exhibit obligative mutualism, a strict interdependency, in which the protozoans digest the wood ingested by the termites; neither partner can survive under natural conditions without the other.

Acacia ants (*Pseudomyrmex ferruginea*) inhabit the bull-horn acacia (*Acacia cornigera*), upon which they obtain food and shelter; the acacia depends on the ants for protection from browsing animals, which the ants drive away. Neither member can survive successfully without the other, also exemplifying obligative mutualism.

The yucca moth is dependent on the yucca plant and vice versa: the moth acts as pollinator at the same time that she lays her eggs in the seed pods of the yucca; the larvae hatch and feed on some but not all the seeds. Both organisms benefit: the plant is pollinated, and the moth has a source of food for its larvae.

muwashshaḥ (Arabic: "ode"), an Arabic poetic genre in strophic form developed in Muslim Spain in the 11th and 12th centuries. From the 12th century onward, its use spread to North Africa and the Muslim Middle East.

The *muwashshaḥ* is written in Classical Arabic, and its subjects are those of Classical Arabic poetry—love, wine, court figures. It sharply differs in form, however, from classical poetry, in which each verse is divided into two metric halves and a single rhyme recurs at the end of each verse. The *muwashshaḥ* is usually divided into five strophes, or stanzas, each numbering four, five, or six lines. A master rhyme appears at the beginning of the poem and at the end of the strophes, somewhat like a refrain; it is interrupted by subordinate rhymes. A possible scheme is *ABcdcdABefefABghghABijijABklklAB*. The last *AB*, called *kharjah*, or *markaz*, is usually written in vernacular Arabic or in the Spanish Mozarabic dialect; it is normally rendered in the voice of a girl and expresses her longing for her absent lover. Such verses make it probable that the *muwashshaḥ* was influenced by some kind of European Romance oral poetry or song. Jewish poets of Spain also wrote *muwashshaḥ*s in Hebrew, with *kharjah*s in Arabic and Spanish.

Muwatallis, also spelled MUWATALLISH (fl. 13th century BC), Hittite king during the New Kingdom (reigned *c.* 1320–*c.* 1294 BC).

Muwatallis was the son and successor of Mursilis II. Although Muwatallis' accession was unmarred by the customary flurry of revolts among the Hittite vassal states, a struggle with resurgent Egypt for the domination of Syria became imminent after Egypt reconquered Palestine and made the Orontes River in Syria the Egyptian-Hittite frontier. One of the great battles of the ancient world was fought at Kadesh (*see* Kadesh, Battle of) on the Orontes about 1300. Although the Egyptian king Ramses II claimed a great victory, the outcome was actually indecisive.

During his protracted military operations in Syria, Muwatallis transferred his capital from Hattusas (Boğazköy in modern Turkey) to the more southerly city of Dattassa. In the meantime, his brother Hattusilis III fought with the Kaska in the north (the only troublesome Hittite satellite during Muwatallis' reign) and was installed as viceroy of the "Upper Country" east of Hattusas. Later, after Muwatallis' son, Urhi-Teshub (Mursilis III), succeeded him, Hattusilis revolted and seized the throne.

Muybridge, Eadweard, original name EDWARD JAMES MUGGERIDGE (b. April 9, 1830, Kingston upon Thames, Surrey, Eng.—d. May 8, 1904, Kingston upon Thames), English photographer important for his pioneering work in photographic studies of motion and in motion-picture projection.

He adopted the name Eadweard Muybridge, believing it to be the original Anglo-Saxon form of his name. He emigrated to the United States as a young man but remained obscure until 1868, when his large photographs of Yosemite Valley, California, made him world famous.

Muybridge's experiments in photographing motion began in 1872, when the railroad magnate Leland Stanford hired him to prove that during a particular moment in a trotting horse's gait all four legs are off the ground simultaneously. His first efforts were unsuccessful because his camera lacked a fast shutter. The project was then interrupted while Muybridge was being tried for the murder of his wife's lover. Although he was acquitted, he found it expedient to travel for a number of years in Mexico and Central America, making publicity photographs for the Union Pacific Railroad, a company owned by Stanford.

In 1877 he returned to California and resumed his experiments in motion photography, using a battery of from 12 to 24 cameras and a special shutter he developed that gave an exposure of 2/1,000 of a second. This arrangement gave satisfactory results and proved Stanford's contention.

The results of Muybridge's work were widely published, most often in the form of line drawings taken from his photographs. They were criticized, however, by those who thought that horse's legs could never assume such unlikely positions. To counter such criticism, Muybridge gave lectures on animal locomotion throughout the United States and Europe. These lectures were illustrated with a zoopraxiscope, a lantern he developed that projected images in rapid succession onto a screen from photographs printed on a rotating glass disc, producing the illusion of moving pictures. The zoopraxiscope display, an important predecessor of the modern cinema, was a sensation at the World's Columbian Exposition of 1893 in Chicago.

Muybridge made his most important photographic studies of motion from 1884 to 1887 under the auspices of the University of Pennsylvania. These consisted of photographs of various activities of human figures, clothed and naked, which were to form a visual compendium of human movements for the use of artists and scientists. Many of these photographs were published in 1887 in the portfolio "Animal Locomotion, An Electro-Photographic Investigation of Consecutive Phases of Animal Movement." Muybridge continued to publicize and publish his work until 1900, when he retired to his birthplace.

Muyua, also called WOODLARK ISLAND, coral island of Papua New Guinea, situated approximately 150 miles (240 km) northeast of the southeasternmost point of the island of New Guinea, Solomon Sea, southwestern Pacific. Muyua measures about 44 miles by 5–18 miles (70 km by 8–29 km). Its rough surface of raised coral pinnacles (rising to 1,200 feet [365 m] in the south) is covered by dense jungle growth. The major anchorages, along the south coast, are Guasopa and Suloga harbours; here also is Kolumadau, the principal settlement.

Gold was mined on Muyua from 1934 to 1938, but mining has not resumed since the end of World War II, during which the island was an Allied air base; there are outcrops of ironstone containing magnetite ore. The island is sometimes called Woodlark after the Australian ship *Woodlark,* which anchored there in 1836. Pop. (1980 prelim.) 3,811.

Muẓaffar ʿAlī (fl. *c.* 1540—*c.* 1576), Persian miniaturist and calligrapher known best for his elegant human figures in rich, lyrical settings, who painted during the great flowering of Persian painting under the Ṣafavid shahs.

He was the son of the Ṣafavid painter Haydar ʿAlī and a relative of the great painter Behzād, who is said to have taught him at Tabrīz. Muẓaffar ʿAlī was a favourite painter of Shah Ṭahmāsp I and became one of the leaders of the school of Kazvīn. He worked on the shah's great *Shāh-nāmeh* with other royal miniaturists and on a series of 14 illustrations for the *Khamseh* executed between 1539 and 1543 under the shah's supervision. He probably worked on the *Haft Awrang* of Jāmī made for Prince Ibrāhīm Mīrzā between 1555 and 1565. All three manuscripts are acknowledged masterpieces of Persian painting. He trained two of the outstanding painters of the next generation, Siyavūsh and Sadiqī, and is said to have designed and partly executed wall paintings for the palace and for the Chihil Sutūn ("Hall of Forty Columns") at Kazvīn.

"Bahrām Gūr Hunting," miniature by Muẓaffar ʿAlī in the *Khamseh* of Neẓāmī done for Shah Ṭahmāsp I, 1539–43; in the British Library (OR MS. 2265 fol 211r)

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Muzaffarnagar, city, northwestern Uttar Pradesh state, northern India, north-northeast of Delhi, with which it is connected by road and rail. Muzaffarnagar was founded about 1633 by Khān-e Jahān, who named it after his father, Muẓaffar Khān. An agricultural marketplace, it also has some light industry. Several colleges are located in the city. Pop. (1991) 240,609.

Muzaffarpur, city, north-central Bihār state, northeastern India, just south of the Burhi Gandak River. The city was founded by Muẓaffar Khān in the 18th century and was constituted a municipality in 1864. A major road and rail hub, it is a trade centre on the Patna-Nepal route. Rice and sugar milling and cutlery manufacture are the chief industries. It is the seat of the University of Bihār (founded in 1952). Pop. (1991) 241,107.

Muztagata Shan (China): *see* Mu-shih-t'a-ko Range.

MVD, former Soviet internal-affairs ministry, and one of the forerunners of the KGB (*q.v.*).

M.V.O., member, either fourth or fifth class, of the Royal Victorian Order. This rank of the order does not confer knighthood. *See* Royal Victorian Order.

Mwenda (African ruler): *see* Msiri.

Mwene Matapa ("Ravager of the Lands"), also spelled MWENE MUTAPA, or MONOMOTAPA, title borne by a line of kings ruling a southeast African territory between the Zambezi and Limpopo rivers, in what is now Zimbabwe and Mozambique, from the 14th to the 17th century. Their domain was often called the empire of the Mwene Matapa, or simply Matapa (or Mutapa), and is associated with the historical site known as Zimbabwe, located in the southeastern part of modern Zimbabwe.

Oral traditions ascribe the dynasty's foundation to Mbire, a semimythical ruler of the 14th century. His great-great-grandson Nyatsimba, who ruled in the late 15th century, was the actual creator of the empire and the first to bear the title Mwene Matapa. During his reign the centre of the state was shifted from Zimbabwe north to Mount Fura on the Zambezi River.

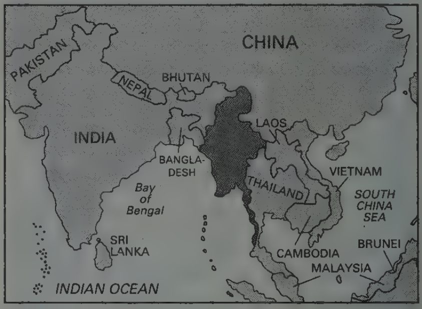
In the 16th century the Mwene Matapa's realm was invaded by the Portuguese, who moved in from the east coast beginning in the 1530s. When the reigning Mwene Matapa attempted to expel them in 1629, they deposed him and forced his successor to grant them extensive trading and mining privileges. By the late 17th century, the power of the Mwene Matapa was overshadowed by the Rowzi kingdom of southwestern Rhodesia.

Mweru, Lake, French LAC MOERO, lake in central Africa, bordered east by Zambia and west by Zaire. The name is Bantu for "lake." A part of the Congo River system, it lies in the northwest of the Mweru-Luapula-Bangweulu plain, its surface being about 3,010 feet (917 m) above sea level. Its greatest length (south-southwest to north-northeast) is 76 miles (122 km), its average width 31 miles (50 km), and its surface area 1,900 square miles (4,920 square km). The lake's margins are generally flat, except on the rocky western coast. The Luapula River enters Mweru on the south, and the Luvua leaves it on the north, west of the town of Pweto, flowing northwest to join the Lualaba. Kilwa and Sokwe islands are in the southern part of the lake. The extensive Bangweulu Swamps adjoin it to the east and south.

MX: *see* Peacekeeper missile.

My Tho, municipality in the flat Mekong delta region of southern Vietnam. An inland port on the north bank of the My Tho River, it is directly linked by highway to Ho Chi Minh City (formerly Saigon), 45 miles (72 km) to the northeast. Formerly Khmer (Cambodian) and known as Misar, it was annexed by the Vietnamese toward the end of the 17th century. In 1862 Emperor Tu Duc of Dai Nam ceded My Tho and surrounding areas to France. With the draining of the marshes by French army engineers, agricultural development began. Between 1881 and 1885 a railway (now dismantled) was completed, linking My Tho to Saigon. The area subsequently became known for coconut, fruit, and vegetable production; the port functions primarily, however, as a transshipment point from the coastal waterway and as a light-manufacturing centre for soap making and coconut-oil extraction. Pop. (1992 est.) 108,404.

Myanmar, officially UNION OF MYANMAR, also called BURMA, Burmese MYANMAR, or PYIDAUNGZU MYANMA NAINGNGANDAW, country lying along the eastern coasts of the Bay of Bengal and the Andaman Sea in southeast Asia. The country is about 1,275 miles (2,050 km) long from north to south—including its 400-mile (640-kilometre) strip along the Malay Peninsula—and about 580 miles (935 km) from east to west at its widest extent. Myanmar is bordered on the southeast by Thailand and Laos, on the northeast by China, and on the northwest by Bangladesh and the Indian states of Arunachal Pradesh, Nāgāland, Manipur, and Mizoram. Its coastline, on the south and southwest, borders the Bay of Bengal, the Gulf of Martaban, and the Andaman Sea. The capital is Yangôn (Rangoon). Area 261,228 square miles (676,577 square km). Pop. (2000 est.) 41,735,000.



Myanmar

A brief treatment of Myanmar follows. For full treatment, *see* MACROPAEDIA: Southeast Asia.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Myanmar can be divided into four main physiographic regions: the northern mountains, the western mountains, the central lowlands, and the Shan Plateau in the east. Northern Myanmar is dominated by the Kumon Range, which descends to the south from the country's highest peak, Mount Hkakabo (19,296 feet [5,881 m] above sea level) on Myanmar's extreme northern border with China. The western mountains, a lesser but major highland region, extend southward from the easternmost Himalayas to form the Chin Hills, whose peaks rise to 10,000 feet (3,000 m), and, farther south, the sparsely populated and densely forested

Arakan Range. The central lowlands, lying between the Arakan Range and the Shan Plateau, consist of the narrow coastal plains of Arakan (fronting the Bay of Bengal) and Tenasserim (fronting the Andaman Sea) and the densely populated delta regions of the Irrawaddy and Sittang rivers. The country's fourth major region, the deeply dissected Shan Plateau, is its easternmost and rises abruptly out of the central lowlands, often 2,000 feet (600 m) in a single step; the plateau's average elevation is 3,000 feet (900 m), and some peaks exceed 8,500 feet (2,600 m). Southward, the plateau merges into the Tenasserim Mountain range.

The north-south orientation of Myanmar's mountains defines the courses of its major rivers, the Irrawaddy and the Salween. The Irrawaddy is navigable for more than 900 miles (1,450 km) of its 1,300-mile (2,100-kilometre) length and drains about three-fifths of the country's surface. The Salween basin lies to the east of the Irrawaddy, draining the Shan Plateau region and emptying into the Gulf of Martaban.

Myanmar's tropical climate is influenced greatly by the monsoons of southern Asia. There are three seasons, a cool dry period from late October to mid-February, a hot dry period from mid-February to mid-May, and the monsoon season from late May to late October. Annual rainfall ranges from 200 inches (5,100 mm) along the coastal plains and mountains to 100 inches (2,500 mm) within the delta regions and 35 inches (900 mm) for the central basin around Mandalay. Nearly all of it comes during the monsoons. Average daily maximum temperatures for the coolest and warmest months range between 73° and 89° F (23° and 32° C) in the highlands of the Shan Plateau and between 85° and 97° F (29° and 36° C) at Yangôn in the south.

Only about one-sixth of Myanmar's extremely mountainous land is considered arable; about a tenth of that is irrigated, mostly for rice production. Hardly any of the land is useful as pasture, and half of the country is forested. In Myanmar's lowlands, the natural vegetation varies with precipitation. Where there is more than 80 inches (2,000 mm) of rainfall, evergreen tropical forests predominate (the delta areas support lush mangrove stands); regions with between 40 and 80 inches have plentiful hardwood monsoon forests (including teak); at less than 40 inches, the forests are gradually replaced by scrubland. In the highlands, forests of oak and pine are found above the frost line (3,000 feet [1,000 m]). Animal life is abundant, with the rain forests supporting a variety of birds, mammals, and snakes of various kinds. The elephant and the tiger are also important though endangered species.

Myanmar has silver, copper, lead, and zinc deposits in the Shan Plateau, alluvial deposits of tungsten and tin in the Tenasserim coastal area, and petroleum and natural gas. High-quality jade is also mined in the northern mountains.

The people. The entire Irrawaddy valley and the coastal strips hold three-fourths of the population. About 70 percent of the total population are Burman. In the western hills of the Chindwin River are the various Chin tribes, and the upper Irrawaddy valley and the northern hills are occupied by Kachin tribal groups. The Shan people occupy the Shan Plateau; the Wa and the Palaung are usually classified with the Shan. The Karen are found on the deltas, in the Pegu Mountains, and along the lower Salween River. The Kayahs inhabit the southern edge of the Shan Plateau. Approximately nine-tenths of the population is Buddhist. Most of the rest are either Christian, Muslim, or animist; a few Hindus are also found.

More than 100 indigenous languages—as distinct from mere dialects—are spoken in Myanmar, but the common and official language is Burmese (Myanmar), spoken by both the people of the plains and the hill peoples. During the British colonial period (1885–1948), when the country was officially called Burma, English became the official language; but, after independence from the British Empire, English was abandoned as the official language. An elementary knowledge of English is still required in schools and colleges, however, and in 1981 the teaching of English was restored to the school curriculum.

Myanmar is one of the least densely populated countries in Asia, and the rugged, forested portion of its terrain is still only lightly settled. It is a land of villages, where fewer than one-fourth of the people live in urban areas. The annual rate of growth of the population is somewhat high by world standards but is about average for Southeast Asia. The relatively high infant mortality rate has decreased considerably since the 1950s. The largest cities are Yangôn on the Irrawaddy delta and Mandalay in the interior.

The economy. Myanmar has a centrally planned, developing economy that is largely nationalized and is based principally upon agriculture and trade. The gross national product (GNP) per capita, however, is one of the lowest in the world.

About three-fifths of the gross domestic product (GDP) originates from agriculture, hunting, forestry, and fishing, followed by services and manufacturing. The agricultural sector employs about two-thirds of the labour force.

Rice is the most important crop; it dominates the economy by providing the major source of employment and is the country's principal export. Other important crops include sugarcane, corn (maize), peanuts (groundnuts), pulses, and cotton. Vegetables, melons, and fruits are also grown.

Although there is little pastureland in Myanmar, much livestock is raised there, including cattle (about one-tenth for dairy purposes). The cattle are raised mostly in the higher-lying dry zone. Other livestock include pigs, water buffalo, and goats. Forests produce teak, an important component of foreign trade.

Fish is second only to rice as a staple in the Myanmar diet; most of the total catch is marine. European carp and tilapia from Thailand have been successfully introduced for fish farming.

Manufacturing is underdeveloped and accounts for only about one-tenth of the GDP. The principal manufactures include refined petroleum products, cement, brown and raw sugar, peanut oil, tinned fish, nitrogenous fertilizer, crude steel, cotton fabric, and cigarettes. Nearly half of the country's electrical production is generated by hydroelectric-power stations and the remainder by thermal-power plants. All large industrial enterprises, the banking system, insurance, foreign trade, domestic wholesale trade, and most of the retail trade were nationalized in the early 1960s. Limited foreign investment was permitted to resume in 1973 and was further liberalized in the late 1980s.

About half of the government's budgetary revenue originates from general sales and value-added taxes and the remainder as income from state enterprises. By the late 20th century foreign aid began to figure prominently as a source of revenue as well.

The country's railways are operated by the state-owned Myanmar Railways Corporation. The heavily used road network is only about two-fifths paved. There are also extensive inland waterways, of which about one-fourth are navigable by large vessels. Yangôn is the chief port, and there are several other major ports. International air service is through Mingaladon Airport, near Yangôn.

Myanmar's exports are dominated by rice and teak, followed by metallic ores and gems. Since the mid-1970s the value of Myanmar's imports usually has exceeded its exports. Imports consist primarily of capital goods, mostly machinery and transport equipment; raw materials and spare parts; and consumer goods. Principal trading partners are Japan, the European Economic Community, the Southeast Asian countries, and India.

Government and social conditions. The 1974 constitution declared that Myanmar was a socialist one-party republic governed by the Burma Socialist Program Party (BSPP). Supreme state authority was vested in the unicameral People's Assembly (Pyithu Hluttaw), whose members were nominated by the BSPP, then formally elected to four-year terms by popular vote. The Assembly chose a prime minister, a cabinet, and a 29-member state council. The state council, in turn, elected a chairman, who also served as president and head of state. The military government that assumed power in 1988 abolished all of the previous institutions but rescinded the ban on political parties; the chairman of the State Law and Order Restoration Council also served as head of state and chief executive officer.

Myanmar's population suffers from generally poor health conditions and from diseases such as malaria, cholera, tuberculosis, hepatitis, plague, dengue fever, and encephalitis. These health problems have been aggravated by a shortage of trained medical personnel. Myanmar's health-service facilities are well developed only in the cities; life expectancy is 60 years for men and 64 for women.

Education, where available, is free in Myanmar; the main emphasis is on primary education. School attendance for children between the ages of 5 and 9 is compulsory. The country's overall literacy rate is about 80 percent. There is an arts and sciences university both in Yangôn and in Mandalay. Intellectual and cultural contacts with other countries were seriously curtailed by the military government beginning in the 1960s.

The news media in Myanmar are owned and operated by the government. The country's constitution prohibits censorship, but in practice the media may not discuss national issues without praising the country's leaders and socialism.

History. The first human settlements in Myanmar appeared some 11,000 years ago in the middle Irrawaddy River valley. A group of people known as the Pyu, who spoke a Tibeto-Burman language, began establishing city-kingdoms in northern Myanmar between the 1st century BC and AD 800. To the south of the Pyu were the Mon, a people speaking an Austro-Asiatic language, who established a port capital at Thaton. The Mon state flourished, as did the Pyu. In the 9th century, the Pyu capital of Halingyi fell to the northern kingdom of Nanchao of southern China. The Myanmar, or Burmans, assumed leadership of the Tibeto-Burmese peoples and established their capital at Pagan.

In 1044 Anawrahta assumed the throne at Pagan and, in a matter of years, united the whole of Myanmar into a single kingdom and founded the first Myanmar empire. A Mongol invasion in 1287 devastated the empire and resulted in its breakup.

Reunification first occurred in the 16th century under the Toungoo dynasty, which lasted fitfully until 1752, when Mon control of Myanmar resumed. Myanmar resistance rallied behind the popular leader Alaungpaya, who, by 1759, had secured all of the country of Myanmar and founded its last dynasty.

The expansionist policies of the Alaungpaya kingdom alarmed its neighbours, particularly the British with regard to Myanmar's designs on Assam. Two Anglo-Burmese wars (1824–26 and 1852) followed Myanmar's occupation of Assam and cost it not only Assam but also

Manipur, Arakan, Tenasserim, and eventually Pegu. The rest of Myanmar fell to the British in 1885 after the third Anglo-Burmese War.

Under British control, Burma became the name of the country, which became a province of India. The Myanmar people resented Britain's refusal to continue state patronage of Buddhism. Furthermore, British laissez-faire economic policies impoverished much of the population. This led to a peasant uprising in 1931, and, in 1937, the British separated Burma from India. World War II brought Japanese occupation; British governance resumed until early 1948, when Burma (the name Myanmar was adopted in 1989) became independent.

A military coup in 1962 established a revolutionary council intent on creating a socialist Burma. Burma's military leaders nationalized the country's major economic enterprises and embarked on an unsuccessful policy of rapid industrialization while isolating Burma from contacts with the outside world. By the late 1980s, governmental corruption and mismanagement had turned resource-rich Burma into one of the world's poorest countries. Long-simmering public dissatisfaction erupted in 1987–88 into widespread antigovernment rioting that the military eventually suppressed by force. In 1990 opposition parties won decisively in national elections, but the army continued in control.

myasthenia gravis, chronic disorder that causes varying degrees of muscular weakness, especially after the muscle has been exercised. The muscles initially affected are those concerned with eye movements, facial expressions, chewing, swallowing, and respiration. The heart is not usually involved. The disease spreads to the neck, trunk, and limb muscles; respiratory difficulties or respiratory arrest may occur in severe cases. Muscles first fail to contract after prolonged use; they seem to become weaker with repeated mild activities but then regain their strength after rest. Eventually, muscular paralysis may remain, with degeneration of muscle fibres and infiltration of lymph cells.

Myasthenia gravis can occur at any age, but it rarely begins before the age of 10 or after 70, and it occurs more frequently in females. There is a tendency for the condition to be more prevalent in some families. Some symptoms show sudden onset, while others may be present for 10 to 20 years without becoming any worse; this is especially true of visual problems such as double vision, drooping eyelids, and eye wandering.

The affected person may have difficulty in climbing stairs, in rising from chairs, in lifting objects, or in raising his arms over his head. All of the lower facial muscles may become involved, so that speech takes on a nasal quality, and the affected person may even have to support his chin with one hand in order to talk. Neck weakness may be mild or so severe that the head cannot be held erect. Each affected person seems to manifest his own set of difficulties; he may be perfectly mobile and yet have difficulty in breathing, or he may be bedridden but free of respiratory problems.

The disease is an autoimmune disorder that breaks the linkage between the nervous system's stimulation of a muscle and the muscle's response. Autoantibodies bind to receptors on muscle cells that normally respond to acetylcholine, a neurotransmitter that stimulates muscles to contract. The binding action destroys the receptors or blocks their response to acetylcholine. Treatment includes anticholinesterase drugs, which stimulate the transmission of nerve impulses, or corticosteroid drugs (such as prednisone). In severe cases removal of the thymus, especially in persons with thyroid tumours, has improved the clinical course of the disease. The disorder also may regress spontaneously for up to several years. Some persons die from sudden respiratory arrest, but in most cases the disease is not fatal.

Myazedi inscription, epigraph written in 1113 in the Pāli, Pyu, Mon, and Burmese languages and providing a key to the Pyu language. The inscription, engraved on a stone found at the Myazedi pagoda near Pagan, Myanmar (Burma), tells the story of King Kyanzittha's deathbed reconciliation with his estranged son, whom he had disinherited by a peace-producing compromise of 1084 that had helped end the bloodletting between the Pagan and Mon kingdoms.

The period described by the Myazedi stone saw the gradual decline in the formal use of the Pāli and Mon languages, and the rise of the Burmese language, which was reaching maturity as a medium of literary expression, using Mon script. The later decades of the Pagan period marked the ascendancy of Burman cultural traits at the expense of Mon tradition. The Myazedi inscription is a benchmark from which to chronicle the development of a peculiarly Burman culture.

Mycenae, prehistoric Greek city in the Peloponnese, celebrated by Homer as "broad-streeted" and "golden." According to legend, Mycenae was the capital of Agamemnon, the Achaean king who sacked the city of Troy, and it was set, as Homer says, "in a nook of Argos," with a natural citadel formed by the ravines between the mountains of Hagios Elias (Ayios Ilias) and Zara, and furnished with a fine perennial spring named Perseia after Perseus, the legendary founder of Mycenae. It is the chief Late Bronze Age site in mainland Greece. Systematic excavation of the site began in 1840, but the most celebrated discoveries there were those of Heinrich Schliemann. (For the context of Mycenae in the prehistory of the Aegean area, *see* the MACROPAEDIA article Greek and Roman Civilizations, Ancient.) The term "Mycenaean" is often used in reference to the Late Bronze Age of mainland Greece in general and of the islands except Crete.

There was a settlement at Mycenae in the Early Bronze Age, but all structures of that or of the succeeding Middle Bronze Age have, with insignificant exceptions, been swept away by later buildings. The existing palace must have been reconstructed in the 14th century BC. The whole area is studded with tombs that have yielded many art objects and artifacts.

The Lion Gate at Mycenae
Larry Burrows—Aspect Picture Library, London

From the Lion Gate at the entrance to Mycenae's citadel, a graded road, 12 feet (3.6 m) wide, leads to a ramp supported by a five-terrace wall and thence to the southwestern entrance of the palace. The latter is composed of two main blocks, one originally covering the top of the hill but largely destroyed on the erection of the Hellenistic temple, the other occupying the lower terrace to the south banked up artificially on its western edge. The two blocks were separated by two parallel east-west corridors with storerooms opening off them. The existence of a palace shrine on the upper terrace seems implied by discoveries of a magnificent ivory group consisting of two goddesses and an infant god with fragments of painted tripod altars and other objects.

At the southwestern corner of the later palace, the west lobby led to the grand staircase of 22 steps, a landing, and another 17 or 18 steps culminating in a small forecourt that afforded entrance to the great court and to a square room immediately to the north of it. There an oblong area with raised plaster border has been interpreted by some scholars as the base for a throne where the king sat in audience. Other scholars, however, have regarded it as a hearth and the room as a guest chamber; the throne might then have stood on the right of the megaron (great central hall), a part that has now disappeared. Both the porch and the main portion of the megaron had floors of painted stucco with borders of gypsum slabs and with frescoes on the walls, one apparently representing a battle in front of a citadel. In the centre was a round plaster hearth enclosed by four wooden columns, possibly implying the existence of a clerestory. The 10 plaster layers of the hearth and 4 of the floor suggest that this hall was in use for a considerable time. The roof was probably flat. East of the corridor lay a series of rooms, the most interesting known from its decoration as "the room of the curtain frescoes."

Within the citadel were various houses of retainers. The most imposing, "the house of the columns," rose to three stories in height. South of the grave circle lie the ruins of the "ramp house," the "south house," and the "house of Tsountas." Another building, known as "the granary," from the carbonized barley, wheat, and vetches found in its basement, was erected in the 13th century BC between the Cyclopean citadel wall and one of the grave circles and continued in use up to the destruction of the city by fire about 1100 BC.

The Late Mycenaean period (1400–1100 BC) was one of great prosperity in the Peloponnese. After the destruction of Knossos, on Minoan Crete, Mycenae became the dominant power in the Aegean, where its fleet must have controlled the nearer seas and colonized the Cyclades, Crete, Cyprus, the Dodecanese, northern Greece and Macedonia, western Asia Minor, Sicily, and some sites in Italy. Mycenaean rather than Minoan goods are found in the markets of Egypt, Syria, and Palestine. Mycenaean raiders harried the coasts of the Egyptians and the Hittites, and at a date traditionally supposed to be 1180, but by some scholars now estimated at about 1250 BC, Agamemnon and his followers sacked the great city of Troy.

In the 16th century BC, Mycenaean art was temporarily dominated by the influences of Minoan art. Cretan artists must have emigrated to the mainland, and local varieties of all the Minoan arts arose at Mycenae. Minoan naturalism and exuberance were tempered by Greek formality and sense of balance, which were already visible in Middle Helladic painted wares and were later to culminate in the splendid Geometric pottery of the Dipylon cemetery at Athens.

Until 1950 Mycenaean literacy was attested only by a few symbols painted on vases; but in 1952 the excavation of "the house of the oil merchant" and "the house of the wine merchant" outside the walls disclosed a number of tablets in the Linear B script first identified at Knossos and later interpreted by the English architect and cryptographer Michael Ventris to be an earlier form of the Greek language.

Mycenae was burned and destroyed perhaps by invading Dorians about 1100 BC, but the outer city was not deserted; graves of the Proto-Geometric and Geometric periods have been excavated. Mycenae evidently continued to exist as a small city-state, and the walls were not pulled down. Early in the 6th century BC a temple, from which one fine relief survives, was erected; in 480 Mycenae sent 400 men to fight against the Persians at Thermopylae, and its men were at Plataea in 479. In 470, however, its aggressive neighbour Argos, which had been neutral in the Persian war, took an ignoble revenge by besieging Mycenae and in 468 destroyed it. In the Hellenistic period Mycenae revived, and a new temple was built on the crown of the acropolis; in 235 BC the Argive tyrant Aristippus was killed there, and the city wall repaired. Nabis of Sparta carried off some of the young men about 195 BC, and an inscription of 194 refers to their detention. A few Roman objects have been found, but, when Greek traveler and geographer Pausanias visited the site about AD 160, he found it in ruins.

Mycenaean language, most generally believed to be the most ancient form of the Greek language that has been discovered. It was a chancellery language, used mainly for perishable records and inventories of royal palaces and commercial establishments. Written in a syllabic script known as Linear B, it has been found mostly on clay tablets discovered at Knossos in Crete and at Pylos in Messenia, as well as in inscriptions on pots and jars from Thebes, Mycenae, Tiryns, Eleusis, and Boeotian Orchomenos.

mycetoma (disease): *see* Madura foot.

Mycobacterium, genus of rod-shaped bacteria of the family Mycobacteriaceae (order Actinomycetales), the most important species of which, *M. tuberculosis* and *M. leprae,* cause tuberculosis and leprosy, respectively, in humans. *M. bovis* causes tuberculosis in cattle and in humans. Some mycobacteria are saprophytes (*i.e.,* they live on decaying organic matter), and others are obligate parasites. Most are found in soil and water in a free-living form or in diseased tissue of animals. Streptomycin, rifampin, and species-specific antimicrobial agents have had some success in treating *Mycobacterium* infections.

mycology, the study of fungi, a group that includes the mushrooms and yeasts. Many fungi are useful in medicine and industry. Mycological research has led to the development of such antibiotic drugs as penicillin, streptomycin, and tetracycline. Mycology also has important applications in the dairy, wine, and baking industries and in the production of dyes and inks. Medical mycology is the study of fungus organisms that cause disease in humans.

mycoplasma, any bacterium in the genus *Mycoplasma.* The name mycoplasma has also been used to denote any species in the class mollicutes or any genus in the order Mycoplasmatales.

Mycoplasmas are among the smallest of bacterial organisms. The cell varies from a spherical or pear shape (0.3 to 0.8 micrometres [0.0000117 to 0.0000312 inch]) to that of a slender branched filament (up to 150 micrometres [0.00585 inch]). *Mycoplasma* species are gram-negative and are mostly facultatively anaerobic, colonial microorganisms that lack cell walls. *Mycoplasma* species are parasites of joints and the mucous membranes lining the respiratory, genital, or digestive tracts of ruminants, carnivores, rodents, and humans. Toxic byproducts excreted by the bacterium accumulate in the host's tissues, causing damage. *M. pneumoniae* causes a widespread but rarely fatal pneumonia in humans. *Mycoplasma* infection may also trigger a serious immune reaction in the host.

mycorrhiza, also spelled MYCORHIZA, an intimate association between the branched, tubular filaments (hyphae) of a fungus (kingdom Fungi) and the roots of higher plants. The association is usually of mutual benefit (symbiotic): a delicate balance between host plant and symbiont results in enhanced nutritional support for each member. The establishment and growth of certain plants (*e.g.,* citrus, orchids, pines) is dependent on mycorrhiza; other plants survive but do not flourish without their fungal symbionts. The two main types of mycorrhiza are endotrophic, in which the fungus invades the hosts' roots (*e.g.,* orchids), and ectotrophic, in which the fungus forms a mantle around the smaller roots (*e.g.,* pines). Exploitation of these natural associations can benefit forestry, horticulture, and other plant industries.

mycosis, plural MYCOSES, in humans and domestic animals, a disease caused by any fungus that invades the tissues, causing superficial, subcutaneous, or systemic disease. Superficial fungal infections, also called dermatophytosis, are confined to the skin and are caused by *Microsporum, Trichophyton,* or *Epidermophyton;* athlete's foot, for example, is caused by *Trichophyton* or *Epidermophyton.* Subcutaneous infections, which extend into tissues and sometimes into adjacent structures such as bone and organs, are rare and often chronic. Candidiasis (*Candida*) may be a superficial infection (thrush, vaginitis) or a disseminated infection affecting certain target organs, such as the eyes or kidneys. Painful ulcerations and nodules appear in subcutaneous tissues in sporotrichosis (*Sporothrix*). In systemic fungal infections fungi may invade normal hosts or immunosuppressed hosts (opportunistic infections). Cryptococcosis (*Cryptococcus*) and histoplasmosis (*Histoplasma*) are marked by respiratory distress.

Effective therapy against the invasive fungi is limited because the same antibiotics that interfere with fungi also attack the host's cells. Griseofulvin has met with some success in the treatment of superficial mycoses. Amphotericin B and flucytosine have also been used in treating the subcutaneous and systemic mycoses.

mycotoxin, toxic substance produced by a fungus (*i.e.,* a member of the kingdom Fungi). Mycotoxins occur in great number and variety; their effects can include hallucinations, skin inflammation, severe liver damage, hemorrhages, abortion, convulsions, neurological disturbances, and death in livestock and humans. Aflatoxins are a complex of mycotoxins produced by species of the soil saprophyte *Aspergillus.* They may cause liver disease and may be carcinogenic.

Food is particularly susceptible to fungal infections at almost every stage of storage or production. Some poisonous mushrooms produce symptoms that include nausea, vomiting, and diarrhea, and certain genera produce such effects as euphoria and hallucinations, but most are not considered to be lethal. One wild mushroom, *Amanita phalloides,* the destroying angel, or death cup, is fatal when eaten.

Myddelton, Sir Hugh, 1ST BARONET, Myddelton also spelled MIDDLETON (b. 1559/60, Galch Hill, Denbighshire, Wales—d. July 19, 1643, Bush Hill, London, Eng.), member of the English Parliament (1603–28) and contractor of the New River scheme for supplying London with water.

The son of Sir Richard Myddelton, governor of Denbigh Castle, Wales, Myddelton became a successful London goldsmith, occupying a shop in Bassihaw or Basinghall Street. He made money by commercial ventures on the Spanish Main, being associated in these with Sir Walter Raleigh; Myddelton was also interested in clothmaking. He was an alderman and then recorder of Denbigh and was a member of Parliament for that borough for 25 years.

In 1609 Myddelton took over from the corporation of London the projected scheme for supplying the city with water obtained from springs near Ware, in Hertfordshire. For this purpose he made a canal about 10 feet (3 m) wide and 4 feet (1.2 m) deep and more than 38 miles (61 km) in length. The canal discharged its waters into a reservoir at Islington called the New River Head. The completion of this great undertaking put a severe strain upon Myddelton's financial resources, and in 1612 he was successful in securing monetary assistance from James I. The work was completed in 1613, and Myddelton was made the first governor of the company, which, however, was not a financial success until after his death. In recognition of his services he was made a baronet in 1622. Myddelton was also engaged in working some lead and silver mines in Cardiganshire.

myelin, white, insulating sheath on the axon of many nerve fibres. It is composed of fatty materials, protein, and water. The myelin sheath is deposited by Schwann cells in layers surrounding the nerve fibres of the central and peripheral nervous systems of many animals. Nerve fibres containing myelin sheaths are white. Nonmyelinated nerve fibres form gray nerves, which are common in invertebrates and in the sympathetic nervous system of vertebrates.

myeloblast, immature blood cell, found in bone marrow, that gives rise to white blood cells of the granulocytic series (characterized by granules in the cytoplasm, as neutrophils, eosinophils, and basophils), via an intermediate stage that is called a myelocyte. The myeloblast nucleus is large and round or oval; its membrane is thin, and the contained chromatin (readily stainable nuclear material) is dispersed in fine strands or tiny granules. Several nucleoli are present; there is relatively little cytoplasm. Cells vary in size and are capable of amoeboid movement; they are difficult to distinguish in the laboratory from lymphoblasts.

myelography, medical procedure for examining the spinal cord by means of X rays. It is especially useful in diagnosing spinal abscesses and tumours and dislocated intervertebral disks.

In this procedure a positive contrast agent, usually in the form of a water-soluble radiopaque substance or iodinated oil, is injected into the spinal canal. This contrast agent, which makes body tissue more visible when irradiated with X rays, is maneuvered throughout the spinal canal from the lumbrosacral (tail bone) region up to the base of the brain by tilting the examination table to which the patient is strapped. A fluoroscope is used to observe the various parts of the canal as the contrast agent passes through them. The contrast medium is generally removed after a myelogram has been completed, though the use of certain water-soluble radiopaque substances makes this step unnecessary since they are readily eliminated from the body by natural means. Iodinated oil may cause irritations, resulting in temporary discomfort.

myeloid tissue: *see* bone marrow.

myeloma protein, in medicine, an abnormal immunoglobulin (protein with antibody activity) that is produced in persons suffering from multiple myeloma, which is a type of malignant tumour in bone marrow. Multiple myeloma is typified by the proliferation of cells that produce, in most cases, large quantities of one kind of immunoglobulin molecule. Except for the fact that few myeloma proteins have been shown to combine specifically with an antigen, they are apparently typical immunoglobulins in other respects. They have been of value as a source of immunoglobulins for immunochemical and genetic studies, as well as for the production of monoclonal antibody. *See also* antibody.

myelomatosis: *see* multiple myeloma.

Myers v. United States (1926), U.S. Supreme Court case that voided a legislative provision restricting the authority of the president to remove or replace certain postmasters without consent of the Senate. In the majority opinion, written by Chief Justice William H. Taft, the court held that the provision was an unconstitutional restriction on the president's power to exercise control over executive personnel under Article II of the Constitution. The president, wrote Justice Taft, "should select those who were to act for him under his direction in the execution of the laws." Taft added that "as his selection of administrative officers is essential to the execution of the laws by him, so must be his power of removing those for whom he can not continue to be responsible. . . ." Nine years later, however, the court held in *Humphrey's Executor* v. *United States* (1935) that the president could not remove a member of an independent regulatory agency in defiance of restrictions provided by law. The court held in that case that the Myers principle applied only to "purely executive officers." The *Humphrey's* decision was reaffirmed in *Wiener* v. *United States* (1958), involving the attempted removal of a member of the War Claims Commission.

Myerson, Goldie: *see* Meir, Golda.

myiasis, infestation of the body with the larvae (maggots) of certain species of flies. Intestinal myiasis results from ingestion of food contaminated with eggs or larvae and may produce cramps, nausea, vomiting, and diarrhea. Within a short time, however, the organisms are destroyed by gastrointestinal juices and passed in the feces. Superficial myiasis occurs when flies, attracted to open or infected wounds or to odoriferous discharges from the eyes, ears, nose, mouth, or vagina, lay their eggs on these areas. The larvae hatch and feed on the involved tissues, sometimes causing extensive or even fatal damage. The larvae of some species penetrate the unbroken skin, especially of infants, producing boillike lesions or creeping eruptions. Treatment of superficial infestation involves removing the larvae by irrigation and by mechanical extraction. Because larvae feed on dead tissue and foreign matter in open wounds, they were sometimes deliberately introduced to supplement surgical removal of dead or diseased tissue and to prevent infection.

Myingyan, town, central Myanmar (Burma). It is a port on the Irrawaddy River and an important cotton-trading centre, at the head of a branch railway to Thazi and the main line between Yangôn (Rangoon) and Mandalay. Myingyan has a cotton ginning and spinning mill. There is a hydroelectric plant nearby and a model village at Pyawbwelay to the northeast. Pop. (1983) 77,060.

Myitkyinā, town, northeastern Myanmar (Burma). It lies along the Irrawaddy River, 25 miles (40 km) below the confluence of its two headstreams, the Mali and Nmai rivers, whence it is navigable for more than 950 miles (1,530 km) to the sea. The town's name means "close to the big river." Myitkyinā is a trading centre on the Stilwell (Ledo) Road, which links with the Burma Road into China, and is also the terminus of the railway north from Yangôn (Rangoon). Another road leads to Putao, 150 miles (240 km) to the north, and to the Tibetan border. The town is also a ferry crossing on the Irrawaddy. Because of these extensive communications links, Myitkyinā is one of the most important river ports in northern Myanmar. A strategic point in the struggle for Burma during World War II, it fell to Allied forces in August 1944. It has an airport and a diesel electric plant. Myitkyinā is also the site of the Kachin traditional religious feast of Manao (held each January). Myitkyinā Degree College is affiliated with the Arts and Science University at Mandalay. An institute for training elementary teachers is also located there. Pidaung game reserve is situated west of the town.

The surrounding area is predominantly hilly and forested and is drained by the headstreams of the Irrawaddy and the Upper Chindwin rivers. Teak and other timbers are produced. Most crops are grown by dry farming, although there is some wet rice and sugarcane cultivation. Pop. (1983) 56,427.

Mykolayiv, Russian NIKOLAYEV, also spelled NIKOLAEV, or NIKOLAJEV, *oblast* (province), southern Ukraine. It lies on the Black Sea Plain, sloping down gently from the Dnieper Upland in the north to the coast of the Black Sea. The northern part of the *oblast* is greatly dissected by gullies, and soil erosion generally is severe. The *oblast* has little surface water other than the Southern (Pivdennyy) Buh River, and even the larger rivers nearly dry out in summer. The coast has many lagoons and long estuaries, often sealed off by sandbars. The whole area is steppe, with fertile soils, and a high proportion is plowed for winter wheat, corn (maize), sunflowers, and sugar beets. Vineyards and orchards are widespread, especially on the Southern Buh, and cattle and sheep are kept in large numbers. Apart from the capital, Mykolayiv, cities are small and concerned chiefly with processing agricultural products. In the north considerable granite is quarried. Area 9,500 square miles (24,600 square km). Pop. (1991 est.) 1,350,800.

Mykolayiv, Russian NIKOLAYEV, also spelled NIKOLAEV, or NIKOLAJEV, city and administrative centre of Mykolayiv *oblast* (province), southern Ukraine. The city lies along the estuary of the Southern (Pivdennyy) Buh River, about 40 miles (65 km) from the Black Sea. It was founded in 1788 as a naval base after the Russian annexation of the Black Sea coast, near the site of the ancient Greek Olbia. In 1862 a commercial harbour was opened, and in 1873 a railway was built to the port. It is now one of the most important Ukrainian Black Sea ports, serving the Kryvyy Rih area and extensive steppe grain lands. Mykolayiv is one of the largest shipbuilding centres of Ukraine. The city also has a wide range of other engineering and consumer-goods industries. An alumina-processing plant utilizing imported bauxite was built in the 1970s in the suburb of Zhovtneve. Mykolayiv is a modern city in appearance, laid out on a gridiron pattern of broad streets. The city has shipbuilding and teacher-training institutes. Pop. (1993 est.) 519,000.

Mylae, Battle of (260 BC), conflict in the First Punic War between Rome and Carthage, whose navy had been harassing Roman peninsular and Sicilian coastal towns. At Mylae the Romans destroyed 50 Carthaginian ships, and the remainder of the enemy fleet fled. The battle marked Rome's attainment of dominance in Sicilian waters by turning sea skirmishes into land battles through the use of boarding bridges that doubled as grappling irons. With the help of these devices, Roman soldiers could board enemy ships to engage in hand-to-hand fighting.

Mylar (trademark), a versatile plastic film composed of the polyester (*q.v.*) polyethylene terephthalate.

Mylius-Erichsen, Ludwig (b. Jan. 15, 1872, Viborg, Den.—d. *c.* Nov. 25, 1907, Greenland), Danish journalist and explorer who led two productive expeditions to Greenland.

The explorer's first expedition (1902–04) yielded information on the languages and customs of the polar Eskimos. The second, on the ship *Danmark* (1906–08), had the object of charting the northern coasts of Greenland. Though Mylius-Erichsen and two of his companions, Høeg Hagen and Jørgen Brønlund, perished on this venture, his papers were subsequently found by another Danish explorer, Ejnar Mikkelsen, and proved valuable in the mapping of northern Greenland.

Mymensingh, formerly NASIRĀBĀD, city, north-central Bangladesh, just north of an old bed of the Brahmaputra River. Once noted for its glass-bangle manufacture, it now has cotton-textile and sugar mills. It was incorporated as a municipality in 1869 and houses an agricultural university and several government colleges affiliated with the University of Dhākā. Pop. (1991 prelim.) 198,662.

mynah, also spelled MYNA, any of a number of Asian birds of the family Sturnidae (or-

Hill mynah (*Gracula religiosa*)

Eric Hosking

der Passeriformes) of somewhat crowlike appearance. The hill mynah (*Gracula religiosa*) of southern Asia, called the grackle in India, is renowned as a "talker." It is about 25 cm (10 inches) long, glossy black, with white wing patches, yellow wattles, and orangish bill and legs. In the wild it chuckles and shrieks; caged, it learns to imitate human speech far better than its chief rival in mimicry, the gray parrot. The common, or Indian, mynah (*Acridotheres tristis*) is about 20 cm long, black and brown, with white in the wings and tail, orange skin around the eyes, and heavy dark wattles; it has been introduced into Australia, New Zealand, and Hawaii. The crested mynah (*A. cristatellus*) is black, with white wing patches and yellow legs and bill. Native to China and Indochina, the crested mynah was introduced into Vancouver Island, British Columbia, in 1900 but has not spread. For pied mynah, *see* starling.

Myō-ō, in the Buddhist mythology of Japan, fierce protective deities, corresponding to the Sanskrit Vidyārāja ("King of Knowledge"), worshiped mainly by the Shingon sect. They take on a ferocious appearance in order to frighten away evil spirits and to destroy ignorance and ugly passions. They are depicted with angry expressions, with a third eye in the middle of their foreheads, and surrounded by flames.

The five great Myō-ō, popularly called Godaison, are the agents of the five "self-born" Buddhas (*see* Dhyāni-Buddha). Of these, Fudō Myō-ō, the fierce form of the Buddha Vairocana, is the most important and occupies the central position. Go Sansei, the fierce form of Akṣobhya, reigns in the east; Dai Itoku, a form of Amitābha, in the west; Gundari-yasha, a form of Ratnasambhava, in the south; and Kongō-yasha, a form of Amoghasiddhi, in the north. Other prominent Myō-ō are the god of love, Aizen Myō-ō, and Kujaku Myō-ō, who sits on a peacock.

Myobatrachidae, family of frogs (order Anura) including 21 genera and about 110 species found in Africa, Australia, and New Guinea. The Catholic frog (*Notaden bennetti*) is a yellow or greenish Australian myobatrachid about 4 cm (1.5 inches) long. It was named for the dark, crosslike pattern on its back, and it frequents dry regions and lives underground, emerging from its burrow after a heavy rain. The flat-headed frog (*Chiroleptes platycephalus*) is a desert-dwelling Australian myobatrachid. It lives in burrows and is noted for its ability to store enough water in its body to take on a ball-like shape. One fascinating species, *Rheoba trachus Silus,* swallows its eggs and broods them in its stomach.

The family Myobatrachidae is considered as part of the family Leptodactylidae by some authorities. An African subfamily of the Leptodactylidae, Heleophryninae, is sometimes separated as the family Heleophrynidae.

myocardial infarction, death of a section of the myocardium, the muscle of the heart, caused by an interruption of the blood flow to the area. Commonly referred to as a heart attack, a myocardial infarction results from constriction or obstruction in the coronary arteries. The most common cause is a blood clot (thrombotic occlusion) that lodges in an area of an atherosclerotic coronary artery, thickened with cholesterol-containing plaque.

Factors that contribute to the risk of myocardial infarction include high blood pressure, diabetes mellitus, hypercholesterolemia (*i.e.,* increased concentrations of low-density lipoprotein [LDL] cholesterol or decreased concentrations of high-density lipoprotein [HDL] cholesterol in the blood), smoking, and a history of coronary artery disease.

Typically a person experiencing a myocardial infarction has severe chest pain, described as crushing, squeezing, or heavy, that is unremitting for 30 to 60 minutes and sometimes is experienced for longer periods. It often radiates to the arms, neck, and back. The pain is similar to that of angina pectoris (*q.v.*), but it is of longer duration and cannot be relieved by nitroglycerin. Other common symptoms include shortness of breath; sweating; nausea; rapid heartbeat, often complicated by one or more arrhythmias (irregular heartbeats); reduced blood pressure; and a sense of impending doom. The intensity of the symptoms depends on the size of the area of muscle affected by the infarction. A minority of individuals do not experience pain; in these cases myocardial infarction may be diagnosed from a routine electrocardiogram (ECG).

The focus of treatment is to limit the size of the area of tissue lost from lack of blood (the infarct) and to prevent and treat complications. As many as 20 percent of individuals with myocardial infarction die before they reach the hospital; most of these deaths are attributed to ventricular arrhythmia, also called fibrillation. Thus, the sooner the heart rate can be monitored by the ECG and the more promptly the arrhythmia is reversed by defibrillation with either antiarrhythmic drugs or electrical shock, the greater is the chance of survival. Pain is treated with narcotics such as morphine, and rest and sedation are required. New therapies such as beta-adrenergic blockers help alleviate pain and lower the heart rate. Coronary thrombolysis therapy is widely used; it involves the administration of drugs such as streptokinase or tissue plasminogen activator to prevent further blood clots from forming. Angioplasty or coronary artery bypass grafting are additional measures for patients requiring further treatment. The prognosis for patients who survive the first month is good; most are gradually able to resume normal activity.

myofibril, very fine contractile fibres, groups of which extend in parallel columns along the length of striated muscle fibres. The myofibrils are made up of thick and thin myofilaments, which help give the muscle its striped appearance. The thick filaments are composed of myosin, and the thin filaments are predominantly actin, along with two other muscle proteins, tropomyosin and troponin. Muscular contraction is caused by the interaction between actin and myosin as they temporarily bind to each other and are released.

myoglobin, a protein found in the muscle cells of animals. It functions as an oxygen-storage unit, providing oxygen to the working muscles. Diving mammals such as seals and whales are able to remain submerged for long periods because they have greater amounts of myoglobin in their muscles than other animals do.

There is a close chemical similarity between myoglobin and hemoglobin, the oxygen-binding protein of red blood cells. Both proteins contain a molecular constituent called heme, which enables them to combine reversibly with oxygen. The heme group, which contains iron, imparts a red-brown colour to the proteins. The bond between oxygen and hemoglobin is more complex than that between oxygen and myoglobin and accounts for the dual ability hemoglobin has to transport oxygen as well as to store it.

In contact with venous blood, oxygen combines more readily with myoglobin than it does with hemoglobin, favouring the transfer of oxygen from blood to muscle cells. Thus, the oxygen that the working muscle requires for the energy-producing biochemical reactions is provided.

Myoglobin has been obtained in pure crystalline form from many sources. It has a molecular weight of 16,700, about one-fourth that of hemoglobin. Though the heme portion of all myoglobins is the same, the protein portions vary considerably between species.

Myoglobin has been of great importance in the elucidation of protein structure. In 1962 a share of the Nobel Prize for Chemistry was awarded to John C. Kendrew for work, utilizing the technique of X-ray diffraction, that permitted construction of a three-dimensional model of crystalline sperm-whale myoglobin.

myoneural junction (biology): *see* neuromuscular junction.

myopathy, any skeletal muscle disorder that originates within the muscle fibres and does not arise secondarily from disorders of the nervous system. Myopathies are marked by muscular degeneration and weakness and may have a genetic or nongenetic basis.

Heritable myopathies include the muscular dystrophies, a group of metabolic diseases in which muscle fibres, predominantly of the pelvis and shoulder areas, atrophy. (*See* muscular dystrophy.) The most common muscular dystrophy is Duchenne's, an X-chromosome-linked disorder involving progressive destruction of muscle tissue that usually results in death before the age of 20. Some muscle disorders, such as the mitochondrial and lipid storage myopathies, result from a genetic defect in an enzyme necessary in metabolism. Other muscle disorders can be caused by external factors such as alcohol or steroid hormones. Inflammatory myopathy, or myositis, can arise from bacteria, viruses, or parasites that specifically invade the muscle. A well-known example is trichinosis, which is caused by infection with the pork roundworm, *Trichinella spiralis*.

In domestic animals azoturia, or blackwater, a myopathy of horses, causes hindleg paralysis; the disease may disappear in hours with rest or may progress to death within four days. The urine, voided with difficulty, may be red, brown, or blackish with pigment from destroyed muscle cells. Cording up (also called tying up), or myositis of horses, may be a mild form of azoturia. White muscle diseases of calves, lambs, and foals are severe and often fatal myopathies. The aforementioned disorders respond variably to vitamin E and selenium supplements, suggesting a deficiency mechanism.

A related disorder, steatitis, or yellow fat disease, occurs in cats. It is marked by fever, inflammation of fatty tissue, and pain on touch. Food rich in fat from marine animals appears to be a contributing factor. Treatment includes vitamin E supplement and change of diet. German shepherd dogs are susceptible to a myositis of unknown cause, in which the jaw muscles and eventually the esophagus are involved, making eating and swallowing difficult. There is no cure; discomfort can be minimized by drugs. Other myopathies of mysterious origin occur in swine, cattle, horses, and rabbits.

myopia, also called NEARSIGHTEDNESS, visual defect in which the resting eye focuses the image of a distant object at a point in front of the retina, the light-sensitive layer of tissue that lines the back and sides of the eye. Myopic eyes, which are longer than normal from front to rear, are somewhat more susceptible to retinal detachment than are normal or farsighted eyes. Myopia is corrected by concave lenses.

myositis, inflammation, and frequently infection, of muscle tissue; it may be caused by any of a number of bacteria, viruses, and parasites; in many cases it is of unknown origin. Most inflammatory muscle diseases are destructive to the tissue involved and to the surrounding areas. They may occur at any age; children seem to have a higher incidence than adults.

Bacteria may cause damage by direct infection of the muscles or by producing substances—toxins—that poison the tissue. The most common bacterial infections are streptococcal or staphylococcal. The muscle tissue is generally highly resistant to bacterial invasion, but when physical injuries occur there is a weakening of defense mechanisms that leads to infection. The onset of disease may be manifested by headaches, fever, chills, and sweating. There is local pain and swelling in the tissue, commonly followed by pustulant abscesses. Initially the muscle remains intact; as the infection progresses there is infiltration by white blood cells, lymph cells, and fibrous scar tissue (fibrosis). The tissue affected may be destroyed, and abscesses may become fibrous cysts that may require surgical removal.

Chronic diseases such as tuberculosis or syphilis are known to involve the muscles. In tuberculosis there may be abscesses and calcification of the muscle. The tissue can degenerate into fatty and fibrous elements. The disease may be totally incapacitating to the sufferer in the advanced stages. Syphilis does not generally affect the muscles until the terminal stages of the disease. It may cause soft tumours in the eyes, chest, extremities, throat, and heart; and muscles may be converted into scar tissue.

Parasites such as tapeworms or protozoa may enter the body in contaminated food, invade the intestines, and enter the bloodstream to lodge in the muscle tissue. One such parasite is the pork tapeworm larva, *Cysticercus,* which causes nodules in the muscle tissue and brain. The organism grows, lays its eggs, and then dies. The nodes become calcified and may be seen on X rays.

myositis ossificans, also called STIFFMAN SYNDROME, rare disorder in which muscle tissue is replaced by bone. In the more common local type (myositis ossificans circumscripta), only one area is affected; ossification is usually observed to follow injury to the part. In the progressive type (myositis ossificans progressiva), group after group of muscles become ossified until the individual is completely rigid. Breathing and swallowing become difficult, and death usually follows respiratory infection. The cause of the disease is unknown; steroid treatment of muscle injury and the use of drugs to prevent calcification may slow its progress.

myotonia, muscular disorder involving difficulty in relaxing voluntary muscles after contraction. All the bodily muscles or only a few may be affected. The cause of the disorder is unknown, but it seems to be a difficulty inherent in the muscles themselves and not in the nervous system (myopathy).

One rather rare form of the disorder, thought to be inherited in most instances, is known as myotonia congenita, or Thomsen's disease. The disease is first noticed in early childhood. The eyelids and eyes can be affected; the eyes appear to be stuck in one position, and the lids remain closed after forceful shutting. There may also be difficulty in swallowing or in talking owing to prolonged contraction of the throat muscles. A quick movement causes muscle stiffening. The muscles show no weakness when used, and the fibres are usually more developed than in the normal person. There is some suggestion that this overdevelopment is caused by involuntary and repeated isometric exercise during attempts to make the muscle react normally or that there might be some replacement of the tissue with fat and fibrous scar tissue.

Some cases of muscular dystrophy, in which there is usually a gradual weakening of the muscles, also show stages of myotonia. This form is also inherited, but it does not become apparent until the third or fourth decade; the muscles do not overdevelop but gradually degenerate. The stiffening effect of the myotonia may precede the degeneration by two to three years. Most instances of myotonia can be distinguished from muscular dystrophy because the myotonia fails to show the dystrophy symptoms of weakness, cataracts, baldness, and gonadal atrophy.

Symptoms of myotonia can be alleviated by administration of analgesics, anesthetics, and anticonvulsant drugs.

Myra, modern DEMRE, one of the most important towns of ancient Lycia, located near the mouth of the Andriacus River on the Mediterranean Sea in southwest Turkey. Its early history is unknown. St. Paul is known to have visited the city, and in the 4th century St. Nicholas was its bishop. The Eastern Roman emperor Theodosius II made Myra the capital of Byzantine Lycia until the city fell to the caliph Hārūn ar-Rashīd in AD 808. The western scarp of its acropolis, dating from the 5th to the 3rd century BC, was sculptured into a large number of rock-cut sepulchres, imitating wooden houses and shrines, with pillared facades and reliefs. At the foot of the acropolis are the remains of a magnificent theatre, one of the largest and finest in Anatolia.

Myrdal, Alva Reimer (b. Jan. 31, 1902, Uppsala, Sweden—d. Feb. 1, 1986, Ersta, near Stockholm), Swedish diplomat, government minister, author, and advocate of nuclear disarmament, corecipient with Alfonso García Robles of Mexico of the Nobel Prize for Peace in 1982.

Myrdal served as principal director of the United Nations Department of Social Welfare during 1949–50 and became director of the UNESCO Department of Social Sciences in 1951. From 1955 to 1961 she served, first as minister, then as ambassador, of the Swedish government to India, Burma (Myanmar), and Ceylon. In 1961 Myrdal was named special disarmament adviser to the Swedish foreign minister. A year later she was elected to Parliament as a Social Democrat and was named head of the Swedish delegation to the Geneva Disarmament Conference. In 1966 she became minister with portfolio covering disarmament and church affairs, holding that post and the one in Geneva until 1973. Subsequently, she wrote and spoke frequently on behalf of disarmament; her publications include *The Game of Disarmament: How the United States and Russia Run the Arms Race* (1976).

Myrdal, Gunnar, in full KARL GUNNAR MYRDAL (b. Dec. 6, 1898, Gustafs, Dalarna, Sweden—d. May 17, 1987, Stockholm), Swedish economist and sociologist who was awarded the Nobel Prize for Economics in 1974 (the cowinner was Friedrich A. Hayek). He was regarded as a major theorist of international relations and in particular of third world development policies.

Myrdal was educated at Stockholm University, receiving a law degree in 1923 and a doctorate in economics in 1927. (He had married Alva Reimer Myrdal [*q.v.*] in 1924.) He received a Rockefeller traveling fellowship in the United States (1929–30), after which he accepted an associate professorship at the Institute of International Studies in Geneva (1930–31). He was professor of political economy (1933–50) and of international economy (1960–67) at Stockholm University; in 1967 he became professor emeritus.

Until the early 1930s Myrdal emphasized pure theory, in sharp contrast to his later concern with applied economics and social problems. In his doctoral dissertation he had examined the role of expectations in price formation, an approach stemming from the work of Frank H. Knight. The theoretical approach was carried over by Myrdal into macroeconomics when, as a member of the Stockholm school of economics, he delivered, in 1931, the lectures resulting in *Monetary Equilibrium* (1939), which contained the important distinction between *ex ante* (or planned) and *ex post* (or realized) savings and investment.

Working at the invitation of the Carnegie Corporation (N.Y.), Myrdal explored the social and economic problems of blacks in America in 1938–40 and wrote *An American Dilemma: The Negro Problem and Modern Democracy* (1944). In this work, Myrdal presented his theory of cumulative causation, of poverty breeding poverty. The same idea became a leading feature of Myrdal's writings on development economics, in which he argued that, rather than rich and poor countries converging with economic development, they might well diverge, the poor countries becoming poorer as the rich countries enjoyed economies of scale and the poor ones were forced to rely on primary products.

From 1947 to 1957 Myrdal was executive secretary of the United Nations Economic Commission for Europe.

Mýrdals Glacier, glacier, southern Iceland. With its western extension, Eyjafjalla Glacier, it is 30 miles (48 km) long and 20 miles (32 km) wide and covers an area of 268 square miles (695 square km). Only a few miles inland from the Atlantic, it reaches its highest elevation, 5,466 feet (1,666 m) above sea level, in Eyjafjalla Glacier. The southeastern part of the glacier surrounds Katla, an active volcano whose eruption in 1918 caused great floods and considerable modification of the coastline.

myriapod, any member of several closely related groups of the invertebrate phylum Arthropoda—the extinct Archipolypoda; the Diplopoda, or millipedes (*see* millipede); the Chilopoda, or centipedes (*see* centipede); the Pauropoda (*see* pauropod); and the Symphyla (*see* symphylan). The myriapods are a little-known group, although some 11,000 living species have been recognized.

Most myriapods are seldom seen. Some attract attention by spectacular mass migrations; others are found occasionally in dark corners of houses and other buildings. Certain tropical species inflict painful bites on humans. The primary significance of myriapods, however, is the role they play in the ecological balance of forested regions. In addition, their limited ability to migrate, their dependence upon stable conditions of moisture and shelter, and their general intolerance of seawater, together with the fact that they appeared rather early in geological history and have since evolved little, make the myriapods important indicators of land-water relationships; they thus provide useful information for understanding evolution and geographic dispersal.

Because myriapods are largely phytosaprophagous (subsisting on dead plants), they play an important role in the breakdown of dead vegetable material. Some species are primarily carnivorous. Myriapods are most abundant and diverse in tropical and temperate forests, although some species of diplopods and an even greater number of chilopods thrive in grassland or in semiarid habitats; still others live in desert conditions.

Myricales, the wax myrtle order of dicotyledonous flowering plants, found throughout the world, comprising the family Myricaceae, with three genera of trees and shrubs having aromatic leaves. Many of the species bear yellow glandular dots on the surface, from which the characteristic odour of these plants emanates, and have single-seeded fruits often covered with waxy granules, bumps, or layers. The flowers are small, greenish, and inconspicuous and usually are separately male and female on the same or different plants in clusters called catkins. Male flowers have 2 to 16 (but usually 4) stamens, or pollen-producing structures, attached just above two small scalelike bracteoles. The female flowers consist of a one-chambered ovary composed of two carpels (structural segments) that are extended on top into a two-branched style (pollen-receptive organ), the whole associated with two or four bracteoles.

Useful plants within the order include the sweet gale, or bog myrtle (*Myrica gale*), a shrub of wet areas with resinous leaves useful in medicines; the wax myrtle, or candleberry (*M. cerifera*), a tall shrub or small tree growing to about 11 m (35 feet); and bayberry (*q.v.; M. pennsylvanica*), which yields a wax used in candles. The sweet fern (*Comptonia peregrina*) is a small aromatic shrub of eastern North America, the leaves of which have been used in folk medicines and as a seasoning.

The largest genus of the order is *Myrica,* with 50 species. Relationships are obscure but the order is thought to be near the orders Casuarinales (beefwood), Betulales (birches), and Juglandales (walnuts).

Myriocephalon, Battle of (September 1176), victory of the Seljuq Turks under Qïlïch Arslan II over the Byzantine army of Manuel I Comnenus in a mountain pass near the ruined fortress of Myriocephalon (southeast of modern Ankara, Tur.) in Phrygia. The battle ended Byzantium's last hope of expelling the Turks from Anatolia.

Manuel determined to reassert his suzerainty over former Byzantine territory by capturing Iconium (now Konya, Turkey), a city of the Seljuq sultanate of Rūm. Ignoring Qïlïch Arslan's attempts to arrange a peace treaty, Manuel led his army across the plains of Anatolia. Slowed by heavy wagons carrying supplies and siege machinery, the Byzantines failed to prevent the Turks from devastating the countryside through which they marched. Making their way up into the Phrygian mountains, the Byzantines arrived at the pass of Tzibritze, which permitted access to the fort of Myriocephalon. The Turkish army massed on the hills flanking the pass.

Manuel's experienced generals warned of impending disaster, but he chose instead to follow the advice of the battle-hungry younger princes, sending the vanguard of the army through the Tzibritze pass. The Turks feigned flight, circling around into the hills, and then charged down the narrow pass onto the main body of the army. Manuel panicked and fled back through the pass, throwing his army into disarray, and the Turkish victory was complete.

Myristicaceae, the nutmeg family of the magnolia order (Magnoliales), best known for the fragrant, spicy seeds of nutmeg (*Myristica fragrans*). The family contains 15 other genera and about 380 species of evergreen trees found throughout moist tropical lowlands. Most species have fragrant wood and leaves. The trees, which are often large, have either male or female petalless flowers, the united sepals of which form a three- to five-lobed funnel or cup. Male flowers have 2 to 20 united stamens; female flowers have a single ovary with one ovule (potential seed). A fleshy covering, known as an aril, surrounds the fluted seed, which has much endosperm (starchy nutritive tissue for the developing embryo). The simple leaves have smooth margins and are alternately arranged along the stem.

The 30-metre (100-foot) Central American tree known as *Virola guatemalense* produces seeds used in flavouring and in the manufacture of candles; the whorled young branches are utilized as eggbeaters. Many of the approximately 38 species of the genus *Virola* provide lumber for local use.

Other genera of the family Myristicaceae are sources of oils, waxes, soaps, and timber. *See also* mace; nutmeg.

myrmekite, irregular, wormy penetration by quartz in plagioclase feldspar; these wartlike, wormlike, or fingerlike bodies may develop during the late stages of crystallization of igneous rocks if the two minerals (quartz and feldspar) grow simultaneously in the presence of a volatile phase. Myrmekite also occurs after the rock crystallizes by replacement of the plagioclase during metasomatism or hydrothermal alteration. In rare cases the plagioclase may be almost completely obliterated by the quartz intergrowths. Although the origin is not always clear, it is evidently a late development in the rock. Acidic rocks, such as granite, most commonly display this feature, especially if the plagioclase feldspar is adjacent to potash feldspar; rocks displaying this feature are said to have a myrmekitic texture.

Myrmidon, in Greek legend, any of the inhabitants of Phthiotis in Thessaly.

According to some authorities, the Myrmidons later crossed over from Thessaly to Aegina. Their name derives from one of two sources: (1) a supposed ancestor, son of Zeus and Eurymedusa, the daughter of King Myrmidon of Thessaly, who was seduced by Zeus in the form of an ant (Greek *myrmēx*), or (2) the re-peopling of Aegina (after all its inhabitants had died of a plague) with ants changed into men by Zeus at the prayer of Aeacus, king of the island. As the fierce and devoted followers of the hero Achilles, their name came to be applied in modern times to subordinates who carry out orders implacably.

Myron (b. Eleutherae; fl. *c.* 480–440 BC), Greek sculptor, an older contemporary of the sculptors Phidias and Polyclitus, considered by the ancients as one of the most versatile and innovative of all Attic sculptors.

Myron was born in Eleutherae, a small town on the border between Attica and Bocotia, and lived most of his life in Athens. The 1st-century writer Pliny cites Myron as the first to achieve lifelike representation in art, but it would be more accurate to say that he was the first Greek sculptor to combine a mastery of movement with a gift for harmonious composition. Working almost exclusively in bronze, he was best known for his many studies of athletes in action. Of his many works, only two representations positively survive: the group of Athena and Marsyas, originally standing on the Acropolis of Athens, and the "Discobolos" ("Discus Thrower"), both in marble copies made in Roman times.

"Discobolos," Roman marble copy of Greek bronze by Myron, *c.* 450 BC; in the National Roman Museum, Rome

Alinari—Art Resource

The group of Athena and Marsyas, described by Pliny, exists in several Roman marble copies. The best version of the Marsyas is in the Lateran collection, Rome; of the Athena, in a collection in Frankfurt. The finest copy of the "Discobolos" is in the National Roman Museum. Both the "Discobolos" and the Athena and Marsyas are dated about 450 BC. In both works Myron has captured that crucial moment of rest at which one motion has just been completed and another is about to begin. The "Discobolos," for example, has just completed his backswing prior to hurling the discus.

There are other works by Myron that have not, as yet, been rediscovered. The most famous of these are "Ladas," which is the statue of an Argive runner and Olympic victor, and a bronze cow that stood in the marketplace of Athens.

myrrh (from Arabic *murr,* "bitter"), bitter-tasting, agreeably aromatic, yellow to reddish brown oleoresinous gum obtained from various small, thorny, flowering trees of the genus *Commiphora,* of the incense-tree family (Burseraceae). The two main varieties of myrrh are herabol and bisabol. Herabol myrrh is obtained from *C. myrrha,* which grows in Ethiopia, Arabia, and Somalia, while bisabol myrrh is obtained from *C. erythraea,* which is an Arabian species of similar appearance. Myrrh trees are found on parched rocky hills and grow up to 3 m (9 feet) tall.

Myrrh was highly esteemed by the ancients; in the Middle East and Mediterranean regions, it was an ingredient of costly incenses, perfumes, and cosmetics and was used in medicines for local applications and in embalming. In medieval Europe myrrh was also regarded as rare and precious; but in modern commerce it is of trifling value. Modern uses are chiefly as an ingredient in dentifrices, perfumes, and stimulating tonics and as a protective agent in pharmaceuticals. Myrrh has slight antiseptic, astringent, and carminative properties and has been employed medically as a carminative and in tinctures to relieve sore gums and mouth. An essential oil distilled from myrrh is a constituent of certain heavy perfumes.

Myrrh exudes as a fluid from resin ducts in the tree bark when the bark splits naturally or is cut in tapping. Upon exposure to air, myrrh hardens slowly into globules and irregular lumps called tears, which are then collected from the trees.

Myrtaceae, the myrtle family of shrubs and trees, in the order Myrtales, containing about 150 genera and 3,300 species that are widely distributed in the tropics. They have rather leathery evergreen leaves with oil glands. Some members of economic importance are the *Eucalyptus,* guava, rose apple, Surinam cherry, and feijoa. Allspice, clove, and oil of bay rum are spices derived from plants of this family. Other members of the family include Brisbane box, *Callistemon, Eugenia, Leptospermum,* myrtle, and jaboticaba (*qq.v.*).

Myrtales, the myrtle order of flowering plants, belonging to the class called dicotyledon (*q.v.;* characterized by two seed leaves). It is composed of 14 families, more than 400 genera, and 10,400 species and is distributed throughout the tropics and warmer regions of the world. The majority of these belong to just two families, Melastomataceae and Myrtaceae. Myrtales includes many trees (notably *Eucalyptus*), shrubs such as the classic myrtle, several food and spice genera, and many ornamental plants.

A brief treatment of Myrtales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

Features of the myrtle order include opposite leaves, flower parts in cycles rather than in spirals, the union of flower parts basally to form a cup around the ovary, and the differentiation of xylem (water-conducting region) around isolated strands of phloem (food-conducting tissues) in the stem.

Woodiness and flower parts arising above the ovary characterize the 150 genera and 3,300 species of the Myrtaceae family. Its dominant genus is *Eucalyptus,* with more than 600 species and many varieties.

Nearly all species of *Eucalyptus* are Australian, where they are classed largely on the appearance and durability of their bark. *E. regnans,* which grows to more than 90 m (300 feet), and *E. diversicolor* furnish much construction timber and quality hardwood. The wood of *E. botryoides,* a relatively small tree, is used in shipbuilding. In addition to lumber, species of *Eucalyptus* provide resins, essential oils, and wood pulp.

Those genera of the myrtle order that produce berry fruits are centred in tropical America. Prized edible fruits include the Surinam cherry (*Eugenia uniflora*) and the jaboticaba (*Myrciaria cauliflora*), both of tropical America, and the rose apple (*Syzygium jambos*) and Java plum (*S. cumini*), both of Southeast Asia. Many are cultivated. The guava (*Psidium guajava*), also ornamentally important, furnishes food that is eaten fresh or made into jelly.

Well-known spices of the Myrtales include the clove (dried flower-buds) of *Syzygium aromaticum,* native to the Old World, and allspice, the unripe berry of *Pimenta dioica,* originally of Central America. The related *P. racemosa* yields oil of bay rum, used in perfumery.

The myrtle of antiquity, *Myrtus communis,* is the best-known ornamental of the myrtle family. Originally from the Mediterranean region, it is planted extensively on many continents. Other horticultural favourites are the tea trees (*Leptospermum*) and the wax-flower (*Chamelaucium*), both of Australia. The crimson bottlebrush (*Callistemon citrinus*) of Australia is prized for its silky-haired branches and showy flowers.

Other well-known ornamentals of Myrtales are loosestrife and crape myrtle, both of the Lythraceae family; and the evening primrose, the day-flowering sundrops, and *Fuchsia* of the Onagraceae family.

The common fireweed (*Epilobium*), which covers mountains following forest fires, propagates by rhizomes in addition to copious production of seed. The swamp loosestrife (*Decadon verticillatus*) of the eastern and central United States populates swamps when its long stems arch downward and root at the tip. Vegetative reproduction, however, is rare in the myrtle order.

Inflorescences of the Myrtales usually are much-branched, either in a panicle (in which flowers open first on lower and outer branches) or in a cyme (in which the earliest flowers are terminal and therefore central as other, lower branches arise).

Flowers are most commonly bisexual (stamens and pistil in one flower), and petals are alike in size and shape (radially symmetrical) and usually separate. Sepals of the calyx and petals of the corolla are in fours or fives depending on the genus. Technically, the bases of sepals, petals, and stamens form a cup (hypanthium); the showy upper portions of these flower parts are displayed from the rim of this structure. In some members of this order, the ovary wall is also joined to the basal portion so that the ovary is inferior in position.

Flowers of a few genera are wind-pollinated but the most common means of pollination is by insects, including bees. Birds pollinate the flowers in some genera. After pollination and fertilization, the ovule becomes the seed and the ovary the fruit. The most common type of fruit is a dry capsule that splits at maturity to release the seeds. Exceptions include the pomegranate, a leathery fruit consisting of distorted ovary chambers filled with juicy seeds. Many genera produce fleshy berries.

myrtle, any of the evergreen shrubs in the genus *Myrtus,* belonging to the family Myrtaceae. Authorities differ widely over the number of species the genus includes. Most occur in South America; some are found in Australia and New Zealand. True myrtles have a central midrib and a major vein just inside and parallel to the leaf margin.

The aromatic common myrtle (*M. communis*) is native to the Mediterranean region and the Middle East and is cultivated in southern England and the warmer regions of North America. In Greco-Roman antiquity, the common myrtle was held to be sacred to Venus and was used as an emblem of love in wreaths and other decorations.

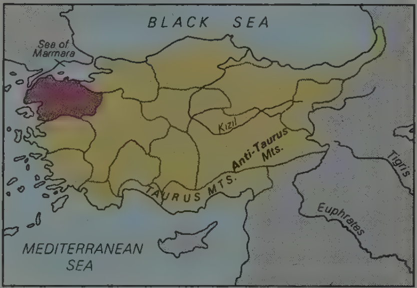
The plant may grow more than 5 m (about 16.5 feet) high. The opposite leaves are thick and lustrous, with many small, translucent, oil-bearing glands. The solitary white flowers, about 1.8 cm (about 0.7 inch) long, are borne on short stalks. The fruit is a purplish black, many-seeded berry. Myrtol, a volatile oil found in most parts of the plant, was formerly used as an antiseptic and tonic.

Variegated, yellow-fruited, and white-fruited varieties of the common myrtle are cultivated for ornament. Other plants known as myrtles are wax myrtle, bog myrtle (or sweet gale), crape myrtle, sand myrtle, gum myrtle, downy myrtle, and the mountain laurel of Oregon and California, the wood of which is often sold as "myrtle." The creeping, or running, myrtle is the periwinkle.

Myrtle Beach, city, Horry county, eastern South Carolina, U.S. It lies along the Atlantic Coast, between the ocean and the Intracoastal Waterway. Myrtle Beach is a year-round resort for golfing, fishing, and swimming. Named for the native myrtle bushes that abound there, the city is the centre of the Grand Strand, a 60-mile- (96-kilometre-) long beach area that extends from the North Carolina border to Pawleys Island. Situated south of the city are Myrtle Beach State Park and Brookgreen Gardens, an outdoor museum of American sculpture. Inc. town, 1938; city, 1961. Pop. (1992 est.) 25,676.

myrtlewood (tree): *see* California laurel.

Mysia, ancient district in northwest Anatolia adjoining the Sea of Marmara on the north and the Aegean Sea on the west. A vague inland perimeter was bounded by the districts of Lydia on the south and Phrygia and Bithynia on the east. Mysia designated a geographic rather than a political territory and encompassed Aeolis, Troas, and the region surrounding Pergamum.



Mysia under the Roman Empire

From W. Shepherd, *Historical Atlas,* Harper & Row, Publishers (Barnes & Noble Books), New York; revision copyright © 1964 by Barnes & Noble, Inc.

Homer mentioned the Mysians (for whom the region was named) as primitive allies of the Trojans, but historically there is no record of their action as an independent nation. Mysia was ruled successively by Lydia, Persia, and Pergamum, after which it was incorporated into the Roman province of Asia (129 BC).

Mysore, city, south-central Karnātaka (formerly Mysore) state, southern India. It lies northwest of Chamundi Hill and midway between the Cauvery and Kabbani rivers on the undulating Deccan plateau at an elevation of 2,525 feet (770 m). The land surrounding the city is characterized by rain-filled shallow depressions (tanks).

The raja's palace at Chamundi Hill, near Mysore, Karnātaka, India

Picturepoint, London

The site was mentioned in the epic *Mahābhārata* as Mahishmati (Mahiṣmatī); it was known as Purigere in the Mauryan era (3rd century BC) and later became Mahishapura. It was the administrative capital of the princely state of Mysore from 1799 to 1831 and remains the second largest city (after Bangalore) of Karnātaka state.

An important manufacturing and trading centre, Mysore has textile (cotton and silk), rice, and oil mills, sandalwood-oil and chemical factories, and tanneries. The suburb of Belagula, to the northwest, produces chrome dyes and chemical fertilizer. The city's industries are powered by the hydroelectric station near Sivasamudram Island to the east. Mysore's cottage industries include cotton weaving, tobacco and coffee processing, and the making of *bidis* (cigarettes). The area is known for its artwork in ivory, metal, and wood, and the market near the railway station serves as a collection centre for local farm products. The city has an airport, lies at the junction of two northern railway lines, and is a major intersection on India's principal western road system.

An ancient fort, rebuilt along European lines in the 18th century, stands in the centre of Mysore. The fort area comprises the Maharaja's Palace (1897) with its ivory and gold throne, Curzon Park, the Silver Jubilee Clock Tower (1927), Gandhi Square, and two statues of maharajas. To the west, near Gordon Park, are the former British residency (1805), the noted Oriental Library, university buildings, and public offices. Jaganmohan Palace and Lalitha Mahal are other notable buildings. The University of Mysore was founded in 1916; other educational facilities include Maharaja's College, Maharani's College for Women, and affiliated colleges of medicine, law, engineering, and teacher training. There are also several institutions for the advancement of Kanarese (Kannaḍa) culture.

Pilgrims frequent Chamundi Hill (about 3,490 feet [1,064 m]) with its monolith of Nandi, the sacred bull of Śiva; the summit affords an excellent view of the Nīlgiri Hills to the south. Krishnarāja Lake, a large reservoir with a dam, lies 12 miles (19 km) northwest of Mysore at the Cauvery River. Spreading below the dam are the terraced Vrindāvan Gardens with their cascades and fountains, which are floodlit at night.

Somnāthpur, to the east, has a temple built (1268) under the Hoysaḷa dynasty. Bandipur Sanctuary, part of the Venugopal Wild Life

Park (1941), is usually approached from Mysore; it is noted for herds of gaur (Indian bison) and spotted deer, has a network of roads for observation, and adjoins Mudumalai Wildlife Sanctuary in Tamil Nādu state.

The area in which Mysore is situated is drained by the Cauvery River and its tributaries. Cotton is grown on large tracts of black soil, and rice, millet, and oilseed are exported. Pop. (1991 prelim.) city, 480,006; metropolitan area, 652,246.

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Mysore Wars (1767–69; 1780–84; 1790–92; 1799), four military confrontations in India between the British and the rulers of Mysore.

About 1761 a Muslim adventurer, Hyder Ali, already commander in chief, made himself ruler of the Hindu state of Mysore and set about expanding his dominions. In 1766 the East India Company joined the Niẓām of Hyderābād against Hyder Ali in return for the cession of the Northern Sarkārs. But the Niẓām abandoned the war in 1768, leaving the British to face Hyder Ali alone. In 1769 Hyder Ali appeared before the company's government in Madras and dictated peace on the basis of the status quo.

In the second war, Hyder Ali joined forces with the Marāthās in 1780 and again devastated the Carnatic. The tide was turned by the dispatch of British help from Calcutta and by the death of Hyder Ali in December 1782. French help came too late to affect the issue. Peace was made with Hyder Ali's son Tippu Sultān by the Treaty of Mangalore (1784).

The third war began in 1790, when Governor-General Lord Cornwallis dropped Tippu's name from the list of the company's "friends." After two campaigns, Tippu was checked at Seringapatam and forced to cede half his dominions (1792).

The fourth war was undertaken by Governor-General Lord Mornington (later Wellesley) on the plea that Tippu was receiving help from France. British troops stormed Seringapatam in May 1799; Tippu died in the fighting and his troops were defeated.

mystery: *see* craft guild.

mystery play, one of three principal kinds of vernacular drama of the European Middle Ages (along with the miracle play and the morality play). The mystery plays, usually representing biblical subjects, developed from plays presented in Latin by churchmen on church premises and depicted such subjects as the Creation, Adam and Eve, the murder of Abel, and the Last Judgment. During the 13th century, various guilds began producing the plays in the vernacular at sites removed from the churches. Under these conditions, the strictly religious nature of the plays declined, and they became filled with irrelevancies and apocryphal elements. Furthermore, satirical elements were introduced to mock physicians, soldiers, judges, and even monks and priests. In England, over the course of decades, groups of 25 to 50 plays were organized into lengthy cycles, such as the Chester plays and the Wakefield plays. In France a single play, *The Acts of the Apostles* by Arnoul and Simon Gréban, contained 494 speaking parts and 61,908 lines of rhymed verse; it took 40 days to perform.

The form in which the mystery plays developed contributed to their demise at the end of the 16th century. The church no longer supported them because of their dubious religious value, Renaissance scholars found little of interest in their great rambling texts, and the general public preferred professional traveling companies that were beginning to arrive from Italy. In England the mystery cycles and miracle plays were suspected of Roman Catholic tendencies and were gradually suppressed.

At their height, the mystery plays were quite elaborate in their production. In England they were generally performed on pageant wagons, which provided both scaffold stage and dressing room and could be moved about readily. In France and Italy, however, a production might take place on a stage 100 feet (30 m) wide, with paradise represented at one end of the stage, hell at the other, and earthly scenes between the two. The plays did not attempt to achieve unity of time, place, and action, and therefore they could represent any number of different geographic locations and climates in juxtaposition. Mechanical devices, trapdoors, and other artifices were employed to portray flying angels, fire-spouting monsters, miraculous transformations, and graphic martyrdoms.

mystery religion, any of various secret cults of the Greco-Roman world that offered to individual initiates a mode of religious experience not provided by the official public religions.

A brief treatment of mystery religions follows. For full treatment, *see* MACROPAEDIA: Mystery Religions.

The word *mystery* derives from the Greek verb *myein* ("to shut," as the mouth or the eyes). The initiate was the *mystes* (plural: *mystae*), and the introducing person the *mystagōgos* ("leader of the *mystes*"). The leaders of the cults included the hierophant (from Greek *hierophantēs,* "revealer of holy things") and the *dadouchos* ("torchbearer"). The constitutive features of the mystery societies, which reached their peak of popularity in the first three centuries of the Christian era, were common meals, dances, and ceremonies, especially initiation rites in which death and resurrection were symbolically represented.

The cult of the grain goddess, Demeter, at Eleusis and later at Athens conducted the most famous of the Greek mysteries; evidence suggests that some type of religious dance or drama, accompanied by singing, retold the myth of Demeter. Dionysus, the Greek god of wine and ecstasy, was worshiped in festivals that included wine-drinking, choral singing, sexual activity, and mime. The Orphic cult, based upon sacred writings attributed to Orpheus, was by contrast a characteristically ascetic one, requiring celibacy and abstinence from meat and wine. The Pythagoreans followed many of the Orphic creeds, combining their emphasis on an afterlife with esoteric beliefs regarding music, mathematics, and astronomy (*see* Pythagoreanism).

The Greek philosopher Plato (4th century BC) assimilated many ideas from earlier Greek religion, especially from the Pythagorean brotherhood and the Eleusinian communities. Later mystery societies, in turn, borrowed freely from the rich imagery of Platonism such concepts as the soul's travels through the spheres of planets and fixed stars, its fall into the body, and its later reward or punishment; some societies also adopted his theories of planetary qualities and the music of the spheres.

With Alexander's conquests in Asia and the growth of world trade, the mysteries began to adopt Oriental religious imagery and elements of sacred kingship. Their rituals spread into Egypt and combined with a belief in the divinity of the pharaonic line. The god Serapis exhibited aspects of both Zeus and Osiris and generated his own royal mysteries, which spread through the Greco-Roman world.

Cults analogous to the Greek mysteries developed in imperial Rome around Dionysus (Bacchus), the Egyptian goddess Isis, the Great Mother in Asia Minor, the Persian god Mithra, the Syrian sun-god Sol, and others.

See also Andania Mysteries; Cabeiri; Dionysus; Eleusinian Mysteries; Eumolpus; hierophantēs.

mystery story, ages-old popular genre of tales dealing with the unknown; it may be a narrative of horror and terror, a pseudoscientific fantasy, a crime-solving story, an account of diplomatic intrigue, an affair of codes and ciphers and secret societies, or any situation involving an enigma. By and large, mystery stories may be divided into two sorts: tales of the supernatural and riddle stories.

Supernatural tales are of ancient origin and form a substantial part of the body of folk literature. But the literary cultivation of fear and curiosity for its own sake began to emerge in the 18th-century pre-Romantic era with the Gothic novel. This genre was invented by a worldly Englishman, Horace Walpole, whose *Castle of Otranto* (1765) may be said to have founded the horror story as a permanent form. Mary Wollstonecraft Shelley introduced the pseudoscientific note in her famous novel *Frankenstein* (1818), about the creation of a monster that ultimately destroys its creator, Dr. Frankenstein.

In the Romantic era the German storyteller E.T.A. Hoffmann and the American writer Edgar Allan Poe raised the mystery story to a level far above mere entertainment through their skillful intermingling of reason and madness, eerie atmosphere and everyday reality. They invested their spectres, doubles, and haunted houses with a psychological symbolism that gave their tales a haunting credibility.

The Gothic influence persisted throughout the 19th century in such works as Joseph Sheridan Le Fanu's *House by the Churchyard* and "Green Tea," Wilkie Collins' *Moonstone,* and Bram Stoker's vampire tale *Dracula.* Later masters of the mystery tale were Ambrose Bierce, Arthur Machen, Algernon Blackwood, Lord Dunsany, and H.P. Lovecraft; but isolated masterpieces have been produced by writers not usually associated with the genre, for example, Guy de Maupassant's "Horla," A.E. Coppard's "Adam and Eve and Pinch Me," Saki's "Sredni Vashtar" and "The Open Window," and W.F. Harvey's "August Heat." Some of the best-known mystery stories owe their power to their development of full-bodied characters in a realistic social environment and the very absence of mysterious atmosphere. In this category are Aleksandr Pushkin's "Queen of Spades" and W.W. Jacob's "Monkey's Paw."

Riddle stories, too, have an ancient heritage. The riddle of Samson, propounded in the Bible (Judges 14:12–18), is the most famous early example, but puzzles were also popular among the ancient Egyptians and the Greeks. The distinguishing feature of the riddling mystery story is that the reader be confronted with a number of mysterious facts and situations, explanation of which is reserved until the end of the story.

Poe's short story "The Gold Bug" is a classic example of one perennially popular type of mystery, the story of a search for lost treasure. In the more sinister field of murder are innumerable tales of roguery involving mystery and crime but without the familiar detective interludes. Two notable riddle stories of modern times offered no solution to the riddle posed and gained wide attention by their novelty: "The Lady or the Tiger" by Frank R. Stockton and "The Mysterious Card" by Cleveland Moffett.

More nearly akin to the detective story than any of these are the spy stories, tales of international intrigue and adventure, entertainingly written by John Buchan, Valentine Williams, Cyril McNeile, William Le Queux, and many others. Two directions taken by the modern spy story were typified by Ian Fleming's enormously popular James Bond thrillers, using technical marvels that approached science-fiction fantasy, and John Le Carré's austerely realistic stories (*e.g., The Spy Who Came in from the Cold,* 1963).

Mystic, historic resort village in the town (township) of Stonington, New London County, southeastern Connecticut, U.S., at the mouth of Mystic River, opposite West Mystic. First settled in 1654, its name was derived from the Indian *missituk* ("great tidal river"). From the 17th to 19th centuries it was a noted shipbuilding and whaling centre. Fast clipper ships were built there, and from its shipyards the first regular iron-clad vessel, "Galena" was launched in 1861. Mystic Seaport reconstructs the sailing ship era, exhibiting along its waterfront the 19th-century whaler "Charles W. Morgan" (now a training ship) and other ships including the square-rigged "Joseph Conrad." A unique row of old sea captains' houses is preserved. Denison Homestead (1717) is a museum displaying life-styles from Colonial times to 1900, and Olde Mysticke Village is a colonial-style recreation-shopping complex. Mystic Marine Life Aquarium features more than 2,000 specimens, and its Marine Theatre is known for its dolphin and sea lion shows.

mystical body of Christ, designation within Christianity signifying a supernatural society uniting all Christians with Christ their head. The concept is rooted in the New Testament and possibly reflects Judaic thought patterns; St. Paul's letters to the Corinthians and Romans both use the image of a body, with a head (Christ) and many members (Christians) to describe the relationship between Christ and Christians. St. Augustine expanded the concept by suggesting that those who were not members of the visible church through no fault of their own may be among the church's invisible members.

Pope Pius XII popularized the phrase in the 1943 encyclical *Mystici Corporis*, in which he discussed the church as the body of Christ. Vatican Council II, in *Lumen Gentium*, reflected the broader, universal nature of the mystical body by stating that all humans are members of the church, at least potentially, because Christ came to offer salvation to everyone.

mysticism, in general, a spiritual quest for hidden truth or wisdom the goal of which is union with the divine or sacred (the transcendent realm). Forms of mysticism are found in all major religions, by analogy in the shamanic and other ecstatic practices of nonliterate cultures, and in secular experience.

The following article is a brief treatment of mysticism. Articles providing fuller treatment appear in the MACROPAEDIA. For the types, goals, and nature of the mystical experience, *see* Religious Experience; for treatment of mysticism in specific religions, *see* Buddhism; Christianity; etc.

Although mysticism is often set over against theology and is said to be more authentic or more subjective or more impassioned, the two forms of religious thought have in fact existed side by side, frequently in the same individual. But this is not the same as saying that a reduction of the mystical experience to its theological implications does it justice. On the contrary, the mystical theologians have been most explicit in their insistence that no theological systematization can capture or explain the unique experience of mystical purgation, illumination, and union.

More perhaps than any other religious system, Hinduism is naturally predisposed to mystical interpretation. As the highest ideal of Hindu religious practice, ascetic *mokṣa* (*q.v.*; "release") has received most attention not only from Western students but from Hindu masters as well. At least in part, Yoga (*q.v.*) represents the rise within traditional Hinduism of a special mystical technique that was intended to make possible for the select few a level of mystical insight originally predicated of the many. The techniques of Yoga were combined with traditional Hindu doctrines about the absorption of the individual soul in the All. Other forms of Hindu mysticism are more personal, relating the devotee to a particular deity of the Hindu pantheon (*e.g.*, Krishna or Shiva), while still others stress the passivity of faith as trust and surrender to the grace and power of the Ultimate Reality.

Common to the various sects of Buddhist thought is an emphasis upon meditation and contemplation as means of moving toward Nirvāṇa (Extinction), but each of the Buddhist traditions sets its own distinctive interpretation on that goal. Of special interest in any discussion of Buddhist mysticism are Vajrayāna and Zen (*qq.v.*). Practitioners of Vajrayāna, or Tantric Buddhism, in Tibet combine Yogic discipline with an absolutistic philosophy and highly symbolic language to cultivate mystical ecstasy. Japanese Zen, on the other hand, because of its practical emphasis and matter-of-fact language, is often interpreted as the direct antithesis of the mystical strain in Buddhism, but its cultivation of *prajñā* ("supreme intuition") over against the partial knowledge attained through ordinary means displays its affinities for mystical thought.

The Ṣūfī mysticism of Islām, like Zen Buddhism, arose in response to the practical religious needs of those for whom conventional answers were inadequate, and it caught up some of the tendencies toward mystical experience that had been indigenous in Islām from the beginning. Ṣūfī mysticism, like numerous other varieties, including Christian, has often expressed itself in the metaphors of intoxication and of the love between bride and bridegroom—language that has not been easy to reconcile with the stress of the Qurʾān upon the sovereignty and transcendence of Allāh. At the same time, mysticism made the reality of the divine more accessible to those who found the "wholly other" god of the Qurʾān too austere and distant.

The foundations for Jewish mysticism were laid in the visions of the biblical prophets and the apocalyptic imagery of postbiblical Judaism. The most characteristic and profound theme of mystical Judaism is the Kabbala (*q.v.*), which reached its climax in the *Sefer ha-zohar* near the end of the 13th century. This "Book of Splendour" described the power and inner life of God and set forth the principles and commandments by means of which the true believer could regain the *devequt* ("adherence to God") that had been destroyed by the fall of man from pristine purity. Upon this zoharic wisdom subsequent Jewish mysticism continued to build. The Hasidic form in particular (*see* Ḥasidism) had far-reaching effects upon the piety and practice of the common people; in the form it took in the thought of Martin Buber it shaped both Christian and secular thought as well.

In contrast to the systematized esoteric traditions that characterize Eastern mysticism, the mystical aspects of Christianity have been manifested most clearly in a recurring pattern of movements. Gnosticism, an early Christian heretical movement that stressed the intrinsic evil of matter, appears to represent the survival of Jewish mysticism with Zoroastrian and other Oriental overtones. In the religion of Paul and John "Christ-mysticism," frequently spontaneous and unsought, is fundamental. The Desert Fathers of the 3rd and 4th centuries established an eremitic tradition of conscious preparation and practice for mystical enlightenment. Augustine's account of the divine Light of being drew upon Neoplatonic themes and imagery that would figure strongly in the literature of subsequent mystics, perhaps culminating in Meister Eckehart (died 1329), who emphasized the reality of the ideal world, in which all things are eternally present as elements in the being of God. Mysticism flourished in the 14th century both within the Church and in numerous heresies, a dichotomy that was to characterize several later periods. In general, Protestant mystics explicitly recognize—what is implied in Catholic teaching—that the divine Light or Spark is a universal principle.

The history of Western philosophy since the Middle Ages includes a form of thought best characterized as cosmic mysticism, perhaps most brilliantly expounded as a philosophical system by Benedictus de Spinoza and in literature by Johann Wolfgang von Goethe. According to this view, in a universe that often seemed to be absurd and threatening, man could find meaning by identifying himself with its structures and purposes and by cultivating attitudes of reverence and commitment. During the modern period, the relation between mystical vision and literary inspiration, as exemplified in works from the ancient epics to the poetry of William Blake, Stéphane Mallarmé, and others, became a major issue in aesthetics.

myth, a story, usually of unknown origin and at least partially traditional, that ostensibly relates actual events to explain some practice, belief, institution, or natural phenomenon, and that is especially associated with religious rites and beliefs. The word mythology denotes both the study of myth and the total corpus of myths in a particular culture or religious tradition.

A brief treatment of myth and mythology follows. For full treatment, *see* MACROPAEDIA: Myth and Mythology.

The authority of myth is implied rather than stated. Myths relate the paradigmatic events, conditions, and deeds of gods or superhuman beings that are outside ordinary human life and yet basic to it. These extraordinary events are set in a time altogether different from historical time, often at the beginning of creation or at an early stage of prehistory. Myths provide models for human behaviour, institutions, or universal conditions.

Features of myth are shared by other kinds of literature. Etiological tales explain the origins or causes of various aspects of nature or human society and life. Fairy tales deal with extraordinary beings and events but lack the authority of myth. Sagas and epics claim authority and truth but reflect specific historical settings.

The modern study of myth arose with the Romantic movement of the early 19th century, but interpretations of myth were offered much earlier. The influence of philosophy in ancient Greece led to allegorical views of myth or to the historical reductionism of Euhemerus (fl. 300 BC), who believed that the gods of myth were originally simply great people. The development of comparative philology in the 19th century, together with ethnological discoveries in the 20th, established the main contours of mythology, the science of myth. Since the Romantics, all study of myth has been comparative. Wilhelm Mannhardt, Sir James Frazer, and Stith Thompson employed the comparative approach to collect and classify the themes of folklore and mythology. Bronisław Malinowski emphasized the ways myth fulfills common social functions. Claude Lévi-Strauss and other structuralists have compared the formal relations and patterns in myths throughout the world.

Sigmund Freud put forward the idea that symbolic communication does not depend on cultural history alone but also on the workings of the psyche. Thus Freud introduced a transhistorical and biological conception of man and a view of myth as an expression of repressed ideas. Carl Jung extended the transhistorical, psychological approach with his theory of the "collective unconscious" and the archetypes, often encoded in myth, that arise out of it.

Some scholars, like the German theologian

Rudolf Otto and Mircea Eliade, a historian of religion, hold that myth is to be understood solely as a religious phenomenon, irreducible to nonreligious categories. Scholars of the so-called Myth and Ritual School contend that any myth functions, or at one time functioned, as the "explanation" of a corresponding ritual. That connections between myths and rituals often exist is undeniable, but which came first is far from certain. And although there are probably no rituals without accompanying myths, there are myths without apparent complementary rituals.

Because they are thought to be the repository of truth and knowledge, myths are supposed to help control the universe or to make man's activities in it efficacious. Cosmogonic myths in particular, which relate the origins of the cosmos, are recited in many cultures in conjunction with the enthronement of kings or other events on which depend the well-being of the world. Closely connected to accounts of the origin of the cosmos are myths relating the origin of man or the institutions of society. Eschatological myths deal with the end of the world, while other myths explain the relation between eternity and mundane time. Myths sometimes revolve around cultural heroes, who made the earth habitable for mankind, or around great beings who made salvation from earthly existence possible. Myths explain how evil and death were introduced into life, or they may tell how fundamental knowledge was "forgotten" and "remembered."

Mytilene, Modern Greek MITILÍNI, chief town of the island of Lesbos and of the *nomós* (department) of Lesbos, Greece. Mytilene, whose name is pre-Greek, is also the seat of a metropolitan bishop of the Orthodox church. The ancient city, lying off the east coast, was initially confined to an island that later was joined to Lesbos, creating a north and south harbour. Mytilene contested successfully with Methymna in the north of the island for the leadership of the island in the seventh century BC and became the centre of the island's prosperous hinterland. From the 6th century BC the city suffered from dictators, wars with Athens, Persian conquest, and civil revolts. It was made a free city under the Romans. From 1355 to 1462 the Gateluzzi family occupied the island, rebuilding (1373) the Byzantine fortress. In 1462 Lesbos fell to the Turks, who held it until 1912, when it joined the Greek kingdom. In 1958 a Greek theatre, overlooking the town from the hillside, was excavated. Pop. (1981) 24,115.

The harbour and town of Mytilene from the citadel, Lesbos, Greece

Tomas Friedmann—Photo Researchers

Mytishchi, also spelled MYTIŠČI, city, centre of a *rayon* (sector), Moscow *oblast* (province), western Russia, situated northeast of the city of Moscow. Mytishchi's importance in the past derived from its position on the road between Moscow and the Trinity–St. Sergius Monastery. It was the source of Moscow's water supply until the 20th century. In 1908 Mytishchi became the site of the first artificial-fibre factory in Russia. Since its incorporation in 1925, the city has become a centre of machine building, especially transport machinery. Pop. (1989 prelim.) 154,000.

Mývatn, shallow lake, northern Iceland, 30 miles (48 km) east of Akureyri, drained by the Laxá River, which flows northward to the Greenland Sea. Nearly 6 miles (9.5 km) long and 4 miles (6.5 km) wide and covering an area of 14 square miles (37 square km), it is the fourth largest lake in Iceland. It attracts many tourists. Mývatn is dotted with volcanic islands and is surrounded by numerous craters, hot springs, and a variety of lava formations. The lake and the river draining it are noted for salmon, trout, and char fishing. Diatomaceous earth is mined from the lake bottom and processed nearby.

Lava formations in Mývatn, Iceland

J. Allan Cash

myxedema, physiological reaction to lack of sufficient thyroid hormone (hypothyroidism) in the adult. It can be brought about by removal of the thyroid for any cause, by a cessation of function of the gland, or simply by glandular atrophy.

The changes come on gradually: enlarged tongue; thickened skin with underlying fluid causing puffiness, particularly in the face around the eyelids and in the hands; drowsiness; apathy; sensitivity to cold; failure to menstruate (amenorrhea) or excessive menstrual bleeding (menorrhagia); cardiac enlargement; and lowering of the basal metabolic rate. The outlook for recovery, when treatment is with dessicated thyroid, is excellent. Therapy must be maintained permanently.

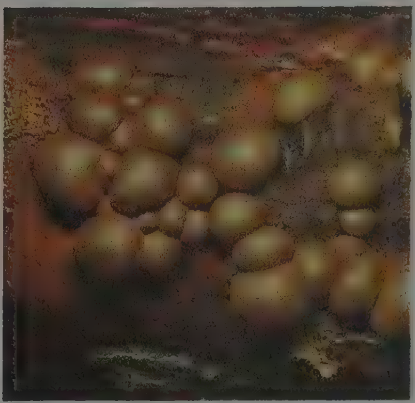
Excesses of the antidiuretic hormone (vasopressin) in myxedema may produce low blood sodium (hyponatremia). Other endocrine glands may be affected by the shortage of thyroid hormone: the gonadotropins, adrenocorticotropin (ACTH), and growth hormone may be decreased. Ovarian dysfunction in myxedema is different in the primary and secondary types. In the former, menstrual flow may be more frequent, prolonged, and excessive. In the latter, if associated losses of gonadotropins are present, the menses cease. In the male, sexual activity and sperm production decrease. Fertility is reduced in both sexes. Myxedema may also cause delayed sexual maturation (which can be corrected by thyroid replacement), but sexual precocity can also occur. Adrenocortical function may become decreased in myxedema either because of loss of pituitary ACTH, a direct effect of hypometabolism on the adrenals, or as a consequence of decreased utilization of, and therefore decreased need for, cortisol. These are temporary changes. At times, the myxedema is accompanied by permanent primary hypofunction of the adrenal cortices (Addison's disease; also called Schmidt's syndrome). Also, circulatory responses to epinephrine (adrenaline) secreted by the adrenal medulla are decreased in hypothyroidism.

myxomatosis, formally INFECTIOUS MYXOMATOSIS, or MYXOMATOSIS CUNICULI, a highly fatal infectious viral disease of rabbits. It is characterized by fever, swelling of the mucous membranes, and the presence on the skin of tumours composed of mucous tissue. The disease exists naturally in populations of certain South American rabbits of the genus *Sylvilagus* and has been introduced into western Europe and Australia as a means of rabbit population control.

Myxomycetes, also called MYCETOZOA, phylum of funguslike organisms within the kingdom Protista, commonly known as true slime molds. They exhibit characteristics of both protozoans (one-celled microorganisms) and fungi. Distributed worldwide, they usually occur in decaying plant material. About 500 species have been described.

The vegetative (active, growing, feeding) phase consists of a multinucleate amoeboid mass or sheet (plasmodium). This gives rise to fruiting structures (sporangia) with one to many spores at the head of a stalk. In nearly all species, spores are borne within the sporangium. In *Ceratiomyxa,* spores are apparently borne externally; each, however, may be a much-reduced sporangium with a true spore within.

Upon germination, a spore releases one or more individual cells known as myxamoebas, which may transform into so-called swarm cells with two flagella (whiplike structures used



Lycogala, a common myxomycete of wood, whose sporangia resemble small puffballs

Walter Dawn

in swimming). The swarm cells often revert to the amoeboid stage. Formerly, it was believed that reproduction involved the nonsexual fusion of swarm cells, but the process is now thought to be sexual.

The plasmodium, with cytoplasm streaming through it, changes shape as it crawls over or within damp wood, leaves, or soil, ingesting bacteria, molds, and fungi. Characteristically, the entire plasmodium is covered by a layer of slime, which is continually secreted and, as the plasmodium creeps, continually left behind as a network of collapsed tubules. Plasmodia are frequently yellow and orange, but they may also be colourless, red, white, buff, maroon, or, rarely, blue, black, or green.

Myxophyta, also called CYANOBACTERIA, division of algae the members of which are commonly known as blue-green algae (*q.v.*).

myxosporidian, any parasite of the phylum Myxosporidia, also called Myxospora, traditionally placed in the kingdom Protista. The Myxosporidia are characterized by complex spores having at least one infective amoeboid sporoplasm and one or more polar capsules containing coiled, extrusible filaments. Although they are primarily parasites of fish, myxosporidians also attack amphibians and reptiles. Infection may be fatal; common infective sites are the hollow organs (gallbladder, urinary bladder), skin, muscles, and gills. After the spores are ingested by an animal, the spore wall breaks down, releasing the sporoplasm, which migrates to an organ or tissue to feed and develop and ultimately to produce new spores. Representatives are *Unicapsula muscularis,* the cause of wormy disease in halibut; *Myxobolus pfeifferi,* the cause of boil disease in barbels; and *Myxosoma cerebralis,* the cause of twist disease in salmonid fishes.

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myxovirus, any of a group of viruses of the families Orthomyxoviridae (agents of influenza) and Paramyxoviridae, members of which can cause the common cold, mumps, and measles in humans, canine distemper, rinderpest in cattle, and Newcastle disease in fowl. The virus particle is enveloped in a fatty membrane; is variable in shape, from spheroidal to filamentous, and in size, from 60 to 300 nanometres (1 nanometre $= 10^{-9}$ metre) in longest dimension; is studded with spikelike protein projections; and contains ribonucleic acid (RNA). These viruses react with mucin (mucoprotein) on the surface of red blood cells (hence the prefix *myxo-*, Greek for "mucin"); many of them cause red cells to clump together (agglutinate). *Compare* retrovirus.

M'zab, region containing five towns, one of the major groups of oases of the Sahara, central Algeria. It was founded in the early 11th century by M'zabite Berbers. The M'zab was annexed to France in 1882 and reverted to Algeria in 1962.

The oases stretch along the Wadi M'zab and are surrounded by *chebka,* arid country crossed by dry riverbeds. The region comprises the Pentapolis, five walled towns of varying size and importance; the houses in the towns rise in brightly coloured cubes along the banks of the wadi. An assembly of 12 scholars (*ḥalqah*) administers the five towns.

Ghardaïa is the chief settlement, while el-Ateuf is the oldest. Beni Isguene is the sacred town of the M'zabite League, barring all nonmembers of the sect from some sections of the town and all strangers from spending the night within its walls. Melika, populated by black Africans, contains large cemeteries. Bou Nouara, built on a rock overhanging the river bed, is the poorest of the towns. The other towns, Guerrera and Berriane, were added to the Pentapolis in the 17th century.

Minaret of the mosque at Ghardaïa, M'zab oasis, in central Algeria
Bernard P. Wolff—Photo Researchers

Date-palm groves of legendary lushness extend 5 miles (8 km) upstream and are watered from six dams built across the river. The sound of the pulleys of more than 4,000 wells, called the "Song of M'zab," is giving way to that of motor pumps. Fruit, cereals, and legumes are grown beneath the palms. A small industrial zone and natural gas piped from Hassi R'Mel are helping to modernize the area.

M'zabite, also spelled MOZABITE, also called M'ZAB, or BENI M'ZAB, member of a Berber people who inhabit the M'zab oases of southern Algeria. Members of the Ibāḍīyah subsect of the Muslim Khārijite sect, the M'zabites are descendants of the Ibāḍī followers of ʿAbd ar-Raḥmān ibn Rustam, who were driven from Tiaret (now Tagdempt) and took refuge (probably in the 9th century) in the desert. According to tradition, they arrived at Sedrata, near present-day Ouargla, in 911, and a century later, choosing, for reasons of defense, the most inhospitable region that they could find, they settled along the Wadi M'zab, their first settlement being El-Ateuf, in approximately 1010.

The form of Islām practiced by the M'zabites is extremely strict, egalitarian, and separatist. No non-Ibāḍī is admitted into a M'zabite mosque. The code of morals is rigid, and the standards of religious purity are high. For this reason, M'zabites do not marry outside their sect, and in consequence they are physically quite homogeneous, tending to be short and thickset and to have a short, broad face. The women are heavily veiled and never leave the community. The men, however, are found throughout Algeria, running small businesses, often groceries, but returning to the oasis periodically. The M'zabites produce a variety of handicrafts, including pottery, brassware, jewelry, and carpets; there is a carpet festival in the spring.

Tombs in a M'zabite cemetery at Melika, Alg.
Klaus D. Francke—Peter Arnold, Inc.

An immense palm grove, the result of perfected methods of cultivation, provides work for the population between May and December. Scientific approaches to the distribution of water (according to a strict and complicated code) and the construction of dams have been effectively carried out, and the lushness of the M'zab gardens is legendary.

Mzilikazi, also spelled UMSILIGASI, or MOZELEKATSE (b. *c.* 1790, near Mkuze, Zululand [now in South Africa]—d. Sept. 9, 1868, Ingama, Matabeleland [near Bulawayo, now in Zimbabwe]), South African king who founded the powerful Ndebele (Matabele) kingdom in what is now Zimbabwe. The greatest Bantu warrior after Shaka, king of the Zulus, Mzilikazi took his Kumalo people more than 500 miles (800 km) from what is now South Africa to the region now known as Zimbabwe, creating en route an immense and ethnically diverse nation. Mzilikazi was a statesman of considerable stature, able to weld the many conquered tribes into a strong, centralized kingdom.

Originally a lieutenant of Shaka, he revolted against the Zulu king in 1823 and withdrew his people northward to safety from their home on the southeast coast of Africa. He traveled to Mozambique and then west into the Transvaal, settling there by 1826. Continued attacks by coalitions of his enemies caused him to move west again to what is now Botswana and, in 1837, northward to present-day Zambia. Unable to conquer the Kololo nation there, Mzilikazi moved his followers, now numbering 15,000 to 20,000, eastward into what is now southwestern Zimbabwe, where he settled Matabeleland (*c.* 1840). He organized the country in a militaristic system of regimental towns strong enough to repel Boer attacks (1847–51) and to force the Boer government in the Transvaal to conclude a peace with him in 1852.

Mzilikazi was generally friendly to European travelers, but the discovery of gold in Matabeleland in 1867 brought a flood of Europeans that he was unable to control and that eventually led to the downfall of the kingdom.

Mzimba, town, northwestern Malaŵi. Formerly the Angoni administrative centre, the town has declined in importance since 1940. The surrounding region includes the Mzimba Plain, the northern extension of the Central Region Plateau, Mount Hora (5,742 feet [1,750 m]), and the Vipya Highlands. Poor soils support subsistence agriculture, as well as a Turkish tobacco cash crop. Pop. (1987 prelim.) 7,735.

N-Town plays, an English cycle of 42 scriptural (or "mystery") plays dating from the second half of the 15th century and so called because an opening proclamation refers to performance "in N. town." Since evidence suggests that the cycle was not peculiar to one city or community but traveled from town to town, the abbreviation "N." would indicate that the appropriate name of the town at which the cycle was being presented would have been inserted by the speaker.

The cycle is preserved in the Hegge Manuscript, so called after its 17th-century owner, Sir Robert Hegge, and it is therefore sometimes referred to as the Hegge cycle. On the flyleaf of the Hegge Manuscript is written "Ludus Conventriae" ("Play of Coventry"), and until the 19th century it was believed that the plays represented the Coventry cycle, until individual plays from Coventry were discovered and found to be totally different from equivalent plays in the N-Town cycle. Some scholars have attempted to show that the N-Town cycle is closely related to that (lost) cycle, which was performed at Lincoln.

The cycle begins with the creation of the angels and the Fall of Lucifer and ends with the Assumption of the Virgin and the Last Judgment. Among the plays with no equivalent in other cycles are one on the death of Cain and five whose central figure is that of the Virgin, with whom the cycle is generally much preoccupied. Typically the N-Town plays are grave and dignified; the comic relief distinguishing other surviving cycles (from Chester, York, Wakefield) is markedly absent. A basic difference between the N-Town plays and those of the other cycles is that this cycle, because it was a traveling one, was apparently presented by professional actors. It did not use pageant wagons, whereby plays were presented as a procession, but was given in a single open space, with "mansions" (indicating general scenes) set up about a single acting area. The performances may have taken place over two successive days.

Na-Dené languages, major grouping (phylum or superstock) of North American Indian languages, consisting of three language families—Athabascan (or Athapascan), Haida, and Tlingit—with a total of 22 languages. Of these languages 20 belong to the Athabascan family; they are spoken in the Northwest Territory, the Yukon, and adjacent parts of Canada, west to Cook Inlet in Alaska; in two isolated areas of the Pacific coast (southwestern Oregon and northern California); and in the southwestern United States (mostly in New Mexico and Arizona). Tlingit and Haida are each single languages making up separate families; they are spoken, respectively, in southeastern Alaska and British Columbia. The major language of the Na-Dené group is Navajo, spoken by large Indian populations in Arizona and New Mexico. It is one of the few North American Indian languages whose speakers are increasing in number. Other large languages of the phylum are Western Apache, spoken in western Arizona, and the Chipewyan dialects of the Northwest Territories in Canada.

Characteristic of many American Indian languages is a polysynthetic word structure, in which words are made up of many so-called bound elements (which cannot stand by themselves but only in conjunction with other elements). A single polysynthetic word may incorporate the information it would take an entire sentence to say in English. The Na-Dené languages are somewhat polysynthetic, although not as much so as the Algonquian or Eskimo languages; words are often built up from a number of loosely bound elements. More typical of the Na-Dené languages, however, is the use of tones to distinguish otherwise identical words. Navajo uses two pitches in this way—high, represented by an acute accent (´), and low, represented by a grave accent (`). Thus, in Navajo, *yààzííd* means "you pour it down," and *yààzììd* means "I have poured it down." Other characteristics of the Na-Dené languages are a clear distinction between active and static verbs, a greater emphasis on verb aspect and voice than on tense, and frequent derivation of verbs from nouns.

na gCopaleen, Myles: *see* O'Brien, Flann.

NAACP: *see* National Association for the Advancement of Colored People.

Naas, Irish AN NÁS, market and garrison town (urban district) and county seat of County Kildare, Ireland. Naas was one of the royal seats of the ancient province of Leinster, and St. Patrick, the patron saint of Ireland, is said to have visited it. After the Anglo-Norman invasion (12th century and following), a castle (the north moat of which survives) was built there. Naas was an important town in the medieval period and is now the administrative centre of County Kildare. Pop. (1986) 10,017.

Nabadwīp, formerly NADIA, city, southeastern West Bengal state, northeastern India, at the confluence of the Bhāgīrathi and Jalangi rivers. The Bhāgīrathi River has shifted its course, cutting the city off from the rest of the district. Reputedly founded in 1063, the town served as the ancient capital of the Sena dynasty. Called the Vārānasi of Bengal, it is an important pilgrimage centre, famous for its sanctity. Caitanya (1486–1533), a Hindu mystic who founded the Vaiṣṇava sect, was born there. It is also noted for its traditional Sanskrit schools. Metalware and brass manufacture are major industries. Constituted a municipality in 1869, it has colleges affiliated with the University of Calcutta. Pop. (1991 prelim.) city, 125,247; metropolitan area, 156,117.

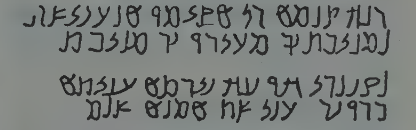
Nabataean, member of a people of ancient Arabia whose settlements lay in the borderlands between Syria and Arabia, from the Euphrates River to the Red Sea. Little is known about them before 312 BC, when they were unsuccessfully attacked by Demetrius I Poliorcetes, king of Macedonia, in their mountain fortress of Petra south of the Dead Sea. Their monopoly on the rich caravan trade that passed from the Arabian interior to the coast was the chief source of their prosperity.

As the Seleucid kingdom grew weaker in the 2nd century BC, the Nabataean kingdom increased in strength and extended its frontiers to the north and east and probably to the south along the eastern coast of the Red Sea. The Nabataeans occupied Ḥawrān, and shortly after 85 BC their king Aretas III ruled Damascus and Coele Syria (Lebanon). Upon the Roman general Pompey's entry into Palestine (63 BC), Aretas became a Roman vassal, retaining Damascus and his other conquests; Damascus, however, was later annexed by the Roman emperor Nero (reigned AD 54–68).

Nabataean obelisk tomb in Petra in modern Jordan

Julian Huxley

The final period of Nabataean history was one of peaceful prosperity as allies of Rome. Hellenistic influences may be traced in the royal coinage and in the rock-cut architecture at Petra. When the Roman emperor Trajan annexed the kingdom (AD 105–106) and set up the new province of Arabia, Bostra (Bozrah), east of the Jordan River, was chosen in place of Petra as the provincial capital.



Nabataean inscription

From *The Alphabet* by David Diringer. Copyright 1948 by David Diringer. With permission of Funk & Wagnalls Publishing Company, Inc. and Hutchinson Publishing Group Ltd.

Nabataean alphabet, writing system used between approximately 150 BC and AD 150 in the Nabataean kingdom of Petra in the Arabian Peninsula. Used by the Nabataeans to write the Aramaic language, this alphabet was related to the Aramaic alphabet, one of the major Semitic scripts. The Nabataean script gave rise to the neo-Sinaitic alphabet, the ancestor of the Arabic alphabet. Like its Semitic precursors, Nabataean had 22 letters, all representing consonants, and was written from right to left. Nabataean inscriptions have been found in Egypt and Italy and on coins from Petra. A bilingual inscription in Nabataean and Greek scripts was discovered on the Aegean island of Kos.

Nabaṭīyah at-Taḥtā, an-, town, southern Lebanon. It is the major centre of tobacco growing in Lebanon. Other agricultural products are grapes, olives, figs, and grains. Most of the inhabitants of the town are Shīʿite Muslims. A main road crosses the region connecting an-Nabaṭīyah at-Taḥtā to Sidon via the road along the Mediterranean Coast, to Marj ʿUyūn, and southeastward to the Israeli border and the occupied al-Qunaytirah sector of Syria. The surrounding region includes the southern ranges of the Lebanon Mountains that descend southward toward the hills of Galilee. Pop. (1985 est.) 100,000.

Nabbes, Thomas (b. 1605, Worcestershire, Eng.—buried April 6, 1641, London), English dramatist and writer of verse, one of a number of lesser playwrights of the period. He is perhaps best known for his masques.

Nabbes attended Exeter College, Oxford, in 1621, but he left the university without taking a degree. He began his writing career in London in about 1630. His first comedy, *Covent Garden,* was dedicated to Sir John Suckling and was performed in 1632 or 1633. The comedies *Totenham Court* (perf. 1633) and *The Bride* (perf. 1638) met with some success, but his tragedies—especially *The Unfortunate Mother* (1640)—were not appreciated and were considered by many to be third-rate. He wrote a number of masques and occasional verses, most of which demonstrate some skill. All of Nabbes' works, with the exception of his continuation of Richard Knolles's *Generall Historie of the Turkes* (1638), were reprinted in A.H. Bullen's *Old English Plays* (1887).

Naberezhnye Chelny, formerly (until 1930) CHELNY, from 1982 to 1988 BREZHNEV, city, Tatarstan, west-central Russia, on the left bank of the Kama River. The city is best known for its Kama truck plant, the world's largest. Also located at Naberezhnye Chelny is the Lower Kama hydroelectric station. Because of these developments, Naberezhnye Chelny experienced rapid growth beginning in the 1970s. Pop. (1991 est.) 513,100.

Nabeul (Tunisia): *see* Nābul.

Nābha, city, southeastern Punjab state, northwestern India. It is located some 16 miles (26 km) west and slightly north of Patiāla. Nābha (founded 1755) was the capital of the princely state of Nābha, established in 1763 and composed of 12 scattered territories claimed by a member of the Sikh Phulkian family. In 1807–08 the raja gained British protection against threatened encroachments by Ranjit Singh. During the 1857 mutiny of the Bengal army, the raja was loyal to the British and was rewarded by grants of territory. In 1948, after India became independent, Nābha joined a union of five Phulkian states, which eventually merged into Punjab state.

The city of Nābha is a trading centre for millet, wheat, chick-pea (gram), cloth fabrics, and sugar. Cotton ginning, wool carding, handloom weaving, and embroidery are also done there. The city has a college. Pop. (1991 prelim.) 54,079.

Nabī Mind, Tall an- (Syria): *see* Kadesh.

nabid bug (insect): *see* damsel bug.

Nābighah, an-, in full AN-NĀBIGHAH ADH-DHUBYĀNĪ, original name ZIYĀD IBN MUʿĀWIYAH (fl. *c.* 600), one of the pre-Islāmic Arab poets whose works were collected in the *Muʿallaqāt.*

Nābighah belonged to the tribe of Dhubyān. The origin of his name is uncertain, as are details of his early life. He lived in luxury and favour for many years at the court of the Lakhmid Arab kings of al-Ḥīrah in Iraq, incurring the jealousy of the other courtiers. According to one story, which seems to be supported by his later poetry, his enemies forged a satire against the king, Nuʿmān, who was so enraged that Nābighah had to leave al-Ḥīrah in great haste. He moved to the court of the Ghassānids, enemies of the Lakhmids, in Syria. Nābighah became a favourite of the court of Ghassān, interceding several times on behalf of his tribesmen during their wars and defeats. He never ceased to assert his innocence to Nuʿmān and eventually returned to al-Ḥīrah.

One of the most highly respected of the pre-Islāmic poets, Nābighah possessed a grave and sensitive style, full of imagination and fine imagery. His verse, mainly eulogies and satires on tribal strife, displays an impressive command of language and its artifices. *See also* Muʿallaqāt, al.

Nabis (d. 192 BC), last ruler (207–192) of an independent Sparta. Nabis carried on the revolutionary tradition of Kings Agis IV and Cleomenes III. Since ancient accounts of him are mainly abusive, the details of his laws remain obscure, but it is certain that he confiscated a great deal of property and enfranchised many helots (Spartan serfs). He undoubtedly was not the monster depicted by the Greek historian Polybius.

Overshadowed by the struggle between Rome and Philip V of Macedonia, Nabis adroitly maintained his power. After the Peace of Phoenice (205) between Rome and Macedonia, he went to war with the Achaean League. The league's general, Philopoemen, rescued Messene from him and later defeated him at Scotitas in Laconia. In 197 Nabis acquired Argos from Philip V of Macedonia, who was then at war with Rome, and kept it by coming to terms with the Roman commander Titus Quinctius Flamininus. But Flamininus, having defeated Philip, proclaimed the Greek states autonomous, accused Nabis of tyranny, took Gythium in Laconia, and forced Nabis to surrender Argos. He tried to recover Gythium when the Romans left in 194 but was badly defeated by Philopoemen north of Sparta. Eventually the Aetolians, as part of their scheme to precipitate war between Rome and Antiochus III of Syria, murdered Nabis and temporarily occupied Sparta.

Nabis, group of artists who, through their widely diverse activities, were a major influence on the art produced in France during the late 19th century. Preaching that a work of art is the end product and visual expression of an artist's synthesis of nature into personal aesthetic metaphors and symbols, they paved the way for the early 20th-century development of abstract and nonrepresentational art.

The Nabis were greatly influenced by Japanese woodcuts, French Symbolist painting, and English Pre-Raphaelite art. Their primary inspiration, however, stemmed from the so-called Pont-Aven school which centred upon the painter Paul Gauguin. Under Gauguin's direct guidance, Paul Sérusier, the group's founder, painted the first Nabi work, "Landscape at the Bois d'Amour at Pont-Aven" (also called the "Talisman," 1888).

"Children Leaving School," Nabis painting by Pierre Bonnard, *c.* 1895; in the National Gallery of Art, Washington, D.C.

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Armed with his painting and the authority of Gauguin's teachings, Sérusier returned to Paris from Pont-Aven and converted many of his artist friends, who received his aesthetic doctrines as a mystical revelation. Assuming the name Nabis (from Hebrew *navi,* "prophet," or "seer"), the original members of the group were the French artists Maurice Denis (with Sérusier the group's main theoretician), Pierre Bonnard, Henri-Gabriel Ibels, Ker-Xavier Roussel, Paul Ranson, Édouard Vuillard, and René Piot. Later, a Dutch painter, Jan Verkade, and the Swiss-born Félix Vallotton joined the group, as did two French sculptors, Georges Lacombe and Aristide Maillol.

In 1891 the Nabis held their first exhibition, attempting in their works to illustrate Denis's dictum: "A picture, before being a war horse, a nude woman, or some anecdote, is essentially a flat surface covered by colours in a certain order." They soon began to apply this idea to such varied works as posters, stained glass, theatre sets, and book illustrations. But dissensions and desertions quickly occurred within the group, which finally disbanded in 1899. Only Vuillard and Bonnard, who came to call themselves Intimists, and Maillol continued to produce major works of art.

Nablus (West Bank): *see* Nābulus.

Nabokov, Vladimir, in full VLADIMIR VLADIMIROVICH NABOKOV (b. April 22, 1899, St. Petersburg, Russia—d. July 2, 1977, Montreux, Switz.), Russian-born American novelist and critic, the foremost of the post-1917 émigré authors. He wrote in both Russian and English, and his best works, including *Lolita* (1955), feature stylish, intricate literary effects.

Nabokov was born into an old aristocratic family. His father, V.D. Nabokov, was a leader of the pre-Revolutionary liberal Constitutional Democratic Party (Kadets) in Russia and was the author of numerous books and articles on criminal law and politics, among them *The Provisional Government* (1922), which was one of the primary sources on the downfall of the Kerensky regime. In 1922, after the family had settled in Berlin, the elder Nabokov was assassinated by a reactionary rightist while shielding another man at a public meeting; and although his novelist son disclaimed any influence of this event upon his art, the theme of assassination by mistake has figured prominently in Nabokov's novels. Nabokov's enormous affection for his father and for the milieu in which he was raised is evident in his autobiography *Speak, Memory* (revised version, 1967).

Nabokov published two collections of verse, *Poems* (1916) and *Two Paths* (1918), before leaving Russia in 1919. He and his family made their way to England, and he attended Trinity College, Cambridge, on a scholarship provided for the sons of prominent Russians in exile. While at Cambridge he first studied zoology but soon switched to French and Russian literature; he graduated with first-class honours in 1922 and subsequently wrote that his almost effortless attainment of this degree was "one of the very few 'utilitarian' sins on my conscience." While still in England he continued to write poetry, mainly in Russian but also in English, and two collections of his Russian poetry, *The Cluster* and *The Empyrean Path,* appeared in 1923. In

Nabokov, 1968

© Philippe Halsman

Nabokov's mature opinion, these poems were "polished and sterile."

Between 1922 and 1940 Nabokov lived in Germany and France, and, while continuing to write poetry, he experimented with drama and even collaborated on several unproduced motion-picture scenarios. By 1925 he settled upon prose as his main genre. His first short story had already been published in Berlin in 1924. His first novel, *Mashenka* (*Mary*), appeared in 1926; it was avowedly autobiographical and contains descriptions of the young Nabokov's first serious romance as well as of the Nabokov family estate, both of which are also described in *Speak, Memory.* Nabokov did not again draw so heavily upon his personal experience as he had in *Mashenka* until his episodic novel about an émigré professor of entomology in the United States, *Pnin* (1957), which is to some extent based on his experiences while teaching (1948–58) Russian and European literature at Cornell University, Ithaca, N.Y.

His second novel, *King, Queen, Knave,* which appeared in 1928, marked his turn to a highly stylized form that characterized his art thereafter. His chess novel, *The Defense,* followed two years later and won him recognition as the best of the younger Russian émigré writers. In the next five years he produced four novels and a novella. Of these, *Despair* and *Invitation to a Beheading* were his first works of importance and foreshadowed his later fame.

During his years of European emigration, Nabokov lived in a state of happy and continual semipenury. All of his Russian novels were published in very small editions in Berlin and Paris. His first two novels had German translations, and the money he obtained for them he used for butterfly-hunting expeditions (he eventually published 18 scientific papers on entomology). But until his best-seller *Lolita,* no book he wrote in Russian or English produced more than a few hundred dollars. During the period in which he wrote his first eight novels, he made his living in Berlin and later in Paris by giving lessons in tennis, Russian, and English and from occasional walk-on parts in films (now forgotten). His wife, the former Véra Evseyevna Slonim, whom he married in 1925, worked as a translator. From the time of the loss of his home in Russia, Nabokov's only attachment was to what he termed the "unreal estate" of memory and art. He never purchased a house, preferring instead to live in houses rented from other professors on sabbatical leave. Even after great wealth came to him with the success of *Lolita* and the subsequent interest in his previous work, Nabokov and his family (he and his wife had one son, Dmitri) chose to live (from 1959) in genteelly shabby quarters in a Swiss hotel.

The subject matter of Nabokov's novels is principally the problem of art itself presented in various figurative disguises. Thus, *The Defense* seemingly is about chess, *Despair* about murder, and *Invitation to a Beheading* a political story, but all three works make statements about art that are central to understanding the book as a whole. The same may be said of his plays, *Sobytiye* ("The Event"), published in 1938, and *The Waltz Invention.* The problem of art again appears in Nabokov's best novel in Russian, *The Gift,* the story of a young artist's development in the spectral world of post-World War I Berlin. This novel, with its reliance on literary parody, was a turning point: serious use of parody thereafter became a key device in Nabokov's art. His first novels in English, *The Real Life of Sebastian Knight* (1941) and *Bend Sinister* (1947), do not rank with his best Russian work. *Pale Fire* (1962), however, a novel consisting of a long poem and a commentary on it by a mad literary pedant, extends and completes Nabokov's mastery of unorthodox structure, first shown in *The Gift* and present also in *Solus Rex,* a Russian novel that began to appear serially in 1940 but was never completed. *Lolita* (1955), with its antihero, Humbert Humbert, who is possessed by an overpowering desire for very young girls, is yet another of Nabokov's subtle allegories: love examined in the light of its seeming opposite, lechery. *Ada* (1969), Nabokov's 17th and longest novel, is a parody of the family chronicle form. All of his earlier themes come into play in the novel, and, because the work is a medley of Russian, French, and English, it is his most difficult work. (He also wrote a number of short stories and novellas, mostly written in Russian and translated into English.)

Nabokov's major critical works are an irreverent book about Nikolay Gogol (1944) and a monumental four-volume translation of, and commentary on, Pushkin's *Eugene Onegin* (1964). What he called the "present, final version" of the autobiographical *Speak, Memory,* concerning his European years, was published in 1967, after which he began work on a sequel, *Speak On, Memory,* concerning the American years.

As Nabokov's reputation grew in the 1930s so did the ferocity of the attacks made upon him. His idiosyncratic, somewhat aloof style and unusual novelistic concerns were interpreted as snobbery by his detractors—although his best Russian critic, Vladislav Khodasevich, insisted that Nabokov's aristocratic view was appropriate to his subject matters: problems of art masked by allegory.

Nabokov's reputation varies greatly from country to country. Until 1986 he was not published in the Soviet Union, not only because he was a "White Russian émigré" (he became a U.S. citizen in 1945) but also because he practiced "literary snobbism." Critics of strong social convictions in the West also generally hold him in low esteem. But within the intellectual émigré community in Paris and Berlin between 1919 and 1939, V. Sirin (the literary pseudonym used by Nabokov in those years) was credited with being "on a level with the most significant artists in contemporary European literature and occupying a place held by no one else in Russian literature." His reputation after 1940, when he changed from Russian to English after emigrating to the United States, mounted steadily until the 1970s, when he was acclaimed by a leading literary critic as "king over that battered mass society called contemporary fiction." (A.Fi.)

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Nabonidus, also spelled NABU-NA'ID ("Reverer of Nabu"), king of Babylonia from 556 until 539 BC, when Babylon fell to Cyrus, king of Persia. After a popular rising led by the priests of Marduk, chief god of the city, Nabonidus, who favoured the moon god Sin, made his son Belshazzar coregent and spent much of his reign in Arabia. Returning to Babylon in 539 BC, he was captured by Cyrus' general Gobryas and exiled.

Nabonidus, stone stela, 6th century BC; in the British Museum

By courtesy of the trustees of the British Museum

Nabu, Hebrew NEBO, major god in the Assyro-Babylonian pantheon. He was patron of the art of writing and a god of vegetation. Nabu's symbols were the clay tablet and the stylus, the instruments held to be proper to him who inscribed the fates assigned to men by the gods. In the Old Testament, the worship of Nebo is denounced by Isaiah (46:1).

Samsuditana, the last king of the 1st dynasty of Babylon (reigned 1625–1595 BC), introduced a statue of Nabu into Esagila, the temple of Marduk, who was the city god of Babylon. Not until the 1st millennium BC, however, did the relationship between Marduk and Nabu and their relative positions in theology and popular devotion become clear. Marduk, the father of Nabu, took precedence over him, at least theoretically, in Babylonia. But in popular devotion it was Nabu, the son, who knows all and sees all, who was chief, especially during the centuries immediately preceding the fall of Babylon. He had a chapel named Ezida in his father's temple Esagila, where at the New Year feast he was installed alongside Marduk. In his own holy city, Borsippa, he was supreme.

Goddesses associated with Nabu were Nana, a Sumerian deity; the Assyrian Nissaba; and the Akkadian Tashmetum, queen of Borsippa, stepdaughter of Marduk, and, as her abstract Akkadian name indicates, Lady of Hearing

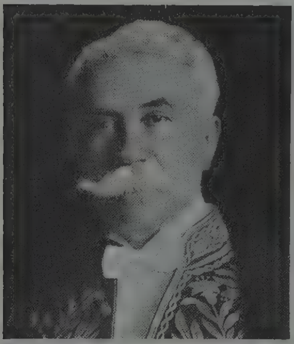
Nabu, statue from the entrance of the Temple of Nabu, Nimrūd, about 780 BC; in the British Museum

By courtesy of the trustees of the British Museum and of Favour. She was rarely invoked apart from her husband, Nabu, whose name means "speaking." Thus, while Nabu speaks, Nana listens.

Nabu-na'id (ancient Babylonian king): *see* Nabonidus.

Nabu-rimanni, also spelled NABURIANOS, NABURIANNUOS, NABURIANNU, or NABURIMANNU (fl. *c.* 491 BC, Babylonia), the earliest Babylonian astronomer known by name, who devised the so-called System A, a group of ephemerides, or tables, giving the positions of the Moon, Sun, and planets at any given moment. Based on centuries of observation, these tables were nonetheless somewhat crude and were superseded about a century later by Kidinnu's System B, a refined mathematical method for finding celestial positions more accurately. Both systems were in use simultaneously between 250 and 50 BC. Naburimanni also calculated the length of the synodic month (from New Moon to New Moon) to be 29.530614 days, as compared with the modern value of 29.530596 days.

Nabuco de Araújo, Joaquim Aurelio Barreto (b. Aug. 19, 1849, Recife, Braz.—d. Jan. 17, 1910, Washington, D.C.), statesman and diplomat, leader of the abolitionist movement in Brazil, and man of letters.



Nabuco de Araújo

By courtesy of the Library of Congress, Washington, D.C.

Nabuco was a member of an old aristocratic family in northeastern Brazil. Both in the national Chamber of Deputies (from 1878) and in the Brazilian Anti-Slavery Society, which he founded, he worked tirelessly for the emancipation of Brazil's slaves, which was proclaimed on May 13, 1888. In the ensuing economic disruption, the emperor Pedro II was overthrown (1889) and a republic was established.

Nabuco, a confirmed monarchist, retired from public life until 1900, when he accepted the republic and entered its service. From 1905, as ambassador to the United States, he distinguished himself as an advocate of Pan-Americanism.

Among Nabuco's writings are *Camões e Os Lusíadas* (1872) and *O Abolicionismo* (1883), both in Portuguese, and *Pensées détachées et souvenirs* (1906), in French.

Nābul, also spelled NABEUL, Latin NEAPOLIS, town, northeastern Tunisia, on the Hammamet Gulf. Formerly a Phoenician settlement, it was destroyed by the Romans in 146 BC and later rebuilt as a Roman colony called Neapolis. It is a noted pottery and ceramics handicraft centre and the eastern terminus of a railroad from Tūnis, 40 miles (65 km) northwest. Other industries include stone cutting, quarrying (chalk), citrus fruit and flower growing, viticulture, and the manufacture of perfume.

Nābul lies on Cape Bon peninsula. The coastal region, especially to the southwest, is a popular beach-resort area. Pop. (1984) town, 39,531.

Nābulus, also spelled NABLUS, biblical Hebrew SHECHEM, or SICHEM, Greek NEAPOLIS, city of central Palestine, the largest community of the West Bank (Judaea and Samaria) territory under Israeli administration since 1967. The city lies in an enclosed, fertile valley and is the market centre of a natural oasis that is watered by numerous springs.

Shechem, a Canaanite city, was important in ancient Palestine because of its position in an east–west pass between Mount Gerizim and Mount Ebal (Arabic Jabal aṭ-T̄ur and Jabal ʿAybāl, respectively), one of the few such routes in Palestine's hill country. Its ruins are under the stratified mound of Tall al-Balatah, just east of the present city, which shows evidence of settlement from the Middle Bronze II period (*c.* 1900–*c.* 1750 BC), generally associated with the time of the biblical patriarchs. In the Bible it is first mentioned in Genesis 12:6, where, after coming into Canaan, "Abram passed . . . to the place at Shechem, to the oak [or terebinth] of Moreh." Jacob bought land there, and it was the site of the rape of his daughter Dinah by the son of the local Hivite chieftain, and of her brothers' subsequent revenge (Genesis 34). The city is mentioned in Egyptian documents of the 19th century BC. During the rule of the Hyksos kings of Egypt (16th–17th century BC), Shechem was a strong walled city, with a triple gate, a fortress-temple, and an acropolis. Some of the sites specifically mentioned in the Book of Judges have tentatively been identified by archaeologists.

Later, after King Solomon's death, the 10 northern tribes of Israel revolted in Shechem against Solomon's son Rehoboam and installed Jeroboam as king in his place (I Kings 12). After the Assyrian conquest of the northern Kingdom of Israel (722 BC), the city of Shechem declined. It was resettled by the Samaritans, who established their sanctuary on adjacent Mount Gerizim, and was important in the Hellenistic period but was destroyed by the Maccabean ruler John Hyrcanus (reigned 135/134–104 BC).

The later city of Nābulus is not identical with the ancient site, but the two have been closely (though erroneously) linked for almost 2,000 years. Both rabbinic and early Christian literature commonly equated Nābulus with ancient Shechem, and Nābulus has been called Shekhem in Hebrew to the present. Founded under the auspices of the Roman emperor Vespasian in AD 72 and originally named Flavia Neapolis, it prospered because of its strategic site and the abundance of nearby springs. Later called Julia Neapolis, or simply Neapolis (Greek: "New City"), it is portrayed on the 6th-century Ma'dabā map (*see* Ma'dabā). It was conquered by the Arabs in AD 636; the modern name is an Arabic corruption of the Greek form. It was held by the Christian crusaders from 1099 until 1187; they called it Naples, and it was briefly the crusader capital.

Though it is the principal centre of the numerically tiny Samaritan community, Nābulus has been a Muslim Arab city for centuries. In modern times, it was part of the Palestine mandate from 1923 until 1948; taken by Arab forces in the Arab–Israeli war of 1948–49, it was subsequently annexed to Jordan. A principal centre of Arab opposition both to Britain and to the Zionist movement during the mandate, it was the scene of frequent unrest. Much of the city was destroyed in a severe earthquake in 1927. The economy, both under the mandate and under Jordanian rule, was based on agricultural trade and handicrafts. An important and long-established industry is the manufacture of soap from olive oil. A centre of terrorist activities against Israel from 1948 to 1967, it was the southern anchor of "the triangle" of Arab guerrilla centres (Nābulus, Ṭūl Karm, Janīn). Resistance to Israeli occupation continued after the Six-Day War of 1967, but by the early 1970s the situation had tempered; in 1972, Nābulus was the site of the first all-West Bank agricultural fair. After the war of October 1973, Nābulus once again became a centre of Arab unrest toward the occupying forces.

Notable places include the Jāmiʿ al-Kabīr and Jāmiʿ an-Nasr mosques, which are built on the remains of Byzantine churches; the old Samaritan quarter; and the traditional site of "Jacob's Well," south of the city. Pop. (1984 est.) 80,000.

Nacaome, city, southern Honduras, on the seasonally dry Nacaome River. It was founded in 1535 and given city status in 1845. Its colonial church, rebuilt in 1867, still stands. Nacaome is a manufacturing and commercial centre. Cement products are made in the city, which also contains tanneries. The surrounding agricultural lands yield principally sesame and cotton. Gold and silver are mined at El Tránsito, just west of the city. Nacaome is on the Pan-American Highway, and from nearby Jicaro a highway leads northward to Tegucigalpa, the national capital. Pop. (1988 prelim.) mun., 38,378.

Nachi-katsuura, town, Wakayama *ken* (prefecture), Honshu, Japan, facing the Pacific Ocean. Lying within Yoshino-Kumano National Park, the town is a summer resort renowned for its proximity to more than 40 waterfalls. The main fall is one of the highest in Japan, dropping 427 feet (130 m); it is approached through a large gate set in a grove of ancient cedars. The 7th-century Seiganto Temple is an important Shintō pilgrimage centre. Nearby is the highly venerated Kumano-Nachi Shrine, dedicated to the Shintō god of the sea and founded in the 4th century. Pop. (1990) 20,611.

The main Nachi Waterfall, Wakayama *ken* (prefecture), Japan

Kokunai Jigyo Kouku

Nachičevan (Azerbaijan): *see* Nakhichevan.

Nachikufan industry, industry of the African Late Stone Age practiced by hunting-gathering peoples who occupied the wooded plateaus of south-central Africa some 10,000–11,000 years ago. The Nachikufan tool industry is characterized by projectiles with several kinds of microlithic heads, heavy stone scrapers that were probably used for working wood and its by-products, flattish stones with centre-bored holes that served either as parts of a spring trap or for digging-stick weights, edge-ground axes, and grindstones for the preparation of wild foodstuffs.

Nachodka (Russia): *see* Nakhodka.

Nachtigal, Gustav (b. Feb. 23, 1834, Eichstedt, Brandenburg—d. April 19, 1885, at sea, off Cape Palmas, Liberia), explorer of the Sahara who helped Germany obtain protectorates in western equatorial Africa. After spending several years as a military surgeon, he went to Tunisia as physician to the bey (ruler) and took part in several expeditions to the interior. In 1868 the king of Prussia, William I, sent him on a mission to the kingdom of Bornu, now in northern Nigeria. He travelled by way of central Sahara regions then unknown to Europeans, including the Tibesti and Borkou regions, which today lie within northern Chad. From Bornu he crossed the sultanate of Baguirmi, also in Chad, and, continuing by way of the Kordofan province of the Sudan, reached Cairo in November 1874. *Sahărâ und Sûdân* (1879–81) gives an account of his expedition. While serving as German consul at Tunis (1882–84), he was sent by Bismarck to western Africa ostensibly to make trade agreements but secretly to help secure German protectorates over regions now in Togo and Cameroon.

Nachtigal, detail from an engraving by V. Froer

Historia-Photo

Nacka, town in the *län* (county) of Stockholm, southeastern Sweden, on the Södertörn peninsula of the *landskap* (province) of Södermanland. A southeastern suburb of Stockholm, it developed into a residential and industrial area with the coming of the railroad in 1893, and in 1949 was incorporated as a town. Leading industries include chemical technology, flour milling, and the manufacture of motors. Pop. (1991 est.) mun., 64,056.

Nacogdoches, city, seat (1837) of Nacogdoches county, eastern Texas, U.S., near the Angelina River, 140 mi (225 km) north-northeast of Houston. It originated in 1716 when a Spanish mission (Nuestra Señora de Guadalupe) was established near a Nacogdoche Indian village. Abandoned in 1718, the site was settled in 1779 when Antonio Gil Y'barbo built the Old Stone Fort (reconstructed on the campus of Stephen F. Austin State University [1923]). The old Nacogdoches University building (1845) is on the high school campus. In Nacogdoches, Hayden Edwards declared Texas independent (1826) and attempted to organize the Republic of Fredonia, but he was quickly driven out by Mexican officials. The pioneer home of Adolphus Sterne, a founder of the Republic of Texas, houses the Hoya Memorial Library and Museum. The city's economy depends chiefly on poultry, dairying, feed processing, truck crops, lumbering, and tourism. Sam Rayburn Dam and Reservoir and the Angelina, Davy Crockett, and Sabine national forests are within a radius of 35 miles. Inc. 1837. Pop. (1990) 30,872.

nacrite, clay mineral, a form of kaolinite (*q.v.*).

Nadar, pseudonym of GASPARD-FÉLIX TOURNACHON (b. April 5, 1820, Paris—d. March 21, 1910, Paris), French writer, caricaturist, and photographer who is remembered primarily for his photographic portraits, which are considered to be among the best done in the 19th century.

As a young man, he studied medicine in Lyon, Fr., but, when his father's publishing house went bankrupt in 1838, he was forced to earn his own livelihood. He began to write newspaper articles that he signed "Nadar." In 1842 Nadar settled in Paris and began to sell caricatures to humour magazines.

By 1853, although he still considered himself primarily a caricaturist, he had become an expert photographer and had opened a portrait studio. Nadar's immediate success stemmed partly from his sense of showmanship. He had the entire building that housed his studio painted red and his name printed in gigantic letters across a 50-foot (15-metre) expanse of wall. The building became a local landmark and a favourite meeting place of the intelligentsia of Paris. When, in 1874, the painters later known as Impressionists needed a place to hold their first exhibit, Nadar lent them his gallery. He was greatly pleased by the storm the exhibit raised; the notoriety was good for business.

In 1854 he completed his first "Panthéon-Nadar," a set of two gigantic lithographs portraying caricatures of prominent Parisians. When he began work on the second "Panthéon-Nadar," he made photographic portraits of the persons he intended to caricature. His portraits of the illustrator Gustave Doré (*c.* 1855) and the poet Charles Baudelaire (1855) are direct and naturally posed, in contrast to the stiff formality of most contemporaneous portraits. Other remarkable character studies are those of the writer Théophile Gautier (*c.* 1855) and the painter Eugène Delacroix (1855).

Nadar was a tireless innovator. In 1855 he patented the idea of using aerial photographs in mapmaking and surveying. It was not until 1858, however, that he was able to make a successful aerial photograph, the world's first, from a balloon. This led Daumier to issue a satirical lithograph of Nadar photographing Paris from a balloon. It was titled "Nadar Raising Photography to the Height of Art."

Nadar remained a passionate aeronaut until he and his wife and other passengers were injured in an accident in *Le Géant,* a gigantic balloon he had built.

In 1858 he began to photograph by electric light, making a series of photographs of Paris sewers. And, in 1886, he made the first "photo interview," a series of 21 photographs of the French scientist Eugène Chevreul in conversation. Each picture was captioned with Chevreul's responses to Nadar's questions, giving a vivid impression of the scientist's personality. Nadar also wrote novels, essays, satires, and autobiographical works.

Nadel, S(iegfried) F(rederick) (b. April 24, 1903, Vienna—d. Jan. 14, 1956, Canberra, Australia), Austrian-born British anthropologist whose investigations of African ethnology led him to explore theoretical questions.

Before turning to anthropology Nadel pursued musical interests. He wrote a biography of the Italian composer Ferruccio Benvenuto Busoni and a work on musical typology, and he toured with his own opera company. In 1932 he entered the London School of Economics, encountering anthropologists C.G. Seligman and Bronisław Malinowski. He made his first expedition to the Nupe and other Nigerian peoples (1934–36) and then examined the Nuba of the Anglo-Egyptian Sudan (1938–40). His first major work, *A Black Byzantium* (1942), dealing with the Nupe, analyzed the theoretical basis of his ethnographic method. In *The Nuba* (1947) he examined structural constants shared by ten tribal groups.

Nadel was a reader in anthropology at the University of Durham in England (1948–50) and professor of anthropology at the University of Canberra (1950–56). Apart from *Nupe Religion* (1954), his other works are theoretical and reveal the influence of, among others, Malinowski, the sociologist Max Weber, the philosopher Alfred North Whitehead, and the psychologist Kurt Koffka. In *The Foundations of Social Anthropology* (1951) he asserted that the main task of the science is to explain as well as to describe aim-controlled, purposive behaviour. Suggesting that sociological facts emerge from psychological facts, he indicated that full explanations are to be derived from psychological exploration of motivation and consciousness. In his posthumous *Theory of Social Structure* (1958), sometimes regarded as one of the 20th century's foremost theoretical works in the social sciences, Nadel examined social roles, which he considered to be crucial in the analysis of social structure.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Nadelman, Elie (b. Feb. 20, 1882, Warsaw—d. Dec. 28, 1946, New York City), sculptor whose mannered, curvilinear human figures greatly influenced early 20th-century U.S. sculpture. Nadelman left home at 19 and, after brief attendance at the Warsaw Art Academy, spent six months in Munich studying the city's art collection. In 1903 he was in Paris, where he worked independently but was influenced by Rodin. In 1905 Nadelman began his analysis of the relationship between sculptural volume and geometry. His research culminated in the series of drawings *Toward a Sculptural Unity* (published 1914). His first one-man show in Paris (1909) was a sensational success, as was his 1915 exhibition at Alfred Stieglitz' gallery. At this time he began making his characteristic humorous manikins—*e.g.,* "Man in the Open Air" (*c.* 1915; Museum of Modern Art, New York City)—which were possibly influenced by the doll collection he had once studied in Munich's Bayerischen Nationalmuseum. In his late work he turned from humour and caricature to a decorative commercial style. A sensitive portraitist and masterful architectural sculptor, Nadelman worked in his last decade on small-scale sculpture fitted to modern domestic living.

"Man in the Open Air," bronze figure by Elie Nadelman, c. 1915; in the Museum of Modern Art, New York City

Collection, The Museum of Modern Art, New York, gift of William S. Paley (by exchange)

Nader, Ralph (b. Feb. 27, 1934, Winsted, Conn., U.S.), American lawyer and consumer advocate, a leader of the consumer protection movement.

The son of Lebanese immigrants, Nader graduated from Princeton University (1955) and received a law degree from Harvard (1958). He soon became interested in unsafe vehicle designs, which had led to high rates of automobile accidents and fatalities. He became a consultant to the U.S. Department of Labor in 1964, and in 1965 he published *Unsafe at Any Speed,* which criticized the American auto industry for its unsafe products and attacked the Corvair automobile, manufactured by the General Motors Corporation (GM) in particular. The book became a best-seller and led directly to the passage of the 1966 National Traffic and Motor Vehicle Safety Act, which gave the government the power to enact safety standards for all automobiles sold in the United States.

GM went to exceptional lengths to discredit Nader, including hiring a private detective to follow him. Nader sued for invasion of privacy, and the case was settled after GM admitted wrongdoing before a committee of the U.S. Senate. With funds from the settlement and aided by impassioned activists, who became known as Nader's Raiders, he helped establish a number of advocacy organizations, most notably the Washington, D.C.-based Public Citizen. Nader's Raiders became involved in issues such as nuclear safety, international trade, regulation of insecticides, meat processing, pension reform, land use, and banking.

Although Nader and his associates did not invent the idea of consumer advocacy, they radically transformed it by focusing on fact-finding research, analysis, and governmental lobbying. Nader was also instrumental in the passage in 1988 of California's Proposition 103, which provided for a rollback of auto insurance rates.

Nader, who collected 700,000 votes when he ran for U.S. president in 1996, was the Green Party's nominee in the 2000 U.S. presidential election. His campaign focused on universal health care, environmental and consumer protections, campaign finance reform, and strengthened labour rights. His support in public opinion polls hovered around 5 percent—the minimum necessary to secure federal matching funds for the Green Party for future presidential campaigns—throughout the campaign, which threatened to siphon vital liberal support from Democratic candidate Al Gore. As the election approached, his support dropped, and he managed to secure only 3 percent of the national vote.

Nadezhdinsk (Russia): *see* Serov.

Nadia (town, West Bengal state, India): *see* Nabadwīp.

Nadiād, city, east-central Gujarāt state, west-central India. It is situated in the lowlands between the Vindhya Range and the Gulf of Cambay (an extension of the Arabian Sea). Nadiād is a major industrial and commercial centre and a road and rail junction. Pop. (1991) 167,051.

Nādir Shāh, also spelled NĀDER SHĀH, original name NĀDR QOLĪ BEG, also called ṬAHMĀSP QOLĪ KHAN (b. Oct. 22, 1688, Kobhān, Ṣafavid Iran—d. June 1747, Fatḥābād), Iranian ruler and conqueror who created an Iranian empire that stretched from the Indus River to the Caucasus Mountains.

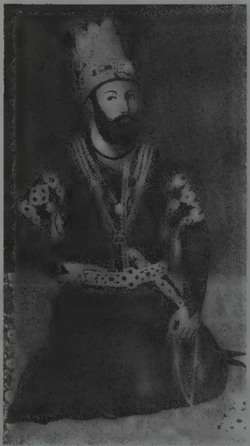
Nādr Qolī Beg had an obscure beginning in the Turkish Afshar tribe, which was loyal to the Ṣafavid shahs of Iran. After serving under a local chieftain, Nādr formed and led a band of robbers, showing marked powers of leadership. In 1726, as head of this group of bandits, he led 5,000 followers in support of the Ṣafavid shah Ṭahmāsp II, who was seeking to regain the throne his father had lost four years earlier to the Ghilzay Afghan usurper Maḥmūd. Nādr reformed Iran's military forces and utterly defeated the Ghilzay Afghans in a series of brilliant victories, after which he restored Ṭahmāsp to the Iranian throne.

Nādr then attacked and routed the Ottoman Turks, who had occupied adjacent areas of Azerbaijan and Iraq. Meanwhile, Ṭahmāsp had rashly attacked the Turks while Nādr was absent quelling a revolt in Khorāsān, but the shah was heavily defeated and was forced to conclude peace with the Turks on ignominious terms. Enraged at this, Nādr hurried back, deposed Ṭahmāsp, placed the latter's infant son on the throne, and declared himself regent. After sustaining a defeat at the hands of the Turks in Iraq, Nādr revenged himself by driving them completely out of Iran. Then, by threatening Russia with war, he forced that nation to relinquish its Caspian provinces to Iran. In 1736 Nādr deposed the youthful ʿAbbās III (as Ṭahmāsp II's son was styled) and ascended the Iranian throne himself, taking the title of Nādir Shāh.

With the navy he proceeded to build, Nādir Shāh was able not only to take Bahrain from the Arabs but also to invade and conquer Oman. In February 1739, after capturing several cities of the Mughal Empire of northern India, he moved against the main Mughal armies at Karnāl, India. He won the battle and entered Delhi, returning to Iran with vast amounts of loot, including the fabulous Peacock Throne and the Koh-i-noor diamond. He then attacked the Uzbeks around the cities of Bukhara and Khiva; his empire had reached its furthest expansion and rivaled the territorial extent of the ancient Iranian empires.

In 1741, after an assassination attempt on him had failed, Nādir Shāh suspected his eldest son of complicity and had him blinded. He also attempted to make the largely Shīʿite populace of Iran adopt the Sunnī form of Islām. In 1743 Nādir Shāh again attacked the Ottoman Turks, but revolts in Iran forced him to conclude a truce. He renewed hostilities with the Turks as soon as possible, winning a great victory over them near Yerevan. Peace was concluded in 1746.

Although brilliantly successful as a soldier and general, Nādir Shāh had little talent for statesmanship or administration, and Iran became utterly exhausted during the later years of his reign. Tens of thousands of people perished in his ceaseless military campaigns, and the exactions of his tax gatherers ruined the country's economy. Nādir Shāh had always been harsh and ruthless, but these traits became more pronounced as he grew older. His suspiciousness and capricious cruelty continued to grow, and wherever he went he had people tortured and executed. The consequence was that revolt after revolt against him occurred. In the end he was assassinated by his own troops while attempting to crush an uprising in Khorāsān. Nādir Shāh's only interests were war and conquest. Once, when informed that there was no warfare in paradise, he remarked: "How then can there be any delights there?"


Nādir Shāh, painting by an unknown artist, c. 1740; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

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Nador, city, northeastern Morocco. The city is a small Mediterranean port on the Bou Areg Lagoon and a trading centre for fish, fruits, and livestock. It is linked to the Spanish *plaza* (North African enclave) of Melilla, 9 miles (15 km) north, by road and railway. Pop. (1994) 112,450.

Næstved, city, Storstøm *amtskommune* (county commune), southern Sjælland (Zealand), Denmark, on the Suså River. Næstved originated around a Benedictine monastery, founded in 1135. The monks moved at the end of the 12th century, and the town developed as a market centre for southern Sjælland (chartered 1426). Chief among its medieval landmarks are Sankt Peder Church, the only survival of the monastery; the later Gothic St. Morten's Church; and the Helligåndshuset, the remains of a medieval hospital, now a museum. North of Næstved is the Herlufsholm school for boys (founded in 1565), resembling an English public (*i.e.,* "private") school, with a 12th-century chapel. The city's industries include the manufacture of paper, glass, pottery, and textiles. A small harbour supports fishing. Pop. (1999 est.) city, 39,264; mun., 46,427.

Naevius, Gnaeus (b. *c.* 270 BC, Capua, Campania [Italy]—d. *c.* 200 BC, Utica [now in Tunisia]), second of a triad of early Latin epic poets and dramatists, between Livius Andronicus and Ennius. He was the originator of historical plays (*fabulae praetextae*) that were based on Roman historical or legendary figures and events.

Naevius chronicled the events of the First Punic War (264–261) in his *Bellum Poenicum,* relying for facts upon his own experience in the war and on oral tradition at Rome. The scope of the tale and the forceful diction qualify it as an epic, showing a marked advance in originality beyond the *Odusia* of Livius and making it a probable influence upon the *Annales* of Ennius and on Virgil's *Aeneid.*

Näfels, Battle of (April 9, 1388), major victory for the Swiss Confederation in the first century of its struggle for self-determination against Habsburg overlordship. Though the catastrophic defeat of the Austrians at Sempach in 1386 had been followed by a truce, hostilities against the Habsburgs were subsequently continued by the rebellious men of Glarus, a district that had adhered to the confederacy in 1352 but had been restored to the Habsburgs in 1355. After the expiration of the truce (February 1388), the Habsburg Albert III of Austria advanced with an army against Glarus; but the rebels, reinforced by troops from Schwyz, first checked the invasion by holding the heights above Näfels, at the northern entrance to their valley, and then repelled it by a bloody counterattack. Further Swiss offensives achieved more successes, and in April 1389 a seven-year truce was ratified by Duke Albert, who allowed the Swiss to keep their alliances and their conquests intact.

NAFTA: *see* North American Free Trade Agreement.

Nafṭah, also spelled NEFTA, oasis town, southwestern Tunisia. It lies on the northwest shore of Al-Jarīd saline lake, which is an important source of phosphates. It was known to the Romans as Aggarsel Nepte. Nafṭah has many small mosques and is a date-growing and trans-Saharan transport centre. The larger oasis of Tawzar (Tozeur) is 15 miles (24 km) east-northeast. Pop. (1989 est.) 17,216.

Nafūd, An-, desert, northern Saudi Arabia, covering about 25,000 square miles (64,000 square km). The reddish, sandy An-Nafūd (Arabic: "The Desert") is sometimes called the Great Nafud; it lies at an elevation of 3,000 feet (900 m) and has some watering places and grass that provide for nomadic herding and agriculture. The desert has been a barrier to travel for ages; its frequent sandstorms shape immense dunes. A historic caravan route runs from northwest to southeast connecting the oases of Al-Jawf with those of Ḥāʾil.

Nafūsah Plateau, Arabic JABAL NAFŪSAH, Nafūsah also spelled NEFUSA, hilly limestone massif, northwestern Libya. It extends in a west-northeasterly arc between Al-Jifārah (Gefara) plain and Al-Ḥamrāʾ Plateau. With heights ranging from 1,500 to 3,200 feet (460 to 980 m), the plateau runs east for 120 miles (190 km) from the Tunisian border to the Kiklah Trough and then curves northeast for 93 miles (150 km), ending in hills near the Mediterranean coast at Al-Khums. It is crowned by a plateau from 12 to 16 miles (19 to 26 km) wide, covered by scrub bush and grasses on the north and barren basalt and lava rock on the south. Rainfall varies from 2 to 16 inches (51 to 406 mm). There is scattered cultivation of olives, figs, apricots, grains, tobacco, and esparto grass (which is used for cordage, shoes, and paper), and nomadic herds are grazed. Towns include Nālūt, Jādū, Yafran, and Gharyān.

Nag Hammadi (town, Egypt): *see* Najʿ Ḥammādī.

naga, Sanskrit NĀGA ("serpent"), in Hindu and Buddhist mythology, a member of a class of semidivine beings, half human and half serpentine. They are considered to be a strong, handsome race who can assume either human or wholly serpentine form. They are regarded as being potentially dangerous but in some ways are superior to humans. They live in an underground kingdom called Nāga-loka, or Pātāla-loka, which is filled with resplendent palaces, beautifully ornamented with precious gems. Brahmā is said to have relegated the nagas to the nether regions when they became too populous on earth and to have commanded them to bite only the truly evil or those destined to die prematurely. They are also associated with waters—rivers, lakes, seas, and wells—and are generally regarded as guardians of treasure. Three notable nagas are Śeṣa (or Ananta), who in the Hindu myth of creation is said to support Vishnu-Nārāyaṇa as he lies on the cosmic ocean and on whom the created world rests; Vāsuki, who was used as a churning rope to churn the cosmic ocean of milk; and Takṣaka, the tribal chief of the snakes. In modern Hinduism the birth of the serpents is celebrated on Nāga-pañcamī in the month of Srāvaṇa (July–August).

The female nagas (or *nāgīs*), according to tradition, are serpent princesses of striking beauty, and the dynasties of Manipur in northeastern India, the Pallavas in southern India, and the ruling family of Funan (ancient Indochina) traced their origin to the union of a human being and a nagi.

In Buddhism, nagas are often represented as door guardians or, as in Tibet, as minor deities. The snake king Mucalinda, who sheltered the Buddha from rain for seven days while he was deep in meditation, is beautifully depicted in the 9th–13th century Mon-Khmer Buddhas of Siam and Cambodia. In Jainism, the Jaina Saviour (Tirthankara Pārśvanātha) is always shown with a canopy of snake hoods above his head.

Naga and nagi, stone statue from Bihār Sharif, Bihār, India, 9th century AD; in the Indian Museum, Calcutta
Pramod Chandra

In art, nagas are represented in a fully zoomorphic form, as hooded cobras but with from one to seven or more heads; as human beings with a many-hooded snake canopy over their heads; or as half human, with the lower part of their body below the navel coiled like a snake and a canopy of hoods over their heads. Often they are shown in postures of adoration as one of the major gods or heroes is shown accomplishing some miraculous feat before their eyes.

Nāga, group of tribes inhabiting the Nāga Hills of Nāgāland (*q.v.*) state in northeastern India. They include more than 20 tribes of mixed origin, varying cultures, and very different physiques and appearances. The numerous Nāga languages (sometimes classified as dialects) belong to the Tibeto-Burman group of the Sino-Tibetan language family. Almost every village has its own dialect; different groups of Nāgas communicate in broken Assamese (Nāgamese), or sometimes in English and Hindi. The largest tribes are the Konyaks, Āos, Tangkhuls, Semās, and Angāmis.

Most Nāgas live in small villages strategically placed on hillsides and located near water. Shifting cultivation (*jhūm*) is commonly practiced, although some tribes practice terracing. Rice and millet are staples. Manufactures and arts include weaving (on simple tension looms) and wood carving. Nāga fishermen are noted for the use of intoxicants to kill or incapacitate fish.

Tribal organization has ranged from autocracy to democracy, and power may reside in a council of elders or tribal council. Descent is traced through the paternal line; clan and kindred are fundamental to social organization.

As a result of missionary efforts dating to the 19th-century British occupation of the area, a sizable majority of Nāgas are Christians.

In response to nationalist political sentiment among the Nāga tribes, the government of India created the state of Nāgāland in 1961.

Naga, city, southeastern Luzon, Philippines. It is situated along the Bicol River, south of San Miguel Bay. Founded in 1573 as Nueva Caceres by the Spaniards, it is the site every September of a festival in honour of Nuestra Señora de ("Our Lady of") Peñafrancia, the patroness of the Bicol Peninsula. Naga has a large cathedral and is the seat of a bishopric. The University of Nueva Caceres (1948) is located there. The city is a regional commercial and agricultural centre; it is a major stop on the Manila-South Railroad and a major road junction, and it has an airport. Mount Isarog National Park is nearby. Inc. city, 1948. Pop. (1990) 115,000.

Naga Dumka (India): *see* Dumka.

Nāga Hills, part of the complex mountain barrier on the border of India and Myanmar (Burma). A northern extension of the Arakan Yoma system, the Nāga Hills reach a height of 12,552 feet (3,826 m) in Mount Saramati on the India-Myanmar frontier. The part of the range within India constituted the Nāga Hills district of Assam until 1961 and since 1963 has been part of Nāgāland. The hills receive a heavy monsoon rainfall and are naturally clothed with dense forest. Placed throughout the hills are villages of the Nāga tribes.

To make the best use of the Britannica, consult the INDEX *first*

Nagai Kafū, pseudonym of NAGAI SŌKICHI (b. Dec. 3, 1879, Tokyo, Japan—d. April 30, 1959, Tokyo), Japanese novelist strongly identified with Tokyo and its immediate premodern past.

Rebellious as a youth, Kafū failed to finish his university studies and was sent abroad from 1903 to 1908. Before he left, he had produced three novels, which were influenced by French naturalism. After he returned to Japan he continued to be a student and translator of French literature, principally the Romantic and Symbolist poets. He also did his most important writing at this time, work which is likely to seem, in its lyricism and delicate eroticism, nearer 19th-century Japanese literature than French. The lyricism is particularly apparent in *Sumidagawa* (1909; *The River Sumida,* 1956), a novelette about the disappearance of the gracious past in the city of Tokyo. For some years after his return, Kafū was a professor at Keiō University in Tokyo and a leader of the literary world. After his resignation in 1916, a stronger note of rancour at what the modern world had done to the old city came into his work. After *Ude Kurabe* (1917; *Geisha in Rivalry,* 1963), a caustic study of the geisha's world, he fell

Nagai Kafū
By courtesy of Nippon Kindai Bungaku-kan, Tokyo

into almost complete silence, broken in the next two decades by dry sketches of graceless modern successors to the classical geisha. Only in 1937, with *Bokutō kidan* (*A Strange Tale from East of the River*), did he return to the nostalgic, lyric vein of his post-French-influence days.

BIBLIOGRAPHY. Edward Seidensticker, *Kafū the Scribbler* (1965, reprinted 1990), a biographical and critical study, also includes a number of translations of Kafū's works.

Nāgāland, constituent state of India, in the northeastern corner of the country. It is bounded on the east by Myanmar (Burma), on the south by the Indian state of Manipur, and on the west and northwest by the Indian state of Assam. A small section of Nāgāland extends north from the Myanmar border into the Indian state of Arunāchal Pradesh. The capital is Kohīma.

A brief treatment of Nāgāland follows. For full treatment, *see* MACROPAEDIA: India.

Nāgāland has no early written history. The first references to the people there are found in 13th-century chronicles of the Ahom kingdom of neighbouring Assam. The word Nāga designates the many tribes and subtribes that occupy the area. The name may have derived from the Sanskrit *nāga* ("snake"); from Hindi *naṅgā* ("naked"); from *nāga* ("belonging to the hills"); or from *nok* ("people," or "folk"). There were occasional clashes between the Ahom and Nāga, but the Ahom normally maintained friendly relations with the Nāga chieftains.

Myanmar ruled the Nāga from 1819 to 1826, at which time the British established rule over Assam and gradually annexed the Nāga hill areas to the British Empire. The British put an end to headhunting and intervillage raids, and the Nāga settled down to a more peaceful life of cultivation and trade. Indian independence in 1947 sparked a movement for an autonomous Nāgāland, but after prolonged negotiation the Nāga people accepted statehood within India in 1963.

Except for a small area of plain, the entire state is covered with ranges of hills that are part of the Himalaya system. The Nāga Hills rise from the Brahmaputra Plain in the north initially to about 2,000 feet (600 m) and then increase toward the east to more than 6,000 feet (1,800 m). Isolated peaks reach 10,000 feet (3,000 m) or higher. The hills merge with the Pātkai Range, which separates Nāgāland from Myanmar and reaches a height of 12,552 feet (3,826 m) at Mount Saramati, on the border. The northwestern portion of Nāgāland is drained by tributaries of the Brahmaputra River, the southeast by tributaries of the Chindwin River of Myanmar. The headstreams of the Barāk River flow through the southwest.

Nāgāland has a wet monsoon climate, with an average annual rainfall that varies between 70 inches (1,800 mm) in the southeast and more than 100 inches (2,500 mm) in the northeast. July and August are the rainiest months. Summer daytime temperatures in the state range between 70° and 104° F (21° and 40° C), while in winter the temperature rarely falls below 39° F (4° C). Frost is common, however, at the higher elevations.

The Nāga people belong to the Indo-Mongoloid ethnic group. Although long-isolated, they lack cohesion as a single people. There are more than 20 major tribes and subtribes, differing in physique, dialect, and customs. There is no common language but rather 60 spoken dialects; in some areas, dialects vary from village to village. Intertribal communication is carried on in a broken Assamese called Nāgamese. Many Nāga also speak Hindi and English. About two-thirds are Christian, one-tenth are Hindu, and the rest are Muslim or other faiths. Most Nāga live in rural villages, some of which have as many as 5,000 inhabitants. Kohīma, Mokokchūng, and Dimāpur are the major urban centres.

Agriculture is the mainstay of the economy. About four-fifths of all workers are cultivators. Crops include autumn and winter rice, small millets, edible seeds, oilseeds, sugarcane, potatoes, and tobacco. An inadequate amount of fertile land and the practice of slash-and-burn (*jhūm*) farming practices have resulted in food shortages, and Nāgāland must import large amounts of food. Agriculture has been undergoing a slow but steady transformation, however, with wasteful practices being replaced by improved methods.

Forestry is a primary source of income and employment. Exploration has revealed chromium, nickel, cobalt, and iron-ore deposits, but at present only coal is mined. Recent drilling suggests exploitable oil reserves in the Wokha district and possibly in the Dikhu River valley. Nāgāland's first hydroelectric plant started operating in 1978.

Lack of raw materials, financial resources, and power—together with inadequate communication and transportation facilities (there are only a few all-weather roads and a few miles of railway line)—have hindered industrial development. Small industries prevail, including a television assembly plant, a distillery, rice mills, furniture factories, a paper and pulp mill, a sugar mill, and a fruit cannery. Cottage industries include weaving, basketry, woodworking, and pottery making.

Tribal organization among the Nāga varies from the powerful Konyak *āng*s (chiefs) and hereditary chieftanships of the Semā and Chang to the democratic councils of the Angāmi, Āo, Lothā, and Rengmā. A prominent village institution is the *morung* (communal house, or dormitory) for young unmarried men, and some tribes maintain communal houses for unmarried women as well. Women hold a high and honourable position in Nāga society, work on equal terms with men in the fields, and wield influence in tribal councils.

One-half of the population is literate. The state has several colleges for general education, several law colleges, and an agricultural college; all are affiliated with the North-Eastern Hill University in Meghālaya. Area 6,401 square miles (16,579 square km). Pop. (1991 prelim.) 1,215,573.

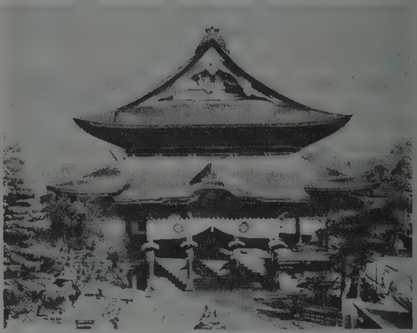
nagana, a form of the disease trypanosomiasis (*q.v.*), occurring chiefly in cattle and horses and caused by several species of the protozoan *Trypanosoma.* The disease, which occurs in southern and central Africa, is carried from animal to animal chiefly by tsetse flies. Signs of infection include fever, muscular wasting, anemia, and swelling of tissues (edema). There is discharge from eyes and nose. First the hindlegs and then other parts of the body become paralyzed. The spleen, lymph nodes, and liver become enlarged, and the spinal cord is affected.

Other forms of trypanosomiasis transmitted by flies include surra (found in Southeast Asia and Africa), a disease of cattle and horses caused by *T. evansi,* and mal de caderas, caused by *T. equinum* and occurring in South America.

Nagano, landlocked *ken* (prefecture), central Honshu, Japan. Most of the prefecture is more than 2,600 feet (790 m) in elevation, and 15 peaks, mostly volcanic, rise to more than 9,800 feet (3,000 m). Such large rivers as the Tenryū, Kiso, Chikuma, and Shinano have been harnessed for hydroelectricity.

Most of the population occupies small mountain basins (Suwa, Matsumoto, Ina, Hida, Zenkoji), in which sericulture and apple raising are specialties. Forest land is a rich resource. Projects for antipollution measures in forests and lakes began in 1974. The capital of the prefecture is Nagano city. Area 5,245 square miles (13,585 square km). Pop. (1990) 2,156,656.

Nagano, formerly ZENKŌJI, city, Nagano *ken* (prefecture), central Honshu, Japan. It is the capital of the prefecture and is situated in the Nagano Basin. The city dates from the 12th–13th century and grew up around the Zenkō Temple, which was founded in the 7th century. Nagano later developed as a market town and post station along the Hokkoku Road. It is now an important commercial centre with food-processing, electrical machinery, and printing and publishing industries. It is also a cultural and educational centre that is the site of Shinshū University. The surrounding area produces apples and Chinese yams. A bronze Buddha, believed to have been a gift from Korea in the 6th century AD, is enshrined at the Zenkō Temple, which is one of the most popular Buddhist temples in Japan. Pop. (1990) 347,036.



The Zenkō Temple, Nagano, Japan

Photos Pack

Nagano Osami (b. June 15, 1880, Kōchi, Japan—d. Jan. 5, 1947, Tokyo), Japanese admiral who planned and ordered the attack on the U.S. naval base at Pearl Harbor, Hawaii, on Dec. 7, 1941, which triggered U.S. involvement in World War II.

In 1913, as a language officer in the United States, Nagano studied law at Harvard University. Returning to Japan, he became known as an expert on the United States. As naval attaché in Washington, D.C., between 1920 and 1923, he attended the Washington Conference (1921–22), in which the big powers agreed to a détente in the Pacific and fixed an arithmetical ratio of 5:5:3 for (respectively) the United States, Great Britain, and Japan on the number and total tonnage of capital (big-gun) ships that each country could possess. When the big powers resumed their naval disarmament talks at the London Naval Conference of 1930, Nagano attended as a member of the Japanese general staff. He was the chief Japanese delegate at the London Naval Conference of 1935–36.

Nagano became naval minister in 1936, commander in chief of the fleet in 1937, and naval chief of staff in April 1941, and it was in the latter capacity that he planned and gave the command to launch the Pearl Harbor attack. This attack, which put a large part of the U.S. Pacific fleet out of action, cost the Japanese forces only minor losses. Nagano's reputation was at its height after Pearl Harbor, and he became a fleet admiral in 1943; however, subsequent military reverses caused his dismissal in February 1944. After the end of the war Nagano assumed responsibility for the Pearl Harbor attack before the international military tribunal, but he died of a heart attack while standing trial.

Nagao Torachiyo (Japanese military leader): *see* Uesugi Kenshin.

Nagaoka, city, Niigata *ken* (prefecture), Honshu, Japan, on the middle reaches of the

Shinano River. A castle town in the 1600s, it prospered with the discovery of the Higashiyama oil well in the early 20th century. Despite heavy damage suffered during World War II, the city continued to grow, its industries producing chemicals, machinery, and processed foods. Nagaoka is a hub of rail and road transportation and serves as a base for the popular ski grounds on nearby Mount Yūkyū. Pop. (1991 est.) 186,536.

Nagaon, also spelled NOWGONG, city, central Assam state, northeastern India, lying on the Kalang River. It is an agricultural trade centre and has several colleges affiliated with Gauhāti University, a technical school, and a nursing school. There is a rail junction at Senchoa, 3 miles (5 km) to the southwest.

The surrounding area encompasses a stretch of the Brahmaputra River valley and contains many marshes and lakes, some of which are important fisheries. The encircling forests provide teak, sal (*Shorea*), and lac timber. Agricultural products include rice, jute, tea, and silk. Pop. (1991 prelim.) 93,324.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Nāgappattinam, formerly NEGAPATTAM, port city, east-central Tamil Nādu state, southeastern India, on the Bay of Bengal. An ancient port known to have traded with Europe in Greek and Roman times, it became a Portuguese and later a Dutch colony. Its influence declined with the growth of Madras, 250 miles (400 km) north. Its industry includes ship repair, fishing, steel rolling, and the manufacture of metal goods. Pop. (1991 prelim.) 86,155.

Nagar Haveli (India): *see* Dādra and Nagar Haveli.

Nāgarakṛtāgama, Javanese epic poem written in 1365 by Prapañcā. Considered the most important work of the vernacular literature that developed in the Majapahit era, the poem venerates King Hayam Wuruk (reigned 1350–89) and gives a detailed account of life in his kingdom. It also includes information about King Kertanagara (reigned 1268–92), great-grandfather of Hayam Wuruk.

Nāgarī (Indian script): *see* Devanāgarī.

Nāgārjuna (b. *c.* AD 150—d. *c.* 250), Indian Buddhist monk-philosopher and founder of the Mādhyamika ("Middle Path") school whose clarification of the concept of *śūnyatā* ("emptiness") is regarded as an intellectual and spiritual achievement of the highest order. He is recognized as a patriarch by several later Buddhist schools. The two basic works that are substantially his and that have remained available in Sanskrit are *Mūlamadhyamakakārikā* (more commonly known as *Mādhyamika Kārikā*) and *Vigrahavyāvartanī*, both critical analyses of views about the origin of existence, the means of knowledge, and the nature of reality.

Traditional accounts of his life. The earliest available biographical account of Nāgārjuna is in Chinese, supplied about AD 405 by a renowned Buddhist translator, Kumārajīva. It agrees with other Chinese and Tibetan accounts that Nāgārjuna was born in South India into a Brahman (Hindu priestly caste) family. The stories of his boyhood are contradictory in historical terms but indicate that he possessed an extraordinary intellectual capacity and underwent a spiritual conversion when he learned the profound meanings of the doctrines of Mahāyāna ("Great Vehicle") Buddhism, now the predominant form of Buddhism in East Asia. According to Kumārajīva's account, after Nāgārjuna had learned some basic Buddhist views, but without complete satisfaction, a "Mahānāga bodhisattva"—"a chief Nāgā [literally "serpent"; also the name of a hill tribe of South India], who was on the path to enlightenment"—took pity on him and presented him with the most profound Mahāyāna verses. Nāgārjuna mastered these in a short time and propagated the truth (dharma) in India, successfully defeating many opponents in scholastic philosophical debates. Traditional accounts also suggest that he lived to an old age and then decided to end his life.

The fact that various texts ascribe different religious qualities to Nāgārjuna and give dates for his life that range over 500 years suggests that the references available may pertain to several persons and may include some imaginary accounts. Nonetheless, various elements of Nāgārjuna's biographies are supported by some historical materials. Present scholarship indicates that Nāgārjuna could have lived as early as AD 50 and as late as AD 280. A common consensus gives his dates as AD 150–250. The claim that he lived in South India is supported by some archaeological evidence: by a letter (*Suhṛllekha,* "Friendly Letter") credited to him, written to a king of the Sātavāhana dynasty, possibly Yajñaśrī (*c.* 173–202); and perhaps by his name, which includes the name of the Nāgā people, who lived in South India.

Influence and writings. Nāgārjuna's influence has continued through the followers of the Mādhyamika school of Buddhism, whose critical examination of philosophical positions and whose didactic expositions have been studied down to the present day in many East Asian schools as part of the Chinese Buddhist canon (*Ta-ts'ang Ching*). Similarly, 17 Mādhyamika treatises are contained in the *Bstan-'gyur* part of the Tibetan Buddhist canon. Not all of these are credited to Nāgārjuna, and some traditionally credited to him are probably not by him. Two basic writings that are substantially his are available at present in Sanskrit; they are *Mūlamadhyamakakārikā* (*Mādhyamika Kārikā,* "Fundamentals of the Middle Way") and *Vigrahavyāvartanī* ("Averting the Arguments"), both critical analyses of false views about how existence arises, the means of knowledge, and the nature of reality. Three important Mādhyamika texts attributed to Nāgārjuna and extant only in Chinese are *Ta-chih-tu-lun* (*Mahāprajñāpāramitā-śāstra,* "Great Perfection of Wisdom Treatise"), *Shi-chu-p'i-p'o-sha-lun* (*Daśabhūmi-vibhāṣā-śāstra,* "Illumination of the Ten Levels Treatise"), and *Shih-erh-men-lun* (*Dvādaśa-dvāra-[nikāya-]śāstra,* "Twelvefold Entrance Treatise"). The following three texts are found only in the Tibetan canon and are accepted by most scholars as compositions of Nāgārjuna: *Rigs pa drug ca paḥi tshig leḥur byas pa shes bya ba* (*Yukti-ṣaṣṭikā,* "Sixty Verses on Union"), *Ston pa ñid bdun cu paḥi tsig leḥur byas pa shes bya ba* (*Śūnyatā-saptati,* "Seventy Verses on Emptiness"), and *Shib mo rnam par ḥtag pa shes bya baḥi mdo* (*Vaidalya-sūtra,* "Sacred Text of the Vaidalya Type").

Besides the verses of Mādhyamika analysis, there are a large number of Tantric (magical) and medical works attributed by Tibetan tradition to a "Nāgārjuna." There are also references in late Indian materials to a great siddha, or sorcerer, by the name of Nāgārjuna, who acquired his magical power through Tantric practices—*e.g.,* employment of magical spells and diagrams, and gaining access to nonphysical planes of existence through diet and meditation. Closely allied with these tales are stories of a powerful alchemist who, among other accomplishments, discovered the elixir of immortality. Owing to the lack of concrete historical data, or because of conflicting accounts, the reports of a great sorcerer are generally not accepted outside the Tibetan tradition as applying to the 2nd-century philosopher.

Something of the Mādhyamika philosopher's life and attitude can be gleaned from Nāgārjuna's writings. His critical analytic verses and his didactic treatises, letters, and hymns indicate his deep concern to practice "nonattachment" (*i.e.,* perceiving the emptiness of all things and hence becoming detached from them) in engagement with people. Through rigorous logical argumentation, as found in the *Mādhyamika Kārikā,* he criticized both Buddhist and Hindu views on existence. Most of his polemics, however, were directed toward the explanations of existence offered by the Buddhist schools of Sthaviravāda and Sarvāstivāda. Nāgārjuna's position is closely allied to, and probably dependent on, that found in the early Mahāyāna literature known as the *Prajñāpāramitā-sūtra*s ("Perfection of Wisdom Verses"), in which texts the notion of *śūnyatā* is an important term for the wayfarer on the path to enlightenment and becomes the distinguishing term in the Mādhyamika school.

It indicates that the nature of existence is relational: there is no soul, no thing, no concept independent of its context; all things are empty of an absolute reality and exist only in relation to conditions. There is no eternal reality behind changing forms; even unconditioned nirvana (enlightenment) is not independent of the changing forms of existence. Those beings who have perfected wisdom perceive nirvana and the changing flux of existence together. This perfection transforms the other "perfections" that are part of the bodhisattva's (buddha-to-be's) course, such as morality, endurance, and meditation. The perfection of wisdom releases the ardent striver for perfection from even attachment to "perfection" that fails to perceive the relational character of the moment. From Nāgārjuna's point of view, then, participating in scholarly debates, writing explanations of the Buddha's teaching, and celebrating freedom from illusion and pain in hymns were considered to be consistent with the highest truth that does not separate wisdom from compassion.

(F.J.S.)

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Nagasaki, *ken* (prefecture), northwestern Kyushu, Japan, facing the East China Sea. It includes the islands of Tsushima, Iki, Hirado, and the Gotō Archipelago. The prefecture has an irregular shape, with rounded Shimabara Peninsula in the southeast; Cape Nomo and Nishisonoki Peninsula enclose Ōmura Bay also in the southeast. Dominated by mountains, the limited agricultural land is intensively cultivated with rice, sweet potatoes, and mandarin oranges. The fishing industry yields flounder and halibut. Coal is mined, but there is little heavy industry except for the shipbuilding of Nagasaki, the prefectural capital, and the naval base of Sasebo. Another major town is Isahaya, at the head of the Shimabara Peninsula. Nagasaki city has a university founded in 1949. Area 1,588 square miles (4,113 square km). Pop. (1991 est.) 1,556,820.

Nagasaki, capital and largest city, Nagasaki *ken* (prefecture), western Kyushu, Japan, at the mouth of the Urakami-gawa (Urakami River) where it empties into Nagasaki-kō (Nagasaki Harbour). The harbour is composed of a narrow, deep-cut bay, formed at the meeting point of Nomo-saki (Cape Nomo; south) and Nishisonoki-hantō (Nishisonoki Peninsula; northwest). The city is shaped like an amphitheatre, its crooked streets and tiered houses clinging to the hillsides that enclose the inner bay. Reclaimed land at bayside and the Urakami Basin provide some level land.

Nagasaki's charm derives from its history as Japan's second oldest port open to foreign trade (after Hirado). Nagasaki was the only Japanese port permitted by the Tokugawa shogunate (military government) between 1639 and 1859 when all other ports were closed. Portuguese traders (who introduced Roman Catholicism and guns to Japan) first arrived there in the mid-16th century. They were later expelled with their enemies, the Protestant English, in 1639; trade was then restricted to the Dutch and, to a lesser degree, the Chinese and Koreans. The Oura Roman Catholic Church, built in Gothic style, was erected (1864) to commemorate the crucifixion of 26 Portuguese Christian martyrs in 1597. (They were canonized in 1862.) In the 19th century Nagasaki became a leading East Asian coaling station and served as the winter port of the Russian Asiatic fleet until 1903. In the early 20th century the city became a major shipbuilding centre. The second atomic bomb dropped on Japan by the United States in World War II destroyed the innermost portion of Nagasaki on Aug. 9, 1945. The terrain and smaller size of Nagasaki reduced the destruction of life and property as compared to that of the atomic bomb explosion over Hiroshima, but nevertheless, 39,000 persons were killed outright and about 25,000 were injured. About 40 percent of the city's buildings were completely destroyed or severely damaged. Since World War II, the city has been rebuilt and is significant as a spiritual centre for movements to ban nuclear weapons. Nagasaki is an important tourist centre; its industry is based upon its large shipyards, which are grouped along the western and inner parts of the harbour.

Oura Roman Catholic Church and, beyond, houses built on a hillside, Nagasaki, Japan

Orion Press, Japan

Nagasaki contains numerous historic sites. The Sofuku-ji (Chinese Temple; 1629) is a fine example of Chinese Ming dynasty architecture, inhabited by Chinese Buddhist monks. A fine view of Nagasaki-kō is offered by the Glover Mansion, the home of a 19th-century British merchant and reputed to be the site of Puccini's opera *Madama Butterfly*. Peace Park, on the Urakami-gawa, was established under the point of detonation of the bomb. The Roman Catholic cathedral of Urakami overlooks the park. Pop. (1985 est.) 449,382.

nagaswaram, Sanskrit NĀGASVARAM, double-reed instrument of southern India related to the shawm and oboe. It descended from the Persian *surnā*, by which name it is still known in northern India, and is generally played in pairs, creating the impression of a double oboe. Sometimes several players alternate on the melodic line, which is accompanied by a drone played on the *ottu*, a type of *nagaswaram* in which all or most of the holes are closed with wax. Owing to its strong and penetrating tone, the instrument is usually played outdoors—*e.g.*, at weddings, processions, festivals, and other occasions that require ceremonial ensemble music. The *nagaswaram* has gained recognition in the classical repertoire of the southern Indian concert stage.

Nāgaur, also spelled NAGOR, town, administrative headquarters of Nāgaur district, Rājasthān state, western India. Nāgaur, a walled town held successively by the 12th-century Hindu ruler of Dillī (Delhi), Pṛthvīrāja, by the 12th- and 13th-century Muslim conqueror Muḥammad of Ghūr, and by Bīkaner and Jodhpur chieftains, is said to take its name from its traditional founders, the Nāga Rājputs (warrior rulers of the historic region of Rājputāna). The fort contains palaces and a 17th-century mosque built by the Mughal emperor Shāh Jahān (reigned 1628–58). Connected by rail and road with Bīkaner and Merta, it is a trade centre for bullocks, wool, hides, and cotton. Industries include handloom weaving and the manufacture of camel fittings, metal utensils, and ivory goods.

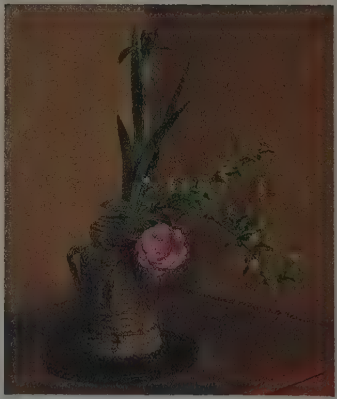
Nāgaur district (6,841 sq m [17,718 sq km]), formerly part of Jodhpur princely state, comprises a sandy plain bordered east by the Arāvalli Range. Bajra (pearl millet), sorghum (jowar), and pulses are the chief crops, and an excellent breed of oxen is reared. Marble (at Makrāna) and gypsum deposits are worked. Pop. (1981) town, 48,005; district, 1,628,669.

nagauta (Japanese: "long song"), basic lyric musical accompaniment of Japanese Kabuki and classical dances (*buyō*). The genre is found in the Kabuki plays by the mid-17th century, although the term itself is common in much earlier poetic forms.

The standard complete instrumentation of a *nagauta* piece consists of singers; players of the three-stringed, plucked samisen; and performers on the three drums and flute found in the *hayashi* ensemble of the earlier Nō theatre. In *nagauta* the flute player may also use a second bamboo flute (*take-bue*) derived from folk traditions. The drums play both the stereotyped patterns found in the Nō style and more direct imitations of the rhythmic phrases of the samisen.

The forms of *nagauta* also reflect interesting combinations of Nō drama structure with Kabuki innovations. In the 19th century *nagauta* began to be composed and performed in concerts as well as for dance accompaniments. Its repertoire of over 100 standard pieces (usually some 20 minutes in length) and new compositions, together with its several guilds of professional and amateur performers, attest to its continued viability in the 20th century.

nageire (Japanese: "thrown in"), in Japanese floral art, the style of arranging that stresses fresh and spontaneous designs adhering only loosely to the classical principles of triangular structure and colour harmony. A single long branch with shorter branches and flowers at the base arranged in a tall upright vase are characteristic of the *nageire* style. *Nageire* was originally a general term meaning all arrangements that differed from the ancient, highly stylized temple art of *rikka*. It was later applied to the lavish large-scale arrangements popular during the 17th century and now refers to flexible designs that reflect the changing patterns of modern life. *See also* rikka.



Nageire arrangement of iris, camellia, and *Kerria japonica*

By courtesy of the International Society for Educational Information, Tokyo

Nagel, Ernest (b. Nov. 16, 1901, Nové Město, Bohemia, Austria-Hungary—d. Sept. 20, 1985, New York City), American philosopher noted for his work on the implications of science.

Nagel came to the United States in 1911 and received American citizenship in 1919. He taught philosophy at Columbia University from 1931 to 1970.

Formerly an exponent of logical realism, Nagel later abandoned a realistic ontology for an empirical and theoretical philosophy of science. His book *An Introduction to Logic and Scientific Method* (1934; with Morris R. Cohen) richly illustrates the function of logical principles in scientific method in the natural and social sciences and in law and history. In *Logic Without Metaphysics* (1957) he defended a naturalistic interpretation of logic, denying the ontological necessity of logico-mathematical principles and arguing that they must be understood according to their function in specific inquiries. *The Structure of Science* (1961) analyzes the nature of explanation, the logic of scientific inquiry, and the logical structure of the organization of scientific knowledge. His other books include *Sovereign Reason* (1954), *Gödel's Proof* (1958; with James R. Newman), and *Teleology Revisited and Other Essays* (1979).

Nägeli, Hans Franz (b. *c.* 1497, Aigle, Savoy—d. Jan. 9, 1579, Bern), Swiss politician and military leader who was prominent in Bern's public affairs for nearly 40 years.

Nägeli was captain of the Bernese forces in the campaign against the adventurer-robber baron Giangiacomo Medici, lord of Musso (1531) and during the occupation of the frontier of the canton of Valais in the second Kappel War (an intercantonal religious struggle). In 1536 he subsequently commanded a Bernese contingent of 6,000 men in the liberation of the canton of Vaud from Savoyard control and led an expedition against the Bishop of Lausanne that freed François Bonivard from the castle of Chillon. Between 1540 and 1568 he served as chief magistrate for Bern. He determined much of the canton's foreign policy and served on numerous diplomatic missions.

Nägeli, Karl Wilhelm von (b. March 27, 1817, Kilchberg, Switz.—d. May 10, 1891, Munich), Swiss botanist famous for his work on plant cells.

Nägeli received his earliest training from the German nature-philosopher Lorenz Oken and later studied botany under Augustin Pyrame de Candolle at the University of Geneva. He continued his botanical studies under Matthias Jakob Schleiden at the University of Jena and began his teaching career as a professor at the universities of Zürich, Freiburg, and Munich.

At the age of 25 he wrote a paper on pollen formation of seed and flowering plants and described cell division with great accuracy. He noted what he called transitory cytoblasts, which later were identified as chromosomes. He also witnessed cell division and investigated the process of osmosis in unicellular algae. In 1844 he discovered the antheridia (reproductive structures in which male sex cells develop) and the spermatozoids of the fern.

Nägeli introduced into botany the concept of meristem, by which he meant a group of plant cells always capable of division. This led him to the first accurate account of apical cells (the initial point of longitudinal growth), which he erroneously believed to be the main site of meristematic growth in all plants. In 1858 he demonstrated the importance of the sequence of the cell divisions in determining the form of the plant parts. While studying different forms of starch, he formulated the hypothetical micella (unit of structure); this concept became the foundation for understanding the structure of starch grains.

Nägeli and Hugo von Mohl, a German botanist, were the first to distinguish the plant cell wall from the inner contents, which von Mohl named protoplasm in 1846. Nägeli believed that cells received their hereditary characters from a certain part of the protoplasm, which he called idioplasma. He also demonstrated, by chemical analyses, the presence of nitrogenous matter in the protoplasm.

Nägeli, a stubborn man who held tenaciously to such ideas as spontaneous generation, did not accept environmental factors acting on variations in species, believing instead that evolution occurred in jumps. He possibly anticipated the discovery of mutation. According to Nägeli, species variation was caused internally by an inherent force that drove evolutionary changes in a particular nonrandom direction, such as increased size. His beliefs led him to reject a paper sent him by the monk Gregor Mendel that, when rediscovered 40 years later, served as the source of the Mendelian laws of inheritance.

Nāgercoil, city, southernmost Tamil Nādu state, southern India. Nāgercoil lies west of the Aramboli Gap in the Western Ghāts. It controls the major routes between Madras and Trivandrum and is a commercial centre for a rich agricultural area. Its name, meaning "snake temple," indicates the early significance of the town's Śaiva temple. Although historically a part of the Hindu kingdom of Travancore, Nāgercoil has developed as an important Christian centre. Among the city's expanding industries are cotton and rice milling, motor repairing, and the manufacture of rubber goods. The city has several colleges affiliated with Manonmaniam Sundaranar University in Tirunelveli. About 9 miles (14 km) west is the tourist centre of Padmanābhapuram Palace, which was formerly the residence of the Travancore raja. Pop. (2001 prelim.) 208,149.

Nagodba (Serbo-Croatian: "Agreement"), English in full CROATIAN-HUNGARIAN AGREEMENT OF 1868, pact that governed Croatia's political status as a territory of Hungary until the end of World War I. When the Ausgleich, or Compromise, of 1867 created the Austro-Hungarian Dual Monarchy, Croatia, which was part of the Habsburg empire, was merged with Slavonia and placed under Hungarian jurisdiction. Although many Croats who sought full autonomy for the South Slavs of the empire objected to that arrangement, a Croatian Sabor (assembly), elected in a questionable manner, confirmed the subordination of Croatia to Hungary by accepting the Nagodba in September 1868.

While explicitly stating that Croatia was a component part of the kingdom of Hungary, the Nagodba recognized the region as a distinct political unit with its own territory. It permitted the Croats to elect their own legislative Sabor and have their own executive authorities. In addition, Serbo-Croatian became the official language of the land.

Despite the large degree of internal autonomy granted by the Nagodba, it designated that the governor (*ban*) of Croatia was to be nominated by the Hungarian prime minister and appointed by the king; it also restricted Croatia's representation in Hungary's parliament as well as its access to the central government institutions of the Dual Monarchy. As a result, Croatia's control over some matters vital to its interests—*e.g.,* taxation and budgetary matters and foreign and military policies—was minimal.

Consequently, opposition to the Nagodba remained strong, and in 1871 the dissidents elected a Sabor that declared the compromise invalid and stimulated a revolt. The compromise, however, was reaffirmed after the suppression of the insurrection and remained in effect until the end of World War I, when Croatia seceded from Hungary and joined the new Kingdom of Serbs, Croats, and Slovenes (later called Yugoslavia).

Nagor (India): *see* Nāgaur.

Nagorno-Karabakh, also spelled NAGORNO-KARABACH, region of southwestern Azerbaijan. It occupies an area of 1,700 square miles (4,400 square km) on the northeastern flank of the Karabakh Range of the Lesser Caucasus and extends from the crest line of the range to the margin of the Kura River lowland at its foot. Nagorno-Karabakh's environments vary from steppe on the Kura lowland through dense forest of oak, hornbeam, and beech on the lower mountain slopes to birchwood and alpine meadows higher up. The peaks of the Karabakh Range culminate in Mount Gyamysh (12,218 feet [3,724 m]). Vineyards, orchards, and mulberry groves for silkworms are intensively developed in the valleys of Nagorno-Karabakh. Cereal grains are grown, and cattle, sheep, and pigs are kept. The region has some light industry and many food-processing plants. Xankändi (formerly Stepanakert) is the chief industrial centre.

The area, historically known as Artsakh, was acquired by Russia in 1813, and in 1923 the Soviet government established it as an autonomous oblast (province) of the Azerbaijan S.S.R., even though its population was about 80 percent Armenian. Isolated from the Armenian S.S.R. to the west by the Karabakh Range, Nagorno-Karabakh thus became a minority enclave within Azerbaijan. The region developed quietly through decades of Soviet rule, but in 1988 the ethnic Armenians of Nagorno-Karabakh began agitating for the transfer of their oblast to Armenian jurisdiction, a demand that was strongly opposed by both the Azerbaijan S.S.R. and the Soviet government. Ethnic antagonisms between Armenians and Azerbaijanis grew inflamed over the issue, and when Armenia and Azerbaijan gained their independence from the collapsing Soviet Union in 1991, Armenians and Azerbaijanis in the enclave went to war. By the mid-1990s the Karabakh Armenian forces, supported by Armenia, had gained control of much of southwestern Azerbaijan, including Nagorno-Karabakh and territory connecting the enclave with Armenia.

Nagoya, capital of Aichi *ken* (prefecture), central Honshu, Japan, and one of the country's leading industrial cities. It is located at the head of Ise Bay.

The history of Nagoya dates from 1610, when a great castle was erected by the Owari branch of the powerful Tokugawa shogunate. After the Meiji Restoration (1868), which marked the end of shogunal government, Nagoya continued as a commercial centre. The development of Nagoya's port, especially after World War II, and the advantages of the city's central location and abundant hydroelectric power from the rivers of central Honshu stimulated the growth of heavy industry. The traditional manufactures of timepieces, bicycles, and sewing machines were followed by the production of special steels, chemicals, oil, and petrochemicals, as the area's automobile, aviation, and shipbuilding industries flourished.

Several railways, including the high-speed Shinkansen ("New Trunk Line") railway service running between Ōsaka and Tokyo, converge on Nagoya. The city is linked to other countries through its port, from which canals lead inland to industrial areas, and by Nagoya Airport, on the north side of the city.

Nagoya abounds in cultural assets. Educational institutions include Nagoya University (1939), Nagoya Institute of Technology (1949), and Nagoya City University (1950). An important landmark is Nagoya Castle, originally built in 1610–12 but destroyed by fire during World War II; it was rebuilt in 1959. The Tokugawa Art Museum preserves the collection of the Tokugawa family. The Atsuta Shrine and the nearby Grand Shrine of Ise are the oldest and most highly esteemed Shintō shrines in Japan. Other institutions include Citizen Hall, Aichi Cultural Centre, Chūnichi Hall, and Misono Theatre. Higashiyama Park is noted for its zoological and botanical gardens. Pop. (2000 prelim.) 2,171,378.

Nāgpur, city, northeastern Mahārāshtra state, western India. It lies along the Nāg River and is situated almost at the geographic centre of India. The present city was founded in the early 18th century by Bakht Buland, a Gond raja. It became the capital of the Bhonsles of the Maratha confederacy but in 1817 came under British influence. In 1853 the city lapsed into British control and in 1861 became the capital of the Central Provinces. The advent of the Great Indian Peninsula Railway in 1867 spurred its development as a trade centre. After Indian independence, Nāgpur was briefly the capital of Madhya Pradesh state until 1956, when what is now Mahārāshtra state was created.

The growing of cotton in the region about the time of the construction of the railway led to the establishment of a large textile mill and signaled the development of the city as an important industrial centre. Since that time Nāgpur's industrial complex has diversified considerably and in the 1970s expanded to absorb the nearby town of Kāmptee, with its factories that produce ferromanganese products, transport equipment, and other metal goods. Situated at the junction of road, rail, and air routes from Bombay to Calcutta and from Madras to Delhi, Nāgpur has developed a flourishing trade.

Nāgpur is dominated by the British fort built on the twin hills of Sītābuldī, in the centre of the city. An educational and cultural centre, Nāgpur has a large museum specializing in local exhibits and is the site of the University of Nāgpur (1923), which has numerous affiliated colleges in the city.

The surrounding region is an undulating plateau rising northward to the Sātpura Range. In the northeast are the Rāmtek Hills, site of a temple at Rāmtek that draws many pilgrims to its sacred annual festivals. Interspersing the hills are two major rivers—the Wardha (west) and the Wainganga (east)—both tributaries of the Godāvari. The region is important agriculturally; jowar (sorghum) and cotton are major crops. The region is especially known for its oranges, which are shipped all over India. Extensive coal and manganese deposits support growing industry. Pop. (2001 prelim.) city, 2,051,320; metropolitan area, 2,122,965.

nagual, also spelled NAHUAL, personal guardian spirit believed by some Meso-American Indians to reside in an animal, such as a deer, jaguar, or bird. In some areas the nagual is the animal into which certain powerful men can transform themselves to do evil; thus, the word derives from the Nahuatl word *nahualli* ("disguise"), applied to the animal forms magically assumed by sorcerers.

The person who is to receive his nagual traditionally goes to an isolated spot and sleeps there; the animal that appears in his dreams or that confronts him when he awakens will thereafter be his particular nagual. Among many modern Meso-American Indians, it is believed that the first creature to cross over the ashes spread before a newborn baby becomes that child's nagual. The belief in nagualism varies from region to region. In some areas it is believed that only the most powerful leaders (usually men) possess naguals. In others, all or most people have personal animal guardian spirits.

Naguib, Muḥammad, also spelled MOḤAMMED NEGUIB (b. Feb. 20, 1901, Khartoum, The Sudan—d. Aug. 28, 1984, Cairo, Egypt), Egyptian army officer and statesman who played a prominent role in the revolutionary overthrow of King Farouk I in 1952.

Naguib
Camera Press

A professional soldier, Naguib distinguished himself during the Egyptian defeat at the hands of Israel (1948) and won the respect of the Free Officers, a nationalist military group led by Gamal Abdel Nasser. In 1952 the Free Officers helped Naguib win election as president of the officers club in opposition to a man backed by King Farouk. The Free Officers engineered a coup that overthrew Farouk that July, and they saw Naguib as the man to represent their new regime to the public. Thus in 1953 he became president of the newly formed republic, although he had a more conservative political outlook than did Nasser and many of the other Free Officers. Naguib wanted to see a speedy return to constitutional government and objected to the summary sentences that were passed on various politicians by the Revolutionary Tribunal. In February 1954 he resigned the presidency, but demands by civilian and military groups impelled him to resume the office. Nasser, however, steadily consolidated his own position and became prime minister. He shrewdly acceded to some of Naguib's wishes by allowing the revival of political parties and calling for a constituent assembly to draft a constitution. An assassination attempt was made on Nasser in 1954 in which Naguib was vaguely implicated. Naguib was placed under house arrest, which was eased in 1960 and ended about 1970, and he ceased to play any role in Egyptian politics.

Nagurski, Bronko, byname of BRONISLAW NAGURSKI (b. Nov. 30, 1908, Rainy River, Ont., Can.—d. Jan. 7, 1990, International Falls, Minn., U.S.), American collegiate and professional football player, who was named All-American at tackle in 1929.

Nagurski played tackle and end on defense and fullback on offense at the University of Minnesota (Minneapolis; 1927–29). He joined the National Football League (NFL) Chicago Bears in 1930 and played fullback through 1937, when he retired because of a salary dispute and the unwillingness of the Bears management to allow him to wrestle professionally. He continued to wrestle until 1942 and returned to the Bears in 1943 for a final season. He helped the Bears win NFL championships in 1932, 1933, and 1943. After he retired from football he owned a gas station at International Falls, Minn. He was elected to the football Hall of Fame in 1963.

Nagy, Ferenc (b. Oct. 8, 1903, Bisse, Hung., Austria-Hungary—d. June 12, 1979, Fairfax, Va., U.S.), statesman who in his brief post-World War II term as premier tried to bring democracy to Hungary.

A member of a Protestant peasant family and a farmer by profession, Nagy began his public career as a local agrarian politician in the Baranya province of Hungary. He helped organize the Smallholders' Party, representing the interests of the farming majority, in the early 1920s. He became the party's first general secretary in 1930, served in Parliament from 1939 to 1942, and was jailed by the German Gestapo in 1944. After the war he became premier (1946) of an antifascist coalition government. His policies, however, were thought by the Soviet-backed Communist Party to be too conservative, and he was indicted in 1947 for crimes against the state. Before his trial he succeeded in escaping to Austria and thence to the United States. His book *The Struggle Behind the Iron Curtain* (1948) recounts his experiences. In 1961–62 he served as chairman of the Assembly of Captive European Nations. His years in the United States were spent largely on a dairy farm in Herndon, Va.

Nagy, Imre (b. June 7, 1896, Kaposvár, Hung., Austria-Hungary—d. June 16, 1958, Budapest, Hung.), Hungarian statesman, independent Communist, and premier of the 1956 revolutionary government whose attempt to establish Hungary's independence from the Soviet Union cost him his life.

Born to a peasant family, Nagy was apprenticed as a locksmith before being drafted in World War I. Captured by the Russians, he joined the Communists and fought in the Red Army. In 1929 he went to live in Moscow, where, as a member of the Institute for Agrarian Sciences, he remained until late 1944. He returned again to Hungary under Soviet occupation and helped establish the postwar government, holding several ministerial posts between 1944 and 1948. Because of his steadfast support of the peasants' welfare, Nagy was excluded from the Communist government in 1949 but was readmitted after making a public recantation. He became premier (1953–55) and then again was forced out because of his independent attitude, whereupon he took up a teaching post.

During the October 1956 revolution, the anti-Soviet elements turned to Nagy for leadership, and he became once more premier of Hungary. On the last day of the unsuccessful uprising, he appealed to the West for help against the invading Soviet troops. Treacherously deported to Romania after leaving his sanctuary in the Yugoslav embassy, he was returned to Hungary, tried, and put to death. Nagy was posthumously rehabilitated by Hungary's Supreme Court in 1989.

Nagy-Alföld (Europe): *see* Great Alfold.

Nagybánya (Romania): *see* Baia Mare.

Nagyszeben (Romania): *see* Sibiu.

Nagyszombat (Slovakia): *see* Trnava.

Nagyvárad (Romania): *see* Oradea.

Naha, city and capital, Okinawa *ken* (prefecture), Japan. It lies on southwestern Okinawa Island, which is one of the Ryukyu Islands. Long the chief city of the archipelago, it contains the Sōgen Temple, burial place of the rulers of the early Okinawa kingdom. The Shurei Gate is a fine example of Ryukyuan architecture. Naha was the seat of the post-World War II U.S. military and Okinawan governments and became the prefectural capital in 1972. Because of its deepwater port, Naha is the commercial centre of the Ryukyu Islands chain. Traditional handicraft industries produce porcelain, lacquerware, dyed cloth, and the potent *awamori* liquor. The city is also the seat of the University of the Ryukyus (1950). Pop. (1993 est.) 301,679.

Shurei Gate, destroyed during World War II and rebuilt in 1958, Naha, Japan
Orion Press—FPG

Naḥamani (Jewish scholar): *see* Naḥmanides.

Nahariyya, city, northwestern Israel. It lies on the Mediterranean coast halfway between ʿAkko (Acre) and the Lebanese border at Rosh ha-Niqra. The name comes from the Hebrew *nahar* ("river") and is an allusion to the Gaʿaton River, which flows through the heart of the city.

Nahariyya was founded in 1934 as an agricultural settlement by German-Jewish refugees. It rapidly developed as a resort, based on a fine sand beach and equable seaside climate, and remains one of Israel's favourite vacation areas. In recent years, industry has developed; principal manufactures are cutting tools and tips, processed foods, and finished textiles. In 1947, during excavation for the foundations of a house, the ruins of a Canaanite temple of the 16th century BC, dedicated to the worship of the goddess Astarte, were found. Inc. 1961. Pop. (1993 est.) 36,800.

Nahāvand, Battle of, Nahāvand also spelled NAHĀWAND, or NEHAVEND (AD 642), military clash in Iran between Arab and Sāsānian forces that was a major turning point in Iranian history. The battle ended in disastrous defeat for the Sāsānian armies and paved the way for the Arab conquest, which resulted in the Islāmization of Iran.

At Nahāvand some 30,000 Arab troops, under the command of Nuʿmān, attacked a Sāsānian army alleged to number 150,000 men. The Sāsānian troops, commanded by Fīrūzan, were entrenched in a strong fortified position. After an indecisive skirmish, Nuʿmān pretended to be defeated and withdrew from the battlefield. Fīrūzan then abandoned his position and pursued his foe. The pursuit proved to be a major tactical error because the Sāsānians were forced to fight on unfavourable ground; the Sāsānian army, caught between two mountain defiles, was massacred by the Arabs. Both Nuʿmān and Fīrūzan died in the battle, and Iranian casualties were said to number 100,000.

After the battle the Arabs consolidated their position, and by 651, with the death of Yazdegerd III, the last Sāsānian emperor, their conquest of Iran was completed.

Nahayan, Sheikh Zayed bin Sultan Al (Abu Dhabi *amīr*): *see* Nahyān, Shaykh Zāyid ibn Sulṭān Al.

nahcolite, colourless to white carbonate mineral ($NaHCO_3$), a naturally occurring sodium bicarbonate. Its structure consists of planar chains of carbonate groups linked with hydrogen bonds; planes are linked together by sodium in six-fold coordination with oxygen. Nahcolite commonly forms by reaction of carbon dioxide with the mineral trona (*q.v.*) in evaporated lake basins. It is found in large quantities in the central salt body of Searles Lake, Calif., and as concentrations up to five feet (1.5 metres) in diameter in the oil-shale deposits of Green River Formation, Colo., where it is commercially mined. For detailed physical properties, *see* carbonate mineral (table).

Naḥḥās Pasha, Muṣṭafā an- (b. June 15, 1876, Samannūd, Egypt—d. Aug. 23, 1965, Alexandria), statesman who, as the leader of the nationalist Wafd party, was a dominant figure in Egyptian politics until the revolution of 1952.

A lawyer by profession, Naḥḥās was appointed a judge in 1904. Soon after World War I he joined the recently formed Wafd, assuming the chairmanship upon Sa'd Zaghlūl's death in 1927. Thus he embarked upon a career during which he was prime minister of Egypt on five occasions. His first term of office as prime minister began in March 1928. His dismissal in June was occasioned by King Fu'ād I's antipathy to constitutional government and the displeasure of the British high commissioner over his introduction of legislation demanded by the extreme nationalist wing of the Wafd. Returned to power in 1929, he resigned in 1930 after differences with the King over limitation of the sovereign's power. Appointed prime minister for the third time in May 1936, he headed the Egyptian delegation to London to negotiate an Anglo-Egyptian treaty of alliance (August 1936) in response to the Italian invasion of Ethiopia.

After Fu'ād's death in April 1936, the young king Farouk I immediately disagreed with Naḥḥās over limiting the king's powers and, significantly, over international policies; he dismissed the Prime Minister in December 1937. At the onset of World War II, Naḥḥās supported the Allies, while the King vacillated. Naḥḥās' pro-Allied position brought him to power once again in February 1942. The British ambassador, armed with an ultimatum and backed by a show of military force, confronted Farouk with the choice of either abdicating or appointing Naḥḥās prime minister. Farouk chose the latter; elections in March of that year gave the Wafd an overwhelming victory, but Farouk again dismissed Naḥḥās in 1944, after the British had withdrawn their support from him.

Naḥḥās' final term of office began in January 1950, amid signs of collaboration with the King. Once in office he called for the abrogation of the 1936 treaty with Britain and declared Farouk king of Egypt and the Sudan. By this time popular opposition was growing both to the corruption in and policies of the palace and the Wafd, resulting in agitation and disorders in Cairo, on the basis of which Farouk dismissed Naḥḥās in 1952.

Naḥmanides, original name MOSES BEN NAHMAN, also called NAḤAMANI, or, by acronym, RAMBAN (b. *c.* 1194, Gerona, Catalonia—d. 1270, Acre, Palestine), Spanish scholar and rabbi and Jewish religious leader. He was also a philosopher, poet, physician, and Kabbalist.

Naḥmanides earned his livelihood as a physician and served successively as rabbi at Gerona and then as chief rabbi of Catalonia. He also attempted to mediate disputes between the followers and opponents of the philosopher Maimonides in Spain. As one of the leading rabbinical scholars in Spain, Naḥmanides was summoned by King James I of Aragon and forced to participate in a public disputation with Christians before the King and other notables. Naḥmanides, although victorious in his arguments, was forced to flee from Spain (1263) as a result of the debate, and he settled at Acre in Palestine. There he reorganized the Jewish settlement and, although advanced in age, began his most celebrated scholarly work, a commentary on the Pentateuch.

Naḥmanides' Halakhic works, including numerous monographs on specific points of law, are considered classics of rabbinical literature. His commentaries on the Talmud greatly influenced the course of subsequent Jewish rabbinical scholarship in Spain.

Nahr al-ʿĀsī (Asia): *see* Orontes River.

Nahua, Middle American Indian population of central Mexico, of which the Aztecs (*see* Aztec) of pre-Conquest Mexico are probably the best known members. The language of the Aztecs, Nahua, is spoken by all the Nahua peoples in a variety of dialects.

The modern Nahua are an agricultural people; their staple crops are corn (maize), beans, chili peppers, tomatoes, and squash. Also common are maguey (the Mexican century plant), sugarcane, rice, and coffee. The primary farming tools are the wooden plow, hoe, and digging stick. Groups of three or four men may cultivate corn, beans, and squash collectively, using slash-and-burn techniques to clear new land. Chickens and turkeys are also raised, and pigs, goats, and donkeys are often kept. Settlements consist of central villages divided into four sections (barrios) grouped around a central church; each barrio recruits compulsory labour to work village common lands in addition to private farming.

Nahua family threshing near Cholula, Mex.
Shostal Assoc.—EB Inc.

Weaving of cotton and wool is the chief craft among the Nahua, whose skill is great in this respect. Both men and women weave, men usually on the European upright loom and women more often on the native belt loom. Fibres of the maguey plant are also woven to make carrying cloths and sacks. Pottery, rope making, palm-fibre weaving, and adobe brickmaking are other crafts practiced.

Nahua houses are usually one-room structures of cane, wood, adobe, or stone, with thatch or tile roofs. Traditional clothing consists of a long wraparound skirt, blouse (*huipil*), sash (*faja*), short triangular cape (*quechquemitl*), and a shawl (*rebozo*) for women; short white cotton pants, cotton shirt, *faja*, woollen overshirt, sandals, and straw hat for men. Ready-made clothes are commonly worn by Nahua men, however, and women may wear dark skirts and white blouses made of commercial cloth.

The social institution of godparenthood (*compadrazgo*) is widely practiced, and parents and godparents are felt to have strong ties. The Nahua are Roman Catholics, oriented toward the patron saints of their villages as well as the Virgin of Guadalupe and various "Cristos" involved in local legend. Witchcraft is commonly believed in, along with a variety of pagan or semipagan supernatural creatures. Pagan religious rituals, except as they relate to witchcraft, are no longer practiced.

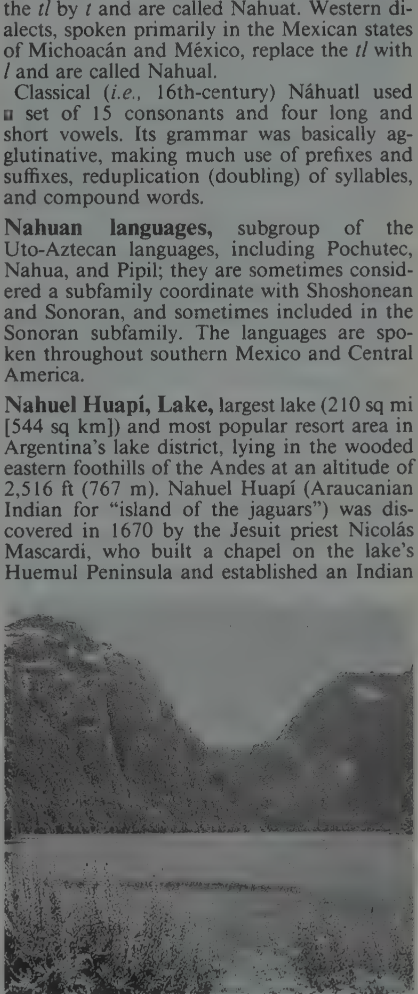
Nahua language, also called AZTEC, an American Indian language of the Uto-Aztecan family, spoken in central and western Mexico. Nahua, the most important of the Uto-Aztecan languages, was the language of the Aztec and Toltec civilizations of Mexico. A large body of literature in Nahua, produced by the Aztecs, survives from the 16th century, recorded in an orthography that was introduced by Spanish priests and based on that of Spanish.

The phonology of Classical Náhuatl, the language of the Aztecs, was notable for its use of a *tl* sound produced as a single consonant and for the use of the glottal stop. The glottal stop has been lost in some modern dialects—replaced by *h*—and retained in others. The *tl* sound, however, serves to distinguish the three major modern dialects: central and northern Aztec dialects retain the *tl* sound, as can be seen in their name, Náhuatl. Eastern Aztec dialects, around Veracruz, Mex., have replaced the *tl* by *t* and are called Nahuat. Western dialects, spoken primarily in the Mexican states of Michoacán and México, replace the *tl* with *l* and are called Nahual.

Classical (*i.e.,* 16th-century) Náhuatl used a set of 15 consonants and four long and short vowels. Its grammar was basically agglutinative, making much use of prefixes and suffixes, reduplication (doubling) of syllables, and compound words.

Nahuan languages, subgroup of the Uto-Aztecan languages, including Pochutec, Nahua, and Pipil; they are sometimes considered a subfamily coordinate with Shoshonean and Sonoran, and sometimes included in the Sonoran subfamily. The languages are spoken throughout southern Mexico and Central America.

Nahuel Huapí, Lake, largest lake (210 sq mi [544 sq km]) and most popular resort area in Argentina's lake district, lying in the wooded eastern foothills of the Andes at an altitude of 2,516 ft (767 m). Nahuel Huapí (Araucanian Indian for "island of the jaguars") was discovered in 1670 by the Jesuit priest Nicolás Mascardi, who built a chapel on the lake's Huemul Peninsula and established an Indian


Lake Nahuel Huapí at Puerto Blest, Arg.
Arthur Griffin—EB Inc.

reducción (work mission). The lake is dotted with islands, including Isla Victoria, which is the site of a forestry-research station. Its waters are deep (more than 1,400 feet [425 m]), clear, and cold. Lake Nahuel Huapí receives small mountain streams and rivers, and the Limay River, its outlet, joins with the Neuquén and Negro rivers. The lake region was designated the Nahuel Huapí National Park in 1934. The park has facilities for boating, fishing, and mountaineering.

Nahuel Huapí National Park, Spanish PARQUE NACIONAL NAHUEL HUAPÍ, national park in Río Negro and Neuquén provinces, southwestern Argentina; it encompasses Lake Nahuel Huapí in the Andes adjacent to the Chilean border. It originated as a reserve in 1903 with a private donation of 18,500 acres (7,500 hectares). It became Argentina's first national park in 1934 and has an area of 2,927 square miles (7,581 square km). The park and adjacent nature reserve include a region of dense forests, numerous lakes, rapid rivers, waterfalls, snow-clad peaks, and glaciers (including Perito Moreno). Among its peaks are the 11,660-foot (3,554-metre) El Tronador ("The Thunderer") and Mount Catedral, the latter being noted for its skiing.

Nahum, Book of, the seventh of 12 Old Testament books that bear the names of the Minor Prophets (grouped together as The Twelve in the Jewish canon). The title identifies the book as an "oracle concerning Nineveh" and attributes it to the "vision of Nahum of Elkosh."

The fall of Nineveh, the capital of the Assyrian Empire, provided the occasion for this prophetic oracle. The mighty Assyrian Empire, which had long been a threat to the smaller nations of the ancient Middle East, was a particular menace to the Israelite people. Its decline, therefore, in the face of the Neo-Babylonian power of the Medes and the Chaldeans and its final collapse in the destruction of Nineveh (612 BC) gave the prophet Nahum cause for extolling these events, which, he announced, occurred because Assyria's policies were not in accord with God's will. The book contains many types of material, among which are an acrostic hymn, oracles of judgment, satire, a curse, and funeral laments, all of which were brought together and related to the fall of Nineveh.

Nahyān, Shaykh Zāyid ibn Sulṭān Al, also spelled SHEIKH ZAYED BIN SULTAN AL NAHAYAN, or NUHAYYAN (b. 1918?), president of the United Arab Emirates (U.A.E.) and emir of Abu Dhabi.

Zāyid was raised as a desert nomad and was governor of Abu Dhabi's Eastern Province from 1946 to 1966, when he deposed his brother Sheikh Shakhbūṭ ibn Sulṭān and became emir. Zāyid was the principal architect of the federation of the old Trucial States and became president of the renamed U.A.E. in 1971. In 1973 he reorganized the U.A.E.'s federal structure, bringing most of Abu Dhabi's ministries into the federal Cabinet.

Zāyid's second term as president, beginning in 1976, brought more reforms, including the integration of the emirates' defense forces and increased budgetary contributions from member emirates. One of Zāyid's primary concerns as emir and president was to use oil revenues to raise the standard of living in the sheikhdoms and internationally.

When a new Cabinet was sworn in in 1977, Zāyid attempted to further tighten the structure of the federation, maintaining that its government would reflect the available bureaucratic talent rather than the interests of separate emirates. Zāyid was reelected president of the federation in 1981.

Naiad (from Greek *naiein,* "to flow"), in Greek mythology, one of the nymphs of flowing water—springs, rivers, fountains, lakes. The Naiads, appropriately in their relation to freshwater, were represented as beautiful, lighthearted, and beneficent. Like the other classes of nymphs, they were extremely long-lived, although not immortal.

naiad, immature stage in the development of certain insects. *See* nymph.

Naidu, Sarojini, *née* CHATTOPADHYAY (b. Feb. 13, 1879, Hyderābād, India—d. March 2, 1949, Lucknow), political activist, feminist, poet-writer, and the first Indian woman to be president of the Indian National Congress and to be appointed an Indian state governor.

Sarojini was the eldest daughter of Aghorenath Chattopadhyay, a Bengali Brahman who was principal of the Nizam's College, Hyderābād. She entered Madras University at the age of 12 and studied (1895–98) at King's College, London, and later at Girton College, Cambridge.

After some experience in the suffragist campaign in England, she was drawn to India's Congress movement and to Mahatma Gandhi's Non-cooperation Movement. In 1924 she traveled in eastern Africa and South Africa in the interest of Indians there and the following year became the first Indian woman president of the National Congress—having been preceded eight years earlier by the English feminist Annie Besant. She toured North America, lecturing on the Congress movement, in 1928–29. Back in India her anti-British activity brought her a number of prison sentences (1930, 1932, and 1942–43). She accompanied Gandhi to London for the inconclusive second session of the Round Table Conference for Indian–British cooperation (1931). Upon the outbreak of World War II she supported the Congress Party's policies, first of aloofness, then of avowed hindrance to the Allied cause. In 1947 she became governor of the United Provinces (now Uttar Pradesh), a post she retained until her death.

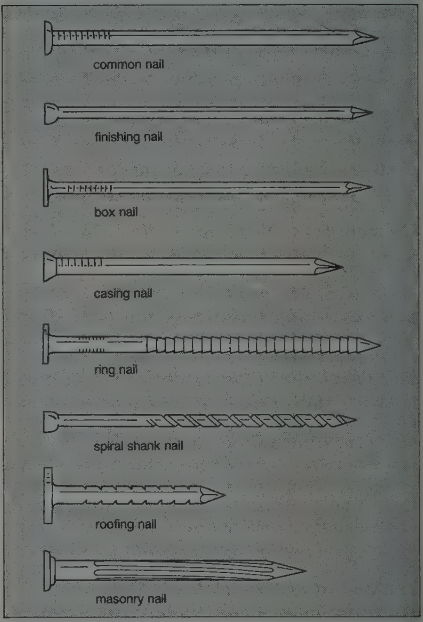
Sarojini Naidu, "the Nightingale of India," also led an active literary life and attracted notable Indian intellectuals to her famous salon in Bombay. Her first volume of poetry, *The Golden Threshold* (1905), was followed by *The Bird of Time* (1912), and in 1914 she was elected a fellow of the Royal Society of Literature. Her collected poems, all of which she wrote in English, have been published under the titles *The Sceptred Flute* (1928) and *The Feather of the Dawn* (1961).

naïf art: *see* naïve art.

nail, in the anatomy of humans and other primates, horny plate that grows on the back of each finger and toe at its outer end. It corresponds to the claw, hoof, or talon of other vertebrates. The nail is a platelike, keratinous, translucent structure that consists of highly specialized epithelial cells. The nail grows from a deep groove in the dermis of the skin. All nail growth occurs at the nail's base, where the specialized cells that make up the nail's plate are produced; these cells are pushed forward as new cells form behind them. The nail plate is also attached to the underlying, richly vascularized nail bed, which supplies the plate with necessary nutrients. The cells at the front edge of the nail plate die and turn white as they lose contact with the nail bed. The whitish, crescent-moon-shaped part of the nail, known as the lunula, is also not attached to the underlying nail bed. The nail's chief function is to protect the terminal portions of the toes and fingers. On the fingers, the front edge of the nail assists in the manipulation of small objects, as well as in scratching.

nail, in construction and carpentry, a slender metal shaft that is pointed at one end and flattened at the other end and is used for fastening one or more objects to each other. Nails are most commonly used to fasten pieces of wood together, but they are also used with plastic, drywall, masonry, and concrete. Nails are usually made of steel but can also be made of stainless steel, iron, copper, aluminum, or bronze. The pointed end of a nail is called the point, the shaft is called the shank, and the flattened part is called the head.

There are many different types of nails, the types depending on the material that they are driven into and the degree of holding power that they must have. Two basic classes of nails are common nails and finishing nails (*see* Figure). The most widely used of all nails, the common nail has a large, flat head that is driven in so that it is flush with the material's surface. A finishing nail has a smaller, narrower head that is driven in below the material's surface with a special tool called a nail set, or punch; the small depression remaining is filled in with putty. Because of their neater appearance, finishing nails are used mostly for interior paneling and cabinetwork. A box nail is similar to a common nail but has a slimmer shank and is used on lighter pieces of wood and on boxes. A casing nail is similar to a finishing nail but has a slightly thicker shaft and a cone-shaped head. Nails smaller than one inch long are called wire nails if they have a head and brads if they have a very small head or none at all. Extremely thick nails are called spikes.



Different types of nails

Nails can be given specially worked shanks to give them greater holding power once they have been driven in; the ring nail has annular rings on its shaft, while the spiral shank nail has a groove running up it in a tight spiral, like that of a screw. Roofing nails have large, flat heads that can better hold down materials such as roofing felt and fibreboard. Certain other nails are specially hardened so that they can be driven into masonry or concrete, usually in the act of attaching wooden members to these materials.

Nails are made by feeding a thick, continuous steel wire into a machine where the wire is gripped between two dies and is cut to the desired length. Sufficient metal to form the head is allowed to protrude from the dies at one end and is then flattened into a head by a blow from a mechanized hammer. The other end of the piece of wire is cut into a point, after which the nail is ejected from the machine and may be smoothed (to remove the rough edges), polished, or plated. Wire-nail presses can produce up to 800 nails per minute.

Naʿīmah, Mikhāʾīl, Naʿīmah also spelled NOUAYME, or NAIMY (b. Nov. 22, 1889, Biskintā, Lebanon—d. Feb. 28, 1988, Beirut), Lebanese literary critic, playwright, essayist, and short-story writer who helped introduce modern realism into Arabic prose fiction.

Naʿīmah was educated at schools in Lebanon, Palestine, Russia, and the United States. After graduating in law from Washington State University in the United States, he settled in New York City and worked as a journalist and critic. He formed a close friendship with the Lebanese American writer Khalil Gibran. In 1932 he returned to Lebanon a celebrated author and settled in his native village.

In his short stories Naʿīmah depicted the problems of Lebanese society more realistically and with greater technical sophistication than had preceding Arabic writers. His collections of short stories include *Kāna mā kāna* (1937; "Once upon a Time") and *Al-bayādir* (1945; "The Threshing Floors"). His other outstanding books are a highly subjective biography of Gibran (1934) and his autobiography, *Sabʿūn*, 3 vol. (1959–60; "Seventy").

Nain, Antoine, Louis, and Mathieu Le (French painters): *see* Le Nain, Antoine, Louis, and Mathieu.

Nainitāl, also spelled NAINI TĀL, town, northern Uttaranchal state, northern India. The town lies in the Siwālik Range. Founded in 1841, it is a popular resort, lying at 6,346 feet (1,934 m) above sea level. The town is built around a beautiful lake and is surrounded by forested hills. It is the site of St. Joseph's College. A disastrous landslide occurred there in 1880. Pop. (2001 prelim.), 38,559.

Sailboats on the lake at the town of Nainitāl, Uttaranchal, India
Vidyavrata

Naipaul, Sir V.S., in full SIR VIDIADHAR SURAJPRASAD NAIPAUL (b. Aug. 17, 1932, Trinidad), Trinidadian writer of Indian descent known for his pessimistic novels set in the developing world. For these revelations of what the Swedish Academy called "suppressed histories," Naipaul won the Nobel Prize for Literature in 2001.

Descended from Hindu Indians who had immigrated to Trinidad as indentured servants, Naipaul left Trinidad to attend the University of Oxford in 1950. He subsequently settled in England, although he traveled extensively thereafter. His earliest books (*The Mystic Masseur,* 1957; *The Suffrage of Elvira,* 1958; and *Miguel Street,* 1959) are ironic and satirical accounts of life in the Caribbean. His fourth novel, *A House for Mr. Biswas* (1961), also set in Trinidad, was a much more important work and won him major recognition. It centres on the main character's attempt to assert his personal identity and establish his independence as symbolized by owning his own house. Naipaul's subsequent novels used other national settings but continued to explore the personal and collective alienation experienced in new nations struggling to integrate their native and Western-colonial heritages. The three stories in *In a Free State* (1971) are set in various countries; *Guerrillas* (1975) is a despairing look at an abortive uprising on a Caribbean island; and *A Bend in the River* (1979) pessimistically examines the uncertain future of a newly independent state in Central Africa. Naipaul's other novels include *The Mimic Men* (1967) and *The Enigma of Arrival* (1987).

Naipaul was knighted in 1989. In 2001 he published the novel *Half a Life,* about an Indian immigrant to England and then Africa. He becomes "half a person," as Naipaul said, "living a borrowed life." *Half a Life* was considered by many critics to illustrate beautifully the reasons that he won the Nobel Prize.

Among Naipaul's nonfiction works are three studies of India, including *An Area of Darkness* (1965), and two works on Islāmic faith, *Among the Believers: An Islāmic Journey* (1981) and *Beyond Belief: Islāmic Excursions Among the Converted Peoples* (1998).

Nair (Hindu caste): *see* Nāyar.

Nair, Sir Chettur Sankaran (Indian jurist): *see* Sankaran Nair, Sir Chettur.

Nair, Mira (b. Oct. 15, 1957, Bhubaneshwar, Orissa, India), Indian director known for her documentaries and feature films dealing with controversial subject matter.

Nair entered the University of Delhi in 1975 and left in 1976 to study at Harvard University. For her thesis in sociology, she produced her first documentary, *Jama Masjid Street Journal* (1979), a record of a traditional Muslim community. Nair then created a series of gritty documentaries that examined Indian culture, including *Children of a Desired Sex* (1987), which examines the patriarchal society's effects on unborn female children, and *India Cabaret* (1985), a portrait of two aging striptease dancers.

In the late 1980s, Nair turned her attention to feature films. She produced, directed, and cowrote the acclaimed film *Salaam Bombay!* (1988), the story of an 11-year-old boy living on the streets that is told using street people instead of professional actors. Nair followed this with *Mississippi Masala* (1991), which chronicled the love affair of an Indian woman and an African American man. In 1997 she battled India's censors—eventually involving the Indian Supreme Court—over the release of *Kama Sutra: A Tale of Love. Monsoon Wedding* (2001) is about a contemporary arranged Punjabi marriage.

Nairne (of Nairne), Carolina Nairne, Baroness, *née* OLIPHANT (b. Aug. 16, 1766, Gask, Perth, Scot.—d. Oct. 26, 1845, Gask), Scottish songwriter and laureate of Jacobitism, who wrote "Charlie Is My Darling," "The Hundred Pipers," "The Land o' the Leal," and "Will Ye No' Come Back Again?"

The daughter of a Jacobite laird, Laurence Oliphant, who was exiled (1745–63), she followed Robert Burns's example of writing in the folk tradition. Her songs helped to create the myth that the Stuart cause was the cause of the common people. She married Major William Nairne, who became 5th Baron Nairne of Nairne upon the restoration of titles of Jacobite families in 1824. Her songs first appeared in *The Scottish Minstrel* (1821–24) under the pseudonym of Mrs. Bogan of Bogan. The songs soon found their way back into the folk repertory. A collected edition, *Lays from Strathearn* (1846), appeared after her death.

Nairnshire, also called NAIRN, historic county, northeastern Scotland, on the southern shore of the Moray Firth. Nairn is the principal town.

Nairobi, city and capital of Kenya. It is situated in the south-central part of the country, in the highlands at an elevation of about 5,500 feet (1,680 m). The city lies 300 miles (480 km) northwest of Mombasa, Kenya's major port on the Indian Ocean.

The city originated in the late 1890s as a colonial railway settlement, taking its name from a water hole known to the Masai people as Enkare Nairobi ("Cold Water"). When the railhead arrived there in 1899, the British colonial capital of Ukamba province was transferred from Machakos (now Masaku) to the site, and in 1905 Nairobi became the capital of the British East Africa Protectorate. From about 1900 onward, when a small Indian bazaar was established at Nairobi, the city was also a trading centre.

As a governmental centre, Nairobi subsequently attracted migrants from rural Kenya and became one of the largest cities in tropical Africa. It was declared a municipality in 1919 and in 1954 was granted city status. When Kenya gained independence in 1963, Nairobi remained the capital. The new nation's constitution expanded the city's municipal area; the enlarged municipality, known as the Nairobi Special Area, is an independent unit administered by the Nairobi City Council.

Nairobi is the principal industrial centre of the country. The railways are the largest single industrial employer. Light-manufacturing industries produce beverages, cigarettes, and processed food. Tourism is also important. The city is located near eastern Africa's agricultural heartland, and a number of primary products are exported via Mombasa. Nairobi also plays an important role in the community of eastern African states; it is the headquarters of the East African Community's railways, harbours, and airways corporation.

The city is well served by roads and railways. The main routes are southeast and south to Mombasa and Tanzania and northwest via the highlands to Lake Victoria and Uganda. Jomo Kenyatta International Airport, 9 miles (15 km) to the southwest, is one of the chief international airports in Africa.

Among the city's architectual landmarks are the modern Kenyatta Conference Centre, the Parliament building and city hall, the law courts, and the Roman Catholic cathedral. There is also a commercial centre.

The University of Nairobi (founded in 1956 as the Royal Technical College of East Africa), of which Kenyatta University College (1972) is a constituent part, is located in the city, as are Kenya Polytechnic (1961) and Kenya Institute of Administration (1961). Other institutions include the Central Government Archives, the McMillan Memorial Library, and the Kenya National Theatre. Nairobi National Park, a large game reserve, is a popular tourist attraction. Pop. (1999 prelim.) 2,143,254.

Nairobi National Park, national park, in south-central Kenya, 5 miles (8 km) south of Nairobi. The park, established in 1946, has an area of 45 square miles (117 square km) and lies about 5,000–6,000 feet (1,500–1,800 m) above sea level. It consists partly of thick woods near the city outskirts, partly of rolling plains and valleys, and partly of a wooded confluence of several rivers. Its vegetation is of the dry transitional savanna type. Acacias and other thorny varieties, *muhuhu,* Cape chestnut, and Kenya olive are the most important trees. Scores of mammals, such as the lion, gazelle, black rhinoceros, giraffe, various species of antelope, and zebra, inhabit the park, as well as numerous reptiles and hundreds of species of birds. Only by establishing migration routes into nearby Ngong Reserve has it been possible to maintain wildlife in the area at its present levels. A small zoo (basically an animal orphanage) is near the main gate. The park's headquarters are at Nairobi.

Naismith, James A. (b. Nov. 6, 1861, Almonte, Ont., Can.—d. Nov. 28, 1939, Lawrence, Kan., U.S.), Canadian-American physical-education director who, in December 1891, at the International Young Men's Christian Association Training School, afterward Springfield (Mass.) College, invented the game of basketball.

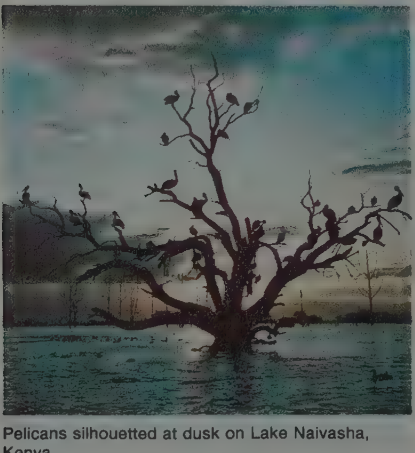
Naismith holding a ball and a peach basket, the first basketball equipment

UPI—EB Inc.

As a young man, Naismith (who had no middle name but adopted the initial "A.") studied theology and excelled in various sports. In the autumn of 1891 he was appointed an instructor by Luther Halsey Gulick, Jr., head of the Physical Education Department at Springfield. Gulick asked Naismith and other instructors to devise indoor games that could replace the boring or dangerous exercises used at the school during the winter. For his new game Naismith selected features of soccer, American football, field hockey, and other outdoor sports but (in theory) eliminated body contact between players. Because his physical education class at that time was composed of 18 men, basketball originally was played by 9 on each side (eventually reduced to 5).

In 1898 Naismith received an M.D. from Gross Medical College, Denver, Colo., afterward the University of Colorado School of Medicine. From that year until 1937 he was chairman of the physical education department at the University of Kansas, Lawrence, where he also coached basketball until 1908. In addition to basketball, he is credited with inventing the protective helmet for football players. The Naismith Memorial Basketball Hall of Fame, Springfield, Mass., was incorporated in 1959.

Naivasha, Lake, lake, in the eastern arm of the East African Rift System, 35 mi (56 km) southeast of Nakuru, Kenya. It is flanked by the Ilkinopop (Kinangop) Plateau (east) and the Mau Escarpment (west). The lake lies on an alluvium-covered flat in the valley floor and is flanked on the north by an extensive papyrus swamp. It is the highest of the lakes in the eastern part of the rift system, and is situated at 6,180 feet (1,884 m) above sea level. Its level and size fluctuate periodically; in the mid-1970s it covered about 81 square miles (210 square km). Its main tributaries are the Engare Melewa and Gilgil rivers.



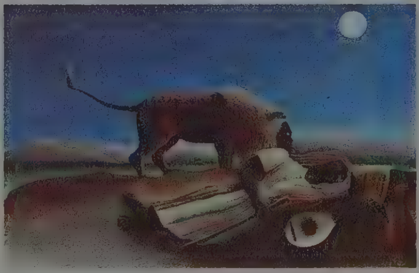
Pelicans silhouetted at dusk on Lake Naivasha, Kenya

Gerald Cubitt

Although it has no outlet, the lake's waters are fresh. Several species of *Tilapia* and black bass (introduced) are the basis of commercial and sport fishing. Bird-watching is also popular. Lake Naivasha serves as a weekend resort for residents of Nairobi, the capital of Kenya, to the southeast.

naïve art, also spelled NAÏF ART, work of artists in sophisticated societies who lack or reject conventional expertise in the representation or depiction of real objects. Naïve artists are not to be confused with hobbyists, or "Sunday painters," who paint for fun. The naïve creates with the same passion as the trained artist but without the latter's formal knowledge of methods.

Naïve works are often extremely detailed, and there is a tendency toward the use of brilliant, saturated colours rather than more subtle mixtures and tones. There is also a characteristic absence of perspective, which creates the illusion that figures are anchored in the space, with the result that figures in naïve paintings are often "floating."



"The Sleeping Gypsy," naïve oil painting by the French artist Henri Rousseau, 1897; in the Museum of Modern Art, New York City

By courtesy of the Museum of Modern Art, New York City, gift of Mrs. Simon Guggenheim

The most frequently reproduced examples of naïve art are the works of the French artist Henri Rousseau, whose portraits, jungle scenes, and exotic vegetation are widely admired. Rousseau's paintings, like many others of this genre, convey a sense of frozen motion and deep, still space, and the figures are always shown either full face or in fairly strict profile (the naïve painter rarely conceals much of a face and almost never portrays a figure completely from the back). Like many naïve painters and sculptors, Rousseau projects his intensity and passion through his figures—especially the staring eyes—and the precision of his line and colour.

The appreciation of naïve art has been a fairly recent phenomenon: many of the artists still living never expected their work to be so eagerly collected. By the mid-20th century most developed nations had naïve artists who had risen to some prominence. While some naïve painters consider themselves professional artists and seek public recognition of their work, others refuse to exhibit for profit and paint only for their families or for religious institutions.

Najʿ Ḥammādī, also spelled NAG HAMMADI, town in Qinā *muḥāfaẓah* (governorate), on the west bank of the Nile, in Upper Egypt, on or near the site of the ancient town of Chenoboskion. It is a market town for the surrounding agricultural region, and it has a sugar refinery; an aluminum plant complex opened in 1975.

Ancient sites in the vicinity include the town of Hiw (Diospolis Parva) to the south and al-Qaṣr waʾṣ Sayyād on the eastern bank, site of Old Kingdom tombs and an important Coptic settlement. There in 1945 were found the Najʿ Ḥammādī (Nag Hammadi) papyri, a collection of 13 codices of Gnostic scriptures and commentaries written in the 2nd or 3rd century (though the codices themselves are 4th-century copies). The Cairo–Aswān railway serves the town and crosses the Nile to the eastern bank over a swing bridge. Pop. (1986 prelim.) 28,493.

Najadales, also called POTAMOGETONALES, the pondweed order of monocotyledonous flowering plants, comprising 10 families, with 19 genera of aquatic and marsh-dwelling herbs. The plants are so diverse in appearance, structure, and technical character that they are unified as an order mostly by their aquatic habit and lack of endosperm (nutrient tissues in the seed for the developing embryo). A further diagnostic character is the presence in most genera of small scales near the leaf bases. (However, some members of the order Arales also exhibit this feature.) The order is considered to be closely related to the water-plantain order (Alismales) and probably evolved from it.

The families Scheuchzeriaceae and Juncaginaceae are composed of emergent plants of marshes and bogs. The two species of the genus *Scheuchzeria,* which constitute the family, grow in wet sphagnum bogs. The arrowgrass family (Juncaginaceae), with four genera and about 18 species, includes the flowering quillwort (*Lilaea subulata*), *Triglochin* (15 species), and two more single-species genera.

The Aponogetonaceae (the lattice plant family) and Potamogetonaceae (the pondweed family) are composed mainly of freshwater aquatic plants with submerged or floating leaves but frequently with emergent flowering shoots. *Aponogeton,* the only genus of its family, contains 30 species, mostly from Africa, of which *A. distachys* is often grown ornamentally in aquariums and pools. The lattice plant of Madagascar (*A. fenestralis*) has unusual underwater leaves that consist of veins only. The pondweed family contains two genera (*Potamogeton,* 100 species; and *Groenlandia,* one species) of widely distributed plants important as food for waterfowl and cover for fishes.

Arrow-grass (*Triglochin maritima*)

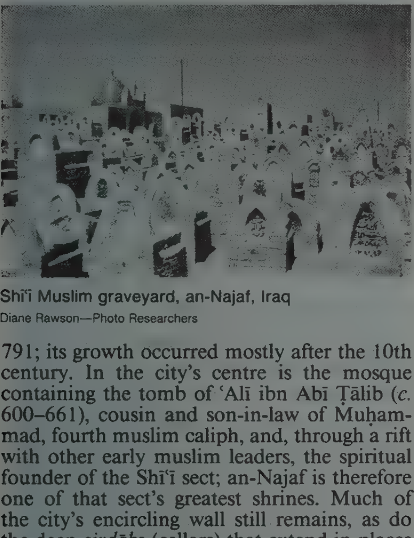
Ingmar Holmasen

The Ruppiaceae (widgeon grass family), with one genus, *Ruppia,* and two species; Zannichelliaceae, with three genera, including the horned pondweed, *Zannichellia;* and Najadaceae (the naiad family), with one genus, *Najas,* and 50 species, are submerged aquatics of freshwater or brackish water.

Aponogeton distachys
Syndication International—Photo Trends

The Zosteraceae (the eelgrass family), with two genera, *Phyllosphadix* and *Zostera*, and 12 species, consists entirely of submerged marine plants in temperate regions of the world. The family Cymodoceaceae (four genera and 21 species) comprises plants that grow in shallow saltwater bays and brackish streams, but it is principally found in warmer coastal waters such as Florida. Its largest genera are *Cymodocea* (10 species) and *Helodule* (7 species). The family Posidoniaceae, with one genus, *Posidonia,* and two species, is a Mediterranean and Australian group similar to the eelgrass.

Najaf, an-, also called NAJAF, city, capital of an-Najaf *muḥāfaẓah* (governorate), central Iraq. One of Iraq's two holy cities (the other is Karbalā'), an-Najaf lies on a ridge just west of the Euphrates River. The caliph Hārūn ar-Rashīd is reputed to have founded it in AD 791; its growth occurred mostly after the 10th century. In the city's centre is the mosque containing the tomb of ʿAlī ibn Abī Ṭālib (*c.* 600–661), cousin and son-in-law of Muḥammad, fourth muslim caliph, and, through a rift with other early muslim leaders, the spiritual founder of the Shīʿī sect; an-Najaf is therefore one of that sect's greatest shrines. Much of the city's encircling wall still remains, as do the deep *sirdāb*s (cellars) that extend in places beyond the city's limits and have provided sanctuary for political dissidents. An-Najaf has long been a hotbed of Shīʿī resistance against the Sunnī rulers in Baghdad, and in the 20th century this resistance has been a source of tension between the Sunnī government of Iraq and the Shīʿī in Iran.



Shīʿī Muslim graveyard, an-Najaf, Iraq
Diane Rawson—Photo Researchers

An-Najaf *muḥāfaẓah*, with an area of 10,615 sq mi (27,494 sq km), is a flat region extending from the Euphrates River in the northeast to the Saudi Arabian border in the southwest. Except for the area near the river, the region is sparsely populated. The governorate was created in 1976 from the western part of al-Qādisiyah and the eastern part of Karbalā' *muḥāfaẓat* (governorates). Pop. (1985 est.) city, 242,600; (1991 est.) *muḥāfaẓah,* 666,400.

Najāḥid DYNASTY, Muslim dynasty of Ethiopian Mamlūks (slaves) that ruled Yemen in the period 1022–1158 from its capital at Zabīd. The Ziyādid kingdom at Zabīd (819–1018) had in its final years been controlled by Mamlūk viziers, the last of whom divided Yemen between two slaves, Nafīs and Najāḥ. Nafīs murdered the last Ziyādid ruler in 1018, and, after several years of bitter fighting and the death of Nafīs, Najāḥ emerged victorious and took control of Zabīd early in 1022. Najāḥ obtained the recognition of the ʿAbbāsid caliph and established his rule over the Tihāmah (coastal lands), though the highlands, a stronghold of tribal chieftains, remained recalcitrant. Najāḥ's murder *c.* 1060 threw the kingdom into chaos, allowing the Ṣulayḥid ruler ʿAlī to take Zabīd, and reduced Najāḥid history to a series of intrigues.

Two of Najāḥ's sons, Saʿīd and Jayyāsh, who had fled the capital, plotted to restore themselves to the Najāḥid throne and in 1081 killed ʿAlī. Saʿīd, supported by the large Ethiopian Mamlūk population, easily secured control of Zabīd. ʿAlī's son al-Mukarram, however, heavily influenced by his mother, took Zabīd *c.* 1083, forcing the Najāḥids to flee again. Saʿīd regained power briefly (1086–88) but was finally murdered by al-Mukarram's wife as-Sayyidah. Jayyāsh, meanwhile, had fled to India. He returned in disguise and assumed power with little difficulty, restoring equilibrium to the Yemeni kingdom during his reign (1089–*c.* 1106). After much family feuding over a successor to Jayyāsh, his grandson al-Manṣūr was installed in Zabīd *c.* 1111 by the Ṣulayḥids as their vassal. Manṣūr was poisoned in 1123 by his Mamlūk vizier Mann Allāh, who proceeded to fight off an attempted invasion by the Fāṭimids of Egypt and to reduce the Najāḥid ruler to a puppet figure. The Yemeni government passed from one Mamlūk vizier to another after Mann Allāh's murder in 1130, as rival factions struggled among themselves for primacy. The threat of ʿAli ibn Mahdī, a Khārijite (member of a puritanical and fanatical Islāmic sect) who had murdered the vizier Surūr in 1156, forced the Ethiopians to seek outside help from the Zaydī *imām* of Ṣanʿā', Aḥmad al-Mutawakkil, and to agree to recognize him as ruler of Zabīd. The Ethiopians were, however, defeated, and ʿAli ibn Mahdī took the Najāḥid capital in 1159.

Najd, also spelled NEJD, region, central Saudi Arabia, comprising a mainly rocky plateau sloping eastward from the mountains of the Hejaz. On the northern, eastern, and southern sides, it is bounded by the sand deserts of an-Nafūd, ad-Dahnā', and the Rubʿ al-Khali. It is sparsely settled, except for the fertile oases strung along the escarpment of Jabal (mountains) Ṭuwayq and the al-ʿAramah plateau. The arid region remained politically divided among rival peoples until the mid-18th century, when it became the centre of the Wahhābī, a fundamentalist Islāmic movement. Led by the Muslim scholar Muḥammad ibn ʿAbd al-Wahhāb and the Āl Saʿūd family, the movement consolidated Najd and expanded into Mecca in 1803. This expansionist policy antagonized the Ottomans, who seized the provincial capital of ad-Dirʿīyah. The Āl Saʿūd, however, quickly regained control, and, with Riyadh as the new capital from 1824, the dynasty has ruled Najd continuously, save for a brief period around the turn of the century when the Rashīd dynasty extended its power over the province. Ibn Saʿūd proclaimed the unified Kingdom of Saudi Arabia in 1932, and his provincial capital of Riyadh became the national capital, although Jidda continued as the diplomatic capital. Oases groups within Najd region include al-Kharj, al-Maḥmal, as-Sudayr, al-Washm, al-ʿĀriḍ, al-Qaṣīm, and Jabal Shammar.

Najin, city, Hamgyŏng-pukto (North Hamgyŏng Province), northeastern North Korea. It is located on Najin-man (bay), on the Sea of Japan (East Sea). Protected by Taech'o and Soch'o islands, it has a good natural harbour and is a port city. Formerly a poor village, it developed rapidly after the construction of the rail line connecting it with the urban centres of Manchuria in 1932. Fisheries are important; the neighbouring waters offer good fishing grounds for codfish, pollack, and herring. Shipbuilding is carried on. It is a station on the rail line passing through Wŏnsan, to the south, through Hamhŭng and Ch'ŏng-jin, and continuing past Najin to Unggi, to the north, via the Ungna Tunnel (12,631 ft [3,850 m] long), the longest tunnel in the country. Beyond Unggi, the rail line parallels the Chinese border, and then crosses into China. Pop. (latest est.) 34,388.

Najrān, town, oasis, and *minṭaqah* (province), southern Asir region, southwestern Saudi Arabia, in the desert along the Yemen (Ṣanʿā') frontier. It is bounded by the *manāṭiq* (provinces) of ar-Riyāḍ (north), ash-Sharqīyah (east), and Asir (west). The province is composed of the Asir plateau (west), Najrān plateau (centre), and the Rubʿ al-Khali (east). First visited by the Romans in 24 BC, it was the seat of an important Christian colony in 500–635. Najrān was one of the main centres producing frankincense and myrrh to supply the Mediterranean basin and the Middle East between 1000 BC and AD 600. In more recent times it has been the subject of controversy between Saudi Arabia and Yemen (Ṣanʿā'). By the Treaty of aṭ-Ṭā'if in 1934, it was given to Saudi Arabia, but the boundary was denounced by Yemen (Ṣanʿā') during the civil war of the 1960s. An extremely fertile agricultural area, the oasis produces dates and grains and is used for stock raising. The town of Najrān is the southern terminus of highways from Mecca and Riyadh. Pop. (1992) town, 90,983; *minṭaqah,* 300,994.

Nakada (Egypt): *see* Naqādah.

Nakae Chōmin, pseudonym of NAKAE TOKUSUKE (b. Dec. 8, 1847, Kōchi, Japan—d. Dec. 13, 1901, Tokyo), noted writer who popularized the equalitarian doctrines of the French philosopher Jean-Jacques Rousseau in Japan. As a result, Nakae is often considered the spiritual founder of the Japanese democratic movement.

Early interested in Western learning, Nakae studied French and Dutch as a boy and served for a while as a translator for the French minister to Japan. In 1871 he was sent abroad as a member of the Ministry of Justice and studied philosophy, history, and literature in France. On his return, he served briefly in the government and then retired and began his own French language school.

In 1881 Nakae started the influential daily newspaper, *Tōyō jiyū shimbun* ("Oriental Free Press"), which he used to propagate Western democratic ideas. He also served as a member of the Diet (parliament) and engaged in various business enterprises. His real fame, however, came from his popularization of Rousseau; he translated *Du contrat social* and then, while he lay dying of a malignancy, wrote two best-selling books in which he explained French democratic ideas to the Japanese.

Nakae Tōju, original personal name GEN, pseudonym MOKKEN (b. April 21, 1608, Ōmi Province, Japan—d. Oct. 11, 1648, Ōmi Province), Neo-Confucian scholar who established in Japan the Idealist thought of the Chinese philosopher Wang Yang-ming.

Nakae was originally a follower of the teachings of the Chinese Neo-Confucian Rationalist Chu Hsi, whose doctrines had become a part of the official ideology of the Japanese government. In 1634 he asked to be released from the post he held as retainer to his feudal lord so he could return to his native village and carry out his filial obligations to his widowed mother. He left despite his lord's refusal of permission. At home he devoted himself to teaching and study, eventually abandoning his adherence to the Chu Hsi school of thought and becoming a propagator of the philosophy of Wang Yang-ming. His fame subsequently spread throughout the land. He attracted many distinguished disciples and became known as the sage of Ōmi province.

Both Wang and Nakae believed that the unifying principle of the universe exists in the human mind and not in the external world. They taught that the true Way could be discovered through intuition and self-reflection, rejecting Chu Hsi's idea that it could be found through empirical investigation. In his conviction that a concept can be fully understood only when acted upon, Nakae emphasized practice rather than abstract learning. This emphasis on individual action made Nakae's philosophy popular among the zealous Japanese reformers and patriots of the 19th and 20th centuries. *Tōju sensei zenshū* ("The Complete Works of Master Tōju") was published in five volumes in 1940.

Nakamura Nakazō I, also called SAKAEYA, or HIDETSURU (b. 1736, Edo [now Tokyo], Japan—d. June 6, 1790, Edo), Japanese kabuki actor who introduced male roles into the kabuki theatre's dance pieces (*shosagoto*), which had been traditionally reserved for female impersonators.

Nakamura was left an orphan and adopted at the age of five by the music master Nakamura Kojūrō and by O-Shun, a dancing mistress whose family were costumers to the Nakamura Theatre. During the 1760s Nakamura gained fame as a player of villains' roles. Supported by the actor and dancer Ichikawa Danjūrō IV, he performed at the Ichimura Theatre in Edo, giving new interpretations (collectively called Hidetsuru style) that are still used by modern actors. Being also the Iemoto ("Grand Master") of the Shigayama School of Dancing, Nakamura made notable contributions to the development and perfection of dance in the kabuki drama. His autobiography, *Tsukiyuki-hana nemonogatari* ("Moon, Snow, and Flowers: Sweet Nothings"), and essays, *Hidetsuru nikki,* survive.

Nakamura Utaemon, notable line of actors in the kabuki theatre of Japan.

Nakamura Utaemon I (b. 1714—d. Nov. 23, 1791, Ōsaka, Japan) became well known for his performance of villains' roles. His student Utaemon II (who, as is customary in Japanese tradition, assumed the name as well as the role of his master) later discarded that name, but Utaemon I's son (b. March 31, 1778—d. Sept. 12, 1838, Ōsaka) assumed the name Utaemon III a few years after his father's death. An extremely versatile player who was a talented dancer and who could brilliantly perform the entire spectrum of male and *onnagata* (female impersonator) roles, Utaemon III became one of the most famous kabuki actors of his day. His student and successor, Utaemon IV (b. 1798, Edo [now Tokyo]—d. March 8, 1852, Ōsaka), also showed remarkable versatility and was well known in his time.

Utaemon V (b. Feb. 12, 1866, Edo—d. Sept. 12, 1940, Tokyo) became a leading actor in *onnagata* roles during the Meiji period and worked to ensure the artistic continuity of the kabuki theatre, which was threatened during that period of intense westernization. He also performed in the innovative plays of dramatist and scholar Isubouchi Shōyō, which incorporated Western theatrical elements. Utaemon V eventually became the dean of all kabuki actors of his time. His son, Utaemon VI (b. Jan. 20, 1917, Tokyo), became a leading performer of *onnagata* roles in the mid-20th century. He tried to preserve the classical style in the kabuki theatre, and to this end he encouraged the novelist Mishima Yukio and others to write new kabuki plays in a style that conformed to traditional practices. Utaemon VI also helped revive old kabuki plays that were seldom performed. He was designated a Living National Treasure by the Japanese government.

Nakano Ōe (Japanese prince and emperor): *see* Tenji.

Nakanuma Shikibu: *see* Shōkadō Shōjō.

Nakao Shinnō (Japanese poet): *see* Nōami.

Nakasone Yasuhiro (b. May 27, 1918, Takasaki, Japan), Japanese politician, leader of the Liberal-Democratic Party (LDP; 1982–89), and prime minister of Japan (1982–87).

The son of a wealthy lumber dealer, Nakasone graduated (1941) from Tokyo Imperial University (now University of Tokyo) and served as a lieutenant in the imperial navy during World War II. At war's end he was a distant witness of the atomic bombing of Hiroshima. In 1947 Nakasone was elected to the lower house of the Diet (parliament), becoming one of the youngest persons ever to hold a seat in that body. He retained his seat in every subsequent election and successively held several cabinet posts, including that of transport (1967–68), defense (1970–71), and international trade and industry (1972–74).

After Prime Minister Suzuki Zenko resigned (October 1982), Nakasone, an ally of the powerful Tanaka Kakuei, won a four-way contest to become the president of the LDP and thus, by reason of that party's dominance, prime minister of Japan. He was formally elected prime minister by the Japanese Diet in November 1982. The political opposition was able to force early parliamentary elections in December 1983. The LDP lost its absolute majority, but Nakasone kept his office by forming a coalition cabinet.

As prime minister, Nakasone sought to strengthen Japan's ties with the United States by increasing Japan's contribution to its own defense and by lowering Japanese trade barriers to American goods. His efforts to increase defense spending aroused considerable controversy in Japan. Outspokenly patriotic, Nakasone tried to enhance Japan's reputation as one of the world's leading economic powers by making frequent overseas trips to confer with Japan's allies. On the domestic scene, he sponsored a program of government austerity measures in an effort to reduce Japan's public debt.

In October 1984 Nakasone was reaffirmed as president of the LDP, thus gaining a second term as prime minister. The Japanese economy continued its sustained growth under his administration, and by the end of Nakasone's second term Japan had become the world's largest creditor nation and had begun to rival the power of the United States in the world economy.

Though the LDP remained in power, Nakasone was not granted a third term. Infighting led him to choose his own successor: Takeshita Noboru. Because he continued to wield great power within the party, Nakasone in May 1989 was forced to resign formally from the LDP—though he remained in the Diet—after Prime Minister Takeshita and others in the LDP were implicated in an influence-peddling scandal. He rejoined the LDP in April 1991.

Nakatomi Kamatari (Japanese clan leader): *see* Fujiwara Kamatari.

Nakatsu, city, Ōita *ken* (prefecture), northern Kyushu, Japan. It lies along the mouth of the Yamakuni River facing the Inland Sea. The city developed around a castle built in 1587 by the Kuroda daimyo family. Industrial development began with the introduction of textile manufacturing in 1896. Nakatsu is now a commercial centre for the porcelain, steel, rice, and silk produced in the surrounding region. The city park, on the old castle site, contains a memorial to Nakatsu's native son Fukuzawa Yukichi (1835–1901), who founded Keiō Gijuku (now Keiō University) in Tokyo. Pop. (1990) 66,383.

Nakbe, archaeological site in the dense tropical forest of northern Guatemala, thought to be one of the earliest ceremonial centres of Mayan culture.

Nakbe was first identified by aerial photographs taken in 1930 and first studied (and named) by archaeologist Ian Graham in 1962. Systematic investigations undertaken in the 1980s and '90s revealed information that may cause significant revision of the theories about the development of Mayan culture. Thought to have been typical of the architecture of the period known as the Late Formative, or Late Pre-classic (300 BC–AD 100), the huge stone pyramids, temples, and other relatively tall buildings characteristic of the construction at Nakbe have been carbon-dated to 600–400 BC (corresponding to the Middle Formative), a period previously believed to have been characterized by simple villages with dwellings built on low stone platforms. Although remains have been unearthed from almost every period of Mayan culture at Nakbe, it was never a major centre after the beginning of the Late Formative period.

naker, small kettledrum that reached Europe from the Middle East in the 13th century, during the Crusades. Nakers were made of wood, metal, or clay and were sometimes equipped with snares. They were almost always played in pairs and were struck with hard sticks. They were probably tuned to high and low notes of identifiable pitch. Like the similar Arabic *naqqārah,* from which they derived, nakers were used in military and battle music, as well as in the softer indoor chamber music and in dance accompaniments. They continued in use through the 16th century.

Nakh languages, languages spoken in the Caucasus in southwestern Russia and in the Akhmeta district of Georgia. The Nakh language group includes Chechen, Ingush, and Bats (Tsova-Tushian). Because Bats has no written form, its speakers use Georgian as their literary language. The Nakh group, sometimes called the Central Caucasian languages, is often classified by scholars with the Dagestanian languages (among which are Avar and Lezgian) in a Nakho-Dagestanian, or Northeast Caucasian, language group.

Nakhichevan Azerbaijani NAXÇIVAN, exclave and autonomous republic of Azerbaijan, in the southern part of the Transcaucasian plateau. It is bounded by Armenia to the north and east, Iran to the south and west, and Turkey to the west. The republic, which is mostly mountainous except for a plain in the west and southwest, lies to the east and north of the middle Aras (Araks) River, which forms the frontier with Iran and Turkey. The region is subject to earthquakes, that of 1931 having been particularly severe. Winter temperatures in the dry continental climate average 20° to 24° F (−7° to −4° C); summer temperatures range from 75° to 84° F (24° to 29° C). The scarcity of precipitation on the plain (less than 20 inches [500 mm] annually) produces a steppe type of vegetation. In the mountains, where precipitation averages 25 to 30 inches (630 to 760 mm) annually, the flora is mountainous steppe, with dwarf oak and Iberian maple occurring in the upper valleys. Gray alluvial soils prevail in the plain, giving way above 3,300 feet (1,000 m) to brown and chestnut soils.

The republic, especially the capital city of Nakhichevan, has a long history dating back to about 1500 BC. Historically the Persians, Mongols, and Turks, competed for the area, but it passed to Russia in 1828, and in 1924 it became an autonomous republic of the Soviet Union. Nakhichevan became part of independent Azerbaijan in 1991. Azerbaijanis constitute virtually the entire population, though there are also small numbers of Armenians and Russians. Chief cities, besides the capital, are Ordubad and Culfa (Dzhulfa).

Agriculture, the principal economic activity, is carried on with the aid of irrigation in the plains. The most important crops are grains (winter wheat, some spring wheat, and barley), cotton, tobacco, mulberries for silkworms, and fruits. Sheep raising provides wool for the Azerbaijan carpet industry. Cattle and goats also are raised. There are mineral-water springs in the foothills. Industrial activity is limited to mining (salt, molybdenum, and lead), cotton ginning, silk textile production, and food processing. The Yerevan-Baku railway follows the Aras valley through the republic, and motor roads link the capital to Yerevan, to Culfa on the Iranian frontier, and to Yevlax in Azerbaijan proper. Area 2,100 square miles (5,500 square km). Pop. (1991 est.) 305,700.

Nakhichevan, Azerbaijani NAXÇIVAN, capital of the Nakhichevan autonomous republic, in Azerbaijan. It lies along the Nakhichevan River about 170 miles (270 km) south-southeast of Tbilisi. Nakhichevan is extremely old, dated by some archaeologists to about 1500 BC. Armenian tradition ascribes the founding of the city to Noah. Until 1828 it was capital of the khanate of Nakhichevan, and it became capital of the autonomous republic in 1924. Historically a trade and handicrafts centre, it now has varied industries, in particular food processing, furniture, leather, and building materials. Pop. (1991 est.) 61,700.

Nakho-Dagestanian languages, also called NORTHEAST CAUCASIAN LANGUAGES, group of languages spoken in the northeastern Caucasus Mountains. The Nakh division consists of the languages of the Chechen, Ingush, and Bats. The Dagestanian division is more multifarious and includes such groups as the Avar-Andi-Dido languages, the Lak-Dargin (Lak-Dargwa) languages, and the Lezgian languages. *See also* Dagestanian languages; Nakh languages.

Nakhodka, also spelled NACHODKA, town, Primorsky *kray* (region), extreme eastern Russia. It lies at the head of Nakhodka Bay on the Sea of Japan. Nakhodka (its name means "find," or "godsend") is an important centre for exports. It is also the terminus of a passenger ferry to Yokohama, Japan, and the base of a fishing fleet.

In the early 1980s a huge new port, under Nakhodka town jurisdiction, was built nearby; it established Nakhodka's prominence over Vladivostok as the largest and most highly mechanized port in eastern Russia, with major facilities for handling timber, coal, and especially containers, and with many new pier terminals for deepwater ships. Pop. (1994 est.) 163,800.

Nakhon Pathom, town, western Thailand. It lies on the deltaic plain of the Chao Phraya River. A prosperous commercial centre, Nakhon Pathom is located 29 miles (47 km) west of Bangkok and has major road and rail connections. It has access to the Chao Phraya delta waterways through a canal from the Nakhon Chai Si River. The town is an old religious (Buddhist) and military centre. According to local tradition, it is the oldest city in Thailand (said to be more than 2,000 years old) and was visited by the Buddha. Artifacts have been found there dating from the 6th century AD. Phra Pathom, the highest stupa in Thailand, rises to 380 feet (116 m). The town also has a campus (arts, education, and science) of the Bangkok-based Silpakorn University (1943).

Nakhon Pathom is situated in a prosperous agricultural region which has rich alluvial soils and receives abundant rainfall that is supplemented by irrigation canals. The area's main products (rice, pigs, coconuts, and grapefruit [pomelo]) are marketed through nearby Bangkok. Pop. (1992 est.) 79,759.

Nakhon Phanom, town, northeastern Thailand. Nakhon Phanom is a commercial centre lying along the Mekong River opposite Thakhek, Laos; it is linked by road to Udon Thani (west), Ubon Ratchathani (south), and Laos and has an airport with scheduled domestic flights. An infertile sandy loam that retains little moisture makes agriculture difficult in much of the surrounding area. There are, however, strips of fertile land along the Mekong and its tributaries. Rice is the main crop. Pop. (1992 est.) 28,869.

Nakhon Ratchasima, also called KHORAT, city, northeastern Thailand, in the southwestern portion of the Khorat Plateau. Nakhon Ratchasima is the largest city and is the transportation, commercial, financial, and governmental centre of northeastern Thailand. A major railway connects the city to Bangkok, and the city is also linked to Bangkok and other Thai cities by air and highway. A network of roads stretches to every part of the region from the city, which is a busy commercial centre and a collecting point for rice and livestock. Nakhon Ratchasima grew rapidly during the 1960s and '70s with the buildup of its Royal Thai Air Force Base, from which American planes operated during the Vietnam War. The city's educational facilities include the Northeastern Technical Institute. Silk is produced in nearby villages. Rice, corn (maize), and tobacco are grown in the surrounding area, much of which is devoted to raising cattle and pigs.

The restored 11th-century Khmer temples at nearby Phimai (Pimai), similar in style to those of Angkor Wat in Cambodia, are a major tourist attraction of northeastern Thailand. Pop. (1992 est.) 190,730.

Nakhon Sawan, town, north-central Thailand. Nakhon Sawan ("Heavenly City") is located where the Ping and Nan rivers converge to form the Chao Phraya River. The town is the leading up-country river port for rice and teak logs. It lies at a major road junction and is served by a nearby station of the Bangkok-Chiengmai rail line. The town has mills for processing rice, lumber, and paper. Rice, beans, corn (maize), cotton, jute, and sesame are produced in the surrounding areas. Pop. (1992 est.) 96,981.

Nakhon Si Thammarat, town, southern Thailand, on the eastern side of the Malay Peninsula. The walled town of Nakhon Si Thammarat, one of Thailand's oldest cities, lies near the coast of the Gulf of Thailand. Founded more than 1,000 years ago, it was the capital of a powerful state that controlled the middle portion of the peninsula; it was often called Ligor until the early 20th century. The city is the area's commercial centre and is the site of Nakhon Si Thammarat Agricultural College and the Wat Mahathudu temple complex. The manufacture of Thai nielloware (a type of metalwork) began in the area. The city's outport is the town of Pak Phanang.

The town lies in a rich agricultural region that produces rice, fruit, coconuts, and rubber. Substantial deposits of phosphate, iron ore, lead, tin, and tungsten are mined in the area. Pop. (1992 est.) 79,447.

Nakīr (Islāmic myth): *see* Munkar and Nakīr.

Naktong River, Korean NAKTONG-GANG, river, in the Yŏngnam area of the provinces (*do*) of North Kyŏngsang and South Kyŏngsang, southeastern South Korea. Korea's second longest river (325 miles [523 km]), it flows generally southward from the T'aebaek Mountains and enters the Korean Strait at Tadae-p'o, a suburb of Pusan. The river is navigable for 215 miles (350 km), from its mouth to Andong in North Kyŏngsang province. With its principal tributaries, the Naesŏng, Panbyŏn, Wi, Kŭmho, and Nam, the river has a drainage basin of 9,200 square miles (23,800 square km). Flowing slowly over old hilly districts, the Naktong River has formed a fertile delta plain along Chin Bay; including the plain, approximately one-fourth of the river's basin is used for the cultivation of crops. The river also supplies water for use in the cities along its course. The Nam River, which flows in the central part of South Kyŏngsang province, has a multipurpose dam near Chinju that was constructed in 1968. During the opening phase of the Korean War (1950–53), the middle Naktong River constituted part of the last line of defense for the South Korean and American forces that had temporarily retreated to the southeastern tip of the Korean Peninsula.

Nakuru, town, west-central Kenya. It lies near the Mau Escarpment, 95 miles (153 km) northwest of Nairobi, near the heart of the Kikuyu people's homeland. One of the largest towns in Kenya, Nakuru is an important agricultural centre and the site of Egerton University (1939). It is a busy commercial and transport centre for west-central Kenya. Nearby attractions include Lake Nakuru, Hyrax Hill prehistoric site, and the immense Menengai Crater. Pop. (1984 est.) 101,700.

Nakuru, Lake, lake in west-central Kenya. It is one of the saline lakes of the lake system lying in the Great Rift Valley of eastern Africa. Primarily known for its many species of birds (including vast numbers of pink flamingos), Lake Nakuru also has waterbucks, impalas, and hippopotamuses. The town of Nakuru lies on its north shore; Lake Nakuru National Park encloses the lake and adjacent lands.

Saline Lake Nakuru, near Nakuru, Kenya

M.P. Price—Keystone

Nālanda, celebrated Buddhist monastic centre, often spoken of as a university, southwest of Bihār city in northern Bihār state, India. Nālanda's traditional history dates to the time of the Buddha (6th–5th centuries BC) and Mahāvīra, the founder of the Jaina religion. According to a later Tibetan source, Nāgārjuna, the 2nd–3rd-century AD Buddhist philosopher, began his studies there. Extensive excavations carried out by the Archaeological Survey of India indicate, however, that the foundation of the monasteries belongs to the Gupta period (5th century AD). The powerful 7th-century ruler of Kanauj (Kannauj), Harṣavardhana, is reported to have contributed to them. During his reign the Chinese pilgrim Hsüan-tsang stayed at Nālanda for some time and left a clear account of the subjects studied there and of the general features of the community. I-ching, another pilgrim a generation later, also provided a minute account of the life of the monks. Nālanda continued to flourish as a centre of learning under the Pāla dynasty (8th–12th centuries), and it became a centre of religious sculpture in stone and bronze. Nālanda was probably sacked during Muslim raids in Bihār (*c.* 1200) and never recovered.

According to pilgrims' accounts, from Gupta times the monasteries of Nālanda were surrounded by a high wall. The excavations revealed a row of 10 monasteries of the traditional Indian design—oblong brick structures with cells opening onto four sides of a courtyard, with a main entrance on one side and a shrine facing the entrance across the courtyard. In front of the monasteries stood a row of larger shrines, or stupas, in brick and plaster. The entire complex is referred to on seals discovered there as Mahāvihāra ("Great Monastery"). A museum at Nālanda houses many of the treasures found in the excavations.

Nalchik, also spelled NALČIK, city and capital of Kabardino-Balkariya, southwestern Russia. The city lies along the Nalchik River where the latter leaves the Caucasian foothills. Founded as a Russian fortress in 1818, the town remained unimportant until after the October Revolution (1917). Now it is a popular holiday, climbing, and health resort, with several sanatoriums. There is considerable industry, including engineering, hydrometallurgy (molybdenum and tungsten), and artificial-leather and foodstuff manufacture. A university and a Kabardino-Balkariya research institute are located in the city. Pop. (1991 est.) 240,600.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Nallamala Range, range of parallel hills and valleys of the Eastern Ghāts in eastern Andhra Pradesh state, southern India. Located south of the Krishna River, the hills run north to south, parallel to the Coromandel Coast on the Bay of Bengal. Their total length is about 265 miles (430 km); the northern boundary is in the Palnād Basin, and the southern boundary is in the Tirupati Hills.

Approximately 19 miles (31 km) wide, the Nallamala Range rises to an average elevation of 2,900–3,600 feet (900–1,100 m). The rugged, sparsely populated hills are composed for the most part of jumbled quartzites and slates and exemplify the mountain scenery of the Eastern Ghāts.

nalorphine, also called N-ALLYLNORMORPHINE, morphine derivative and a pharmacologic antagonist to morphine, meperidine, and methadone. Like these depressants, nalorphine is considered a narcotic, but it reverses respiratory depression and other symptoms of an overdose of narcotics. Since nalorphine precipitates acute withdrawal symptoms when administered to morphine addicts, it has been used to diagnose addiction. Nalorphine is ineffective against respiratory depression caused by barbiturates and general anesthetics. Its overdose may cause serious bodily disturbances.

Nam Dinh, municipality, northern Vietnam. It lies on a canal linking the Day and the Red rivers and has road and railway links with Hanoi, 50 miles (80 km) northwest. Manufactures include textiles and distillery and salt products. The city is also an educational centre. Nearby is the Pho Minh, or Chua Thap, Temple, with a tower that reaches a height of 69 feet (21 m); it was built in the Ly period and expanded in the Tran (1225–1400). Pop. (1989) 165,649.

Nam Viet (Vietnamese), Chinese (Wade-Giles romanization) NAN YÜEH, Pinyin NAN YUE, ancient kingdom occupying much of what is now northern Vietnam and the southern Chinese provinces of Kwangtung and Kwangsi.

The kingdom was formed in 207 BC, during the breakup of the Ch'in dynasty (221–206 BC), when the Ch'in governor of Yüeh (now Kwangtung and Kwangsi provinces) declared his territory independent. His son Chao T'o (Trieu Da) expanded the new kingdom southward, incorporating the Red River delta and the area as far south as Da Nang.

Nam Viet, or Nan Yüeh (meaning "Southern Yüeh"), remained independent though loosely associated with the Han dynasty (founded 206 BC) until it was conquered by the Han emperor Wu Ti in 111 BC. Following the conquest, the area became a region for Chinese settlement, a policy that eventually resulted in the sinicization of Kwangtung and Kwangsi and introduced Chinese culture to northern Vietnam. The attempt to absorb Vietnam into China also engendered an increasing self-consciousness among the people of the northern and central regions of Vietnam.

In AD 939 the term Nam Viet appeared again as the name of the kingdom centred in the Red River valley at Co Loa. Ngo Quyen (*q.v.*) drove the Chinese out of the area and founded his own dynasty, which endured only until 954.

The term was revived again in 1802 by the emperor Gia Long but was inverted to Viet Nam.

Nama, also called NAMAN, NAMAKWA, or NAMAQUA, Khoikhoin (Hottentot) people living in southern Namibia. They constitute by far the largest Khoikhoin ethnic group, perhaps larger than all the others combined, but many Nama now have admixtures of white, Owambo (Ovambo), or Herero ancestry. The Nama were formerly reasonably prosperous sheep or cattle pastoralists, but intertribal warfare and nearly continuous fighting with the Herero and the Germans from the 19th to the early 20th century decimated their numbers. Some Nama still graze sheep, cattle, or goats where the groundwater of their arid countryside is not too highly mineralized for their stock to drink; many more work as migrant labourers on nearby white farms herding sheep, tending gardens, or working in homes.

nāman (Sanskrit), Pāli NĀMA, in Vedism and Hinduism, the characteristic sign or mark, most frequently used in the sense of the "name," of an individual, or the word that stands for an object. The term has been appropriated by Indian linguistics to denote the noun in a sentence unit. In some Hindu schools the term assumes the philosophical meaning of the essence, or substance, of a thing, as opposed to its form (*rūpa*). In Theravāda Buddhism *nāma* denotes the four immaterial components of one's personality: feelings (*vedanā*); ideations (*saññā*); mental formations, or dispositions (*sankhāra*); and consciousness (*viññāṇa*). These subtle components are said to conjoin with various physical qualities, such as size, shape, and weight, to form the individual person. According to most schools of Buddhist thought and practice, the identification of any or all of these immaterial and material components of an individual with any sort of essential personality is a hindrance to the attainment of enlightenment. Thus, a Buddhist who is on the path to enlightenment endeavours to comprehend the fundamental unreality of both the immaterial (*nāman*) and the material (*rūpa*) aspects of reality.

Namangan, *oblast* (province), eastern Uzbekistan, with an area of 3,100 square miles (7,900 square km), in the northern part of the Fergana Valley. It is traversed by the Syr River, the Severny (Northern) Fergana irrigation canal, and the Great Namangan Canal. The economy is predominantly agricultural. Because of the dry climate, almost all crops are grown on irrigated land along the Syr River and in the river valleys of the Chatkal Mountains. Much of the sown acreage is under cotton; grain, fruit, vegetables, grapes, and fodder are also cultivated, and sericulture (raw-silk production) is important. The pasturelands are poor, but sheep, goats, and cattle are raised, primarily in the west. Industry is concentrated in the capital, Namangan (*q.v.*).

The ancient settlement of Chust is the home of the *tyubeteyka,* the traditional Uzbek square skullcap, and Chartak spa attracts visitors from all over Russia and Central Asia. Uzbeks constitute more than four-fifths of the inhabitants, the remainder including Tajiks, Russians, Tatars, and Kyrgyz. More than three-fifths of the people are rural. Pop. (1991 est.) 1,557,800.

Namangan, city and administrative centre of Namangan *oblast* (province), Uzbekistan, in the northern Fergana Valley. The first mention of the settlement dates from the end of the 15th century. By the mid-18th century, its many craftsmen made it one of the foremost cities in the Fergana Valley. In the same century, it became part of the khanate of Kokand and the centre of a political unit. Industry processing local agricultural raw materials, particularly cotton, began to develop after the Fergana Valley was annexed by Russia in 1876, and Namangan is now known for its food and other light industries. It is on the Fergana circular railway and has a teacher-training institute, a theatre, and a museum. Pop. (1991 est.) 319,200.

Namaqua (African people): *see* Nama.

Namath, Joe, byname of JOSEPH WILLIAM NAMATH, also called JOE WILLIE, or BROADWAY JOE (b. May 31, 1943, Beaver Falls, Pa., U.S.), American collegiate and professional football quarterback who was one of the best passers in football.

Namath excelled in several sports as a youth in the steel-mill town of Beaver Falls, near Pittsburgh. He played football at the University of Alabama (1962–64) under coach Bear Bryant, a famous developer of professional quarterbacks. While playing in college he sustained the first of many knee injuries that ultimately shortened his career. The National Football League (NFL) and the American Football League (AFL) competed for him as a first-round draft choice, and he went to the AFL New York Jets with an unprecedented three-year contract for more than $400,000. He became the Jets' starting quarterback midway through his first season, and in 1967 he threw for a record 4,007 yards. Before the 1969 Super Bowl he "guaranteed" that the Jets would defeat the favoured NFL Baltimore Colts, and they did: 16–7. In 1969 Namath retired briefly over the issue of his ownership of a New York City nightclub (hence his nickname Broadway Joe), but he sold it and returned to the Jets. In the same year, he was chosen for the all-time AFL team (the AFL and the NFL merged in 1970). He played with the Jets through the 1976 season, sustaining further injuries, but he had by then set seasonal and career records for most games with 300 yards or more gained by passing. In 1977–78 he was a backup quarterback for the Los Angeles Rams, and then he retired. He was inducted into the Pro Football Hall of Fame in 1985.

He remained in the public eye through television commercials (begun during his playing days) and film, television, and theatre appearances.

Namatjira, Albert (b. July 28, 1902, Hermannsburg, near Alice Springs, N.Terr., Australia—d. Aug. 8, 1959, Alice Springs), Australian Aborigine painter noted for his watercolour landscapes of desertlike central Australia.

A member of the Aranda tribe, Namatjira attended a Lutheran mission school, was taught European watercolour technique by a white artist, Rex Battarbee, from 1934 to 1936, and became a teacher at the Finke River Aboriginal Mission School. In 1936 he sold his first painting, and, in 1938, 41 of his watercolours were exhibited in Melbourne and were sold out, entailing a great demand for his work. He exhibited frequently in the next two decades and became well known in Australia and even overseas (one of his paintings was presented to Queen Elizabeth II in 1954).

Although he was granted Australian citizenship in 1957, his racial origin hindered his freedom. He was barred from moving into what he aspiringly called "a white man's house" in a residential area of Alice Springs because he was an Aborigine. In the last year of his life he was jailed for two months for supplying alcoholic liquor to a noncitizen Aborigine. After release, he spent most of his final months at Hermannsburg, Australia's largest mission station, continuing to paint, though in poor health.

namāzlik: *see* prayer rug.

Nambane, also called NAMBA (people): *see* Lamba.

Nambucca Heads, town and promontory, north-coastal New South Wales, Australia. The name, derived from an Aboriginal term meaning "entrance to the waters," comes from the Nambucca River, which flows 70 miles (115 km) through heavily timbered country to enter the Pacific just south of the promontory. The town, at the river's mouth, was founded in 1842 by cedar lumbermen, but by the 1870s dairy farmers were appropriating the deforested river flats. Proclaimed a village in 1885, it became a shire in 1915. Connected to Sydney (250 miles [400 km] southwest) by rail and the Pacific Highway, it serves a region of mixed farming (bananas, dairying, beef, corn [maize], and vegetables) and lumbering. Tourism, based on the nearby New England National Park, fishing and surfing facilities, and the spectacular view of the coast afforded by Yarrahampi Lookout, provides additional income. Pop. (1986) 4,923.

Nambucca Heads, New South Wales, Australia

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Nambūdiri, also spelled NAMPŪTIRI, the dominant caste of the Indian state of Kerala. Orthodox in the extreme, its members regard themselves as the true repositories of the ancient Vedic religion and of the traditional Hindu code.

The Nambūdiri caste follows a distinctive marriage alliance with the important warrior caste of the Nāyars (*see* Nāyar). Though the eldest son of a Nambūdiri household customarily marries a Nambūdiri woman, thus observing the typical caste practice of endogamy, the younger sons marry Nāyar women and obey the matrilineal-descent system of the Nāyars. In contrast to other Brahman castes in southern India, the Nambūdiris place great emphasis on their priestly status and do not normally engage in profitable professions. They derive their wealth from their landholdings, being the chief landowners of Kerala.

There are five subdivisions within the Nambūdiri caste: Tampurakkal, the highest in status, who with the Adhyas form an endogamous subcaste; the Adhyas, who are temple priests; the Visistas, some of whom are ritualists, while others pursue traditional learning and philosophy; the Samanyas, who study the Veda; and the Jatimatras, who are the leading physicians according to the Ayurvedic school of medicine.

Nāmdev (b. 1270?, Narasi, India—d. 1350?, Pandharpur, Bahmanī), leading poet-saint of the Indian medieval period, who wrote in the Marāṭhi language.

The son of a tailor and thus of low caste, Nāmdev married and had five children. As a youth, he was a member of a murderous gang of thieves but was overcome with remorse one day on hearing the plaintive lamentations of a woman whose husband he had killed. He was about to take his own life when he was saved by a revelation of the god Vishnu.

Nāmdev then turned to a life of devotion and became the foremost exponent of the Vārakarī ("Pilgrim School," so called because of the emphasis it placed on pilgrimages to Pandharpur to worship a local image of Vishnu called Viṭṭhal [Viṭhobā]). The school is known for its expression of bhakti (loving devotion to a personal god) and for its freedom from caste restrictions in a religious setting.

Nāmdev wrote a number of *abhaṅgas* (hymns) expressive of his surrender to God. Extremely popular in Mahārāshtra and in the Punjab, some of his verses are included in the *Ādi Granth,* the holy scripture of the Sikhs. Nāmdev inspired a tradition of devotional poetry that continued in Mahārāshtra for four centuries, culminating in the works of the great devotional hymnist Tukārām.

Nāmdhārī, also called KŪKĀ, an austere sect within Sikhism, a religion of India. The Nāmdhārī movement was founded by Balak Singh (1797–1862), who did not believe in any religious ritual other than the repetition of God's name (or *nām,* for which reason members of the sect are called Nāmdhārīs). His successor, Rām Singh (1816–85), introduced the sect's distinctive style of wearing the turban (bound straight across the forehead rather than at an angle), of dressing only in clothing made from white, handwoven cloth, and of frenzied chanting of hymns culminating in shrieks (*kūks*; hence the name Kūkā). Under Rām Singh's leadership the Nāmdhārīs sought a resurgence of Sikh rule in the Punjab. After a clash with the police in January 1872, 66 of them were apprehended and executed by being tied to the mouths of cannons that were then fired. Rām Singh was exiled to Rangoon (Yangôn), Burma (Myanmar), where he died. The Nāmdhārīs maintain their own *gurdwārās* (houses of worship) and do not marry outside the sect.

name, a word or small group of words used to indicate an individual entity, real or imaginary, in its entirety. The term "common name" is sometimes used roughly as the equivalent of "noun"; the concern in this treatment is with what is more specifically a "proper noun," or "proper name," although a wholly logical distinction has never been established between the two classes.

A brief treatment of names follows. For full treatment, *see* MACROPAEDIA: Names.

A name is a label, and there are, roughly, nine classes into which names can be grouped: (1) personal names; (2) quasi-personal names, such as those given to individual animals and personified objects (such as ships or dolls); (3) names given to objects not personified but still noteworthy (*e.g.,* Plymouth Rock); (4) place-names (*e.g.,* Edinburgh); (5) communal, group, or corporate names (*e.g.,* Germans, Baptists, Exxon); (6) titles of works of art (*e.g.,* "Mona Lisa," *Paradise Lost*); (7) brand names (*e.g.,* Sanka, Vaseline); (8) names of historical events or epochs (*e.g.,* War of the Roses, Renaissance); and (9) concepts and abstractions not personified (*e.g.,* Toryism, Skepticism). These categories are not absolutes. A name can easily fall into two or more categories simultaneously. Ford is, for example, a personal name, the name of a corporation, and the brand name of a product manufactured by that corporation.

Personal names have followed the same sort of evolution and transmittal that other language components have, based, as they usually are, on common, everyday words. They may be gradually assimilated from one culture to another (*e.g.,* the Celtic *Godofrido* becomes the English *Geoffrey,* or *Jeffrey*). Some names are adopted fairly intact, such as the Germanic *Karl.* Some are translations (*e.g.,* the Latin *Renatus,* "reborn," becomes the French *René*). Family names, or surnames, are of relatively recent origin, their principles not being codified until about the 11th century AD. Starting apparently with the nobility and gradually spreading down and outward, family names have had several roots. Frequently a given name served as the basis for a hereditary family name. Thus, Alfred, whose father is named John, would come to be known as Alfred John's son and his family the Johnsons. Place-names have come to be used as family names. Thus, Henri from the town of Avignon would come to be known as Henri d'Avignon, or Davignon. Frequently a family name reflects an industry or occupation; thus, a German keeper of geese might become Werner Gans (German for "geese").

Place-names have as great a diversity of sources as do personal names. There are descriptives (Sulphur Creek, High Point), incident names (Battle Creek, Avalanche Pass), possessives (Pikes Peak, Cooperstown), euphemistics (Greenland), and manufactured names (Tesnus, which is *sunset* spelled backward). Place-names have also gone through an evolution similar to that of personal names. In Europe, Celtic, Germanic, and Latin names or their derivatives predominate. The Roman word for "camp," *castra,* came down into such English forms as *Lancaster* and *Chester.* In France the Celtic *Lucodunos* became modern *Lyon* through the Latin *Lugundum.* In the United States, Spanish, French, English, and native Indian sources are evident in such names as *Los Angeles, Louisiana, New York,* and *Connecticut.*

Namen (Belgium): *see* Namur.

Namib, Portuguese NAMIBE, cool coastal desert along the Atlantic coast of southwestern Africa, extending 1,200 miles (1,900 km) from the city of Namibe in Angola southward through Namibia to the Olifants River in Cape province, South Africa.

A brief treatment of the Namib follows. For full treatment, *see* MACROPAEDIA: Africa.

The Namib reaches inland 80 to 100 miles

(130–160 km) to the foot of the Great Escarpment of southern Africa. The desert is basically a relatively smooth platform of truncated bedrock of various types and ages. Scattered, isolated mountains rise steeply and abruptly above the platform, and in the northern half, streams have carved deep, steep-walled gorges. In much of the desert's southern half, the platform is surmounted by a vast expanse of sand. Dunes are arrayed in lines, and individual dunes reach 10–20 miles (16–32 km) long and 200–800 feet (60–240 m) high. The troughs between them are interrupted by smaller, transverse dunes.

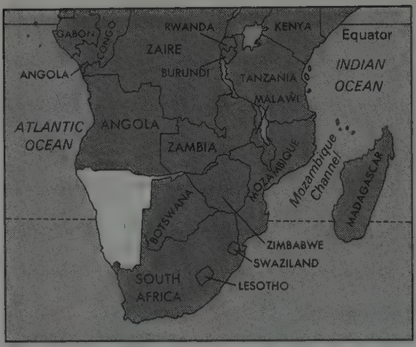
The coast is almost entirely rainless, yet moisture is present in the form of nighttime dew or fog, which is produced by the cold offshore Benguela Current. Rains occur only a few days each year in spring or fall, usually as short-lived torrential thunderstorms. On rare occasions, snow falls on the higher southern mountains and freezing temperatures are recorded along the inner edge of the desert. Owing to the lack of precipitation, the Namib has a poorly developed and fragmentary drainage pattern. In the desert's northern half, the larger streams reach the sea, but, between the Kuiseb and the Orange rivers, every stream terminates in a vlei (salt pan or mud flat) against or among the dunes.

Large areas of the Namib are completely soilless, with bedrock at the surface; arable soils are limited to the floodplains and terraces of major rivers. The vegetable cover is varied and includes an unusual plant, the tumboa (*Welwitschia mirabilis*), whose two huge leaves sprawl over the ground from the crest of its huge crown. Animal life varies with the vegetational regions. Generally, antelope, ostrich, and zebra live on the plains and dunes of the Inner Namib, insects and reptiles on the barren Outer Namib, and large flocks of marine birds and a few jackals along the coast.

The principal human inhabitants of the Namib include a few hundred Ovahimba and Ovatjimba Herero, who herd cattle and goats between waterholes in the northern region, and a few Topnaar Nama (Khoikhoi), who graze sheep and cattle along the Kuiseb River in the central Namib. The desert is crossed by rail lines that link the ports of Lüderitz and Walvis Bay with cities in South Africa.

Namibe, formerly (until 1982) MOÇÂMEDES, also spelled MOSSAMEDES, city and port, southwestern Angola. Founded by Brazilians in the mid-19th century and located on an arid coastal strip from which rises the steep Huíla escarpment, Moçâmedes was cut off from the Angolan interior until construction of the Moçâmedes Railway was begun in 1905 to Vila Serpa Pinto (now Menongue), 470 miles (755 km) east. Though the interior developed, the port, which was dependent on fishing, had little activity until the discovery of iron ore at Cassinga (Kassinga) and the completion of a 56-mile (90-kilometre) rail spur from Dongo to the mines in 1967; the port's harbour has subsequently been enlarged. Houses and administrative buildings in Namibe are crowded together along a low cliff running inland, with commercial buildings on the open bay shore below. Pop. (1987 est.) 77,000.

Namibia, officially REPUBLIC OF NAMIBIA, also called (internationally until 1968) SOUTH WEST AFRICA, Afrikaans NAMIBIË, or SUIDWES-AFRIKA, country located on the southwestern coast of Africa astride the Tropic of Capricorn. Originally administered by the government of South Africa, it achieved independence in 1990 under the auspices of the United Nations. Namibia is about 820 miles (1,320 km) long from north to south and about 380 miles (610 km) wide from east to west in its central part; it is bordered by Angola and Zambia in the north, Botswana in the east, South Africa in the southeast and south, and the Atlantic Ocean on the west. The town, harbour, and environs of Walvis Bay, along the central coast, for many years constituted a South African exclave; administration of the area was transferred to Namibia in 1994. The capital of Namibia is Windhoek. Area 318,580 square miles (825,118 square km). Pop. (1993 est.) 1,560,000.



Namibia

A brief treatment of Namibia follows. For full treatment, *see* MACROPAEDIA: Southern Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The country can be divided into three broad physiographic regions from west to east: the Namib (desert), the Central Plateau, and the Kalahari (desert). The barren and inhospitable Namib (*q.v.*), a broad strip of sand dunes and bare rock outcrops, extends for about 1,200 miles (1,900 km) along the Atlantic Coast. Behind the Namib rises the Central Plateau (3,200 to 6,500 feet [975 to 1,980 m]), extending from the northern to the southern boundaries of the country. High mountains (6,000 to 8,000 feet [1,800 to 2,500 m]), forming the major watershed of the territory, occupy the central part of the plateau. In the east it slopes downward to the Kalahari (elevation less than 300 feet [90 m]), consisting of sands and limestone outcrops. Perennial rivers such as the Okavango, Kunene, Zambezi, and Orange are confined to Namibia's northern and southern borders.

The climate is continental tropical and very dry. Average temperatures in Windhoek, on the plateau, are 75° F (24° C) in summer (December) and 55° F (13° C) in winter (July). Daily temperatures on the plateau and in the Kalahari may differ by as much as 50° F (30° C) in the summer. The coast is cooled somewhat by the Benguela Current. The meagre and highly variable precipitation is not very effective in watering the land because of a high rate of evaporation. The territory suffers from prolonged periodic droughts. The vegetation is generally sparse except in the far north. Namibia's widely varied animal life includes lion, leopard, elephant, rhinoceros, giraffe, zebra, ostrich, and antelope. The country's most renowned game reserve is the Etosha National Park, one of the largest in the world.

Namibia has extensive deposits of valuable minerals. Rich deposits of alluvial diamonds exist in the southern Namib and of uranium, tin, and tungsten in the central Namib; there are copper deposits in the north. The exploitation of gold and natural gas is increasing in significance. There are also known deposits of lead, zinc, cadmium, lithium, and silver.

The people. Namibia has a very low population density, with only 5 persons per square mile (2 per square km). The north is the most densely populated sector and is inhabited by the Ovambo, the country's largest ethnolinguistic group (almost 50 percent of the population). There are a number of other Bantu-speaking groups, as well as Khoisan-speaking peoples. The Rehoboth Basters (Rehobothers), who speak Afrikaans, are the result of intermarriage between Afrikaners and Nama. Whites (Afrikaner, German, and English) are the most highly urbanized group, and English is the country's official language. About one-third of the population lives in urban areas.

The economy. The economy of Namibia is based largely on agriculture and on the production and export of diamonds and minerals. Agriculture accounts for almost one-sixth of the gross domestic product (GDP), employs about one-fifth of the population, and is dominated by the commercial farming of cattle and karakul sheep for export; there is also some subsistence and other farming. Mineral industries account for over one-fifth of the GDP and centre on diamonds, uranium, and zinc. Manufacturing industries account for about one-fifteenth of the GDP and centre mostly on processing fish and beef for export, food processing, brewing, and metal fabrication. Most imports originate in South Africa, which is, with the United States and Japan, also a major export destination.

Government and social conditions. Under a constitution adopted in 1990, Namibia became a multiparty republic with the president as head of state and with a bicameral legislature consisting of a lower house, the National Assembly, and an upper house, the National Council. The president is elected by direct popular vote to a five-year term of office, as are all but six appointed members of the National Assembly. The National Council comprises members elected by regional councils from among their own membership. The president is assisted by a cabinet led by the prime minister. An independent judiciary is headed by a Supreme Court. The practice of apartheid, which was enforced by former South African administrations, is outlawed.

Health conditions in Namibia compare favourably to most other African countries. Modern medical care has been extended in varying degree to most tribal areas. Regular immunization programs have been successful against a number of infectious diseases, including malaria.

Education is officially compulsory for all children between the ages of 7 and 16. The educational system includes seven-year primary, five-year secondary schools, and technical and teacher-training institutes.

Cultural life. The culture of the indigenous population is still strongly influenced by tribal institutions and customs. The rich diversity of traditional arts, music, and dancing includes rock painting, engraving, and sculpture in the Central African style of toys, religious figures, and masks. Among the white population, German culture has predominated. Music has been especially prominent, featuring orchestras and choral groups.

History. Prior to European contact, southwestern Africa was occupied by Khoikhoi and San peoples and the Bantu-speaking Herero. In the late 1480s Portuguese navigators explored the coastal regions at Cape Cross, Walvis Bay, and Dias Point. During the 17th, 18th, and early 19th centuries, the Dutch and English explored the coast and limited inland areas. In the 1840s the German connection with the territory began with the arrival of the Rhenish Missionary Society. In the 1860s tribal wars prompted missionaries, settlers, and the German government to offer the British territorial sovereignty in exchange for protection. Each request was denied by the British, until, in 1876, the Cape Colony secured treaties with the tribal chiefs that brought the territory under British colonial rule. The British government agreed only to annex Walvis Bay and some adjacent territory. Finally, in 1884, Germany's chancellor, Otto von Bismarck, took the initiative to offer complete German protection, which developed into full-fledged annexation by Germany.

The first German farmers settled in South West Africa in 1892. The next year trouble developed with the Khoikhoi people, which led to later uprisings by them (1903) and by the Herero (1904). The Germans responded by reducing the Herero from a tribe of 80,000 persons to 15,000 refugees. The discovery of diamonds (1908) brought an influx of Europeans. During World War I troops from the Union of South Africa defeated German troops and occupied South West Africa. Following the war the territory was mandated to South Africa by the League of Nations. Initially, the mandate was administered as a South African colony. In 1926 a legislative assembly was established with limited domestic authority.

With the demise of the League of Nations, South Africa denied any obligation to relinquish the mandate to the newly established United Nations. In 1946 South Africa, with alleged but dubious tribal support, requested UN permission to incorporate South West Africa, but the request was denied.

In 1964 the UN voted to end South Africa's mandate and four years later, in 1968, voted to recognize the name "Namibia." South Africa, however, refused to relinquish its control or to soften its policies toward the country's economically disenfranchised black majority. Demands for the immediate withdrawal of South African administration came from the UN Security Council (1969) and the International Court of Justice (1970). In the mid-1970s South Africa proposed the partition of Namibia, but this was rejected by the South West Africa People's Organization (SWAPO), an organization of black Namibians that since the 1960s had waged a guerrilla war against South African rule in an effort to gain independence. In 1988, after many years of conflict, South Africa agreed to grant Namibia independence. In 1989 SWAPO won a majority of seats in a new Constituent Assembly that drew up a new constitution. Following elections in 1990, Namibia gained full independence under a government dominated by SWAPO, which retained its parliamentary majority in elections in 1994 and 1999 that were widely held to be fair and inclusive.

Namier, Sir Lewis Bernstein, original name LUDWIK BERNSTEIN NIEMIROWSKI (b. June 27, 1888, Wola Okrzejska, near Warsaw, Pol., Russian Empire—d. Aug. 19, 1960, London, Eng.), British historian, who was most noted for his work on 18th- and 19th-century Europe.

Namier immigrated to England in 1906 and studied at Balliol College, Oxford. He took British nationality and legally adopted an Anglicized name before World War I, in which he served first in the army and then in the Foreign Office, where he remained until 1920. Namier failed to get a teaching post at Oxford, went into business, and later devoted his time to research.

The appearance of Namier's *The Structure of Politics at the Accession of George III* in 1929 revolutionized 18th-century historiography and remains his most considerable work. By intensive research over a brief period, he aimed to show why men entered politics, and he rejected the simple classification of Whig and Tory in favour of personal, family, or regional interests. He was professor of modern history (1931–53) at the Victoria University of Manchester and produced various books of essays and two important works: *1848: The Revolution of the Intellectuals* (1946) and *Diplomatic Prelude, 1938–39* (1948). Of an official *History of Parliament,* begun under his editorship, part I, *The House of Commons, 1745–90,* in three volumes, appeared in 1964.

Namier was made an honorary fellow of Balliol in 1948 and was knighted in 1952. His approach to history attracted many followers but also created opposition among historians who felt that he ignored irrational elements in history in favour of a preoccupation with the mechanism of politics.

Namp'o, formerly CHINNAMP'O, city, southwestern North Korea. It is 30 miles (50 km) southwest of P'yŏngyang, on the estuary of the Taedong River. Formerly a fishing village, it developed rapidly after it became an open port in 1897. The harbour can accommodate ships of 20,000 tons but is frozen during the winter. Namp'o is the chief seaport in the area and is connected to the interior by rail and by river transport on the Taedong. The city is a market centre for marine products, including shellfish, and its industries include copper and gold refining, shipbuilding, glassmaking, and electrode manufacturing. Along the coast are solar-evaporation salt pans. The surrounding area is known for the quality of the apples it produces. Pop. (1993 est.) 731,448.

Namur (French), Flemish NAMEN, *province,* southern Belgium. It is bounded on the north by Brabant, on the northeast by Liège, on the east by Luxembourg (*province*), on the south by France, and on the west by Hainaut. Namur is one of the less densely populated provinces of Belgium. It is divided into three administrative *arrondissements* (Namur, Dinant, and Philippeville), with the capital at Namur. French is the principal language of the entire province.

The medieval county of Namur was much smaller than the modern province, since much of the eastern part of the province formerly belonged to the prince-bishops of Liège. Ceded to Hainaut in 1188 and temporarily raised to a marquisate in 1199, Namur passed to Flanders in 1263. It was sold to Philip the Good, duke of Burgundy, in 1421, and its history then merged with that of the Burgundian Netherlands.

Namur is drained by the Meuse (Maas), Sambre, and Lesse rivers. The Meuse River flows from eastern France northward across the centre of the province to join with the Sambre River at the city of Namur. The province may be divided into a number of geographic regions. The rich alluvial soils of the plateau of Brabant in the north support wheat, sugar beets, fodder crops, and orchards. The mild climate and calcareous loams, clays, and alluvial soils of the Sambre and Meuse valleys in the central part of the province support mixed agriculture and dairying. The rock plateau of Condroz in the east has sandstone ridges and limestone valleys and is similar to Entre-Sambre-et-Meuse in the southwest. The ridges of both these areas are wooded, and their valley clays support wheat, winter barley, rye, potatoes, fodder, flax, dairying, cattle raising, and horse breeding. The Famenne depression south of these plateaus has much woodland and pasture; in places the limestone bedrock has given rise to underground streams, striking rock formations, and grottoes, such as the Han grottoes in the Lesse valley and the caverns near Rochefort on the Lomme River. The rocky Ardennes region farther south has only peat moors, bogs, patches of coniferous plantation, and limited pasture for beef cattle.

The Sambre and Meuse valleys are part of the "industrial crescent" of southern Belgium. Although the small Namur coal basin has been exhausted, steel-related industries, metallurgical and chemical works, and glassworks still thrive in Namur city. Sugar refining and the manufacturing of agricultural machinery are industries in the north, while a growing resort industry prevails in the south along the Meuse and its tributaries. Limestone, granite, marble, and sandstone are quarried from the Condroz. The province is served by several rail lines, and the Meuse and Sambre have both been canalized for freight transport. Population centres are Namur and Dinant (*qq.v.*) on the Meuse, Ciney on the Condroz plateau, Philippeville in Entre-Sambre-et-Meuse, and Gembloux on the northern plateau. Unusual rock formations along the rivers and medieval châteaus and abbeys throughout the province attract tourists. The Natural Reserve of Champale and Poilvache includes some of these formations and the ruins of the feudal château of Poilvache. Area 1,415 square miles (3,666 square km). Pop. (1993 est.) 441,205.

Namur (French), Flemish NAMEN, capital of Namur *province,* south-central Belgium. It lies at the junction of the Sambre and Meuse (Maas) rivers. A pre-Roman *oppidum* (fortified town), it was the seat of the counts of Namur from 908 until it passed to Burgundy in 1421. Namur is dominated by its medieval citadel, which sits atop a rocky promontory between the two rivers. The city has been an episcopal see since 1559.

Because of its strategic position at the head of routes into France, Namur was the scene of a number of battles and sieges. Two campaigns—known as the sieges of Namur—that occurred during the War of the Grand Alliance (1689–97) are particularly notable. The citadel on a rock located above the town was originally the castle of the counts of Namur; it was fortified in the 15th, 16th, and 19th centuries before being abandoned in 1862. The city's newer outlying fortifications (1893) were destroyed by the Germans in World War I, and Namur sustained a considerable amount of damage in World War II.

A rail junction and centre of art and tourism, Namur is also an industrial town, its industries including the manufacture of glass, paper, leather goods, steel products, and cement. Despite the wars and sieges, many architectural landmarks remain in Namur. These include the Baroque Cathedral of St. Aubain, with notable paintings and metalwork; the Jesuit Church of St. Loup, notable for its columns of red marble; the Convent of the Sisters of Our Lady, containing 13th-century treasures of silver and gold craftsmanship; and the Meat Hall (1588), housing the archaeological museum. Baroque (1632–48) horse stalls are a unique feature of the 17th-century church, Notre-Dame, transformed in 1770–75 by the architect L.-B. Dewez. The Diocesan Museum exhibits the Carolingian shrine of Andenne and the golden crown and portable altar (1217) of the counts of Namur. A restored 11th-century bridge crosses the Meuse not far (4 miles [7 km]) from Namur and is the place where the alpinist king Albert I fell to his death in 1934. Pop. (1997 est.) 105,243.

Nan, town, northern Thailand, in the Luang Phra Bang (Prabang) Range. Nan lies about 90 miles (145 km) northeast of Lampang along the Nan River and is a commercial centre for teak and agricultural products. An airport has scheduled flights to other Thai cities, and a road leads southwest to Den Chai on the Bangkok-Chiengmai railway. In the 1970s the region received many refugees from Laos. Pop. (1998 est.) 22,709.

Nan-ch'ang, Pinyin NANCHANG, city and provincial capital of Kiangsi *sheng* (province), China. The city is situated on the right bank of the Kan River just below its confluence with the Chin and some 25 miles (40 km) south of its discharge into P'o-yang Lake.

The city was founded and first walled in 201 BC, when the county town was given the name Nan-ch'ang. It was also the administrative seat of a commandery, Yü-chang. In 589 this commandery was changed into a prefecture named Hung-chou, and after 763 it became the provincial centre of Kiangsi, which was then beginning the rapid growth that by the 12th century made it the most populous province in China. In 959, under the Southern T'ang regime, it became Nan-ch'ang superior prefecture and also the southern capital. After the conquest by the Sung regime in 981 it reverted to the name Hung-chou. In 1164 it was renamed Lung-hsing superior prefecture, which name it retained until 1368. At the end of the Yüan (Mongol) period (1279–1368), it became a battleground between Chu Yüan-chang, the founder of the Ming dynasty (1368–1644), and the rival local warlord, Ch'en Yu-liang. At the beginning of the 16th century it was the power base from which Chu Ch'en-hao, the prince of Ning, launched a rebellion against the Ming regime.

In the 1850s it suffered considerably as a result of the Taiping Rebellion (1850–64), and its importance as a commercial centre declined as the overland routes to Canton were replaced by coastal steamship services in the latter half of the 19th century. Nan-ch'ang has, however, remained the undisputed regional metropolis of Kiangsi. On Aug. 1, 1927, it was the site of one of a series of insurrections organized by the Chinese Communist Party. The Nan-ch'ang Uprising, though it succeeded in holding the city for only a few days, provided a core of troops and a method of organization from which the People's Liberation Army later developed.

In 1949 Nan-ch'ang was still essentially an old-style administrative and commercial city, with little industry apart from food processing; it had a population of about 275,000. Nan-ch'ang first acquired a rail connection in 1915, when the line to Chiu-chiang, a port on the Yangtze River, was opened. Several other rail links have since been opened. After World War II a line was completed to Lin-ch'uan and Kung-ch'i in the Ju River Valley to the south-southeast.

Since 1949 Nan-ch'ang has been extensively industrialized. It is now a large-scale producer of cotton textiles and cotton yarn. Papermaking is also a large industry, as is food processing (especially rice milling). Heavy industry began to be important in the mid-1950s. A large thermal-power plant was installed and uses coal brought by rail from Feng-ch'eng, to the south. A machinery industry also grew up, at first mainly concentrating on the production of agricultural equipment and diesel engines. Nan-ch'ang then became a centre of the automotive industry, producing trucks and tractors and also such equipment as tires. An iron-smelting plant helping to supply local industry was installed in the later 1950s. There is also a large chemical industry, producing agricultural chemicals and insecticides as well as pharmaceuticals. Nan-ch'ang has a university. Pop. (1999 est.) 1,264,739.

Nan-ching (China): *see* Nanking.

Nan-ch'ung, Pinyin NANCHONG, city in east-central Szechwan *sheng* (province), China. Nan-ch'ung is situated in the valley of the Chia-ling River, which is a northern tributary of the Yangtze River. Nan-ch'ung lies along the west bank of the Chia-ling, which provides easy water transport to Ch'ung-ch'ing (Chungking), some 95 miles (150 km) to the south. To the north, highways give access to southern Shensi province, while Nan-ch'ung also lies on the important east-west route of the Ch'eng-tu to Wan-hsien highway.

Nan-ch'ung's name goes back to the early Sui (581–618) period. From Sung times (960–1279) it was the seat of the Shun-ch'ing superior prefecture, by which name it is still commonly known. The original Nan-ch'ung was some 12.5 miles (20 km) farther upstream; the present town dates from Ming times (1368–1644).

Nan-ch'ung is not only an important communications hub but also the chief market for an extremely prosperous and productive agricultural plain. It is a major grain market (supplying rice to Ch'ung-ch'ing) and also markets sweet potatoes, cotton, hemp, tobacco, and other agricultural products.

The city is notable as one of the largest centres of the silk industry in Szechwan, with silk factories and weaving, dyeing, and printing plants producing silks of high quality. Nan-ch'ung also has a handicraft industry specializing in lacquer goods. There is a small metalworking and light-engineering industry. Exploitation of major oil fields in the area, discovered in 1958, began in the 1960s, with production subsequently becoming large-scale. A petroleum refinery has been built at Nan-ch'ung. There are also major coal deposits at Shih-tzu-t'an, some 25 miles (40 km) south of Nan-ch'ung. Pop. (1999 est.) 390,603.

Nan-ga (Japanese: "Southern Painting"), also called BUNJIN-GA ("Literati Painting"), style of painting practiced by numerous Japanese painters of the 18th and 19th centuries. Some of the most original and creative painters of the middle and late Edo period belonged to the Nan-ga school. The style is based on developments of 17th- and 18th-century individualism in the Ch'ing-dynasty painting of China. Nan-ga artists transformed as they borrowed, however, exaggerating elements of Chinese literati painting, not only in composition but in brushwork. A decided sense of humour is often evident. Ike Taiga (1723–76), Yosa Buson (1716–83), and Uragami Gyokudō (1745–1820) are among the most famous Nan-ga artists.

The style was introduced in the early 18th century at a time when Japanese intellectuals were taking an eager interest in the outside world and new Chinese paintings were entering Japan through the port of Nagasaki. The *Chieh-tzu yüan hua chuan* ("Painting Manual of the Mustard Seed Garden"), published in China in 1679 and in Japan in 1748, contributed to the formation of the principles of this school.

"Forbidden to the Vulgar," Nan-ga hanging scroll (*kakemono*) by Uragami Gyokudō (1745–1820), ink on paper, Edo period; in the Cleveland Museum of Art

By courtesy of the Cleveland Museum of Art, Mr. and Mrs. William H. Marlatt Fund

Nan-ga became trapped by mannerism in the 19th century, when it became exclusively a subjective vehicle of expression, too often lacking form or a sense of solid construction. A self-conscious sense of the intellectual superiority of their adopted Chinese culture often had the effect of making literati painters excessively subtle.

Nan Hai: *see* South China Sea.

Nan-hu (Chinese poet): *see* Hsü Chih-mo.

Nan Hua Chen Ching (Chinese classic): *see* Chuang-tzu.

Nan Huai-jen: *see* Verbiest, Ferdinand.

Nan Mountains, Chinese (Wade-Giles and Pinyin) NAN SHAN, a vast complex of mountain ranges in the northwestern region of China. The ranges lie between the Tsaidam Basin to the southwest and the plateau of northwestern Kansu province to the north. The Nan Mountains consist of ranges with a predominantly northwest-to-southeast axis, forming a complex of folded blocks separated by synclinal troughs. The ranges are for the most part about 13,000–16,500 feet (4,000–5,000 m) in elevation; individual peaks, however, often exceed 20,000 feet (6,000 m) and the highest peak reaches 20,820 feet (6,346 m). The ranges are higher and more complex in the west, to the south of Tun-huang and Yü-men (both in Kansu), where, in spite of the aridity of the climate, many peaks are covered with snow and glaciers. The eastern section of the mountains is somewhat lower, and only a few high peaks have a permanent snow cover. Among the ranges are a number of large intermontane depressions and fault basins. The largest of these is the depression in which lies Koko Lake (Koko Nor).

The northernmost range, fronting the Kansu Corridor, is the Ch'i-lien Mountains. The ranges to the south are the T'o-lai Mountains and the Ta-t'ung Mountains. The Ta-t'ung ranges form the northern side of the two major lake depressions, Ha-la Lake in the northwest and Koko Lake to the southeast, both being areas of internal drainage. South of these depressions are the South Koko Lake Mountains and the A-te-erh-kan Mountains (Adirgan Ula), again enclosing further basins with lakes and saline swamps.

The western part of these mountains is extremely arid. Vegetation is everywhere sparse, and great areas of the Nan Mountains are completely barren. Elsewhere the cover largely consists of hardy desert-type plants, of sparse grassland on higher ground, and of a sort of mountain tundra (treeless plain) above 12,500 feet (3,800 m). The eastern sections of the mountains are much wetter, and the vegetation cover is more diverse and richer. On the wetter slopes there are spruce forests, and alpine meadows are found up to the snow line. The dry intermontane basins, however, have semidesert or steppe (grassland) vegetation. East of Koko Lake, a widespread, largely coniferous forest cover occurs between 8,000 and 10,000 feet (2,400 and 3,000 m), mostly consisting of spruce, pine, and birch. Above this elevation are alpine shrubs and subalpine meadows similar to those of the borderlands of Szechwan province. Generally speaking, the environment of the western parts of the range is typical of Central Asia, while that of the eastern sections is more typically Chinese.

The Nan Mountains area is very sparsely populated, and vast areas are virtually uninhabited. Most of the inhabitants are seminomadic Tibetan or western Mongol (Khoshut, or Tu-Mongor) herdsmen.

Nan Mountains, Chinese (Wade-Giles and Pinyin) NAN LING, series of mountain ranges in southern China that forms the divide and watershed between Hunan and Kiangsi provinces (*sheng*) and the Yangtze River basin to the north and Kwangtung province and the Chuang autonomous *ch'ü* (region) of Kwangsi and the Hsi River valley to the south. The ranges also form a sharp divide in climate, for they shelter southern China from the cold, continental north winds. Traditionally the mountains were referred to simply as the Ling ("Ranges"), while the area to the south was known as Ling-wai ("Beyond the Ranges") or Ling-nan ("South of the Ranges"). Until the 12th century AD or even later, the far south was still an exotic, semicolonized area, and the Nan Mountains were a major cultural boundary. As a human boundary it played almost as important a role as the Tsinling Mountains in the north (which run west to east from Kansu to Shensi provinces), though it is a comparatively small-scale mountain range.

Village in the Nan Mountains, southeastern China
Andrew J. Watson

Structurally the Nan Mountains are complex, the landforms resulting from two distinct periods of folding—the first in the later part of the Mesozoic Era, which produced massive folding with a west–east axis, and the second representing a later stage that superimposed the southwest-to-northeast folding characteristic of southeastern China. The latter forms predominate in the eastern section of the Nan Mountains. The entire system is some 870 miles (1,400 km) long and consists of a wide mountain belt rather than a single sharply defined range. The central section, on the borders of southern Hunan and Kiangsi, is the broadest and most complex in structure, with many subordinate chains that are often at right angles to the main axis. The elevation of the ranges is comparatively low and is seldom more than 3,300 feet (1,000 m). The geology of the area, like its topography, is extremely complex. The main axis of the ranges is formed of granites and very ancient sedimentary rocks that were heavily metamorphosed. The flanks are formed of red sandstone dating from the Cretaceous Period and the Tertiary Period. The whole range has been much-eroded by a complex drainage system, and its extensive limestone areas have developed a typical karst topography.

The Nan Mountains have for long been an important source of mineral wealth. A major source of silver in medieval times, the mountains now yield tin, copper, wolfram, zinc, antimony, tungsten, and iron. In addition, there are small deposits of coal to the north of Shao-kuan (in Kwangtung) in the central range. Little of the area is cultivated apart from valley bottoms, and much of it suffers badly from soil erosion. Three major passes cross the range: the Kuei-lin, followed by the Ling Canal, which affords an easy passage from southern Hunan to Kuei-lin and eastern Kwangsi, the chief route in early times; the Che-ling, northwest of Shao-kuan, which connects Hunan with central Kwangtung and is followed by the Canton to Wu-han railway; and the Mei-ling (Ta-yü), northeast of Shao-kuan, which led into southern Kiangsi and was the major north–south route until the end of the 19th century.

Nan-ning, formerly (1913–45) YUNG-NING, Pinyin NANNING, or YONGNING, city in south-central Chuang autonomous *ch'ü* (region) of Kwangsi, China. Nan-ning is the provincial capital. The city is located on the north bank of the Yung River, the chief southern tributary of the Hsi River, and lies some 19 miles (30 km) below the confluence of the Yü and the Tso rivers. The Yung River (which later becomes the Yü River) affords a good route to Canton and is navigable by shallow-draft junks and motor launches, even though it is obstructed by rapids and sandbanks.

A county seat was first established at the site in AD 318; called Chin-hsing, it also became the administrative seat of a commandery. In 589 the commandery was suppressed, and the county was renamed Hsüan-hua. Under the T'ang dynasty (618–907) the prefecture of Yung was established there; it was garrisoned to control the non-Chinese districts in Kwangsi and on the Yunnan–Kweichow provincial border. In the mid-9th century the T'ang and the Yün-nan state of Nan-chao fought over it, and after 861 it was briefly occupied by Nan-chao. It remained a frontier prefecture throughout the Sung dynasty (960–1279), being the scene of a rebellion led by Nung Chih-kao in 1052 and thereafter a garrison town. Under the Ming (1368–1644) and Ch'ing (1644–1911) dynasties, it was a superior prefecture, Nan-ning. Opened to foreign trade by the Chinese in 1907, it grew rapidly. From 1912 to 1936 it was the provincial capital of Kwangsi, replacing Kuei-lin. Early in the 20th century the city spilled over from the old walled city into a southern suburban area. In the 1930s Nan-ning became the centre of a "model provincial government" under the warlord Li Tsung-jen, and a spacious modern city was laid out. During the Sino-Japanese War (1937–45), Nan-ning was temporarily occupied in 1940 by the Japanese. It subsequently became an important U.S. air base supporting the Chinese armies in Kwangsi, but during 1944–45 it was again under Japanese occupation.

In 1949 Nan-ning again became the provincial capital, first of Kwangsi province and then (1958) of the Chuang autonomous *ch'ü* (region) of Kwangsi, which replaced it. Until then Nan-ning had essentially been a commercial centre dependent on Canton and on the Hsi River system. In the late 1930s a railway was begun, joining Heng-yang in southern Hunan province with Kuei-lin, Liu-chou, Nan-ning, and the Vietnam border, while another was begun from Liu-chou to Kuei-yang in Kweichow. The construction of the Nan-ning section of this line was halted in 1940 by the Japanese advances, however, and was not completed until 1951, after which Nan-ning was directly linked with central China; completion of a branch line to the port of Chan-chiang (in Kwangtung) in 1957 gave it a direct outlet to the sea. During the French war in Indochina (1946–54), Nan-ning was the chief support base in China for the Vietnamese forces, and during the Vietnam War in the 1960s and early 1970s it again became a staging post for the sending of supplies southward to North Vietnam. It was also an important military supply centre during the Sino-Vietnam confrontation in 1979.

Formerly an essentially commercial and administrative centre, Nan-ning from 1949 experienced industrial growth. The city is surrounded by a fertile agricultural region producing subtropical fruits and sugarcane; food processing, flour milling, sugar refining, meatpacking, and leather manufacture are important in the city. Nan-ning is a centre for printing and paper manufacture, and it is also important in heavy industry.

After the recognition of the Chuang ethnic minority in 1958, Nan-ning became the chief centre for the training of Chuang leaders. Kwangsi University, a large medical school, and a school of agriculture all date from the 1920s.

A cavern at Iling, 12 miles (19 km) to the northwest, has a 3,600-foot (1,100-metre) passage through picturesque stalactites. In the 1970s coloured lights were installed and the cavern was developed as a tourist attraction. Pop. (1985 est.) 564,900.

Nan-p'ing, Pinyin NANPING, city in north central Fukien *sheng* (province), China. Nan-p'ing occupies an important position in the communications of northern Fukien. It is situated on the northwest bank of the Min River at the place where that river is formed by the confluence of three major tributary systems, the Sha River flowing from the southwest, the Chien River flowing from the northeast, and the Fu-t'un River flowing from the west. All of these valleys are natural routes through the rugged and difficult country of the Fukienese interior, leading toward the neighbouring provinces.

Nan-p'ing county was established at the end of the Later Han period (AD 23–220). The name was later changed to Chien-an and Yen-an but was suppressed. In the early 10th century it was a minor town called Yen-p'ing Chen; but when Wang Yen-cheng established himself as an independent ruler in north Fukien in 944, it was promoted to the status of Lung-chin county and made the seat of an independent prefecture of T'an-chou. When northern Fukien was conquered by the Southern T'ang state in 945, the town was renamed Chien-chou; but in 979 the Sung conquerors of the south renamed it Nan-chien-chou. Under the Sung dynasty (960–1279) it prospered as a major producer of copper, lead, and tin. In 1302 its name was changed to Yen-p'ing, and under the Ming (1368–1644) and Ch'ing (1644–1911) dynasties it formed the superior prefecture of Yen-p'ing. Its name was changed to Nan-p'ing in 1913. Under the Ch'ing its commerce—mostly in forest products, timber, bamboo, and paper—grew considerably. Nan-p'ing had traditionally sent its goods, particularly lumber, to Fu-chou by river.

Since the Communists came to power in 1949, the Min River has been improved for navigation. More important, however, was the opening in 1956 of the railway from Kiangsi province to Amoy, which is joined at Nan-p'ing by another line to the port of Fu-chou. Nan-p'ing thus became the most important rail junction in Fukien and subsequently developed some industries, among which the most important are timber working, papermaking, and the manufacture of cement and chemicals. Pop. (1985 est.) 153,000.

Nan River, river in northern Thailand, rising in the northern portion of the Luang Phra Bang Range on the Laotian border and flowing south for 390 miles (627 km). It receives the Yom River near Chum Saeng. Just above Nakhon Sawan the Ping and the Nan rivers combine to form the Chao Phraya River (*q.v.*). The towns of Nan, Uttaradit, Phichai, and Phitsanulok are on the Nan's banks.

Nan-t'ou, *hsien* (county), central Taiwan. It has an area of 1,585 square miles (4,106 square km) and is bordered by the *hsien* of T'ai-chung (north), Chang-hua and Yün-lin (west), Chia-i and Kao-hsiung (south), and Hua-lien (east). The Chung-yang Mountain Range, with an elevation of 10,000 to 12,500 feet (3,000 to 3,800 m) above sea level, gives rise to the Ch'en-yu-lan and Pei-kang rivers. The mountains extend over most of the *hsien* except for a small alluvial plain in the northeast, where Nan-t'ou town, the administrative seat, is located. Paddy rice, tea, sugarcane, bananas, and oranges are grown in the *hsien.* Sugar milling, fruit canning, woodworking, and porcelain and pottery making are the important industries; coal, gold, silver, graphite, and clay deposits are worked. The Nan-t'ou and A-li Mountains coalfields are located in the east-central part of the region. The East-West Cross-Island highway, in the northern part of the *hsien,* connects Nan-t’ou town with scenic T’ai-lu-ko (Taroko) Gorge. Jih-yüeh (Sun Moon) Lake, at an elevation of 2,500 feet (760 m) in a wooded mountain setting, and Ho-huan Mountain (11,210 feet [3,420 m]), providing Taiwan’s only ski slope, are the major tourist attractions. Chung-hsing-hsin-ts’un city, about 4 miles (6 km) north of Nan-t’ou, is the seat of the Taiwan Provincial Government. The Wan-ta hydroelectric plant on Wan-ta Dam is the major source of electricity. Pop. (1989 est.) 533,128.

Nan-t’ou, *shih* (municipality) and seat of Nan-t’ou *hsien* (county), west-central Taiwan. It lies 26 miles (42 km) south of T’ai-chung city. Situated in a fertile alluvial plain on a tributary of the Wu River, the town flourished in the late 17th century and became the marketing centre for rice, sugarcane, bananas, and oranges grown nearby. Sugar and rice milling, fruit canning, woodworking, and pottery making are the main industries. The town is connected by the Chung-shan freeway to T’ai-chung in the north and T’ai-nan in the south. Pop. (1982 est.) 85,273.

Nan-t’ung, Pinyin NANTONG, city, eastern Kiangsu *sheng* (province), China. Nan-t’ung is situated on the northern shore of the head of the Yangtze River estuary. Northward, it is connected with the Yün-yen and T’ung-yü canal systems, which serve the coastal zone of Kiangsu north of the Yangtze and connect westward with the Grand Canal. T’ien-sheng-kang, about 7.5 miles (12 km) to the west, provides Nan-t’ung with a port on the Yangtze.

During the Han dynasty (206 BC–AD 220), and even as late as the Sui (581–618) and T’ang (618–907) periods, the seacoast was much farther west than at present; and the area now called Nan-t’ung was an outlying county, Hai-ling, subordinate to Yang-chou. It grew into a commercial, communications, and strategic centre and became a prefecture (*chou*) under the name of T’ung in 958. After 1368 it lost its prefectural status and again became a county subordinate to its wealthy neighbour, Yang-chou. In 1724, however, it was again created a prefecture and was given the name Nan-t’ung (meaning “southern T’ung”) to avoid confusion with T’ung-chou, near Peking. After 1912 it became a county, retaining its old name.

The coastal area to the east and northeast has always been known for salt, and the inland area to the north and northwest is a rich rice- and cotton-growing region. It is above all on cotton that Nan-t’ung’s prosperity has depended. Domestic-scale spinning and weaving of cotton had long been established, but the modern industry was almost entirely the creation of a statesman and modernizer named Chang Chien (d. 1926), who was a native of the district. After the disasters of the Sino-Japanese War of 1894–95, Chang decided to abandon politics and to devote himself to developing Nan-t’ung into a model district. In 1895 he founded the Dah Sun Cotton Mill at T’ang-chia-chia, some 5.5 miles (9 km) west of Nan-t’ung. This mill came into production in 1899 and proved more efficient than any other private textile firm of the same period. Out of its profits, Chang, between 1900 and 1905, built up an industrial complex in Nan-t’ung that included flour and oil mills, a modern factory for reeling silk, a distillery, and a machine shop. He also founded a shipping line and, after 1901, formed the T’ung-hai Land Reclamation Company—the first of a number of such companies that brought much of the saline coastal zone of Chiang-pei under cotton cultivation.

Chang also founded the first teacher-training colleges in China—the Nan-t’ung normal schools—which staffed hundreds of primary schools. Later he founded an agricultural college, a textile school, and a medical college (1910–12), which eventually merged to form Nan-t’ung University. He also founded museums, libraries, and theatres, so that Nan-t’ung became an important cultural centre as well as a prosperous industrial town. In the early republican period (after 1911), Nan-t’ung was commonly called “Chang Chien’s Kingdom,” or the “Model County.”

Like all centres of cotton manufacture in China, Nan-t’ung suffered seriously during the years of economic depression in the 1930s, after which the area came under Japanese occupation for a time. The modern city remains heavily dependent upon the textile industry and upon cotton. In 1984 Nan-t’ung was designated one of China’s “open” cities in the new open-door policy inviting foreign investment. Pop. (1988 est.) 306,000.

Nan-yang, Pinyin NANYANG, city in southwestern Honan *sheng* (province), China. Nan-yang is situated on the Pai River, which is a tributary of the Han. It was from early times an important centre, commanding a major route between Sian (Hsi-an [Ch’ang-an]) in Shensi province and Hsiang-fan in Hupeh province and the Yangtze River valley, as well as two routes across the Fu-niu Mountains into the central plain of Honan, leading to Lo-yang and K’ai-feng. Another route extends southeastward into Anhwei province.

In the early part of the 1st millennium BC, Nan-yang was the seat of the state of Shen. For most of the period from 600 to 220 BC, it was on the borders of the southern state of Ch’u and was known as Wan-i. With the Ch’in conquest in 221 BC, it became Wan county, seat of the commandery of Nan-yang. It became important under the Han dynasty (206 BC–AD 220), both as a centre of commerce and as the seat of state iron foundries and of other state manufacturies. It was also the point at which converged the major routes leading from the western capital at Ch’ang-an (modern Sian) and the eastern capital at Lo-yang leading to the Yangtze River at Chiang-ling and the far south. In Later Han times (AD 23–220) its local magnates played a large part in the restoration of Han power. In the 1st and 2nd centuries its name was a byword for refinement and luxury. For a time it was designated the southern capital. Later, however, its importance declined, and it remained a county town, subordinated to Teng-chou, until the last years of the 13th century, when the Mongols established it as the superior prefecture of Nan-yang. It kept this status until 1912, when it became a county town.

In the 20th century Nan-yang’s importance has somewhat declined, since the route of the Peking–Han-k’ou railway lies east of it. Nan-yang is still a local commercial centre of considerable importance, however, providing a market for the grain, beans, sesame, tobacco, and other crops produced in the surrounding basin and transported by boat on the Pai River to the Han or by a rail line to Lo-ho (opened in 1969) and Hsian-fan. From early times the city has had a reputation for handicrafts, including the cutting and polishing of gemstones and jade. The surrounding region has a highly developed sericulture industry, producing raw silk, silk yarn, silk textiles, and embroidery. The city has developed a considerable industrial capacity, mostly based on small units. In the late 1950s an iron and steel industry was founded there. Pop. (1988 est.) 208,000.

Nan Yüeh (ancient kingdom): *see* Nam Viet.

Nana, also called NANAY (b. 1800/15?—d. ?1895), Chiricahua Apache Indian warrior who was one of the leaders in the Apaches’ final resistance against white domination.

Nana was a member of the Eastern band of the Chiricahua Apaches, who ranged throughout western New Mexico. He took part in raids on Mexicans and Americans with such Chiricahua leaders as Geronimo and Victorio. By the 1870s he had joined Victorio on the Apache reservation at Warm Springs, New Mexico, but in about 1877 they and their followers were moved by the U.S. government to an inhospitable reservation at San Carlos, Ariz. Victorio and many members of his band were killed by Mexican army troops in 1880 after they had fled the reservation and taken to raiding. Nana, who had not been with Victorio’s band when it was wiped out, took over the leadership of its survivors and began terrorizing parts of Texas, southwestern New Mexico, and northern Chihuahua state in Mexico. Pursued by U.S. Army troops, Nana took his band of 30 or 40 followers on a two-month-long chase through New Mexico that covered more than 1,000 miles (1,600 km). His band killed 40 to 50 Americans, fought and won a dozen skirmishes with U.S. troops, and successfully eluded the pursuit of more than 1,400 soldiers. Nana and his band retreated southward into the Sierra Madre mountains of northern Mexico, but in 1883 he surrendered to the American general George Crook and returned with his followers to the San Carlos reservation. He broke out in 1885 along with Geronimo but was recaptured with the latter in 1886. After being deported to Florida with Geronimo and the other remaining rebellious Apaches, Nana spent the last years of his life on the Chiricahua reservation at Fort Sill, Okla.

Nana Sahib, byname of DHONDU PANT (b. *c.* 1820—d. *c.* 1859, Nepal), a prominent leader in the Indian Mutiny of 1857. Although he did not plan the outbreak, he assumed leadership of the sepoys (British-employed Indian soldiers).

Adopted in 1827 by Bājī Rāo II, the last Marāthā peshwa (prince), Nana Sahib was educated as a Hindu nobleman. On the death of the exiled Bājī Rāo in 1852, he inherited Bājī Rāo’s home in Bithūr (now in Uttar Pradesh) rent-free, and his private property. Although Nana Sahib’s adoptive father had pleaded that his £80,000-a-year life pension be extended to Nana Sahib, the British governor-general of India, Lord Dalhousie, refused. Nana Sahib sent an agent, Azimullah Khan, to London to push his claims, but without success. On his return, Azimullah told Nana Sahib he was unimpressed by supposed British military strength in the Crimea against Russia.

This report, the refusal of his claim, and threats of the sepoys led him to join the sepoy battalions at Cawnpore (Kānpur) in rebellion in June 1857. He had sent Sir Hugh Wheeler, commander of British forces at Cawnpore, a letter warning of the attack—a sardonic gesture to his former friends. A safe conduct given to the British under General Wheeler by Nana Sahib was broken on June 27, and British women and children were massacred at Nana Sahib’s palace. Lacking military knowledge, he could not command the mutinous sepoys, though he had the satisfaction of being declared peshwa in July 1857 by Tantia Topi and his followers after the capture of Gwalior. Defeated by General Henry Havelock and in December 1857 by Sir Colin Campbell, he appointed a nephew, Rao Sahib, to give orders to Tantia. Nana Sahib was driven in 1859 into the Nepal hills, where he is thought to have died.

Nanaimo, city, southwestern British Columbia, Canada, on Vancouver Island and the Georgia Strait. Founded as Colvilletown around a Hudson’s Bay Company trading post, it developed after 1849 when coalfields were discovered nearby by the Indians. In 1860 the settlement was renamed Sne-ny-mo (whence *Nanaimo*) from an Indian word meaning “a big, strong tribe,” which was applied to a tribal confederation. An important distributing centre, Nanaimo is connected with Vancouver

The Bastion, remnant of a Hudson's Bay Company's fort, Nanaimo, B.C.

Bob and Ira Spring

and the mainland by ferries. Coal mining was the chief industry until the last mine closed in 1953. The economy now depends chiefly on lumbering, pulp processing, commercial fishing, agriculture, shipbuilding, and tourism. The federal government maintains a fisheries and oceanographic research station at the north edge of the city. Historic features are Petroglyph Park, with its ancient rock carvings, and the Bastion, part of a fort built by the Hudson's Bay Company in 1853 to protect the miners and settlers. The city is host to a unique sporting event—the annual mid-July Bathtub Race across the strait to Vancouver. Inc. city, 1874. Pop. (1991) 60,129.

Nānak (b. April 15, 1469, Rāi Bhoi dī Talvaṇḍī [now Nankana Sahib, Pak.], near Lahore, India—d. 1539, Kartārpur, Punjab), Indian spiritual teacher who was the first guru of the Sikhs, a monotheistic religious group that combines Hindu and Muslim influences.

Nānak (centre), detail of a painting in the Mughal style, c. 1689; in the collection of Mahant Indresh Charan Dass, Dehra Dūn, Uttar Pradesh, India

By courtesy of Dr. M.S. Randhawa

His teachings, expressed through devotional hymns, many of which still survive, stressed salvation from rebirth through meditation on the divine name. Among modern Sikhs he enjoys a particular affection as their founder and as the supreme master of Punjabi devotional hymnody.

Life. What little information there is about Nānak's life has been handed down mainly through legend and tradition. There is no doubt that he was born in 1469 in the village of Rāi Bhoi dī Talvaṇḍī. His father was a member of a subcaste of the mercantile Khatrī caste. The relatively high social rank of the Khatrīs distinguishes Nānak from other Indian religious reformers of the period and may have helped promote the initial growth of his following. He married the daughter of a Khatrī, who bore him two sons.

For several years Nānak worked in a granary until his religious vocation drew him away from both family and employment, and, in the tradition of Indian religious mendicants, he embarked on a lengthy journey, probably traveling to the Muslim and Hindu religious centres of India, and perhaps even to places beyond India's borders. Neither the actual route nor the places he visited can be positively identified.

References found in four of his hymns suggest that Nānak was present at attacks Bābur (an invading Mughal ruler) launched on Saidpur and Lahore, so it seems safe to conclude that by 1520 he had returned from his travels and was living in the Punjab.

The remaining years of his life were spent in Kartārpur, another village of central Punjab. Tradition holds that the village was actually built by a wealthy admirer to honour Nānak. It was presumably during this final period that the foundations of the new Sikh community were laid. By this time it must be assumed that Nānak was recognized as a Gurū, an inspired teacher of religious truth, and that, in accordance with the custom of India, disciples who accepted him as their Gurū gathered around him in Kartārpur. Some probably remained as permanent residents of the village; many more made periodic visits to obtain his blessing. All of them listened to the teachings expressed there in numerous devotional hymns intended for communal singing, many of which survive to this day.

The actual year of Nānak's death is disputed, tradition being divided between 1538 and 1539. Of these two possibilities, the latter appears to be the more likely. One of his disciples, Aṅgad, was chosen by Nānak as his spiritual successor, and following Nānak's death he assumed the leadership of the young Sikh community as Gurū Aṅgad.

In view of the size of the following that Nānak attracted, numerous anecdotes concerning the deeds of the Gurū began to circulate within the community soon after his death. Many of these were borrowed from the current Hindu and Muslim traditions, and others were suggested by Nānak's own works. These anecdotes were called *sākhīs*, or "testimonies," and the anthologies into which they were gathered in rough chronological order are known as *Janam-sākhīs*. The interest of the narrators and compilers of the *Janam-sākhīs* has largely concentrated on the childhood of Nānak and above all on his travels. Among the earlier traditions are tales of visits he is supposed to have made to Baghdad and Mecca. Ceylon is a later addition, and later still the Gurū is said to have traveled as far east as China and as far west as Rome. Today the *Janam-sākhīs* offer a substantial corpus of hagiographical material, and the more important of these collections continue to be the basis of "biographies" of Nānak.

Doctrine. Nānak's message can be briefly summarized as a doctrine of salvation through disciplined meditation on the divine name. Salvation is understood in terms of escape from the transmigratory round of death and rebirth to a mystical union with God. The divine name signifies the total manifestation of God, a single Being, immanent both in the created world and within the human spirit. Meditation must be strictly inward, and all external aids such as idols, temples, mosques, scriptures, and set prayers are explicitly rejected. The Muslim influence is relatively slight; the influence of Hindu mystical and devotional beliefs is much more apparent. Always, though, the coherence and beauty of Nānak's own expression dominates early Sikh theology. (W.H.McL.)

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Nanao, city, Ishikawa *ken* (prefecture), Honshu, Japan, on the Noto Peninsula, facing Nanao Bay. During the Tokugawa Era (1603–1867), the castle town served as a naval base for the Maeda daimyo family, who possessed several European ships, while Japan isolated itself from the rest of the world. The port was opened to trade with Russia, China, and Korea after the arrival of a railway in 1899. In its most prosperous days, the port was visited by an estimated 7,000 ships annually. Its importance declined, however, with the development of land transportation in the 20th century. Imports are now largely restricted to small quantities of wood and manganese ore from Russia. Industries include cement manufacture and lumber processing. Pop. (1990) 50,101.

Nanchao, Tai kingdom that arose in the 8th century in western Yunnan Province in southern China, a region to which the Tai peoples trace their origin. Many fragmented Tai kingdoms had occupied this region, centred at Lake Tali between the Mekong, the Yangtze, and the sources of the Red River, under varying degrees of Chinese control, since the 1st century AD.

Nanchao (Chinese: Southern Princedom) was formed by the unification of six Tai kingdoms in 729. Pi-lo-ko, the leader of one small tribal state, extended his control over the five neighbouring kingdoms while acting in alliance with China, which needed an ally against the aggressive Tibetans. Once unification was complete, Pi-lo-ko established Nanchao's centre of power in the Lake Tali Plain. Geographic factors rendered the capital impregnable, and two Chinese attacks were repulsed in 751 and 754. Nanchao was also able to dominate the East-West trade routes from China and Tongking through Myanmar (Burma) to India. By the 9th century, Nanchao became an imperialistic state waging war deep into Myanmar in 832 and into Tongking in 862.

Nanchao attained a high level of culture. Skilled artisans taught the weaving of cotton and silk gauze. Salt and gold were mined in many parts of the kingdom, and a complex system of government and administration was developed.

The Mongols under the leadership of Kublai Khan conquered a declining Nanchao in 1253. During the preceding two centuries, however, the Tais had been moving southward in large numbers, eventually forming the bulk of the population in what is present-day Thailand.

Nancy, city, capital, Meurthe-et-Moselle *département,* Lorraine *région,* eastern France, in what was formerly the province of Lorraine, west of Strasbourg, near the left bank of the Meurthe River.

Until the 18th century Nancy was composed of two distinct fortified towns. To the north stood the medieval city, the Ville-Vieille (Old Town), and to the south the Ville-Neuve (New

Town), founded in the late 16th century. In 1750 Stanisław I (Stanisław Leszczyński), king of Poland and father-in-law of Louis XV (reigned 1715–74), pulled down the walls that separated the two towns and commissioned the French architect Emmanuel Héré de Corny to design a new, well-planned city centre. The town was further enlarged after the Franco-German War of 1870–71 and during the 20th century.

The central group of buildings erected by Héré under Stanisław I constitutes one of the most perfect and homogenous existing examples of 18th-century French architecture. The rectangular public square called the Place Stanislas measures 400 by 350 feet (120 by 105 m) and has four cutoff corners ornamented by wrought-iron railings edged with gilding. On one side of the square is the handsome town hall (*hôtel de ville*), and on another side is the Musée des Beaux-Arts, which has a fine collection of Baroque and Rococo paintings. Opposite the town hall is a monumental arch, built in honour of Louis XV; it opens onto the oblong Place de la Carrière (16th–18th century). The 18th-century Palais du Gouvernement, standing at the end of this square, has a fine Greek Ionic colonnade. Adjoining the building is the former Palais Ducal (mostly 16th-century), which now houses the Musée Historique Lorrain, with its rich collection of regional art and folklore.

Town hall in the Place Stanislas, Nancy, Fr.
Shostal—EB Inc.

In the 11th century Nancy was a small township dominated by a castle. Fortified in the 12th century, it became the capital of the dukes of Lorraine. In 1477 Charles the Bold, duke of Burgundy (1467–77), was killed while trying to capture the town. During the 16th century it became prosperous; and Charles II (or III), the Great, duke of Lorraine and the Bar (1543–1608), founded a separate new town, the Ville-Neuve, which was captured by the French in 1633 and restored to the dukes of Lorraine after the Treaty of Rijswijk in 1697. Louis XV granted Nancy and the duchy of Lorraine to Stanisław I after he lost the Polish crown in 1735. At Stanisław's death in 1766, the city passed to France. After the Franco-German War of 1870–71, the population increased considerably, as Nancy became the main refuge for French-speaking emigrants from Alsace and Metz, which had come under German rule. Nancy suffered damage in World War I but was almost unharmed during World War II.

Nancy, which has been largely supplanted by Metz (30 miles [50 km] to the north) as an industrial centre, has chemical, clothing, and food-processing industries. The town has also developed as an administrative and financial capital. The old university (founded 1572), now called the University of Nancy, was closed during the French Revolution but was reestablished during the early 19th century. It is now split into a unit for the sciences and one for the humanities and social sciences. Nancy is presently associated with Metz as a *"métropole d'équilibre,"* or focus of urban development, one of eight in France. The two cities have been connected by high-speed railroad. Pop. (1982) 95,654.

Nanda DYNASTY, family that ruled Magadha, in northern India, between *c.* 343 and 321 BC. The Nanda dynasty immediately preceded the dynasty of the Mauryas, and, as with all pre-Maurya dynasties, what is known about it is a mixture of fact and legend. Indigenous traditions, both Brahmanical and Jaina, suggest that the founder of the dynasty, Mahāpadma (who was also known as Mahāpadmapati, or Ugrasena), evidently had a low social origin—a fact confirmed by classical scholarship. Mahāpadma took over from the Śaiśunāgas not only the reins of Magadhan power but also their policy of systematic expansion. His probable frontier origin and early career as an adventurer helped him to consolidate the empire with ruthless conquests. The authenticity of the Purāṇic statement that he was the "destroyer of all Kṣatriyas" and that he overthrew such disparately located powers as the Ikṣvākus, Pañcālas, Kāśīs, Haihayas, Kaliṅgas, Aśmakas, Kurus, Maithilas, Śūrasenas, and Vītihotras is borne out by independent evidence, which also associated the Nandas with conquests in the distant Godāvari Valley, Kaliṅga, and part of Mysore.

The post-Mahāpadma genealogy of the Nanda dynasty is perfunctory in the *Purāṇas*, which mention only Sukalpa (Sahalya, Sumālya), while the Buddhist text *Mahābodhivaṃsa* enumerates eight names. Dhanananda, the last of this list, possibly figures as Agrammes, or Xandrames, in classical sources, a powerful contemporary of Alexander the Great. The Nanda line ended with him in about 321 BC when Candragupta laid the foundation for Maurya power.

The brief spell of Nanda rule, along with the lengthy tenure of the Mauryas, represents the political aspect of a great transitional epoch in early Indian history. The changes in material culture in the Ganges Valley beginning in the 6th–5th centuries BC, chiefly characterized by settled agricultural technology and growing use of iron, resulted in agricultural production surpluses and a tendency toward the growth of commerce and urban centres. It is significant in this context that in many sources, indigenous and foreign, the Nandas are portrayed as extremely rich and as ruthless collectors of various kinds of taxes. In Alexander's period, Nanda military strength is estimated at 20,000 cavalry, 200,000 infantry, 2,000 quadriga (chariots), and 3,000 elephants. In administration the initiatives of the Nanda state are reflected in references to irrigation projects in Kaliṅga and the organization of a ministerial council.

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Nanda Bayin, also spelled NANDABAYIN (fl. late 16th century), king of the Toungoo dynasty of Burma whose reign (1581–99) ended with the dismemberment of the empire established by his father, Bayinnaung.

Upon coming to the throne, Nanda Bayin was faced with a rebellion of his uncle, the viceroy of Ava, whom he defeated three years later. In December 1584 Nanda Bayin marched into Siam, which had been a vassal of his father, to subjugate the Siamese patriot Naresuan. For the next three years he sent several armies into the Chao Phraya river valley, but Naresuan defeated all of them. The Siamese then went on the offensive, taking Tavoy and Tenasserim in 1593. Nanda Bayin's troubles were compounded when another group of his father's subject peoples in southern Burma revolted and invited the Siamese to occupy Martaban and Moulmein on the Salween River. In 1595 Nanda Bayin was obliged to retreat to Pegu and defend the city from a Siamese attack.

In 1599 Nanda Bayin's brothers, the viceroys of Toungoo, Prome, and Ava, revolted and, after inviting the king of Arakan to join in the fray, besieged Pegu, took Nanda Bayin prisoner, and dismembered the last remnants of Bayinnaung's empire. Nanda Bayin's reign had been a series of catastrophes, but this was due less to a lack of energy and initiative on his part than to the overreaching ambition of his father, who had built an empire too large to govern.

Nānded, also spelled NĀNDER, town, east-central Mahārāshtra state, western India. It lies on the banks of the Godāvari River. Its name is derived from *Nānda tat* ("Nānda border"), a term that refers to the boundary of the Magadha kingdom during the 7th century BC. Primarily a commercial centre, it also has cotton spinning and weaving mills. The town is known as a centre of Sanskrit learning and is the location of the Sikh *gurdwārā* ("temple and kitchen") built on the site of Gurū Gobind Singh's assassination in 1708. Nānded was the birthplace of three Marāṭhā saint-poets—Vishnupant Śeṣa, Raghunāth Śeṣa, and Vāman Paṇḍit. It has several colleges affiliated with Marāṭhwādā University.

Nānded is situated in one of the less-developed areas of Mahārāshtra. Most of the population in the area is dependent upon agriculture; jowar (sorghum) and rice are the major food crops, and cotton is the basic cash crop. Cattle breeding is also important. Major industries are cotton and oilseed processing. Pop. (1981) 191,269.

Nandeva (South American Indians): *see* Apapocuva.

Nandi, Kalenjin-speaking people of the Southern Nilotic language group who inhabit the western part of the Kenya highlands.

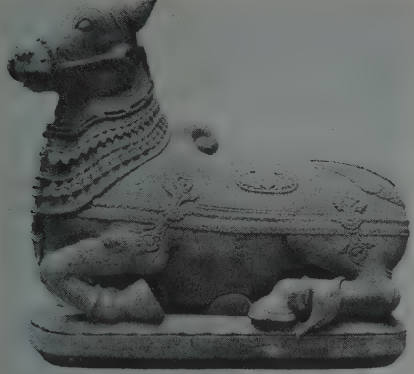
The Nandi are primarily intensive cultivators; their major crops are millet, corn (maize), and sweet potatoes. Cattle are important, providing food and bride-price payments and holding great ritual importance.

The people are divided among 17 patrilineal and exogamous clans that are dispersed throughout Nandi territory. The most important traditional social groups are the age sets, to one of which every male belongs from birth. The Nandi age-grade system is of the cyclical type, with seven named grades covering approximately 15 years each, a single full cycle being 105 years. Men advance through the warrior grades and, upon entering the grade of elder, hold political and juridical authority. No political authority transcends this local council of elders.

General polygyny is the rule, with substantial bride-price in livestock expected. Nandi society was traditionally egalitarian; no slaves were kept.

Nanḍi, bull *vāhana* (mount) of the Hindu god Śiva. Some scholars suggest that the bull was originally the zoomorphic form of Śiva, but from the Kuṣāṇa (Kushan) age onward (*c.* 1st century AD), he is identified as the god's vehicle.

Every Śiva temple has the figure of a white, humped bull reclining on a raised platform and facing the entrance door of the shrine so that, according to tradition, he may perpetually gaze on the lord in his symbolic form, the *liṅga* (phallus). Nandi is considered to be one of Śiva's chief attendants and occasionally is depicted in sculpture as a bull-faced dwarf fig-

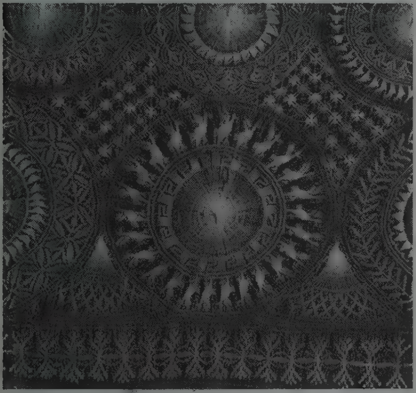


Nandi, granite sculpture from South India, late 15th century AD; in the Asian Art Museum of San Francisco, The Avery Brundage Collection

By courtesy of the Asian Art Museum of San Francisco, The Avery Brundage Collection, gift of the Atholl McBean Foundation

ure. Nandi is known also in a wholly anthropomorphic form, called variously Nandikēśvara, or Adhikāranandin. Sculptures of him in human form, found at the entrance door of many Śiva temples in South India, are frequently confused with images of the deity because they are alike in such iconographic features as the third eye, crescent moon in the matted locks, and four arms, two of which hold the battle-ax and an antelope. Usually a distinguishing feature is that Nandi's hands are pressed together in adoration. The respect shown the bull in modern India is due to his association with Śiva. In sacred Hindu cities such as Benares (Vārānasi), certain bulls are given the freedom to roam the streets. They are considered to belong to the lord, and they are branded on the flank with the trident insignia of Śiva.

nanduti (Guaraní Indian: "spider web"), type of lace introduced into Paraguay by the Spaniards. It is generally characterized by a spoke-like structure of foundation threads upon which many basic patterns are embroidered. This structure, resembling a spider web or the rays of the Sun, is usually made on a small circular cushion and is common in many Spanish countries. It is also found in drawn thread work. A comparable lace is made on the island of Tenerife and bears its name.



Nanduti lace from Paraguay, late 19th–early 20th century; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

nang-mchod (Tibetan: "internal worship"), also called OFFERINGS OF THE FIVE SENSES, in Tibetan Buddhist ceremonies, pleasurable sense perceptions presented to honour tranquil deities. The offerings include a mirror (to please the sense of form, or sight); a bell or stringed musical instrument (hearing); incense, nutmeg, or scented flower (smell); sugar, a conch filled with curds, or the sacrificial cake *gtor-ma* (taste); and a piece of silk cloth (touch). The texts refer also to a sixth sense, that of mind, which does not usually figure in a ceremony but which may be honoured by offering a page of scripture.

The offerings of the five senses made to wrathful Tantric deities consist of a skull cup (*kapāla*) containing a heart, tongue, nose, pair of eyes, and pair of ears. The texts refer to these offerings as human organs, but the offerings presented in actual ceremonies are molded replicas of those organs made from barley flour and butter, and realistically coloured and shaped.

The *nang-mchod* are distinguished from the *phyi-mchod* (*q.v.*), eight similar offerings that are considered "external worship."

Nānga Parbat, also called DIAMIR, one of the world's tallest mountains (26,660 feet [8,126 m]), situated in the western Himalayas 17 miles (27 km) west-southwest of Astor, in the Pakistani-administered sector of the Kashmir region. The mountain's steep south wall rises nearly 15,000 feet (4,600 m) above the valley immediately below, and the north side drops about 23,000 feet (7,000 m) to the Indus River.

The British Alpine climber Albert F. Mummery led the first attempt to ascend the glacier- and snow-covered mountain in 1895, but he died in the attempt. At least 30 more climbers (mostly German-led) also perished on Nānga Parbat because of the severe weather conditions and frequent avalanches before the Austrian climber Hermann Buhl reached the top in 1953. The Kashmiri name Nānga Parbat is derived from the Sanskrit words *nagna parvata,* meaning "naked mountain." Diamir is a local name for the peak and means "King of the Mountains."

Nangnang, Chinese LO-LANG, one of four colonies (Nangnang, Chinbŏn, Imdun, and Hyŏnto) established in 108 BC by Emperor Wu Ti of the Han dynasty (206 BC–AD 220) of China when he conquered the ancient Korean state of Wiman (later named Chosŏn). Nangnang, which occupied the northwestern portion of the Korean peninsula and had its capital at P'yŏngyang, was the only one of the four colonies to achieve success. It lasted until AD 313, when it was conquered by the expanding northern Korean state of Koguryŏ. Chinbŏn and Imdun were abandoned in 82 BC and Hyŏnto in 75 BC.

An extremely prosperous state with a population of around 400,000, Nangnang was the centre of Chinese culture and influence in Korea at the time. The Chinese officials assigned to govern Nangnang brought with them all the customs of their motherland and created a miniature Chinese society. The tombs left behind by this Chinese ruling class contain some of the finest examples of ancient Chinese art in existence. Though the Chinese culture and social institutions of Nangnang appear to have had little impact on the general population of Korea at the time, its technology, especially the metalworking techniques, strengthened the native tribal communities outside of Chinese dominance.

Nangnim Mountains, Korean NANGNIM-SANMAEK, mountain range stretching from north to south, west of the Kaema Highlands (*q.v.*), in central North Korea. The Nangnim Mountains form the watershed between Kwanbuk (the northeastern part of the Korean Peninsula) and Kwansŏ (the northwestern part). With average heights of approximately 5,000 feet (1,500 m), the Nangnim's peaks include Mount Maengba (7,421 feet), Sobaek (9,003 feet), Nangnim (7,165 feet), and Paek (6,152 feet). Three spurs, all more than 3,000 feet (900 m) high, stretch toward the southwest. The Taedong and the Ch'ŏngch'ŏn rivers originate in the Nangnim Mountains and flow with their tributaries between the spurs southwest to the Yellow Sea. Although the mountains are high enough to obstruct natural trade routes between the Kwanbuk and Kwansŏ areas, the regions are nevertheless connected by railways and roads.

Naning War (1831–32), disastrous attempt by the British to exact tribute from the Minangkabau people of the Malay state of Naning, near Malacca. Claiming to have inherited a right formerly held by the Dutch, British officials at Malacca demanded one-tenth of Naning's annual crop in 1829. Naning's ruler, Abdul Said, refused and defeated a British force sent against him in 1831. A second expedition ended Naning's resistance after a three-month campaign in 1832, but the costly and humiliating war discouraged British expansion in Malaya for the next four decades.

Nanino, Giovanni Maria, Nanino also spelled NANINI (b. 1543/44, Tivoli, Papal States—d. March 11, 1607, Rome), Italian musician and composer who was one of the better known figures in European music in the late 16th century.

Nanino studied singing and composition and subsequently served as maestro di cappella (choirmaster) at several important Roman churches before becoming a permanent singer in the papal choir in 1577; he served as choirmaster of that body during several years. Nanino was a notable teacher and is thought to have established, along with his brother Giovanni Bernardino Nanino, the first public music school in Rome to be run by Italians. He taught most of the eminent Roman composers of the first half of the 17th century. Nanino wrote both secular and sacred music, composing madrigals, motets, and canzonets, among other works. His madrigals are among the finest of his day, but his sacred music has been totally eclipsed by that of his eminent contemporary, G.P. Palestrina.

Nanjing (China): *see* Nanking.

Nankan (Taiwan): *see* Matsu Island.

nankeen, durable, firm-textured cotton cloth originally made in China and now imitated in various countries. The name is derived from Nanking, the city in which the cloth is said to have been originally manufactured.

The characteristic yellowish colour of nankeen is attributed to the peculiar colour of the cotton from which it was originally made. The cloth is finished without size or bleach.

Nanking, Chinese (Wade-Giles) NAN-CHING, or (Pinyin) NANJING, city, capital of Kiangsu *sheng* (province), east-central China. Nanking, whose name means "Southern Capital," is a port on the Yangtze River and a major industrial and communications centre. It served as the capital of regional empires, the seat of revolutionary governments, and the site of a puppet regime under the Japanese, and it was twice the capital of China. Area municipality, 2,516 square miles (6,516 square km). Pop. (1998 est.) city, 2,762,300; municipality, 5,323,000.

A brief treatment of Nanking follows. For full treatment, *see* MACROPAEDIA: Nanking (Nanjing).

Nanking is situated on the southeastern bank of the Yangtze, about 160 miles (260 km) northwest of Shanghai. In addition to the city proper, which occupies the area enclosed by ancient city walls and adjacent suburbs, the municipality of Nanking includes both urban and rural territory. Nanking's climate is characterized by four clearly distinguishable seasons, with mild winters and hot summers, and an average annual rainfall of 39 inches (990 mm).

The substantial rural population within Nanking municipality cultivates grains (rice and wheat), legumes (beans and peanuts [groundnuts]), and fruits (watermelon, peaches, and pears). Other important products include tea, rice, cotton, lily bulbs, water chestnuts, eggs, and poultry. Pressed Nanking duck is a regional specialty.

For centuries Nanking was noted for its satins, pongees (home-woven silks), velvets, brocades, porcelain ware, paper, and ink sticks. Modern industry, first promoted by the Nationalist government between 1928 and 1937, developed further from the 1950s. Important manufactures include automobiles, petrochemicals, electronics, machinery, textiles, consumer goods, pharmaceuticals, and high-technology products. High-technology industrial parks, economic development zones, foreign investment, and international joint ventures all play major roles in the economy. Nanking is an important commercial port in the Yangtze River delta, second only to Shanghai, and serves as a hub for trade between the north and south.

The layout of Nanking resembles a gourd, with its tip pointing northwest. This scenic city of tiled gates, greenery, lotus blossoms, and tea pavilions has four major districts. The north district is traversed by Chung-shan Avenue and contains the Pei-chi ("North Pole") Pavilion and the Chi-ming ("Cockcrow") Temple. The central district, surrounding the Hsin Chieh-k'ou ("New Crossroads"), is the business centre. To the south is the populous and lively old city, and in the east district is the former Ming dynasty palace. Nanking's immediate outskirts contain many monuments, notably the mausoleums of Sun Yat-sen and of the Ming emperor Hung-wu and the Ling-ko Ssu ("Temple of the Valley of Spirits").

Paramount among educational centres of the city are Nanking University and Nanking Institute of Technology. The city also has many other technical institutes, research agencies, and scientific societies. The Nanking Museum, the Museum of the Heavenly Kingdom of Great Peace, and the Kiangsu Provincial Museum are noteworthy.

Most of Nanking's commerce centres on the Yangtze River, though several rail lines connect with Shanghai and other cities. Major highways fan out from the east and south, and to the northwest the Yangtze bridge (1968) provides for rail and highway traffic. Nanking lies on major air routes within China.

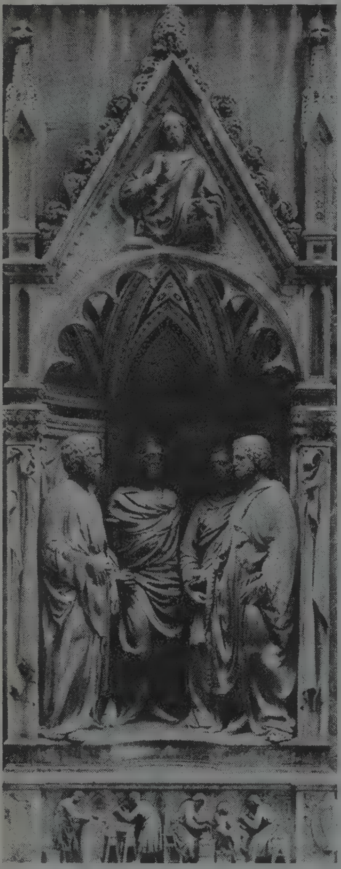
Nanking Massacre, also called RAPE OF NANKING (December 1937–January 1938), mass killing and ravaging of Chinese citizens and capitulated soldiers by soldiers of the Japanese Imperial Army after its seizure of Nanking, China, on Dec. 13, 1937, during the Sino-Japanese War that preceded World War II. The number of Chinese killed in the massacre has been subject to much debate, with most estimates ranging from 100,000 to more than 300,000.

The destruction of Nanking—which had been the capital of the Nationalist Chinese from 1928 to 1937—was ordered by Matsui Iwane, commanding general of the Central China Front Army that captured the city. Over the next several weeks, Japanese soldiers carried out Matsui's orders, perpetrating numerous mass executions and tens of thousands of rapes. The army looted and burned the surrounding towns and the city, destroying more than a third of the buildings. In 1940 the Japanese made Nanking the capital of their Chinese puppet government headed by Wang Ching-wei. Shortly after the end of World War II, Matsui and Tani Hisao, a lieutenant general who had personally participated in acts of murder and rape, were found guilty of war crimes by the International Military Tribunal for the Far East and executed.

Nanna (Mesopotamian deity): *see* Sin.

Nanni DI BANCO (b. 1384/90?, Florence [Italy]—d. 1421, Florence), Florentine sculptor whose works exemplify the stylistic transition from the Gothic to the Renaissance that occurred in Italy in the early 15th century.

Nanni was trained by his father, Antonio di Banco, a sculptor who worked with Niccolò d'Arezzo on the Cathedral of Florence. It is not surprising, therefore, that Nanni's first important work, a life-size marble statue of the prophet Isaiah, was commissioned for the cathedral. Installed on the western facade, it is more Gothic in feeling than his later, more classical works for the guilds of the Or San Michele in Florence. Of the latter, the "Quattro Coronati" ("Four Crowned Saints"; *c.* 1411–13) is considered his masterpiece. Influenced by antique art, the four saints are dressed in firmly modeled Roman togas and have heads that strongly resemble the ancient portrait busts of Roman senators that Nanni had studied. The group of figures is bound together by the spatial relation of each to the other and by a kind of mute conversation in which they all seem to be engaged.



"Quattro Coronati" ("Four Crowned Saints"), life-size marble sculpture by Nanni di Banco, *c.* 1411–13; outside the Church of Or San Michele, Florence

Brogi—Alinari from Art Resource

A relief of the Assumption of the Virgin Mary that was placed above the Mandorla Gate (Porta della Mandorla) was begun about 1414. This was his last major work and was probably finished posthumously by Luca Della Robbia, who is generally thought to have been Nanni's student.

Nansei-Shotō Trench (Pacific Ocean): *see* Ryukyu Trench.

Nansen, Fridtjof (b. Oct. 10, 1861, Store Frøen, near Kristiania [now Oslo], Nor.—d. May 13, 1930, Lysaker, near Oslo), Norwegian explorer, oceanographer, statesman, and humanitarian who led a number of expeditions to the Arctic (1888, 1893, 1895–96) and oceanographic expeditions in the North Atlantic (1900, 1910–14). For his relief work after World War I he was awarded the Nobel Prize for Peace (1922).

Early life. Nansen went to school in Kristiania, where, in 1880, he passed his entrance examination to the university. He chose to study zoology in the expectation that fieldwork would give him the chance of an outdoor life and enable him to make use of his artistic talents. Although scientific work was always closest to his heart, he first attained fame as an explorer.

As a young man Nansen was a great outdoor athlete, an accomplished skater and skier, and a keen hunter and fisherman. In 1882, when he joined the sealing ship *Viking* for a voyage to the Greenland waters, Nansen first saw at a distance Greenland's mighty ice cap. It occurred to him that it ought to be possible to cross it, and gradually he developed a plan, which he announced in 1887. Instead of starting from the inhabited west coast, he would start from the east coast and, by cutting off his means of retreat, would force himself to go forward. The expedition of six from Norway started the crossing on Aug. 15, 1888. After enduring storms and intense cold, they reached the highest point of the journey (8,920 feet [2,719 m]) on September 5 and struck the west coast at Ameralik fjord on September 26. They were forced to winter at the settlement of Godthåb (Nuuk), where Nansen took the opportunity to study the Eskimos and gather material for his book *Eskimoliv* (1891; *Eskimo Life*). The party returned home in triumph in May 1889.

In 1890 Nansen presented before the Norwegian Geographical Society a plan for an even more hazardous expedition. Having collected evidence showing that the ice of the polar sea drifted from Siberia toward Spitsbergen, he proposed to build a ship of such a shape that it would be lifted but not crushed when caught by the ice. He proposed to let this ship freeze in off eastern Siberia in order to be carried from there across the Arctic Ocean to Spitsbergen by the currents. Though his plan was severely criticized by contemporary Arctic explorers, the Norwegian Parliament granted two-thirds of the estimated expenses, and the rest was raised by subscriptions from King Oscar II and private individuals. His ship, *Fram* (*i.e.,* "Forward"; now preserved outside Oslo), was built according to his ideas.

With a complement of 13 men, the *Fram* sailed from Kristiania on June 24, 1893. On September 22 it was enclosed by the ice at 78°50′ N, 133°37′ E; it froze in, and the long drift began. It bore the pressure of the ice perfectly. On March 14, 1895, Nansen, being satisfied that the *Fram* would continue to drift safely, left it in 84°4′ N, 102°27′ E, and

Nansen

EB Inc.

started northward with dogsleds and kayaks, accompanied by one F.H. Johansen. On April 8 they turned back from 86°14′ N, the highest latitude then yet reached by man, and headed toward Franz Josef Land. As they approached the northern islands, progress was hampered by open water and, because of the advanced season, they wintered on Frederick Jackson Island (named by Nansen after the British Arctic explorer), where they stayed from Aug. 26, 1895, to May 19, 1896. They built a hut of stone and covered it with a roof of walrus hides and lived during the winter mainly on polar bear and walrus meat, using the blubber as fuel. On their way to Spitsbergen they encountered Frederick Jackson and his party of the Jackson-Harmsworth expedition, on June 17, and returned to Norway in his ship *Windward,* reaching Vardø on August 13. The *Fram* also reached Norway safely, having drifted north to 85°57′. Nansen and his companions on board the *Fram* were given a rousing welcome, which reached its climax on their arrival in Kristiania on September 9. His two-volume account of the expedition, *Fram over Polhavet* (*Farthest North*), appeared in 1897.

Scientific work. Nansen's success as an explorer was due largely to his careful evaluation of the difficulties that might be encountered, his clear reasoning, which was never influenced by the opinions of others, his willingness to accept a calculated risk, his thorough planning, and his meticulous attention to detail. Many of these traits can be recognized in his scientific writings. In 1882 he was appointed curator of zoology at the Bergen museum. He wrote papers on zoological and histological subjects, illustrated by excellent drawings. For one of his papers, "The Structure and Combination of Histological Elements of the Central Nervous System" (1887), the university in Kristiania conferred upon him the degree of doctor of philosophy. Though the paper contained so many novel interpretations that the committee that had to examine it accepted it with doubt, it is now considered a classic.

On his return from the *Fram* expedition in 1896, a professorship in zoology was established for Nansen at the university in Kristiania, but his interests shifted from zoology to physical oceanography, and in 1908 his status was changed to professor of oceanography. During 1896–1917 he devoted most of his time and energy to scientific work. He edited the report of the scientific results of his expedition and himself wrote some of the most important parts. He participated in the establishment of the International Council for the Exploration of the Sea and for some time directed the council's central laboratory in Kristiania. In 1900 he joined the *Michael Sars* on a cruise in the Norwegian Sea. In 1910 he made a cruise in the *Fridtjof* through the northeastern North Atlantic; in 1912 he visited the Spitsbergen waters on board his own yacht *Veslemoy;* and in 1914 he joined B. Helland-Hansen on an oceanographic cruise to the Azores in the *Armauer Hansen.* In 1913 Nansen traveled through the Barents Sea and the Kara Sea to the mouth of the Yenisey River and back through Siberia. He published the results of his cruises in numerous papers, partly in cooperation with Helland-Hansen. His lasting contributions to oceanography comprise improvement and design of instruments, explanation of the wind-driven currents of the seas, discussions of the waters of the Arctic, and explanation of the manner in which deep- and bottom-water is formed.

Nansen also dealt with other subjects: for instance, his *Nord i tåkeheimen,* 2 vol. (1911; *In Northern Mists*) gave a critical review of the exploration of the northern regions from early times up to the beginning of the 16th century.

Statesman and humanitarian. As Nansen grew older he became more interested in the relations between individuals and nations. In 1905 he took a lively part in the discussion about the dissolution of the union between Norway and Sweden. His attitude may be summarized by his words: "Any union in which the one people is restrained in exercising its freedom is and will remain a danger." On the establishment of the Norwegian monarchy, Nansen was appointed its first minister in London (1906–08). In 1917, during World War I, he was appointed head of a Norwegian commission to the United States and negotiated a satisfactory agreement with the U.S. government about the import of essential supplies to Norway.

At the first assembly of the League of Nations in 1920, the Norwegian delegation was headed by Nansen, who was to remain one of the outstanding members of the assembly until his death. In April 1920 the council of the League of Nations gave Nansen his first great task, appointing him high commissioner responsible for the repatriation from Russia of about 500,000 prisoners of war from the former German and Austro-Hungarian armies. The Soviet government would not recognize the League of Nations but negotiated with Nansen personally, and in September 1922 he reported to the third assembly of the League that his task was completed and that 427,886 prisoners of war had been repatriated.

In August 1921 Nansen was asked by the International Committee of the Red Cross to direct an effort to bring relief to famine-stricken Russia. He accepted, and on August 15 a conference in Geneva, at which 13 governments and 48 Red Cross organizations were represented, appointed him high commissioner of this new venture. On August 27 he concluded an agreement with the Soviet government authorizing him to open in Moscow an office of the "International Russian Relief Executive." Nansen's request to the League for financial assistance was turned down, but by appealing to private organizations and by addressing large public meetings he succeeded in raising the necessary funds.

On July 5, 1922, on Nansen's initiative, an international agreement was signed in Geneva introducing the identification card for displaced persons known as the "Nansen passport." In 1931 the Nansen International Office for Refugees was created in Geneva (after Nansen's death); it cared mainly for anti-Communist ("White") Russians, for Armenians from Turkey, and, later, for Jews from Nazi Germany.

In 1922 Nansen was awarded the Nobel Prize for Peace; he used the prize money for the furtherance of international relief work. The Nansen International Office for Refugees won the Nobel Prize for Peace in 1938.

(H.U.S./Ed.)

BIBLIOGRAPHY. Jon Sörensen, *The Saga of Fridtjof Nansen* (1932), is a good, relatively brief biography. Liv Nansen Høyer, *Nansen: A Family Portrait* (1957), was written by his daughter.

Nansen bottle, ocean-water sampler devised late in the 19th century by the Norwegian oceanographer Fridtjof Nansen and subsequently modified by various workers. The standard Nansen bottle has a capacity of 1.25 litres and is equipped with plug valves at either end. The bottle is affixed to a winch wire with its valves open, and the winch wire is paid out until the bottle is approximately at its desired sampling depth. A weight, or "messenger," is then allowed to slide down the cable. The upper attachment of the Nansen bottle is disengaged from the cable by the impact of the messenger; and the bottle is reversed end over end, its valves closing in the process to trap the water sample. Thermometers usually are attached to the Nansen bottle to record the temperature and pressure of the sample site. Several Nansen bottles are employed during a single hydrographic cast, each bottle releasing another messenger when tripped, in order to trigger the deeper bottles in turn.

Nanshe, also spelled NANŠE, or NAZI, in Mesopotamian religion, Sumerian city goddess of Nina (modern Surghul, Iraq) in the southeastern part of the Lagash region of Mesopotamia. According to tradition, Nanshe's father Enki (Akkadian: Ea) organized the universe and placed her in charge of fish and fishing. Nanshe was also described as a divine soothsayer and dream interpreter. Although at times overshadowed by her sister Inanna (Akkadian: Ishtar), Nanshe was, nevertheless, important in her own geographic area, and many rulers of Lagash record that they were chosen by her.

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Nantahala River, river rising in the Nantahala Mountains southwest of Asheville, N.C., U.S., near the Georgia–North Carolina line. It flows 40 miles (64 km) north through the Nantahala National Forest. Nantahala Dam (1942) impounds Nantahala Lake, sometimes called Aquone Lake. Farther north, the river cuts an 8-mile- (13-kilometre-) long scenic gorge with sides up to 2,000 feet (610 m) high. Nantahala Gorge is the subject of many Cherokee Indian legends and gave the river its name, which means "the place where only the noonday sun can shine." The river empties into Fontana Lake on the Little Tennessee River.

Nanterre, ancient NEMETODOR, or (Latin) NEMETODORUM, city, capital of the Hauts-de-Seine *département,* Île-de-France *région.* Located on the east bank of a loop of the meandering Seine River, and separated from Paris by the suburbs of Puteaux and Neuilly-sur-Seine, Nanterre is a centre for precision foundries and automobile construction and also produces electrical equipment, perfumes, hosiery, paints, and toys. The suburb, less than 3 miles (5 km) west of the city limits of Paris, has grown into an administrative and educational centre. It is the seat of a branch (opened 1971) of the University of Paris and is an episcopal see. It is the traditional birthplace of St. Geneviève (*c.* AD 422–500), patron saint of Paris. Pop. (1990) 86,627.

Nantes, city, capital of Loire-Atlantique *département,* Pays de la Loire *région,* western France. Nantes is situated at the head of the estuary of the Loire River, where it is joined by the Erdre and the Sèvre rivers, 35 miles (56 km) from the sea and southwest of Paris. It is one of the French towns most changed in the 20th century.

Nantes derives its name from the Namnètes,

Exterior of the château at Nantes, Fr.

Art Resource

a Gallic tribe who made the town their capital. It became a commercial centre under the Romans. The Normans, after pillaging the town, occupied it from 834 to 936. After a long struggle in the Middle Ages between the counts of Nantes and Rennes for the sovereignty of Brittany, in 1560, Francis II, king of France (1559–60), granted Nantes a communal constitution. During the Wars of Religion (1562–98), Nantes joined the Catholic League and only opened its gates to Henry IV, king of France (1589–1610), in 1598, the same year he signed the Edict of Nantes, a charter assuring religious and civil liberties to the Protestants. During the French Revolution, Nantes suffered the ruthless repression of an envoy of the revolutionary Committee of Public Safety named Jean-Baptiste Carrier. In 1793 Carrier replaced executions by the guillotine, which he considered too slow, by mass drownings. The city was occupied by the Germans during World War II.

Greatly modified by an urban renewal plan that was adopted in 1920, Nantes was further altered and extended after having been partly destroyed in World War II. Arms of the river have been filled up and made into roads; the railway, which used to cut across the town, now runs largely underground; and the port has been extensively rebuilt. Under a national planning scheme, Nantes has been made a major economic development centre. In the late 20th century, road, air, and rail communications were being extended, and vast industrial zones were being built. The well-equipped port has more than 2 mi of quays, and the river has been dredged to allow access to larger vessels; it functions in close association with Saint-Nazaire, its outport (seaward terminal for deep-draft vessels).

The shipbuilding yards are important. The chemical (fertilizers, paint) and mechanical (rail and aircraft equipment) industries expanded during the 1970s. The traditional food industries (fruit preserves and baked goods) continue. The original university (founded 1460) was abolished during the French Revolution, but a new one was established in 1961.

Although the cathedral of Saint-Pierre was built over a period between the 15th and 20th centuries, it retains a Gothic unity. The imposing facade (1434–1508) has three finely sculptured doorways and two high towers. The cathedral, bombed during World War II, had been nearly completely restored in 1972 when a fire largely destroyed the roof. The magnificent Renaissance tomb of Francis II, duke of Brittany (ruled 1458–88), was luckily unharmed. The medieval castle had been rebuilt in 1466 by this same Francis II. Viewed from without, it looks like a fort with crenellated towers, but the inner courtyard is a typical Renaissance palace. The Musée des Beaux-Arts has one of the most important and varied collections of paintings in France. Pop. (1982) 237,789.

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Nantes, Edict of, French ÉDIT DE NANTES, law promulgated at Nantes in Brittany on April 13, 1598, by Henry IV of France. It granted a large measure of religious liberty to his Protestant subjects, the Huguenots. The edict upheld Protestants in freedom of conscience and permitted them to hold public worship in many parts of the kingdom, though not in Paris. It granted them full civil rights and established a special court, the Chambre de l'Édit, composed of both Protestants and Catholics, to deal with disputes arising from the edict. Protestant pastors were to be paid by the state and released from certain obligations; finally, the Protestants could keep the places they were still holding in August 1597 as strongholds, or *places de sûreté*, for eight years, the expenses of garrisoning them being met by the king.

The edict also restored Catholicism in all areas where Catholic practice had been interrupted; and it made any extension of Protestant worship in France legally impossible. Nevertheless, it was much resented by Pope Clement VIII, by the Roman Catholic clergy in France, and by the *parlements.* Catholics tended to interpret the edict in its most restrictive sense. The Cardinal de Richelieu, who regarded its political clauses as a danger to the state, annulled them by the Peace of Alès (1629). On Oct. 18, 1685, Louis XIV revoked the Edict of Nantes and deprived the French Protestants of all religious and civil liberties. Within a few years, more than 400,000 Huguenots emigrated—to England, Prussia, Holland, and America—depriving France of its most industrious commercial class.

Nantes, University of, French UNIVERSITÉ DE NANTES, autonomous, state-financed coeducational institution of higher learning at Nantes, in western France. Founded in 1970 under the 1968 law reforming French higher education, the university replaced the former University of Nantes founded in 1962, which in turn had its origins in the University of Nantes established by papal bull in 1460, and the University of Angers authorized by Charles V in 1364.

The university is organized into a series of teaching and research units, each academically and administratively independent. It offers programs in law and economics, business administration, medicine, the sciences, pharmacy, and liberal arts, among other fields. An Institute of Technology offers two-year courses.

Nanteuil, Robert (b. 1623/30, Reims, Fr.—d. Dec. 9, 1678, Paris), the outstanding French portrait engraver of his age, whose achievement resulted in the elevation of engraving from a humble craft to a fine art. He became known by his crayon portraits and was pensioned by Louis XIV and appointed designer and engraver of the cabinet to that monarch. It was mainly because of his influence that the king granted the edict of 1660, which pronounced engraving distinct from the mechanical arts and gave its practitioners the privileges of other artists.

The plates of Nanteuil, several of them almost life-size, number about 300. In his early practice he imitated the technique of his predecessors, working with straight lines, strengthened but not crossed in the shadows, in the style of Claude Mellan, and in other prints crosshatching like Nicolas Regnesson, his teacher and brother-in-law, or stippling in the manner of Jean Boulanger. He then gradually acquired an individual style, modelling the faces of his portraits with the utmost precision and completeness and employing various methods of touch for the draperies and other parts of his plates. Among the finest of his mature works are portraits of Pomponne de Bellièvre, Gilles Ménage, Jean Loret, the duc de la Meilleraye, and the duchesse de Nemours.

Nantgarw porcelain, an English granular, soft-paste porcelain, pure white in colour, containing bone ash. It was made at a factory founded in 1813 by William Billingsley at Nantgarw, Glamorgan, Wales. Translucent and restrained in shape, it attracted the London trade, and much of Nantgarw porcelain was delivered to London in white and decorated there. An iridescent halo surrounds the enamel colours of London-decorated ware. The ware usually is impressed with "Nantgarw" in full. The factory closed in 1822.

Nantgarw porcelain plate painted in London, *c.* 1815; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

Nanthasen, Chao, also called CHAO NAN (d. 1795?, Bangkok), ruler (1781–95?) of the Lao principality of Vientiane who conquered the rival Lao state of Luang Prabang in 1791.

In 1781 the Siamese, who had captured Vientiane in 1778, chose Nanthasen to succeed his father, King Siribunyasan. Like the rulers of Luang Prabang and Champassak, he then reigned as a vassal of the kings of Siam.

In 1791 Nanthasen accused Luang Prabang of conspiring with the Burmese against Vientiane and gained Siamese permission to attack the city. The Siamese did not allow the reunification of Vientiane and Luang Prabang, which had been separated for a century, but Nanthasen was able to annex territory in northern Laos. Several years later, Nanthasen was accused of conspiring with the ruler of Nakhon Phanom against Siam and was recalled to Bangkok where he died while awaiting trial.

Nanticoke, a confederacy of Algonkian-speaking Indians who lived along the eastern shore of what are now Maryland and southern Delaware; their name means Tidewater People. They were related to the Delaware and the Conoy (*qq.v.*). Nanticoke subsistence depended largely on fishing and trapping, and their social organization probably included a head chief, as well as subordinate chiefs of the various tribes. They were at war with the Maryland colonists from 1642 to 1678; in 1698 reservations were set aside for them. Some time after 1722 most of the Nanticoke began moving northward, some settling with the Iroquois in western New York; many emigrated westward about 1784 and were incorporated into the Delaware in Ohio and Indiana.

Nantong (China): *see* Nan-t'ung.

Nantucket, island in the Atlantic Ocean, 30 mi (48 km) south of Cape Cod, Massachusetts, U.S., across Nantucket Sound and separated

Upper Main Street, Nantucket, Mass.

Arthur Griffin—EB Inc.

from Martha's Vineyard (15 miles [24 km] west) by the Muskeget Channel. The island is coextensive with Nantucket town (township) and forms (with nearby Tuckernuck and Muskeget islands) Nantucket county. Nantucket is nearly 15 miles long and 3–6 miles (5–10 km) wide. It is of glacial origin and has wide, sandy beaches, a commodious harbour, and a moderate climate. Visited in 1602 by the English navigator Bartholomew Gosnold, the island was purchased from the Plymouth Colony by Thomas Mayhew in 1641 and administered as part of New York. It was settled in 1659 by Quakers, and fishing, boatbuilding, and trading were early activities. It was ceded to Massachusetts in 1692 and given its Indian name, probably meaning either "far away land" or "sandy, sterile soil tempting no one." The town of Nantucket was incorporated in 1687 and the county formed in 1695. Whaling, begun in the early 18th century, reached its peak just before the American Revolutionary War, when the island was home port to more than 125 whaling ships. Nantucket's commercial activity declined after the War of 1812, and it was soon bypassed by other ports; it never regained its early maritime prominence. Later, with improved transportation, the island developed a lively summer tourist trade that is now the economic mainstay. Tourists are attracted by Nantucket's sea captains' houses and other colonial buildings, cobblestone roads, museums, art galleries, and yachting facilities. Resort villages include Nantucket (county seat), Siasconset, Wauwinet, and Polpis. Nantucket is connected to Cape Cod and Martha's Vineyard by ferry steamers and by summer air services from Boston and New York City. Sankaty Head Lighthouse (1850) is on an East Coast bluff. Inc. town, 1687. Pop. (1990) 6,012.

Nantwich, town ("parish"), Crewe and Nantwich district, county of Cheshire, England, in the Weaver Valley. The town dates from Roman times, when it achieved importance because of its salt deposits. Today it contains more than 100 buildings listed by the government as being of special architectural or historical interest. They date from the 16th to the 19th century and include some fine examples of half-timbered buildings, the most notable being Churche's Mansion. The large 14th-century church suggests the town's early prosperity. Pop. (1981) 12,023.

Naogaon (town, India): *see* Nowgong.

Naoroji, Dadabhai (b. Sept. 4, 1825, Bombay, India—d. June 30, 1917, Bombay), Indian nationalist and critic of British economic policy in India.

Educated at Elphinstone College, Bombay, he was professor of mathematics and natural philosophy there before turning to politics and a career in commerce that took him to England, where he spent much of his life.

He stood unsuccessfully for election to Parliament in 1886. In 1892, however, he was elected Liberal member of Parliament for Central Finsbury, London. He became widely known for his unfavourable opinion of the economic consequences of British rule in India and was appointed a member of the royal commission on Indian expenditure in 1895. In 1886, 1893, and 1906 he also presided over the annual sessions of the Indian National Congress, which led the nationalist movement in India. In the session of 1906 his conciliatory tactics helped to postpone the impending split between moderates and extremists in the Congress Party. In his many writings and speeches and especially in *Poverty and Un-British Rule in India* (1901), Naoroji argued that India was too highly taxed and that its wealth was being drained away to England.

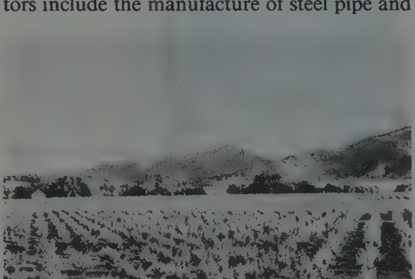
naos (architecture): *see* cella.

Naosari (India): *see* Navsāri.

Nap, formally NAPOLEON, card game introduced in England in the 1880s. Using a 52-card deck, two to seven may play (five is best), with each player being dealt five cards. The player to the dealer's left declares, or bids, the number of tricks he can win against the rest (usually more than one trick must be declared), or else he passes. The next player has the option of declaring to make more tricks than the previous bid or passing, and so on, all round. There is only one round of bidding. If all hands pass, the dealer bids 1. The player who bids highest tries to make his bid, and the others try to prevent him. The highest bidder leads, his first card led determining the trump.

A bid of 5 is known as Nap. If the bidder fulfills the contract, he collects chips equal to the number bid from each player. If he loses, he pays that many. A nap bid, however, is worth 10 if accomplished but costs only 5 if it fails. Variations include Wellington (bidder doubles the stakes) and Blücher (triple the stakes), which are both bids of 5. Sometimes a player declares misère; that is, he proposes to take no tricks. This ranks as a declaration between bids of three and four. The player declaring misère pays a double stake if he takes a trick and receives a single stake if he takes none.

Napa, city, seat of Napa county, west-central California, U.S., on the Napa River. It was founded as the county seat in 1848 by Nathan Coombs partly on the Rancho Napa, an 1838 Spanish grant. As the head of river navigation, it became a port for the shipment of cattle, lumber, and quicksilver to San Francisco (50 miles [80 km] south). It developed as an outlet for farm produce and is best known for table wines produced in the Napa valley's many vineyards. Later economic factors include the manufacture of steel pipe and leather goods, Napa State Hospital, Napa (junior) College (1942), and Mare Island Naval Shipyard at Vallejo, 20 miles (32 km) south. Inc. 1872. Pop. (1990) city, 61,842; Vallejo-Fairfield-Napa PMSA, 451,186.



Napa valley orchards, California

Fred Lyon from Rapho/Photo Researchers—EB Inc.

napalm, the aluminum salt or soap of a mixture of naphthenic and aliphatic carboxylic acids (organic acids of which the molecular structures contain rings and chains, respectively, of carbon atoms), used to thicken gasoline for use as an incendiary in flamethrowers and fire bombs. The thickened mixture, now also called napalm, burns more slowly and can be propelled more accurately and to greater distances than gasoline. It was developed by U.S. scientists during World War II.

Napalm is also employed in a pyrotechnic gel containing gasoline and less-volatile petroleum oil, powdered magnesium, and sodium nitrate; this composition burns at a temperature of about 1,000° C (1,800° F), compared to 675° C (1,250° F) for thickened gasoline.

Napata, the capital in about 750–590 BC of the ancient kingdom of Cush (Kush), situated downstream from the Fourth Cataract of the Nile, near Kuraymah in the northern part of what is now The Sudan.

An area rather than a single town, Napata extended to the east and south of Kuraymah, from Nuri to Kurru. It was part of the homeland of the Karmah culture, and from the early 18th dynasty it came under Egyptian influence. Napata's main feature, the hill of Barkol, was regarded from the Egyptian New Kingdom (1521–1075 BC) as a holy mountain, the seat of the god Amon; under it lie the ruins of several temples. A stela of Thutmose III (reigned 1479–1425), on which a fort is mentioned, has been found there, and Amenhotep II (reigned *c.* 1426–1400) sent an Asian prisoner to be hanged on its walls.

By the beginning of the 1st millennium, Egypt was in decline, with Lower Egypt increasingly prey to Libyan immigrants. It has been speculated that a body of the priests of Amon at Thebes voluntarily exiled themselves to Napata, where they may have Egyptianized the native princes of Cush, inspiring them—from about 750—to conquer a degenerate Egypt. The descendants of the first known Cushite prince, Alara (*c.* 790 BC), established themselves as the 25th dynasty of Egypt; they are remembered for being largely responsible for restoring to Egypt its ancient customs and beliefs. During this period Napata became a capital of a significant part of the ancient world, and Cushite kings intrigued with Tyre, Sidon, Israel, and Judah in a vain attempt to repel the Assyrians.

The Egyptian custom of royal burial under pyramids was introduced into Cush, as may be seen at Kurru and at Nuri, where the largest pyramid, that of the king Taharqa (reigned 690–664 BC), is situated. Taharqa, who also built several Egyptian-style temples at Napata and elsewhere, was defeated by the Assyrians and expelled from Egypt in 671 BC.

Though Taharqa's successor Tanutamon (reigned 664–656 BC) briefly reconquered Memphis (*c.* 664 BC), his plans were thwarted by the 26th (Saite) dynasty of Egypt, which sent an expedition of Greek and Carian mercenaries to sack Napata in 592 BC. The capital of Cush was thereafter transferred to Meroe, some 150 miles (240 km) southeast on the opposite bank of the Nile. Napata remained the religious capital of Cush, however, and royal burials continued to take place at Nuri until 315 BC. Two subsequent and separate groups of royal burials at Barkol have given rise to the hypothesis that Napata may twice have made itself independent of Meroe.

Naperville, city, Du Page county, northeastern Illinois, U.S., on the west branch of the Du Page River. The oldest town in the county, it was laid out in 1832 by Captain Joseph Naper, who built a sawmill on the river. The coming of the Chicago, Burlington and Quincy Railroad (1864) stimulated its growth. Primarily residential, Naperville has some manufacturing (furniture and electronic-switching equipment). North Central College, founded in Plainfield in 1861, was moved to Naperville in 1870. The Evangelical Theological Seminary was established there in 1873. Inc. village, 1851; city, 1890. Pop. (1990) 85,351.

Naphtali, one of the 12 tribes that in biblical times constituted the people of Israel who later became the Jewish people. The tribe was named after the younger of two sons born to Jacob and Bilhah, a maidservant of Jacob's second wife, Rachel. After Joshua led the people of Israel into the Promised Land, he divided the new territory among the 12 tribes, assigning a region northwest of the Sea of Galilee to the tribe of Naphtali.

After the death of King Solomon (922 BC), the 10 northern tribes established an independent Kingdom of Israel. In 734 BC the Naphtalites were conquered by the Assyrian king Tiglath-pileser III, whose armies in 721 BC gained control over the entire northern kingdom. Israelites who were deported into slavery and those who remained behind were gradually assimilated by other peoples. The tribe of Naphtali thus lost its identity and became known in Jewish legend as one of the Ten Lost Tribes of Israel.

naphtha, any of various volatile, highly flammable liquid hydrocarbon mixtures used chiefly as solvents and diluents and as raw materials for conversion to gasoline. Naphtha was the name originally applied to the more volatile kinds of petroleum issuing from the ground in the Baku district of Azerbaijan and Iran. As early as the 1st century AD, naphtha was mentioned by the Greek writer Dioscorides and the Roman writer Pliny the Elder. Alchemists used the word principally to distinguish various mobile liquids of low boiling point, including certain ethers and esters.

In modern usage the word naphtha is usually accompanied by a distinctive prefix. Coal-tar naphtha is a volatile commercial product obtained by the distillation of coal tar. Shale naphtha is obtained by the distillation of oil produced from bituminous shale by destructive distillation. Petroleum naphtha is a name used primarily in the United States for petroleum distillate containing principally aliphatic hydrocarbons and boiling higher than gasoline and lower than kerosene.

naphthalene, the simplest of the fused or condensed ring hydrocarbon compounds composed of two benzene rings sharing two adjacent carbon atoms; chemical formula, $C_{10}H_8$. It is an important hydrocarbon raw material that gives rise to a host of substitution products used in the manufacture of dyestuffs and synthetic resins. Naphthalene is the most abundant single constituent of coal tar, a volatile product from the destructive distillation of coal, and is also formed in modern processes for the high-temperature cracking (breaking up of large molecules) of petroleum. It is commercially produced by crystallization from the intermediate fraction of condensed coal tar and from the heavier fraction of cracked petroleum. The substance crystallizes in lustrous white plates, melting at 80.1° C (176.2° F) and boiling at 218° C (424° F). It is almost insoluble in water. Naphthalene is highly volatile and has a characteristic odour; it has been used as moth repellent.

In its chemical behaviour, naphthalene shows the aromatic character associated with benzene and its simple derivatives. Its reactions are mainly reactions of substitution of hydrogen atoms by halogen atoms, nitro groups, sulfonic acid groups, and alkyl groups. Large quantities of naphthalene are converted to naphthylamines and naphthols for use as dyestuff intermediates. For many years napthalene was the principal raw material for making phthalic anhydride.

naphthol, either of two colourless, crystalline organic compounds derived from naphthalene and belonging to the phenol family; each has the molecular formula $C_{10}H_7OH$. Both compounds have long been identified with the manufacture of dyes and dye intermediates; they also have important uses in other areas of the chemical industry.

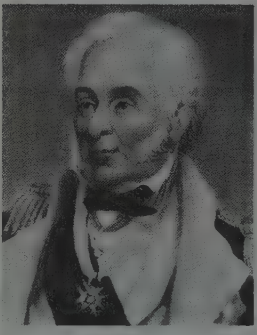
The compound 1-naphthol, or α-naphthol, made by heating 1-naphthalenesulfonic acid with caustic alkali or by heating 1-naphthylamine with water under pressure, is used directly in making several dyes, and large amounts of it are converted to compounds ultimately incorporated into other dyes.

The compound 2-naphthol, or β-naphthol, is regarded as the most important chemical intermediate based on naphthalene. It is manufactured by fusing 2-naphthalenesulfonic acid with caustic soda and is converted into numerous dyes and dye intermediates, as well as into tanning agents, antioxidants, and antiseptics. It has been shown to be carcinogenic.

Napier, city and port, Hawke's Bay local government region, eastern North Island, New Zealand, on the southwestern shore of Hawke Bay. Laid out in 1856, the town was named for Sir Charles Napier, a 19th-century British military commander in India. It was made a borough in 1874 and a city in 1950.

Napier, on a small headland known as Napier Hill, is linked to Wellington (about 200 miles [320 km] southwest) by rail and road. It serves an agricultural and livestock district and is the nation's leading wool trade centre. Industries are woolen mills, tobacco and fertilizer works, wineries, and commercial fishing. The harbour (Port Ahuriri), once a natural bay, was destroyed by an earthquake in 1931 and is now artificial; it ships wool, frozen meat, dairy products, hides, and tallow. The city, a winter resort, has an Anglican cathedral; the Hawke's Bay Art Gallery and Museum, featuring Maori and Polynesian arts; and the Hawke's Bay Medical Research Foundation. Pop. (1991) 51,645.

Napier, Sir Charles, COUNT (Conde) NAPIER DE SÃO VICENTE (b. March 6, 1786, near Falkirk, Stirling, Scot.—d. Nov. 6, 1860, near Catherington, Hampshire, Eng.), admiral in the Portuguese and British navies, controversial commander of the British Baltic Fleet during the Crimean War of 1853–56. Created Conde Napier de São Vicente in the Portuguese peerage, he was less elegantly known in Great Britain as "Black Charley" and "Mad Charley."



Charles Napier, detail of an oil painting by E.W. Gill, 1854; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Becoming a midshipman in 1800, Napier served in the Napoleonic Wars and in the War of 1812 against the United States. In 1831 he was in the Azores to assist supporters of the Portuguese princess Maria da Glória (afterward Queen Maria II). Subsequently, as commander of the Portuguese loyalist navy, he destroyed the fleet of Dom Miguel, pretender to the Portuguese throne, off Cape St. Vincent on July 5, 1833. The next year he directed the loyalist forces in the defense of Lisbon against the Miguelites.

Rejoining the British Navy in 1836, Napier for a time was second in command in the Syrian expedition of 1840–44, taking part in the capture of Beirut and Acre (October–November 1840). From 1847 to 1849 he commanded the Channel Fleet.

In February 1854, at the beginning of the Crimean War, Napier was appointed commander of the Baltic Fleet. The British public's extravagant confidence in him turned to odium when, alleging insufficient firepower, he refused to attack the great Russian naval base of Kronshtadt. After his recall he was never again offered a command.

Napier, Sir Charles James (b. Aug. 10, 1782, London—d. Aug. 29, 1853, Portsmouth, Hampshire, Eng.), British general, conqueror (1843) and governor (1843–47) of Sindh, now in Pakistan.

Napier was a veteran of the (Iberian) Peninsular War against Napoleonic France and of the War of 1812 against the United States. From 1822 to 1830 he was military resident of Cephalonia, in the Ionian Islands. In 1839, when the Chartist agitation for political and social reform threatened to lead to violence, Napier was given command in northern England, where, by tempering his sympathy for the industrial workers with insistence on law and order, he kept a dangerous situation under control for two years.

In 1841 Napier went to India, and in August 1842 he was assigned to the Sindh command, subordinate to Edward Law, Earl of Ellenborough, governor-general of India (1841–44). In February 1843 Ellenborough forced the armies of Sindh to sign a treaty providing for the permanent annexation of British-occupied bases in Sindh and for the transfer of large northern areas to Bahāwalpur in the event that Napier found the Sindhi *amīrs* (rulers) disloyal. Soon convincing himself that some of them were untrustworthy, Napier provoked a war, and, after winning major battles at Miāni (February 17) and Dabo (Dubba), near Hyderābād (March 24), he was knighted and made governor of Sindh. As governor Napier established a model police force, encouraged trade, and began work on a breakwater and water-supply facilities for Karāchi. He also repulsed marauding hill tribes on the northern Sindhi border.

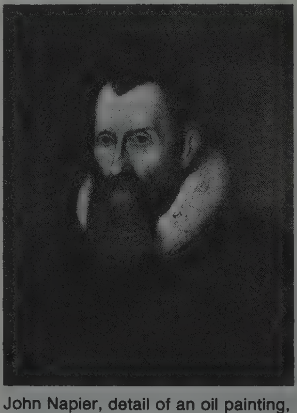
Having left for England in 1847, Napier returned to India in 1849 as commander in chief in the Second Sikh War (1848–49), but the conflict had ended by the time he arrived. A quarrel with the governor-general, James Ramsay, 1st Marquess of Dalhousie, caused him to leave India finally in 1851.

A bronze statue of Napier, by the sculptor G.G. Adams, is in Trafalgar Square, London.

Napier, John, Napier also spelled NEPER (b. 1550, Merchiston Castle, near Edinburgh, Scot.—d. April 4, 1617, Merchiston Castle), Scottish mathematician and theological writer who originated the concept of logarithms as a mathematical device to aid in calculations.

Life. At the age of 13, Napier entered the University of St. Andrews, but his stay appears to have been short, and he left without taking a degree.

Little is known of Napier's early life, but it is thought that he traveled abroad, as was then the custom of the sons of the Scottish landed gentry. He was certainly back home in



John Napier, detail of an oil painting, 1616; in the collection of the University of Edinburgh

By courtesy of the University of Edinburgh; photograph, the Scottish National Portrait Gallery

1571, and he stayed either at Merchiston or at Gartness for the rest of his life. He married the following year. A few years after his wife's death in 1579, he married again.

Napier's life was spent amid bitter religious dissensions. A passionate and uncompromising Protestant, in his dealings with the Church of Rome he sought no quarter and gave none. It was well known that James VI of Scotland hoped to succeed Elizabeth I to the English throne, and it was suspected that he had sought the help of the Catholic Philip II of Spain to achieve this end. Panic stricken at the peril that seemed to be impending, the general assembly of the Scottish Church, a body with which Napier was closely associated, begged James to deal effectively with the Roman Catholics, and on three occasions Napier was a member of a committee appointed to make representations to the King concerning the welfare of the church and to urge him to see that "justice be done against the enemies of God's Church."

In January 1594, Napier addressed to the King a letter that forms the dedication of his *Plaine Discovery of the Whole Revelation of Saint John,* a work that, while it professed to be of a strictly scholarly character, was calculated to influence contemporary events. In it he declared:

> Let it be your Majesty's continuall study to reforme the universall enormities of your country, and first to begin at your Majesty's owne house, familie and court, and purge the same of all suspicion of Papists and Atheists and Newtrals, whereof this Revelation forthtelleth that the number shall greatly increase in these latter daies.

The work occupies a prominent place in Scottish ecclesiastical history.

Following the publication of this work, Napier seems to have occupied himself with the invention of secret instruments of war, for in a manuscript collection now at Lambeth Palace, London, there is a document bearing his signature, enumerating various inventions "designed by the Grace of God, and the worke of expert craftsmen" for the defense of his country. These inventions included two kinds of burning mirrors, a piece of artillery, and a metal chariot from which shot could be discharged through small holes.

Napier devoted most of his leisure to the study of mathematics, particularly to devising methods of facilitating computation, and it is with the greatest of these, logarithms, that his name is associated. He began working on logarithms probably as early as 1594, gradually elaborating his computational system whereby roots, products, and quotients could be quickly determined from tables showing powers of a fixed number used as a base.

His contributions to this powerful mathematical invention are contained in two treatises: *Mirifici Logarithmorum Canonis Descriptio* (*Description of the Marvelous Canon of Logarithms),* which was published in 1614, and *Mirifici Logarithmorum Canonis Constructio (Construction of the Marvelous Canon of Logarithms*), which was published two years after his death. In the former, he outlined the steps that had led to his invention.

Logarithms were meant to simplify calculations, especially multiplication, such as those needed in astronomy. Napier discovered that the basis for this computation was a relationship between an arithmetical progression—a sequence of numbers in which each number is obtained, following a geometric progression, from the one immediately preceding it by multiplying by a constant factor, which may be greater than unity (*e.g.,* the sequence 2, 4, 8, 16 . . .) or less than unity (*e.g.,* 8, 4, 2, 1, $\frac{1}{2}$ . . .).

In the *Descriptio,* besides giving an account of the nature of logarithms, Napier confined himself to an account of the use to which they might be put. He promised to explain the method of their construction in a later work. This was the *Constructio,* which claims attention because of the systematic use in its pages of the decimal point to separate the fractional from the integral part of a number. Decimal fractions had already been introduced by the Flemish mathematician Simon Stevin in 1586, but his notation was unwieldy. The use of a point as the separator occurs frequently in the *Constructio.* Joost Bürgi, the Swiss mathematician, between 1603 and 1611 independently invented a system of logarithms, which he published in 1620. But Napier worked on logarithms earlier than Bürgi and has the priority due to his prior date of publication in 1614.

Although Napier's invention of logarithms overshadows all his other mathematical work, he made other mathematical contributions. In 1617 he published his *Rabdologiae, seu Numerationis per Virgulas Libri Duo* (*Study of Divining Rods, or Two Books of Numbering by Means of Rods,* 1667); in this he described ingenious methods of multiplying and dividing of small rods known as Napier's bones, a device that was the forerunner of the slide rule. He also made important contributions to spherical trigonometry, particularly by reducing the number of equations used to express trigonometrical relationships from 10 to 2 general statements. He is also credited with certain trigonometrical relations—Napier's analogies—but it seems likely that the English mathematician Henry Briggs had a share in these. (J.F.S.)

BIBLIOGRAPHY. The most exhaustive account of the life and work of John Napier is the *Napier Tercentenary Memorial Volume* (1915), ed. by C.G. Knott, which consists of articles on different aspects of Napier's work by a number of writers, each expert in his particular field. There is an English translation of the *Mirifici Logarithmorum Canonis Constructio* by William Rae Macdonald (1889). It contains a catalog of all Napier's works and is compiled with great care and thoroughness. See also the article "Logarithms," by J.W.L. Glaisher, in *Encyclopædia Britannica,* 11th ed., vol. 16.

Napier, MacVey (b. April 11, 1776, Kirkintilloch, Dunbartonshire, Scot.—d. Feb. 11, 1847, Edinburgh), Scottish lawyer, first professor of conveyancing at the University of Edinburgh, who was an innovative editor of the Supplement to the 4th, 5th, and 6th editions of *Encyclopædia Britannica* and editor of the 7th edition.

Napier studied at Glasgow and Edinburgh universities. Apprenticed to a member of the Society of Writers to the Signet (lawyers), he became the society's librarian (1805) and in 1816 was chosen by it for the first lectureship (later professorship) in conveyancing founded by the society at Edinburgh University. Although not so distinguished a scholar as some editors of the *Britannica,* Napier influenced the encyclopaedia's development by acquiring as contributors a host of knowledgeable, independent-minded specialists.

Napier (of Magdala), Robert (Cornelis) Napier, 1st Baron (b. Dec. 6, 1810, Colombo, Ceylon—d. Jan. 14, 1890, London), British field marshal who had a distinguished military and civil engineering career in India and commanded military expeditions to Ethiopia and China.

The son of Major Charles Frederick Napier, a British artillery officer stationed in Ceylon, he attended the military college of the East India Company at Addiscombe, joined the Bengal Engineers in 1826, was stationed at Calcutta in 1828, and began employment on the East Jumna Canal irrigation works in 1831. In Europe he studied engineering and railway works (1836–39). He laid out the settlement of Darjeeling (1839–42) and the cantonment at Ambāla (1842). At the outbreak of the First Sikh War (1845) he joined the army of the Sutlej as commanding officer of engineers and was at the battles of Mudki, Sobrāon, and Fīroz Shāh, where he was wounded. In 1846 he took the hill fort of Kāngra. After the Sikh government surrender he became consulting engineer to the resident at Lahore. In the Second Sikh War (1848–49) he directed the siege of Multān and then commanded the engineers of the right wing of the army of the Punjab at the battle of Gujarāt and in the pursuit to Attock, ending the campaign. As civil engineer to the Punjab Board of Administration (1849–51), he executed public works of roads, canals, bridges, buildings, and frontier defenses. He was recalled to military service for the Hazāra expedition (1852) and for the campaign against the Bori clan in Peshāwar (1853).

Baron Napier, detail of an oil painting by T. Jensen, 1867; in the Prince of Wales Museum of Western India, Bombay

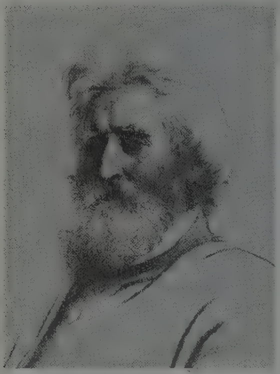
By courtesy of the trustees of the Prince of Wales Museum of Western India, Bombay

Napier went on leave to England in 1856, returned to India as a lieutenant colonel, and in the Indian Mutiny of 1857 was chief engineer to the Lucknow relief force under Sir James Outram. He directed an active defense against the sepoys and was wounded during the second relief, led by Sir Colin Campbell, but participated in the final attack on the city. A brigadier general under Sir Hugh Rose at the capture of Lucknow in March 1858, he defeated Tantia Topi at Jaora Alipur and routed Fīroz Shāh in December 1858. He was afterward placed in command of the final operations in the area and made a Knight Commander of the Bath.

Napier's troop division in the 1860 expedition to China under Sir Hope Grant crippled forts north of the Pei Ho (river) and advanced to Peking, leading to the Chinese surrender. In 1861 he returned to India, was promoted to major general, and served as military member of the governor general's council (February 1861–March 1865). He acted as viceroy and governor general from Nov. 21 to Dec. 2, 1863. In 1865 he was given command of the Bombay army and in 1867 was promoted to lieutenant general and given command of the expedition to Ethiopia, defeating Emperor Tewodros II at Magdela (Magdala) in April 1868. He was rewarded with titles, the thanks of Parliament, and an annual pension of £2,000. He was created Baron Napier of Magdala (1868) and in 1870–76 was commander in chief in India. After service as governor of Gibraltar (1876–82) he was appointed field marshal in 1883 and served as constable of the Tower of London from 1887 until his death.

Napier, Sir William Francis Patrick (b. Dec. 17, 1785, Celbridge, County Kildare, Ire.—d. Feb. 10, 1860, Clapham Park, Surrey, Eng.), British general and historian who fought in the Napoleonic Wars, particularly in the Peninsular War in Spain and Portugal; he wrote the popular *History of the War in the*

Peninsula . . . , 6 vol. (1828–40), based partly on his own combat experiences and partly on information supplied by two commanders in that conflict, the Duke of Wellington and the French marshal Nicolas-Jean, de Dieu Soult.



Sir William Napier, drawing by George Frederick Watts

By courtesy of the Courtauld Institute of Art, London

During the Peninsular War, Napier fought in the major battles of Fuentes de Oñoro, Salamanca, and the Nivelle River and was wounded several times. He retired in 1819.

Napier began his *History* in 1823. His account was widely acclaimed for its vigorous battle scenes and powerful style, but it was also attacked for its inaccuracy and bias. Nonetheless, it remained the standard work on the subject until the publication of Sir Charles Oman's *History of the Peninsular War* (1902–30). Napier was knighted in 1848. He later edited and wrote two books about his brother Sir Charles James Napier, conqueror of Sind.

Naples, Italian NAPOLI, ancient (Latin) NEAPOLIS ("New Town"), city, capital of Naples *provincia,* Campania *regione,* southern Italy. Naples is located on the western (Tyrrhenian Sea) shore of the Italian Peninsula 120 miles (190 km) southeast of Rome. It is the great port city, intellectual centre, and financial capital of the traditionally poor Mezzogiorno. It was once the capital of the kingdoms of Naples and of the Two Sicilies.

A brief treatment of Naples follows. For full treatment, *see* MACROPAEDIA: Naples.

Naples curves around one of the most beautiful (and celebrated) bays of the world, the entrance to which is flanked by the islands of Ischia on the north and Capri on the south. The city nestles on hills between Mount Vesuvius and the Campi Flegrei (Phlegraean Fields).

Naples' traditional industries include the manufacture of porcelain ware, textiles, and steel; among its newer industries are electronics, petroleum refining, and automobile assembly. Tourism also is important to the regional economy.

The central and most ancient part of Naples is built on flat ground beside the bay and east of the ridge that runs down from the heights of Vomero. On now-fashionable Vomero, the 14th-century Sant'Elmo Castle (rebuilt 1537–46) dominates both the old city to the east and the modern sections to the west. In the old town the narrow streets of the medieval city follow the pattern of ancient Neapolis, traversed by the three *decumani* ("streets of orientation"), running from east to west and now called Via San Biagio dei Librai, Via Tribunali, and Via Anticaglia; narrow streets descend at right angles toward the harbour. At the foot of Vomero is the neighbourhood known as the Chiaia, once a favourite residence of foreigners.

The site of Neapolis is dotted with palaces, castles, and churches, and man-made subterranean grottoes underlie many areas of the city. The Duomo (cathedral; 1294–1323), located on the street that bears its name, was extensively restored after earthquake damage. Other landmarks include the palace of Capodimonte; the Castel Nuovo ("New Castle"), also known as the Angevin Fortress, built in 1279–82 and located to the west of the Piazza del Municipio, where the municipal offices are housed; the cruciform Galleria Umberto II, housing shops and offices; and the Dominican monastery, where St. Thomas Aquinas studied and later taught.

The University of Naples (1224), the Italian Institute for Historical Studies, and the Music Conservatory (dating from 1537, the oldest conservatory in the West) are the principal centres of higher education in the city. The San Carlo Theatre (1737), the largest opera house in Italy, is world-renowned. The Renaissance Palazzo Cuomo now houses the Gaetano Filangieri Civic Museum; the National Archaeological Museum (1586) contains the Farnese collection of marbles, as well as murals, mosaics, and bronzes recovered from the ruins of Pompeii and Herculaneum. The National Library contains early papyri and manuscripts.

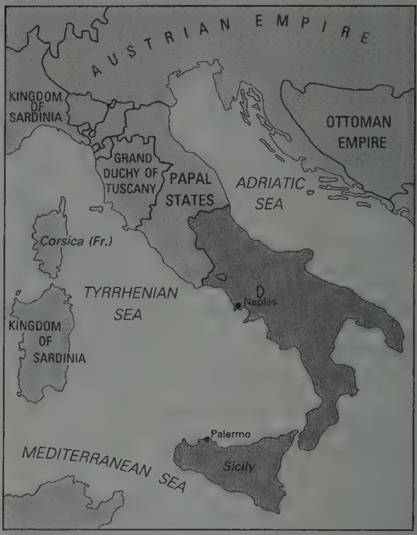
Naples is the main railway junction between Rome and areas to the south. The existing harbour works were reconstructed after World War II, but Naples' importance as a passenger port has been reduced. The international airport of Capodichino is located 5 miles (8 km) north of the city centre. Area city, 45 square miles (117 square km). Pop. (1998 est.) 1,035,835.

Naples, city, seat (1962) of Collier county, southern Florida, U.S. It lies at the edge of the Everglades, on the Gulf of Mexico. Named for the Italian city, it developed as a resort after attracting the attention of Henry Watterson, a Kentucky journalist, in the late 19th century. Tourism and truck gardening are the economic mainstays. Nearby are the Caribbean Gardens (an African safari exhibit) and Collier Seminole State Park. The city's recreation facilities are enhanced by a 7-mile (11-kilometre) mainland beach and the abundance of game fish in the Ten Thousand Islands, about 30 miles (48 km) southeast. Inc. town, 1923; city, 1949. Pop. (2000) city, 20,976; Naples MSA, 251,377.

Naples, Bay of, Italian GOLFO DI NAPOLI, Latin SINUS CUMANUS, semicircular inlet of the Tyrrhenian Sea (an arm of the Mediterranean Sea), southwest of the city of Naples, southern Italy. It is 10 miles (16 km) wide and extends southeastward for 20 miles (32 km) from Cape Miseno to Campanella Point. The bay is noted for its scenic beauty, which is enhanced by the steep, mainly volcanic hills surrounding it (including the still-active Mount Vesuvius). The major port is Naples; other coastal towns along the bay are Pozzuoli, Torre Annunziata, Castellammare di Stabia, and Sorrento. Along the bay shore are the extensive ruins of the ancient cities of Pompeii and Herculaneum. At the bay's entrance are the islands of Ischia, Procida, and Capri. The Gulf of Pozzuoli is a northwest inlet.

Naples, kingdom of, state covering the southern portion of the Italian peninsula from the Middle Ages to 1860. It was often united politically with Sicily.

By the early 12th century the Normans had carved out a state in southern Italy and Sicily in areas formerly held by the Byzantines, Lombards, and Muslims. In 1130 Roger II, on uniting all the Norman acquisitions, assumed the title of king of Sicily and Apulia. The existence of this Norman state was at first contested by the popes and Holy Roman emperors, who claimed sovereignty over the south. In the late 12th century the kingdom passed to the Hohenstaufen emperors (the most notable of whom was Emperor Frederick II, king of Sicily from 1198 to 1250). Under these early rulers the kingdom was at the height of its prosperity. Politically it was one of the most centralized states of Europe, economically it was a major commercial centre and grain producer, and culturally it was a point of diffusion of Greek and Arab learning into western Europe.



Kingdom of the Two Sicilies (or of Naples) after the Congress of Vienna (1815)

From W. Shepherd, *Historical Atlas,* Harper & Row, Publishers (Barnes & Noble Books), New York, revision Copyright © 1964 by Barnes & Noble, Inc.

After the extinction of the legitimate Hohenstaufen line, Charles of Anjou, brother of the French king Louis IX, gained control of the kingdom (1266), in response to an invitation from the pope, who feared the south would pass to a king hostile to him. Charles transferred the capital from Palermo, Sicily, to Naples, a shift that reflected the orientation of his policy toward northern Italy, where he was leader of the Guelf (pro-papal) party. But his harsh rule and heavy taxation provoked the revolt known as the Sicilian Vespers (*q.v.;* 1282), which resulted in the political separation of Sicily from the mainland and in the acquisition of the island's crown by the Spanish house of Aragon. The episode had important consequences for both Naples and Sicily. In the struggles between the Angevins and the Aragonese that lasted for more than a century, the real victors were the barons, whose powers were extended by grants from the kings. In the prevailing anarchy, feudalism gained a firm hold on both kingdoms.

Naples enjoyed a brief period of prosperity and importance in Italian affairs under Robert, king of Naples (1309–43), but from the mid-14th to the 15th century, the history of the kingdom was a story of dynastic disputes within the Angevin house. Finally, in 1442, Naples fell to the ruler of Sicily, Alfonso V of Aragon, who in 1443 assumed the title "king of the Two Sicilies," *i.e.,* of Sicily and Naples. The title was retained by his son and grandson, Ferdinand I and Ferdinand II.

At the end of the 15th century the kingdom of Naples continued to be involved in the struggles among the foreign powers for domination of Italy. It was claimed by the French king Charles VIII, who held it briefly (1495). Won by the Spanish in 1504, Naples and Sicily were ruled by viceroys for two centuries. Under Spain the country was regarded merely as a source of revenue and experienced a steady economic decline. Provoked by high taxes, the lower and middle classes rebelled in July 1647 (Revolt of Masaniello), but the Spanish and the barons combined to suppress the uprising in 1648.

As a result of the War of Spanish Succession (1701–14), the Kingdom of Naples came under the influence of the Austrian Habsburgs. (Sicily, for a brief period, was held by Piedmont.) In 1734 the Spanish prince Don Carlos de Borbón (later King Charles III) conquered Naples and Sicily, which were then governed by the Spanish Bourbons as a separate kingdom. During the 18th century the Bourbon kings, in the spirit of "enlightened despotism," sponsored reforms to rectify social and political injustices and to modernize the state.

The Bourbon king Ferdinand IV was halted in his course of reform by the example of the French Revolution, which released a flood of republican and democratic ideas. These ideas appealed strongly to those liberals—middle-class intellectuals, nobles, and churchmen alike—who had seen the Bourbon reforms as designed rather to increase the king's power than to benefit the nation. "Patriots" began to conspire and were countered by persecution. Ferdinand's army joined the allied forces against republican France in the War of the Second Coalition—with disastrous results. Naples was seized by the French, and Ferdinand fled to Sicily. On Jan. 24, 1799, the Parthenopean Republic was proclaimed but was left unprotected. The city of Naples, abandoned by the French, fell to Ferdinand's forces on June 13, 1799, after desperate resistance by the patriots. Before yielding, they had been promised freedom to remain or to go into exile, but, on June 24, Horatio Nelson's fleet arrived, and Nelson, in agreement with the powers in Sicily, repudiated the terms of the capitulation. Many captured republicans were put to death. Ferdinand returned to Naples, but his further machinations with the Austrians and British exasperated Napoleon. After defeating the Austrians at Austerlitz, he sent his brother Joseph to conquer Ferdinand's kingdom. Napoleon first annexed the kingdom to France, then declared it independent, with Joseph as king (March 30, 1806). When Joseph was transferred to Spain (1808), Napoleon gave Naples to his brother-in-law Joachim Murat. Under the French, Naples was modernized by the abolition of feudalism and the introduction of a uniform legal code, and Murat was deservedly popular as king. Ferdinand IV (later Ferdinand I of the Two Sicilies) was twice forced to flee to Sicily, which he held with the aid of the British.

With the Restoration of 1815, the kingdom, now officially called the Two Sicilies, eventually aligned with the conservative states of Europe. Because many in the kingdom adopted liberal ideas while the kings were more and more confirmed in their absolutism, political clashes were inevitable. Serious revolts broke out in 1820, when Ferdinand I was forced to grant a constitution, and again in 1848 under Ferdinand II, when Sicily tried to win its independence. The poor political and economic condition of the kingdom led to its easy collapse in the face of Giuseppe Garibaldi's invasion in 1860, and both Naples and Sicily voted overwhelmingly for unification with northern Italy in the plebiscite of October of the same year.

Naples, University of, Italian UNIVERSITÀ DEGLI STUDI DI NAPOLI, coeducational state university at Naples founded in 1224 as a *studium generale* by the Holy Roman emperor Frederick II to offset the dominant influence of the university at Bologna. Although universities were generally chartered after students had chosen to study in a particular place, Frederick decreed the existence of the university before any students or teachers had gathered there and then forbade his subjects to attend any other institution of higher learning. Thomas Aquinas lectured at Naples during the 13th century.

In spite of several attempts at reorganization, the university fell into decline and its existence was sporadic for two centuries, and itinerant until 1777, when it was reconstituted and moved to the Jesuits' convent, now a museum in the rear of the present building. The university was gradually brought under state control as a result of the Casati Act (1859), which formalized the state's responsibility for education, and the Gentile Reform of 1923, which centralized control of the universities under the Fascist government. The present university is state-controlled with administrative autonomy.

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Napo River, Spanish RÍO NAPO, river in northeastern Ecuador and northeastern Peru. It flows from the eastern slopes of the Andes in Ecuador and descends generally eastward to the Peruvian border. There it turns southeastward and continues through dense tropical rain forests, joining the Amazon River approximately 50 miles (80 km) downstream from Iquitos. Explored first by the Spanish soldier and Amazon explorer Francisco de Orellana in 1540 and then by the Portuguese Amazon explorer Pedro Teixiera in 1638, the river, 550 miles (885 km) long, is an important transportation artery, for much of it is navigable. Cattle are raised along its banks, and the forests yield rubber, chicle, timber, and furs.

Napoleon I, French in full NAPOLÉON BONAPARTE, original Italian NAPOLEONE BUONAPARTE, byname THE CORSICAN, or THE LITTLE CORPORAL, French LE CORSE, or LE PETIT CAPORAL (b. Aug. 15, 1769, Ajaccio, Corsica—d. May 5, 1821, St. Helena Island), French general, First Consul (1799–1804), and emperor of the French (1804–1814/15), one of the most celebrated personages in the history of the West. He revolutionized military organization and training; sponsored the Napoleonic Code, the prototype of later civil-law codes; reorganized education; and established the long-lived Concordat with the papacy.

A brief account of the life and works of Napoleon I follows; for a full biography, *see* MACROPAEDIA: Napoleon.

A Corsican by birth, Napoleon was educated in France, becoming an army officer in 1785. He fought during the French Revolution and was promoted to brigadier general in 1793. The threat of revolt brought him the command of the army of the interior in 1795; he then commanded the army of Italy in several victorious campaigns. His expedition to Egypt and Syria in 1798–99 ended in defeats at the hands of the British, however, and he returned to France. A coup in 1799 brought him to supreme power, and he instituted a military dictatorship, with himself as First Consul.

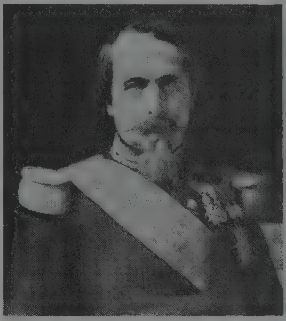
In the early 1800s, Napoleon made numerous reforms in government and education. He defeated the Austrians in 1800, went to war against Great Britain in 1803, and had himself crowned emperor in the following year. His greatest victory, the Battle of Austerlitz, against Austria and Russia, came in 1805; thereafter, except for temporary setbacks in Spain, he was successful, consolidating most of Europe as his empire about 1810. His downfall began with his embroilments in Spain and Portugal in the Peninsular War (1808–14) and, especially, with his disastrous invasion of Russia in 1812. The Allied coalition revived, and in April 1814 he was forced to abdicate and was exiled to Elba. In March 1815 he returned to France for the "Hundred Days" and was decisively defeated at the Battle of Waterloo (June 18, 1815), resulting in his second abdication and final exile to St. Helena.

Napoleon (II): *see* Reichstadt, Napoléon-François-Charles-Joseph Bonaparte, Herzog von.

Napoleon III, also called (until 1852) LOUIS-NAPOLÉON, in full CHARLES-LOUIS-NAPOLÉON BONAPARTE (b. April 20, 1808, Paris—d. Jan. 9, 1873, Chislehurst, Kent, Eng.), nephew of Napoleon I, president of the Second Republic of France (1850–52), and then emperor of the French (1852–70). He gave his country two decades of prosperity under a stable, authoritarian government but finally led it to defeat in the Franco-German War (1870–71).

Youth in exile. He was the third son of Napoleon I's brother Louis Bonaparte, who was king of Holland from 1806 to 1810, and his wife, Hortense de Beauharnais Bonaparte, stepdaughter of Napoleon I.

Louis-Napoléon's childhood and youth were spent largely in exile. His mother, like all the Bonapartes, was banished from France in 1815 after the fall of Napoleon I. Eventually, she found a new home in Switzerland, where, in 1817, she bought the castle of Arenenberg. Of romantic disposition herself, she inspired young Louis-Napoléon with a longing for his lost fatherland, as well as with enthusiastic admiration of the genius of Napoleon I. After attending a grammar school at Augsburg, Ger. (1821–23), her "sweet stubborn boy" was taught by private tutors. During visits to relatives in southern Germany and Italy, he became acquainted not only with other exiled victims of the restoration of the Bourbon monarchy but also with the life of a suppressed people, such as those Italians who were living under Austrian and papal rule. He was, above all, interested in history and inspired by the idea of national liberty. Accordingly, he took part in an unsuccessful plot against the papal government in Rome in 1830 and in the rebellion in central Italy in 1831, in which his beloved brother perished. He himself was saved from the Austrian troops only by his mother's bold intervention.



Napoleon III, detail of a portrait by Hippolyte Flandrin; in the Musée de Versailles

H. Roger-Viollet

Claim to the throne. After the death in 1832 of his cousin the Duke of Reichstadt (Napoleon I's only son), Louis-Napoléon considered himself his family's claimant to the French throne. To be better prepared for his task, he completed his military training and pursued his studies of economic and social problems. Soon after, he felt ready to publish his own writings on political and military subjects. In his pamphlet "Rêveries politiques" (1832), he asserted that only an emperor could give France both glory and liberty. He thus wanted to make his name known, propagate his ideas, and recruit adherents. Convinced that as Napoleon's nephew he would be popular with the French army, he vainly tried, on Oct. 30, 1836, to win over the Strasbourg garrison for a coup d'état. King Louis-Philippe exiled him to the United States, from which he was recalled early in 1837 by his mother's last illness. Expelled from Switzerland in 1838, he settled in England.

In 1839 he published "Des idées napoléoniennes." So far, Bonapartism had been nothing but a wistful reminiscing of former beneficiaries of the empire or a romantic legend created by those who were dissatisfied with the humdrum present. In his new booklet Louis-Napoléon tried to transform Bonapartism into a political ideology. In doing so, he obeyed mystical inspirations as well as rationalism. To him, ideology and politics were the result of rational reflection as well as of belief. The central exponent in history was, in his opinion, the great personality called by Providence and representing progress. Napoleon I had been such a man, even though he was not allowed to finish his work. But Napoleon, the "Messiah of the new ideas," was survived by the "Napoleonic idea," for the "political creed," like the religious creeds, had its martyrs and apostles. The Napoleonic idea was a "social and industrial one, humanitarian and encouraging trade," that would "reconcile order and freedom, the rights of the people and the principles of authority." Louis-Napoléon saw it as his task to accomplish this mission.

Landing with 56 followers, near Boulogne, Fr., on Aug. 6, 1840, he was again unsuccessful. The town's garrison did not join him. He was arrested, brought to trial, and sentenced to "permanent confinement in a fortress." At his "university of Ham" (the castle in which he was held) he spent his time studying to fit himself for his imperial role. He corresponded with members of the French opposition and published articles in some of their newspapers. He also wrote several brochures, among them "Extinction du paupérisme" (1844), which won him some supporters on the left. It was not until May 25, 1846, that he succeeded in escaping and fleeing to Great Britain, where he waited for another chance to seize power.

Presidency. On hearing of the outbreak of the revolution, in February 1848, he travelled to Paris but was sent back by the provisional government. Some of his supporters, however, organized a small Bonapartist party and nominated him as their candidate for the Constituent Assembly. On June 4 he was elected in four *départements* but, awaiting more settled conditions, he refused to take his seat. Running again in September, he was elected in five *départements,* and after his arrival in Paris he lost no time in preparing to run for the presidency. He was supported by the newly founded Party of Order, which consisted of adherents of the Bourbons, Louis-Philippe, and Catholics. Lacking a suitable candidate, they regarded Louis-Napoléon—not a skilled parliamentarian but a popular figure—as a useful tool.

He used, now on a large scale, the kind of propaganda that had won him elections before. Because of his name and his descent, the Emperor's nephew captivated the voters. Evoking the Napoleonic legend with its memories of national glory, Louis-Napoléon promised to bring back those days in time of peace. He succeeded also in recommending himself to every group of the population by promising to safeguard their particular interests. He promised "order" and "prosperity" to the middle class and the farmers and assistance to the poor. In December 1848 he was the only candidate to obtain votes—totalling 5,434,226—from among all classes of the population.

He took office, determined to free himself from dependence on the Party of Order, which had also won the parliamentary elections of May 1849. The government sent a military expedition to help the Pope reconquer Rome. At home it deprived active Republicans of their government positions and restricted their liberties, but the President could rely on only about a dozen members of the National Assembly who were Bonapartists. Prudently expanding his power by using every right the constitution granted him, Louis-Napoléon soon obtained key positions in the administration and in the army for his adherents. On October 31, he succeeded for the first time in appointing a Cabinet consisting of men depending more on him than on the National Assembly. By travelling through the country he gained wide popularity. Moreover, he used the disfranchisement of 3,000,000 electors of the poorer classes by the National Assembly in 1850 and an economic recession in 1851 as a pretext for agitating against the parties and for advertising himself as the "strong man" against the danger of a nonexistent revolution.

The constitution forbade the reelection of the president after expiration of his four-year term, and when Louis-Napoléon realized that he could not obtain the three-fourths majority necessary for a revision of the constitution he carried out a coup d'état on December 2. Only the Republicans dared to resist him. On December 4 they were defeated in street fighting in Paris, just as they were in other towns and in some regions. Arrests and deportations numbered in the thousands. Louis-Napoléon dissolved the Legislative Assembly and decreed a new constitution, which among other provisions restored universal suffrage. A plebiscite approved the new constitution. Encouraged by his success, he held another plebiscite in November 1852 and was confirmed as emperor after the resolution of the Senate concerning the restitution of the empire. Failing to obtain the hand of a princess of equal birth, Napoleon III married the countess Eugénie de Montijo in January 1853.

Domestic policy as emperor. Napoleon III intended to be always ahead of public opinion so as to be able to understand the requirements of his time and to create laws and institutions accordingly. Hence, he took the greatest pains to study the public opinion and to influence it by means of propaganda. Although promising "reasonable freedom," for the time being he considered it necessary to use the methods of a police state.

Willing "to take the initiative to do everything useful for the prosperity and the greatness of France," he promoted public works, the construction of railroads, the establishment of institutions of credit, and other means of furthering industry and agriculture. An enthusiastic promoter of great technical projects, he supported inventors and took a personal interest in the rebuilding of modern Paris.

He did not, however, disavow what he called his "love of the diligent and needy." He ensured a lower price for bread, furthered the construction of hygienic dwellings for workers, and established boards of arbitration. In his societies of mutual assistance, employers and employees were to learn to understand each other. He hoped that his social-welfare institutions, to the endowment of which he frequently contributed, would be imitated by the citizens. The middle class, however, looked upon him only as its protector against Socialism and regarded his social ideas as mere utopianism.

Foreign policy as emperor. As in domestic policy, the Emperor immediately took the initiative in foreign affairs. "Louis-Philippe fell because he let France fall into disrepute. I must do something," he declared. He wanted to make France a great power once more by breaking up the European system created by the Congress of Vienna of 1815, which, incidentally, had imposed great humiliations on France. Convinced that in the present "epoch of civilization the successes of armies were only temporary" and that it was "public opinion which always gained the final victory," he planned "to march at the head of generous and noble ideas," among which the principle of nationality was the most important. In accordance with this principle he wanted an international congress to reconstruct "the European balance of power on more durable and just foundations." And "if other countries gain anything France must gain something also."

The Crimean War offered him a chance of realizing one of his favourite ideas: the conclusion of an alliance with Great Britain that would succeed in checking Russian expansion toward the Mediterranean. After the Paris conference, at which the peace terms were settled, Napoleon seemed to become Europe's arbitrator. Ironically, it was an attempt on his life by Felice Orsini, an Italian revolutionary (January 1858), that reminded him of his wish "to do something for Italy." Together with Piedmont-Sardinia, he went to war against Austria in order to expel it from Italy. A promoter of technical warfare, he witnessed the success of his modernized artillery and of the military use of the captive balloon. The fact that at the victorious Battle of Solferino in June 1859 he had been in command convinced him of his military genius. Yet, frightened by the possibility of intervention by the German Confederation, he suddenly made peace. Outmanoeuvred by Count Cavour, who confronted him with a unified Italy instead of the weak federation he had intended, he received Nice and Savoy as a reward. His activities in Italy displeased the British. Despite the conclusion of an Anglo-French commercial treaty in 1860, they remained suspicious and apprehensively watched his construction of armoured warships and his colonial and oriental policies.

Napoleon III dreamed of "opening new ways to commerce and new outlets to European products overseas," of accelerating "the progress of Christianity and civilization." He was therefore open to a colonial policy bent on furthering commercial interests and the establishment of bases. He intensified the extension of French power in Indochina and West Africa. In the Middle East the Emperor hoped that a better treatment of the Algerians would have a favourable influence on the Arabs from Tunisia to the Euphrates. He supported the construction of the Suez Canal. When the Roman Catholic Maronites who were under French protection in Lebanon were persecuted in 1860, he hoped to profit politically by dispatching an expeditionary force.

Attempts at reform. In 1860 Napoleon III believed his regime to be stable enough to grant certain freedoms. The commercial treaty with Great Britain was to be the beginning of a new economic policy based on free-trade principles, with the aim of increasing prosperity and decreasing the cost of living. Dissatisfied with the functioning of the legislature, the Emperor decided to give "the great bodies of the state a more direct part in the formation of the general policy of our government."

His hopes were not fulfilled to the extent he had expected. A deterioration in the economy caused dissatisfaction among the middle class and the working people, who joined the Catholics, angered by his anti-papal Italian policy, to become a steadily growing opposition. In the elections of 1857 only five members of the opposition had gained seats in the National Assembly; six years later there were 32.

At this very time, repeated bladder-stone attacks temporarily incapacitated the Emperor, who had been in poor health since 1856. He had always insisted on exercising control over all decisions of government; in his ministers he had seen nothing but tools. Now, he became dependent on persons in his entourage who formed groups and intrigued against each other. In 1863 the authoritarian Eugène Rouher, nicknamed the "Vice Emperor," became prime minister; on the other hand, Napoleon III took the advice of his half brother the Duke of Morny to continue his policy of liberalization. With the help of his uncle Jérôme Bonaparte, who preached a democratic Bonapartism, he tried to win over the workers. But his concessions (freedom of coalition in 1864, freedom of assembly in 1868, extension of the rights of members of parliament, and liberalization of the press laws) were restricted by too many reservations and came too late. He allowed Victor Duruy, his minister of education from 1863, to fight clerical influence in education, yet on the other hand he tried to reconcile French Catholics by working for a compromise settlement in disputes between the papacy and the new Italian kingdom.

In 1861, by proposing to make the Austrian archduke Maximilian emperor of Mexico and by negotiating with the president of Ecuador about a projected "Kingdom of the Andes," he had begun his Latin-American venture. He had expected material rewards for France and also hoped that the planned kingdom would check the growing influence of the United States in Latin America. Yet, as soon as the United States had concluded its Civil War it forced the French to withdraw. In Europe when the Polish insurrection broke out in 1863, he did not, in spite of his sympathy, dare to support Poland against Russia. Nevertheless, such sympathies led to an estrangement from Russia. Moreover, the great powers refused Napoleon's proposal of a conference for the reorganization of Europe. Regarding Otto von Bismarck's policy with a certain benevolence, he kept aloof when Prussia settled the Schleswig-Holstein question by a war on Denmark. He had always sympathized with Prussia and the idea of the extension of Prussia's power in North Germany. He did not, however, openly tell Bismarck what price he demanded for his help. When in 1866, after routing Denmark, Prussia turned on its former ally, Austria, and defeated it more quickly than Napoleon had expected, he refused any armed intervention in its favour and only acted as mediator. Bismarck, however, was not willing to pay for Napoleon's neutrality by the cession of German territories. The emperor's plans to obtain compensation in Belgium failed, as did his attempt to gain Luxembourg in 1867. The retreat of Prussian troops from the fortress Luxemburg was no satisfactory reward: "Bismarck tried to cheat me. A French emperor cannot be cheated," grumbled Napoleon III, not willing to allow the Prussians to cross the Main River line and extend their power into southern Germany, which was Bismarck's obvious aim.

Last years. The emperor's failures in foreign affairs strengthened the opposition. When in the 1869 elections the government received 4,438,000 votes against the opposition's 3,355,000, Napoleon recognized that a genuine change of the regime was inevitable. In January 1870 he appointed Olivier-Émile Ollivier, whom Morny had recommended as the most appropriate prime minister for a liberal empire. The new Cabinet informed Great Britain and Prussia that France was ready to disarm, but Bismarck refused to cooperate.

On July 2 it became known that a Hohenzollern prince, a relative of the king of Prussia, was a candidate for the Spanish throne. In Paris this was regarded as Prussian interference in a French sphere of interest and a threat to security. Using his favourite means of secret diplomacy, Napoleon played a major part in causing the Hohenzollern prince to renounce his candidature. But then the sick emperor, influenced by the advocates of a belligerent policy, set out to humiliate Prussia by demanding that the candidature of the Hohenzollern prince would never be revived. As a result, war broke out on July 19. At the Battle of Sedan the sick emperor tried in vain to meet his death in the midst of his troops, but on September 2 he surrendered. He was deposed, and on September 4 the Third Republic was proclaimed.

Napoleon was released by the Germans and went to live in England. He studied technical and social problems, defended his politics in various publications, and even thought of landing in France to regain his throne. He died after undergoing an operation for the removal of bladder stones. (H.G.E.)

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Napoleonic Code, French CODE NAPOLÉON, French civil code enacted in 1804 and still extant, with revisions; it has been the main influence in the 19th-century civil codes of most countries of continental Europe and Latin America.

The demand for codification and, indeed, codification itself preceded the Napoleonic era. Diversity of laws was the dominant characteristic of the prerevolutionary legal order. Roman law governed in the south of France, whereas in the northern provinces, including Paris, a customary law had developed, based largely on feudal Frankish and Germanic institutions. Marriage and family life were almost exclusively within the control of the Roman Catholic church and governed by canon law. In addition, starting in the 16th century, a growing number of matters were governed by royal decrees and ordinances and by a case law developed by the *parlements.* Each area had its own collection of customs, and, despite efforts in the 16th and 17th centuries to organize and codify each of these local customary laws, there had been little success at national unification. Vested interests blocked efforts at codification, because reform would encroach upon their privileges.

After the Revolution, codification became not only possible but almost necessary. Powerful control groups such as the manors and the guilds had been destroyed; the secular power of the church had been suppressed; and the provinces had been transformed into subdivisions of the new national state. The Napoleonic Code, therefore, was founded on the premise that, for the first time in history, a purely rational law should be created, free from all past prejudices and deriving its content from "sublimated common sense"; its moral justification was to be found not in ancient custom or monarchical paternalism but in its conformity to the dictates of reason.

Under the code all citizens are equal: primogeniture, hereditary nobility, and class privileges are extinguished; civilian institutions are emancipated from ecclesiastical control; freedom of person, freedom of contract, and inviolability of private property are fundamental principles.

The first book of the code deals with the law of persons: the enjoyment of civil rights, the protection of personality, domicile, guardianship, tutorship, relations of parents and children, marriage, personal relations of spouses, and the dissolution of marriage by annulment or divorce. The second book deals with the law of things: the regulation of property rights—ownership, usufruct, and servitudes. The third book deals with the methods of acquiring rights: by succession, donation, marriage settlement, and obligations. In the last chapters, the code regulates a number of nominate contracts, legal and conventional mortgages, limitations of actions, and prescriptions of rights.

With regard to obligations, the law establishes the traditional Roman-law categories of contract, quasi-contract, delict, and quasi-delict. Freedom to contract is not spelled out explicitly but is an underlying principle in many provisions.

The code was originally introduced into areas under French control in 1804: Belgium, Luxembourg, parts of western Germany, northwestern Italy, Geneva, and Monaco. It was later introduced into territories conquered by Napoleon: Italy, the Netherlands, the Hanseatic lands, and much of the remainder of western Germany and Switzerland. The code is still in use in Belgium, Luxembourg, and Monaco.

During the 19th century, the Napoleonic Code was voluntarily adopted in a number of European and Latin-American countries, either in the form of simple translation or with considerable modifications. The Italian Civil Code of 1865, enacted after the unification of Italy, had a close but indirect relationship with the Napoleonic Code. The new Italian code of 1942 departed to a large extent from this tradition. In Latin America in the early 19th century, the code was introduced into Haiti and the Dominican Republic and is still in force there. Bolivia and Chile followed closely the arrangement of the code and borrowed much of its substance. The Chilean code was in turn copied by Ecuador and Colombia, closely followed by Uruguay and Argentina.

In Louisiana, the only civil-law state in the United States, the civil code of 1825 (revised in 1870 and still in force) is closely connected with the Napoleonic Code.

The influence of the Napoleonic Code was diminished at the turn of the century by the introduction of the German Civil Code (1900) and the Swiss Civil Code (1912); the former was adopted by Japan and the latter by Turkey. In the 20th century, codes in Brazil, Mexico, Greece, and Peru were products of a comparative method, with ideas borrowed from the German, French, and Swiss.

Napoleonic Wars: *see* French revolutionary and Napoleonic wars.

Napoli (Italy): *see* Naples.

Napoli, Golfo di (Mediterranean Sea): *see* Naples, Bay of.

Nappanee, city, Elkhart county, northern Indiana, U.S., 21 miles (34 km) southeast of South Bend. Founded in 1874, it adopted an Algonquian Indian name (probably meaning "flour") and developed along the Baltimore & Ohio Railroad. There is a large concentration of Amish farmers in the vicinity, and their horse-drawn buggies are a familiar sight around the public square; nearby Amish Acres is a working farmstead open to the public. The city's economy centres on the agricultural markets (mint, onions, grain); manufactures include furniture, mobile homes, electronic and steel products. Inc. 1926. Pop. (1990) 5,510.

nappe, in geology, large body or sheet of rock that has been moved a distance of about 2 km (1.2 miles) or more from its original position by faulting or folding. A nappe may be the hanging wall of a low-angle thrust fault (a fracture in the rocks of the Earth's crust caused by contraction), or it may be a large recumbent fold (*i.e.,* an undulation in the stratified rocks of the Earth's crust having an essentially horizontal axial plane); both processes position older rocks over younger rocks. In places, erosion may cut into the nappe so deeply that a circular or elliptical patch of the younger, underlying rock is exposed and completely surrounded by the older rock; this patch is called a fenster, or window. Fensters generally occur in topographic basins or deep, V-shaped valleys. Elsewhere, an eroded, isolated remnant of the older rock or nappe may be completely surrounded by the younger, underlying rock; this is known as a klippe, or thrust outlier. Mythen Peak in the Alps in a typical example of a klippe.

Naqādah, also spelled NAKADA, town, Upper Egypt. It lies on the west bank of the Nile, in the great bend of the river, opposite Qūṣ, in Qinā *muḥāfaẓah* (governorate). One of the oldest regions of Egypt, it is the site of a Neolithic town and burial grounds of the Predynastic period (before *c.* 2925 BC). It was first excavated by the British archaeologist Sir Flinders Petrie, and the cultures found are referred to by scholars as Amratian (Naqādah I) and Gerzean (Naqādah II). There was possibly a nome (province) political organization centred there in predynastic times, with the god Seth as tutelary deity. The modern town is largely Coptic and has pottery and silk industries. Locally grown sugarcane, dates, and cereals are processed in the town. Pop. (1986 est.) 17,200.

Naqādah I culture: *see* Amratian culture.

Naqādah II culture: *see* Gerzean culture.

Naqshbandīyah, orthodox fraternity of Muslim mystics (Ṣūfīs) found in India, China, the Central Asian republics, and Malaysia. It claims a lineage extending back to Abū Bakr, the first caliph. Bahāʾ ad-Dīn (d. 1384), founder of the order at Bukhara, Turkistan, was called *an-naqshband,* "the painter," because of the impression of God that the repetition of his prescribed ritual prayer (dhikr) should leave upon the heart, and so his followers became known as Naqshbandīyah. The order has no mass support, for its litanies are subdued and emphasize repetition of the dhikr to oneself. Through the reforming zeal of Aḥmad Sirhindī (1564–1624), the Naqshbandīyah were given new life in India in the 17th century and played a vital role in the reform of Muslim life in the 18th and 19th centuries throughout the Islāmic world.

Nara, *ken* (prefecture), southern Honshu, Japan. The prefecture occupies the central part of the Kii Peninsula. Its southern and northeastern portions are mountainous, while the northwest is composed of the lowland of the Nara Basin. The basin is separated from Ōsaka (west) by mountains and contains most of the prefecture's population, main cities, and transport facilities. Agriculture, including rice, wheat, flowers, and fruit, is centred in the Nara Basin. Traditional crafts are also a profitable industry in some parts. The basin contains many historic sites, chief among them the ancient city of Nara and its many associated Buddhist temples. Although it is one of the most historic areas of Japan, the Nara Basin is being increasingly drawn into the commercial and industrial orbit of Ōsaka. Area 1,425 square miles (3,692 square km). Pop. (1991 est.) 1,389,000.

Nara, city, Nara *ken* (prefecture), southern Honshu, Japan. The city of Nara, the prefectural capital, is located in the hilly northeastern edge of the Nara Basin, 25 miles (40 km) east of Ōsaka. It was the national capital of Japan from 710 to 784—when it was called Heijō-kyō—and retains the atmosphere of ancient Japan. The city is most noted for the many ancient Japanese Buddhist buildings and artifacts in and around the city, including the Seven Great (and many ancient but lesser) Temples of Nara. The five-storied pagoda of the Kōfuku Temple dates from 710. The Tōdai Temple (745–752) is noted for the Daibutsu, or Great Buddha, a giant statue about 50 feet (15 m) high that is housed in the Great Buddha hall, one of the largest wooden buildings in the world. The nearby Shōsō Repository (761), a log storehouse raised above the ground on stilts, was built to hold the thousands of 8th-century treasures of the Tōdai Temple. Its artwork and artifacts (now housed in fireproof concrete buildings) include jewels, musical instruments, masks, paintings, sculpture, samples of calligraphy, and household items. The Grand Shrine of Kasuga is one of Japan's oldest Shintō shrines. The Tōshōdai and Yakushi temples are also within Nara. The Hōryū Temple, at Ikaruga, southwest of the city, is Japan's oldest surviving temple, and its compound abounds with priceless paintings and carvings and some of the most ancient wooden buildings in the world. These ancient remnants of early Japanese civilization form the basis of Nara's tourism industry, which has wide appeal to foreigners as well as Japanese. Nara's status as a national cultural monument is reflected in a Japanese proverb: "See Nara and die"; *i.e.,* one can die content if one has seen Nara. The city is also a leading commercial and educational centre and has some manufacturing. Pop. (1991 est.) 351,985.

The middle gate of the Grand Shrine of Kasuga, Nara, Japan

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Nāra Canal, important water channel in Sindh province, Pakistan. From its source above Rohri, it runs southward and discharges into the Puran River, an old channel of the Indus River, which flows to the sea farther south through the Rann of Kutch. Because of the uncertain water supply received through the Nāra, it was connected in 1858–59 with the Indus at Rohri by a supply channel 12 miles (19 km) long. The Nāra Canal irrigates more than 1,500,000 acres (600,000 hectares). With its chief canal, the Jāmrao, it has a length of 513 miles (825 km) and provides a perennial water supply to branch canals.

Nara National Museum, Japanese NARA KOKURITSU HAKUBUTSUKAN, in Nara, Japan, art museum devoted primarily to Buddhist art. Exhibits include dry-lacquer works, wooden statues, and lacquered wood from the earlier and later Heian periods. There are Kamakura sculptures, including Jizō-Bosatsu, and a relief of 1327 from Kōchi of Kobo Daishi (Kūkai), one of the best-known Buddhist saints in Japan. Pieces on display include a fine gilded-bronze halo of the Asuka period from the statue of the Nigatsudo.

Nara period (AD 710–784), in Japanese history, period in which the imperial government was at Nara, and Sinicization and Buddhism were most highly developed. Nara, the country's first permanent capital, was modeled on the Chinese T'ang dynasty (618–907) capital, Ch'ang-an. Nara artisans produced refined Buddhist sculpture and erected grand Buddhist temples. A network of roads connected the capital with remote provinces.

Chinese language and literature were studied intensively; the Chinese characters were adapted to the Japanese language; and numerous Chinese manuscripts, particularly Buddhist scriptures, were copied. Two official histories, the *Koji-ki* and *Nihon shoki,* were compiled. The *Kaifūsō,* a collection of Chinese poems by Japanese poets, and the *Manyō-shū,* an anthology of native poetry, were produced.

Legal codes based on Chinese models were compiled to replace the less-structured native tradition of legal process. Although the codification of law was probably begun earlier, the Taihō code (701) completed previous efforts. With the adoption of the imperial title *tennō,* translated from the Chinese *t'ien-huang,* or "heavenly emperor," the Chinese concept of the emperor as the supreme symbol of central government rule was incorporated into the native Japanese interpretation of the emperor as also the leading Shintō cult figure. Like its T'ang Chinese prototype, the Japanese central government consisted of a Council of State (Dajōkan) and ministries of Rites, Personnel, Public Works, War, Justice, and Revenue. An Office of Deities (Jingikan) supervised Shintō official ceremonies. The imperial state extended its frontiers to include southern Kyushu during the 8th century and conquered the Ezo (Emishi) people in northern Honshu following a series of campaigns (late 8th–early 9th century).

Naracoorte, town and rail junction, southeastern South Australia. It lies 190 miles (310 km) southeast of Adelaide, near the Victoria border. Founded as Kincraig in 1845, it took its present name in 1869 from an Aboriginal word meaning "large waterhole." During the 1850s Naracoorte was an important stopping place along the route to the Victorian goldfields. Created a municipality in 1924, it now serves as a market for wool, wheat, and dairy products. Limestone quarrying and lumbering are also undertaken, and tourism, based on the nearby Naracoorte Caves, is an added source of income. Pop. (1991 prelim.) 4,712.

Narai (b. December 1632—d. July 11, 1688, Lop Buri, Siam [now Thailand]), king of Siam (1656–88), who was best known for his efforts in foreign affairs and whose court produced the first "golden age" of Thai literature.

Narai was a son of King Prasat Thong by a queen who was a daughter of King Song Tham, and he came to the throne after violent palace upheavals had cut short the reigns of his elder brother and his uncle. He was an effective ruler who dealt successfully with Siam's traditional Southeast Asian rivals and was ambitious to thrust his kingdom onto the stage of world politics. Anxious to break the domination of the Dutch East India Company over Siam's external trade, his officers—including Chinese, Persians, and Englishmen—developed trade with Japan and India, and Narai sought to develop contacts with the British East India Company and the French. In the 1680s, when the British proved uninterested in competing with the Dutch in Siam, Narai committed himself to seeking an alliance with the French.

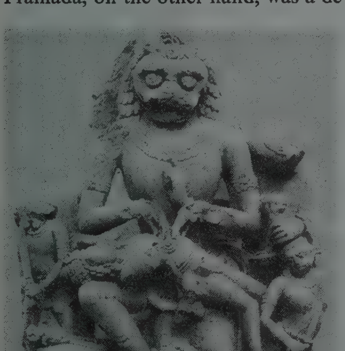
Narai's flirtations with the French were encouraged by the Greek adventurer Constantine Phaulkon, who became his chief minister and adviser. Thai diplomatic missions were sent to King Louis XIV of France in 1680, 1684, and 1686; and, encouraged by Phaulkon to hope for territorial concessions and even Narai's conversion to Christianity, the French sent increasingly large delegations to Siam in 1682, 1685, and 1687. Though expecting the French to be satisfied with the cession of Songkhla, Narai was forced to accept their occupation of Bangkok. Anti-French and anti-Phaulkon sentiment ran high, and, when Narai's health began to fail, leading figures at court arranged the execution of Phaulkon and, following Narai's death, the expulsion of the French.

Narameikhla, also called MENG SOAMWUN (fl. early 15th century), founder and first king (reigned 1404–34) of the Mrohaung dynasty in Arakan, the maritime country lying to the west of Lower Burma on the Bay of Bengal, which had been settled by the Burmese in the 10th century.

When Arakan became the scene of a struggle between rival centres of power in the 15th century, Narameikhla, the son of King Rajathu (reigned 1397–1401), was forced in the first year of his reign to flee to Bengal, where he became a vassal to King Aḥmad Shāh of Gaur. With the aid of Aḥmad Shāh's successor, he regained control of Arakan in 1430. In 1433 he built at Mrohaung a new capital, which remained the capital of Arakan until the 18th century. As a nominal vassal of Gaur's Muslim kings, Narameikhla employed Muslim titles, though he and his subjects were Buddhists. He was succeeded by his son, Ali Khan (reigned 1434–59), who had adopted a Muslim name.

Narashino, city, Chiba *ken* (prefecture), Honshu, Japan. Narashino is situated on the northeastern shore of Tokyo Bay. Formed in 1951 by the merger of Minomi, Maka, Tsuda-numa, and Okubo, the settlement has no city centre because the former towns are lined up along two railways to Tokyo. Narashino is a weekend vacation area because of its proximity to Tokyo. Formerly the site of a military base, the city is now a residential suburb of the Tokyo–Yokohama metropolitan area. Several institutions of higher learning, including the Chiba Institute of Technology and the Nihon University, are located there. Pop. (1995) 152,887.

Narasiṃha (Sanskrit: "Man-Lion"), fourth of the 10 avatars (incarnations) of the Hindu god Vishnu. The demon Hiraṇyakaśipu, twin brother of the demon overthrown by Vishnu in his previous incarnation as Varāha, obtained a boon from Brahmā that he could not be killed by man or beast, from inside or outside, by day or by night, and that no weapon could harm him. Thus, feeling secure, he began to trouble heaven and earth. His son, Prahlāda, on the other hand, was a devotee of Vishnu, even though his father threatened his life because of it. One day the demon challenged Prahlāda and, kicking a stone pillar, asked: "If your god is omnipresent, is he in this pillar also?" Vishnu emerged from the pillar in the form of a man-lion and slew the demon at dusk on the threshold.


Narasiṃha, stone sculpture from Devangana, Rājasthān, India 9th century AD
Pramod Chandra

The incident is often depicted in art, with Narasiṃha appearing out of the pillar or engaged in ripping open the belly of the demon. The animal aspect is shown by a curly mane of hair, sharp, curved teeth, and leonine facial features. The body, though human, has a thick neck, large shoulders, and slender abdomen and waist. Seated images of Narasiṃha are also found in which the lion face has a pacific expression.

Narayan, Jaya Prakash, also spelled JAI PRAKASH NARAIN (b. Oct. 11, 1902, Sitab Diyara, India—d. Oct. 8, 1979, Patna), Indian political leader and theorist.

Narayan was educated at universities in the United States, where he became a Marxist. Upon his return to India in 1929, he joined the Congress Party. In 1932 he was sentenced to a year's imprisonment for his participation in the civil-disobedience movement against British rule in India. Upon release he took a leading part in the formation of the Congress Socialist Party, a left-wing group within the Indian National Congress, the organization that led the campaign for Indian independence. He was imprisoned by the British again in 1939 for his opposition to Indian participation in World War II on the British side. He made a dramatic escape and tried to organize violent resistance to the government, but he was recaptured in 1943. After his release in 1946, he tried to persuade the Congress leaders to adopt a more militant policy against British rule.

Along with many Socialists, he left the Congress Party in 1948 and in 1952 formed the Praja Socialist Party. Dissatisfied with party politics, he announced in 1954 that he would thenceforth devote his life exclusively to the Bhoodan Yajna movement, founded by Vinoba Bhave, which demanded the redistribution of land to the landless. By 1959, however, his political interest reappeared when he argued for a "reconstruction of Indian polity" by means of a four-tier hierarchy of village, district, state, and union councils.

In 1974 Narayan became a critic of Prime Minister Indira Gandhi's government, which he viewed as corrupt and undemocratic. Although he gained support from students and opposition politicians, there was little mass enthusiasm. The next year a lower court convicted Gandhi of corrupt election practices, and Narayan called for her resignation. Instead, she declared a national emergency and jailed Narayan. His health broke down in prison, and though he was released after five months, he never recovered. After Ghandi's defeat in elections in 1977, Narayan was an advisor to the victorious Janata party.

Narayan, R(asipuram) K(rishnaswami), original name RASIPURAM KRISHNASWAMI NARAYANSWAMI (b. Oct. 10, 1906, Madras, India—d. May 13, 2001, Madras), one of the finest Indian authors of his generation writing in English.

Reared by his grandmother, Narayan completed his education in 1930 and briefly worked as a teacher before devoting his time to writing. His first novel, the episodic *Swami and Friends* (1935), recounts the adventures of a group of schoolboys. That book and his later works are set in the fictitious South Indian town of Malgudi. He typically portrayed the peculiarities of human relationships and the ironies of Indian daily life, in which modern urban existence clashes with ancient tradition. His style is graceful, marked by genial humour, elegance, and simplicity.

His best-received novels include *The English Teacher* (1945), *Waiting for the Mahatma* (1955), *The Guide* (1958), *The Man-Eater of Malgudi* (1961), *The Vendor of Sweets* (1967), and *A Tiger for Malgudi* (1983). Collections of his short stories include *Lawley Road* (1956), *A Horse and Two Goats and Other Stories* (1970), *Under the Banyan Tree and Other Stories* (1985), and *The Grandmother's Tale and Selected Stories* (1994).

Narayanan, Kocheril Raman (b. Feb. 4, 1921, Uzhavoor, India), Indian politician and diplomat, who in 1997 became India's president, the first member of the group considered untouchable to occupy the office.

Despite his family's poverty and social status, Narayanan's intellect won him a government-sponsored scholarship. He attended the University of Travancore (now the University of Kerala), where he graduated with honours. After graduation, he worked as a journalist for the *Hindu* and the *Times of India.* He soon won another scholarship and left India to attend the London School of Economics, where he received top academic honours.

After returning to India, Narayanan entered the foreign service, despite opposition from upper-caste officials. His distinguished career included stints as India's ambassador to Thailand (1967–69), Turkey (1973–75), China (1976–78), and the United States (1980–83).

Narayanan became active in politics after leaving the foreign service, serving as a member of the legislature, holding several ministerial posts, and becoming vice president. In 1997 he was elected president of India, winning 95 percent of the vote from mainly upper-caste lawmakers. During his tenure he has expanded the role of the presidency.

Nārāyanganj, city, east-central Bangladesh, situated along both banks of the Lakhya River at its confluence with the Dhaleśwarī. The city is the chief river port for nearby Dhākā. Nārāyanganj is the busiest trade market in the country, a collection centre for hides and skins, and a terminal market for jute. Together with Dhākā, it also forms the largest industrial region of Bangladesh, with the largest number of jute presses and jute and cotton mills. Constituted a municipality in 1876, Nārāyanganj houses a college, a hospital, and a library. Historic buildings include Kadam Rasul (1801), a shrine built by Ghulām Muḥammad of Tippera; a 16th-century fort of the Bara Bhaiyas (12 landlords of Bengal); and the 12th-century temple of Lakṣmī-Nārāyaṇa, after which the town is named. Pop. (1991) 296,000.

Narbada (India): *see* Narmada River.

Narbonensis, in full GALLIA NARBONENSIS, English NARBONESE GAUL, ancient Roman province that lay between the Alps, the Mediterranean Sea, and the Cévennes Mountains. It comprised what is now southeastern France.

The area first entered ancient history when the Greek colony of Massilia (modern Marseille) was founded about 600 BC. Roman armies first entered the area in 154 BC to help defend Massilia against Celtic invaders. The Romans conquered southeastern Gaul in the years following 125 BC. In 121 BC the coast from what is now Montpellier to the Pyrenees—with its port of Narbo Martius (modern Narbonne) and its trade route by Tolosa (Toulouse) to the Atlantic—was annexed by Rome, and in 118 the city of Narbo itself was formed into a Roman colony. Roman traders and veterans then speedily flocked in to settle the area. Gradually the province was extended north of Massilia, up the Rhône. Originally named Provincia, the province was renamed Gallia Narbonensis during the reign of Augustus. The province became fully Romanized and was governed by a proconsul appointed by the Senate.

Narbonensis, the sun-steeped home of the vine and the olive, was in climate and history markedly different from the rest of Gaul; and it attracted a large number of Roman immigrants. Splendid buildings were erected, many of which have left impressive remains. To the prosperous vineyards and olive groves were added other industries, particularly in timber and specialized metalwork. Narbonensis was the birthplace of several men prominent in Roman public life. Agricola came from Forum Iulii (modern Fréjus); and it has been conjectured that his son-in-law, the historian Tacitus, was also Narbonese. The high level of culture in the province was famous, particularly the schooling provided at Massilia.

Narbonne, city, Aude *département,* Languedoc-Roussillon *région,* southeastern France. It lies on a vine-growing plain 8 miles (13 km) from the Mediterranean and east of Carcassonne.

Narbonne was the site of Narbo Martius (Narbo), the first colony founded by the Romans in Gaul (118 BC), from which the town derived its name. Then on the Mediterranean, it became a flourishing port. In 413 it was seized by the Visigoths, who later made it their capital. In 719 the Saracens captured the town, occupying it until 759. During the Middle Ages, the southern part of the town was ruled by the counts of Toulouse, while the northern part was under episcopal administration. At the beginning of the 16th century, Narbonne was united to the French crown.

The Cathedral of Saint-Just, begun in 1272 but never completed, has only a choir and two square towers. Built in the style of the cathedrals of northern France, the choir, which is of exceptional height, has pleasingly harmonious proportions. The Basilica of Saint-Paul-Serge (mainly 12th and 13th centuries) is an interesting example of early Gothic architecture in the south of France. The three square towers of the fortified Palais des Archevêques date from the 13th and 14th centuries, but the Gothic-style town hall was added to the palace only in the 19th century. The building now houses two museums with collections of paintings, ceramics, and Roman artifacts.

The Canal de la Robine, a branch of the Canal du Midi, runs through the city, separating the northern part historically known as the Cité from the Bourg to the south. The old town, now surrounded by boulevards, has picturesque, narrow, winding streets. A major road and rail junction, Narbonne specializes in the trade of Aude wines. A uranium processing plant was built just outside the town in 1959. Other industries are mainly connected with wine production (fertilizers and agricultural machinery). Pop. (1990) 47,086.

Narborough Island (Galápagos Islands): *see* Fernandina Island.

Narcissus, in Greek mythology, the son of the river god Cephissus and the nymph Leiriope; he was distinguished for his beauty. His mother was told that he would have a long life, provided he never looked upon his own features. His rejection, however, of the love of the nymph Echo or of his lover Ameinias drew upon him the vengeance of the gods. He fell in love with his own reflection in the waters of a spring and pined away (or killed himself); the flower that bears his name sprang up where he died. According to another source, Narcissus, to console himself for the death of his beloved twin sister, his exact counterpart, sat gazing into the spring to recall her features.

The story may have derived from the ancient Greek superstition that it was unlucky or even fatal to see one's own reflection. In psychiatry and especially psychoanalysis, the term narcissism denotes an excessive degree of self-esteem or self-involvement, a condition that is usually a form of emotional immaturity.

Narcissus, wall painting from the House of Lucretius Fronto, Pompeii, Italy, AD 14–62

Alinari—Art Resource

Narcissus (d. AD 54), freedman who used his position as correspondence secretary (*ab epistulis*) to the Roman emperor Claudius (ruled 41–54) to become, in effect, a minister of state.

Narcissus exercised great influence over Claudius and accumulated immense wealth. At first he allied himself with Claudius' third wife, Messalina Valeria, but fear that she and her lover, Gaius Silius, were conspiring to seize power made him join with others to have her executed (48). By failing to support Claudius' subsequent marriage to Agrippina the Younger, Narcissus lost influence in the government. The finance secretary, Pallas, who had favoured the match, became Claudius' favourite. Narcissus' power was further undermined when he backed Britannicus, son of Claudius and Messalina, for the succession even after Agrippina had persuaded Claudius to designate as his successor her own son (by a previous marriage), Lucius Domitius Ahenobarbus. In 54 Claudius died, perhaps poisoned by Agrippina. Domitius took power as the emperor Nero and immediately had Narcissus arrested. Shortly afterward the freedman committed suicide.

Daffodil (*Narcissus pseudonarcissus*)

Walter Chandoha

narcissus, any member of a genus (*Narcissus*) of bulbous, often fragrant, ornamental plants in the family Amaryllidaceae. The genus contains about 40 species, native primarily to Europe. Daffodil, or narcissus (*N. pseudonarcissus*), jonquil (*N. jonquilla*), and poet's narcissus (*N. poeticus*) are popular garden flowers. The central crown of each yellow, white, or pink flower ranges in shape from the form of a trumpet, as in the daffodil, to a ringlike cup, as in the poet's narcissus. The rushlike or flattened leaves arise from the base of the plant; they may be only 5 to 7.5 cm (2 to 3 inches) high or up to 0.6 to 1.2 m (2 to 4 feet). Some species hybridize in the wild, and many man-made crosses between species have resulted in attractive garden hybrids. The bulbs of *Narcissus* species, which are poisonous, were once used in medicines as an emetic and cathartic. An oil from jonquil flowers is used in perfumes.

narcolepsy, a sleep disturbance that is characterized by sudden, uncontrollable spells of sleep during the day, with disturbances of sleep at night.

The syndrome usually occurs in youth or early adult life and is presumably due to dysfunction of the diencephalic reticular system. The narcoleptic can fall asleep anywhere, anytime—while in conversation, at work, while eating, and even when standing or walking. Sleep may last a few seconds or several minutes, rarely for more than an hour, and the narcoleptic is easily awakened to an alert state. Narcoleptics may also experience sleep paralysis, which normally occurs as one is either falling asleep or awakening. Although mentally alert, the narcoleptic experiencing sleep paralysis is totally unable to move for a very brief period. Most narcoleptics reveal rapid eye movement (REM) at the onset of sleep, in contrast to normal sleep, in which REM occurs about 90 minutes after the onset of sleep. Associated with narcolepsy is cataplexy, a brief impairment of muscle tone such as a limpness of the arms or legs.

narcotic, drug that produces analgesia (pain relief), narcosis (state of stupor or sleep), and addiction (physical dependence on the drug). In some people narcotics also produce euphoria (a feeling of great elation).

A brief treatment of narcotics follows. For full treatment, *see* MACROPAEDIA: Alcohol and Drug Consumption.

The main therapeutic use of narcotics is for pain relief, and hence they are often called narcotic analgesics. The best-known narcotics are the opiates—*i.e.,* compounds found in or derived from opium. Opium is obtained as the dried milky juice of the seed pods of the opium poppy (*Papaver somniferum*). Of the 20 or more alkaloids found in opium, the most important is morphine, which is primarily responsible for opium's narcotic properties. Drugs with actions similar to morphine that are produced synthetically are known as opioids; the terms opiate, opioid, and narcotics are used interchangeably. In most countries the production, trade in, and use of narcotics are limited because of their addictive properties, detrimental effects, and the incidence of narcotic drug abuse.

Narcotics occurring naturally in the opium poppy have been used since ancient Greek times, both for relieving pain and for producing euphoria. Extracts of the opium poppy were smoked, eaten, or drunk (as laudanum, a crude mixture of alcohol and opium). The pharmacologically active components of opium were isolated during the first half of the 19th century. The first was morphine, isolated by a young German pharmacist, F.W.A. Sertürner, in 1803. A much milder narcotic, codeine, was in turn isolated from morphine.

The invention of the hypodermic needle in the mid-19th century allowed morphine to be administered by injection, which is useful in medicine because injections of morphine produce much greater effects than taking the same amount of drug orally. However, the availability of morphine injections led to serious problems of abuse, and laws were introduced to control the use, production, and trade of narcotics and other dangerous drugs. Such laws now exist in most countries of the world. In 1898 heroin, or diacetylmorphine, was developed from morphine by the Bayer Company in Germany. Heroin is five to ten times as potent as morphine itself and is used by most narcotic addicts. Because heroin proved to be even more addictive than morphine, a search for synthetic substitutes was undertaken that resulted in such opioids as meperidine (Demerol), methadone, and levorphanol (Levo-Dromoran).

Most persistent users of heroin or other narcotics follow a classic progression from inhaling the drug to injecting it subcutaneously and then to injecting it intravenously; each of these stages usually brings a greater likelihood of addiction with it. With increasing use of the drug, euphoria and relaxation eventually give way to drug tolerance and physical dependence; the addict must use progressively larger doses to achieve the same pleasurable effects, and once the drug wears off he must endure painful symptoms of physical and psychological withdrawal. An overdose of narcotics can severely depress the central nervous system, with respiratory failure and death as a consequence.

Probably the most effective therapy for narcotics addicts involves the synthetic opiate methadone, which, though itself addictive, blocks the addict's craving for heroin and provides no disruptive euphoric effects of its own.

Medically speaking, narcotics are the most powerful painkillers available, but they are used with great caution because of their addictive properties. They are often given to patients who are dying from cancer and are in great pain. Narcotics not only relieve pain but also seem to reduce suffering, worry, fear, and panic associated with severe pain. As terminal cancer patients often do not have long to live and providing an acceptable quality of life may be the paramount issue, problems of addiction are largely irrelevant.

What are known as narcotic antagonists block the actions of the narcotics and reverse their effects. Examples include naloxone, naltrexone, and nalorphine. They are used to reverse the effects of overdoses of narcotics, and they can often save the life of the victim. Narcotic receptors have been identified in the brain. Narcotics act at these receptors to produce their many effects, whereas narcotic antagonists block these receptors and prevent narcotics from reaching them and exerting their actions.

Nardi, Jacopo (b. July 21, 1476, Florence [Italy]—d. after 1563, Venice), Florentine statesman and historian who wrote a history of Florence that sharply criticized the ruling Medici family.

Nardi was born to a family that was long hostile to the Medici. He followed a military career until the expulsion of the Medici in 1494; he then served in several posts as a magistrate and became one of the principal republican partisans of Girolamo Savonarola, the religious reformer who virtually ruled Florence from 1494 until 1498. When the Medici returned in 1512, Nardi continued to occupy several minor posts. With the final fall of the Florentine republic (1530–31), he was exiled and his property confiscated. Nardi spent the rest of his life in Venice, wrote to support his family, and represented the Florentine exiles in 1535, when they made a formal accusation against Alessandro de' Medici before the Holy Roman emperor Charles V.

Nardi is best known for his *Istorie della citta' di Firenze* (1582; "History of the City of Florence"), which covers the period 1494–1538 and is a valuable discussion of Florentine politics during the time of Savonarola and the republic. He also wrote two comedies in verse, *L'amicizia* (1503–12; "Friendship") and *I due felici rivali* (before 1519; "Two Happy Rivals"), and translated several classics.

Nardini, Pietro (b. April 12, 1722, Livorno, Tuscany [Italy]—d. May 7, 1793, Florence), Italian violinist and composer, one of the most eminent violinists of the 18th century.

The most famous pupil of the composer and virtuoso violinist Giuseppe Tartini, Nardini was solo violinist at the court at Stuttgart from 1753 to 1767. He then returned to Livorno and lived with Tartini during Tartini's last illness until his death in 1770. In 1770 Nardini became music director to the duke of Tuscany. He enjoyed great fame as a composer and performer, his playing praised by contemporaries for its beauty and emotional power. His violin compositions, though not numerous, are melodious and highly playable and are valued as technical studies.

Nardò, Latin NERETUM, town, Lecce *provincia,* Puglia (Apulia) *regione,* southeastern Italy, southwest of Lecce city. Originally the Roman city of Neretum, Nardò was both Byzantine and Norman; it has a 13th–14th-century cathedral in the Gothic style and an unusual circular chapel called the Osanna, dating from 1603. Examples of Baroque architecture in the town include the Church of San Domenico. Modern Nardò is an agricultural centre, trading in wheat, olive oil, and tobacco. Pop. (1991 prelim.) mun., 31,066.

Narek, Gregory: *see* Gregory Narekatzi, Saint.

Naresuan, also called PHRA NARET (b. 1555, Phitsanulok, Siam [now Thailand]—d. April 25, 1605, on the Salween River), king of Siam (1590–1605), regarded as a national hero by the Thai people for having liberated the country from the Myanmar (Burmese).

In 1569 the Myanmar king Bayinnaung (reigned 1551–81) conquered Siam and placed Naresuan's father, Maha Thammaracha, on the throne as his vassal. The capital, Ayutthaya, was pillaged, thousands of Siamese were deported to Myanmar (Burma) as slaves, and Siam then suffered numerous invasions from Cambodia. At the age of 16 Naresuan was also made a vassal of Myanmar and appointed governor of the northern province of Phitsanulok. After campaigning with the Myanmar armies in the Shan states, he renounced his allegiance to Myanmar in 1584. In a series of brilliant military operations, he defeated three Myanmar armies that had invaded Siam, frustrated repeated attempts of the Myanmar to capture the capital, and simultaneously defeated Cambodian invasions. Becoming king on the death of his father in 1590, Naresuan then took the initiative: he captured the Cambodian capital of Lovek, made Cambodia a vassal of Siam, and established suzerainty over the northern kingdom of Chiang Mai. When the Myanmar sent a huge army to curb his ambitions, Naresuan defeated and killed the Myanmar crown prince in personal combat early in 1593. Thereafter, Myanmar ceased to be a threat to Siam when civil wars broke out among contenders for the Myanmar throne, and Naresuan was able to seize the Myanmar peninsular provinces of Tavoy and Tenasserim, giving Siam a commercial outlet on the Indian Ocean.

In addition to winning a Siamese independence that was to endure almost two centuries, Naresuan laid the foundation for the military power and stability that enabled the kingdom to expand and prosper in the 17th century. He died on a military campaign in the Shan states in 1605 and was succeeded by his brother Ekathotsarot.

Narew River, east-bank tributary of the Vistula River that rises in western Belarus and flows into eastern Poland. The Narew River is 272 miles (438 km) long and drains an area of more than 10,800 square miles (28,000 square km). It rises in the Belovezhskaya Forest in western Belarus and flows westward through wooded plains and marshlands. After entering Poland it swings north near Bialystok before turning west again, after which it is joined by the Biebrza and Pisa rivers. Swinging south again, the Narew receives its largest tributary, the Bug River, before itself joining the Vistula River at a point about 20 miles (32 km) northwest of Warsaw.

Nariño, *departamento,* southwestern Colombia, bounded by the Pacific Ocean on the west and Ecuador on the south. Its population is concentrated principally in the volcanic Andean highlands above 5,000 feet (1,500 m). The densely settled Altiplano (high plateau) of Túquerres-Ipiales, which is situated on the Ecuadoran frontier, is separated by the Guáitara River from that of the departmental capital of Pasto (*q.v.*). The economy is based almost exclusively on agriculture (wheat, barley, beans, and potatoes). Bananas are cultivated in the Pacific lowlands and are exported from the port of Tumaco, which handles large, oceangoing vessels. Sulfur deposits exist at the Cumbal volcano near Ipiales. The department is also a centre of lumbering; products of that industry include sawn wood, molding, and plywood. The Pan-American Highway runs north-south through the province. Area 12,845 square miles (33,268 square km). Pop. (1992 est.) 1,163,436.

Galeras Volcano and mountain fields near Pasto, Nariño *departamento,* Colombia

Victor Englebert

Narita, city, Chiba *ken,* central Honshu, Japan. It is located approximately 30 miles (50 km) east of Tokyo, on the Ryoso Plateau. Originally an agricultural region producing rice, peanuts (groundnuts), sweet potatoes, and other vegetables, Narita developed as a temple town of the Shinshō Temple, which is visited by millions of Buddhist pilgrims each year, thus generating an extensive tourist industry. In 1966 Sanrizuka, in the eastern part of the city, became the site of the new Tokyo International Airport. The massive purchase of farmland by the government provoked dissent among the farmers, leading to political disputes that delayed the opening of the airport from its completion in 1973 until 1978. Pop. (1990) 86,708.

Närke, *landskap* (province) lying mostly in the administrative *län* (county) of Örebro, south-central Sweden. Its land area of 1,592 square miles (4,122 square km) lies between the traditional *landskap* (provinces) of Västmanland on the north, Södermanland on the east, Östergötland on the southeast, Västergötland on the southwest, and Värmland on the west. Dominating its landscape is the great central plains area, bordered by the Kils Hills (915 feet [279 m]) on the northwest and wooded heights on the south. Two of Sweden's largest lakes—Vättern and Hjälmaren—are partly within its boundaries. Based on the many small iron-ore deposits, ironworking was prevalent during the Middle Ages. Although some mining operations remain, particularly on the border with Östergötland, they have been replaced largely by forestry and its allied industries. The central plains area is one of the most agriculturally productive of central Sweden. The acreage of arable land has been greatly increased by the reclamation of swampland and by the lowering of lake levels. Among the leading industries are shoe manufacturing and food processing. Principal towns include Örebro, Kumla, and Askersund. Pop. (1994 est.) 179,769.

Narmada River, also called NARBADA, or NERBUDDA, river in central India, rising in the Maikala Range in east-central Madhya Pradesh state. Following a tortuous course through the hills of Mandla, it enters the structural trough between the Vindhya and Sātpura ranges at Marble Rocks Gorge and then flows westward across Madhya Pradesh and Gujarāt states, entering the Gulf of Cambay through an estuary 13 miles (21 km) wide, just below Bharūch. Along its 800-mile (1,300-kilometre) course, the Narmada drains the northern slopes of the Sātpura Range. Called Namade by the 2nd-century-AD Greek geographer Ptolemy, the river has always been an important route between the Arabian Sea and the Ganges River valley. Hindus believe it sprang from the body of the god Śiva, and the Narmada ranks only after the Ganges in sanctity. The *pradakṣiṇā* pilgrimage takes pilgrims from Bharūch to Amarkantak, up one bank of the river and down the other.

Narni, Latin NARNIA, town, Terni *provincia,* Umbria *regione,* central Italy, situated on a hilltop above the Nera River. It originated as the Umbrian Nequinum (later Narnia, after the Roman conquest) and was the birthplace of Pope John XIII (10th century), the Roman emperor Nerva (1st century), and the condottiere Erasmo da Narni (15th century). The town's ruined castle dates from the 14th century; the Palazzo Comunale houses paintings by the 15th-century painters Benozzo Gozzoli and Domenico Ghirlandaio. Besides its 12th-century cathedral, medieval churches include those of Santa Maria in Pensole and San Francesco. Linoleum, woodwork, and electrical appliances are manufactured. Pop. (1993 est.) mun., 20,405.

Naro-Fominsk, city and centre of a *rayon* (sector), Moscow *oblast* (province), western Russia, on the Nara River southwest of the capital. It was formed in 1926 from three villages and textile centres. The town Fominsk was totally destroyed in World War II but later reemerged with its cotton-based industries of the past replaced by a huge silk-weaving combine. Pop. (1994 est.) 60,000.

Narodnaya, Mount, Russian GORA NARODNAYA ("People's Mountain"), peak of the Nether-Polar section of the Ural Mountains in west-central Russia. Rising to 6,217 feet (1,895 m), it is the highest mountain in the Urals range. Several small glaciers are found on the slopes of Narodnaya and nearby mountains. Coniferous forests lie on the lower slopes of the mountain, giving way fairly quickly to tundra higher up. The gentler slopes are used as reindeer pasture in summer.

Narodnaya Volya, English PEOPLE'S WILL, or PEOPLE'S FREEDOM, 19th-century Russian revolutionary organization that regarded terrorist activities as the best means of forcing political reform and overthrowing the tsarist autocracy.

Narodnaya Volya was organized in 1879 by members of the revolutionary Populist party, Zemlya i Volya ("Land and Freedom"), who were disillusioned by the failure of their efforts to promote social revolution by agitating among peasants. The new group, emphasizing the need for an organized political struggle against the state structure, used terror to force political reform as well as to undermine the state. Led by Andrey I. Zhelyabov and Sofya L. Perovskaya, it elected an executive committee that planned the assassination of government officials, and even of the emperor Alexander II, who was killed by its members on March 1 (March 13, New Style), 1881. The assassins were arrested and hanged. The murder of the emperor stimulated antiterrorist sentiment in Russia, and Narodnaya Volya, its ranks already decimated by mass arrests, collapsed in the following year.

Narodnik (Russian: "Populist"), plural NARODNIKI, or NARODNIKS, member of a 19th-century socialist movement in Russia who believed that political propaganda among the peasantry would lead to the awakening of the masses and, through their influence, to the liberalization of the tsarist regime. Because Russia was a predominantly agricultural country, the peasants represented the majority of the people (*narod*): hence the name of the movement, *narodnichestvo,* or "populism."

The movement arose among the Russian intelligentsia in the 1860s and gained momentum in the 1870s. It was enhanced by dissatisfaction with Alexander II's Emancipation Manifesto of 1861, which, though liberating the peasants from serfdom, created unsatisfactory economic conditions for peasant agriculture by favouring the landowners in the redistribution of land and by imposing an involved system of collective compensation on the villages. The Narodniki embodied in their teachings a considerable amount of communist ideology gathered from Karl Marx's works, accepting, for instance, his ideas of communal ownership and production and his dislike for private enterprise. However, they modified two of Marx's fundamental principles. First, they believed in agrarian communism and disregarded the industrial proletariat, which at that time represented only a small minority of the population of Russia. Second, they adapted to their needs Marx's theory of historical development, according to which human society must progress inevitably from primitive communism to industrial capitalism and thence to the dictatorship of the proletariat. That, the Narodniki argued, would not apply to Russia, where peasant life was based on the traditional institution of communal land tenure, the *mir.* A successful change of regime would, in their view, allow Russia to skip the intermediate stage of capitalism and pass straight from primitive communism to modern socialism. The *mir* and the *artel* (a primitive village productive cooperative), the Narodniki asserted, would then naturally evolve a system of production and distribution beneficial to the community.

The activities of the Narodniki developed in the late 1860s and early 1870s in a diffuse movement known as *khozhdenie v narod* ("going to the people") in the course of which hundreds of young intellectuals, dressed in peasant clothes, canvased rural regions and incited the peasantry to rise against the system. This led to police persecution, arrests, and political trials of the Narodniki, the most famous mass trial of which was the "trial of the 193" (1878). Furthermore, the illiterate peasantry did not always respond to propaganda in the expected way and sometimes betrayed the dedicated intellectuals to the police.

The combination of peasant indifference and government persecution drove the Narodniki in the mid-1870s to a more radical program and to tighter methods of organization. The first truly Narodnik organization to emerge from this situation was the revolutionary group Zemlya i Volya (*q.v.;* "Land and Freedom"). Zemlya i Volya initially continued to work among the peasantry, but continued police persecution soon drove its members to terrorism. In 1879 Zemlya i Volya split into two groups: Narodnaya Volya (*q.v.;* "People's Will"), a terrorist party that disintegrated after it assassinated Tsar Alexander II (1881), and Chorny Peredel ("Black Repartition"), a party that continued to emphasize work among the peasantry until its members shifted their attention to the urban proletariat in the 1880s. The populist ideology of the Narodnik movement was revived by its 20th-century ideological descendant, the Socialist Revolutionary Party (*q.v.*).

narra, also called ASANA, any of several timber trees of the genus *Pterocarpus* of the pea family (Fabaceae or Leguminosae). The name refers especially to *P. indicus,* or India padauk, or the hard wood, noted for its ability to take a high polish, that is derived from the trees. Narra wood is used for cabinetwork; it is usually red or rose colour, often variegated with yellow, and is hard and heavy. The trunk of the tree is surrounded (or, occasionally, supported) by huge buttresses extending outward and upward for about 5 m (15 feet); these are sometimes made into tabletops, the pattern of the grain and the colouring being hardly equaled by any other timber. A small chip of the wood placed in water soon takes on an opalescent colour because of a substance in the wood cells. Narra wood is known also as Burmese rosewood, Andaman redwood, and kiabooca wood.

Narrabri, town, northeastern New South Wales, Australia. It lies along Narrabri Creek (tributary of the Namoi River), just west of the Nandewar Range. Surveyed in 1859 and declared a municipality in 1883, it derives its name from an Aboriginal word meaning "big creek" and "forked sticks." On the Newell Highway, with regular air and rail service to Sydney (264 miles [425 km] southeast) and Brisbane, Narrabri serves an area of dairy, sheep, cereal, and cotton farming (on the Namoi flats) and rutile mining. The town has freezing, engineering, sheet plaster, and joinery works and flour mills, sawmills, and one of the nation's largest oilseed mills. Located nearby are Mount Kaputar National Park, agricultural research centres, and the Paul Wild Observatory (the Culgoora astronomical site), which has a major array of radio telescopes. Pop. (1991) 6,694.

Narraganset, Algonquian-speaking Indian tribe that occupied most of what is now Rhode Island west of Narragansett Bay. They were grouped in eight territorial divisions, each with a chief who was in turn subject to a head chief. Their subsistence depended on the cultivation of corn (maize), hunting, and fishing.

The Narraganset maintained good relations with whites until King Philip's War (*q.v.*) in 1675–76, in which they sided with the hostile tribes. Soon after a battle at Kingston, R.I., in 1675 in which nearly 1,000 Narraganset were killed or captured, they abandoned their territory. Most joined the Mahican or Abnaki or fled to Canada, from where some later received permission to return. The latter were settled among other Algonquian groups that had remained neutral in the war. The combined tribes, known as the Narraganset, decreased in number, and in 1788 many joined Indian settlements in New York composed of remnants of various Algonquian tribes. Some joined the Mohegan in Connecticut, and a few remained near Charlestown, R.I.

Narragansett, town (township), southeastern Washington county, southern Rhode Island, U.S., at the entrance to Narragansett Bay. The Pettaquamscutt River forms the western boundary of the community, which includes the village of Narragansett Pier and the fishing villages of Galilee and Jerusalem. Near Galilee is Point Judith Lighthouse (1816), an important Coast Guard beacon. Settled in 1657–59 and set off from South Kingstown in 1888, Narragansett was named for the Narra-

Ninigret, sachem of the Narraganset; painting by an unknown American artist, 18th century

By courtesy of the Museum of Art, Rhode Island School of Design, Providence

ganset Indian tribe, dispersed by King Philip's War (1675–76). Inc. 1901. Pop. (1990) 14,985.

Narragansett Bay, inlet of the North Atlantic, extending northward (from Rhode Island Sound) for 28 mi (45 km) into Rhode Island, U.S., almost dividing the state into two parts. The bay is 3 to 12 mi wide and receives the Taunton, Providence, and Sakonnet rivers. It includes Rhode, Prudence, and Conanicut islands and Mt. Hope Bay (a northeastern arm), which is crossed by one of New England's longest bridges. Since colonial times, the bay has been an active shipping centre, the chief ports being Providence (capital of Rhode Island) and Newport. Much of the bay's area is devoted to fishing and recreation.

Mt. Hope Bay, an arm of Narragansett Bay

J.L. Stage—Photo Researchers/EB Inc.

Narrandera, town, south central New South Wales, Australia, on the Murrumbidgee River. Settled in 1863 as a livestock station, it was proclaimed a town in 1880 and given an Aboriginal name meaning "place of lizards." Gazetted a borough in 1885, it was merged with Yanco Shire in 1960. Lying within the Murrumbidgee Irrigation Areas, it serves, with the nearby towns of Leeton and Griffith, a district producing beef, fodder, merino sheep, poultry, fruit, wheat, and wool. Industries include flour mills and sawmills and factories for concrete, pipe, building stone, cordials, and plasterboard. Narrandera is at the junction of the Newell and Sturt highways and has rail and air connections to Sydney, 272 mi (438 km) east-northeast, and to Melbourne. Pop. (1981) 5,013.

Narrogin, town, southwestern Western Australia. It developed in the 1880s, when the Great Southern Railway came through the site, and a hotel was erected at the trackside. The settlement grew around the hotel and became a town in 1895. Its name derives from the Aboriginal term *gnargajin,* meaning "water hole." Situated on the Great Southern Highway and near Albany Highway, the town is the junction of rail lines extending east to the Wheat Belt (*q.v.*), west and south to the coast, and northwest to Perth (105 mi [170 km]). It is a market for the grain, wool, and pigs produced in the area. Large mallet-tree (eucalyptus or gum-tree) plantations yield tannin. The Narrogin Farm School was founded in 1914. Pop. (1981) 4,969.

narrow-mouthed toad, any amphibian of the family Microhylidae, which includes more than 50 genera and more than 200 species. Narrow-mouthed toads are found in North and South America, Africa, Asia, and Australia. Typically, they are small, stocky, and smooth skinned with short legs, small heads, pointed snouts, and narrow mouths. They live on land, underground, or in trees and are generally secretive in nature. Most species are less than five centimetres (two inches) long.

Eastern narrow-mouthed toad (*Gastrophryne carolinensis*)

George Porter from The National Audubon Society Collection/Photo Researchers—EB Inc.

The eastern narrow-mouthed toad, *Gastrophryne carolinensis,* is a small, terrestrial microhylid of the United States. It is gray, reddish, or brown with darker stripes, spots, or blotches. The Mexican narrow-mouthed toad, or sheep frog (*Hypopachus cuneus*), is similar but is larger and has a yellow stripe on its back. It hides in burrows, pack rat nests, or, as does the eastern narrow-mouth, under objects lying on the ground.

A variety of microhylids are found in Asia and Africa. The genus *Breviceps* includes a number of plump, short-faced, African species. These live and breed on land. The rain frog (*B. gibbosus*) is a burrowing South African form that is thought by the natives to control the coming of rain.

Among the Oriental microhylids are *Glyphoglossus molossus*, a pug-nosed native of southeastern Asia, and *Kaloula pulchra*, a frequent visitor to gardens in China and Malaya. The African genus *Phrynomerus* (sometimes separated as the family Phrynomeridae) includes about six species of arboreal frogs; *P. bifasciatus* is a black and red, striped form whose skin secretions are strong enough to irritate human skin.

Narses, also spelled NARSEH (d. *c.* 302), king of the Sāsānian Empire whose reign (293–302) saw the beginning of 40 years of peace with Rome.

Narses was the youngest son of an earlier king, Shāpūr I. On the death of Bahrām II (293), Narses, at that time viceroy of Armenia, successfully contested the succession of Bahrām's son, Bahrām III. Narses later antagonized Rome by occupying the independent portion of Armenia. In the following year he suffered a severe reversal, losing his war chest and his harem. He then concluded a peace (296), by the terms of which Armenia remained under Roman suzerainty, and the steppes of northern Mesopotamia, with Singara and the hill country on the left bank of the Tigris as far as Gordyene, were also ceded to the victors. In return Narses recovered his household. By this peace, which lasted for 40 years, the Sāsānians withdrew completely from the disputed districts.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Narses (b. *c.* 480, Armenia—d. 574, probably Rome or Constantinople), Byzantine general under Emperor Justinian I; his greatest achievement was the conquest of the Ostrogothic kingdom in Italy for Byzantium.

A eunuch, Narses became commander of the imperial bodyguard of eunuchs and eventually rose to be grand chamberlain. When rioting broke out in Constantinople in 532, Narses helped save Justinian's throne both by timely military action and by skillful and lavish political bribes. He was sent to Alexandria (535) to ensure the establishment of the imperial candidate Theodosius as patriarch and to quell disturbances that had arisen from the election. In 538 he became imperial treasurer and was sent to Italy to assist Belisarius, commander of an expedition for the reconquest of Italy, but was also ordered to spy upon him. The rivalry, misunderstanding, and mutual antipathy between the two soon paralyzed all military operations and led to the recapture and devastation of Milan by the Ostrogoths. Consequently, Justinian recalled Narses in 539.

In the summer of 551, Narses was in charge of operations against barbarian raiders, mainly Huns, Gepids, and Lombards, who were devastating the Balkans. Later that year, with the resurgence of Ostrogothic power in Italy under Totila, Narses headed for Italy with 30,000 troops. He defeated the Ostrogothic forces under Totila (who died of his wounds) in June 552, at Taginae in the Apennines. During the next two years, he crushed scattered Ostrogothic resistance and stopped attempts by the Franks and Alemanni to enter northern Italy.

Narses seems to have exercised both military and civil authority in Italy until the death of Justinian I. In 567, however, Justinian's successor, Justin II, removed him from his command, and he retired to a villa near Naples. When the Lombards invaded Italy and conquered large parts of it the following year, it was rumoured that Narses had retaliated for his dismissal by inviting the Lombards into Italy, but this report has never been confirmed.

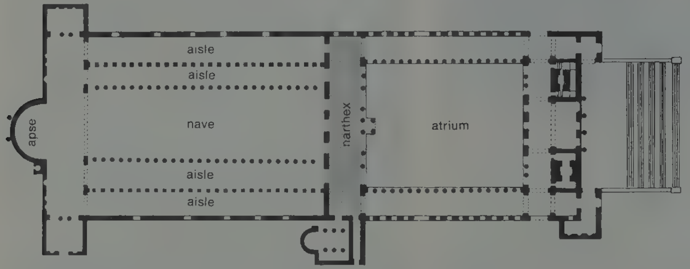
Narsimhapur, also called NARSINGHPUR, town, administrative headquarters of Narsimhapur district, Madhya Pradesh state, central India, on the Singri River. Once called Chhoṭa Gadarwara, the town was renamed Narsinghpur after the Narasiṃha (the man-lion, an incarnation of Vishnu) temple, erected *c.* 1800. The Singri River divides the town into two parts, Kandeli (east) and Narsimhapur (west). It is a rail junction and is heavily engaged in trade in agricultural produce and timber. Sawmilling is the chief industry. There is a government college affiliated with the University of Saugar.

Narsimhapur district (1,984 sq mi [5,138 sq km]) occupies a narrow alluvial strip between the Narmada River (north) and the Sātpura Range (south). Wheat, jowar (sorghum), gram (chick-pea), and oilseeds are the chief crops. Forest products are important, and coal deposits are worked. Pop. (1981) town, 34,226; (1991) district, 784,523.

Narsinghgarh, also called NARSINGARH, town, Rājgarh district, Madhya Pradesh state, central India. A major road and rail junction, it is an agricultural market centre. Cloth weaving is the chief industry. Founded in 1681, it served as capital of the former princely state of Narsinghgarh. The town is adjacent to a lake backed by a hill ridge on which the fort and palace stand. There are a musical academy and a government college affiliated with Vikram University. Pop. (1981) 17,572.

narthex, long, narrow, enclosed porch, usually colonnaded or arcaded, crossing the entire width of a church at its entrance. The narthex is usually separated from the nave by columns or a pierced wall, and in Byzantine churches the space is divided into two parts. An exonarthex forms the outer entrance to the building and bounds the esonarthex, which opens onto the nave. Occasionally the exonarthex does not form an integral part of the main body of the church but consists of a single-storied structure set against it.

In the early days of Christianity the narthex was the only portion of the church to which catechumens (those preparing for the sacrament of Baptism) and penitents were admitted.



Location of the narthex on a plan of the original basilican church of St. Peter's, Rome, AD 330

From Sir Banister Fletcher, *A History of Architecture on the Comparative Method*, p. 259 (1961)

Naruszewicz, Adam (Stanisław) (b. Oct. 20, 1733, Pinsk, Russia—d. July 6, 1796, Janów, Poland), first Polish historian to use modern methods of scholarship and a poet whose work reflects the transition from the Baroque to the classical style.

As a young man Naruszewicz entered the Roman Catholic Church. He eventually became bishop of Smolensk.

Naruszewicz' most important work is *Historja narodu polskiego od przyjęcia chrzesścijaństwa*, 7 vol. (1780–86; "The History of the Polish Nation from its Conversion to Christianity"), which records events to the end of the 14th century. Aided in this task by King Stanisław August, who obtained many documents from archives abroad, he used as many primary sources as possible and included not only accounts of kings and battles but also descriptions of the economic, social, and cultural life of each period.

Naruto, city, Tokushima Prefecture (*ken*), Shikoku, Japan, facing the Naruto-kaikyō (Naruto Strait), which connects the Inland Sea with the Pacific Ocean. During the Tokugawa era (1603–1867) Naruto was a flourishing port and centre of salt manufacture. Since the late 19th century, chemicals and medicines have been produced there. Traditional products include socks and knitwear. Fishing and the gathering of seaweed are still important.

Naruto is perhaps best known as a base for viewing the Naruto-kaikyō, popularly known as the Awa no Naruto (Roaring Gateway of Awa Province), a strait 1 mi (1.5 km) wide that is filled with rushing water and whirlpools at each ebb and flow of the tide. Pop. (1995 prelim.) 64,923.

Naruto-kaikyō (Naruto Strait), between Shikoku and Awaji islands, Japan

Kokunai Jigyo Kouku

Narva, German NARWA, city, Estonia. It lies along the Narva River 9 mi (14 km) above the latter's outfall into the Gulf of Finland. It was founded in the 13th century and quickly became a substantial commercial city. Occupied first by Russia (1558–81) and then by Sweden, it was important as the scene of Peter I the Great's defeat by the Swedes in 1700 and his subsequent victory, reconquering Narva for Russia, by means of a siege in 1704.

Since the 1850s Narva has been a major cotton textile centre. It also manufactures jute and hemp products and furniture. It has a technical school and a historical museum. Pop. (1998 est.) 74,572.

Narváez, Panfilo de (b. *c.* 1478, Valladolid, Castile—d. November 1528, Gulf of Mexico), Spanish conquistador, colonial official, and explorer.

Narváez entered military service as a youth and arrived in Jamaica as one of the island's first settlers. Later, he commanded a company of archers during Diego Velásquez' campaign to conquer and pacify Cuba. He was rewarded for his services with public offices and extensive land grants on the island. In March 1520 he left Cuba, commanding a fleet of ships and about 900 men with orders from Velásquez to capture and replace Hernán Cortés as ruler of Mexico. Cortés, who had been charged with treason and disloyalty, defeated the expedition. Narváez was taken prisoner with most of his men; he was released the next year on orders from Spain and returned to Cuba.

In 1526 Narváez received authorization and numerous governing titles from Charles V to subdue and colonize vast lands from Florida westward. He sailed from Spain on June 17, 1527, with five ships and about 600 soldiers, sailors, and colonists. In Santo Domingo, 140 men deserted the expedition, and in Cuba, a hurricane sank two of the ships, killing 50 men and several horses. Narváez remained in Cuba until late February 1528, then sailed with five ships and 400 followers to the region around Tampa Bay in Florida. After claiming the land for Spain, Narváez began an overland expedition in May with about 300 men. The force made a difficult and distressing march northward, continually fighting Indians, until the survivors reached the area of present-day St. Marks, Fla., near the end of July.

Since the vessels from the expedition failed to come to their aid, Narváez' suffering survivors had to construct additional ships. They built five vessels, and in late September, 245 men sailed along the coast, hoping to reach Mexico. The ships drifted along the northern part of the Gulf of Mexico, passing Pensacola Bay and the mouth of the Mississippi River. As the journey progressed, the boats were gradually lost, and at about the beginning of November 1528, Narváez disappeared when his own vessel was suddenly blown out to sea. Only four men survived the expedition.

Narváez, Ramón María, DUQUE (duke) DE VALENCIA (b. Aug. 5, 1800, Loja, Granada, Spain—d. April 23, 1868, Madrid), Spanish general and conservative political leader, who supported Queen Isabella II of Spain and was six times prime minister (1844–66).

During the First Carlist War (1833–39) he was one of Regent María Cristina de Borbón's most capable military leaders. In 1838 he was elected to the Spanish Cortes (parliament), led an unsuccessful rising at Seville against the Progresistas (Liberals) of Gen. Baldomero Espartero, and had to go into exile.

After he and the generals Juan Prim and Francisco Serrano staged a successful coup d'etat against Espartero in 1843, Narváez was asked to form a government under Isabella II. In his first ministry the constitution of 1845 was promulgated, and the finance minister, Alejandro Mon, reformed the tax system. His government fell early in 1846.

Narváez reached other significant achievements in his third ministry (October 1847–January 1851), among them suppression of a new Carlist revolt and the completion of numerous public works. Although he announced his retirement in 1851, he returned briefly to power three times, always in the service of Isabella II, who was deposed a few months after his death.

Narvik, town and ice-free seaport, Nordland *fylke* (county), northern Norway, near the head of Ofotfjorden. It is a major transshipment point for iron ore from the rich Kiruna-Gällivare mines in northern Sweden, since the Swedish ports on the Gulf of Bothnia are frozen in winter. The site was chosen as an ore port by an Anglo-Swedish consortium in 1883 and was named Victoriahavn (Victoria's Port) in 1887 to honour the Crown Princess of Sweden. The original developers went bankrupt in 1889, but the Norwegian government took over the work in 1892; the name Narvik was adopted in 1898. The town was incorporated in 1902 and grew rapidly after the completion of one of the world's most northerly rail lines. In World War II, Narvik was seized by German forces during their invasion of Norway (April 1940); important naval battles between British and German forces were fought offshore. An Anglo-French expeditionary force aided in re-capturing the port on May 28 but

Iron ore for shipment out of Narvik, an ice-free seaport in northern Norway

Tommy Olofsson/Mira/Samfoto

was compelled to evacuate it on June 9, owing to the collapse of the front in France. After the war Narvik was rebuilt and resumed its function as an ore port. This export trade and some fishing are its economic mainstays. Pop. (1999 est.) mun., 18,499.

Narwar, historic town, northern Madhya Pradesh state, central India, just east of the Sind River. Traditionally said to have been the capital of Raja Nala of the Sanskrit epic *Mahābhārata,* the town was called Nalapura until the 12th century. Its fort, which stands on a steep scarp of the Vindhya Range, figured significantly in medieval Indian history. From the 12th century onward, Narwar was held successively by Kachwāhā, Parihār, and Tomar Rājputs (warrior caste) until its capture by the Mughals in the 16th century. It fell to the Marāṭhā chief Sindhia in the early 19th century. Outside the walled town are memorial pillars of the Tomar chiefs.

narwhal, also spelled NARWAL, or NARWHALE (species *Monodon monoceros*), small whale belonging to the family Monodontidae, found along coasts and, sometimes, in rivers throughout the Arctic. Mottled gray in colour, the narwhal is usually about 3.5 to 5 m (11.5 to 16 feet) long. It lacks a dorsal fin and has only two teeth, both at the tip of the upper jaw. The left tooth develops in the male into a straight tusk protruding forward from the upper lip. This tusk, prized in medieval times as the fabled horn of the unicorn, grows up to 2.7 m (8.9 feet) in length and is grooved on the surface in a left-handed spiral. Rare males may develop two tusks; females usually develop none. The tusk has no known function; it is believed to have developed as a result of sexual selection. The narwhal is a gregarious whale usually found in groups of 15 to 20. It feeds on fish, cephalopods, and crustaceans and is hunted by the Eskimos.

Narwhal (*Monodon monoceros*)

Painting by Richard Ellis

Naryn, *oblast* (province), southeastern Kyrgyzstan, with an area of 18,300 square miles (47,300 square km). The least accessible part of the republic, inhabited mainly by Kyrgyz people, it occupies the inner Tien Shan at an elevation of 4,300 feet (1,300 m) or more and is separated from the rest of Kyrgyzstan by mountain ranges. On the frontier with China in the south, the Kokshaal-Tau Range rises to 19,626 feet (5,982 m). The climate is continental, and annual precipitation is only 8 to 12 inches (200 to 300 mm) in the valleys. Sheep, raised on the extensive steppe and alpine pastures, are the mainstay of the economy. There is little industry, but the exploitation of the hydroelectric potential of the Naryn River, which bisects the oblast east-west, was begun with the Atbashi power station (1970) near the administrative centre, Naryn. The sparse population is concentrated in the Kochkor, Dzhumgol, middle Naryn, Atbashi, and Toguz-Tarau valleys. Pop. (1993 est.) 267,000.

Naryn, city and administrative centre of Naryn *oblast* (province), Kyrgyzstan. It lies along the Naryn River at an elevation of 6,725 feet (2,050 m). Founded as a fortified point on the trade route from Kashgar in Sinkiang to the Chu River valley, it was made a city in 1927. Naryn has a number of small industries and a music and drama theatre. Pop. (latest est.) 30,409.

Naryn River, river in Kyrgyzstan and Uzbekistan that is fed by the glaciers and snows of the central Tien Shan (mountains). It becomes the Syrdarya (river) after merging with the Karadarya in the Fergana valley. The Naryn River flows westward for 430 miles (700 km), receiving many tributaries and draining an area of 22,540 square miles (58,370 square km). High water occurs in May. The reservoirs of the Toktogul and Uchkurgan hydroelectric stations help regulate the Naryn's flow and increase irrigation in the area.

Naryshkina, Natalya Kirillovna (b. 1651, Russia—d. 1694, Moscow), second wife of Tsar Alexis of Russia and mother of Peter I the Great. After Alexis' death she became the centre of a political faction devoted to placing Peter on the Russian throne.

The daughter of the provincial nobleman Kirill Naryshkin, Natalya married the tsar in 1671. After she gave birth to Peter, Natalya and her relatives and associates increased their political influence.

Immediately after Alexis' death, Natalya's adherents, known as the Naryshkin party, tried to obtain the throne for Peter. But Fyodor, the eldest son of Alexis by his first wife, succeeded his father, and the Naryshkin party lost influence to Fyodor's maternal relatives, the Miloslavsky family. Nevertheless, during Fyodor's reign (1676–82), Natalya, though living in relative obscurity, gained the additional support of the patriarch of Moscow, Ioakim, and of many boyar and gentry families.

When Fyodor died, Ioakim bypassed Ivan, the late tsar's brother, and secured the throne for Peter, naming Natalya regent (April 1682). But the Miloslavsky family, claiming the throne for Ivan, encouraged the *streltsy* (sovereign's bodyguard), who were the only organized armed force in Moscow, to revolt. After several members of the Naryshkin family had been killed, the Naryshkin party submitted and recognized Ivan V and Peter as corulers, with Ivan as the senior tsar and his sister Sophia as regent for both youths.

During the period of Sophia's regency (1682–89), Natalya and Peter were effectively confined to Preobrazhenskoye, and the Naryshkin family was again excluded from governmental affairs. But in 1689, when Sophia apparently tried to seize the throne in her own name, the Naryshkins rallied their supporters and forced her to yield the throne to Peter (September 1689). Subsequently, until Peter assumed personal control over the government in 1694, Natalya, aided by her brother Lev and Patriarch Ioakim, played the major role in the Muscovite government.

Nás, An (Ireland): *see* Naas.

NASA: *see* National Aeronautics and Space Administration.

nasal, in phonetics, speech sound in which the airstream passes through the nose as a result of the lowering of the soft palate (velum) at the back of the mouth. In the case of nasal consonants, such as English *m, n,* and *ng* (the final sound in "sing"), the mouth is occluded at some point by the lips or tongue and the airstream is expelled entirely through the nose. Sounds in which the airstream is expelled partly through the nose and partly through the mouth are classified as nasalized. Nasalized vowels are common in French (*e.g.,* in *vin* "wine," *bon* "good," and *enfant* "child"), Portuguese, and a number of other languages. There are also instances of nasalized consonants in which the feature of nasalization carries over to a typically nonnasal consonant (*e.g.,* the *l* in French *branlant,* "shaky").

nasal concha, also called TURBINATE, or TURBINAL, any of several thin, scroll-shaped bony elements forming the upper chambers of the nasal cavities. They increase the surface area of these cavities, thus providing for rapid warming and humidification of air as it passes to the lungs. In higher vertebrates the olfactory epithelium is associated with these upper chambers, resulting in keener sense of smell. In humans, who are less dependent on the sense of smell, the nasal conchae are much reduced. The components of the nasal conchae are the inferior, medial, superior, and supreme turbinates.

nasal gland, in marine birds and reptiles that drink saltwater, gland that extracts the salt and removes it from the animal's body. Its function was unknown until 1957, when K. Schmidt-Nielsen and coworkers solved the long-standing problem of how oceanic birds can live without fresh water. They found that a gland, located above each eye, removes sodium chloride from the blood far more efficiently than does the avian kidney and excretes it as brine through a duct into the nasal cavity. It is discharged from the nostrils (sometimes the mouth) in headshaking movements characteristic of cormorants, penguins, and other marine species. In marine reptiles a similar gland is located between eye and nostril.

nasal polyp, lump of tissue that protrudes into the nasal cavity and sometimes obstructs it. Polyps can form as the result of allergic conditions or of inflammation and infection. Allergic polyps are usually bright red because of their extensive network of blood vessels. These polyps are most common along the side and upper walls of the nose. Sometimes they arise in the sinus cavities and emerge into the nasal cavity. They may be treated with drugs (by spray or injection) or excised surgically, but usually they recur until the allergic source is eliminated. Inflammatory polyps result from infections and from injuries to the nose. They do not recur after removal. These polyps contain less fluid than allergic polyps do, but there is an abundance of white blood cells. Polyps can also sometimes arise from closely associated blood vessels that expand as a result of previous injuries to the nose or of high blood pressure.

nasal tumour, abnormal growth in the nose. Tumours may be malignant or may remain localized and nonrecurrent. The nose is a common site for tumour growth in the upper respiratory tract because it is exposed to external weather conditions, as well as irritants in the air. Some nasal tumours arise from the mucous membrane that lines the nose; others originate in the brain and spread to the nose.

Epithelial papilloma is one of the more common benign nasal tumours. It affects the nasal mucous membrane and is composed of tall column-shaped cells, mucous cells, which have small hairlike structures called cilia. The tumour grows in small nipplelike protrusions. Nasal carcinoma, a malignant growth, also is found in the nasal mucous membrane. Frequently this type of tumour obstructs the nasal and sinus cavities; it can also erode the bone by invasion and rapid growth. Nasopharyngeal carcinoma is a cancer found at the extreme back of the nasal cavity, near the juncture with the throat. It arises commonly in males and spreads rapidly to the lymphatic nodes in the neck. It spreads under the surface mucous membrane without ulceration of the membrane.

Olfactory neuroblastoma is a highly malignant tumour that originates in the olfactory (smell) receptor cells, located in the upper rear portion of the nose. This tumour is one of the few that can generally be obliterated with radiation treatment.

Nasby, Petroleum V., in full PETROLEUM VESUVIUS NASBY, pseudonym of DAVID ROSS LOCKE (b. Sept. 20, 1833, Binghamton, N.Y., U.S.—d. Feb. 15, 1888, Toledo, Ohio), American humorist who had considerable influence on public issues during and after the American Civil War.

From an early age Locke worked for newspapers in New York and Ohio. In 1861, as editor of the *Findlay* (Ohio) *Jeffersonian,* he published the first of many satirical letters purporting to be written by one Petroleum V. Nasby. For over 20 years Locke contributed "Nasby Letters" to the *Toledo Blade,* which under his editorship gained national circulation. Many of the letters appeared also in such books as *The Nasby Papers* (1864) and *The Diary of an Office Seeker* (1881).

Petroleum V. Nasby

By courtesy of the Library of Congress, Washington, D.C.

An ardent Unionist and foe of slavery, Locke vigorously supported the Northern cause. His chief weapon was a heavy irony, with his character Nasby, a coarse and vicious "Copperhead," arguing illiterately the Southern position. Used for a serious end, such verbal fooling delighted Northern readers, including President Abraham Lincoln, who occasionally read Nasby letters to his cabinet.

Nascimento, Edson Arantes do: *see* Pelé.

Nascimento, Francisco Manuel do, pseudonym FILINTO ELÍSIO (b. Dec. 23, 1734, Lisbon, Port.—d. Feb. 25, 1819, Paris, France), the last of the Portuguese Neoclassical poets, whose conversion late in life to Romanticism helped prepare the way for that movement's triumph in his country.

Of humble birth and probably illegitimate, Nascimento was educated by Jesuits and ordained in 1754. In 1768 he became tutor to the daughters of the Marquis of Alorna and fell in love with one of them, the "Maria" of his poems. Disapproving of the low-born poet's affection for his daughter, the marquis may have been ultimately responsible for Nascimento's being denounced to the Inquisition in June 1778. He succeeded in escaping to France and there, except for some four years spent in The Hague during the revolutionary Terror, he remained, living by translations and by taking private pupils.

The themes of Nascimento's poetry—which is usually in blank verse, polished, robust, but often overladen with archaisms—range from denunciations of the tyranny of the aristocracy, the Inquisition, and the hierarchy to homely evocations of the joys of life in his native land and laments on the poverty and loneliness of exile. His demonstration of the flexibility and richness of the Portuguese language, his choice of themes, and his translations of such works as Christoph Wieland's *Oberon* and the Viscount de Chateaubriand's *Les Martyrs* influenced the Romantic writers.

Nasdaq, acronym for NATIONAL ASSOCIATION OF SECURITIES DEALERS AUTOMATED QUOTATIONS, American market for over-the-counter (OTC) securities. It is a subsidiary of the National Association of Securities Dealers (NASD) and is monitored by the Securities and Exchange Commission (SEC).

Nasdaq, created by NASD in 1971, is an automated quotation system that reports on trading of domestic securities not listed on the regular stock markets. By the 1990s it had grown into the second largest securities market in the United States and the third largest in the world. In 1992 it was linked to the International Stock Exchange in London, forming the first intercontinental linkage of markets.

Nasdaq lists more than 5,000 securities. To be a member a company must register with the SEC, have at least two market makers (a market maker is a brokerage firm that acts as a principal on either side of an OTC transaction), and meet minimum requirements for assets, capital, public shares, and shareholders. It publishes two composite price indexes daily and also bank, insurance, other finance, transportation, utilities, and industrial indexes.

Naseby, Battle of (June 14, 1645), battle fought about 20 miles (32 km) south of Leicester, Eng., between the Parliamentary New Model Army under Oliver Cromwell and Sir Thomas Fairfax and the royalists under Prince Rupert of the Palatinate; it largely decided the first phase of the English Civil Wars. The New Model Army had been following in pursuit of the royalists, who had left Oxford and stormed Leicester on May 30. The two armies met about a mile north of Naseby and deployed along parallel ridges between which lay a valley known as Broad Moor. The royalists, though outnumbered 14,000 to nearly 10,000, attacked all along the line. Rupert was successful in driving back the left wing of Parliamentary cavalry under General Henry Ireton but made the mistake of engaging in wild pursuit, thus leaving the beleaguered royalist infantry in the centre unsupported. The more disciplined Parliamentary cavalry on the right under Cromwell was then able to regroup and deliver a decisive assault on the centre. As a result the royalist army was completely routed, with the Parliamentarians taking about 4,000 prisoners and the royalists' artillery. With the loss of his best infantry regiments at Naseby, King Charles I could no longer meet the New Model Army in open battle and had effectively lost the war.

Naselli, Alberto, Naselli also spelled NASELI: *see* Ganassa, Zan.

Nāṣer, Jamal ʿAbd an- (Egyptian president): *see* Nasser, Gamal Abdel.

Nāṣer od-Dīn Shāh, also spelled NASIR AD-DIN SHAH (b. July 17, 1831, Tehrān, Iran—d. May 1, 1896, Tehrān), Qājār shah of Iran (1848–96) who began his reign as a reformer but became increasingly conservative, failing to understand the accelerating need for change or for a response to the pressures brought by contact with the Western nations.

Although a younger son of Moḥammad Shāh, Nāṣer od-Dīn was named heir apparent through the influence of his mother. Serious disturbances broke out when he succeeded to the throne on his father's death in 1848, but these were quelled through the efforts of his chief minister, Mīrzā Taqī Khān. Under Taqī Khān's influence, Nāṣer od-Dīn began his rule by instituting a series of needed reforms. Taqī Khān, however, was later forced from power by his enemies, who included Nāṣer od-Dīn's mother, and was disgraced, imprisoned, and finally murdered. In 1852 an attempt was made on Nāṣer od-Dīn's life by two Bābīs (members of a religious sect considered heretical); he responded with a fierce, cruel, and prolonged persecution of the sect.

Unable to regain territory lost to Russia in the early 19th century, Nāṣer od-Dīn sought compensation by seizing Herāt, Afg., in 1856. Great Britain regarded the move as a threat to British India and declared war on Iran, forcing the return of Herāt as well as Iranian recognition of the kingdom of Afghanistan.

Nāṣer od-Dīn was effective in certain areas. He curbed the secular power of the clergy, introduced telegraph and postal services, built roads, opened the first school offering education along Western lines, and launched Iran's first newspaper. He visited Europe in 1873, 1878, and 1889 and was impressed with the technology he saw there. In the later years of his rule, however, he steadfastly refused to deal with the growing pressures for reforms. He also granted a series of concessionary rights to foreigners in return for large payments that went into his own pockets. In 1872 popular pressure forced him to withdraw one concession involving permission to construct such complexes as railways and irrigation works throughout Iran. In 1890 he made an even greater error in granting a 50-year concession on the purchase, sale, and processing of all tobacco in the country, which led to a national boycott of tobacco and the withdrawal of the concession. This last incident is considered by many authorities to be the origin of modern Iranian nationalism. Increasingly unpopular among various Iranian factions, Nāṣer od-Dīn was assassinated in Tehrān by a fanatic.

Nash, John (b. 1752, London, Eng.—d. May 13, 1835, Cowes, Isle of Wight), English architect and city planner best known for his development of Regent's Park and Regent Street, a royal estate in north London that he partly converted into a varied residential area which still provides some of London's most charming features. Begun in 1811, this major project was named for Nash's official patron, George, Prince of Wales, at that time regent for his father, King George III.

Trained by the architect Sir Robert Taylor, Nash became a speculative builder and architect in London. After going bankrupt in 1783 he moved to Wales, where, as a country-house architect, he rehabilitated himself professionally. In the late 1790s he returned to London as an informal partner of the landscape gardener Humphry Repton. From 1798 he was employed by the Prince of Wales. Soon acquiring considerable wealth, Nash built for himself East Cowes Castle (from 1798), which had much influence in the early Gothic Revival period.

In 1811 Marylebone Park reverted to the crown, and on that land Nash laid out Regent's Park. This development comprises the Regent's Canal, a lake, a large wooded area, a botanical garden, and, on the periphery, shopping arcades and picturesque groupings of residences (for working class as well as more prosperous families). Nash's East and West Park Villages (completed after his death

Cumberland Terrace, Regent's Park, London, by John Nash, begun 1811

Richard Waite/ARCAID

by James Pennethorne) served as models for "garden suburbs" of separate houses informally arranged. Regent Street, with its colonnades (demolished 1848) and its Quadrant leading into Piccadilly Circus, was finished about 1825.

From 1813 to 1815 Nash held the government post of deputy surveyor general. He rebuilt the Royal Pavilion, Brighton, Sussex (1815–23), in a fanciful "Hindoo" style at enormous financial cost. He also redesigned St. James's Park, London (1827–29), and began to reconstruct Buckingham House, London, as a royal palace (from 1821). When George IV died in 1830, Nash was dismissed before he could complete the Buckingham Palace project, and in 1831 he faced an official inquiry into the cost and structural soundness of the building.

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Nash, John F. (b. 1928, Bluefield, W.Va., U.S.), American mathematician who was awarded the 1994 Nobel Prize in Economics for his landmark work, first begun in the 1950s, on the mathematics of game theory (*q.v.*). He shared the Nobel Prize with Hungarian-American economist John C. Harsanyi and German mathematician Reinhard Selten.

In 1948 Nash received bachelor's and master's degrees in mathematics from the Carnegie Institute of Technology (now Carnegie-Mellon University) in Pittsburgh, Pa. Two years later, at age 22, he completed his doctorate at Princeton University, publishing his influential thesis "Non-cooperative Games" in the journal *Annals of Mathematics.* He joined the faculty of the Massachusetts Institute of Technology in 1951 but resigned in the late 1950s after bouts of mental illness. He then began an informal association with Princeton.

Nash established the mathematical principles of game theory, a branch of mathematics that examines the rivalries among competitors with mixed interests. Known as the Nash solution, or the Nash equilibrium, his theory attempted to explain the dynamics of threat and action among competitors. Despite its practical limitations, the Nash solution was widely applied by business strategists.

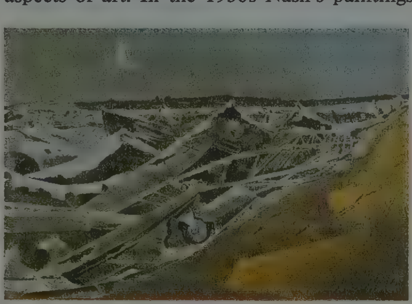
Nash, Ogden, in full FREDERIC OGDEN NASH (b. Aug. 19, 1902, Rye, N.Y., U.S.—d. May 19, 1971, Baltimore, Md.), American writer of humorous poetry who won a large following for his audacious verse.

After a year at Harvard University (1920–21), Nash held a variety of jobs—advertising, teaching, editing, bond selling—before the success of his poetry enabled him to work full-time at it. He sold his first verse (1930) to *The New Yorker,* on whose editorial staff he was employed for a time. With the publication of his first collection, *Hard Lines* (1931), he began a 40-year career during which he produced 20 volumes of verse with such titles as *The Bad Parents' Garden of Verse* (1936), *I'm a Stranger Here Myself* (1938), and *Everyone but Thee and Me* (1962). Making his home in Baltimore, he also did considerable lecturing on tours throughout the United States. He wrote the lyrics for the musicals *One Touch of Venus* (1943) and *Two's Company* (1952), as well as several children's books.

His rhymes are jarringly off or disconcertingly exact, and his ragged stanzas vary from lines of one word to lines that meander the length of a paragraph, often interrupted by inapposite digressions. He said he learned his prosody from the unintentional blunders of the notoriously slipshod poet Julia Moore, the "Sweet Singer of Michigan."

Nash, Paul (b. May 11, 1889, London, Eng.—d. July 11, 1946, Boscombe, Hampshire), painter, printmaker, illustrator, and photographer, who was appointed (1917 and 1940) an official war artist by the British government in both World Wars I and II.

Nash studied at the Slade School, London. In 1914 he enlisted in the Artists' Rifles, and his 1918 exhibition of paintings portrayed, in an abstract, Cubist-influenced style, shattered war landscapes such as "The Menin Road" (1918). There followed seascapes and landscapes of distinguished design and cool, vibrating colours. He was largely responsible in 1933 for organizing Unit One, a group of British artists including Ben Nicholson, Barbara Hepworth, and Henry Moore, who stressed the formal instead of the mimetic aspects of art. In the 1930s Nash's paintings developed freer design and richer colour, together with a symbolic vision influenced by Surrealism. One of his best-known paintings of World War II was "Totes Meer" (1940–41; "Dead Sea"). His later paintings reveal his imaginative poetic symbolism.



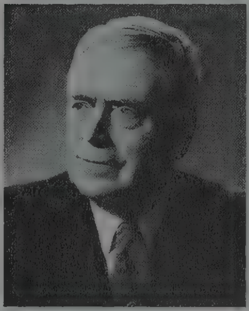
"Totes Meer," oil painting by Paul Nash, 1940–41; in the Tate Gallery, London

By courtesy of the trustees of the Tate Gallery, London

Nash, Richard Southwell Bourke, Lord: *see* Mayo, Richard Southwell Bourke, 6th Earl of.

Nash, Sir Walter (b. Feb. 12, 1882, Worcestershire, Eng.—d. June 4, 1968, Auckland, N.Z.), New Zealand statesman who was prime minister in 1957–60 and who earlier, as finance minister during the Great Depression and through World War II, guided the Labour Party's economic recovery program and then directed the government's wartime controls.

While continuing his self-education, Nash worked as a costing clerk around Birmingham and became a wholesale confectionery merchant in 1907. He emigrated to New Zealand in 1909, soon joining the Labour Party, and from 1919 to 1960 he was a member of the party's executive. He entered Parliament in 1929 and became the first Labour minister of finance in 1935. In 1938 he was named to head the newly formed social security program, which provided guaranteed medical care and improved pensions.



Sir Walter Nash, 1966

Ronald D. Woolf—Camera Press

Nash was deputy prime minister from 1940 to 1949. During World War II he introduced a program to control prices, wages, and costs; raise taxes; impose rationing; and increase family welfare benefits—a program under which New Zealanders experienced a smaller decline in their standard of living than did the peoples of other Allied nations. From 1942 to 1944 Nash also served as New Zealand's minister to the United States and as a member of the Pacific War Council. He was a delegate to the United Nations financial conference at Bretton Woods, N.H. (1944).

After leading the Labour Party opposition in Parliament during 1950–57, Nash served as prime minister and minister of external affairs and Maori affairs (1957–60). He headed the Labour opposition again from 1960 to 1963. In foreign policy, he opposed the United States' involvement in Vietnam and favoured the seating of the People's Republic of China in the United Nations. Nevertheless, he supported New Zealand's defense treaties with the United States. He was knighted in 1965.

Nashe, Thomas, Nashe also spelled NASH (b. 1567, Lowestoft, Suffolk, Eng.—d. *c.* 1601, Yarmouth, Norfolk?), pamphleteer, poet, dramatist, and author of *The unfortunate traveller; or, The life of Jacke Wilton* (1594), the first picaresque novel in English.

Nashe was educated at the University of Cambridge, and about 1588 he went to London, where he became associated with Robert Greene and other professional authors. In 1589 he wrote *The anatomie of absurditie* and the preface to Greene's *Menaphon.* Both works reveal the author as a recent university graduate in their traditional espousal of literary standards, hostility to popular literature, conventional misogynic attitude, and style marked by euphuism (self-conscious elegance of language).

In 1589 and 1590 he evidently became a paid hack of the episcopacy in the Marprelate controversy and matched wits with the unidentified Puritan "Martin." Almost all the Anglican replies to Martin have variously been assigned to Nashe, but only *An Almond for a Parrat* (1590) has been convincingly attributed to him. He wrote the preface to Thomas Newman's unauthorized edition of Sir Philip Sidney's *Astrophel and Stella* (1591). Though Nashe penned an extravagant dedication to Sidney's sister, the countess of Pembroke, the book was withdrawn and reissued in the same year without Nashe's foreword.

Pierce Penilesse his supplication to the divell (1592) revealed Nashe's artistic strengths and weaknesses. His prose had become a combination of colloquial diction and idiosyncratic coined compounds, ideal for controversy and for his eccentric discussion of the seven deadly sins. Verbal facility was frequently an end in itself; Nashe rambled and failed to impose a consistent structure upon his material. Having become involved in his friend Greene's feud with the writer Gabriel Harvey, Nashe satirized Harvey and his brothers in *Pierce* and then joined the combat in an exchange of pamphlets with Harvey, *Strange newes* (1592) and *Have with you to Saffron-Walden* (1596). If Harvey is to be credited, Nashe was a hack for the printer John Danter in 1593. The controversy was terminated in 1599, when the archbishop of Canterbury ordered that "all Nasshes bookes and Doctor Harveyes bookes be taken wheresoever they maye be found and that none of theire bookes bee ever printed hereafter."

Apparently Nashe wrote *Strange newes* while he was living at the home of Sir George Carey, who momentarily relieved his oppressive poverty. In *Christs teares over Jerusalem* (1593), Nashe ominously warned his countrymen during one of the worst plagues that, unless they reformed, London would suffer the fate of Jerusalem. *The Terrors of the Night* (1594) was a discursive, sometimes bewildering, attack on demonology.

Pierce Penilesse excepted, Nashe's most successful works were his masque *Summers last Will and Testament* (1592, published 1600), his picaresque novel *The unfortunate traveller; or, The life of Jacke Wilton* (1594), and *Nashes lenten stuffe* (1599). *The unfortunate traveller* is a brutal and realistic tale of adventure narrated with speed and economy. The book describes the travels through Germany and Italy of its rogue hero, Jacke Wilton, who lives by his wits and manages to witness all sorts of historic events before he is converted to a better way of life. *Lenten stuffe,* in praise of herrings, contains a charming description of Yarmouth, Norfolk, a herring fishery.

Nashe was the first of the English prose eccentrics, an extraordinary inventor of verbal hybrids. *The Works* were edited by R.B. McKerrow, 5 vol. (1904–10; reprinted and reedited by F.P. Wilson, 1958).

nashiji, also called AVENTURINE, in Japanese lacquerwork, form of *maki-e* (*q.v.*) that is frequently employed for the background of a pattern. Gold or silver flakes called *nashiji-ko* are sprinkled onto the surface of the object (excluding the design), on which lacquer has been applied. *Nashiji* lacquer is then applied and burnished with charcoal, so that the gold or silver can be seen through the lacquer. The name *nashiji* is thought to have originated in the resemblance that the lacquer bears to the skin of a Japanese pear, *nashi.*

The technique flourished in the Muromachi period (1338–1573). During the Azuchi-Momoyama period (1574–1600), variations of the technique were developed, such as *e-nashiji,* in which *nashiji* is applied to parts of the design. Later, in the Tokugawa period (1603–1867), more variations were devised—*muranashi-ji,* for example, in which gold or silver flakes are sprinkled thickly in some parts and lightly in others to depict clouds or to create an irregular effect in the design.

Five-case *inrō* with samurai design done in *takamaki-e* ("high relief") against a background sprinkled with red-gold *nashiji-ko,* signed Kajikawa, Tokugawa period (1603–1867)

From Melvin and Betty Janss, *Inro and Other Miniature Forms of Japanese Lacquer Art;* Charles E. Tuttle, Inc.

Nashim (Hebrew: "Women"), the third of the six major divisions, or orders (*sedarim*), of the Mishna (codification of Jewish oral laws), which was given its final form early in the 3rd century AD by Judah ha-Nasi. *Nashim* covers principally aspects of married life. The seven tractates (treatises) of *Nashim* are: *Yev-amot* ("Levirates"; *i.e.,* husband's brothers), *Ketubbot* ("Marriage Contracts"), *Nedarim* ("Vows"), *Nazir* (a "Nazirite"; *i.e.,* a vowed ascetic), *Soṭa* ("A Woman Suspected of Adultery"), *Giṭṭin* ("Bills of Divorce"), and *Qiddushin* ("Marriages"). Both the Palestinian and Babylonian Talmuds have Gemara (critical commentaries) on each of the tractates.

Nashua, city, seat of Hillsborough county, southern New Hampshire, U.S., lying along the Merrimack and Nashua rivers. It was settled about 1656 and was chartered in 1673 as Dunstable. It was a part of Massachusetts until a boundary settlement in 1741 placed it in New Hampshire. In 1803 the village of Indian Head, across the Nashua River, took the name of Nashua (allegedly derived from a local Indian tribe). The two settlements merged as Nashua in 1837. The northern section withdrew, as Nashville, in 1842 over a dispute in locating the town hall. They were reunited under a city charter in 1853. Since the closing of the textile mills after World War II, Nashua has developed a diversified industrial base. Its manufactures include computer products, electronic components, chemicals, office equipment, heavy machinery, and plastics. Nashua is the seat of Rivier College (founded 1933; Roman Catholic). A federal fish hatchery is in the city, and Silver Lake State Park is nearby. Pop. (2000) city, 86,605; Nashua PMSA, 190,949.

Nashville, also called NASHVILLE-DAVIDSON, city, capital (1843) of Tennessee, U.S. Nashville lies in the north-central part of the state on the Cumberland River. It is the centre of an urbanized area that also embraces parts of seven surrounding counties. The governments of Nashville and Davidson county were consolidated in 1963.

The Nashville area was once inhabited by peoples of the Mississippian culture; Cherokee, Chickasaw, and Shawnee later moved into the region. French fur traders established a post known as French Lick on the site in 1717. A force behind the area's settlement was Richard Henderson, a North Carolina jurist who in 1775 acquired most of middle Tennessee and Kentucky in the Transylvania Purchase from the Cherokee. In 1779 he sent a party under James Robertson to investigate the Cumberland Valley. They settled at French Lick and were joined in the spring of 1780 by another group under John Donelson. Fort Nashborough, built at the site and named for American Revolutionary War general Francis Nash, became the centre of the new community. Henderson is also credited with having written the Cumberland Compact, the articles of self-government adopted by the settlers. The community was renamed Nashville in 1784.

Chartered as a city in 1806, Nashville developed as a river trade depot and manufacturing site for middle Tennessee and became the political centre of the state. Its commercial importance was enhanced by the advent of the railroads in the 1850s. Nashville was occupied by Union troops in February 1862, and the last major American Civil War battle (Dec. 15–16, 1864) took place outside the city, when Union forces defeated the Confederates.

Nashville's industrial development was accelerated in the 1930s by the availability of cheap electric power from the Tennessee Valley Authority and from dams on the Cumberland River. The modern economy is diversified. The music industry is a primary factor, and services such as health care, finance, insurance, and education are major contributors. Manufacturing (including automobiles, automobile glass, trucks, tires, appliances, and aircraft parts), printing and publishing (especially music and religious materials), and tourism are also important. The city's central location, combined with an international airport, river port facilities, and rail and highway connections, make it a distribution and transportation centre. Regional agriculture produces tobacco, livestock, dairy products, corn, and soybeans.

Nashville is well known for country music, which is the basis of a large recording industry in the city. Regular radio broadcasts of the Grand Ole Opry, a traditional and contemporary country music program, began in Nashville in 1925; shows can be seen in person at the Opry House. The city has dozens of tourist attractions related to music, including the Country Music Hall of Fame and Museum and the Ryman Auditorium, a concert venue that was once the home of the Opry. The annual International Country Music Fan Fair (June) offers fans the opportunity to meet and get autographs from their favourite musicians.

Nashville is also a religious and educational centre, and several companies and denominations have publishing headquarters there, including the United Methodist Publishing House, one of the largest of its kind in the world. The city is the national headquarters of several boards and agencies of the United Methodist Church and the Sunday School Board of the Southern Baptist Convention; it is also the international headquarters of the Disciples of Christ Historical Society. Educational institutions affiliated with churches include Belmont University (1890; Tennessee Southern Baptist Convention), Lipscomb University (1891; Churches of Christ), Fisk University (1866; United Church of Christ), Aquinas College (1961; Roman Catholic), and Trevecca Nazarene University (1901). Nashville is also the seat of Meharry Medical College (1876), Tennessee State University (1912), Vanderbilt University (1873), and Nashville State Technical Institute (1970).

In Centennial Park is a full-scale replica of the Parthenon (the Athenian temple), built for the Tennessee Centennial of 1897 and containing a 42-foot (13-metre) statue of Athena. The State Capitol (1859) was designed along Greek classical lines by William Strickland; President James K. Polk is buried on its grounds. Bicentennial Capitol Mall State Park, near the building, includes a black granite globe as a memorial to World War II. The Hermitage, the home and burial place of

President Andrew Jackson, is east of the city. Other historic sites include Belle Meade Plantation, with a mansion built in 1853 on one of the country's first Thoroughbred horse farms, and Travellers Rest (1799), built by John Overton (a law partner of Andrew Jackson) and maintained as a museum. Cultural attractions include a symphony orchestra, opera, ballet, and theatre, and museums of history, art, and science. Nashville has professional football (Titans) and ice hockey (Predators) teams. Nearby Old Hickory and J. Percy Priest lakes provide recreational opportunities. Radnor Lake State Natural Area and Long Hunter State Park are also near the city. Pop. (2000) city, 545,524; Nashville MSA, 1,231,311.

Nashville, Battle of (Dec. 15–16, 1864), in the American Civil War, decisive Union victory over the Confederates that ended organized Southern resistance in Tennessee for the remainder of the war. Hoping to cut the supply lines of the Union general William T. Sherman and perhaps to threaten Cincinnati, Ohio, and other Northern cities, Confederate general John B. Hood moved back into Tennessee in late 1864, incurring heavy losses in an engagement with General John M. Schofield's Union troops at Franklin, Tenn., on November 30. As Hood approached Nashville in early December, a Union force of quickly assembled troops under General George H. Thomas marched out of the city and administered a resounding defeat to the South. The Confederate army retreated in near disorder to Alabama, and, though Hood escaped, his army virtually ceased to exist as a fighting force.

Nashville Convention (1850), two-session meeting of proslavery Southerners in the United States. John C. Calhoun initiated the drive for a meeting when he urged Mississippi to call for a convention. The resulting Mississippi Convention on Oct. 1, 1849, issued a call to all slave-holding states to send delegates to Nashville, Tenn., in order to form a united front against what was viewed as Northern aggression.

Delegates from nine Southern states met in Nashville on June 3, 1850. Robert Barnwell Rhett, a leader of the extremists, sought support for secession, but moderates from both the Whig and the Democratic parties were in control. The convention ultimately (June 10) adopted 28 resolutions defending slavery and the right of all Americans to migrate to the Western territories. The delegates were ready to settle the question of slavery in the territories, however, by extending the Missouri Compromise line west to the Pacific.

In September the U.S. Congress enacted the Compromise of 1850, and six weeks later (November 11–18) the Nashville Convention reconvened for a second session. This time, however, there were far fewer delegates, and the extremists were in control. Although they rejected the Compromise of 1850 and called upon the South to secede, most Southerners were relieved to have the sectional strife seemingly resolved, and the second session of the Nashville Convention had little impact.

Nashville Dome, southward geologic extension of the Cincinnati Arch (*q.v.*) that is prominent in Tennessee. Ordovician rocks (about 505 to 438 million years in age) constitute the oldest strata exposed in the core of the dome; they are surrounded by Carboniferous strata (roughly 360 to 286 million years old). The dome was submerged at various times, while during others the central portions were elevated above sea level and exposed to erosion.

Two major uplifts affected the Nashville Dome. The first occurred in Late Devonian time (374 to 360 million years ago); considerable erosion occurred, and some 150 m (500 feet) of deposits were removed. The second major tectonic event took place in the Carboniferous Period, when extensive erosion again occurred.

Näsi, Lake, Finnish NÄSIJÄRVI, lake in Häme *lääni* (province), southwestern Finland. It extends northward from the city of Tampere, northwest of Helsinki. Approximately 20 miles (32 km) long and 2 to 8 miles (3.2 to 13 km) wide, it is the largest of the Pyhä lakes and the central lake of the western branch of the system. Lake Vanka, the northern arm of Lake Näsi, is connected by canal (built 1854) to Lakes Palo and Ruo. This route allows passenger ferry service to connect the town of Ruovesi with Tampere to the south. Ferry service has operated on Lake Näsi since 1858. Lake Näsi drains southward into the Pyhä lakes via the Tammer Rapids. The southern banks of the lake are flat and barren, whereas the northern shore is more developed. The village of Teisko is located on the eastern shore.

Nāsik, city, northwestern Mahārāshtra state, western India. It lies along the Godāvari River and is situated along major road and rail routes at a point about 110 miles (180 km) northeast of Bombay. Nāsik is an important religious centre and attracts thousands of pilgrims annually because of the sanctity of the Godāvari River and because of the legend that Rāma, the hero of the *Rāmāyaṇa* epic, lived there for a time with his wife Sītā and his brother Lakṣmaṇa. The main part of the town lies on the right (south) bank of the river, while Panchavati, a quarter on the left bank, has several temples. The town's riverbanks are lined with ghats (stepped bathing places). Nāsik is the site of the Pandu (Buddhist) and Chamar (Jaina) cave temples dating to the 1st century AD. Of its many Hindu temples, Kāla Rām and Gora Rām are among the holiest. Tryambakeśvar, a village and the site of a Śaivite Jyotirliṅga temple 14 miles (22 km) from Nāsik, is the most important of the pilgrim sites. In the second half of the 20th century the town became industrialized; silk and cotton weaving and sugar and oil processing are important. Ozar is a new suburban township. Nāsik has several colleges affiliated with the University of Poona.

Ghats along the Godāvari River, Nāsik, Mahārāshtra, India

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The area in which Nāsik is situated is drained by the Girna and Godāvari rivers, which flow through open, fertile valleys. The chief crops grown in the region are wheat, millet, and peanuts (groundnuts). Sugar is an important irrigated cash crop. A military-aircraft factory is nearby. Pop. (1991) city, 656,925; metropolitan area, 725,351.

Nāṣin-ud-Dīn Muḥammad (Mughal ruler): *see* Humāyūn.

Nāṣir, an- (d. 1225), 34th ʿAbbāsid caliph (reigned 1180–1225), the last strong ʿAbbāsid caliph before the destruction of the dynasty by the Mongols.

Nāṣir devoted himself almost exclusively to restoring the former temporal power of the caliphate, turning his attention particularly to the east. In the west, Saladin was engaged in his struggles against the Crusaders, but Nāṣir sent him little aid in spite of repeated requests. In the east, however, Nāṣir was helped by the ongoing collapse of the Seljuk Turkish empire, giving him opportunities to expand his control. He fought the Turks, Persians, and later the Mongols, built numerous buildings, and assumed control of the chivalrous *futūwa* order, enhancing his standing among the various Muslim princes.

Nasir ad-Din Shah (Iranian ruler): *see* Nāṣer od-Dīn Shāh.

Nāṣir-i Khusraw, in full ABŪ MUʿĪN NĀṢIR-I KHUSRAW AL-MARVĀZĪ AL-QUBĀDIYĀNĪ (b. 1004, Qubādiyān, Merv, Khorāsān [Iran]—d. *c.* 1072/77, Yumgān, Badakhshān, Central Asia [now in Afghanistan]), poet, theologian, and religious propagandist, one of the greatest writers in Persian literature.

Nāṣir-i Khusraw came of a family of government officials who belonged to the Shīʿite sect of Islām, and he attended school only briefly. In 1045 he went on a pilgrimage to Mecca and continued his journey to Palestine and then to Egypt, which was ruled at that time by the Fāṭimid dynasty. The Fāṭimids headed the Ismāʿīlīyah sect, an offshoot of Shīʿite Islām, and they were engaged in propagating that doctrine by missionaries throughout the Islāmic world. Nāṣir-i Khusraw became such a missionary, though it is not certain whether he became an Ismāʿīlī before his trip to the Fāṭimid capital or after. He returned to his homeland in what is now Afghanistan, but his vigorous advocacy of the Ismāʿīlīyah ideology within Sunnīte territory forced him to flee to Badakhshān, where he spent the rest of his days, lamenting in his poetry that he was unable to be an active missionary.

Nāṣir-i Khusraw's poetry is of a didactic and devotional character and consists mainly of long odes that are considered to be of high literary quality. His philosophical poetry includes the *Rawshana'ināme* (*Book of Lights*). Nāṣir's most celebrated prose work is the *Safarnāme* (*Diary of a Journey Through Syria and Palestine*), a diary describing his seven-year journey. It is a valuable record of the scenes and events that he witnessed. He also wrote more than a dozen treatises expounding the doctrines of the Ismāʿīlīs, among them the *Jāmiʿ al-ḥikmatayn* ("Union of the Two Wisdoms"), in which he attempted to harmonize Ismāʿīlī theology and Greek philosophy. Nāṣir's literary style is straightforward and vigorous. In his verse he displays great technical virtuosity, while his prose is remarkable for the richness of its philosophical vocabulary.

Nāṣirīyah, An-, city, southeastern Iraq. It lies along the Euphrates River in a flat, date-growing area. Built largely of sun-dried brick and enclosed by a mud wall, the town is a local market and a rail terminus. Its industries include boatbuilding, carpentry, and silverworking. A relatively new town founded about 1870, it was captured by the British from Ottoman forces in 1915, during World War I. The ruins of the ancient city of Ur are 11 miles (18 km) to the southwest. Pop. (latest est.) 265,937.

Naskapi (people): *see* Montagnais and Naskapi.

naskhī script, Islāmic style of handwritten alphabet developed in the 4th century of the Islāmic era (*i.e.,* the 10th century AD). From the beginning of Islāmic writing, two kinds of scripts existed side by side—those used for everyday correspondence and business and those used for copying the Qurʾān. *Naskhī* script is a cursive style developed from the earliest everyday business scripts. It has remained perhaps the most popular script in the Arab world.

Naskhī is a legible, stately script with emphasis on a horizontal line and on the proportions between letters. The two names associated with its development are Ibn Muqlah (d. 940) and Ibn al-Bawwāb (d. 1022 or 1031), both of whom worked in Mesopotamia. A Qurʾān manuscript of Ibn al-Bawwāb is in the Chester Beatty Library in Dublin. From the 11th century AD, *naskhī* was widely used for copying the Qurʾān.

Nasmyth, James (b. Aug. 19, 1808, Edinburgh, Scot.—d. May 7, 1890, London, Eng.), British engineer known primarily for his invention of the steam hammer.

Nasmyth showed an extraordinary mechanical inclination while still a schoolboy in Edinburgh, building successful model steam engines. For two years he worked in Henry Maudslay's machine shop in London and subsequently moved to Manchester, where rapid industrialization was in progress. In 1836 he began to build his own foundry near the junction of the Bridgewater Canal with the newly opened Liverpool and Manchester Railway. He made machine tools of all kinds along with a variety of steam-powered machines. Isambard Kingdom Brunel, when designing his steamship *Great Britain,* originally made plans for paddle wheels of exceptional size. Nasmyth solved the challenging problem of forging the drive shaft by designing and fabricating a powerful steam hammer, which he patented in 1842. Although the *Great Britain* was eventually furnished with screw propellers instead of paddle wheels, the steam hammer immediately became an important part of the metallurgical arsenal of the Industrial Revolution.

Besides steam hammers, Nasmyth manufactured more than 100 steam locomotives, many small high-pressure steam engines, and a variety of pumps, hydraulic presses, and other machines. At the age of 48 he retired from the foundry in order to devote himself to his hobby, astronomy. He wrote *The Moon: Considered as a Planet, a World, and a Satellite* (1874).

Naṣr ibn Sayyār (d. 748), governor of Khorāsān (now part of Iran) and other eastern provinces from 738 to 748, under the last of the Umayyad caliphs.

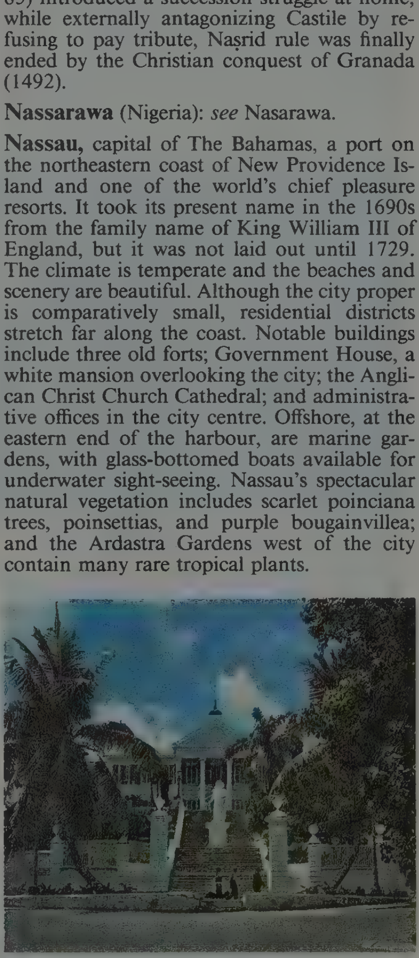
Naṣr distinguished himself by his military leadership and clever, humane diplomacy. Having led a campaign against two rebellious tribes, Naṣr was appointed governor of Khorāsān by the caliph al-Malik at the age of 74. Naṣr waged a vigorous war against his Turkish neighbours, certain dissident tribes and, at the last, the ʿAbbāsid family who later seized the caliphate. Besides al-Malik, he also served the Umayyad caliphs Hishām, al-Walīd II, and Yazīd III. He introduced the system of land taxation for Muslims and poll taxes for non-Muslims and did much to reduce Arab intertribal hostilities.

Naṣrid DYNASTY, last of the Muslim dynasties in Spain, rising to power following the defeat of the Almohads at the Battle of Las Navas de Tolosa, in 1212. They ruled Granada from 1238 to 1492.

The first Naṣrid ruler, Muḥammad I al-Ghālib (d. 1273), a tributary vassal of the Christian king Ferdinand III of Castile and later of Alfonso X, began the construction of the Alhambra and laid the basis of Granada's prosperity by welcoming Muslim refugees from Seville, Valencia, and Murcia. The Naṣrid rulers who succeeded Muḥammad, weakened by dynastic and factional strife, wavered between submission to Christian Castile and dependence on their Marīnid kinsmen of Fès (in modern Morocco); but the African alliance finally proved disastrous, leading to the defeat of the Naṣrid ruler Yūsuf I (1333–54) at Salado River (1340) by Alfonso XI. In 1469 Christian Spain united under the marriage of Ferdinand II of Aragon and Isabella I of Castile. Then, when the Naṣrid ruler Abū al-Ḥasan ʿAlī (1466–85) introduced a succession struggle at home, while externally antagonizing Castile by refusing to pay tribute, Naṣrid rule was finally ended by the Christian conquest of Granada (1492).

Nassarawa (Nigeria): *see* Nasarawa.

Nassau, capital of The Bahamas, a port on the northeastern coast of New Providence Island and one of the world's chief pleasure resorts. It took its present name in the 1690s from the family name of King William III of England, but it was not laid out until 1729. The climate is temperate and the beaches and scenery are beautiful. Although the city proper is comparatively small, residential districts stretch far along the coast. Notable buildings include three old forts; Government House, a white mansion overlooking the city; the Anglican Christ Church Cathedral; and administrative offices in the city centre. Offshore, at the eastern end of the harbour, are marine gardens, with glass-bottomed boats available for underwater sight-seeing. Nassau's spectacular natural vegetation includes scarlet poinciana trees, poinsettias, and purple bougainvillea; and the Ardastra Gardens west of the city contain many rare tropical plants.



Christopher Columbus monument at Government House, Nassau, The Bahamas

John Phillips—Photo Researchers

Paradise Island, a recreational centre, connects with Nassau by a bridge 1,500 feet (460 m) long and is accessible by ferry. It shelters Nassau's excellent natural harbour, which accommodates ships of 24-foot (7-metre) draft. Nassau has no important industries, but sisal, sponges, citrus fruits, tomatoes, and pineapples are exported. Nassau is reached by international sea or air routes and has local service to other islands. Pop. (2000) 210,832.

Nassau, historical region of Germany, and the noble family that provided its hereditary rulers for many centuries. The present-day royal heads of The Netherlands and Luxembourg are descended from this family, called the house of Nassau.

The region of Nassau is located in what is now the western part of the *Land* (state) of Hesse and the Westerwald *Kreis* (district) of Rhineland-Palatinate, in western Germany. The Lahn River divides Nassau roughly into two halves: in the south are the Taunus Mountains; in the north lies the Westerwald.

By the 12th century the local counts of Laurenburg had established themselves near the town of Nassau, and Walram (d. 1198) was the first of them to assume the title count of Nassau. His grandsons divided the inheritance: Walram II took the southern portion of Nassau, and Otto I took the northern portion.

Walramian Nassau. Walram II's son, Adolf of Nassau, was the German king from 1292 to 1298. Adolf's descendants, however, partitioned their lands, and by the late 18th century the Walramian inheritance was divided between the Nassau-Weilburg and Nassau-Usingen branches. In 1801 Napoleonic France acquired the Walramians' lands west of the Rhine; in 1803 the branches of Nassau-Weilburg and Nassau-Usingen reunited and received considerable additions of territory in compensation from France. Walramian Nassau entered Napoleon I's Confederation of the Rhine in 1806, and a cession of territory to the grand duchy of Berg that year was balanced by additions, mainly from Ottonian Nassau. Walramian Nassau was also made a duchy at this time. The extinction of the Usingen line in 1816 made William of Weilburg sole duke of Nassau. By supporting the losing Austrian side in the Seven Weeks' War (1866), William's successor, Duke Adolf, lost the duchy to Prussia; thereafter, it formed most of the Wiesbaden district of Prussia's Hesse-Nassau province.

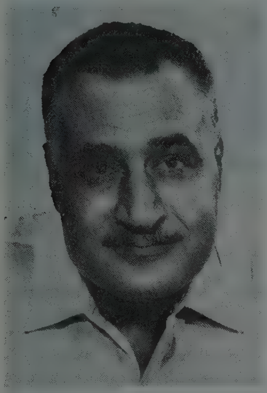
Ottonian Nassau. Otto I's descendants also indulged in partitions and subdivisions, and one branch of the family acquired extensive Dutch territories, becoming known as the Nassau-Dillenburg-Breda branch. Upon the death of the last ruler of this branch in 1544, a cousin, William of Nassau (the future William I the Silent, prince of Orange), inherited the branch's Dutch principality of Orange, and members of this line were henceforth called princes of Orange-Nassau. William the Silent was the founder of the dynasty of hereditary stadholders who were prominent in the Netherlands in the 16th, 17th, and 18th centuries. When William's direct male line became extinct upon the death of King William III of England in 1702, the Ottonians' posssessions in both the Netherlands and Nassau passed to Count John William Friso of the Ottonian branch of Nassau-Dietz. The Nassau-Dietz branch eventually reunited the Ottonians' partitioned German territories in the 18th century.

The Ottonian ruler William VI of Orange lost his German possessions to Napoleon in 1806 but was awarded Luxembourg by the Congress of Vienna in 1815 in compensation. William VI also succeeded to the kingdom of The Netherlands as King William I in that year. His descendants (including female descendants) still reign in The Netherlands today with the princely title of Orange-Nassau. When the Ottonian branch became extinct in the male line with the death of William III in 1890, his daughter, Wilhelmina, became queen of The Netherlands while Luxembourg passed to Duke Adolf of Nassau, a member of the Walramian branch of the house of Nassau. The Walramian line is still the ruling house of the grand duchy of Luxembourg.

Nasser, Gamal Abdel, Arabic JAMAL ʿABD AN-NĀṢER (b. Jan. 15, 1918, Alexandria, Egypt—d. Sept. 28, 1970, Cairo), army officer, prime minister (1954–56) and then president

(1956–70) of Egypt, who became a controversial leader of the Arab world, creating the short-lived United Arab Republic (1958–61), twice fighting losing wars with Israel (1956, 1967), and engaging in such inter-Arab policies as mediating the Jordanian civil war (1970).

Early life. He was born in a mud-brick house on an unpaved street in the Bacos section of Alexandria, where his father was in charge of the local post office. In an effort to identify him with the fellahin (peasants), Egyptian government publications for years gave his birthplace as Banī Murr, the primitive Upper Egypt village of his ancestors. From Alexandria, Nasser's father was transferred to al-Khaṭāṭibah, a squalid delta village, where the boy got his first schooling. Then he went to live in Cairo with an uncle who had just been released from a British prison and had rooms in a building occupied by nine Jewish families.


Nasser, photograph by Yousuf Karsh
© Karsh from Rapho/Photo Researchers—EB Inc.

Constantly in trouble with schoolteachers, some of them British, Nasser took part in many anti-British street demonstrations. In one he received a blow on the forehead that left a lifetime scar. After secondary school he went to a law college for several months and then entered the Royal Military Academy, graduating as a second lieutenant.

While serving in the Egyptian army in The Sudan, he met three fellow officers—Zakaria Mohieddine, later vice president of the United Arab Republic; Abdel Hakim Amer, later field marshal; and Anwar as-Sadat, who would succeed Nasser as president. Together, they planned a secret revolutionary organization, the Free Officers, whose composition would be known only to Nasser; their aim was to oust the British and the Egyptian royal family.

In the 1948 Arab war against the newly created state of Israel, Nasser was an officer in one of three battalions surrounded for weeks by the Israelis in a group of Arab villages called the Faluja Pocket.

Attainment of power. On July 23, 1952, Nasser and 89 other Free Officers staged an almost bloodless coup d'état, ousting the monarchy. Sadat favoured the immediate public execution of King Farouk and some members of the establishment, but Nasser vetoed the idea and permitted Farouk and others to go into exile. The country was taken over by a Revolutionary Command Council of 11 officers controlled by Nasser, with Major General Mohammad Naguib as the puppet head of state. For more than a year Nasser kept his real role so well hidden that astute foreign correspondents were unaware of his existence, but in the spring of 1954, in a complicated series of intrigues, Naguib was deposed and placed under house arrest, and Nasser emerged from the shadows and named himself prime minister. That same year an Egyptian fanatic tried to assassinate Nasser at a mass meeting in Alexandria. When he confessed that he had been given the assignment by the Muslim Brotherhood, Nasser cracked down on this extremist Arab religious organization.

In January 1956 Nasser announced the promulgation of a constitution under which Egypt became a socialist Arab state with a one-party political system and with Islām as the official religion. In June, 99.948 percent of the 5,000,000 Egyptians voting marked their ballots for Nasser, the only candidate, for president. The constitution was approved by 99.8 percent.

As Nasser took titular as well as actual control, Egypt's prospects looked bright. A secret contract had been signed with Czechoslovakia for war matériel, and Great Britain and the United States had agreed to put up $270,000,000 to finance the first stage of the Aswān High Dam project. But on July 20, 1956, the U.S. secretary of state, John Foster Dulles, canceled America's offer; the next day Britain followed suit. Five days later, addressing a mass meeting in Alexandria, Nasser announced the nationalization of the Suez Canal, promising that the tolls Egypt collected in five years would build the dam. On October 29, while attending a birthday party for one of his children, Nasser received news that the Israeli army had invaded the Sinai Peninsula. Two days later, French and British planes attacked Egyptian airfields. Although the Israelis occupied the Sinai Peninsula to Sharm ash-Shaykh and the Egyptian air force was virtually destroyed, Nasser emerged from the brief war with undiminished prestige throughout the Arab world.

In *Philosophy of the Revolution,* which he wrote in 1954, Nasser told of "heroic and glorious roles which never found heroes to perform them" and outlined his aspiration to be the leader of the 55,000,000 Arabs, then of the 224,000,000 Africans, then of the 420,000,000 followers of Islām. In 1958 Syria and Egypt formed the United Arab Republic, which Nasser hoped would someday include the entire Arab world. Syria withdrew in 1961, but Egypt continued to be known as the United Arab Republic. That was as close as Nasser ever came to realizing his tripartite dream.

Nasser's accomplishments. But there were other accomplishments. The Aswān High Dam, built with the help of the Soviet Union, began operating in 1968; 20th-century life was introduced into many villages; industrialization was accelerated; land reforms forbade any individual to own more than 100 feddans (104 acres); a partially successful campaign was conducted against corruption; and women were accorded more rights than they had ever had. A new middle class began to occupy the political and economic positions once held in Egypt by Italians, Greeks, French, Britons, and other foreigners, whom Nasser now encouraged—sometimes not gently—to leave the country. Nasser's outstanding accomplishment was his survival for 18 years as Egypt's political leader, despite the strength of his opponents: Communists, Copts, Jews, old political parties, rival military cliques, dispossessed landowners, supporters of Naguib, and what was left of the foreign colony.

On the negative side, Nasser made Egypt a police state, in which mail was opened, the communications media were strictly censored, the chief newspapers nationalized, telephones tapped, and visitors' rooms searched. Political democracy in the Western sense was nonexistent. One-party candidates for office were handpicked by Nasser and his close associates. Political enemies were herded into concentration camps in the desert. Life was little changed for most fellahin. The birth rate remained so high as to defeat attempts to increase the living standard.

In foreign affairs Nasser joined Josip Broz Tito of Yugoslavia and Jawaharlal Nehru of India as an advocate of nonalignment, or "positive neutrality." At the Bandung conferences of Asian and African nations in 1955, he emerged as a world figure. His refusal to recognize Israel and Egypt's defeat by Israel in 1956 forced him to divert vast sums into military channels that might have gone to implement his social revolution.

Egyptian troops supported the Republican Army in Yemen's civil war starting in 1962. But they were withdrawn in 1967, when war broke out again between Egypt and Israel after Nasser had requested the United Nations to remove its peacekeeping troops from the Gaza Strip and Sharm ash-Shaykh, then closed the Gulf of Aqaba to Israeli shipping. After the Egyptian air force was destroyed on the ground and the Egyptian army forced to retreat across the Suez, Nasser attempted to resign, but massive street demonstrations and a vote of confidence by the National Assembly induced him to remain in office. The Soviet Union immediately began replacing all the destroyed war equipment and installed surface-to-air missiles along the Suez as a cover for Egypt's artillery emplacements. Nasser had tentatively accepted a U.S. plan leading to peace negotiations with Israel when he died, in 1970, from a heart attack.

Assessment. Although complex and revolutionary in his public life, privately Nasser was conservative and simple. He knew the loneliness of power. He was more than six feet tall, weighed about 200 pounds, had close-cropped graying hair, a swarthy complexion, the physique of an athlete, and a warm, pleasant personality. No other Arab leader in modern times has succeeded in winning the sometimes hysterical support of Arab masses throughout the Middle East as did Gamal Abdel Nasser during the last 15 years of his life. Even the loss of two wars, with disastrous results for Egypt, did not dim the popularity of this charismatic, almost mythogenic, army officer who became the first true Egyptian to rule the country in several millennia, giving his people the dignity denied them under foreign rule. Yet he failed in his ambition to create a unified Arab world, and before his death he was forced to sacrifice some of Egypt's political independence for the military support of the Soviet Union. (R.St.J.)

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Nasser, Lake, reservoir on the Nile River, in Upper Egypt and northern Sudan. It was created by the impounding of the Nile's waters by the Aswān High Dam, which was built in the 1960s and dedicated in 1971. With a gross capacity of 136,927,000 acre-feet (168,900,000,000 cubic m), Lake Nasser's waters, when discharged downstream, have brought 800,000 acres (324,000 hectares) of additional land under irrigation and have converted 700,000 acres (283,000 hectares) from flood to perennial irrigation. The lake has been stocked with food fish. In the early 1980s land reclamation projects began in the desert around the lake. The northern two-thirds of the lake, lying in Egypt, is named for Gamal Abdel Nasser, president (1956–70), and the southern third, in The Sudan, is called Lake Nubia.

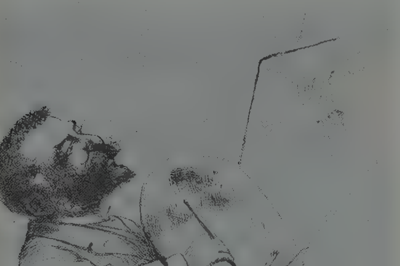
Nast, Thomas (b. Sept. 27, 1840, Landau, Baden [Germany]—d. Dec. 7, 1902, Guayaquil, Ecuador), American cartoonist, best known for his attack on the political machine of William M. Tweed in New York City in the 1870s.

Nast arrived in New York as a boy of six. He studied art at the National Academy of Design and at the age of 15 became a draftsman for *Frank Leslie's Illustrated Newspaper* and at 18 for *Harper's Weekly*. In 1860 he went to England for the *New York Illustrated News* and in the same year went to Italy to cover Giuseppe Garibaldi's revolt for *The Illustrated London News* and American publications.

With the outbreak of the American Civil War, Nast vigorously supported the cause of the Union and opposed slavery from his drawing board at *Harper's Weekly*. His cartoons "After the Battle" (1862), attacking Northerners opposed to energetic prosecution of the war, and his "Emancipation" (1863), showing the evils of slavery and the benefits of its abolition, were so effective that President Abraham Lincoln called him "our best recruiting sergeant." During Reconstruction, Nast's cartoons portrayed President Andrew Johnson as a repressive autocrat and characterized Southerners as vicious exploiters of helpless blacks, revealing his bitter disappointment in postwar politics.

Many of Nast's most effective cartoons, such as his "Tammany Tiger Loose" and "Group of Vultures Waiting for the Storm to Blow Over" (both 1871), were virulent attacks on New York's Tammany Hall political machine led by "Boss" Tweed. His cartoons were probably one of the chief factors in the machine's downfall. Nast's caricature of the fleeing political boss led to Tweed's identification and arrest in Vigo, Spain, in 1876.

By 1885 Nast's disagreements with the editors of *Harper's Weekly* were becoming increasingly frequent; his last *Harper's* cartoon appeared in 1886. His contributions to other journals became infrequent and, having lost nearly all his savings in the failure of the brokerage house of Grant & Ward in 1884, he became destitute. He was appointed consul general at Guayaquil, Ecuador, in 1902.

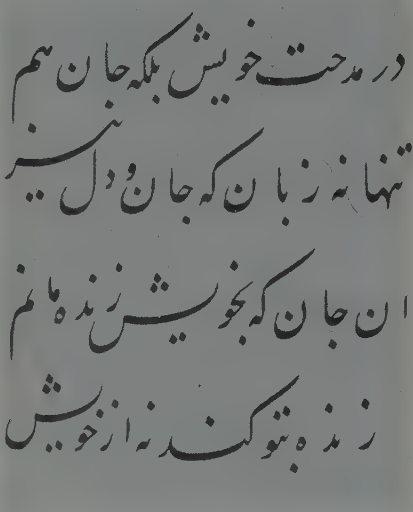


Thomas Nast, self-portrait etching, 1892

By courtesy of the Library of Congress, Washington, D.C.

Nast did some painting in oil and book illustrations, but his fame rests on his caricatures and political cartoons. From his pen came the Republican Party's elephant, Tammany Hall's tiger, and one of the most popular images of Santa Claus. He also popularized the Democratic Party's donkey.

nastaʿlīq script, predominant style of Persian calligraphy during the 15th and 16th centuries. The inventor was Mīr ʿAlī of Tabrīz, the most famous calligrapher of the Timurid period (1402–1502).


در مدحت خویش بلکه جان هم
تنها نه زبان که جان و دل نیز
ان جان که بخویش زنده مانم
زنده بتو کند نه از خویش

Nastaʿlīq script from "Laylā wa Majnūn," calligraphy by Sulṭān ʿAlī Mashhadī, 1506 (London, India Office Library, MS. Ethé 1204, fol. 5r)

By courtesy of the India Office Library, London

A cursive script, *nastaʿlīq* was a combination of the *naskhī* and *taʿlīq* styles, featuring elongated horizontal strokes and exaggerated rounded forms. The diacritical marks were casually placed, and the lines were flowing rather than straight. *Nastaʿlīq* was frequently incorporated into the paintings of the early Safavid period (16th century) and is traditionally considered to be the most elegant of the Persian scripts.

Nastase, Ilie (b. July 19, 1946, Bucharest, Rom.), Romanian tennis player known for his on-court histrionics and outstanding Davis Cup play. He was the first European to surpass $1 million in career prize money and was ranked number one in the world in 1973.

A Davis Cup player since 1966, Nastase almost single-handedly powered Romania to the finals in 1969, 1971, and 1972, although the United States won each time. The most heartbreaking loss for Nastase occurred in 1972, when the United States retained the Davis Cup after Stan Smith defeated Nastase in the singles. After winning the U.S. indoors and Italian singles in 1970, Nastase won the Grand Prix Masters in 1971–73 and 1975 and the U.S. Open against Arthur Ashe in 1972. In 1973 he won the Italian and French singles titles and combined with Jimmy Connors for the U.S. Open doubles in 1975.

Nastase consistently was ranked much higher in world ratings than his major tournament record would seem to indicate, placing him among the top 10 players from 1970 to 1977. His outstanding professional indoor record made him a perennial contender, but his on-court antics and temper tantrums caused a record of disqualifications, fines, and suspensions. At his best, Nastase was a fast player and exhibited intricate footwork and brilliant ball handling in lobbing past opponents.

nasturtium, any of various annual plants of the genus *Tropaeolum*, in the family Tropaeolaceae, native to Mexico, Central America, and northern South America and introduced into other regions as cultivated garden plants.

Common nasturtium (*Tropaeolum majus*)

Derek Fell

Nasturtium is also a genus of aquatic herbs of the family Cruciferae (*see* watercress).

The peppery-tasting leaves are sometimes used in salads. The brilliant yellow, orange, or red flowers are funnel-shaped and have a long spur that contains sweet nectar.

Tropaeolum majus, the common nasturtium, is also known as Indian cress. The young flower buds and fruit are sometimes used as seasoning. The plant grows 2.4–3.6 m (8–12 feet) tall, and the flowers are commonly yellow-orange with red spots or stripes. *T. minus*, the dwarf nasturtium, has flowers 3 cm (1.2 inches) across or less. *T. peltophorum*, the shield nasturtium, is a climbing plant with orange-red flowers about 2.5 cm (1 inch) long. *T. peregrinum* is commonly known as the canary creeper.

nat, in Burmese folk religion, any of a group of spirits that are the objects of an extensive, probably pre-Buddhist cult; in Thailand a similar spirit is called *phi*. Most important of the *nat*s are a group collectively called the "thirty-seven," made up of spirits of human beings who have died violent deaths. They are capable of protecting the believer when kept properly propitiated and of causing harm when offended or ignored.

Other types of *nat*s are nature spirits; hereditary *nat*s, whose annual tribute is an inherited obligation; and village *nat*s, who protect a community from wild animals, bandits, and illness and whose shrine is attached to a tree or pole near the entrance to the village. Most households also hang a coconut from the southeast pillar of the house in honour of Min Mahagir, the house *nat*.

*Nat*s are appeased by offerings of food or flowers, given on all important occasions. Among the special *nat* festivals are those honouring the Taungbyon brothers—a prominent, rather rowdy pair of *nat*s said to have been executed in the 11th century—and the king of the "thirty-seven," Thagya Min, associated by scholars with the Indian god Indra (known in Myanmar [Burma] as Sakka).

Natal, city, capital of Rio Grande do Norte *estado* ("state"), northeastern Brazil, situated near the mouth of the Potengi River, or Rio Grande do Norte, on the Atlantic coast. Founded by the Portuguese in 1597 near the site of a fort (Tres Reis Magos, or "The Three Magi"), Natal was given town status in 1611. The state's principal commercial centre, it produces silk and cotton textiles, sugar, salt, hides, and skins. It has a coastal seaport and a large airport with flights to Teresina and Recife. Railroads and highways extend from Natal to the interior and to coastal urban centres. Natal is the seat of the State University of Rio Grande do Norte (1958). The Marine Research Institute and the Barreira do Inferno rocket base are located in the vicinity. Pop. (2000 prelim.) 709,422.

Natal, former province of South Africa. It was the smallest of the four traditional provinces and occupied the southeastern part of the country.

The Portuguese navigator Vasco de Gama sighted the coast along what is now Durban on Christmas Day in 1497 and named the country Terra Natalis, after the Portuguese word ("Natal") for Christmas. The Portuguese maintained a trading settlement farther north at Delagoa Bay from the 1540s. The interior of Natal had been occupied since the 16th century by the Nguni branch of the Bantu-speaking peoples. In the 1820s and '30s the Zulu clan of the Nguni, under the successive leadership of Dingiswayo (1807–17), Shaka (1817–28), and Dingane (1828–40), developed highly trained regiments and new fighting tactics that enabled the Zulus to establish a powerful kingdom north of the Tugela River. Shaka launched devastating military campaigns south of the Tugela River that disrupted or destroyed the peoples in that area. Those not killed or conscripted by the Zulus fled to other regions or went into hiding, leaving much of the region temporarily depopulated. In the meantime, the British had established a trading post at Port Natal (now Durban) in 1824, and that same year they signed a treaty with Shaka ceding them Port Natal and about 50 miles (80 km) of coastline to a depth of 100 miles (160 km) inland. The British made little attempt to develop the interior, which continued to be decimated by the Zulus.

The British settlement at Port Natal did grow, however, and in 1835 Captain A.F. Gardiner secured from Dingane a treaty ceding the southern half of Natal to the British. The apparently empty interior was entered in October 1837 by the Voortrekkers, *i.e.,* Afrikaners who had left the British-ruled Cape Colony. They crossed the passes of the northern Drakensberg Mountains under the leadership of Piet Retief and others. Retief obtained from Dingane the promise of nearly all of Natal if he recovered some stolen cattle for the Zulu leader. Retief's promptness in this task so alarmed Dingane that he had Retief and more than 60 of his followers massacred in February 1838. In December 1838 the Boers under the overall command of Andries Pretorius defeated the Zulus at the Battle of Blood River, destroying more than 3,000 of Dingane's army. Dingane was replaced by his brother Mpande, who made concessions to the Boers (Afrikaners) and established himself north of the Tugela in a vassal state known as Zululand.

The Afrikaners established the Republic of Natal with its capital at Pietermaritzburg and its northern border at the Tugela River. The new Boer republic was soon unsettled by an influx of natives returning to Natal to resettle the lands they had abandoned to the Zulus. The British, moreover, opposed the establishment of any independent state on the coast of southern Africa. The British annexed Natal in 1843. In response, many of the former republic's Afrikaner inhabitants left for the Transvaal and the Orange Free State and were replaced by new immigrants, mainly from Britain. Natal was given a local administration but remained basically an adjunct of the Cape Colony until 1856, when it was made a crown colony and given its own legislative council. The chief diplomatic agent for the Natal government, Theophilus Shepstone, introduced (from 1849) a policy aimed at reserving large tracts of land for the native Bantu peoples, who by then greatly outnumbered whites in the colony. From 1860, increasing numbers of Indians also entered the colony to work as indentured labourers in the sugar plantations on the coast. The Natal colony was extended by successive acquisitions—notably that of Zululand, of which the British had assumed control after their victory over the Zulus in the Zulu War (1879). Zululand was formally annexed by the British in 1887 and made a part of Natal in 1897, becoming the eastern part of the colony.

Natal was granted internal self-government by the British in 1893. A railroad running from Durban to Pretoria in the Transvaal was completed in 1895, and in 1898 Natal joined the customs union of the South African states. During the South African War (1899–1902), Natal was invaded by Boer forces, which were checked by the British defense at Ladysmith. Natal remained pro-British throughout the war on account of the British origins of its ruling white minority. In 1910 the colony became a province of the Union of South Africa and in 1961 of the Republic of South Africa. Natal remained the base of pro-British sentiments in South Africa in the 20th century.

The black reserves that had been set aside under the Native Land trust (1864) eventually came to form the extensive, but highly fragmented, nonindependent black state of KwaZulu. This served as the legal homeland for all of the country's Zulus under the South African government's system of apartheid, or racial separation. In the late 1980s and early '90s, Natal and KwaZulu became the scene of violent clashes between rival black political parties that were vying for the support of black South Africans prior to the establishment of majority rule under a projected new constitution. Thousands of people died in this conflict, which pitted Zulu supporters of the Inkatha Freedom Party against adherents of the African National Congress. When the new South African constitution abolished the apartheid system, KwaZulu in 1994 was reincorporated into Natal province, which was renamed KwaZulu/Natal (*q.v.*) province.

Natalis, Alexander, French ALEXANDRE NOËL (b. Jan. 19, 1639, Rouen, France—d. Aug. 21, 1724, Paris), controversial theologian and ecclesiastical historian who clashed with Rome for expressing Gallicanism, a French position advocating restriction of papal power, and for defending Jansenism, a religious movement of nonorthodox tendencies in France.

Natalis joined the Dominicans at Rouen (1655), received a doctorate in divinity from the Sorbonne (1675), and was regent of studies at Saint-Jacques, Paris. Natalis' chief work, *Selecta historiae ecclesiasticae capita,* 24 vol. (1676–86; "Selected Chapters of Ecclesiastical History"), was condemned by Pope Innocent XI in 1684 because of its defense of Gallican claims. Natalis issued a revised edition, *Historia ecclesiastica veteris et novi testamenti* ("Ecclesiastical History of the Old and New Testaments"), in 8 volumes in 1699, but it was not until 1734 that the edition was removed from the *Index of Forbidden Books.*

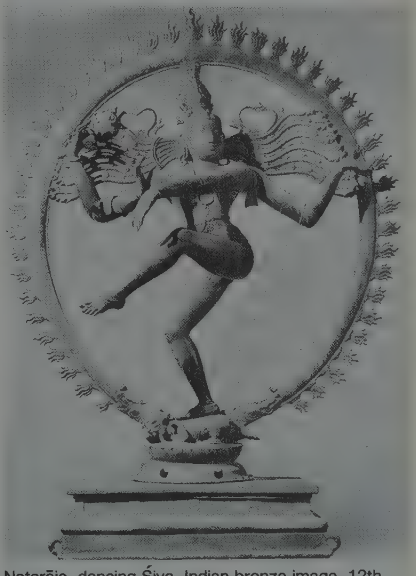
In 1701 Natalis signed the *Cas de conscience* ("Case of Conscience"), a document allowing "silent submission" to a Jansenist asking for absolution, but, when it was condemned by Pope Clement XI, Natalis submitted. He appealed against Clement's bull *Unigenitus* (1713), which condemned propositions of one of the leading Jansenists, Pasquier Quesnel, but again submitted. Thereafter, he retired to Saint-Jacques, exhausted and having become blind.

Natanya (Israel): *see* Netanya.

Naṭarāja (Sanskrit: "Lord of Dance"), the Hindu god Śiva (Shiva) in his form as the cosmic dancer, represented in metal or stone in most Śaiva temples of South India.

In the most common type of images, which includes the magnificent Cōḷa bronzes of the 10th–11th century, Śiva is shown with four arms and flying locks dancing on the figure of a dwarf, the Apasmārapuruṣa (a symbol of man's ignorance; *puruṣa* meaning "man," and *apasmāra* "forgetfulness," or "heedlessness"). The back right hand of Śiva holds the *ḍamaru* (hourglass-shaped drum); the front right hand is in the *abhaya-mudrā* (the "fear-not" gesture, made by holding the palm outward with fingers pointing up); the back left hand carries *agni* (fire) in a vessel or in the palm of the hand; and the front left hand is held across the chest in the *gajahasta* (elephant-trunk) pose, with wrist limp and fingers pointed downward toward the uplifted left foot. The locks of Śiva's hair stand out in several strands and are interspersed with the figures of Gaṅgā (the River Ganges personified as a goddess), flowers, a skull, and the crescent moon. His figure is encircled by a ring of flames, the *prabhāmaṇḍala.* This form of dance, which is the most common representation of Naṭarāja, is called in the classic Sanskrit treatises on dance the *bhujaṅgatrāsa* ("trembling of the snake").

The significance of the Naṭarāja sculpture is said to be that Śiva is shown as the source of all movement within the cosmos, represented by the arch of flames. The purpose of the dance is to release men from illusion, and the place where it is said to have been performed, Chidambaram, called the centre of the universe, is in reality within the heart. The gestures of the dance represent Śiva's five activities (*pañcakṛtya*): creation (symbolized by the drum), protection (by the "fear-not" pose of the hand), destruction (by the fire), embodiment (by the foot planted on the ground), and release (by the foot held aloft).



Naṭarāja, dancing Śiva, Indian bronze image, 12th–13th century AD; in the Museum of Asiatic Art, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

Other dances of Śiva seen in sculpture and painting are the wild *tāṇḍava,* which he performs on cremation grounds in the company of his consort Devī, and the evening dance performed on Mount Kailāsa before the assembly of gods, some of whom accompany him on various instruments.

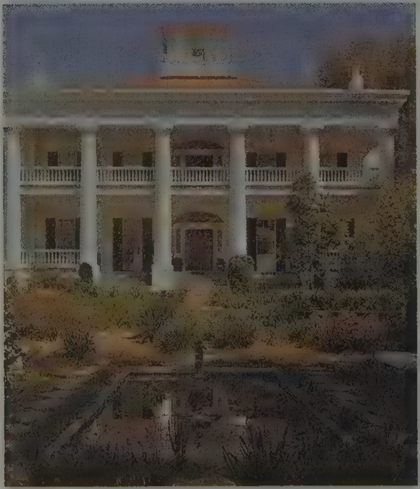
Natchez, North American Indian tribe of the Macro-Algonquian linguistic phylum that inhabited the east side of the lower Mississippi River. In the early 18th century at the time of the first French settlement, the tribe numbered about 6,000, living in nine villages between the Yazoo and Pearl rivers near the site of the present-day city of Natchez, Miss.

Relations between the French settlers and the Natchez were friendly at first; but three French-Natchez wars—in 1716, 1723, and 1729—resulted in the French, with the aid of the Choctaw, driving the Natchez from their villages. Some 400 Natchez were captured and sold into the West Indian slave trade; the remainder took refuge with the Chickasaw and later with the Upper Creeks and Cherokee. When the latter tribes were forced to move west into Indian Territory (present Oklahoma), the Natchez went with them. A few Natchez retained their language into the early 20th century, and there were still a few tribe members living in northeastern Oklahoma in the late 20th century.

The Natchez, allied in general culture to other Muskogean tribes, were a primarily agricultural people. They made clothes by weaving a fabric from the inner bark of the mulberry, excelled in potterymaking, and built large temples—similar to those of the Creeks—of wattles and mud set upon eight-foot mounds. Their dwellings—built in precise rows around a plaza or common ground—were four-sided and constructed of sun-baked mud and straw with arched cane roofs.

They were sun worshippers, ruled by a monarch called the Great Sun, who had the power of life and death over them. He maintained several wives and a household of volunteers to work and hunt for him; all were killed at his death, along with any others who wished to join him in the afterlife. Integral to their religion was a perpetual fire kept burning in the temple. It was allowed to die once a year on the eve of their midsummer festival, the Busk, or Green Corn, ceremony (similar to that of the Creeks). The fire was remade at dawn of the festival day, and all the village fires were then made anew from the sacred fire. The Natchez were notable for the peculiar caste system, in which the people were classified as suns, nobles, honoured people, and commoners. The chief, or Great Sun, and the heads of the villages claimed descent from the sun. Persons of the sun caste were not allowed to intermarry. Rather, they were required to marry commoners. The offspring of female suns and commoners were suns, while the children of male suns and commoners belonged to the caste of honoured people.

Natchez, city, seat (1817) of Adams county, southwestern Mississippi, U.S., on the Mississippi River (there bridged to Vidalia, La.), 70 mi (113 km) south-southwest of Vicksburg. Established in 1716 as Ft. Rosalie by Jean-Baptiste Le Moyne, sieur de Bienville, it survived a massacre (1729) by Natchez Indians for whom it was later named. It passed from France to England (1763) at the conclusion of the French and Indian Wars, and was a haven for Loyalists during the American Revolution. In 1779 it was captured by a Spanish expedition under Bernardo de Gálvez and remained under Spanish dominion until 1798 when the U.S. took possession and made it the first capital (1798–1802) of the Territory of Mississippi. During the ensuing years it burgeoned as the commercial and cultural centre of a vast and rich cotton-producing area. It was the southern terminus of the Natchez Trace (an overland trail from Nashville, Tenn.) and an important river port. During the Civil War it was bombarded by a Federal gunboat and was occupied in July 1863.


D'Evereux mansion, one of many antebellum homes in Natchez, Miss.
Arthur Griffin—EB Inc.

Natchez recovered from its post-Civil War decline to become one of the state's leading industrial centres. Timber, petroleum, and natural gas reserves have enticed manufacturers of rubber, wood, paper, and textile products. It is regarded as the stereotype of the antebellum South and is noted for its annual Spring Pilgrimage, during which antebellum homes such as Longwood (*c.* 1840) and Stanton Hall (1851–59) are open to the public and historical pageants are held. Connelly's Tavern (*c.* 1795, restored) was the gathering place for adventurers who sailed the river or travelled the Natchez Trace. Natchez Junior College was established in 1885, and the Natchez Center is a branch campus of the University of Southern Mississippi.

A few miles to the east in Washington is Historic Jefferson College (1802–63) where Jefferson Davis went to school; it was on its campus under "Burr Oaks" that Aaron Burr was given a preliminary trial for treason, and there the state's first constitutional convention was held (March 1, 1817) in a Methodist meeting house. Homochitto National Forest and Emerald Indian Mound (dating from 1300–1600) are nearby. Inc. 1803. Pop. (1990) 19,460.

Natchez Trace Parkway, old road and one of the most scenic highways in the United States, about 450 mi (725 km) long, following an Indian trail, or trace, northeastward from Natchez, Miss., across northwestern Alabama to Nashville, Tenn. Originally an Indian trail, from 1800 to 1820 it was the most important highway in the Old Southwest—militarily, economically, and politically. With the advent of the river steamer and of newer and more direct roads after the War of 1812, it began a gradual decline.

Among the historical landmarks along its route, which was under redevelopment in the late 1970s, are the Emerald and Bynum Indian ceremonial mounds and Chickasaw Village in Mississippi, and Napier Mine and Metal Ford in Tennessee, the last two harking back to frontier iron mining and smelting. In 1938 the parkway became part of the National Park system with headquarters at Tupelo, Miss., and in 1961 Ackia Battleground and Meriwether Lewis National Monuments were added to its area.

Natchitoches, city, seat (1805) of Natchitoches parish, northwestern Louisiana, U.S., on Cane River Lake, 68 mi (109 km) southeast of Shreveport. The oldest permanent settlement in the Louisiana Purchase territory, it was founded in about 1714 as Ft. St. Jean Baptiste by the French to forestall Spanish occupation of the area. Many French Colonial homes, including the historic Prudhomme-Rouguier House, survive. Renamed for the Natchitoches Indians, it developed as a cotton market, but its commercial importance declined after 1832, when the Red River, then its main artery of transportation, changed course (5 mi [8 km] east). After 1950 the city acquired diversified industry. Northwestern State University of Louisiana (1884) is located there. Units of the Kisatchie National Forest are nearby. Inc. 1872. Pop. (1990) 16,609.

Nātha, religious movement of India whose members strive for immortality by transforming the human body into an imperishable divine body. It combines esoteric traditions drawn from Buddhism, Śaivism (worship of the Hindu deity Śiva), and Haṭha Yoga, with a liking for the occult. The term is derived from the names of the nine traditional masters, all of which end in the word *nātha* ("master, lord"). Texts do not agree on the lists of the nine. All are believed to have successfully transformed their bodies through yogic discipline into indestructible spiritual entities, and, according to popular belief, they reside as demigods in the Himalayas. The nine *nātha*s are in many respects similar to the 84 "great perfect ones," the *mahāsiddha*s, common to both Hinduism and Buddhism, and their names appear on both lists.

The Nātha cult is essentially made up of yogis whose aim is to achieve *sahaja,* defined as a state of neutrality transcending the duality of human existence. This is accomplished through the cultivation of *kāya-sādhana* ("culture of the body"), with great emphasis laid on the control of semen, breath, and thought. Guidance of an accomplished guru is considered essential. The Nātha yogis share with similar esoteric cults a liking for paradox and enigmatic verse.

Nathan, Daniel (U.S. author): *see* Queen, Ellery.

Nathan, George Jean (b. Feb. 14, 1882, Fort Wayne, Ind., U.S.—d. April 8, 1958, New York City), U.S. author, editor, and drama critic, who is credited with raising the standards of play producers and playgoers alike.

Nathan graduated from Cornell University in 1904 and joined the staff of the *New York Herald.* Beginning in 1906, he was at various times drama critic for numerous magazines and newspapers, but his name is particularly associated with *The Smart Set*, of which he was co-editor (1914–23) with H.L. Mencken, and with the *American Mercury*, which, also with Mencken, he helped to found in 1924. As a critic Nathan championed the plays of Ibsen, Strindberg, Shaw, O'Neill, O'Casey, and Saroyan. He published his *Theatre Book of the Year* annually from 1943 through 1951, as well as more than 30 volumes of lively essays on theatrical and other subjects. Nathan married the actress Julie Haydon in 1955.

George Nathan
By courtesy of the Library of Congress, Washington, D.C.

Nathan, Maud (b. Oct. 20, 1862, New York City—d. Dec. 15, 1946, New York City), U.S. social welfare leader who helped to found the Consumer's League.

In 1880 Maud Nathan married her cousin Frederick Nathan, a broker. In 1890 she founded the Consumers' League of New York, with Josephine Shaw Lowell and Alice Woodbridge; its object was to pressure store owners, under threat of a consumer boycott, to sell goods manufactured under proper working conditions. She directed the League for more than 20 years, also serving as vice president of the National Consumers' League. Nathan was an avid advocate of the league's philosophy and spoke at conferences in the United States and Europe. An active suffragist, she was also a leader of the Woman's Municipal League of New York and the General Federation of Women's Clubs.

Her publications include a history of the Consumers' League, *The Story of an Epoch-Making Movement* (1926).

Nathans, Daniel (b. Oct. 30, 1928, Wilmington, Del., U.S.—d. Nov. 16, 1999, Baltimore, Md.), American microbiologist, corecipient with Hamilton Othanel Smith of the United States and Werner Arber of Switzerland of the Nobel Prize for Physiology or Medicine in 1978. The three scientists were cited for their work in molecular genetics, specifically in the discovery and application of enzymes that modify the giant molecules of deoxyribonucleic acid (DNA) to permit study of the genetic information they contain.

Nathans attended the University of Delaware and Washington University in St. Louis, Mo., where he earned a medical degree in 1954. He became a professor of microbiology at Johns Hopkins University in Baltimore, Md., in 1962 and director of its department of microbiology in 1972. In his prizewinning research, Nathans used the restriction enzyme isolated by Smith from the bacterium *Haemophilus influenzae* to investigate the structure of the DNA of the simian virus 40 (SV40), the simplest virus known to produce cancerous tumours. This achievement, the construction of a genetic map of a virus, heralded the first application of the new enzymes to the problem of identifying the molecular basis of cancer.

Nāthdwāra, town, southern Rājasthān state, northwestern India, just south of the Banās River. Connected by road with Udaipur and close to the Malvi rail junction, Nāthdwāra is a place of Hindu pilgrimage; it contains a 17th-century Vaishnavite shrine that is one of the most famous in India. Within the temple is a celebrated image of the god Krishna, popularly said to date to the 12th century BC. The town is an agricultural market and has a government college affiliated with the University of Rājasthān. Pop. (1991 prelim.) 30,855.

Natick, town ("township"), Middlesex county, eastern Massachusetts, U.S., 15 miles (24 km) southwest of Boston. The first recorded settlement there was made in 1650, when the missionary John Eliot was granted the land for use as a plantation for his "praying Indians." Eliot published an Indian Bible in 1663, a copy of which the town possesses; the site of his Indian Meeting House in South Natick is marked by a boulder. After the Indians were crowded out by white settlers, Natick became a farming community. The modern town is residential but with industrial development (leather, paper, and food products). Much of Cochituate State Park (1,012 acres [409 hectares]), with its large lake, lies within Natick's borders. Inc. 1781. Pop. (1993 est.) 30,946.

Nation, Carry, in full CARRY AMELIA NATION, *née* MOORE (b. Nov. 25, 1846, Garrard county, Ky., U.S.—d. June 9, 1911, Leavenworth, Kan.), American temperance advocate famous for using a hatchet to demolish barrooms. The scourge of barkeepers and drinkers in Kansas and elsewhere, she received little support from the national or world temperance movements, but her activities may have helped bring about the ratification of the Prohibition Amendment to the U.S. Constitution in 1919.

Although she held a teaching certificate from a state normal school, her education was intermittent. In 1867 she married a young physician, Charles Gloyd, whom she left after a few months because of his alcoholism. In 1877 she married David Nation, a lawyer, journalist, and minister, who divorced her in 1901 on the grounds of desertion.

She entered the temperance movement in 1890, when a U.S. Supreme Court decision in favour of the importation and sale of liquor in "original packages" from other states weakened the prohibition laws of Kansas, where she was living. In her view, the illegality of the saloons flourishing in that state meant that anyone could destroy them with impunity. A formidable woman, nearly 6 feet tall and weighing 175 pounds, she dressed in stark black and white clothing. Alone or accompanied by hymn-singing women, she would march into a saloon and proceed to sing, pray, hurl biblical-sounding vituperations, and smash the bar fixtures and stock with a hatchet. At one point, her fervour led her to invade the governor's chambers at Topeka. Jailed many times, she paid her fines from lecture-tour fees and souvenir-hatchet sales, at times earning as much as $300 per week. She herself survived numerous physical assaults.

Carry Nation

Brown Brothers

Carry Nation's actions were also directed against fraternal orders, tobacco, foreign foods, corsets, skirts of improper length, and mildly pornographic art of the sort found in some barrooms of the time. She was an advocate of woman suffrage.

Nation, The, American weekly journal of opinion, the oldest such continuously published periodical still extant. It is generally considered the leading liberal magazine of its kind. It was founded in 1865 by Edwin L. Godkin at the urging of Frederick Law Olmstead.

The Nation under Godkin was an eloquent and increasingly influential voice against Reconstruction excesses, graft and corruption in government, civil-service abuses, and the like. In 1881 Godkin sold the magazine to the New York *Evening Post,* beginning a long association between the two publications. Godkin became an editor of the *Post* and Wendell Phillips Garrison editor of *The Nation,* which became a weekly edition of the paper until 1914. The journal began to increase its international coverage and its attention to the arts.

In 1918 Oswald Garrison Villard became editor, and *The Nation* ended its affiliation with the New York *Evening Post* and began moving steadily toward the political left. Its circulation dwindled to a few thousand but then, when one issue was refused mailing by the postmaster general, began a recovery. The magazine became vocal in its admiration of the Bolsheviks in Russia and ardently advocated U.S. recognition of the Soviet government, which took place in 1933. Subsequent changes in ownership and editorship kept the journal's staff and readers in some suspense about its location on the spectrum of the left, with occasional periods of general accord, as during *The Nation*'s outspoken opposition to the tactics of U.S. senator Joseph R. McCarthy in the 1950s and to the U.S. involvement in the Vietnam War. It received grants from supporters to augment its modest circulation and advertising revenues.

National Academy of Sciences, nongovernmental American organization of scientists and engineers, established March 3, 1863, by act of Congress to serve as an official adviser to the government in all matters of science and technology. It is a self-perpetuating body of limited membership; new members are co-opted on the basis of distinguished contributions to research.

In 1916 the academy established the National Research Council to coordinate the activities of various scientists and engineers in universities, industry, and government; the council issues many publications and awards a number of postdoctoral fellowships. In 1950 the Academy and the Council were administratively joined. In 1964 the National Academy of Engineering was organized under the 1963 charter. An Institute of Medicine was created to advise nationally on medicine and public health. The academy has organized U.S. participation in such efforts as the International Geophysical Year (1957–58), the International Biological Program (1964–74), and the International Geosphere-Biosphere Program (from 1986).

National Action Bloc, Arabic KUTLAH AL-ʿAMAL AL-WAṬANĪ, first Moroccan political party, founded in 1934 to counteract mounting French domination of Morocco and to secure recognition of the equality of Moroccans and Frenchmen under the French protectorate.

The National Action Bloc attracted young, educated Moroccans of many different views. Informally in existence since 1930, under the leadership of such notable figures as Mohammed Allal al-Fassi and Ahmad Balafrej, it maintained a number of publications and launched a vigorous campaign of political instruction among the Muslim population. The bloc became a formal political body in December 1934. While the reform measures it presented to increase the Muslim share of the Moroccan government were rejected by the French, Arabic was finally admitted as a language of the press, alongside French, in 1937. The party, having gained in popular support and influence, was dissolved by the French in the same year, and late in 1937 its leaders either were exiled or fled the country. Ahmad Balafrej returned to Morocco in 1943 and founded the Istiqlāl party, which was to lead in Morocco's struggle for liberation.

National Aeronautics and Space Administration (NASA), independent U.S. governmental agency established in 1958 for the research and development of vehicles and activities for the exploration of space within and outside of Earth's atmosphere.

The organization is composed of five program offices: Aeronautics and Space Technology, for the development of equipment; Space Science and Applications, dealing with programs for understanding the origin, structure, and evolution of the universe, the solar system, and the Earth; Space Flight, concerning manned and unmanned space transportation and all matters to do with the space shuttle; Space Tracking and Data, involving tracking and data acquisition; and Space Station, which has a long-term goal of establishing a manned space station. A number of additional research centres are affiliated, including the Goddard Space Flight Center in Greenbelt, Md.; the Jet Propulsion Laboratory in Pasadena, Calif.; the Lyndon B. Johnson Space Center in Houston, Texas; and the Langley Research Center in Hampton, Va. Headquarters of NASA are in Washington, D.C.

NASA was created largely in response to the Soviet launching of Sputnik in 1957. It was organized around the National Advisory Committee for Aeronautics (NACA), which had been created by Congress in 1915. NASA's organization was well underway by the early years of President John F. Kennedy's administration, when Kennedy proposed that the United States put a man on the Moon by the end of the 1960s. To that end the Apollo program was designed, and in 1969 the U.S. astronaut Neil Armstrong became the first man on the Moon. Later unmanned programs—such as Viking, Mariner, Voyager, and Galileo—explored other bodies of the solar system.

NASA was also responsible for the development and launching of a number of satellites with Earth applications, such as Landsat, a series of satellites designed to collect information on natural resources and other Earth features; communications satellites; and weather satellites. It also planned and developed the space shuttle, a reusable vehicle capable of carrying out missions that cannot be conducted with conventional spacecraft.

National Alliance, formerly (until 1994) ITALIAN SOCIAL MOVEMENT, Italian ALLEANZA NAZIONALE, or MOVIMENTO SOCIALE ITALIANO (MSI), extreme right-wing anticommunist party of Italy, some of whose members had neo-Fascist tendencies.

The MSI was formed in 1948 from elements of the defunct Uomo Qualunque (Average Man) Party that had appeared in 1945. In the early 1950s MSI's electoral success worried moderates until they saw that the right-wing party was not gaining a substantial number of votes. The moderates' occasional need for MSI votes, however, proved embarrassing; in 1960, when the MSI formed a necessary part of a parliamentary majority, protest riots led to the fall of the Christian Democratic government. In the 1972 general elections MSI joined with another right-wing party, the Italian Democratic Party of Monarchical Unity, to form an alliance known as the National Right (Destra Nazionale; DN). In January 1973 they formally merged as the MSI-DN; but after a moderate faction bolted from the party in 1976, the party readopted its original name.

The MSI renamed itself the National Alliance in 1994. It joined two newly formed centre-right parties, the Forza Italia and the Northern League, in an alliance that was swept to power in parliamentary elections in March 1994.

national anthem, hymn or song expressing patriotic sentiment and either governmentally authorized as an official national hymn or holding that position in popular feeling. The oldest national anthem is Great Britain's "God Save the Queen," which was described as a national anthem in 1825, although it had been popular as a patriotic song and used on occasions of royal ceremonial since the mid-18th century.

During the 19th and early 20th centuries, most European countries followed Britain's example, some national anthems being written especially for the purpose, others being adapted from existing tunes. The sentiments of national anthems vary, from prayers for the monarch to allusions to nationally important battles or uprisings ("The Star-Spangled Banner," United States; "La Marseillaise," France) to expressions of patriotic feeling ("O Canada").

National anthems vary greatly in musical merit; and the verse or text, like the music, has not in every case been written by a national of the country concerned. Changes in politics or international relationships often cause the texts to be altered or a new anthem to be adopted. For example, the former Soviet Union adopted "Gimn Sovetskogo Soyuza" ("Hymn of the Soviet Union") as its national anthem in 1944, replacing the Communist hymn "Internationale," whose words and music were written in the late 19th century by two French workers.

Few national anthems have been written by poets or composers of renown, a notable exception being the first Austrian national anthem, "Gott erhalte Franz den Kaiser" ("God Save Emperor Francis"), composed by Joseph Haydn in 1797 and later (1929) sung to the text "Sei gesegnet ohne Ende" ("Be Blessed Forever"). Haydn's melody was also used for the German national anthem "Deutschland, Deutschland über Alles" ("Germany, Germany Above All"), adopted in 1922. Beginning with its third verse, "Einigkeit und Recht und Freiheit" ("Unity and rights and freedom"), it continues in use as the national anthem of Germany, retitled as "Deutschlandlied." The German national anthem before 1922 had been "Heil dir im Siegerkranz" ("Hail to Thee in Victor's Garlands"), sung to the melody of "God Save the Queen." (*See also* Advance Australia Fair; Deutschlandlied; God Save the Queen; Internationale, L'; Marseillaise, La; O Canada; Star-Spangled Banner, The.)

National Aquarium, oldest public aquarium in the United States. Originally built at Woods Hole, Mass., in 1873, the aquarium was relocated to a site in Washington, D.C., in 1888. Since 1932 it has been located in the basement of the U.S. Department of Commerce building in Washington.

The facility houses more than 1,000 specimens of nearly 200 species of fishes in 54 individual display tanks ranging in capacity from 285 to 10,640 litres (75 to 2,800 gallons). American game fishes such as trout, bass, and pike are exhibited in their natural habitats.

National Aquarium in Baltimore, The, one of the largest public aquariums in the United States. The aquarium, which opened in 1981 in the Inner Harbor area of Baltimore, was financed by the city but was officially designated a branch of the National Aquarium, by the U.S. Congress. Of the more than 3,000 aquatic specimens maintained by the aquarium, many are marine mammals and birds. The marine-life exhibits are connected to a system of three large tanks that are used to circulate 1,900,000 litres (500,000 gallons) of salt water. Numerous freshwater life forms are also on display. The decor and effect of the aquarium are impressive. For example, suspended from the ceiling is a 19-metre- (63-foot-) long skeleton of a finback whale. Background sounds of the sea and sea life are audible throughout various sections of the facility.

The underlying theme of the exhibits is the concept that all life is dependent on water, whether in the atmosphere, in the soil, or in the lakes, rivers, and oceans. One of the more notable displays is of a tropical rain forest with waterfalls and dripping vegetation inside a 20-metre-high glass pyramid.

National Archaeological Museum, Greek ETHNIKON ARCHAIOLOGIKON MOUSEION, in Athens, museum of ancient Greek art, containing probably the finest collection of Greek antiquities in the world. The museum was erected in 1866–89 and extended in 1925–39, when an additional wing was built. The holdings include sculpture, bronzes, pottery, jewelry, and artifacts from all parts of Greece; they range in date from the Mycenaean period to the Hellenistic Age.

Among the museum treasures are the contents of six shaft graves from Mycenae, including gold objects, cups, diadems, and a bull's head in silver with gold horns and rosettes. Treasures of archaic Greek sculpture include many kouros and kore figures (standing male and female figures) as well as fine vases. The best-known kouros is the colossal figure from the temple of Poseidon at Sounion. Sculpture from the pediments of the Temple of Aphaia at Aegina illustrate the preclassical phase of Greek sculpture. Sculpture of the classical period of the 5th century BC is well represented. An especially fine piece is the bronze statue of Poseidon found off Cape Artemision in 1928 and dating from about 450, possibly by the sculptor Kalamis.

National Art Gallery, in Wellington, N.Z., national collection of paintings by New Zealand and European artists and portraits of prominent New Zealand figures. The gallery grew out of the city's first public art gallery, opened in 1907 by the New Zealand Academy of Fine Arts. The basis for the original collection was a group of paintings purchased in England in 1906–07 and another group purchased at the New Zealand International Exhibition in 1906–07 at Christchurch.

The National Art Gallery building opened in 1936 when the collection formed by the New Zealand Academy of Fine Arts was given to it. The collection is particularly strong in British paintings of the 20th century and includes works by such artists as Spencer Gore, Frank Brangwyn, and Augustus John and sculpture by Barbara Hepworth.

National Assembly, French ASSEMBLÉE NATIONALE, any of various historical French parliaments or houses of parliament. From June 17 to July 9, 1789, it was the name of the revolutionary assembly formed by representatives of the Third Estate; thereafter (until replaced by the Legislative Assembly on Sept. 30, 1791) its formal name was National Constituent Assembly (Assemblée Nationale Constituante), though popularly the shorter form persisted.

The name was not used again until the National Assembly of 1871–75, which concluded the Franco-German War and drafted the constitution of 1875. During the ensuing Third Republic (1875–1940), it was the joint name for the two houses of parliament, the Senate and the Chamber of Deputies. During the Fourth Republic (1946–58), it was the new name of the lower house alone (the former Chamber of Deputies)—the name of the upper house (the former Senate) being changed to the Council of the Republic. For the Fifth Republic (beginning in 1958), the name National Assembly was retained for the lower house, and the upper house reverted to the name of Senate.

Popularly, the name National Assembly has often been used when referring to any constituent assembly (*assemblée constituante*)—not only the National Constituent Assembly of the Revolution but also the Constituent Assembly of 1848 (which created the Second Republic) and the Constituent Assembly of 1945–46 (which created the Fourth Republic).

National Association for the Advancement of Colored People (NAACP), interracial American organization created to work for the abolition of segregation and discrimination in housing, education, employment, voting, and transportation; to oppose racism; and to ensure blacks their constitutional rights. The NAACP was created in 1909 with the merging of the Niagara Movement, a group of young blacks led by W.E.B. Du Bois, and a group of concerned whites.

Since its founding, the NAACP has been most successful in the areas of legal redress. Other areas of activity have included political action to secure enactment of civil-rights laws, programs of education and public information to win popular support, and direct action to achieve specific goals. In 1939 the NAACP Legal Defense and Education Fund was established independently of the NAACP to act as the legal arm of the civil-rights movement, and it was the NAACP's legal council that carried to the Supreme Court the case (*Brown* v. *Board of Education of Topeka*) that resulted in the high court's landmark 1954 school-desegregation decision. Since 1986 its headquarters have been in Baltimore, Md.

National Association of Evangelicals, fellowship of Evangelical Protestant groups in the United States, founded in 1942 by 147 Evangelical leaders. It embraces some 50 denominations, many independent religious organizations, local churches, groups of churches, and individual Christians. All members must subscribe to a Statement of Faith that requires belief in the Bible "as the inspired, the only infallible, authoritative word of God" and commitment to a well-defined category of fundamental Christian doctrines.

The association renders services to member bodies in the major fields of Christian activity, with commissions and affiliated agencies for evangelism and church extension, world relief, public affairs, higher education, Christian day schools, Sunday schools, publications, foreign missions, laypersons' work, radio and television broadcasting, government chaplaincies, international relations, social action, stewardship, spiritual life, and theological concerns. Among its related agencies are the Evangelical Foreign Missions Association, the National Christian Education Association, and the National Religious Broadcasters. Besides its national headquarters in Azusa, Calif., it has offices in Washington, D.C.; New York City; and other major American cities. The organization is officially related to the World Evangelical Fellowship, with offices in London.

National Association of Free Will Baptists, association of Baptist churches organized in Nashville, Tenn., in 1935. It traces its history back to Free Will, or Arminian, Baptists in the 18th century. These Baptists believed in free will, free grace, and free salvation, in contrast to most Baptists, who were Calvinists (*i.e.,* who believed that Christ died only for those predestined to be saved).

One Free Will Baptist group was organized in North Carolina in 1727, and its churches were located primarily in North and South Carolina. The second group originated with the work of Benjamin Randall, who became a Baptist in 1776 and began traveling in New England as an evangelist. He preached free-will doctrine and established many Baptist churches. The movement eventually spread to the Midwest through the work of evangelists and preachers. In 1827 the General Conference of Free Will Baptists was organized. The majority of this group merged with the Northern (later American) Baptist Convention in 1911, but some of the churches did not take part in the merger. In 1935 the Free Will congregations reorganized into the National Association of Free Will Baptists.

This group, which has some 2,400 congregations, emphasizes Arminian doctrine and believes salvation is available to all who accept Christ. Local congregations are independent and belong to state associations. The National Association, headquartered in Antioch, Tenn., meets annually.

national bank, in the United States, any commercial bank chartered and supervised by the federal government and operated by private individuals.

The first Bank of the United States (1791–1811) and the second Bank of the United States (1816–36) had functioned as agents of the U.S. Treasury and competed with the state, or private, banks, thereby ensuring that the private banks redeemed their banknotes at full value. In spite of its contribution to national monetary stability, the second Bank of the United States had come under attack by President Andrew Jackson, and its charter failed to be renewed in 1836; a chaotic period of state banking resulted that lasted until the American Civil War. The difficulties in financing that war pointed to the need for a better banking system and a sounder currency.

The National Bank Act of 1863 provided for the federal charter and supervision of a system of banks known as national banks; they were to circulate a stable, uniform national currency secured by federal bonds deposited by each bank with the comptroller of the currency (often called the national banking administrator). The act regulated the minimum capital requirements of national banks, the kinds of loans they could make, and the reserves that were to be held against notes and deposits; it also provided for the supervision and examination of banks and for the protection of noteholders. The 1863 act did not prohibit state banks from issuing their own currency, but Congress did impose a 10 percent tax on state banknotes that effectively eliminated such a rival currency.

The inflexibility of national banknote supplies and a lack of reserves led to the formation of the Federal Reserve System in 1913. By 1935 the national banks had transferred their note-issuing powers to the Federal Reserve. National banks have become primarily commercial in nature, although some also maintain savings and trust functions. The Federal Reserve shares supervisory and regulatory authority with the Office of the Comptroller of the Currency, which charters, regulates, and supervises national banks. *See also* United States, Bank of the.

National Baptist Convention of the United States of America, Inc., also called NATIONAL BAPTIST CONVENTION, U.S.A., INC., the larger of two associations of black Baptist churches that formed after a schism in 1915 in the National Baptist Convention. It is the largest black church in the United States and claimed a membership of some 8,000,000 in 30,000 congregations in the late 20th century.

The National Baptist Convention had its origins in the period after the American Civil War, when many independent black Baptist congregations were established. Eventually they joined in various national organizations, and the merger of the Foreign Mission Baptist Convention (1880), the American National Baptist Convention (1886), and the Baptist National Educational Convention (1893) in Atlanta, Ga., in 1895 produced the National Baptist Convention. Disagreements over the organization's publishing house and adoption of a charter resulted in a schism in 1915, when one group adopted the charter and took the name National Baptist Convention of the United States of America, Inc., and the other group rejected the charter and continued as the National Baptist Convention of America. The latter denomination had about 3,500,000 members by the late 20th century. In 1961 a dispute within the National Baptist Convention, U.S.A., Inc., resulted in the establishment of the Progressive National Baptist Convention, Inc., with about 2,500,000 members.

National Baseball Hall of Fame and Museum: *see* Baseball Hall of Fame.

National Basketball Association (NBA), professional basketball league formed in the United States in 1949 by the merger of two rival organizations, the National Basketball League (founded 1937) and the Basketball Association of America (founded 1946). In 1976 the NBA absorbed four teams from the former American Basketball Association (ABA).

By the early 1980s the NBA was plagued by money-losing franchises, low attendance, and declining television ratings. The league soon rebounded under the leadership of David Stern, NBA commissioner from 1984, who helped transform it into an international entertainment company. Aggressive marketing highlighted such star players as Magic Johnson, Larry Bird, and Michael Jordan. Other innovations included league limits on player salaries, lucrative broadcast rights for network and cable television, and expanded All-Star Game festivities.

The NBA comprises two conferences, each with two divisions. In 2002–03 there were 29 teams, aligned as follows:

Eastern Conference:
Atlantic Division: Boston Celtics, Miami Heat, New Jersey Nets, New York Knicks, Orlando Magic, Philadelphia 76ers, Washington Wizards.
Central Division: Atlanta Hawks, New Orleans Hornets, Chicago Bulls, Cleveland Cavaliers, Detroit Pistons, Indiana Pacers, Milwaukee Bucks, Toronto Raptors.

Western Conference:
Midwest Division: Dallas Mavericks, Denver Nuggets, Houston Rockets, Minnesota Timberwolves, San Antonio Spurs, Utah Jazz, Memphis Grizzlies.
Pacific Division: Golden State Warriors, Los Angeles Clippers, Los Angeles Lakers, Phoenix Suns, Portland Trail Blazers, Sacramento Kings, Seattle SuperSonics.

The top-ranking teams at the end of each season engage in a play-off to determine the NBA champion, which claims the title of world champion. Probably the most outstanding team in NBA history was the Boston Celtics, which, led by centre Bill Russell, won 11 of 13 titles from 1956–57 to 1968–69. Other dominant clubs were the Los Angeles Lakers in the 1980s and the Chicago Bulls in the '90s. *See* Sporting Record: *Basketball.*

National Botanic Gardens of South Africa, also called KIRSTENBOSCH BOTANIC GARDENS, one of the world's largest botanical gardens, occupying a 1,305-acre (528-hectare) site in Kirstenbosch, near Cape Town, Western Cape province, S.Af. The 6,200-species collection consists almost exclusively of Cape plants native to the fynbos (scrubland) and forests of southern Africa. The botanical garden was established in 1913. It includes such beautiful flowering plants as the protea and heather, an enormous number of flowering bulbs, and immense cycads (palmlike tropical plants). Conservatories house plants from all climatic regions. Three herbaria, with a total of about 300,000 specimens, are retained at Kirstenbosch.

One of the main objectives of the National Botanical Institute of South Africa is to preserve endangered local plant species. Over the years the institution has acquired property in areas that have numerous specimens of plants that are in danger of becoming extinct. It has set aside eight such sites throughout South Africa as regional gardens or reserves.

National Botanical Garden of Belgium, French JARDIN BOTANIQUE NATIONAL DE BELGIQUE, Flemish NATIONALE PLANTENTUIN VAN BELGIË, botanical garden consisting of the plant collections at Meise, on the outskirts of Brussels, Belg. The garden has about 18,000 different species of plants. Originally founded in 1870 on a 17-acre (7-hectare) site in the heart of Brussels, the botanical garden was gradually transferred after the mid-1960s to a magnificent estate at Meise, the Domaine de Bouchout. The world's largest greenhouse, the Palace of Plants, has been constructed on the 230-acre (93-hectare) estate there. The estate, which long served as a park around a castle, is beautifully landscaped. An herbarium, containing nearly 2,000,000 dried specimens, and a library collection of 150,000 volumes have been moved to a new building at Meise. The research program of the National Botanical Garden has traditionally focused on the plants of tropical Africa as well as on those of Belgium.

National Broadcasting Co., Inc. (NBC), major American commercial broadcasting company, now a subsidiary of General Electric Company (GE).

NBC was formed in 1926 jointly by the Radio Corporation of America (RCA), GE, and Westinghouse Electric Corporation. Created by David Sarnoff, RCA's president (or, from 1947, chairman), NBC was the first American company organized solely and specifically to operate a radio broadcasting network. In 1930 it became wholly owned by RCA, and in 1986 RCA was purchased by GE. NBC's headquarters are in Rockefeller Center, New York City.

Two early radio stations in Newark, N.J., and New York City—WJZ, founded by Westinghouse in 1921, and WEAF, founded by the American Telephone & Telegraph Company in 1923—were early acquired by RCA and, after NBC was created in 1926, became the centres of NBC's two semi-independent networks, the Blue Network, based on WJZ, and the Red Network, based on WEAF, each with its respective links to stations in other cities. During the 1930s the Red Network prospered and, by 1938, carried 75 percent of NBC's commercial programs. In 1943 NBC sold off the Blue Network, which became the American Broadcasting Company (ABC). Five years later NBC suffered severely when it lost several of its leading performers (including Jack Benny, George Burns and Gracie Allen, Edgar Bergen, and Red Skelton) to the Columbia Broadcasting System (CBS) in a talent raid, thereby losing an edge in the upcoming television age.

NBC had installed nationwide television service by 1951 and quickly became one of the three major television networks. In 1953 it pioneered the first coast-to-coast transmission of a colour television broadcast, and in 1956 it made the first television broadcast recorded on videotape (rather than presented live). In 1964 NBC presented the first made-for-television movie. Though its television operations continued to expand throughout the 1960s and '70s, NBC's radio business sagged, and in 1988 the company sold most of its remaining radio stations. In the 1990s NBC began to establish itself in cable television with CNBC and other new cable networks. In 1996 it created MSNBC, a joint venture with Microsoft to deliver news and programming on the Internet.

National Capital Parks, system of national monuments and government-owned parks and recreation areas in and around the District of Columbia, U.S. The system was authorized by the U.S. Congress in 1790 and became part of the National Park Service in 1933.

Today there are more than 300 park units with a combined area of 10 square miles (26 square km). The overwhelming majority of units are located in Washington, D.C.; others are in Virginia and Maryland. Units include the Washington Monument, the Jefferson Memorial, the White House, the Lincoln Memorial, the Vietnam Veteran's Memorial, the President's Parks, and the Frederick Douglass Home, all in Washington, D.C., as well as Prince William Forest Park and the Arlington House (Custis-Lee Mansion) in Virginia.

National Cash Register Company: *see* NCR Corporation.

National Church of Iceland, established, state-supported Evangelical Lutheran Church of Iceland. Christian missionaries came to the country in the late 10th century, and about 1000 the Althing (the national Parliament and high court) averted a civil war between pagans and Christians by deciding that the country's population should be Christian. The first Icelandic bishop was consecrated in 1056.

Norway gained control over independent Iceland in the 13th century, and in 1380 Norway and Denmark were united. The Protestant Reformation was brought to Iceland by Christian III, king of Norway and Denmark (1534–59), who gradually overcame the Icelandic people's resistance and by 1550 had established Lutheranism as the official religion.

The outstanding Icelandic Reformation scholar was Gudbrandur Thorláksson, bishop of Hólar for 56 years. He wrote or prepared for publication many religious works in the Icelandic language, including the Bible (1584).

In 1918 Iceland became an independent state under the Danish king, and in 1944 the Republic of Iceland was founded. The historic relationship of the state and the Evangelical Lutheran Church was maintained, although freedom of religion exists for all other congregations. In the 20th century a very small percentage of the people took part in church activities, although most Icelandic citizens remained official members of the church. The state gives financial support to the church but allows it considerable freedom.

National Coal Board (NCB), British public corporation created on Jan. 1, 1947, which operates previously private coal mines, manufactures coke and smokeless fuels, and distributes coal, heating instruments, and other supplies. Headquarters are in London.

Redeeming its longstanding pledge to nationalize the coal mines, the British Labour Party, upon coming to power at the end of World War II, promptly passed the Coal Industry Nationalization Act (1946), which created the National Coal Board, the members of which were to be appointed by the minister of power. Under the chairmanship of Lord Hyndley, the NCB took control of the country's 1,647 mines, more than a million acres of land, about 100,000 dwellings, and transportation equipment and other facilities formerly in the hands of 850 private coal companies. Coal owners were paid £164,600,000 in compensation.

The NCB set out to increase coal production while at the same time reducing the miners' workweek to five days, improving wages and working conditions, and extending fringe benefits. Although such efforts were hailed by the National Union of Mineworkers, the NCB in the 1980s, during the administration of Margaret Thatcher, reversed past policy and tried to streamline operations by closing unprofitable pits and laying off mineworkers. By the late 20th century both its workforce and its coal mines had been considerably reduced in number.

National Collegiate Athletic Association (NCAA), organization in the United States that administers intercollegiate athletics. It was formed in 1906 as the Intercollegiate Athletic Association to draw up competition and eligibility rules for football and other intercollegiate sports. The NCAA adopted its current name in 1910. In 1921 it conducted its first national championship event, the National College Track and Field Championship, and it gradually extended its jurisdiction over intercollegiate competition in other sports and their college associations, or conferences. The NCAA did not acquire significant powers to enforce its rules until 1942, however. In 1952 it began regulating live televised coverage of college football in order to protect game attendance in the stadiums.

The NCAA functions as a general legislative and administrative authority for intercollegiate athletics. It formulates and enforces the rules of play for various sports and the eligibility criteria for athletes. It supervises both regional and national intercollegiate athletic contests, and it conducts about 80 national championships in a total of about 20 sports. In 1973 the NCAA reorganized into three divisions, each representing a different level of competition, with each member college allowed to select the division it belongs to. Each division holds national championship competitions in various sports.

The NCAA compiles statistics on college football, baseball, and basketball. It publishes rule books and guides on these sports as well as on fencing, gymnastics, lacrosse, ice hockey, soccer, skiing, swimming, track-and-field, and wrestling, among others. The NCAA's membership in the late 20th century included more than 860 educational institutions. Its headquarters are at Overland Park, Kan.

National Congress of Parents and Teachers, byname PARENT-TEACHER ASSOCIATION (PTA), American organization concerned with the educational, social, and economic well-being of children. The PTA was founded on Feb. 17, 1897, as the National Congress of Mothers; membership was later broadened to include teachers, fathers, and other citizens. There are 52 state branches, including one in the District of Columbia and one in Europe to serve American dependents on military bases. Within the national framework, local PTA's have a large measure of autonomy with which to design their own programs.

The stated purposes of the PTA are to bring the home and school into closer relationship so that parents and teachers may cooperate intelligently in the training of the child, and to develop between educators and the general public such united efforts as will secure for every child the highest advantages in mental, social, and physical education. Publications include *The PTA Magazine* and the *National PTA Bulletin.*

National Convention, French CONVENTION NATIONALE, assembly that governed France from Sept. 20, 1792, until Oct. 26, 1795, during the most critical period of the Revolution. The National Convention was elected to provide a new constitution for the country after the overthrow of the monarchy (Aug. 10, 1792). The Convention numbered 749 deputies, including businessmen, tradesmen, and many professional men. Among its early acts were the formal abolition of the monarchy (September 21) and the establishment of the republic (September 22).

The struggles between two opposing Revolutionary factions, the Montagnards and the Girondins, dominated the first phase of the Convention (September 1792 to May 1793). The Montagnards favoured granting the lower classes more political power, while the Girondins favoured a bourgeois republic and wanted to reduce the power of Paris over the course of the Revolution. Discredited by a series of defeats in the war they promoted against the anti-Revolutionary European coalition, the Girondins were purged from the Convention by the popular insurrection of May 31 to June 2, 1793.

The Montagnards controlled the Convention during its second phase (June 1793 to July 1794). Because of the war and an internal rebellion, a revolutionary government with dictatorial powers (exercised by the Committee of Public Safety) was set up. As a result, the democratic constitution approved by the Convention on June 24, 1793, was not put into effect, and the Convention lost its legislative initiative; its role was reduced to approving the Committee's suggestions.

Reacting against the Committee's radical policies, many members of the Convention participated in the overthrow of the most prominent member of the Committee, Robespierre, on July 27, 1794 (9 Thermidor). This Thermidorian Reaction corresponded to the final phase of the Convention (July 1794 to October 1795). The balance of power in the assembly was then held by the moderate deputies of The Plain (La Plaine). The Girondins were recalled to the Convention, and the leading Montagnards were purged. In August 1795 the Convention approved the constitution for the regime that replaced it, the bourgeois-dominated Directory (1795–99).

National Council of the Churches of Christ in the U.S.A., also called NATIONAL COUNCIL OF CHURCHES, an agency of Protestant, Anglican, and Eastern Orthodox denominations that was formed in 1950 in the United States by the merger of 12 national interdenominational agencies. The National Council of Churches is the largest ecumenical body in the United States, with a membership of more than 50 million in the early 21st century. Its international counterpart is the World Council of Churches. The National Council's purpose is to provide an organization through which member churches can express their common faith and cooperate with one another on various programs. The council's headquarters are in New York City.

The National Council of Churches has initiated many interchurch activities, including a revision of the English Bible (the New Revised Standard Version, 1989); the publication of religious education, evangelism, and family-life materials; and the promotion of religious and moral values in broadcasting. The council also encourages collaboration with overseas churches in the modern use of the mass media; it fights against illiteracy and enlists local churches to fight against hunger through better agriculture, nutrition, and family planning.

In the 21st century, the council's membership was made up of 36 Protestant and Eastern Orthodox churches as full members, with other church bodies, including conservative Protestants and Roman Catholics, participating in its programs.

National Covenant, solemn agreement inaugurated by Scottish churchmen on Feb. 28, 1638, in the Greyfriars' churchyard, Edinburgh. It rejected the attempt by King Charles I and William Laud, archbishop of Canterbury, to force the Scottish church to conform to English liturgical practice and church governance. The National Covenant was composed of the King's Confession (1581), additional statements by Alexander Henderson (a leader in the Church of Scotland), and an oath. The covenant reaffirmed Reformed faith and Presbyterian discipline and denounced the attempted changes, but it also urged loyalty to the king. It was signed by many Scotsmen.

National Diet Library, Japanese KOKURITSU KOKKAI TOSHOKAN, the national library of Japan, formed at Tokyo in 1948 and combining the libraries of the upper and lower houses of the Diet (national legislature) with the collections of the former Imperial Library (established 1872). The library's building opened in 1961, adjacent to the National Diet Building. It is organized on the system of the U.S. Library of Congress, serving legislators and the nation at large through various major divisions and 35 branch libraries.

The main collection contains more than six million volumes. The library serves as the headquarters of both the Japan Special Libraries Association and the Centre of International Book Exchange. Law provides that all Japanese publications be deposited at the library, and this forms the basis for the computer-generated Japanese national bibliography, which is published by the library.

National Education Association (NEA), American voluntary association of teachers, administrators, and other educators associated with elementary and secondary schools and colleges and universities. It is the world's largest professional organization. Its headquarters are in Washington, D.C.

The association originated in 1857 as the National Teachers Association, which merged in 1870 with the National Association of School Superintendents and the American Normal School Association to form the National Education Association. Its membership was more than 2,500,000 in the late 20th century.

The NEA has a complex organizational structure. First, it is a general-purpose, individual-membership organization that advances the cause of public education and the welfare of its members. It has a large professional staff and establishes committees and commissions, which provide numerous services, such as research, publications, liaison with federal-government agencies, promotion of federal legislation, and defense of professional rights.

Second, the NEA comprises many national bodies that are based on specialized, professional, and vocational interests. These are simultaneously departments in the NEA and autonomous organizations with their own dues-paying members, officers, and staffs and in many cases with state and local affiliates or branches. Examples are the successors to two of the founding organizations, now the American Association of School Administrators and the American Association of Colleges for Teacher Education. There are departments of elementary-school principals, of secondary-school principals, and of classroom teachers; departments of teachers of various subjects, such as art, music, mathematics, science, and social studies; and departments of specialists in such fields as educational research, curriculum development, audiovisual instruction, rural education, and elementary, kindergarten, and preschool education.

Third, the NEA may be viewed as a confederation of affiliated local and state education associations. The representative assembly of the NEA, which establishes its policies and elects its officers, is composed of delegates sent by these affiliated associations, which are represented according to the number of their members who belong to the national body. The rapid growth of membership in the NEA dates from the creation of the representative assembly in 1921.

It is by forming local and state associations that teachers and school administrators have chiefly sought to improve the schools and their own working conditions, because local school boards set salary scales and conditions of employment and because overall educational authority for the public-schools system and its financing is vested in the governments of the several states. In some states, members of the local and the state associations must join the National Education Association; in others, either membership is independent.

National Football League (NFL), major professional football organization in the United States, founded in 1920 at Canton, Ohio, as the American Professional Football Association. Its first president was Jim Thorpe, an outstanding Native American athlete. The league adopted its present name in 1922.

The NFL became the strongest American professional league and survived several challenges by rival organizations, the most serious being that of the American Football League in the 1960s. The National and American leagues completed a merger in 1970, creating a 26-team circuit under the name of the older NFL. Since then teams have relocated and been renamed and new teams have been added. By 2002 there were 32 teams aligned as follows:

National Football Conference:
North Division: Chicago Bears, Detroit Lions, Green Bay Packers, and Minnesota Vikings.
East Division: Dallas Cowboys, New York Giants, Philadelphia Eagles, and Washington Redskins.
South Division: Atlanta Falcons, Carolina Panthers, New Orleans Saints, and Tampa Bay Buccaneers.
West Division: Arizona Cardinals, St. Louis Rams, San Francisco 49ers, and Seattle Seahawks.

American Football Conference:
North Division: Baltimore Ravens, Cincinnati Bengals, Cleveland Browns, and Pittsburgh Steelers.
East Division: Buffalo Bills, Miami Dolphins, New England Patriots, and New York Jets.
South Division: Houston Texans, Indianapolis Colts, Jacksonville Jaguars, and Tennessee Titans.
West Division: Denver Broncos, Kansas City Chiefs, Oakland Raiders, and San Diego Chargers.

The league season culminates with an annual playoff—the Super Bowl—among its top teams for the world-championship title. The NFL has headquarters in New York City and since 1962 has maintained a professional football hall of fame in Canton, Ohio. *See* Sporting Record: *Football.*

national forest, in the United States, any of numerous forest areas set aside under federal supervision for the purposes of conserving water, timber, wildlife, fish, and other renewable resources and providing recreational areas for the public. The national forests are administered by the Forest Service in the Department of Agriculture. They numbered 156 in the 21st century and occupied a total area of almost 300,000 square miles (about 770,000 square km) in 40 states and Puerto Rico. They are managed according to the principle of multiple use, whereby various resources—including water, timber, and grasslands—are utilized to serve the nation's interests without reducing the land's capability to produce more.

The U.S. national forests began in 1891 as a system of forest reserves, the establishment of which had been urged by Secretary of the Interior Carl Schurz. President Theodore Roosevelt created the Forest Service in 1905 and established additional forest reserves. In 1907 the forest reserves were renamed national forests.

National Gallery, art museum in London, Eng., that houses Great Britain's national collection of European paintings. It is located on the north side of Trafalgar Square in the City of Westminster, London.

The National Gallery was founded in 1824 when the British government bought a collection of 38 paintings from the estate of the merchant John Julius Angerstein (1735–1823). The collection was initially exhibited in Angerstein's house at 100 Pall Mall, but in 1838 it was reopened to the public in its current premises. This Neoclassical structure, designed by the Greek Revival architect William Wilkins, was enlarged in 1860, 1876, 1886, and 1975 and in 1991 with the addition of the Sainsbury Wing, by the architect Robert Venturi. Until the opening of the Tate Gallery (*q.v.*) in 1897, modern British art was also displayed at the National Gallery. Since 1856 the National Gallery also has had responsibility for the historical portraits housed in the National Portrait Gallery (*q.v.*).

The collection now comprises only some 2,300 works, but it is regarded by many as the most representative sampling of European painting in the world. It has the most comprehensive collection of Italian Renaissance paintings outside Italy, with works by most of the great Florentine and Venetian masters of that period. There are also impressive holdings of works by various British, Dutch, French, Spanish, and Flemish painters from the 15th to the 19th century. Among the artists represented are Leonardo, Raphael, Holbein, Velázquez, Van Dyck, Claude Lorrain, Poussin, Rembrandt, Rubens, and Vermeer. Because of the small size of the collection, most of the paintings are exhibited.

National Gallery of Art, American museum of art, part of the federally operated Smithsonian Institution system, located at the east end of the Mall, Washington, D.C. It was founded in 1937 when the financier and philanthropist Andrew W. Mellon donated to the government a collection of paintings by European masters and a large sum of money to construct the gallery's Neoclassical building, which was designed by the architect John Russell Pope and opened in 1941. That structure came to be known as the West Building after 1978, when it was connected by plaza and underground concourse to the new East Building, which was designed by I.M. Pei and Partners.

The National Gallery now houses a very extensive collection of European and American paintings, sculpture, decorative arts, and graphic works from the 12th to the 20th century. The museum has especially rich holdings of works by Italian Renaissance painters, as well as by Dutch and Spanish Baroque and French Rococo artists.

National Gallery of Victoria, major Australian art museum, located in Melbourne, with collections ranging over European, Asian, and Australian art of all periods. The museum is housed in the Victorian Arts Centre. The Great Hall features a dramatic stained-glass ceiling by Leonard French, a Melbourne artist. The building was designed in the late 1960s by Sir Roy Grounds.

National Geographic Magazine, monthly magazine of geography, archaeology, anthropology, and exploration, providing the armchair traveler with literate and accurate accounts and unsurpassed photographs and maps to comprehend those pursuits. It is published in Washington, D.C.

The magazine was founded in 1888 and still is published by a nonprofit corporation, the National Geographic Society. The society originally intended the periodical to be oriented toward the United States, but the nature of its articles soon made it a magazine with a world view. Under the editorship of Gilbert Hovey Grosvenor, it attained a circulation of 1,000,000 by 1926. *National Geographic* was one of the first magazines to reproduce colour photographs, and it was also the leader in printing photographs of undersea life, views from the stratosphere, and animals in their natural habitats (exotic or endangered animals are often subjects). The magazine became world famous for its richly illustrated articles on the various geographic regions of the world; meanwhile, it kept to its creed: "Only what is of a kindly nature is printed about any country or people." These features included substantial information on the environmental, social, and cultural aspects of the areas covered and their peoples. Proceeds from the magazine help support the society's scientific expeditions.

National Geographic Society, American scientific society founded (1888) in Washington, D.C., by a small group of eminent explorers and scientists "for the increase and diffusion of geographic knowledge." With more than nine million members in the mid-1990s, the organization is the world's largest scientific and educational society. Members receive the monthly *National Geographic Magazine.*

The society has supported more than 5,000 major scientific projects and expeditions, including the polar expeditions of the American explorers Robert E. Peary and Richard E. Byrd, the British archaeologist Howard Carter's discovery of the tomb of King Tutankhamen in Egypt, and the first American climb of Mount Everest. In the 1960s the society funded research by the British anthropologists L.S.B. Leakey and Mary Leakey in the Olduvai Gorge of eastern Africa that produced remarkable fossil remains of early hominids. Society support also benefited the investigations of the French undersea explorer Jacques-Yves Cousteau, the work of the British ethnologist Jane Goodall with chimpanzees and that of American zoologist Dian Fossey with gorillas, and the exploration of the wreck of the ocean liner *Titanic.*

In addition to the *National Geographic Magazine,* the society publishes books and atlases, issues weekly bulletins to educators, librarians, and students, and operates a news service. In one of its most successful endeavours, the society has created hundreds of documentary programs for television and has produced numerous educational videocassettes, CD-ROM products, and interactive multimedia educational systems.

National Health Service (NHS), in Great Britain, a comprehensive public-health service under government administration, established by the National Health Service Act of 1946 and subsequent legislation. Virtually the entire population is covered, and health services are free except for certain minor charges.

The services provided are administered in three separate groups: general practitioner and dental services, hospital and specialist services, and local health authority services. General practitioners or family physicians give primary medical care to a group of persons who register with them. These doctors and dentists operate their own practices but are paid by the government on a per capita basis (*i.e.,* according to the number of people registered with them). Their services are organized locally by an executive council. Physicians are free to contract in or out of the service and may have private patients while within the scheme. Hospital and specialist services are provided by professionals on government salaries working in government-owned hospitals and other facilities that are under the direction of regional authorities called hospital boards. Local health authority services provide maternity and child welfare, posthospital care, home nursing, immunization, ambulance service, and various other preventive and educational services. They may also operate family-planning clinics, as well as day nurseries for children.

The National Health Service is financed primarily by general taxes, with smaller contributions coming from local taxes, payroll contributions, and patient fees. The service has managed to provide generally high levels of health care while keeping costs relatively low, but the system has come under increasing financial strain because the growth of medical technology has tended to make hospital stays progressively more expensive.

National Hockey League (NHL), organization of professional ice hockey teams in North America, formed in 1917 by five Canadian teams, to which the first U.S. team, the Boston Bruins, was added in 1924. The NHL became the strongest league in North America and in 1926 took permanent possession of the Stanley Cup, representing world supremacy in ice hockey. Headquarters are in Montreal.

League membership rose to 10, then dropped, and held steady at 6 after 1942. After various periods of expansion and reorganization, the NHL in 2001 consisted of 30 teams in two conferences and six divisions.

Eastern Conference:
Atlantic Division: New Jersey Devils, New York Islanders, New York Rangers, Philadelphia Flyers, Pittsburgh Penguins.
Northeast Division: Boston Bruins, Buffalo Sabres, Montreal Canadiens, Ottawa Senators, Toronto Maple Leafs.
Southeast Division: Atlanta Thrashers, Carolina Hurricanes, Florida Panthers, Tampa Bay Lightning, Washington Capitals.

Western Conference:
Central Division: Chicago Blackhawks, Columbus Blue Jackets, Detroit Red Wings, Nashville Predators, St. Louis Blues.
Northwest Division: Calgary Flames, Colorado Avalanche, Edmonton Oilers, Minnesota Wild, Vancouver Canucks.
Pacific Division: Mighty Ducks of Anaheim, Dallas Stars, Los Angeles Kings, Phoenix Coyotes, San Jose Sharks.

At the end of the league's regular winter season, the top teams in each division engage in a play-off for possession of the Stanley Cup. *See* Sporting Record: *Ice hockey.*

national income accounting, a set of principles and methods used to measure the income and production of a country. There are two ways of measuring national economic activity: as the money value of the total production of goods and services during a given period (usually a year) or as the total of incomes derived from economic activity after allowance has been made for capital consumption.

The most commonly used indicator of national output is the gross national product (GNP), which is a measure of the total market value of currently produced finished goods and the value of services rendered. Because national output includes goods and services that are highly diverse in nature and some that are not in fact placed on the market, the determination of market value is difficult and somewhat imprecise. Nonetheless the use of a common basis of valuation makes it possible to obtain a total that fairly represents the level of output of a country. The rule that only currently produced goods and services should be counted ensures that only production occurring in the course of a given year is included and that any transaction in which money changes hands but no good or service does so in return (so-called transfer payments, *e.g.,* unemployment or social-security payments, gifts) is excluded. The rule that only finished or final goods must be counted is necessary to avoid double or triple counting of raw materials, intermediate products, and final products. For example, the value of automobiles already includes the value of the steel, glass, rubber, and other components that have been used to make them.

National income may be derived from the GNP by making allowances for certain nonincome costs included in the GNP, mainly the costs of indirect taxes, subsidies, and the consumption of fixed capital (depreciation). National income thus calculated represents the aggregate income of the owners of the factors of production; it is the sum of wages, salaries, profits, interest, dividends, rent, and so on.

The data accumulated for calculating the GNP and national income may be manipulated in a number of ways to show various relationships in the economy. Common uses of the data include: breakdowns of the GNP or the closely related GDP (gross domestic product) according to types of product or according to functional stages in its generation; breakdowns of national income by type of income; and analyses of the sources of financing (depreciation; savings by individuals, corporations, or institutions; and national deficits).

In practice, statisticians face a number of difficulties and complications in computing the national product and income. Although there is a wealth of information available from regular production returns made by companies, from value-added tax figures, from income and corporation tax returns, and from other reports relating to incomes or expenditures, they are all incomplete, subject to errors, and based on different definitions and valuation methods. Statisticians have developed various techniques for estimating and adjusting so as to improve the quality of the figures. Much indirect evidence is used to close gaps in data. Margins of error that accompany published calculations are themselves subject to error. Thus simple comparisons of, for example, one nation's reported national product and income with another's may be misleading. National accounting remains an inexact science, but it constitutes an invaluable tool for economic planners and government budget makers.

National Institutes of Health (NIH), agency of the United States government that conducts and supports biomedical research into the causes, cure, and prevention of disease. The NIH is an agency of the Public Health Service of the U.S. Department of Health and Human Services. It is the largest single supporter of biomedical research in the country and also provides training for health researchers and disseminates medical information.

The NIH is comprised of 25 specialized institutes that conduct or support research in various fields of health and disease, including: the National Cancer Institute; National Heart, Lung, and Blood Institute; National Institute of Diabetes and Digestive and Kidney Diseases; National Institute of Allergy and Infectious Diseases; National Institute of Child Health and Human Development; National Institute of Dental and Craniofacial Research; National Institute of Environmental Health Sciences; National Institute of General Medical Sciences; National Institute of Neurological Disorders and Stroke; National Eye Institute; National Institute on Aging; and National Institute of Arthritis and Musculoskeletal and Skin Diseases.

In addition to its various institutes, the NIH maintains the National Library of Medicine, which is the foremost source of medical information in the United States. The NIH also maintains several general-research centres and the Division of Computer Research and Technology, which uses computer technologies to support health-research programs nationwide.

Most of the actual research funded by the NIH is conducted in medical schools, universities, and other nonfederal institutions. The primary form of funding is the research grant.

National Invitation Tournament (NIT), collegiate basketball competition initiated in the United States in 1938 by New York City basketball writers and held annually since then in Madison Square Garden under the auspices of the Metropolitan Intercollegiate Basketball Association (MIBA). It is a single-elimination tournament (a loss brings elimination) with 32 of the nation's outstanding college teams invited to participate. *See* Sporting Record: *Basketball.*

National Labor Relations Act: *see* Wagner Act.

National Labor Relations Board (NLRB), in the United States, an independent federal agency created by the U.S. Congress in 1935 to administer the National Labor Relations Act (the Wagner Act). The act was amended in 1947 (the Taft-Hartley Act) and in 1959 (the Landrum-Griffin Act). The primary functions of the NLRB are (1) to determine by secret-ballot elections conducted by the agency whether the employees in a business or industry wish to be represented by labour unions in collective bargaining and (2) to prevent or correct unfair labour practices by employers or unions. The agency deals with labour disputes by means of investigation and informal settlements or through quasi-judicial proceedings. The general counsel of the board is responsible for issuing formal complaints and for prosecuting complaints and court cases. Members of the board are selected by the U.S. president.

The NLRB has no independent power to enforce its orders but may seek enforcement through a U.S. court of appeals; parties to the orders may also seek judicial review. The board may not act on its own motion; charges and representation petitions must be initiated by employers, individuals, or unions.

National League, the oldest existing major-league professional baseball organization in the United States. The league began play in 1876 as the National League of Professional Baseball Clubs, replacing the failed National Association of Professional Base Ball Players. The league's supremacy was challenged by several rival organizations over the years, beginning with the American Association in 1882–91. Of these, only the American League, formed in 1900, survived. Since 1903, the champions of the National and American leagues have engaged in an annual World Series contest to decide the championship of major American professional baseball.

From 1998 the National League consisted of 16 teams (including one Canadian team) aligned in three divisions. In the East Division were the Altanta Braves, Florida Marlins (Miami), Montreal Expos, New York Mets, and Philadelphia Phillies. In the Central Division were the Chicago Cubs, Cincinnati Reds, Houston Astros, Milwaukee Brewers, Pittsburgh Pirates, and St. Louis Cardinals. In the West Division were the Arizona Diamondbacks (Phoenix), Colorado Rockies (Denver), Los Angeles Dodgers, San Diego Padres, and San Francisco Giants. *See* Sporting Record: *Baseball.*

National Liberal Party, German NATIONALLIBERALE PARTEI, political party that was active first in Prussia from 1867, then in Germany in 1871–1918. With purely middle-class support, the National Liberals hoped to make the government under Chancellor Otto von Bismarck less autocratic. Originally a moderate section of the old Prussian Liberals, the nucleus of the National Liberals broke from that party in 1867 in support of Bismarck's drive to unite Germany under Prussia.

From 1871 until 1879 the National Liberals, under the leadership of Rudolf von Bennigsen and Johannes von Miquel, supported Bismarck enthusiastically in the Reichstag (parliament) and constituted a virtual government party, winning more seats than any other party. Conflict with Bismarck arose in the years 1877–79 because of National Liberal demands for a parliamentary ministry; and this was exacerbated by disagreement over taxes when the National Liberals wanted to give the Reichstag control over revenues. The party split over this issue in 1880 after losing many seats in the election of 1879. In 1890 they were in coalition with the Conservatives in support of the government, but thereafter their influence waned.

National Liberation Front, French FRONT DE LIBÉRATION NATIONALE (FLN), the only constitutionally legal party in Algeria from 1962 to 1989. The party was a continuation of the revolutionary body that directed the Algerian war of independence against France (1954–62).

The FLN was created by the Revolutionary Committee of Unity and Action (Comité Révolutionnaire d'Unité et d'Action; CRUA), a group of young Algerian militants, organized in March 1954. The CRUA sought to reconcile the warring factions of the nationalist movement and to wage war against the French colonial presence in Algeria. By the middle of 1956 almost all the Algerian nationalist organizations had joined the FLN, which was then reorganized so that it resembled a provisional government, consisting of a five-man executive body and a legislative body, which comprised all the district (*wilayāh*) heads.

The Algerian war for independence, a continuous series of guerrilla attacks, terrorism, and strikes, continued until March 18, 1962, when the French at last signed a cease-fire agreement with the FLN at Évian-les-Bains and made provisions for future economic and social cooperation. In a referendum held July 1, 1962, the Algerians voted overwhelmingly for self-determination and approved the Évian Agreement.

The proclamation of Algerian independence on July 3, 1962, was immediately followed by a power struggle within the FLN. The Political Bureau of the FLN was created in July 1962 by Ahmed Ben Bella, Colonel Houari Boumedienne, and Muhammad Khidr in opposition to Belkacem Krim. It attracted a broad popular following through its socialist-Islāmic ideology and effective propagandizing, enabling Ben Bella to become premier in May 1963. In 1965 Ben Bella was overthrown by Boumedienne, who held tight control of the leadership of the party and government until his death in December 1978. The following year the party was reorganized. It maintained its one-party control of Algeria into the 1990s.

National Liberation Front (NLF), formally NATIONAL FRONT FOR THE LIBERATION OF THE SOUTH, Vietnamese MAT-TRAN DAN-TOC GIAI-PHONG MIEN-NAM, Vietnamese political organization formed on Dec. 20, 1960, to effect the overthrow of the South Vietnamese government and the reunification of North and South Vietnam. An overtly communist party was established in 1962 as a central component of the NLF, but both the military arm, the Viet Cong, and the political organization of the NLF included many noncommunists. The NLF was represented by its own diplomatic staffs in all communist countries and in several neutral countries.

Unlike the Viet Minh (anti-French guerrilla force, many members of which became part of the Viet Cong), the NLF did not establish a provisional government until June 1969, when the Provisional Revolutionary Government (PRG) of South Vietnam was announced. With the reunification of Vietnam in 1976, the NLF joined the Vietnamese Communist Party and the other political organizations in forming a National United Front.

national monument, in the United States, any of numerous areas reserved by act of Congress or presidential proclamation for the protection of objects or places of historical, prehistoric, or scientific interest. They include natural physical features, remains of Indian cultures, and places of historical importance.

In 1906 President Theodore Roosevelt established the first national monument, Devils Tower in Wyoming, under the American Antiquities Act passed earlier that year. Many more were added during the next few years. Their jurisdiction, originally assigned to several agencies, was unified in 1933 under the National Park Service in the Department of the Interior.

National Museum of Anthropology, Spanish MUSEO NACIONAL DE ANTROPOLOGÍA, in Mexico City, world-famous repository of some 600,000 art and other objects relating to Mexico. Many anthropological, ethnological, and archaeological materials in the collection date from the pre-Hispanic period. Exhibited on two large floors, these displays show ancient human remains and art objects; figures and pottery of the Pre-Classical Period that began about 5000 BC; and frescoes and statuary of the Classical Period (about 200 BC to AD 900). The Post-Classical Period that began with the arrival of the Spanish conquistadors (1519–1522) is represented by fine ceremonial dishes, ornaments, and giant votive tablets.

The museum was founded in 1825 and acquired its present name in 1939. In 1964 it opened in a modern new building that contained a school, a library of some 300,000 volumes, a film archive, and public auditoriums. Among its outstanding exhibits are the "Group of Figures" from the Olmec culture and the 22-ton Aztec "Sun Stone," representing the history of the world.

National Museum of India, in New Delhi, museum devoted to Indian art history and iconography as well as to Buddhist studies. The museum was merged with the Asian Antiquities Museum to bring the treasures of India and Central Asia together. The collections include examples of art and archaeology, anthropology, decorative arts, and epigraphy.

The art of painting is well represented with Indian miniatures of the Mughal, Rājput, Deccani, and Pahari schools. The museum has fine old manuscripts, as well as temple hangings, lavishly brocaded saris, weapons set with precious stones, and painted pottery. Antiquities from Central Asia recovered by Sir Aurel Stein include the only examples of mural paintings from Buddhist shrines outside their native countries.

National Nonpartisan League (U.S.): *see* Nonpartisan League.

National Organization for Women (NOW), American activist organization (founded 1966) that promotes equal rights for women.

The National Organization for Women was established by a small group of feminists who were dedicated to actively challenging sex discrimination in all areas of American society, but particularly in employment. The organization is composed of both men and women, and in the late 20th century it had some 150,000 members.

Among the issues that NOW addressed by means of lobbying and litigation were child care, pregnancy leave, and abortion and pension rights. Its major concern during the 1970s was passage of a national equal rights amendment to the Constitution; the amendment failed to gain ratification in 1982. NOW also campaigned for such issues as passage of state equal rights amendments and comparable-worth legislation (equal pay for work of comparable value) and met with greater success on the state level.

National Palace Museum, major art museum in the Republic of China, at Taipei, that preserves many of the art holdings of the Chinese imperial collection. The museum houses about 240,000 art objects and documents that were formerly held at Peking.

The museum came into being in 1965 when the collections of Taiwan's National Palace Museum, the Central Museum, and other public Taiwanese cultural institutions were brought together in a new museum building in Taipei; the combined collections were called the National Palace Museum. The core of the museum's art holdings once formed part of the imperial art collection in Peking, which in turn derived primarily from the far-flung collecting activities of the Ch'ing- (Manchu-) dynasty emperor Ch'ien-lung (reigned 1735–96). His art holdings and those of his successors remained in the Imperial Palace at Peking as a private collection until 1925, when China's republican government converted the palace into a public institution called the Palace Museum. In the 1930s the Japanese invasion of North China prompted the Chinese government to relocate part of the Palace Museum's holdings to Nanking and then to Shanghai and other locations. After the end of World War II, these dispersed collections were reassembled in Nanking, but in 1948–49 they were taken by the retreating Nationalist armies to Taiwan, where they were stored at the Taipei suburb of Taichung until they were installed in their new home in 1965.

The National Palace Museum's collection illustrates more than 4,000 years of Chinese art, from the Shang through the Ch'ing dynasty. Its collection of Chinese painting is probably the finest in the world, with many important masterpieces from the T'ang, Sung, Ming, and Ch'ing dynasties. The museum also has large collections of Chinese ritual bronzes, ceramics, jade, lacquerware, enamelware, decorative carvings, embroidery and tapestry, books, calligraphy, and archival documents.

national park, an area set aside by a national government for the preservation of the natural environment. A national park may be set aside for purposes of public recreation and enjoyment or because of its historical or scientific interest. Most of the landscapes and their accompanying plants and animals in a national park are kept in their natural state. The national parks in the United States and Canada tend to focus on the protection of both land and wildlife, those in Great Britain focus mainly on the land, and those in Africa primarily exist to conserve animals. Several other countries have large areas reserved in national parks, notably Brazil, Japan, India, and Australia.

The concept of a park or nature reserve under state ownership originated in the United States in 1870, and legislation creating the world's first such park, Yellowstone National Park in Wyoming, was signed by President Ulysses S. Grant in 1872. Yosemite, Sequoia, and General Grant national parks were established in 1890, and during this time the idea of protecting outstanding scenic natural areas for their own sake grew into a concept of American national policy. The national park system was expanded during the following decades, and the National Park Service was created in 1916 to administer the parks. By the late 20th century the American (U.S.) national park system administered more than 350 separate areas comprising about 80 million acres (32 million hectares). In addition to national parks, the system included national preserves, national monuments, national recreation areas, national seashores, lakeshores, historic parks and sites, parkways, scenic trails, and battlefields.

Partly inspired by the American example, movements in favour of national parks sprang up in many other countries, beginning with Canada, which established its first three national parks in the mid-1880s. Nature reserves had been maintained in Europe for centuries to protect hunting grounds for use by kings and nobles, but the establishment of modern national parks and nature reserves gained momentum only after World War I or, in some cases, after World War II. Great Britain established the administrative machinery for both national parks and nature reserves in 1949. It also began establishing national parks in India and its African colonies after the war, and this practice was continued and expanded by those new nations after reaching independence. Japan and Mexico established their first national parks in the 1930s, but interest in parks generally came later in Asia and Latin America than it did in the Anglo-American countries and Europe.

The national parks of various countries differ greatly in their effectiveness in protecting their resources. Some governments provide their park systems with large enough budgets to make possible strict enforcement of regulations; others do not. Most national parks have a built-in paradox: although they often depend for their existence on tourism stimulated by public interest in nature, the preservation of their wildlife depends on its not being molested. This paradox is usually resolved by allowing visitors to travel only within limited areas in the park. This lets them see the park while it minimizes their contact with the wildlife. *See also* conservation; nature reserve; national forest.

For a detailed listing of the world's principal national parks and nature reserves, *see* the accompanying Table. *See also* the various articles on particular parks, *e.g.,* Yellowstone National Park.

National Party, also called (1975–82) NATIONAL COUNTRY PARTY, or (1914–75) COUNTRY PARTY, an Australian political party that for most of its history has held office as a result of its customary alliance with the Liberal Party of Australia (*q.v.*). It often acted as a margin in the balance of power, but its own power declined over the years. In 1934 it could command 16 percent of the vote in federal elections. By 1975 its federal vote had fallen to 8 percent. In October 1982 it took the name National Party.

The agricultural interest in Australia first began to organize politically in the 1890s to eliminate import duties on farm machinery, to end the Labor land tax on big estates, and to counter the growing strength of organized labour and the Labor Party. State farmers' associations with these objectives developed during World War I. The first local Country Party to win seats in an Australian parliament was that in Western Australia in 1914. In 1918 a federal organization was created and in 1919 named the Country Party. In 1923, Country Party leader Earle Page negotiated a coalition agreement with the Nationalist (formerly Liberal) Party leader, Stanley Melbourne Bruce, and led 5 Country Party members into a cabinet of 11. The coalition government, which continued until 1929, focused largely on developing the national economy.

Never again did Page or the party exercise so much influence as in the 1920s. However, it continued to supply votes and ministers to the governments of the Nationalist Party and its successors, the United Australia Party (1931–44) and the Liberal Party (from 1944), when those parties were in power.

National Party: *see* New Zealand National Party.

National Party of South Africa, Afrikaans NASIONALE PARTY VAN SUID-AFRIKA (NP), South African political party, founded in 1914, which ruled the country from 1948 to 1994. Its following includes most of the Dutch-descended Afrikaners and many English-speaking whites. The National Party was long dedicated to policies of apartheid and white supremacy, but by the early 1990s it had begun moving toward sharing power with South Africa's black majority.

J.B.M. Hertzog founded the National Party in 1914 in order to rally Afrikaners against what he considered the Anglicizing policies of the government of Louis Botha and Jan Christian Smuts. In 1924, after mild attempts to relax the colour bar, the Smuts government was defeated by a Nationalist-Labour coalition led by Hertzog, who in two terms sought to further emancipate South Africa from British imperial control and to provide greater "protection" for the whites from the black Africans and for the Afrikaners from the British. From 1933 to 1939 Hertzog and Smuts joined a coalition government and fused their respective followings into the United Party. Some Nationalists, led by Daniel F. Malan, however, held out and kept the National Party alive and, in 1939, reaccepted Hertzog as their leader in a reorganized opposition party known as the Re-united National Party, or People's Party (Herenigde Nasionale Party, or Volksparty). The new party was weakened by wartime factionalism; and Hertzog and others with Nazi sympathies eventually walked out and formed the Afrikaner Party (1941).

The Re-united National Party returned victoriously in the 1948 elections and subsequently enacted a mass of racial legislation that was designed to preserve white supremacy in South Africa; the National Party named its policy "apartheid." The party went on to consolidate its power, absorbing the Afrikaner Party in 1951. It renamed itself the National Party of South Africa (1951) and gradually augmented its control of the House of Assembly—from 73 seats in 1948 to 134 seats (81 percent)

Principal national parks of the world

country	date		area		description
national park	protected status	national park status	square miles	square km	
Algeria					
Ahaggar	. . .	1987	17,375	45,000	barren volcanic plateau in the Sahara
Chréa	1925	1983	103	266	Atlas Mountains near Blida; boar and jackal
Djurdjura	. . .	1983	71	185	mountain range in the Kabylie region
El Kala	. . .	1983	295	764	forested mountains along the Mediterranean Sea coast
Tassili-n-Ajjer	. . .	1972	27,799	72,000	eroded sandstone formations in the Sahara; prehistoric rock paintings
Angola					
Bicuari	1938	1964	3,050	7,900	undulating plain; savanna and deciduous woodland; buffalo, cheetah, and antelope
Cangandala	1963	1970	243	630	gently sloping hills; woodland and savanna; antelope, hippopotamus, and leopard
Quiçama	1938	1957	3,668	9,500	Atlantic coast and cliffs; savanna woodland; buffalo, antelope, elephant, and cheetah
Argentina					
Baritú	. . .	1974	55	143	subtropical mountain rain forest; Bermejo River; sloth, jaguar, and porcupine
Calilegua	. . .	1979/80	93	240	Calilegua Mountains; subtropical rain forest; deer, jaguar, and monkey
Chaco	1935	1954	27	71	broad plateau; savanna, marsh, and humid forest; wolf, tapir, deer, and rhea
El Rey	. . .	1948	55	143	Chaco plains and Andean woodland; tapir, jaguar, and anteater
Iguazú	1909	1934	20	52	basaltic plateau and Iguazú (Iguaçu) Falls; subtropical rain forest; jaguar and monkey
Lanín	1937	1945	551	1,426	dormant Lanín volcano and lakes; evergreen forest; otter, opossum, and fox
Los Alerces	. . .	1937/45	176	455	montane forests of larch (alerces); lakes and glaciers; puma, deer, fox, and monkey
Los Glaciares	. . .	1937	625	1,618	Andean-Patagonian zone with glaciers, lakes, and forest; guanaco, chinchilla, and deer
Nahuel Huapí	1903	1934	1,437	3,721	Lake Nahuel Huapí in the Andes; glaciers and evergreen forest; deer, puma, and fox
Perito Moreno	. . .	1937/49	26	67	southern Andes with lakes, glaciers, and forest; guanaco, deer, fox, and condor
Pilcomayo River	. . .	1951	108	280	plain of the Pilcomayo and Paraguay rivers; subtropical forest; wolf, anteater, and tapir
Puelo Lake	1937	1946	45	117	Andes Mountains and Puelo Lake; mixed humid forest; deer, fox, and nutria
Tierra del Fuego	. . .	1960	133	345	remote mountainous and coastal region; beech forest; guanaco, sea lion, and penguin
Armenia					
Sevan	. . .	1978	579	1,500	Sevan Lake basin; mountain steppe and alpine landscape
Australia					
Alpine	. . .	1989	2,479	6,421	mountains in the Great Dividing Range in Victoria
Archer Bend	. . .	1977	641	1,660	sandy plains on Cape York Peninsula in Queensland; gallery forests; crocodiles
Barrington Tops	. . .	1969	151	391	broad basalt plateau in New South Wales; temperate rain forest; wombat and kangaroo
Bellenden Ker	. . .	1921	120	310	granite mountain range in Queensland; Josephine Falls; tropical rain forest; kangaroo
Ben Lomond	. . .	1947	64	165	large alpine (dolerite) plateau in Tasmania; mountain wildflowers
Blackdown Tableland	. . .	1979/82	92	238	sandstone plateau in Queensland; cliffs, gorges, and waterfalls; eucalyptus forest
Bladensburg	. . .	1984	130	337	in Queensland
Blue Mountains	. . .	1959	954	2,470	sandstone formations in New South Wales; tropical forest; platypus and kangaroo
Bogong	. . .	1981	314	812	high plateau in Victoria; forest, alpine flora, and snowfields
Boorabbin	. . .	1977	100	260	sandy plain (scrubland) in Western Australia
Border Ranges	. . .	1979/83	122	315	rim of a volcanic caldera in New South Wales; subtropical rain forest
Bowling Green Bay	. . .	1940/50	214	554	coastal wetland in Queensland; Mount Elliot; tropical rain forest
Budawang	. . .	1977	62	161	low mountain range in New South Wales; rain forest and open forest
Bundjalung	. . .	1980	68	177	beaches, lagoons, and coastal heath near Lismore in New South Wales
Bunya Mountains	. . .	1908	45	117	basalt mountain chain of the Great Dividing Range in Queensland; tropical forest
Burrowa–Pine Mountain	. . .	1978	71	184	rhyolite and granite mountains in Victoria; cypress pine and eucalyptus; kangaroo
Cape Arid	. . .	1969	1,079	2,794	coastal landscape on the Great Australian Bight and Mount Arid in Western Australia
Cape Le Grand	. . .	1948/66	122	316	rugged coastline with beaches and swamps in Western Australia; wallaby and opossum
Cape Melville	. . .	1977	139	360	granite range forming a peninsula in Queensland and coastal plain
Cape Range	. . .	1965	195	506	rugged canyons in Western Australia; caves; thick scrub; wallaby
Cape Tribulation	. . .	1981	66	170	scenic coastline and tropical rain forest in Queensland; birdlife
Carnarvon	. . .	1938/79	969	2,510	sandstone gorge in the Great Dividing Range in Queensland; eucalyptus and tree ferns
Cobbers-Tingaringy	. . .	1979	450	1,166	forested mountain range in Victoria; headwaters of the Murray River
Coffin Bay Peninsula	. . .	1983	117	304	coastal sand dunes and mallee scrubland in South Australia
Collier Range	. . .	1978	1,073	2,778	spinifex and soft grasslands in Western Australia
Conway Range	. . .	1962	92	238	coastline and hills of Whitsunday Passage in Queensland; lowland rain forest
Cooloola	1962	1975	211	547	sand hills and coastal dunes in Queensland; lakes; mangroves and rain forest
Coopracambra	. . .	1979	150	388	mountain peak in Victoria; gorge of the Genoa River; eucalyptus forest
Coorong	. . .	1966	154	399	sandspit coastline, dunes, and lagoon in South Australia; kangaroo and waterfowl
Cradle Mountain–Lake St. Clair	. . .	1922	622	1,611	glaciated mountains in Tasmania; lakes and streams; moorland and eucalyptus and coniferous forest; wallaby and opossum
Croajingolong	. . .	1978/79	338	875	coastal beaches and lagoons in Victoria; eucalyptus forest; kangaroo and flying fox
Daintree River	. . .	1962/77	218	565	plateau and gorges of the Great Dividing Range in Queensland; tropical rain forest
D'Entrecasteaux	. . .	1967/77	224	581	coastal dunes, wetlands, heaths, and forest in Western Australia
Deua	. . .	1979	316	818	forested ranges in New South Wales; ridges and limestone caves
Dharug	. . .	1967	57	148	dissected plateau in New South Wales; semiarid forest and marsh; rock engravings
Drysdale River	. . .	1974	1,683	4,359	wooded wilderness in the Kimberleys of Western Australia; Aboriginal rock art
Errinundra	. . .	1988	99	256	granite plateau and river valley in Victoria; cool-temperate rain forest
Eungella	. . .	1941/50	196	508	mountainous area in Queensland; grassy eucalyptus woodland and rain forest; platypus
Finke Gorge	. . .	1967	177	458	river gorge with red sandstone cliffs and relict palms in Northern Territory; birdlife
Fitzgerald River	. . .	1954/73	1,270	3,290	coastal inlets, cliffs, and barren mountain ranges in Western Australia; valley woodland
Flinders Chase	. . .	1919	285	738	Kangaroo Island in South Australia; eucalyptus; kangaroo, anteater, koala, and emu
Flinders Ranges	1945	1970/72	366	949	eroded synclinal rock formations in South Australia; gorges, pools, and caves; kangaroo
Frank Hann	. . .	1970	237	614	arid lands in Western Australia; sand-plain flora
Franklin–Lower Gordon Wild Rivers	. . .	1981	1,699	4,401	undisturbed wild river, quartz peaks, wilderness gorges, temperate rain forest, and limestone caves in Tasmania
Gammon Ranges	. . .	1970	495	1,282	rugged mountain wilderness broken by deep gorges in South Australia
Gibraltar Range	. . .	1963	67	173	granite mountains in northern New South Wales; heath with some rain forest; platypus
Goongarrie	. . .	1975	233	604	mulga (acacia) vegetation in Western Australia
Goulburn River	. . .	1982	268	693	river flowing through hilly sandstone country in New South Wales; wildflowers
Grampians	. . .	1984	645	1,670	rugged sandstone mountain range in Victoria; gorges and waterfalls; orchids; birdlife
Great Sandy	. . .	1971	289	749	sand dunes on Fraser Island in Queensland; rain forest and coastal heath; dugong
Gregory	. . .	1990	3,776	9,781	scenery along the Victoria River in Northern Territory
Gurig	. . .	1964	852	2,207	Cobourg Peninsula in Northern Territory; mangrove swamp; dugong and birdlife
Guy Fawkes River	. . .	1972	137	356	river meanders with steep rock walls in New South Wales; woodland; kangaroo
Hattah-Kulkyne	. . .	1960	185	480	lakes and floodplain in the mallee scrub region of Victoria; kangaroo and waterbirds
Herbert River Gorge	. . .	1963/82	73	189	scenic gorge in Queensland; tableland and waterfalls
Hinchinbrook Island	. . .	1932/68	154	399	island in Queensland; granite mountains and sandy beaches; bush and rain forest
Iron Range	. . .	1977	134	346	rugged hills, coastal scenery, lowland rain forest, and tropical fauna in Queensland
Jardine River	. . .	1977	915	2,370	tropical wilderness with swamps, heaths, and rain forest in Queensland
Kakadu	1972	1979	7,829	20,277	coastal plateau, gorge, and plains in Northern Territory; eucalyptus forest; wallaby
Kalbarri	. . .	1963	719	1,861	gorge of the Murchison River in Western Australia; valley eucalyptus trees; kangaroo
Kanangra-Boyd	. . .	1969	264	683	dissected sandstone plateau in New South Wales; eucalyptus forest; wallaby and koala
Karijini (Hamersley Range)	. . .	1969	2,342	6,066	layered sandstone mountains and gorges in Western Australia; acacia; kangaroo
Katherine Gorge (Nitmiluk)	. . .	1963	697	1,804	gorges of red-brown quartzite in Northern Territory; tropical woodland; wallaby
Keep River	. . .	1982	220	569	red sandstone landforms, ranges, and lagoons in Northern Territory; tropical savanna
Kennedy Range	. . .	1993	547	1,417	in Western Australia

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Kinchega	...	1967/69	171	442	Darling River plain and overflow lake system in New South Wales; swamps; kangaroo
Kosciusko	1944	1974	2,498	6,469	snowfields, caves, and forest in the Snowy Mountains of New South Wales; kangaroo
Ku-ring-gai Chase	...	1894	57	148	sandstone plateau on Broken Bay in New South Wales; bush and rain forest; koala
Lake Eyre	...	1985	5,236	13,560	normally dry salt lake in South Australia; saltbush country
Lakefield	...	1978/79	2,073	5,370	savanna woodland and swamps on the Cape York Peninsula in Queensland; crocodile
Lamington	...	1915	79	205	mountains in Queensland; gorges, caves, and waterfalls; rain forest; koala
Lawn Hill	...	1984	1,012	2,620	oasis of gorges, creeks, ponds, and tropical vegetation in an arid part of Queensland
Leeuwin-Naturaliste	...	1970	73	190	coast of Western Australia between Capes Naturaliste and Leeuwin; heath and forest
Lincoln	...	1941/62	112	291	plateau of the Eyre Peninsula in South Australia; mallee scrubland; kangaroo and emu
Little Desert	...	1955/68	510	1,320	semiarid sandy heath and mallee scrubland in Victoria; seasonal wildflowers; kangaroo
Lower Glenelg	...	1969	105	273	gorge of the Glenelg River in Victoria; caves; heath and eucalyptus forest; kangaroo
Macquarie Island	1933	1972	49	128	subantarctic region of Macquarie Island southeast of Tasmania; seal and penguin
Main Range	...	1909	44	115	Mount Cordeaux and scenic plain of Queensland; rain forest
Mallee Cliffs	...	1977	224	580	eucalyptus scrubland and fauna in New South Wales
Millstream-Chichester Range	...	1969	771	1,997	semiarid mountain range in Western Australia; spring-fed pools and palms; kangaroo and flying fox; Aboriginal rock engravings
Mitchell and Alice Rivers	...	1977	143	371	open woodlands and gallery forests along these rivers in Queensland; crocodiles
Moore River	...	1969	68	175	area of wildflowers in Western Australia
Mootwingee	...	1982	266	689	sandstone hills in New South Wales; acacia woodland; kangaroo; Aboriginal rock art
Moreton Island	...	1986	65	168	island with enormous sandhills and dunes in Queensland; lakes; birdlife
Morton	1938	1964	627	1,624	forested hilly area with sandstone mesas, gorges, and waterfalls in New South Wales
Mount Buffalo	1898	1956	120	310	mountains in the Great Dividing Range in Victoria; eucalyptus woodlands; wombat
Mount Field	1885	1916	63	163	parkland, dense rain forest, and glaciated mountain plateau in Tasmania; kangaroo
Mount Kaputar	...	1925/60	142	368	slopes, gorges, and cliffs of the Nandewar Range in New South Wales; extinct volcano
Mungo	...	1979	107	278	stabilized dunes and dry lakes in New South Wales; Aboriginal archaeological sites
Murray-Sunset	...	1991	2,444	6,330	salt lakes in the mallee scrub region of Victoria
Myall Lakes	...	1972	122	315	coastal lakes, beaches, and dunes in New South Wales; swamp and rain forest; wallaby
Namadgi	...	1984	405	1,050	granite outcrops and peaks in the Australian Capital Territory; forest
Nambung	...	1968	71	183	limestone pinnacles and coastal beaches in Western Australia; desert scrub and heath
New England	...	1935	116	300	tropical primeval forest of the Great Dividing Range in New South Wales; kangaroo
Nullarbor	...	1979	2,290	5,930	coastal cliffs and limestone caves in South Australia; saltbush country; wombat
Oxley Wild Rivers	...	1986	348	902	Apsley gorge and waterfalls in New South Wales; subtropical rain forest
Palmerston	...	1941	55	142	tropical rain forest in northern Queensland; gorges and waterfalls
Peak Charles	...	1979	154	400	granite peak in Western Australia; mallee vegetation
Purnululu (Bungle Bungle)	...	1987	806	2,087	eroded sandstone formations (towers) in Western Australia; wallaby
Robinson Gorge	...	1953	298	773	deep sandstone gorge in the Expedition Range of Queensland; palm-fringed creeks
Rokeby-Croll Creek	...	1983	1,124	2,910	McIlwraith Range and peninsula landforms in Queensland; crocodiles
Royal	1879	1886	58	151	rocky headlands, sandy beaches, and coastal forest in New South Wales; wildflowers
Rudall River	...	1977	6,060	15,695	rugged hills, sand dunes, water holes, and salt lakes in Western Australia
Shannon	...	1988	203	526	in Western Australia
Simpson Desert	...	1967	3,907	10,120	sand ridge desert in Queensland; abundant flowering after rain; kangaroo
Simpsons Gap	...	1958/70	119	309	rocky mountain ridges in Northern Territory; gorges; shrubs and trees; wallaby
Snowy River	...	1978/79	381	987	deep river gorge in Victoria; mountains; eucalyptus and rain forest
Southwest	1955	1968	2,349	6,083	high peaks, dense rain forest, swift rivers, waterfalls, and isolated coastline in Tasmania
Staaten River	...	1971/77	1,815	4,700	open woodland and gallery forest along the Staaten River in Queensland
Stirling Range	1913	1957	447	1,157	steep rocky peaks and sand plains in Western Australia; kangaroo, wombat, and emu
Sturt	...	1972	1,199	3,106	stony desert and eroded cliffs in New South Wales; shrubs; kangaroo and emu
Uluru (Ayers Rock–Mount Olga)	...	1958	512	1,326	enormous monolith of Ayers Rock and the Olga group of domes in Northern Territory; arid sand plains; kangaroo, dingo, and birdlife; Aboriginal art
Wadbilliga	...	1979	299	775	Brogo River wilderness area in New South Wales; rain forest, woodland, and heath
Walpole-Nornalup	1910	1957/72	61	159	rugged coast and estuary in Western Australia; eucalyptus forest and heath; kangaroo
Warrumbungle	...	1953	81	209	jagged volcanic mountain ridge in New South Wales; pine and eucalyptus; kangaroo
Washpool	...	1983/84	107	277	wilderness area with subtropical rain forest in New South Wales
Watheroo	...	1969	172	445	area of wildflowers in Western Australia
Werrikimbe	...	1975	136	352	temperate and subtropical rain forest in New South Wales
West MacDonnell	...	1992	795	2,058	mountains west of Alice Springs in Northern Territory; gorges with relic palms
Willandra	...	1972	75	194	floodplain and intermittent watercourses in New South Wales; saltbush; kangaroo
Wilson's Promontory	1884	1905	189	490	mountainous coastal region with beaches in Victoria; rain forest; wombat and koala
Witjira	...	1985	3,000	7,769	hills, salt pans, and dunes in South Australia; mound, thermal, and hot springs
Wollemi	...	1979	1,881	4,873	dissected landscape of sandstone and volcanic mountains in New South Wales; forest
Wonnangatta-Moroka	...	1982	413	1,070	deep river gorge and subalpine scenery in Victoria
Wyperfeld	1909	1921/56	1,378	3,568	arid mallee scrub and sandhills covered with heath and thicket in Victoria; kangaroo
Yengo	...	1988	540	1,399	mountain in New South Wales; rain forest
Yuraygir	...	1973/80	71	183	coastal beaches, heath, woodland, and fauna in New South Wales
Austria					
Hohe Tauern (Salzburg)	...	1981/84	311	805	Alpine region; high mountain peaks, waterfalls, and glaciers; pine forest; ibex and deer
Bahamas					
Exuma Cays	...	1958/64	176	456	islands (cays) with sandy beaches, coral reefs, and underwater caves; birdlife
Inagua	...	1965	287	743	Great Inagua Island; saline marsh and mangroves; flamingo
Belarus					
Belovezh Virgin Forest	...	1939	338	876	ancient forest of pine, beech, oak, and alder; European bison, elk, deer, and boar
Benin					
Boucle de la Pendjari	1954	1961	1,064	2,755	savanna region along the Pendjari River; lion, elephant, hippopotamus, and antelope
W du Benin	...	1954	1,938	5,020	savanna plains south of the Niger River; elephant, lion, antelope, and cheetah
Bhutan					
Jigme Dorji	1974	1993	1,506	3,900	Himalayan peaks; glaciers; coniferous forest; leopard, deer, wild goat, and bear
Royal Mānas	1966	1988	254	658	Himalayan foothills; deciduous forest; tiger, rhinoceros, elephant, and buffalo
Bolivia					
Amboró	1973	1983	695	1,800	sub-Andean mountains, Amazon basin, and Chaco; forest; jaguar and peccary
Carrasco Ichilo	...	1988	5,019	13,000	...
Isiboro-Sécure	...	1965	4,247	11,000	slopes of the Andes and nearby plains; rain forest and savanna; deer, tapir, and jaguar
Noel Kempf Mercado (Huanchaca)	...	1979	3,529	9,140	extensive mesa of the Brazilian Shield; waterfalls; humid subtropical forest; jaguar, bear, peccary, and armadillo
Sajama	...	1939/45	115	299	snow-covered volcano and hot springs; grassland and forest; vicuña, jackal, and rhea
Santa Cruz la Vieja	...	1989	66	171	...
Torotoro	...	1989	64	166	sedimentary rock formations with dinosaur tracks in the Cordillera Real
Botswana					
Chobe	1961	1968	4,081	10,570	Chobe River floodplains and seasonal marsh; savanna; elephant, buffalo, and zebra
Gemsbok	1932	1971	10,682	27,665	desert (Kalahari) with some savanna vegetation; antelope, lion, and leopard
Makgadikgadi	1970	1992	1,883	4,877	salt pans bounded by the Boteti River; savanna; antelope, zebra, lion, and cheetah
Nxai Pan	...	1971	927	2,402	two salt pans with woodland savanna; giraffe, zebra, antelope, and lion

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Brazil					
Amazônia (Tapajós)	. . .	1974	3,838	9,940	Tapajós River plain in Pará-Amazonas states; rain forest; caiman, anteater, and jaguar
Araguaia	. . .	1959	2,171	5,623	Bananal Island in the Araguaia River in Tocantins state; rain forest; jaguar and deer
Brasília	. . .	1961	108	280	highland plateau with tree savanna in the Distrito Federal; wolf, deer, anteater, and rhea
Caparaó	. . .	1961	100	260	Caparaó Mountains in Espírito Santo–Minas Gerais states; rain forest; monkey and cavy
Cape Orange	. . .	1980	2,390	6,190	marine and riverside flats in Amapá state; mangroves and tropical forest; flamingo
Diamantina Upland	. . .	1985	587	1,520	mountainous country in Bahia state; waterfalls and large caves; monkey
Dos Abrolhos Marine	. . .	1983	353	913	five small islands and several coral reefs in Bahia state; wild goat, whale, and birdlife
Emas	. . .	1961	509	1,319	grassy plains and woody savanna in Goiás state; deer, anteater, rhea, and armadillo
Grande Sertão River	. . .	1989	324	840	swampy plains and hills in Minas Gerais state; palms; wolf, armadillo, and rhea
Guimarães Upland	. . .	1989	127	330	rock formations, canyons, and waterfalls in Mato Grosso state; forest
Iguaçu	. . .	1939	656	1,700	Iguaçu Falls in Paraná state; subtropical rain forest; otter, jaguar, and deer
Itatiaia	. . .	1937	116	300	Mantiqueira Mountains in Rio de Janeiro state; tropical rain forest; jaguar and sloth
Jaú	. . .	1980	8,772	22,720	Negro River flats and tableland in Amazonas state; tropical rain forest; jaguar
Lençóis Maranhenses	. . .	1981	598	1,550	dunes region of the Atlantic coast in Maranhão state; lakes and mangroves; seabirds
Neblina Peak	. . .	1979	8,494	22,000	Amazon-Orinoco interfluvial plateau in Amazonas state; tropical forest; monkey
Pacaás Novos	. . .	1979	2,953	7,648	flat-topped, steep-sided mountains in Rondônia state; tropical forest; jaguar and tapir
Pantanal Mato-Grossense	. . .	1981	521	1,350	Paraguay River plain in Mato Grosso state; marsh and woodland; deer and tapir
Peixe Lake	. . .	1986	133	344	coastal lake in Rio Grande do Sul state; migratory birds
São Joaquim	. . .	1961	190	493	dissected Brazilian plateau in Santa Catarina state; grassland and pine forest; deer
Serra da Bocaina	. . .	1971	386	1,000	island and coastal plateau in São Paulo–Rio de Janeiro states; rain forest; jaguar
Serra da Canastra	. . .	1972	276	715	rocky plateau in Minas Gerais state; grassland; wolf, anteater, rhea, and deer
Serra da Capivara	. . .	1979	378	979	plain with eroded tableland in Piauí state; dense brush; ocelot, bush dog, and cavy
Serra do Cipó	. . .	1984	131	338	mountains and waterfalls in Minas Gerais state; grassland; wolf, monkey, and anteater
Serra do Divisor	. . .	1989	2,336	6,050	hills and floodplains of the Juruá River in Acre state; tropical rain forest
Veadeiros Upland	. . .	1961	232	600	plains with exposed rock in Goiás state; waterfalls; grassland; deer, wolf, and peccary
Xingú	. . .	1961	8,494	22,000	Xingú River plain in Mato Grosso state; rain forest; South American Indian refuge
Bulgaria					
Pirin	. . .	1963	155	401	mountains, granite formations, and lakes; spruce and pine forest; wild goat and bear
Vitosha	. . .	1934	103	266	Vitosha Mountain, a dormant volcano, near Sofia; oak, beech, and birch forest; deer
Burkina Faso					
Deux Balés	1937	1967	219	566	savanna plains along the Black Volta River; hippopotamus, buffalo, and elephant
Kaboré-Tambi (Pô)	1936	1976	937	2,427	floodplain along the Red Volta River; wooded savanna; elephant, antelope, and lion
W du Burkina Faso	1926	1953/54	734	1,900	peneplain in the Niger River basin; wooded savanna; lion, elephant, and antelope
Burundi					
Kibira	1933	1980/82	154	400	three massifs; dense mountain equatorial forest; chimpanzee and monkey
Cambodia					
Angkor Wat	. . .	1925	42	108	jungle-covered ancient sandstone temple complex; wild ox, deer, tiger, and crocodile
Cameroon					
Benue	1932	1968	695	1,800	rugged relief on the Benue plain; wooded; elephant, lion, hippopotamus, and antelope
Bouba Ndjidda	1947	1968	849	2,200	rugged peneplain with savanna woodland; rhinoceros, elephant, cheetah, and antelope
Faro	1947	1980/81	1,274	3,300	mountainous plateau; savanna woodland; cheetah, hippopotamus, and rhinoceros
Korup	1961	1986	486	1,259	inland plateau in the coastal zone; evergreen forest; monkey, elephant, and bushpig
Waza	1934	1968	656	1,700	grassy plains and acacia woodland in the Lake Chad basin; giraffe, elephant, and lion
Canada					
Aulavik	. . .	1992	4,739	12,275	hills and meandering rivers on Banks Island in Northwest Territories; tundra; musk-ox
Auyuittuq	. . .	1972	8,290	21,471	mountains, glaciers, and fjords of Baffin Island in Northwest Territories; tundra; lemming
Banff	. . .	1885	2,564	6,641	Rocky Mountains of Alberta; coniferous forest; mountain goat, bighorn, deer, and bear
Bruce Peninsula	. . .	1987	104	270	Niagara Escarpment and islands in Lake Huron, Ontario; marsh and deciduous forest
Cape Breton Highlands	. . .	1936	367	951	rugged coast of Cape Breton Island, Nova Scotia; heath and forest; moose and bear
Elk Island	1906	1913	75	194	rolling plains and hills in Alberta; aspen and poplar forest; bison, deer, elk, and moose
Ellesmere Island	. . .	1986	15,251	39,500	mountains and glaciers in Northwest Territories; tundra; musk-ox, wolf, fox, and caribou
Forillon	. . .	1970	93	240	coastal cliffs and mixed forest on the Gaspé Peninsula of Quebec; deer and moose
Fundy	. . .	1948	80	206	hills along the Bay of Fundy in New Brunswick; mixed forest; moose, deer, and bear
Georgian Bay Islands	. . .	1929	5	14	numerous islands in the Georgian Bay of Ontario; maple and beech forest; deer
Glacier	. . .	1886	521	1,349	Selkirk Mountains in British Columbia; glaciers; coniferous forest; bear and deer
Grasslands	. . .	1981	350	907	virgin short-grass prairie in Saskatchewan; badlands topography; pronghorn and coyote
Gros Morne	. . .	1973	750	1,943	coastal hills and lakes of Newfoundland; coniferous forest; moose and caribou
Gwaii Haanas Archipelago	. . .	1988	568	1,470	mountains on Queen Charlotte Islands, British Columbia; spruce forest; bear
Ivvavik	. . .	1984	3,926	10,168	plain along the Beaufort Sea in Yukon Territory; tundra; caribou, moose, and bear
Jasper	. . .	1907	4,200	10,878	Rocky Mountains of Alberta; coniferous forest; mountain goat, caribou, elk, and bear
Kejimkujik	. . .	1968	147	382	glacier-scarred rolling landscape and lakes in Nova Scotia; mixed forest; deer and bear
Kluane	. . .	1972	8,500	22,015	mountains in Yukon Territory; glaciers; forest and tundra; Dall sheep, bear, and caribou
Kootenay	. . .	1920	532	1,378	Rocky Mountains of British Columbia; spruce and fir forest; bighorn, moose, and bear
Kouchibouguac	. . .	1969	92	239	maritime park in New Brunswick; coniferous forest and dune plants; waterfowl
La Mauricie	. . .	1970	210	544	Laurentian Mountains in Quebec; mixed forest and lakes; moose, deer, and bear
Mingan Archipelago	. . .	1984	58	151	islands in the St. Lawrence River, Quebec; moorland and coniferous forest; seal
Mount Revelstoke	. . .	1914	102	263	Selkirk Mountains of British Columbia; alpine meadows; bear, caribou, and deer
Nahanni	. . .	1972	1,840	4,766	canyons in Northwest Territories; boreal forest; Dall sheep, bear, and caribou
Northern Baffin Island	. . .	1992	8,592	22,252	rugged Bylot Island and part of Baffin Island in Northwest Territories; tundra; seabirds
Pacific Rim	. . .	1970	193	500	coast of Vancouver Island in British Columbia; cedar rain forest; bear, deer, and cougar
Point Pelee	. . .	1918	6	16	peninsula of Lake Erie in Ontario; marsh and hackberry forest; deer and raccoon
Prince Albert	. . .	1927	1,486	3,848	mixed forest region (plains) in Saskatchewan; lakes; deer, wolf, bear, moose, and bison
Prince Edward Island	. . .	1937	7	18	north shore of Prince Edward Island; spruce forest; fur-bearing mammals
Pukaskwa	. . .	1971	725	1,878	north shore of Lake Superior in Ontario; boreal forest; caribou, deer, moose, and wolf
Riding Mountain	. . .	1929	1,149	2,976	plateau and lakes in Manitoba; boreal and deciduous forest; bison, elk, moose, and wolf
St. Lawrence Islands	. . .	1904	2	4	mainland and islands in the St. Lawrence River in Ontario; mixed forest; deer and fox
Terra Nova	. . .	1957	153	397	maritime region with spruce and fir forest in Newfoundland; bear, lynx, and moose
Vuntut	. . .	1993	1,678	4,345	vast plain with lakes in Yukon Territory; spruce and tundra; caribou and waterfowl
Waterton Lakes	. . .	1895	203	526	Rocky Mountains of Alberta; coniferous forest; bison, moose, bighorn, deer, and bear
Wood Buffalo	. . .	1922	17,300	44,807	plains in Alberta and Northwest Territories; boreal forest; bison, moose, deer, and bear
Yoho	. . .	1886	507	1,313	Rocky Mountains of British Columbia; coniferous forest; bear, deer, moose, and elk
Central African Republic					
Bamingui-Bangoran	1916	1933	4,131	10,700	savanna and woodlands with rocky outcrops; rhinoceros, elephant, leopard, and giraffe
Manovo-Gounda-Saint Floris	. . .	1933	6,718	17,400	flat plain with seasonal flooding; wooded savanna; rhinoceros, leopard, elephant, giraffe, lion, antelope, and crocodile
Chad					
Manda	1953	1965/69	440	1,140	densely wooded plain along the Chari River; antelope, leopard, lion, and hippopotamus
Zakouma	1958	1963	1,158	3,000	plain drained by the Salamat Wadi; open wooded savanna; elephant, lion, and antelope

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Chile					
Alberto de Agostini	. . .	1965	5,637	14,600	mountains with glaciers extending to the ocean; steppe and scattered trees; seal
Alerce Andino	1912	1982	152	393	granite massif with lakes and waterfalls; coniferous (alerce) forest
Bernardo O'Higgins	. . .	1969/70	13,614	35,259	coastal islands, mountains, lakes, and a huge ice field; tundra, steppe, and forest
Cape Horn	. . .	1945	244	631	rocky islands at the southern tip of Chile; thick low trees; otter, sea lion, and seal
Chiloé	. . .	1982	166	431	mountainous Pacific coast of Chiloé Island; temperate rain forest; fox, deer, and sea lion
Conguillío	. . .	1950/70	235	608	Andes with an active volcano, lava flows, and lakes; mixed woodland; deer and puma
Fray Jorge	. . .	1941/67	39	100	mountainous coastal complex; relict subtropical forest in semiarid steppe; fox and puma
Hornopirén	. . .	1988	186	482	volcano near the Reloncaví Fjord
Isluga Volcano	. . .	1967	675	1,747	volcano and salt flats in the Andean tableland of the Atacama Plateau; guanaco
Juan Fernández	. . .	1935	35	91	islands off the Chilean coast; volcanic hills and coastal cliffs; palms and giant ferns; seal
Lauca	1965	1970	532	1,379	high arid Andean plateau and lakes; cacti and steppe; flamingo, vicuña, and puma
Magdalena Island	. . .	1983	608	1,576	forested island in southern Chile
Pan de Azúcar	. . .	1986	169	438	Atacama coastal desert; cacti; guanaco, sea lion, and penguin
Puyehue	. . .	1941	413	1,070	Andes in Chile's Lake District; hot springs; temperate rain forest; deer, fox, and coypu
Queulat	. . .	1983	595	1,541	mountains, Colgado glacier, and Cóndor waterfalls; evergreen forest
Rapa Nui (Easter Island)	. . .	1935/68	26	67	Easter Island in the Pacific; grasslands; giant stone statues in human form
San Rafael Lake	. . .	1945/59	6,726	17,420	San Rafael Lake (fjord) and glacier in Patagonia; forest and tundra; puma, fox, and seal
Simpson River	. . .	1967	158	408	high mountains, narrow valleys, Simpson River, and waterfalls; evergreen forest; deer
Torres del Paine	. . .	1959	712	1,844	tablelands, crags, glaciers, and lakes in Patagonia; scrub vegetation; guanaco and fox
Vicente Pérez Rosales	. . .	1926	874	2,263	series of Andean volcanoes, waterfalls, and Todos los Santos Lake; evergreen forest
Villarrica	. . .	1940	236	610	chain of three volcanoes (including active Villarrica); araucaria forest; deer
Colombia					
Amaca-Yacú	. . .	1975	1,131	2,930	hills, plains, and swamps of the Amazon; tropical rain forest; jaguar, monkey, and otter
Cahuinari	. . .	1987	2,222	5,755	Amazon region
Cali Headlands	1961	1968	579	1,500	high mountain group near the Pacific Ocean; subtropical forest; bear
Catatumbo-Bari	. . .	1989	610	1,581	. . .
Chingaza	1968	1977/78	195	504	Cordillera Oriental; tropical montane forest; bear, deer, coati, and monkey
Chiribiquete	. . .	1989	4,942	12,800	mountain range
Cocuy, El	. . .	1977	1,181	3,060	Cordillera Oriental; subtropical forest; coati, bear, and wildcat
Corales del Rosario	. . .	1977	75	195	coral reef in the Caribbean Sea; mangroves on Barú Island; marine life
Cordillera Los Picachos	. . .	1977	1,695	4,390	mountain divide between the Orinoco and Amazon rivers; humid subtropical forest; tapir
Gorgona Island	. . .	1983/84	190	492	mountainous (volcanic) Gorgona and Goronilla islands; coral reefs; rain forest
Hermosas, Las	. . .	1977	483	1,250	rugged mountains with small lakes; palm and fir forest; tapir, bear, and deer
Katíos, Los	. . .	1973	278	720	Darién hills and swampy plateau; subtropical rain forest; tapir, otter, and jaguar
Macuira	. . .	1977	97	250	mountainous peninsula in the Caribbean Sea; dry montane and cloud forests; monkey
Munchique	. . .	1977	170	440	Cordillera Occidental; mountain and tropical rain forest; deer and puma
Nevado del Huila	. . .	1977	610	1,580	active volcano and high barren plain; cloud forest; tapir, deer, bear, and monkey
Nevados, Los	1959	1973	147	380	snow-capped volcanic peaks of the central Andes; palm forest; bear, tapir, and deer
Orquídeas, Las	. . .	1973/77	124	320	Cordillera Occidental with rivers and steep gorges; mountain rain forest; birdlife
Paramillo	. . .	1977	1,776	4,600	mountainous region including the Paramillo massif; humid subtropical forest; tapir
Paya, La	. . .	1984	1,629	4,220	stretch along the Putumayo River between Puerto Asís and Puerto Leguízamo
Picachos, Los	1977	1989	1,695	4,390	rugged branch of the Cordillera Oriental; humid forest; tapir and condor
Pisba	. . .	1977	174	450	Cordillera Oriental; mixed forest; bear and deer
Puracé	1961	1968	320	830	Almaguer Massif of the Andes; active volcano; forest and grassland; bear and deer
Salamanca Island	1964	1977	81	210	island with mangrove swamps in the Magdalena River estuary; crocodile and manatee
Sanquianga	. . .	1977	309	800	island and adjacent Pacific shore; hills, mangrove swamp, and sandy beaches
Serranía de la Macarena	1948	1971/89	2,432	6,300	isolated mountain range; gorges and rock domes; tropical forest; deer, bear, and tapir
Sierra Nevada de Santa Marta	. . .	1964	1,479	3,830	mountain massif near the Caribbean seacoast; arid foothills, lowland tropical forest, cloud forest, and glaciers; deer, puma, jaguar, and anteater
Sumapaz	1968	1977	595	1,540	mountain massif, high barren plain, and cloud forest; tapir, bear, and condor
Tamá	. . .	1977	185	480	undulating terrain; humid forest; bear, monkey, and otter
Tatamá	. . .	1987	200	519	. . .
Tayrona	. . .	1964	58	150	Caribbean beaches, coastal woodlands, foothills, and cloud forest; monkey and deer
Tinigua	. . .	1989	779	2,018	. . .
Tuparro, El	. . .	1970	2,116	5,480	savanna along the Orinoco River; woodland and swamp; jaguar, tapir, and otter
Utría	. . .	1987	210	543	. . .
Congo					
Odzala	1935	1940	489	1,266	undulating plateau; humid tropical forest; chimpanzee, gorilla, elephant, and lion
Costa Rica					
Amistad, La (Talamanca)	. . .	1982	749	1,939	rugged Talamanca mountain range; montane rain forest; tapir and quetzal
Braulio Carrillo	. . .	1978	177	459	two dormant volcanoes and eroded canyons; rain forest; jaguar, tapir, and deer
Chirripó	. . .	1975	194	502	mountain with high barren plains, cloud forest, and glacial lakes; tapir, jaguar, and deer
Corcovado	. . .	1975	210	545	Osa Peninsula; beaches, estuaries, and rain-forested hills; peccary, deer, and jaguar
Guanacaste	. . .	1989/91	125	325	mountain range; dry tropical forest; tapir and wildcat
Rincón de la Vieja	. . .	1973/74	54	141	volcano and the Santa María Mountains; fumaroles and mud pots; rain forest; quetzal
Santa Rosa	1966	1971/76	144	372	coastal beaches and salt flats; tropical dry forest; deer, peccary, monkey, and jaguar
Tortuguero	. . .	1975	73	189	beach, estuary, and tropical rain forest along the Carribean coast; tapir and jaguar
Côte d'Ivoire					
Asagny	1926	1981	73	190	waterlogged Bandama River basin; marshy savanna; chimpanzee, elephant, and buffalo
Banco	1929	1953	116	300	tropical rain forest along the Ébrié Lagoon; monkey, civet, chimpanzee, and antelope
Komoé (Comoe)	1926	1968	4,440	11,500	peneplain along the Komoé River; forest and savanna; chimpanzee, elephant, and lion
Marahoué	. . .	1968	390	1,010	undulating (hilly) area; savanna woodland; monkey, elephant, and hippopotamus
Mount Péko	. . .	1968	131	340	mountainous region; deciduous forest; monkey, chimpanzee, leopard, and elephant
Mount Sangbé	. . .	1975	367	950	Toura Mountains; savanna woodland; elephant, warthog, buffalo, and monkey
Taï	1926	1972	1,351	3,500	peneplain of the Sassandra River; rain forest; monkey, pangolin, leopard, and elephant
Croatia					
Kornati	1967	1980	86	224	barren islands in the Adriatic Sea; steep shores and cliffs; scattered oak, olive, and fig
Krka River	1962	1985	55	142	Krka River gorge with waterfalls and lakes; oak and hornbeam; fox, martin, and polecat
Plitvice Lakes	. . .	1949	74	192	massifs with lakes, waterfalls, and caves; beech and fir forest; bear, deer, and wolf
Cuba					
Cristal Peak	. . .	1930	58	150	mountains northwest of Guantánamo
Granma Landing	. . .	1980/86	100	258	. . .
Turquino	. . .	1959	68	175	. . .
Czech Republic					
Krkonoše (Giant Mountains)	. . .	1963	140	363	part of the Giant Mountains of Bohemia; spruce forest and alpine meadow; deer, wild sheep, and boar
Djibouti					
Day Forest	. . .	1939	39	100	plateaux of the Goda Mountains; vestige of juniper forest; monkey and leopard

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Dominica					
Morne Trois Pitons	. . .	1975	26	69	spikelike remains of a former volcano; fumaroles and hot springs; rain and cloud forest
Dominican Republic					
Armando Bermúdez	1933	1956	296	766	northern slope of the Cordillera Central; moist subtropical pine forest; boar and birdlife
Del Este	. . .	1975	162	420	coastal peninsula, beaches, and Saona Island; moist subtropical forest; parrot
Haitises, Los	. . .	1976	80	208	karstic formations (hills), coastal caves, and keys; moist subtropical forest; parrot
Jaraguá	. . .	1983	531	1,374	saltwater Trujín (Oviedo) Lagoon and sandy beaches; spiny trees and cacti; flamingo
José del Carmen Ramírez	. . .	1958	285	738	southern slope of the Cordillera Central; moist subtropical pine forest; birdlife
Monte Cristi	. . .	1983	505	1,309	El Morro mesa, rocky beaches, and keys; mangroves and desert shrubland; birdlife
Sierra de Baoruco	. . .	1983/86	309	800	high mountains; moist subtropical pine forest and dry subtropical vegetation; birdlife
Ecuador					
Cotopaxi	. . .	1975	129	334	Cotopaxi volcano (active) in the Andes; mountain grassland; deer, wolf, puma, and fox
Galápagos	. . .	1936	2,678	6,937	islands off the coast of Ecuador; unique flora and fauna (tortoise, finch, and iguana)
Machalilla	. . .	1979	213	551	coastal beaches, cliffs, and islands; tropical forest; deer, peccary, and armadillo
Podocarpus	. . .	1982	565	1,463	part of the Andes Mountains near Loja; cloud forest; bear and birdlife
Sangay	. . .	1975	1,999	5,177	mountains of the Andes, active volcano, and tropical rain forest; tapir, puma, and jaguar
Yasuní	. . .	1979	3,793	9,823	land along the Yasuní River in the Amazon basin; tropical rain forest; jaguar and puma
Egypt					
Ra's Muḥammad	. . .	1983	237	615	southern tip of the Sinai Peninsula; coral reef in the Red Sea; marine life
Estonia					
Lahemaa	. . .	1971	683	1,769	rocky shore along the Gulf of Finland; grassland and juniper groves; elk, bear, and lynx
Ethiopia					
Ābiyata-Shala Lakes	. . .	1970/71	342	887	plains between two saline lakes in the Great Rift Valley; acacia savanna; migrant birds
Āwash	1961	1966/69	292	756	Denakil plains; savanna with palm forest; antelope, zebra, cheetah, and ostrich
Bale Mountains	. . .	1969	954	2,471	tableland, caves, and lakes; cedar forest and grassland; antelope, fox, and warthog
Gambēla	. . .	1973/74	1,954	5,061	plains flanking the Gilo and Ītang rivers; marshlands; antelope, elephant, and lion
Mago (Makī)	. . .	1978	835	2,162	Makī River valley; savanna and thornbush; buffalo, antelope, elephant, giraffe, and lion
Nech' Sar	. . .	1972/73	198	514	grassy plains, Lake Haro Robi, and rocky ridges; zebra, antelope, buffalo, and leopard
Omo	. . .	1969	1,571	4,068	grassy plains and acacia along the Omo River; buffalo, antelope, elephant, and lion
Simēn Mountains	. . .	1966/69	69	179	Simēn Mountains, cliffs, and gorges; grassy plains and juniper; ibex, fox, and leopard
Yangudi Rassa	. . .	1976/78	1,827	4,731	grassy plains rising to Mount Galato Daba; antelope, warthog, zebra, and cheetah
Finland					
Lemmen River	. . .	1956	1,102	2,855	hills and lakes; pine and spruce forest and open heath; elk, reindeer, bear, and wolf
Oulanka	. . .	1956	104	269	valley of the Oulanka River; heathland and pine forest; reindeer, elk, fox, and bear
Pallas-Ounas Hills	. . .	1938	195	506	mountain plateau; canyons; peat land and coniferous forest; reindeer, bear, and elk
Urho Kekkonen	. . .	1983	985	2,550	hills, small rivers, and gorges; heathland and pine and spruce forest; reindeer
France					
Cévennes	. . .	1970	353	913	plateau, mountains, and gorges; grassland and oak-beech forest; boar, deer, and fox
Écrins	. . .	1973	354	918	region of the Alps; lakes, gorges, cirques, and glaciers; larch forest; chamois and fox
Mercantour	. . .	1979	264	685	part of the Alps; lakes and glaciers; pine and larch forest; chamois, ibex, and fox
Pyrénées Occidentales	. . .	1967	176	457	mountains on the Spanish border; beech and pine forest; chamois, bear, lynx, and ibex
Vanoise	. . .	1963	204	528	region of the Alps; lakes and glaciers; pine forest and heather; chamois, ibex, and fox
Georgia					
Prielbrussky	. . .	1986	390	1,010	Caucasus Mountains and Baksan River valley east of Mount Elbrus
Tbilisi	. . .	1973	76	197	. . .
Germany					
Bavarian Forest	. . .	1969/70	51	131	undulating mountain plateau; spruce, fir, and beech forest; deer, boar, otter, and lynx
Berchtesgaden	1910	1978	81	210	Alpine region; flat-topped mountains, mixed forest, and lakes; chamois, deer, and eagle
Lower Saxony Wadden Sea	. . .	1986	927	2,400	North Sea coastline in Lower Saxony; sand dunes and salt meadows; seal and marine birds
Schleswig-Holstein Wadden Sea	. . .	1985	1,100	2,850	North Sea coastline south of the Danish border; mudflats, sand cliffs, and islands; seal and marine birds
Ghana					
Bui	. . .	1971	703	1,821	savanna woodland along the Black Volta River; hippopotamus, buffalo, and antelope
Digya	. . .	1971	1,343	3,478	peninsula of Lake Volta; savanna woodland; monkey, elephant, and antelope
Mole	1961	1971	1,869	4,840	hilly region with savanna woodland; baboon, jackal, hyena, elephant, and antelope
Greece					
Mount Olympus	. . .	1938	15	40	massif of Olympus near the Aegean Sea; maquis and pine forest; wolf and fox
Préspa	1971	1974	75	195	Lake Mikrá Préspa and part of Lake Préspa; lagoons and reed swamp; waterfowl
Greenland					
Greenland	. . .	1974	375,291	972,000	Arctic landscape of northeastern Greenland; interior ice cap and tundra; birdlife
Guadeloupe					
Guadeloupe	. . .	1989	67	173	active volcano, tropical forest, and mangrove-marine coastal area; raccoon
Guatemala					
Lacandón	. . .	1990	772	2,000	La Gloria and San Diego lakes in the low limestone plateau of the Petén; rain forest
Lake Atitlán	. . .	1955	212	548	Lake Atitlán surrounded by three volcanic peaks; birdlife
Tigre, El	. . .	1990	1,351	3,500	. . .
Tikal	. . .	1955/57	222	574	ruined city of the Maya Indians; mountainous; tropical forest; deer, jaguar, and tapir
Guyana					
Kaieteur	. . .	1929/30	226	586	mesas, gorges, and Kaieteur Falls; rain forest and savanna; jaguar, capybara, and tapir
Honduras					
Agalta	. . .	1987	253	655	mountains in eastern Honduras
Azul de Meámbar	. . .	1987	77	200	mountains near Lake Yojoa
Bay Islands	1960	1979	114	294	islands in the Caribbean Sea; sandy beaches, coral reefs, and coniferous forest
Celaque	. . .	1987	104	270	mountain peak; cloud forest; quetzal
Comayagua Mountains	. . .	1987	69	180	. . .
Mount Azul	. . .	1987	60	155	peak near the border with Guatemala
Mount Cusuco	1959	1987	71	184	mountain peak and waterfalls; tropical rain and cloud forests; jaguar, tapir, and peccary
Plátano River	1960	1980	1,351	3,500	Caribbean coastal plain; mountains; pine savanna and jungle; tapir, jaguar, and deer
Yoro Mountains	. . .	1987	116	300	. . .

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Hungary					
Aggtelek	1945	1985	76	197	cave system, including the Baradla Caves, with huge chambers and stalagmites
Bükk	. . .	1976	150	388	plateau region with deep valleys, streams, and caves; beech forest
Hortobágy	. . .	1973	202	522	large grassy plain with lakes, marshes, and scattered woods; waterbirds
Kiskunság	. . .	1974/75	139	359	Great Alfold lowlands; grassland, lakes, and reed marsh; birdlife
Iceland					
Jökulsár Gorge	. . .	1973	58	151	canyon with sheer cliff walls, waterfalls, and grassy plains; birch and willow; birdlife
Skaftafell	. . .	1967/68	618	1,600	partly glaciated scenery, hot springs, and sand plains; heath, willow, and birch; fox
India					
Anshi	. . .	1987	96	250	in Karnātaka
Balphakram	. . .	1986	85	220	Gāro Hills in Meghālaya; forest; elephant, gaur, deer, and boar
Bandhavgarh	. . .	1968	173	449	Maikala Range (hills) in Madhya Pradesh; shorea forest; tiger, gaur, bear, and deer
Bandipūr	1941	1974	337	874	hills of the Western Ghāts in Karnātaka; teak and sandalwood; gaur, deer, and tiger
Corbett	. . .	1935	201	521	valley and hills in Uttar Pradesh; grassland and shorea forest; tiger, deer, and leopard
Dachigam	. . .	1981	54	141	western Himalayas in Jammu and Kashmir; dense forest; Kashmir stag, deer, and bear
Desert	. . .	1981	1,221	3,162	Thar Desert in Rājasthān; antelope, fox, and bustard
Dudwa	. . .	1977	189	490	hilly country and lakes in Uttar Pradesh; shorea forest; tiger, leopard, deer, and bear
Gir	1900	1975	100	259	hilly area of scrubland and teak in Gujarāt; Asian lion, deer, antelope, and boar
Great Himalayan	. . .	1984	234	606	northwestern Himalayas in Himāchal Pradesh; leopard, bear, wild goat, and deer
Gugamal	. . .	1987	140	362	in Mahārāshtra
Hemis High Altitude	. . .	1981	1,583	4,100	trans-Himalayas in Jammu and Kashmir; leopard; wild sheep, wild goat, and wolf
Indrāvati	. . .	1978	486	1,258	river valley in Madhya Pradesh; tiger, gaur, leopard, and deer
Kanger Ghati	. . .	1982	77	200	in Madhya Pradesh; tiger, deer, leopard, and gaur
Kānha	1935	1955	363	940	Maikala Range (hills) in Madhya Pradesh; grassland and shorea forest; deer and tiger
Kāziranga	1908	1974	166	430	flat swampy country in Assam; Indian rhinoceros, elephant, buffalo, deer, and tiger
Keoladeo Ghana	1955	1981	11	29	natural depression and seasonal lake in Rājasthān; migratory birds, deer, and antelope
Khangchendzonga	. . .	1977	328	850	central Himalayas in Sikkim; leopard, bear, wild sheep, and deer
Kishtwar	. . .	1981	120	310	in Jammu and Kashmir; deer, stag, wild goat, and leopard
Kudremukh	. . .	1987	232	600	mountain in Karnātaka
Madhav	. . .	1959	60	156	in Madhya Pradesh; leopard, antelope, and deer
Marine (Gulf of Kutch)	. . .	1982	63	163	coast of Gujarāt; mangroves; elephant, antelope, and birdlife
Marine (Wandūr)	. . .	1983	109	282	Andaman Islands; mangroves; boar, deer, and crocodile
Mouling	. . .	1986	186	483	in Arunāchal Pradesh
Nagarhole	1955	1975	248	643	hills of the Western Ghāts in Karnātaka; elephant, gaur, deer, and bear
Namdapha	. . .	1983	766	1,985	eastern Himalayas in Arunāchal Pradesh; tiger, elephant, leopard, gaur, and deer
Nanda Devi	1939	1982	243	630	basin in the western Himalayas in Uttar Pradesh; leopard, gaur, deer, and bear
North Simplipal	. . .	1978	327	846	Simplipal Hills in Orissa; antelope, deer, elephant, leopard, pangolin, tiger, and bear
Palāmau	1959	1986	82	213	Chota Nāgpur plateau in Bihār; tiger, deer, elephant, leopard, boar, and wolf
Panna	. . .	1981	2,095	5,427	hills in Madhya Pradesh; tiger, leopard, hyena, deer, and antelope
Pench	. . .	1975	99	257	in Mahārāshtra; tiger, leopard, gaur, deer, and bear
Pench	. . .	1977	113	293	in Madhya Pradesh; tiger, leopard, gaur, and deer
Periyār	1940	1982	118	305	hills along Periyār Lake in Kerala; tropical rain forest; elephant, gaur, deer, and tiger
Pin Valley	. . .	1987	312	807	in Himāchal Pradesh; wild goat, leopard, and wild sheep
Rajaji	1948	1988	321	832	in Uttar Pradesh; tiger, leopard, elephant, deer, and bear
Ranthambore	1957	1980	151	392	Vindhya Range of Rājasthān; deciduous forest and grassland; tiger, deer, and antelope
Sanjay	. . .	1981	748	1,938	in Madhya Pradesh; tiger, leopard, gaur, deer, and antelope
Sāriska	1955	1982	106	274	valleys and hills in Rājasthān; desert scrub and acacia; tiger, leopard, and deer
Sātpura	. . .	1981	202	524	mountains in Madhya Pradesh; tiger, leopard, deer, and gaur
Sundarbans	1973	1984	514	1,330	Ganges River delta in West Bengal; estuarine mangrove swamp; tiger, deer, and boar
Tādoba	1935	1955	45	117	mountains and Tādoba Lake in Mahārāshtra; deciduous rain forest; deer and tiger
Indonesia					
Bali Barat	1941	1982	300	777	hilly northwestern Bali; sandy beaches; mixed evergreen forest; tiger, deer, and wild ox
Baluran	1937	1980	97	250	coast and extinct volcano of eastern Java; acacia savanna; wild ox, buffalo, and leopard
Barisan Selatan	1935	1982	1,409	3,650	southwest coastal Sumatra; volcanic cones; mangroves and shorea forest; rhinoceros
Bromo-Tengger-Semeru	1919	1982	224	580	rugged volcanic uplands on eastern Java; woodlands; boar, deer, and leopard
Cape Puting	1936	1982	1,371	3,550	swampy peninsula on southern Kalimantan; rain forest; orangutan, gibbon, and leopard
Dumoga-Bone	1979	1982	1,158	3,000	valleys and mountains in north-central Celebes; lowland rain forest; wild ox
Kerinci Seblat	. . .	1981	5,732	14,847	steep-sided rift valley on west-central Sumatra; forest; rhinoceros, tapir, and tiger
Komodo	1938	1980	670	1,735	three rugged Lesser Sunda islands; giant monitor lizard (the Komodo dragon) and deer
Kutai	1936	1982	767	1,986	east coast of Kalimantan; tropical rain forest; orangutan, gibbon, and leopard
Lore Lindu	1973	1982	892	2,310	folded mountains and hot springs in central Celebes; rain forest; wild ox and babirusa
Manusela	. . .	1982	730	1,890	central mountains of Ceram (Moluccas); tropical rain forest; deer, boar, and civet
Meru Betiri	1972	1982	224	580	hills and valleys of southeastern Java; lowland rain forest; tiger, wild ox, and leopard
Mount Gede Pangrango	1889	1980	58	150	twin volcanoes and hot springs on western Java; tropical rain forest; gibbon
Mount Leuser	1934	1980	3,061	7,927	Barisan Range of northern Sumatra; tropical rain forest; orangutan, gibbon, and tiger
Mount Palung	. . .	1990	347	900	mountain near west coast of Kalimantan
Point Kulon	1921	1980	475	1,229	peninsula and island of western Java; rain forest; rhinoceros, deer, and leopard
Rinjani	. . .	1990	154	400	mountain peak and lake on Lombok; coniferous forest; buffalo, deer, and monkey
Wasur	. . .	1990	1,189	3,080	extensive swamps in southern Irian Jaya
Iran					
Bamou	. . .	1962	186	481	mountains, hills, and plains; dwarf scrub vegetation; wild goat, wild sheep, and leopard
Golestān	. . .	1957	355	919	Elburz Mountains; temperate forest and steppe; wild sheep, leopard, bear, and deer
Kavir	. . .	1964	1,622	4,200	Kavir Desert; sand dunes, salt waste, and mountains; gazelle, cheetah, and wild goat
Urmia Lake	1960	1967	1,790	4,636	saline lake with salt flats and marsh; a wintering area for waterfowl; leopard and deer
Tandoureh	. . .	1968	119	308	limestone Kopet-Dag Range; steppe vegetation; wolf, bear, and wild sheep
Israel					
Mount Carmel	. . .	1956/60	32	84	mountain near Haifa; Mediterranean scrub vegetation and pine forest; birdlife
Italy					
Abruzzi	. . .	1923	170	440	central Apennine Range with glacial relief; beech forest; wolf, bear, chamois, and deer
Calabria	. . .	1968	61	159	La Sila massif in southern Italy; pine, beech, fir, and maple forest; wolf, boar, and deer
Gran Paradiso	1836	1922	271	702	Alpine terrain of the upper Valle d'Aosta; glaciers; larch forest; ibex, chamois, and fox
Pollino	1971	1990	758	1,964	southern Apennine Range; gorges; pine forest; wolf, boar, and deer
Stelvio	. . .	1935	573	1,483	rugged Alpine region; glaciers and larch forests; chamois, deer, ibex, and fox
Japan					
Akan	. . .	1934	349	905	active volcanoes and lakes on Hokkaido; coniferous forest; bear, raccoon, and deer
Aso-Kuju	. . .	1934	281	727	sunken caldera of Aso volcano (active) with grassland skirting it on Kyushu
Bandai-Asahi	. . .	1950	722	1,870	volcano and mountains on Honshu; lakes; beech forest; bear, monkey, and antelope
Chichibu-Tama	. . .	1950	470	1,216	mountain region of sedimentary rocks on Honshu; pine and mixed forest
Chūbu-Sangaku	. . .	1934	673	1,743	Japanese Alps on Honshu; beech, oak, and coniferous forest; antelope
Daisen-Oki	. . .	1936	123	319	Mount Daisen on Honshu; Oki islands in the Sea of Japan; grassy plains and forest
Daisetsuzan	. . .	1934	892	2,309	Ishikari volcanic mountain range on Hokkaido; spruce and fir forest; bear

Principal national parks of the world (continued)

country national park	date protected status	 national park status	area square miles	 square km	description
Fuji-Hakone-Izu	. . .	1936	474	1,227	Mount Fuji volcano, seacoast, and islands of Honshu; pine and fir forest; deer and boar
Inland Sea (Seto-Naikai)	. . .	1934	242	628	some 600 islands and part of the main shores of Honshu, Kyushu, and Shikoku of the Inland Sea; pine forest; monkey
Ise-Shima	. . .	1946	214	555	Shima Peninsula and islets of Honshu; Ise Bay noted for its Shintō shrine
Jōshin'etsu Kōgen	. . .	1949	730	1,891	plateaus and volcanoes on Honshu; lakes; larch and birch forest; antelope
Kirishima-Yaku	. . .	1934	212	548	Kirishima volcanic range of Kyushu and Yaku Island; cedar forest
Kushiro Shitsugen	. . .	1987	104	269	Kushiro wetlands, Lake Tōro, Shiraruto marsh, and hills on Hokkaido
Minami Alps	. . .	1964	138	358	Southern Alps of Japan on Honshu; fir and hemlock forest; antelope
Mount Haku	. . .	1962	184	477	volcanic mountain chain on Honshu; pine, beech, and oak forest; bear and antelope
Nikkō	. . .	1934	541	1,402	volcanic mountains, lakes, and waterfalls on Honshu; coniferous forest; serow and bear
Rishiri-Rebun-Sarobetsu	. . .	1974	82	212	volcanic islands and marshy coastal plain of Hokkaido; sea cliffs and sand dunes
Saikai	. . .	1955	95	247	volcanic Gotō Archipelago and the Kujūku Islands west of Kyushu; subtropical forest
Shikotsu-Tōya	. . .	1949	380	983	Mount Yōtei and caldera lakes on Hokkaido; fir forest; bear and sable
Shiretoko	. . .	1964	149	386	mountainous peninsula of Hokkaido; spruce and fir forest; deer, fox, and bear
Towada-Hachimantai	. . .	1936	330	854	Mount Hakkōda and Lake Towada on Honshu; hot springs; fir and beech forest
Unzen-Amakusa	. . .	1934	109	283	volcano of Mount Unzen and maple forest on Kyushu; the Amakusa Islands
Yoshino-Kumano	. . .	1936	231	598	Mount Yoshino on Honshu; the Kumano region with gorges and evergreens
Jordan					
Petra	1963	1968	47	122	Nabataean city carved in sandstone cliffs; semiarid with dwarf shrubs and oleander
Kazakhstan					
Bayanaul	. . .	1985	176	455	. . .
Kenya					
Aberdare	. . .	1950	296	766	volcanic mountains; rain forest and high moorland; rhinoceros, lion, and elephant
Amboseli	1906/48	1974	151	392	dry lake basin; seasonal swamps and thornbush; elephant, rhinoceros, and cheetah
Chyulu	. . .	1983	182	471	hills in southern Kenya; a former game preserve
Kora	1974	1989	690	1,788	bushland along the Tana River; riverine forest; elephant, rhinoceros, and hippopotamus
Lake Nakuru	1960/61	1967	73	188	shallow alkaline lake in the Great Rift Valley; dry savanna and hilly country; flamingo
Mari Waterhole	. . .	1989	338	876	. . .
Meru	1960/61	1966/67	336	870	plains and hills; thornbush and grassland; rhinoceros, antelope, zebra, and lion
Mount Elgon	1958	1967/68	65	169	volcanic cone of Mount Elgon; montane forest; elephant, buffalo, leopard, and antelope
Mount Kenya	. . .	1949	277	718	eroded mountain; glaciers; forest and high moorland; elephant, buffalo, and forest hog
Nairobi	. . .	1946	45	117	upland plateau; woody savanna; concentrations of migratory plains mammals
Sibiloi	. . .	1972/73	607	1,571	shore of Lake Rudolf (Turkana); dry grassy plains; zebra, giraffe, lion, and cheetah
Tsavo East	. . .	1948	4,536	11,747	high Yatta Plateau; thornbush grassland; elephant, rhinoceros, and hippopotamus
Tsavo West	. . .	1948	3,500	9,065	Chyulu Hills; thornbush grassland; elephant, rhinoceros, hippopotamus, and antelope
Korea, North					
Mount Kŭmgang	. . .	. . .	169	439	rugged peak in the T'aebaek Mountains; deep gullies, waterfalls, and forest
Korea, South					
Ch'iak	. . .	1984	70	182	mountain peak near Wŏnju; Kuryong temple
Chiri	. . .	1967	170	440	peak of the Sobaek Mountains; gorges and waterfalls; deciduous forest; deer and bear
Halla	. . .	1970/73	58	149	dormant volcano on Cheju-do Island; subtropical vegetation; pheasant
Kyŏngju	. . .	1968	53	138	ancient capital of Korea during the Silla kingdom, with temples and tombs; pine forest
Odae	. . .	1975	115	299	mountain peak; pine forest; temples
Songni	. . .	1970	109	283	mountain peak and gorges; oak, maple, and gingko forest; Pŏpchu temple
Sŏrak	. . .	1970	144	373	granite mountain peak in the T'aebaek Mountains; maple and gingko forest; goral (goat)
Tŏgyu	. . .	1970/75	85	219	mountain peak south of Taejŏn; temples
Worak	. . .	1984	110	285	mountain peak and hot springs
Kyrgyzstan					
Alaarcha	. . .	1976/77	75	194	gorge in the Kyrgyz Mountain Range; fir forest and alpine meadows; deer and leopard
Latvia					
Gauja	. . .	1973	355	920	exposed rock in the Gauja River valley; mixed forest; elk, deer, and beaver
Liberia					
Sapo	. . .	1983	499	1,292	tropical-forest-covered lowland and marsh; elephant, pygmy hippopotamus, and zebra
Libya					
Kouf	. . .	1979	135	350	mountainous Mediterranean Sea coast near Zāwiyat al-Bayḍā'
Lithuania					
Lithuanian (Aukstaitija)	. . .	1974	117	303	moraines, lakes, and forest in the Aukštaičiai Highland
Macedonia					
Galičica	. . .	1958	88	228	mountains on the Albanian border; lakes; juniper-oak forest; bear, wild goat, and deer
Mavrovo	. . .	1949	282	731	Bistra and Šar mountains; lake and gorge; beech-fir forest; bear, deer, and chamois
Pelister	. . .	1948/49	48	125	mountains and glacial lakes; alpine pasture and pine forest; bear, chamois, and deer
Madagascar					
Ambre Mountains	. . .	1958	70	182	ancient volcanic massif with crater lakes and waterfalls; tropical rain forest; lemur
Isalo	. . .	1962	315	815	dissected massif with steep escarpments and gorges; woodland savanna; lemur
Mananara	. . .	1989	89	230	mouth of the Mananara River (Cape Bellone)
Malaŵi					
Kasungu	1922	1970	894	2,316	wooded hills, rocky outcrops, and grassy valleys; elephant, antelope, and cheetah
Lake Malaŵi (Nyasa)	1934	1980	34	87	peninsula and islands in Lake Malaŵi; woodland; hippopotamus, leopard, and antelope
Lengwe	1928	1970	342	887	plains along the Shire River; savanna and thicket; antelope, monkey, lion, and hyena
Liwonde	. . .	1973	208	538	sloping plains along the Shire River; woodland savanna; lion, elephant, and buffalo
Nyika	. . .	1965	1,210	3,134	Nyika Plateau; grassland and evergreen forest; zebra, antelope, leopard, and lion
Malaysia					
Crocker Range	. . .	1984	540	1,399	mountains in East Malaysia (Sabah)
Kinabalu	. . .	1964	291	754	Mount Kinabalu in East Malaysia (Sabah); waterfalls; tropical rain forest; birdlife
Mount Mulu	. . .	1974	204	529	mountain in East Malaysia (Sarawak); caves; tropical rain forest; leopard
Negara	. . .	1938/39	1,677	4,344	plateau in West Malaysia; tropical rain forest; rhinoceros, elephant, wild ox, and tiger
Mali					
Boucle du Baoulé	1950	1953/54	1,351	3,500	sandstone plateau; woodland savanna; antelope, giraffe, hippopotamus, and lion
Mauritania					
Arguin Banks	. . .	1976	4,529	11,730	islands, coral reefs, and sandy Atlantic shore; grassland and acacia scrub; birdlife

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Mexico					
Blanco River Canyon	. . .	1938	215	557	canyon extending from the Acutzingo Mountains; tropical jungle and coniferous forest
Bosencheve	. . .	1940	58	150	Lake Carmen and the slopes of the Cerro de Zacatónes; pine forest; migratory birds
Chacahua Lagoons	. . .	1937	55	142	lagoons on the Oaxaca coast; beaches and tropical forest; deer, boar, and crocodile
Cofre de Perote	. . .	1937	45	117	volcano (also called Nauhcampatépetl) in the Sierra Madre Oriental; pine forest
Colima Peak	. . .	1936/40	86	222	active volcano and fumaroles; subtropical vegetation, pine forest, and high grassland
Gogorrón, El	. . .	1936	97	250	Gogorrón valley enclosed by mountains; hot springs; pines and semiarid vegetation
Iztaccíhuatl-Popocatépetl	. . .	1935	99	257	two dormant volcanoes in the Sierra Nevada; snow-covered summits; pine forest
Malinche, La	. . .	1938	176	457	isolated volcano in the Cordillera Neo-Volcánica; pine forest with grassland higher up
Mármoles, Los	. . .	1936	90	232	Barranca de San Vicente and Cerro de Cangandó; coniferous forest
Monterrey Mountains	. . .	1939	952	2,465	Sierra Madre Oriental; streams, canyons, waterfalls, and caves; pine forest
Orizaba Peak	. . .	1936/37	76	198	isolated volcano (also called Citlaltépetl); snow-capped with pine forest on its slopes
Palenque	. . .	1981	7	18	ruins of Maya hilltop temples; tropical forest; monkey and birdlife
Sierra de San Pedro Mártir	. . .	1947	243	630	San Pedro Mártir mountain ridge and streams in Baja California; pine forest; deer, coyote, and puma
Sumidero Canyon	. . .	1980	84	218	deep canyon of the Grijalva River, there impounded by Chicoasén Dam; birdlife
Tancítaro Peak	. . .	1940	113	293	old volcano with overhanging lava fragments around its base; pine forest on its slopes
Tepozteco, El	. . .	1937	93	240	archaeological zone of Tlahuica with the Tepozteco pyramid; mountainous
Toluca Peak	. . .	1936/37	197	510	dormant snow-capped volcano; two lakes in its crater; pine forest
Zoquiapan and Anexas	. . .	1937	75	194	mountainous terrain, canyons, and streams; high-elevation pine forest
Mongolia					
Ar-Toul	. . .	1984	361	936	former game reserve near Ulaanbaatar
Dzungarian Gobi	. . .	1976	2,124	5,500	wildlife reserve
Great Gobi Desert	. . .	1975	20,463	53,000	stony desert; scattered shrub and grass; antelope and wild camel
Morocco					
Toubkal	. . .	1934/42	139	360	High Atlas Mountains; holm oak and juniper forest; wild sheep, gazelle, and hyena
Mozambique					
Gorongoza	1921	1940	1,456	3,770	grassy plains; thorn scrub and palm jungle; elephant, antelope, buffalo, and lion
Myanmar					
Alaungdaw Kathapa	. . .	1984	620	1,606	pagoda and mountains north of Pegu
Namibia					
Etosha	1907	1958	8,598	22,270	area of inland drainage (salt pan); arid savanna; antelope, zebra, elephant, and lion
Nepal					
Khaptad	. . .	1986	87	225	plateau in the Himalayas; grassland and mixed forest; leopard, bear, boar, and deer
Lāngtāng	. . .	1976	660	1,710	alpine valley in the Himalayas; subtropical forest; wild goat, deer, panda, and leopard
Royal Bardīa (Karnāli)	. . .	1988	374	968	plains of the Bardīa and Babai rivers; shorea forest and some grassland; tiger, deer, leopard, boar, elephant, and dolphin
Royal Chitwan	1846	1973	360	932	plains along the Rāptī River; marsh and shorea forest; rhinoceros, tiger, deer, and bear
Sāgarmāthā	. . .	1976	443	1,148	Mount Everest (Sāgarmāthā); pine, fir, and juniper forest; deer, wild goat, and leopard
Shey-Phoksumdo	. . .	1984	1,373	3,555	trans-Himalayan region; forest and Tibetan flora; wild sheep, deer, and leopard
Netherlands, The					
De Hoge Veluwe	. . .	1935	21	54	stabilized region of drifting sand; mixed woodland and lakes; deer, fox, and boar
New Zealand					
Abel Tasman	. . .	1942	87	225	beaches, islands, and mountains on Tasman Bay; beech forest; deer and boar
Arthur's Pass	. . .	1929	383	993	alpine region of the Southern Alps; glaciers; beech forest; chamois and deer
Egmont	. . .	1900	129	335	volcanic cone of Mount Egmont; waterfalls; subtropical forest; wild goat and deer
Fiordland	. . .	1952	4,834	12,519	fjords along the coast of South Island; glaciers; beech forest; chamois and deer
Mount Aspiring	. . .	1964	1,373	3,555	Southern Alps; glaciers and river valleys; beech forest; deer, chamois, and wild goat
Mount Cook	. . .	1953	270	700	Southern Alps; glaciers and alpine vegetation; wild goat, chamois, and deer
Nelson Lakes	. . .	1956	393	1,018	Rotoiti and Rotoroa lakes surrounded by mountains; beech forest; deer and chamois
Paparoa	. . .	1987	118	306	coastal Pancake Rocks formation; Paparoa mountains; beech forest; birdlife
Tongariro	. . .	1887	307	796	three volcanoes (two of them active), glaciers, and geysers; beech forest; birdlife
Urewera	. . .	1954	821	2,127	mountains of North Island; waterfalls; mixed forest; feral cat, boar, and deer
Westland	. . .	1960	454	1,175	western foothills of the Southern Alps and glaciers; subtropical rain forest; chamois
Whanganui	. . .	1986	286	742	mountains of North Island and cliffs bordering the Whanganui River; forest; birdlife
Niger					
W du Niger	1937	1954	849	2,200	Tapoa and Mékrou river valleys; wooded savanna; elephant, buffalo, and antelope
Nigeria					
Gashaka-Gumti	. . .	1991	2,263	5,860	Gotel Mountains on the Cameroon border; forest; antelope, lion, and monkey
Kainji Lake	1961	1975/79	2,054	5,320	shore of Kainji Lake and adjacent plains; wooded savanna; antelope, lion, and elephant
Old Oyo	1988	1991	977	2,530	savanna woodland; antelope, elephant, warthog, buffalo, and lion
Yankari	1956	1991	870	2,254	hills drained by the Gaji River; savanna woodland; elephant, antelope, and lion
Norway					
Børge Mountains	1963	1970	427	1,107	mountains, lakes, and streams; birch forest; elk, deer, fox, and wolverine
Dovre Mountains	. . .	1974	99	256	mountainous plateau; birch forest, bogs, and grassland; musk ox, wild reindeer, and elk
Femundsmarka	. . .	1971	151	390	low mountain plateau, moraines, and lakes; pine forest; bear, wolverine, and lynx
Gressåmoen	. . .	1970	70	182	barren mountain terrain, broad valley, and lakes; spruce forest; elk, lynx, and fox
Hardanger Plateau	. . .	1981	1,321	3,422	high granitic and schist plateau; Arctic and subarctic vegetation; wild reindeer and fox
Jotunheimen	. . .	1980	442	1,145	high mountains, glaciers, and lakes; alpine flora; deer, wild reindeer, lynx, and fox
Northwest Spitsbergen	. . .	1973	1,375	3,560	mountains and glaciers of Haakon VII Land; Arctic tundra; wild reindeer
Øvre Anar River	. . .	1975	540	1,399	low undulating plateau; bogs and birch and pine forest; elk, wolverine, and wolf
Øvre Divi Valley	. . .	1971	287	743	plateaus, valleys, and lakes; pine and birch forest; lynx, bear, wolf, and wolverine
Prins Karls Forland	. . .	1973	247	640	mountainous island with jagged glaciated peaks west of Spitsbergen; Arctic tundra
Rago	. . .	1971	64	167	rock-covered mountainous terrain and waterfalls; pine forest; lynx, elk, and wolverine
Rondane	1962	1970	224	580	mountain massif; alpine and subalpine vegetation; wild reindeer, elk, deer, and fox
Salt Peak–Svartisen	. . .	1989	813	2,105	mountain plateau; snowfields and glaciers of Svartisen
South Spitsbergen	. . .	1973	2,046	5,300	mountains and glaciers of Torell and Sørkapp lands; Arctic tundra
Pakistan					
Dhrun	. . .	1988	647	1,677	mountain ridge and peak in Balochistān
Hazārganji-Chiltan	1890	1980	60	156	mountains in Balochistān; sparse scrub forest; wild goat, wild sheep, and leopard
Hingol	. . .	1988	637	1,650	river valley in Balochistān
Khūnjerāb	. . .	1975	876	2,269	valleys in the Himalayas, glaciers, and alpine meadows; birch forest; wild sheep
Kīrthar	1940	1974	1,192	3,087	hills in the Thar Desert; xerophytic trees and shrubs; wild goat, antelope, and fox
Lālsuhānra	1947	1972	337	874	Cholistan Desert and impounded Patisar Lake; thorn forest; boar, deer, and jackal
Margalla Hills	1959	1980	67	174	hill ranges near Islāmābād; acacia and pine forest; monkey

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Panama					
Altos de Campana	1966	1977	19	48	mountainous area with Pacific and Caribbean biological elements; evergreen rain forest
Amistad, La	. . .	1988	799	2,070	mountainous region on the border with Costa Rica; tropical rain forest
Barú Volcano	. . .	1976	54	140	an old eroded volcano and mountains; tropical forest; quetzal
Cerro Hoya	. . .	1984	126	326	southwestern tip of the Azuero Peninsula
Chagres	. . .	1984	498	1,290	river valley
Coiba	. . .	1991	1,043	2,701	island in the Pacific Ocean
Darién	. . .	1980	2,236	5,790	mountains on the border with Colombia; tropical rain forest; jaguar, tapir, and anteater
Portobelo	. . .	1976	134	348	coastline with islands, bays, and swamps; mangroves and tropical forest
Soberanía	. . .	1979/80	85	221	eastern bank of the Panama Canal with rolling hills; lowland tropical rain forest
Paraguay					
Defensores del Chaco	. . .	1975	3,012	7,800	northern Gran Chaco (plains); semiarid thorn forest; peccary, jaguar, and armadillo
Teniente Encisco	. . .	1980	154	400	northwestern Gran Chaco (plains); semiarid palm forest; peccary, capybara, and deer
Tinfunqué	. . .	1966	1,081	2,800	permanent and seasonal palm marsh (wet Chaco) along the Pilcomayo River; birdlife
Ybytyruzú	. . .	1990	93	240	mountains
Peru					
Abiseo River	. . .	1983	1,060	2,745	steep mountain slopes of the Andes and broad valleys; rain forest; bear
Amotape Mountains	. . .	1975	353	913	Amotape Mountains on Peru's northern coast; thorn woodland; deer and peccary
Huascarán	. . .	1975	1,313	3,400	peak of the Andes Mountains; montane moist forest; vicuña, deer, and bear
Manú	1968	1973	5,918	15,328	area of the Amazon basin (Manú River); tropical rain forest; bear, deer, and jaguar
Tingo María	1950	1965	69	180	range of hills; humid subtropical forest; cave in which guacharos (oilbirds) nest
Yanachaga-Chemillén	. . .	1987	471	1,220	central Amazon basin near Lima; tropical rain forest; armadillo
Philippines					
Bataan	. . .	1945	92	237	rugged terrain along Manila Bay on Luzon; tropical forest; World War II battlefield
Lake Naujan	. . .	1956	84	217	Lake Naujan area on Mindoro; marsh and forest; birdlife, deer, monkey, and boar
Mayon Volcano	1930	1938	21	55	active volcano on Luzon; grasslands and dwarf trees; deer, boar, and monitor lizard
Mount Apo	. . .	1936	281	728	active volcano, lakes, hot springs, and waterfalls on Mindanao; forest; deer and boar
Mount Canlaon	. . .	1934	95	246	active volcano, hot springs, and waterfalls on Negros; forest; deer, monkey, and boar
Mount Malindang	. . .	1971	206	533	mountain and lake on Mindanao; tropical moist forest; wildlife
Mounts Iglit-Baco	. . .	1970	291	754	rugged mountains on Mindoro; grasslands; buffalo (tamarau)
Poland					
Babia Góra	1924	1933/54	7	17	massif of the Beskid Mountains; coniferous forest; bear, lynx, deer, and wildcat
Białowieża	1919	1932/47	20	53	lowland forest of the European plains; marshland; bison, elk, wild horse, and bear
Bieszczady	. . .	1973	59	153	Carpathian Mountains; fir forest; bear, wolf, lynx, bison, deer, and boar
Kampinos	. . .	1959	137	355	sand dunes and meadows along the Vistula River; pine woods; elk, deer, and fox
Pieniny	1921	1932/54	9	23	mountains cut by the ravine of the Dunajec River; fir and larch forest; deer and lynx
Słowiński	. . .	1966/67	70	182	desertlike Baltic coast, saline lakes, and sand dunes; marsh and pine forest; deer
Tatra	. . .	1954/55	82	212	Carpathian Mountains with lakes and caves; pine forest; chamois, bear, wolf, and deer
Portugal					
Peneda-Gerês	. . .	1971	271	703	granite mountains and valleys; oak and pine forest; boar, deer, wolf, and wild horse
Romania					
Apuseni	. . .	1990	146	379	karst scenery in the Apuseni Mountains; caves
Bucegi	1943	1990	138	357	Bucegi massif with rocky peaks; beech and fir forest; chamois, bear, wolf, and deer
Caraş Gorge	1982	1990	117	304	. . .
Ceahlău	1941	1990	66	172	mountain massif with pointed crags and waterfalls; larch forest
Domogled–Cerna Valley	1932	1990	232	601	Mount Domogled; karst relief of the Cerna Valley; oak, ash, hazel, and pine forest
Nera Gorge–Beuşniţa	1982	1990	176	456	limestone gorge; Beuşniţa River basin; karst relief, caves, waterfalls, and lakes; forest
Piatra Craiului	1938	1990	57	148	limestone mountain massif; beech, spruce, and fir forest; chamois and bear
Retezat	. . .	1935	210	544	Carpathian Mountains; lakes; beech, spruce, and fir forest; chamois, bear, and deer
Rodna	. . .	1990	219	567	mountain massif and glacial lakes
Russia					
Bashkiriya	1930	1986	378	980	hilly region of the southern Urals; pine, larch, and birch forest; bear, elk, and deer
Pribaikalsky	. . .	1986	1,748	4,527	southwestern coast of Lake Baikal near Irkutsk in Siberia
Samarskaya River Bend	. . .	1984	517	1,340	arched bend of the Volga River skirting the Zhiguli Mountains
Sochinsky	. . .	1983	732	1,896	area along the Black Sea near Sochi
Tunkinsky	. . .	1991	4,570	11,837	. . .
Zabaikalsky	. . .	1986	1,032	2,672	northeastern coast of Lake Baikal in Siberia
Rwanda					
Akagera	. . .	1934	1,205	3,120	hills, lakes, and marshes along the Kagera River; grassland; zebra, antelope, and lion
Volcanoes	1925	1929	58	150	Virunga massif; bamboo forests and woodland; gorilla, elephant, buffalo, and antelope
Saudi Arabia					
Asir	. . .	1978/81	1,737	4,500	mountains and coastal plain; palm, acacia, and juniper; jackal, wolf, ibex, and monkey
Senegal					
Djoudj	1962	1971	62	160	saline flats (wetland) in the Sénégal River delta; acacia and tamarisk; flamingo
Niokolo Koba	1926	1954	3,525	9,130	floodplains along the Gambia River; savanna-woodland; leopard, elephant, and lion
Saloum Delta	1964	1976	293	760	delta with sand islands and lagoons; mangroves and open forest; monkey and warthog
Sierra Leone					
Outamba-Kilimi	. . .	1981/86	312	808	broad river plains; savanna and woodland; elephant, leopard, and hippopotamus
Slovakia					
Malá Fatra	1967	1988	87	226	mountainous limestone and dolomite plateau; spruce and beech forest
Nízké Tatry	. . .	1978	313	811	Low Tatra Mountains; spruce, fir, and pine forest; bear and lynx
Slovenské Raj	1964	1988	76	198	karstic landscape in the Slovakian Ore Mountains; spruce, fir, beech, and maple forest
Tatry	. . .	1948	286	741	High Tatra Mountains; alpine meadow and spruce forest; chamois and bear
Slovenia					
Triglav	1924	1961/81	327	848	peak in the Julian Alps; beech and spruce forest; mountain goat, deer, and chamois
South Africa					
Addo Elephant	. . .	1931	45	117	broken country covered by scrub in Eastern Cape; elephant, antelope, and rhinoceros
Kalahari Gemsbok	. . .	1931	3,703	9,591	red sand dunes and grassland in Northern Cape; antelope, lion, anteater, and ostrich
Karoo	1962	1979	127	328	plains in Western Cape; grassland and bush; antelope, monkey, leopard, and ostrich
Kruger	1898	1926	7,523	19,485	undulating savanna in Northern and Eastern Transvaal; rhinoceros, elephant, and buffalo
Pilanesberg	. . .	1979	212	550	volcanic hills in the North-West; savanna; rhinoceros, antelope, elephant, and cheetah
Richtersveld Contractual	. . .	1991	627	1,624	mountainous desert in Northern Cape; loop of the Orange River; succulents

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Spain					
Covadonga Mountains	. . .	1918	65	169	limestone mountain region; beech and oak forest; chamois, wolf, bear, boar, and deer
Doñana	1963	1969	196	507	delta of the Guadalquivir River; marshland, sand dunes, and cork oak forest; birdlife
Garajonay	. . .	1980/81	15	40	Garajonay peak on Gomera Island in the Canary Islands; dense laurel forest
Ordesa and Mount Perdido	. . .	1918	60	156	Gavarnie valley in the Pyrenees; limestone cliffs, waterfalls, and caves; coniferous forest; ibex, chamois, bear, deer, boar, and fox
Teide	. . .	1954	53	136	huge volcanic crater of Teide Peak on Tenerife Island in the Canary Islands; juniper
Sri Lanka					
Gal River	. . .	1954	100	259	Senanayake Lake and peneplain; tree savanna; elephant, buffalo, leopard, and deer
Maduru River	1979	1983	227	589	undulating peneplain; grassland and evergreen forest; elephant, bear, and buffalo
Ruhunu (Yala West)	1900	1938	376	975	coastal plain with rocky outcrops; thorn-scrub forest; bear, leopard, elephant, and deer
Somawathiya Chaitiya	1966	1986	145	376	deltaic floodplains of the Mahaweli River; grasses; elephant, jackal, wildcat, and boar
Uda Walawe	. . .	1972	119	308	plains and foothills along the Walawe Reservoir; grassland; elephant, deer, and boar
Wasgomuwa	1907	1980/84	130	336	Sudukanda Mountain Range; evergreen forest; elephant, leopard, bear, and deer
Wilpattu	1905	1938	433	1,121	level region with lakes and dunes; patches of forest; elephant, deer, boar, and leopard
Yala East	. . .	1969	69	179	Kumana mangrove swamp; semiarid thorn scrub and dense forest; birdlife
Sudan, The					
Bandingilo	1935	1985	6,371	16,500	marshland near the Nile River; acacia savanna; rhinoceros, elephant, giraffe, and lion
Boma	1960	1981	8,803	22,800	flat floodplain and undulating plateau; woodlands; antelope, giraffe, buffalo, and lion
Dinder	. . .	1935	3,436	8,900	floodplain along the Ethiopian Highlands; acacia savanna; giraffe, buffalo, and antelope
Nimule	1946	1954	158	410	hills along the White Nile River; savanna woodland; elephant, monkey, and antelope
Radom	1979	1980	4,826	12,500	hills and mountain range; savanna woodland; elephant, antelope, and hippopotamus
Shambe	1935	1985	239	620	papyrus marsh near Lake Shambe; savanna woodland; antelope, buffalo, and lion
Southern	. . .	1939	8,880	23,000	flatland along the Sue River; bush and gallery forest; elephant, buffalo, and rhinoceros
Sweden					
Abisko	. . .	1909	30	77	Abisko River valley, mountains, and barren rock; birch scrub; elk, reindeer, and fox
Muddus	. . .	1942	190	493	plateau crossed by a river valley; spruce and pine forest; elk, bear, lynx, and reindeer
Padjelanta	. . .	1962	766	1,984	mountainous area of Swedish Lappland and lakes; alpine heath; elk, reindeer, and bear
Peljekaise	. . .	1909	59	153	mountain massif; birch forest and alpine heath; elk, fox, reindeer, and stoat
Sarek	. . .	1909	761	1,970	rocky peaks and glaciers in Swedish Lappland; birch forest; elk, fox, bear, and reindeer
Stora Sjöfallet	. . .	1909	493	1,278	mountains in Swedish Lappland; lakes; pine and spruce forest; elk, reindeer, and bear
Switzerland					
Swiss	1909	1914	65	169	Rhaetian Alps; pine forest and alpine meadows; chamois, deer, ibex, and fox
Taiwan					
K'en-ting	. . .	1982	126	326	rocky coasts and sand hills on the southern tip of Taiwan; tropical rain forest; birdlife
T'ai-lu-ko (Taroko)	1936	1986	355	920	deep marble gorge and mountains; rain forest; leopard, monkey, bear, and wild goat
Yü Peak	. . .	1985	407	1,055	mountains and waterfalls; fir, spruce, and pine forest; serow, deer, bear, and monkey
Tanzania					
Arusha	. . .	1960/67	53	137	Ngurdoto Crater and Mount Meru; rain forest; elephant, hippopotamus, and rhinoceros
Gombe	1943	1968	20	52	mountains along Lake Tanganyika; gallery forest; chimpanzee, monkey, and buffalo
Katavi	1951	1974	870	2,253	floodplain and lakes; woodland savanna; hippopotamus, buffalo, elephant, and antelope
Kilimanjaro	1951	1973	292	756	volcanic Mount Kilimanjaro rain forest; elephant, buffalo, rhinoceros, and antelope
Lake Manyara	1957	1960	125	325	salt lake of the Great Rift Valley; acacia grassland; rhinoceros, elephant, and lion
Mahali Mountains	. . .	1985	609	1,577	mountain chain and valleys; tropical rain forest; chimpanzee, antelope, lion, and giraffe
Mikumi	. . .	1964	1,247	3,230	Mkata River floodplain; woodland savanna; monkey, lion, giraffe, elephant, and zebra
Ruaha	1910	1964	5,000	12,950	Ruaha River valley; savanna and evergreen forest; lion, elephant, zebra, and rhinoceros
Rubondo	1966	1977	176	457	hilly island in Lake Victoria; evergreen forest; antelope, hippopotamus, and chimpanzee
Serengeti	1929	1951	5,700	14,763	open grassland plains; huge herds of migrating animals (antelope and zebra) and lion
Tarangire	1957	1970	1,004	2,600	undulating country; acacia thornbush; rhinoceros, antelope, elephant, lion, and buffalo
Thailand					
Chae Son	. . .	1988	229	592	. . .
Chang Islands	. . .	1982	251	650	islands in the Gulf of Thailand southwest of Trat; sandy beaches and dense jungle
Chao Mai Beach	. . .	1981	89	231	white-sand beach backed by casuarina trees near Trang; limestone hills with caves
Chat Trakan	. . .	1987	210	543	. . .
Erawan	1959	1975	212	550	Erawan waterfall; mountains, cliffs, and limestone caves; sal and bamboo forest
Huat River	. . .	1988	320	829	. . .
Krachan Rapids	. . .	1981	1,125	2,915	Phetchaburi River and mountains; rain forest; tiger, gaur, gibbon, elephant, and deer
Laem Ya Hill–Samet Islands	. . .	1981	51	131	mainland white-sand beach and the Samet Islands in the Gulf of Thailand; deer, monkey, and fruit bat
Mae Surin Waterfall	. . .	1981	153	396	near Mae Hong Son
Mount Chong-Na Yoi	. . .	1987	265	686	. . .
Mount Hin Rong Kla	. . .	1984	119	307	mountains, knotty stone formations, and waterfalls; pine forest; tiger, bear, and deer
Mount Inthanon	1959	1972	186	482	Thailand's highest mountain; waterfalls; moist summit forest; civet, deer, bear, and lemur
Mount Khuntan	. . .	1975	98	255	mountains and waterfalls near Chiang Mai; bear, serow, boar, deer, and tiger
Mount Kradung	1947	1962	134	348	limestone plateau; pine forest and grassland; deer, gibbon, elephant, bear, and jackal
Mount Luang	1961	1974	220	570	mountains with waterfalls; tropical rain forest; rhinoceros, leopard, elephant, and tiger
Mount Phan	. . .	1972/75	257	665	mountains, waterfalls, and caves near Sakon Nakhon; forest; deer and elephant
Mount Pu–Mount Ya	. . .	1982	268	694	. . .
Mount Salaeng Luang	1963	1972	487	1,262	mountains; waterfalls; wooded pastureland; elephant, gaur, deer, gibbon, and tiger
Mount Sok	. . .	1980	249	646	limestone cliffs and waterfalls near Phangnga; rain forest; elephant, leopard, and serow
Mount Yai	1959	1962	837	2,169	sandstone mountains and waterfalls; rain forest; deer, gibbon, elephant, tiger, and gaur
Nao River	. . .	1972	373	966	hills, waterfalls, and caves near Lom Sak; pine and oak forest; elephant and banteng
Nopharat Thara Beach–Phi Phi Islands	. . .	1983	151	390	sandy beach lined with casuarina trees near Krabi; islands with high cliffs, caves, and coconut trees; coral reef; birdlife
Ob Luang	. . .	1991	1,334	3,456	deep gorge of the Chaem River; jungle
Pang Sida	. . .	1982	326	844	. . .
Phangnga Bay	. . .	1981	154	400	weathered limestone outcrops (islands) in Phangnga Bay; mangrove swamp
Phetra Islands	. . .	1984	191	494	. . .
Ping River	. . .	1981	387	1,003	river south of Ban Hong, cliffs, and mountains; teak forest
Ramkhamhaeng	. . .	1980	132	341	mountains west of Sukhothai; pangolin, serow, boar, deer, and gaur
Sai Yok	. . .	1980	193	500	waterfall near Kanchanaburi; limestone caves; bamboo forest; elephant and tiger
Si Laana	. . .	1989	543	1,406	. . .
Si Nakarin	. . .	1981	592	1,532	Lake Kwae Yai, waterfalls, and mountains; forest
Si Satchanalai	. . .	1981	82	213	old walled city of the Sukhothai kingdom; temples
Similan Islands	. . .	1982	49	128	nine islands in the Andaman Sea northwest of Phuket Island; coral reef; dense jungle
Son Point	. . .	1983	122	315	Andaman Sea coastline; mangrove swamp and sandy beach; deer and monkey
Tarutao	. . .	1974	575	1,490	islands in the Andaman Sea west of Satun; beaches and coral reef; dense jungle
Thap Lan	. . .	1981	863	2,236	. . .
Wiang Kosai	. . .	1981	158	410	near Lampang
Wong River	. . .	1987	345	894	. . .
Yom River	. . .	1986	176	455	. . .

Principal national parks of the world (continued)

country national park	date		area		description
	protected status	national park status	square miles	square km	
Togo					
Fazao-Malfakassa	. . .	1950/75	741	1,920	Fazao Mountains; savanna woodland; chimpanzee, elephant, buffalo, and antelope
Kéran	. . .	1950/71	632	1,636	Koumongou River floodplain; gallery forest and savanna; elephant and hippopotamus
Tunisia					
Ichkeul	. . .	1980	49	126	lake on the Mediterranean coast; wetlands; resident and migratory birds
Mount Bū Hadmah	1936	1980	64	165	plateau of the Bū Hadmah range; juniper forest-steppe; gazelle and wild sheep
Turkey					
Gallipoli Peninsula	. . .	1973	127	330	sandy beaches and cliffs along the Dardanelles; pine and cypress woods; wolf
Göreme	. . .	1986	37	96	rose-coloured cones and pinnacles of volcanic tuff in the Göreme valley
Karatepe-Aslantaş	. . .	1958	30	77	ruins of a Hittite city on a plateau; oak and pine woods; deer, jackal, wolf, and boar
Köprülü Canyon	. . .	1973	141	366	deep limestone canyon of the Köprü River; cypress forest; deer and wolf
Mount Nemrut	. . .	1988	54	139	temple-tomb of Antiochus I near Kâhta; colossal stone statues
Munzur Valley	. . .	1971	162	420	mountain lakes and canyons; oak woods; bear, wolf, lynx, boar, and ibex
Olimpos-Beydaglari	. . .	1970/72	269	698	coastal cliffs rising to mountains; pine, fir, and cedar forest; bear, wolf, and boar
Uganda					
Bwindi Impenetrable Forest	1932	1991	124	321	steep, hilly countryside near the Ishasha River; montane tropical forest; mountain gorilla and birdlife
Kabarega (Murchison) Falls	. . .	1952	1,482	3,839	rolling savanna with forest along the Victoria Nile; waterfalls; chimpanzee, buffalo, antelope, rhinoceros, elephant, hippopotamus, and lion
Kidepo Valley	1958	1962	519	1,344	Kidepo and Larus river basin; tree and shrub steppe; zebra, cheetah, and antelope
Lake Mburo	1959	1982	99	256	plains, hills, and swamp around Lake Mburo; acacia grassland; antelope and leopard
Queen Elizabeth	. . .	1952	764	1,978	savanna and swamp between Lakes Edward and George; hippopotamus and elephant
Ruwenzori Mountains	. . .	1991	385	996	high peaks; glaciers; forest and alpine vegetation; chimpanzee, elephant, and leopard
Ukraine					
Karpatsk	. . .	1980	194	503	Carpathian Mountains including Mount Hoverlya and lakes; forest
Shatsk	. . .	1983	319	825	. . .
United Kingdom					
Brecon Beacons	. . .	1957	522	1,351	Brecon Beacons (sandstone peaks) in Wales; wooded valleys and heather moors
Broads, The	. . .	1989	117	303	shallow lakes and connecting inland waterways in England; marshes; birdlife
Dartmoor	. . .	1951	368	954	rolling granite tableland fringed by oak-wooded valleys in England; heather moors
Exmoor	. . .	1954	268	693	plateau along the coast in England; heather moors and deciduous forest; deer and pony
Lake District	. . .	1951	885	2,292	rounded mountains and lakes in England; grassland with oak woods; deer and badger
New Forest	. . .	1993	145	375	beech and oak forest on The Solent in England; heath; birdlife
North York Moors	. . .	1952	554	1,436	plateau extending to the coast in England; wooded valleys and heather moors; deer
Northumberland	. . .	1956	405	1,049	region of the Cheviot Hills in England; peat and heather moor; forest
Peak District	. . .	1951	555	1,438	southern end of the Pennines (hills) in England; heather, grassland, and ash woodland
Pembrokeshire Coast	. . .	1952	225	584	rocky Welsh coastline with cliffs, sandy bays, and blowholes; some woodland; seabirds
Snowdonia	. . .	1951	827	2,142	glaciated mountain region in Wales; moors, oak forest, and coastal marsh; waterbirds
Yorkshire Dales	. . .	1954	683	1,769	Pennine hill land in England; limestone scenery and moors; birdlife
United States					
Acadia	1916	1919	66	171	Mount Desert Island and granite coastal mountains in Maine; mixed forest; deer
Arches	1929	1971	115	298	eroded limestone arches and pinnacles in Utah; desert flora; deer, coyote, and fox
Badlands	1929	1939/78	379	982	barren spires, buttes, and gullies in South Dakota; grassland with bison and bighorn
Big Bend	1935	1944	1,252	3,243	mountains and canyons along the Rio Grande in Texas; arid grassland; deer and coyote
Biscayne	1968	1980	270	699	tropical islands and coral reef along Florida; mangrove shoreline and bay community
Bryce Canyon	1923	1924	56	145	eroded pinnacles, walls, and spires of rock in Utah; sagebrush and pine forest; deer
Canyonlands	. . .	1964	527	1,365	canyons of eroded standing rocks in Utah; pine and grassland; deer and coyote
Capitol Reef	1937	1971	378	979	cliff of coloured sandstone with rock towers in Utah; desert vegetation and pine
Carlsbad Caverns	1923	1930	73	189	caves with limestone formations and large underground chambers in New Mexico; bats
Channel Islands	1938	1980	390	1,010	five islands off the southern California coast; unique plants; seal, sea lion, and seabirds
Crater Lake	. . .	1902	286	741	caldera lake in the Cascade Range in Oregon; pine forest; deer, bear, and coyote
Death Valley	1933	1994	5,213	13,502	rugged desert, peaks, and depression in California; salt-tolerant plants; bighorn
Denali	. . .	1917	7,813	20,236	Mount McKinley in Alaska; glaciers; spruce forest; caribou, Dall sheep, moose, and bear
Dry Tortugas	1935	1992	101	262	coral islands west of Key West, Florida; all-masonry Fort Jefferson; birdlife
Everglades	1934	1947	2,354	6,097	subtropical saw grass swamp in Florida; mangrove forest; cougar, deer, and alligator
Gates of the Arctic	1978	1980	11,756	30,448	mountains of the Brooks Range in Alaska; coniferous forest; bear, caribou, and moose
Glacier	. . .	1910	1,584	4,102	peaks, glaciers, and lakes in Montana; coniferous forest; bighorn, moose, and bear
Glacier Bay	1925	1980	5,040	13,053	tidewater glaciers in Alaska; temperate rain forest; bear, mountain goat, whale, and seal
Grand Canyon	1893	1919	1,902	4,926	huge chasm of the Colorado River in Arizona; desert vegetation; coyote and deer
Grand Teton	. . .	1929	484	1,254	mountain range in Wyoming; spruce and pine forest; elk, moose, deer, and bear
Great Basin	1922	1986	120	311	Snake Range, a remnant ice field, and limestone caves in Nevada; forest
Great Smoky Mountains	1926	1934	813	2,105	mountains in Tennessee and North Carolina; hardwood forest; deer, bear, and wildcat
Guadalupe Mountains	1966	1972	135	350	mountains rising from the desert in Texas; scrub and pine; deer, bighorn, and puma
Haleakala	1916	1960	44	114	dormant volcano (Haleakala Crater) on Maui, Hawaii; alpine desert vegetation; birdlife
Hawaii Volcanoes	1916	1961	358	927	active volcanoes (Kilauea and Mauna Loa) on Hawaii; tropical rain forest; birdlife
Hot Springs	1832	1921	9	23	thermal springs in Arkansas; oak, pine, and hickory woodland; rabbit, skunk, and fox
Isle Royale	. . .	1931	893	2,313	wilderness island in Lake Superior, Michigan; mixed forest; wolf, moose, and coyote
Joshua Tree	1936	1994	1,241	3,214	mountains and desert flats in California; Joshua trees (giant yuccas); bighorn
Katmai	1918	1980	5,806	15,037	Aleutian Mountains and coast of the Alaskan Peninsula; boreal forest and tundra; bear
Kenai Fjords	1978	1980	1,046	2,709	coastal fjords and Harding Icefield in Alaska; rain forest; sea lion, sea otter, and seal
Kings Canyon	. . .	1890	722	1,870	canyons and peaks of the Sierra Nevada in California; giant sequoias; bear and deer
Kobuk Valley	1978	1980	2,735	7,084	valley of the Kobuk River in Alaska; boreal forest; caribou, bear, wolf, and moose
Lake Clark	1978	1980	4,120	10,671	glacial lake in the Chigmit Mountains of Alaska; forest and tundra; caribou and bear
Lassen Volcanic	1907	1916	166	430	Lassen Peak, hot springs, and mud pots in California; coniferous forest; deer and bear
Mammoth Cave	1926	1941	82	212	Mammoth Cave system and hilly country in Kentucky; hardwood forest; bats
Mesa Verde	. . .	1906	81	210	mesa with Indian cliff dwellings in Colorado; pine and juniper forest; deer and bear
Mount Rainier	. . .	1899	368	953	ancient volcano and its glacial system in Washington; coniferous forest; deer and bear
North Cascades	. . .	1968	789	2,043	mountain region with snowfields and glaciers in Washington; lush forest
Olympic	1909	1938	1,442	3,735	mountains in Washington; glaciers; hemlock and spruce rain forest; elk, deer, and bear
Petrified Forest	1906	1962	146	378	petrified trees and the Painted Desert of Arizona; dry shrub land; pronghorn and coyote
Redwood	. . .	1968	172	445	scenic Pacific coastline in California; groves of ancient redwood trees
Rocky Mountain	. . .	1915	415	1,075	peaks, valleys, and lakes in Colorado; pine and fir forest; elk, deer, bighorn, and bear
Saguaro	1933	1994	30	78	flatlands of the Sonoran Desert in Arizona; forests of giant saguaro cactus; deer
Sequoia	. . .	1890	629	1,629	Sierra Nevada range in California; giant sequoia trees; deer, bear, and bighorn
Shenandoah	1926	1935	307	795	Blue Ridge Mountains in Virginia; hardwood (oak) forest; deer, bear, bobcat, and fox
Theodore Roosevelt	1947	1978	110	285	badlands along the Little Missouri River in North Dakota; grassland; bison and coyote
Voyageurs	1971	1975	341	883	streams and lakes in the North Woods of Minnesota; fir, spruce, and pine; beaver
Wind Cave	. . .	1903	44	114	limestone caverns in the Black Hills of South Dakota; prairie grassland; bison
Wrangell–St. Elias	1978	1980	13,018	33,716	high peaks and glaciers in Alaska; coniferous forest; caribou, bear, wolf, and moose
Yellowstone	. . .	1872	3,468	8,982	mountains, waterfalls, and geysers in Wyoming; pine forest; bear, deer, and pronghorn
Yosemite	1864	1890	1,189	3,079	granite peaks, domes, and waterfalls in California; coniferous forest; deer and bear
Zion	1909	1919	229	593	Zion River canyon in the Utah desert; cactus, pine, and juniper; deer and coyote

Principal national parks of the world (continued)

country	date		area		description
national park	protected status	national park status	square miles	square km	
Uruguay					
Franklin D. Roosevelt	. . .	1915/16	6	15	area of dunes and irrigation channels; swamp and eucalyptus, pine, and ash; nutria
Uzbekistan					
Uzbekistan People's Park	. . .	1978	122	315	mountains along the north shore of the Turkestan Reservoir
Venezuela					
Aguaro-Guariquito	. . .	1974	2,262	5,858	central llanos (plains); savanna and gallery forest; capybara, monkey, deer, and jaguar
Avila, El	. . .	1958	329	852	mountains along the Caribbean coast; savanna and montane forest; puma and deer
Batallón and La Negra Uplands	. . .	1989	368	952	alpine (paramo) areas in the Cordillera de Mérida
Canaima	. . .	1962	11,583	30,000	colossal buttes; Angel Falls; savanna and rain forest; jaguar, tapir, deer, and peccary
Cinaruco-Capanaparo	. . .	1988	2,256	5,844	tributaries to the Orinoco River and llanos (plains)
Dinira	. . .	1988	162	420	. . .
Duida-Marahuaca	. . .	1978	811	2,100	vertical tabletop mountains; tropical rain forest; jaguar, tapir, and monkey
Guácharo, El	. . .	1975	242	627	Guácharo Cave and mountains; tropical rain forest; oilbirds living in the cave
Guaramacal	. . .	1988	81	210	. . .
Guatopo	. . .	1958	473	1,225	granitic mountain region; tropical rain forest; jaguar, deer, tapir, peccary, and sloth
Henri Pittier	. . .	1937	413	1,070	Cordillera de la Costa of the Caribbean; savanna and wet montane forest; birdlife
Jaua-Sarisarinama	. . .	1978	1,274	3,300	sandstone tableland (mesa) with deep collapsed chasms; tropical rain forest
Macarao	. . .	1973	58	150	Caribbean coastal cordillera; savanna and wet montane forest; deer, wild hog, and fox
Médanos de Coro	. . .	1974	353	913	extensive sand dunes along the Caribbean coast; desert plants; lizard and iguana
Mochima	. . .	1973	366	949	mountainous Caribbean coast; dry and humid tropical forest; deer, armadillo, and jaguar
Morrocoy	. . .	1974	124	321	Caribbean coast with islands and salt flats; mangroves and palms; birdlife and deer
Neblina Mountain Range	. . .	1978	5,251	13,600	southern mountains and the Baria River canyon; tropical rain forest; tapir and jaguar
Paria Peninsula	. . .	1978	145	375	Caribbean peninsula; dry coastal vegetation and evergreen forest; birdlife
Perijá	. . .	1978	1,140	2,953	Motilones Mountains; rain forest and alpine (paramo) areas; monkey, bear, and agouti
Restinga Lagoon, La	. . .	1974	73	189	portion of Margarita Island; beaches and mangrove forest; seabirds
Roques Islands, Los	. . .	1972	854	2,211	atoll with numerous islands in the Caribbean Sea; mangrove and cacti; seabirds
San Esteban	. . .	1987	168	435	Caribbean coastal cordillera
Sierra de San Luis	. . .	1987	77	200	mountain ridge south of Coro
Sierra Nevada	. . .	1952	1,067	2,764	western Andes with glacial lakes; tropical forest and pines; deer, bear, and tapir
Tacarigua Lagoon	. . .	1974	151	391	lagoon and beaches on the Caribbean Sea; mangrove and tropical dry forest; flamingo
Tamá, El	. . .	1978	537	1,390	alpine (paramo) areas in the Andes Mountains; humid forest; bear, tapir, and agouti
Terepaima	. . .	1976	72	187	Sierra de Portuguesa; cloud forest; jaguar, bear, agouti, monkey, and deer
Yacambú	. . .	1962	56	146	Sierra de Portuguesa with a fumarole; deciduous and cloud forest; deer
Yapacana	. . .	1978	1,236	3,200	tabletop mountain rising from the surrounding plains; tropical rain forest and savanna
Yurubí	. . .	1960	92	237	rugged terrain along the Yaracuy and Aroa rivers; forest and savanna; deer and wildcat
Vietnam					
Bach Ma-Hai Van	. . .	1986	87	225	two mountains; the scenic Hai Van mountain pass near Da Nang
Cat Ba	. . .	1986	59	152	mountainous island, grottoes, and beaches; ironwood and teak; deer and chamois
Cuc Phuong	. . .	1962	87	225	rugged area with caves and grottoes; primeval tropical forest; deer and monkey
Nam Bai-Cat Tien	. . .	1978	145	376	. . .
Western Samoa					
O Le Pupu-Pue	. . .	1978	11	29	mountain terrain with a lava tube; tropical rain forest; birdlife
Yugoslavia					
Djerdap (Iron Gate)	. . .	1983	245	635	deep narrow canyon of the Danube River; oak woodland
Durmitor	. . .	1952	127	330	Durmitor massif and the Tara River Gorge; lakes; mixed forest; chamois, bear, and deer
Fruška Mountain	. . .	1960	98	254	low massif and surrounding plains; beech and oak forest; wildcat, deer, and boar
Šar	. . .	1986	151	390	Mount Šar, mountain lakes, and river valleys; oak, beech, fir, spruce, and pine forest
Scutari (Skadar) Lake	. . .	1983/86	154	400	large karst lake in the Black Mountains; birdlife
Tara	. . .	1981/82	74	192	Mount Tara, other peaks, and the deep canyon of the Drina River
Zaire					
Garamba	. . .	1938	1,900	4,920	undulating peneplain; wooded savanna; rhinoceros, elephant, giraffe, and hippopotamus
Kahuzi-Biega	1950	1970	2,317	6,000	mountains of the Great Rift Valley; primary forest; gorilla, chimpanzee, and elephant
Kundelungu	1939	1970	2,934	7,600	plateau, foothills, and river valley; open woodland; zebra, antelope, and cheetah
Maiko	. . .	1970	4,181	10,830	semimountainous region; dense equatorial forest; gorilla, okapi, elephant, and buffalo
Salonga	. . .	1970	14,116	36,560	basin of the Congo River; equatorial forest; pygmy chimpanzee, elephant, and antelope
Upemba	. . .	1939	4,529	11,730	Lake Upemba depression; swamp, savanna, and woodland; hippopotamus and zebra
Virunga (Albert)	. . .	1925	3,012	7,800	Virunga volcanoes; Lake Edward; equatorial forest-steppe; gorilla and plains mammals
Zambia					
Blue Lagoon	. . .	1973	174	450	Kafue Flats floodplain; grassland and fig trees; zebra, antelope, and wild dog
Isangano	1957	1972	324	840	flats of Lake Bangweulu; swamp forest and grassland; elephant, zebra, and antelope
Kafue	1951	1972	8,649	22,400	plateau along the Kafue River; teak forest and savanna; zebra, antelope, and lion
Kasanka	1941	1972	151	390	plateau; swamp and woodland savanna; antelope, elephant, hippopotamus, and zebra
Lavushi Manda	1941	1972	579	1,500	hills with vertical cliff faces; woodland savanna; leopard, lion, elephant, and buffalo
Liuwa Plain	. . .	1972	1,413	3,660	flat sand plain; Kalahari short-grass vegetation; zebra, buffalo, and antelope
Lochinvar	. . .	1972	158	410	seasonally flooded Kafue Flats; grassland and acacia; zebra, antelope, and birdlife
Lower Zambezi	. . .	1983	1,580	4,092	hills along the Zambezi River; woodland savanna; elephant, hippopotamus, and buffalo
Luambe	1966	1972	98	254	alluvium along the Luangwa River; woodland savanna; lion, elephant, and rhinoceros
Lukusuzi	1938	1972	1,050	2,720	plateau of the Luangwa escarpment; woodland savanna; elephant, antelope, and zebra
Lusenga Plain	1942	1972	340	880	plain along the Kalungwishi River; woodland-grassland; elephant, zebra, and buffalo
Mosi-oa-Tunya	. . .	1972	25	66	Zambezi River bank and Victoria Falls; woodland; elephant, warthog, and antelope
Mweru Wantipa	1942	1972	1,210	3,134	lakes; marsh and woodland savanna; elephant, buffalo, hippopotamus, and lion
North Luangwa	1939	1972	1,790	4,636	Luangwa River valley; woodland; buffalo, hippopotamus, lion, elephant, and antelope
Sioma Ngweze	. . .	1972	2,037	5,276	flat area along the Zambezi River; Kalahari sand veld; giraffe, lion, and elephant
South Luangwa	1904	1972	3,494	9,050	Luangwa River valley; woodland savanna; buffalo, hippopotamus, elephant, and lion
Sumbu (Nsumbu)	1942	1972	797	2,063	shoreline of Lake Tanganyika; acacia and grassland; lion, elephant, and hippopotamus
West Lunga	1951	1972	650	1,684	flat area along the West Lunga River; dry evergreen forest; elephant, zebra, and buffalo
Zimbabwe					
Chimanimani	. . .	1953	66	171	Chimanimani Mountains, gorges, and waterfalls; grassland and forest; antelope
Chizarira	1963	1975	737	1,910	Zambezi escarpment with gorges; woodland savanna; elephant, buffalo, and antelope
Gonarezhou	1968	1975	1,951	5,053	flat country along the Lundi River; mixed woodland; elephant, antelope, and buffalo
Hwange (Wankie)	1928	1930	5,657	14,651	expanse of Kalahari sands; teak forest; elephant, buffalo, antelope, giraffe, and lion
Inyanga	1902	1965	127	330	mountainous area and waterfalls; montane grassland; antelope, lion, and bushpig
Kazuma Pan	1949	1975	121	313	flat plains subject to seasonal flooding; open grassland; antelope and cheetah
Mana Pools	1930	1963	848	2,196	floodplain of the Zambezi River; woodland savanna; rhinoceros, elephant, and buffalo
Matopo	. . .	1902	164	425	granite Matopo Hills and caves; woodland savanna; antelope, leopard, and buffalo
Matusadona	1963	1975	543	1,407	hilly escarpment along Lake Kariba; grassland; elephant, buffalo, antelope, and lion
Victoria Falls	1931	1979	8	20	Zambezi River bank and Victoria Falls; rain forest; antelope, hippopotamus, and lion
Zambezi	1931	1979	217	563	Kalahari sands along the Zambezi River; woodland; antelope, elephant, and lion

in 1977. The party was led successively by Daniel F. Malan (1948–54), Johannes Gerhardus Strijdom (1954–58), Hendrik Frensch Verwoerd (1958–66), John Vorster (1966–78), Pieter Willem Botha (1978–89), and Frederik Willem de Klerk (1989–). The National Party also broke South Africa away from the Commonwealth, making it a republic in 1961. From the premiership of Vorster on, the National Party attempted what it termed an "enlightened" (*verligte*) policy on the race question; but this meant hardly more than speeding up the formation of black "homelands" and alleviating—selectively—some of the apartheid policies found inconvenient to general economic and cultural development.

In 1982 much of the party's right wing broke off in opposition to the granting of limited political rights to Coloureds and Asians and formed the Conservative Party. Under de Klerk's leadership from 1989, the National Party began taking steps away from apartheid and toward a constitutional arrangement that would allow political representation to the country's black African majority. To this end, many repressive laws were repealed and black antiapartheid political organizations were legalized. In 1992 a referendum called by de Klerk won a strong endorsement of the party's reform policy and led to negotiations with the African National Congress (ANC) and other minority parties toward a new constitution. The National Party was defeated in South Africa's first multiracial elections, held in April 1994, but remained a significant presence in Parliament and joined in the government of national unity formed by the ANC.

National Popular Liberation Army (Greece): *see* EAM-ELAS.

National Portrait Gallery, museum in London that houses the national collection of portraits of British men and women. It is located adjacent to the National Gallery, north of Trafalgar Square, in the City of Westminster, London.

The gallery was founded by an act of Parliament in 1856 and was housed at a number of locations until its present home, an Italian Renaissance-style building designed by Ewan Christian, opened in 1896. The building was extended in 1933. The gallery also maintains displays from its extensive collection at Montacute House, Somerset; Beningborough Hall, Shipton, Yorkshire; Gawthorpe Hall, Padiham, Lancashire; and Bodelwyddam Castle, Clwyd, Wales.

The collection of the National Portrait Gallery comprises some 10,000 portraits in a variety of media: paintings, drawings, medallions, sculptures, photographs, motion pictures, and video recordings. The portraits are collected primarily for historical reasons and mainly consist of Britons who have made notable contributions to the nation's history since Tudor times. The gallery's holdings are presented chronologically, beginning with the Tudors and moving on through the 17th, 18th, 19th, and 20th centuries. The gallery's arrangement illustrates different themes in British history, with maps and other period objects being used to complement the pictures.

Although the criterion for inclusion has always been the celebrity of the sitter rather than the merit of the artist, many superb works of art are in the collection. Among the numerous portraits of English monarchs are one by Hans Holbein of Henry VIII with his father (*c.* 1537) and a fine portrait of Elizabeth I (*c.* 1575). Other famous works include Peter Paul Rubens' portrait of Thomas Howard, 2nd earl of Arundel (1629), Sir Isaac Newton by Sir Godfrey Kneller (1702), and Warren Hastings (1766–68) by Sir Joshua Reynolds. Self-portraits include ones by Sir Joshua Reynolds (*c.* 1747), Thomas Gainsborough (*c.* 1759), and George Stubbs (1781).

National Radio Astronomy Observatory (NRAO), the national radio observatory of the United States. It is funded by the National Science Foundation and is managed by Associated Universities, Inc., a consortium of nine leading private universities. Its headquarters are in Charlottesville, Va.

The NRAO was established in the mid-1950s and acquired its first operational radio telescope in 1959. It now has three principal observing facilities: at Green Bank, W.Va.; at Kitt Peak, near Tucson, Ariz.; and at a site 50 miles (80 km) west of Socorro, N.M. The NRAO was originally headquartered at the Green Bank site, whose chief instrument was a 91-metre (300-foot) partially steerable radio telescope that was completed in 1962 but which inexplicably collapsed in 1988. Its replacement, the Green Bank Telescope, which was scheduled to enter operation in 1998, will have an aperture of 100 m (330 feet) and will be one of the world's largest fully steerable radio telescopes. The NRAO has several other important radio telescopes. The Very Large Array (*q.v.*), near Socorro, is one of the most powerful radio telescopes in the world. The Very Long Baseline Array (VLBA) is an array of 10 identical 25-metre radio telescopes spread across the United States that are used for very long baseline interferometry.

National Railroad Passenger Corporation: *see* Amtrak.

National Recovery Administration (NRA), U.S. government agency established by President Franklin D. Roosevelt to stimulate business recovery through fair-practice codes during the Great Depression. The NRA was an essential element in the National Industrial Recovery Act (June 1933), which authorized the president to institute industry-wide codes intended to eliminate unfair trade practices, reduce unemployment, establish minimum wages and maximum hours, and guarantee the right of labour to bargain collectively.

The NRA Blue Eagle holding Uncle Sam aloft; cover of *Vanity Fair*, September 1934

The Granger Collection

The agency ultimately established 557 basic codes and 208 supplementary codes that affected about 22 million workers. Companies that subscribed to the NRA codes were allowed to display a Blue Eagle emblem, symbolic of cooperation with the NRA. Although the codes were hastily drawn and overly complicated and reflected the interests of big business at the expense of the consumer and small businessman, they nevertheless did improve labour conditions in some industries and also aided the unionization movement. The NRA ended when it was invalidated by the Supreme Court in 1935, but many of its provisions were included in subsequent legislation.

National Republican Party, U.S. political party formed after what had been the Republican (or Jeffersonian Republican) party split in 1825. The Jeffersonian Republicans had been the only national political party following the demise of the Federalists during the War of 1812. During the contested election of 1824, followers of Henry Clay and John Quincy Adams began calling themselves National Republicans, while backers of Andrew Jackson emerged as Democratic Republicans.

By the election of 1828, the Jacksonians were simply called Democrats. Opponents of Jackson joined the National Republican coalition and nominated Adams for a second term. Adams lost, but the National Republicans grew stronger. In 1831 they nominated Henry Clay to run on a platform endorsing the tariff, internal improvements, and the Bank of the United States.

Jackson and the Democrats won an overwhelming victory in the election of 1832, and the National Republicans never nominated another presidential candidate. During Jackson's second administration, the National Republicans joined with northern and southern conservatives, supporters of the Bank of the United States, and other anti-Jackson groups to form a new coalition. Claiming Jackson governed as "King Andrew I," the new party called itself the Whigs—after the British party that had opposed the power of the monarchy. By about 1834, there was little trace of the National Republican Party.

National Review, biweekly magazine of news and opinion published in New York City, and the leading conservative journal in the United States. It was founded in 1955 by William F. Buckley, Jr.

Each issue features a long article addressing a major issue, usually political, on the American or international scene, viewed from a rightist perspective. There are numerous short articles and columns of analysis, commentary, opinion, and criticism, including one by Buckley. The magazine's consistent criticism of the political left is usually leavened with wit. Its writers have included many distinguished figures of the American political right. The journal's well-written, lively articles and Buckley's provocative editorials appeal to the conservative intellectual.

National Revolutionary Party, Spanish PARTIDO REVOLUTIONARIO NACIONAL, Mexico's major political party from 1929 to 1938, when it changed its name to the Institutional Revolutionary Party (*q.v.*).

National Rifle Association of America (NRA), governing organization for the sport of shooting with rifles and pistols, formed in the United States in 1871. By the early 1990s it claimed a membership of about 3 million target shooters, hunters, gun collectors, gunsmiths, police, and others interested in firearms. Among the NRA's more publicized activities in the second half of the 20th century was highly effective political lobbying against various legislative proposals for the control of firearms. The American NRA was modeled after the National Rifle Association in Great Britain, which had been formed in 1860. Both the British and U.S. groups sponsor regional and national competitions and select teams for international events. The British NRA has its headquarters at Woking, Surrey, the American in Fairfax, Va.

National Road: *see* Cumberland Road.

National Roman Museum, Italian MUSEO NAZIONALE ROMANO, in Rome, one of the world's greatest museums of ancient Greco-Roman art, founded in 1889 and housed in a monastery restored by Michelangelo on the site of the baths of Diocletian. The museum is also known as the Terme Museum after the Terme (thermal baths) of Diocletian. It contains antiquities discovered in Rome since 1870, as well as the treasures of the Cardinal Ludovico Ludovisi collection in the cloister known as the Boncompagni. The museum's important collection of sculpture includes a large number of Roman copies of lost Greek works as well as a few important Greek originals. There is the "Venus of Cyrene," an original Greek work of the 4th century BC, depicting the goddess Venus risen from the sea with her cloak supported by a dolphin near her right leg, possibly by a predecessor of Praxiteles. The "Torso Valentini" represents a hero or athlete of the 5th century BC. The "Head of Hypnos" is attributed to Praxiteles, and there is the fine "Boxer Resting," signed by Apollonius. The "Maiden of Anzio," of the school of Lysippus, was found at Anzio in 1878. The sculpture represents a young girl approaching an altar. Important Roman copies include two examples of the discus thrower by Myron, the "Discobolos of Castel Porziano" and the "Discobolos ex-Lancelotti." "The Daughter of Niobe" is an original Greek example of the 5th century BC. Examples of Roman sculpture include many portrait busts and the famous "Altar from Ostia" relief showing the origin of Rome. The "Head of Vespasian" from Ostia is one of the finest of all Roman portrait busts.

national seashore, in the United States, any of a number of coastal areas reserved by the federal government for recreational use by the public. Cape Hatteras in North Carolina was established as the first national seashore in 1953. Others have since been added and include Cape Cod (Massachusetts), Padre Island (Texas), Point Reyes (California), Fire Island (New York), Assateague Island (Maryland and Virginia), Cape Lookout (North Carolina), Gulf Islands (Florida and Mississippi), Canaveral (Florida), and Cumberland Island (Georgia). Their attractions include beaches, waterfowl and other wildlife, and fishing.

National Security Agency (NSA), U.S. intelligence agency within the Department of Defense that is responsible for cryptographic and communications intelligence and security. The NSA grew out of the communications intelligence activities of U.S. military units during World War II. The NSA was established in 1952 by a presidential directive and, not being a creation of the Congress, is relatively immune to Congressional review; it is the most secret of all U.S. intelligence agencies. Its director is a military officer of flag rank, *i.e.,* a general or admiral.

The agency's mission includes the protection and formulation of codes, ciphers, and other cryptology for the U.S. military and other government agencies, as well as the interception, analysis, and solution of coded transmissions by electronic or other means. The agency conducts research into all forms of electronic transmission. It operates posts for the interception of signals around the world. Being a target of the highest priority for penetration by hostile intelligence services, the NSA maintains no contact with the public or the press.

National Security Council (NSC), U.S. agency within the Executive Office of the President, established by the National Security Act in 1947 to advise the president on domestic, foreign, and military policies related to national security. The president of the United States is chairman of the NSC; other members include the vice president and the secretaries of state and defense. Advisers to the NSC are the chairman of the Joint Chiefs of Staff, the director of the Central Intelligence Agency, and other officials whom the president may appoint with Senate approval. The NSC staff is headed by a special assistant for national security affairs, who generally acts as a close adviser of the president. The NSC provides the White House with a useful foreign policy-making instrument that is independent of the State Department. In the late 1980s, covert illegal activities by members of the NSC caused the scandal known as the Iran-Contra Affair (*q.v.*).

National Socialism, also called NAZISM, or NAZIISM, German NATIONALSOZIALISMUS, or NAZISMUS, totalitarian movement led by Adolf Hitler as head of the Nazi Party (*q.v.*) in Germany. In its intense nationalism, mass appeal, and dictatorial rule, National Socialism shared many elements with Italian Fascism. Nazism, however, was far more extreme both in its ideas and in its practice. It was homegrown in Germany and shaped by the unique personality of Hitler.

National Socialism had its peculiarly German roots. Some can be traced to the Prussian tradition as it developed under Frederick William I, Frederick the Great, and Otto von Bismarck. This tradition had always regarded the militant spirit and the discipline of the Prussian Army as the model for all individual and civic life. To it was added the tradition of political romanticism, with its sharp hostility to rationalism and to the principles underlying the French Revolution, with its emphasis on instinct and the past, and with its proclamation of the rights of the exceptional individual over all universal law and rules. These two traditions were later reinforced by the 19th-century adoration of science and of the laws of nature, which seemed to operate independently of all concepts of good and evil. Further reinforcements came from such 19th-century intellectual figures as the Comte de Gobineau, Richard Wagner, and Houston Stewart Chamberlain. These men greatly influenced early National Socialism with their claims of the racial and cultural superiority of the "Nordic" (Germanic) peoples over all other Europeans and all other races.

In addition to these currents in the German tradition, it should be pointed out that the formation of Hitler's own intellectual viewpoint was influenced during his youth by specific Austrian movements that professed various political sentiments, notably those of pan-Germanic expansionism and anti-Semitism. Much in Hitler's ferocious nationalism, his contempt of the Slavs, and his hatred of the Jews can be explained by his bitter experiences as an unsuccessful artist living a threadbare existence on the streets of Vienna, the capital of the multi-ethnic Austro-Hungarian Empire.

But this intellectual preparation would in no way have been sufficient for the growth of National Socialism in Germany if that nation's defeat in World War I, with its ensuing disillusionment, pauperization, and frustration, especially in the lower middle classes, had not paved the way for Hitler's propaganda. The Treaty of Versailles (1919), the formal settlement of World War I drafted without German participation, alienated many Germans by the harsh monetary and territorial reparations it imposed on their nation. Resentment of the peace treaty gave Hitler a starting point. Because Germany agreed to cease hostilities and did not unconditionally surrender in the Armistice of Nov. 11, 1918, there was a widespread feeling, particularly in military circles, that Germany's defeat had been engineered by diplomats at the Versailles meetings. From the beginning, Hitler's propaganda of revenge for this "traitorous" act and his call for rearmament appealed to the military circles, which regarded the peace only as a temporary setback in Germany's expansionist program. The ruinous inflation of the German currency in 1923 wiped out the savings of many middle-class households and led to further public alienation and dissatisfaction.

Hitler added to pan-Germanic aspirations the almost mystical fanaticism of a faith in the mission of the German race and the fervour of a social revolutionary gospel. This gospel was most fully expressed in Hitler's personal testament *Mein Kampf* (1925–27), in which he outlined both his practical aims and his theories of race and propaganda.

Hitler found a powerful ally in the widespread fear of Bolshevism (Communism), which he exploited, first in Germany and then on a worldwide scale, posing as the bulwark against Bolshevism. Thus, he secured the support of many conservative elements that misunderstood the totalitarian character of his movement.

Hitler's most important individual contribution to the theory and practice of National Socialism was his deep understanding of mass psychology and mass propaganda in the contemporary world. He stressed the fact that all propaganda must hold its intellectual level at the capacity of the least intelligent of those at whom it is directed, and that its content of truth does not count compared with the only valid criterion, that of success. According to Hitler:

> It is part of a great leader's genius to make even widely separated adversaries appear as if they belonged to but one category, because among weakly and undecided characters the recognition of various enemies all too easily marks the beginning of doubt of one's own rightness.

Hitler found this common denominator in the Jews, whom he identified with both Bolshevism and a kind of cosmic evil. The Jews were to be discriminated against not according to their religion but according to their "race." National Socialism declared the Jews, whatever their educational and social development, to be forever fundamentally different from and inimical to Germans.

National Socialism attempted to reconcile conservative, nationalist ideology with socially radical doctrine. In so doing, it became a profoundly revolutionary movement, mostly in a negative sense. It rejected rationalism, liberalism and democracy, the rule of law, human rights, and all movements of international cooperation and peace. It stressed instead instinct, the subordination of the individual to the state, and the necessity of blind and unswerving obedience to leaders appointed from above. It also stressed the inequality of men and races and the right of the strong to rule the weak. It sought to purge or suppress competing political, religious, and social institutions and advanced an ethic of hardness and ferocity; it partly destroyed class distinctions by drawing into the movement misfits and failures from all social classes.

Totalitarianism and expansionism. Working from these principles, Adolf Hitler was able to carry his party from its small beginnings in a beer cellar in Munich to a dominant position in world politics 20 years later. The Nazi Party originated in 1919 and was led by Hitler from 1920 onward. The party came to power in Germany in 1933 and governed by totalitarian methods until 1945, when Germany was defeated and occupied by the Allies at the close of World War II.

The history of National Socialism after 1934 can be divided into two parts of about equal length. The years between 1934 and 1939 were used to establish the full control of all phases of life in Germany by the party. During these years Hitler and his movement gained the support and even the enthusiasm of a majority of the German population. Many Germans had grown weary of the party conflicts, economic and political instability, and in general the disorderly freedom that characterized the last years of the Weimar Republic. They welcomed the strong, decisive, and apparently effective government provided by the Nazis. After 1934 the endless ranks of Germany's unemployed rapidly dwindled as the jobless were put to work in extensive public-works projects and in rapidly multiplying armaments factories. Germans were swept up in this orderly, intensely purposeful mass movement bent on restoring their country to its dignity, pride, and grandeur and to first place on the European stage. Economic recovery from the effects of the Great Depression and the forceful assertion of German nationalism were thus the key factors in National Socialism's appeal to the German population. Finally, Hitler's continuous string of diplomatic successes and foreign conquests from 1934 through the early years of World War II secured the unqualified support of most Germans, including many who had previously been opposed to him.

But National Socialism also maintained its power by coercion and mass manipulation. The Nazi regime kept up a perpetual outpouring of propaganda through all cultural and informational media. Its rallies, insignia, and ubiquitous uniformed cadres were intended to impart an aura of omnipotence. The underside of its propaganda machine was its apparatus of terror, which centred in its secret police and concentration camps. It fanned and focused German anti-Semitism to make the Jew a symbol of all that was hated and feared. By means of deceptive rhetoric the party portrayed the Jew as the enemy of all classes of society.

The principal instrument of control was the unification of all the police, security, and SS organizations under the direction of Heinrich Himmler and his chief lieutenant, Reinhard Heydrich. Opposition to the regime was broken either by outright terror or, more frequently, by the all-pervading fear of possible repression. All opponents of the regime were declared enemies of the state and of the people. An elaborate web of informers—often members of the family or intimate friends—imposed utmost caution on all expressions and activities. Justice was no longer recognized as objective but was completely subordinated to the alleged needs and interests of the "people." In addition, however, to the now-debased methods of the normal judicial process, special detention camps were erected. In these camps the SS exercised supreme authority and introduced a system of sadistic brutality unknown in modern times and by far surpassing anything known in that respect in Fascist Italy or Communist Russia.

The years between 1938 and 1945 witnessed the attempt to expand and apply the Nazi system to territories outside the German Reich. This attempt was confined, in 1938, to lands inhabited by a German-speaking population. In 1939 began the subjugation of non-German-speaking nationalities to the totalitarian Nazi police state. When Germany started World War II, it came as the logical outcome of Hitler's plans. Thus, Hitler's first years were spent in preparing the Germans for the approaching struggle for world control and in forging that instrument which would enable Germany to establish its military and industrial superiority and thereby fulfill its ambitions. With mounting diplomatic and military successes, the aims grew in quick progression. The first aim was to unite all people of German descent within their historic homeland on the basis of "self-determination." The next step foresaw the creation of a *Grosswirtschaftsraum* ("large economic unified space") or a *Lebensraum* ("living space") through the military conquest of Poland and other Slavic nations to the east. Thereby the Germans would acquire sufficient soil to become economically self-sufficient and militarily impregnable. There, the German master race, or *Herrenvolk*, would rule over a hierarchy of subordinate peoples and organize and exploit them with ruthlessness and efficiency. The initial success of that plan in the military campaigns of 1939–41 widened it into the vision of a hemispheric order that would embrace all of Europe, western Asia, and Africa and finally of an order that would establish worldwide domination of National Socialism.

These extravagant hopes came to an end with Germany's defeat in 1945, after almost six years of war. To a certain extent World War II had repeated the pattern of World War I: great initial German military successes, the forging of a large-scale coalition against Germany as the result of German ambitions and behaviour, the loss of the war because of German overreaching and conduct. National Socialism as a mass movement effectively ended on April 30, 1945, when Adolf Hitler committed suicide to avoid falling into the hands of Soviet troops completing the occu-pation of Berlin. Out of the ruins of National Socialist Germany there arose a divided and occupied Germany. Though a number of Germans remained faithful to National Socialism even after Hitler's downfall, and though there were a few attempts made to reorganize National Socialist groups in West Germany, the political and mental climate there was not favourable to it.

National Socialist German Workers' Party: *see* Nazi Party.

National Theatre (United Kingdom): *see* Royal National Theatre.

National Trust, in full NATIONAL TRUST FOR PLACES OF HISTORIC INTEREST OR NATURAL BEAUTY, British organization founded in 1895 and incorporated by the National Trust Act (1907) for the purpose of promoting the preservation of—and public access to—buildings of historic or architectural interest and land of natural beauty. (The powers and privileges of the Trust were extended by acts of Parliament of 1919, 1937, and 1939.) Headquartered in London, it serves England, Wales, and Northern Ireland. A parallel organization, the National Trust for Scotland, headquartered in Edinburgh, was founded in 1931.

The society was established through the efforts of Octavia Hill (*q.v.*), a housing reformer; Sir Robert Hunter, a campaigner for the protection of commons and public rights; and Hardwicke D. Rawnsley, vicar of Wray, Westmorland. Its governing council consists of 50 members, half chosen by learned societies, museums, and other bodies and half chosen by incumbent members. A number of committees and subcommittees are staffed by various experts in the care of land, buildings, and artifacts. The two Trusts are dependent financially on voluntary support in the form of donations, legacies, admission fees, and the annual subscription of members. (Membership is open to all.) The National Trust had a membership of more than 2,000,000 by the late 20th century.

The first acquisition (a donation in 1895) was 4.5 acres (1.8 hectares) of cliff land at Dinas Oleu, overlooking Cardigan Bay in Wales. One hundred years later the two Trusts owned almost 700,000 acres and some 350 stately homes, buildings, gardens, and other places open to the public at stated times for admission fees. Included are such famous sites as Bannockburn Monument, Chartwell (Winston Churchill's home), Cliveden, Culloden (the battlefield), parts of Hadrian's Wall, Hatfield Forest, Knole, Lyme Park, Penrhyn Castle, Petworth House, Powis Castle, Runnymede (of Magna Carta fame), and Sudbury Hall.

National Union of Conservative and Unionist Associations (United Kingdom): *see* Conservative Party.

National University of Ireland, state-supported institution in Dublin, composed of three constituent and five recognized colleges, established in 1908 to foster Irish culture and values.

The germ of the university was the Catholic University of Ireland, founded in 1853 with John Henry Newman (later Cardinal Newman) as rector. The Catholic University declined after Newman left in 1857, but it was revived as the University College, Dublin, in 1882, when it and three other Roman Catholic colleges in Ireland were federated under the name Royal University of Ireland.

In 1908 University College became one of the constituent colleges of the newly organized National University, along with University College, Cork (founded as Queen's College, Cork, in 1845), and University College, Galway (founded as Queen's College, Galway, in 1845). The National University also comprises five other institutions: St. Patrick's College, Maynooth; St. Patrick's College of Education, Drumcondra; Mary Immaculate College of Education, Limerick; Royal College of Surgeons in Ireland, Dublin; and St. Angela's College of Education, Sligo. All of the constituent colleges offer courses in arts, Celtic studies, science, commerce, law, medicine, and engineering. University College, Dublin, also conducts programs in agriculture and veterinary science; University College, Cork, in dairy science.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

National Urban League, American voluntary-service agency tracing its origins to 1911 and dedicated to eliminating racial segregation and discrimination and helping blacks and other minorities to participate in all phases of American life. By the late 20th century more than 110 local affiliated groups were active throughout the United States. It is headquartered in New York City.

In 1911 three organizations—the Committee for Improving the Industrial Conditions Among Negroes in New York (founded in 1906), the League for the Protection of Colored Women (founded 1906), and the Committee on Urban Conditions Among Negroes (founded 1910)—were merged to form the National League on Urban Conditions Among Negroes, which sought to help blacks, especially rural Southern blacks migrating to New York City, to find jobs and housing and generally to adjust to urban life. The model organization established in New York City was imitated in other cities where affiliates were soon established. By 1919 the national organization had assumed the shorter name, National Urban League.

From its founding, the League has been interracial—the chairman of the board traditionally being white and the president and chief executive officer (overseeing day-to-day operations) being black. The primary task of helping migrants gradually evolved over the years into larger concerns, and, especially under the presidency of Whitney M. Young, Jr. (1961–71), the League emerged as one of the strongest forces in the American civil-rights struggle. Under his successor, Vernon E. Jordan, Jr. (1971–81), the League furthered its vision by embracing such causes as environmental protection, energy conservation, and the general problems of poverty. Under the presidency of John E. Jacob (1982–94), the agency renewed its emphasis on social welfare.

National Westminster Bank PLC, former British bank holding company that was acquired in March 2000 by the Royal Bank of Scotland Group, whose headquarters are in Edinburgh.

The organization was formed in 1968 as National Westminster Bank Ltd. to merge two banking groups, National Provincial Bank Ltd. (established in 1833) and Westminster Bank Ltd. (1836). A number of acquisitions and sales of various interests followed in the next decade, including the purchase of the National Bank of North America, a large American bank with branches located throughout the state of New York, in 1979. This American subsidiary changed its name to National Westminster Bank USA in 1983. National Westminster Bank Ltd. reregistered under the present name in 1981. It was frequently referred to as NatWest.

As part of the Royal Bank of Scotland, the company conducts business in the United Kingdom, Europe, and the United States. In the UK it is a leading provider of corporate and commercial banking, private banking, and credit cards.

National Zoological Gardens of South Africa, also called PRETORIA ZOO, zoo near Pretoria, S.Af., that is noted for its wildlife conservation programs. It was opened in 1899 by the State Museum of the South African Republic on a small stretch of land along the Apies River, which flows through Pretoria. In 1913 the zoo became the Transvaal Zoological Gardens, independent of the state museum; in 1916 it adopted its present name, and in 1933 the state took over management of the institution. Over the years the zoo gradually expanded, and it now occupies both sides of the Apies River, covering a total area of about 32 hectares (80 acres). The zoo's collection of antelope is one of the largest in the world. On the 4,047-hectare (10,000-acre) game-breeding centre, opened in 1974 near Lichtenburg, the zoo has successfully bred the endangered scimitar-horned oryx and the banteng. It also operates a 40.5-hectare (100-acre) cheetah-breeding area called De Wildt. The Pretoria Zoo was the first to breed the aardwolf, a member of the hyena family.

National Zoological Park, zoo in Washington, D.C., that was established under the Smithsonian Institution by acts of the U.S. Congress in 1889 and 1890, when a site in the wooded valley of Rock Creek, a tributary of the Potomac River, was purchased. The Smithsonian was authorized to transfer to the zoo the animals kept in cages at the rear of the Smithsonian Institution. Various government departments, including the foreign consular service, donated specimens, and many exotic specimens have been received as gifts from foreign governments.

The zoo, which occupies about 76 hectares (187 acres), has approximately 2,500 specimens of more than 425 species. It has developed one of the finest small-mammal collections in the world and has become famous for breeding pygmy hippopotamuses. Rarities include a white Bengal tiger, received in 1960, and a pair of pandas, a gift from China in 1972. A remodeling program in the 1960s resulted in the construction of an outstanding great flight cage and new hoofed-stock areas. A hospital-research building was added in 1970. In 1975 the zoo acquired 1,280 hectares (3,150 acres) in Front Royal, Va., to use as a conservation and research centre.

Nationalgalerie (Berlin): *see* National Gallery.

nationalism, loyalty and devotion to one's nation or country, such that national interests are placed above either individual or other group interests.

A brief treatment of nationalism follows. For full treatment, *see* MACROPAEDIA: Socio-Economic Doctrines and Reform Movements, Modern.

Nationalism is a peculiarly modern phenomenon. It originates from the assumption that nations are the primary and natural focus of allegiance—an assumption that has by no means always been widely accepted. Until the 18th century the focus of such allegiance was more likely to be a smaller unit, such as the fiefdom, religious group, city, or immediate locality. In the religious context, for example, the focus of allegiance would be a supranational group, such as the Christian community as a whole, called Christendom. The nation was therefore one among many objects of allegiance. Only in the 18th century did the nation first begin to become the focal point of political activity. There were many reasons for this. The rise of large, centralized states ruled by absolute monarchs helped bring about the demise of feudal structures and other objects of local loyalty. The secularization of life and education fostered the vernacular languages and further weakened the ties of church and religious sect. Equally important, expanding commerce, capitalism, and industrialization created a need for unified, centralized states whose rising middle classes could directly participate in the act of government.

A common language and geographic contiguity are the two most important factors in determining whether people cohere in a nation. A common religion, race, political institutions, and various historical factors also help influence the constitution of a nation.

Nationalism may take different forms. Nationalist movements can spring up in ethnic, racial, or cultural communities that do not exist as independent political units but are under the domination of others; examples are the nationalism of mid-18th century Italy, or of the Balkan states, under the Austro-Hungarian Empire. Nationalist movements are not always exclusively political in nature. "Cultural nationalism" consists of encouraging expressions of national characteristics through nonpolitical activities such as art, literature, music, dance, and other forms of culture.

Two early nationalist thinkers were Jean-Jacques Rousseau and Johann Gottfried Herder. Rousseau, inspired by the example of the Greek city-states, tried to conceive how modern political communities could once again become the focal point of human activities. Rousseau stressed the contribution of all of the citizens to the general will as well as the need to make political constitutions reflect the peculiarities of each community for which they are drawn up. Herder's contribution was to emphasize the cultural unity of a community and the role played by folklore and popular traditions in its identity.

Many nationalist movements in the late 18th and early 19th centuries were liberal and internationalist in character. Such movements generally accepted and embraced national differences, which led them to view each other as participating in a common struggle.

There were exceptions to this, however; the German unifier and nationalist Prince Otto von Bismarck, for example, was conservative and authoritarian. These nationalist movements typically had a strong cultural element reflecting an intensified appreciation of the history and literature of one's own country.

At the end of the 19th century, European nationalist movements began to lose some of their internationalism and become more conservative and even reactionary. The progressive intensification and parochialism of these nationalist movements culminated in the outbreak of World War I. The conservative tendency of nationalism continued to spread during the interim between the two world wars, particularly in Italy, Germany, and Japan. Even movements that were originally cosmopolitan and antinationalist in character, such as communism, began to acquire national flavours. Karl Marx's "Workers of the world, unite!" gave way to Joseph Stalin's "Socialism in one country"—a doctrine used to justify actions taken in defense of Russian national interests that were in conflict with the exigencies of the international communist movement.

After World War II nationalist fervour died down in many European nations, in part owing to their awareness of an increasing interdependence, fostered by such organizations as NATO, the European Economic Community, and others. In Asia and Africa, however, nationalism grew rapidly, chiefly as a reaction against colonialism; in later stages neutralism and nonalignment were also employed as bulwarks against domination by large political and economic powers. With the downfall of the communist system in eastern Europe, nationalism again reasserted itself among many Soviet satellite countries. Nationalism based on linguistic, ethnic, and religious affiliations resurfaced in a striking fashion in the former republics of the Soviet Union and in the remnants of Yugoslavia in the early 1990s.

Nationalist China, district of China governed by the Nationalist Party. *See* Taiwan.

Nationalist Party, also called KUOMINTANG, Wade-Giles romanization KUO-MIN TANG (KMT; "National People's Party"), political party that governed all or part of mainland China from 1928 to 1949 and subsequently ruled Taiwan under Chiang Kai-shek and his successors.

Originally a revolutionary league working for the overthrow of the Chinese monarchy, the Nationalists became a political party in the first year of the Chinese republic (1912). The party participated in the first Chinese parliament, which was soon dissolved by a coup d'état (1913). This defeat moved its leader, Sun Yat-sen, to organize it more tightly, first (1914) on the model of a Chinese secret society and, later (1923–24), under Soviet guidance, on that of the Bolshevik party. The Nationalist Party owed its early successes largely to Soviet aid and advice and to close collaboration with the Chinese communists (1924–27).

After Sun Yat-sen's death in 1925, leadership of the party passed gradually to Chiang Kai-shek, who brought most of China under its control by ending or limiting regional warlord autonomy (1926–28). Nationalist rule, inseparable from Chiang's, became increasingly conservative and dictatorial but never totalitarian. The party program rested on Sun Yat-sen's Three Principles of the People: nationalism, democracy, and people's livelihood. Nationalism demanded that China regain equality with other nations, but the Nationalists' resistance to the Japanese invasion of China (1931–45) was halfhearted compared to their determined attempts to suppress the Chinese Communist Party. The realization of democracy through successive constitutions (1936, 1946) was also largely a myth. Equally ineffective were attempts to improve the people's livelihood or eliminate corruption. The Nationalist Party's failure to effect such changes itself derived partly from weaknesses in leadership and partly from its unwillingness to radically reform China's age-old feudal social structure.

After the defeat of Japan in 1945, civil war with the communists was renewed with greater vigour. In 1949–50, following the victories of the Chinese communists on the mainland, a stream of Nationalist troops, government officials, and other refugees estimated at 2,000,000 persons led by Chiang, poured onto Taiwan; a branch of the Nationalist Party that was opposed to Chiang's policies and supported continued resistance to the Japanese still exists on the mainland. Taiwan became the effective territory, apart from a number of islands off the China coast, of the Republic of China (Nationalist China). The Nationalists for many years constituted the only real political force, holding virtually all legislative, executive, and judicial posts. The first legal opposition to the Nationalist Party came in 1989, when the Democratic Progressive Party (DPP; established 1986) won 21 of 101 seats in the Legislative Yuan.

nationality, in law, membership in a nation or sovereign state. It is to be distinguished from citizenship (*q.v.*), a somewhat narrower term that is sometimes used to denote the status of those nationals who have full political privileges. Before an act of the U.S. Congress made them citizens, for example, American Indians were sometimes referred to as "noncitizen nationals."

Individuals, companies (corporations), ships, and aircraft all have nationality for legal purposes. It is in reference to natural persons, however, that the term finds most frequent use. Nationality is in fact commonly regarded as an inalienable right of every human being. Thus, the UN Universal Declaration of Human Rights (1948) states that "everyone has the right to a nationality" and that "no one shall be arbitrarily deprived of his nationality." Nationality is of cardinal importance because it is mainly through nationality that the individual comes within the scope of international law and has access to the political and economic rights and privileges conferred by modern states on their nationals.

The state, through constitutional and statutory provisions, sets the criteria for determining who shall be its nationals. The right of a state to confer its nationality is, however, not unlimited, for otherwise it might impinge upon other states' rights to determine what persons shall be their nationals. By one rule of international customary law, a person who is born within a state's territory and subject to its jurisdiction acquires that state's nationality by the fact of such birth. By another rule, one has a nationality as an inheritance from one or both of one's parents. States vary in the use of the two principles.

When one state cedes territory to another, inhabitants of the region that is ceded commonly have an opportunity to acquire that state's nationality. Practice, however, supports the idea that the individuals concerned should be allowed a free choice. Another method of acquiring nationality is through the process of naturalization (*q.v.*).

In international law, nationality assumes significance in a variety of circumstances. In extradition treaties, for example, states include clauses making it optional for them to surrender their own nationals. If a state expels a person from its territory, only the state of which the person is a national is obligated to receive him.

Differences in national legislation and the absence of universally binding laws or practices have given rise to a number of unsettled questions on nationality; these include the problem of dual or multiple nationality and the problem of stateless persons—that is, persons having no nationality.

nationalization, alteration or assumption of control or ownership of private property by the state. It is historically a more recent development than and differs in motive and degree from "expropriation" or "eminent domain," which is the right of government to take property for particular public purposes (such as the construction of roads, reservoirs, or hospitals), normally accompanied by the payment of compensation. Nationalization has often accompanied the implementation of communist or socialist theories of government, as was the case in the transfer of industrial, banking, and insurance enterprises to the state in Russia after 1918 and the nationalization of the coal, electricity, gas, and transport industries in the United Kingdom and France between 1945 and 1950. More recently, a further impetus has been resentment of foreign control over industries upon which the state may be largely dependent, as in the nationalization of the oil industries in Mexico in 1938 and Iran in 1951, and in the nationalization of foreign businesses in Cuba in 1960. A third motive for recent nationalizations may be the belief in some developing countries that state control of various industrial operations is at least temporarily necessary because of the lack of a developed capital market or supply of entrepreneurs in the domestic private sector.

Nationalization may occur through the transfer of a company's assets to the state or through the transfer of the share capital, leaving the company in existence to carry on its business under state control. Questions of international law normally arise only when the property is owned either by aliens or by companies in which aliens have a large shareholding interest. As a result of a number of diplomatic episodes and international arbitrations, it is acknowledged that isolated seizures of alien private property are lawful only if accompanied by the payment of fair compensation. Whether these precedents apply with equal force to large-scale nationalization has not yet been settled by any international tribunal.

States whose nationals tend to be investors are placing increasing reliance upon specific treaty clauses providing for the protection of investments. The United States, in particular, since the end of World War II has entered into such treaties, coupled with clauses conferring compulsory jurisdiction upon the International Court of Justice. Insurance against nationalization is also offered by the U.S. government.

Nationalization cases with particularly far-reaching consequences are those involving waterways and other transport passes. The nationalization of the Suez Canal Company in 1956 by Egypt is said to have resulted in the invasion of the canal zone by the French and British (coinciding with the invasion of the Sinai Peninsula by the Israelis), whose oil supplies depended in large measure upon access to the canal.

Nationalsozialistische Deutsche Arbeiterpartei: *see* Nazi Party.

Nations, Battle of the: *see* Leipzig, Battle of.

nations, law of: *see* international law.

Nations, League of, an organization for international cooperation established at the initiative of the victorious Allied Powers at the end of World War I.

During the war influential groups in the United States and Britain had urged the creation of such a body, and U.S. President Woodrow Wilson strongly favoured the idea as a means of preventing another destructive world conflict. A league covenant, embodying the principles of collective security (joint action by League members against an aggressor), arbitration of international disputes, reduction of armaments, and open diplomacy, was formulated and subscribed to by the Allies at the Paris Peace Conference (1919). The Covenant established the League's directing organs: an assembly composed of representatives of all members; a council composed of permanent representatives of the leading Allied Powers (with additional rotating members); and a secretariat (executive), presided over by a secretary general. It also provided for a Permanent Court of International Justice and for a system whereby colonies in Asia and Africa would be distributed among the Allied Powers in the form of mandates.

During the 1920s the League, with its headquarters at Geneva, assimilated new members (neutral and enemy nations had been initially excluded), helped settle minor international disputes, and experienced no serious challenges to its authority. It was seriously weakened, however, by the nonadherence of the United States; the U.S. Congress failed to ratify the Treaty of Versailles (containing the Covenant). One of the League's main purposes in preventing aggression was to preserve the status quo as established by the post-World War I peace treaties. In the 1930s, when dissatisfied nations (Japan, Italy, Germany) undertook to upset this arrangement and the other major powers declined to enforce it, the League, which had no power other than that of its member states, was unable to take action. Discredited by its failure to prevent Japanese expansion in Manchuria and China, Italy's conquest of Ethiopia, and Hitler's repudiation of the Versailles treaty, the League ceased its activities during World War II. In 1946 it was replaced by the United Nations, which inherited many of its purposes and methods and much of its structure.

Native American, in American usage, member of the aboriginal peoples of the Western Hemisphere, with the exception of the Eskimos and Aleuts. *See* American Indian.

Native American Church, also called PEYOTISM, or PEYOTE RELIGION, most widespread indigenous religious movement among North American Indians and one of the most influential forms of Pan-Indianism. The term peyote derives from the Nahuatl name *peyotl* for a cactus. The tops of the plants contain mescaline, an alkaloid drug that has hallucinogenic effects. It was used in Mexico in pre-Columbian times to induce supernatural visions and as a medicine.

From the mid-19th century, use of peyote extended north into the Great Plains of the United States, and probably first developed into a distinct religion about 1885 among the Kiowa and Comanche of Oklahoma. After 1891 it spread rapidly as far north as Canada and is now practiced among more than 50 tribes. Statistics are uncertain, but reports suggest nearly a fifth of the Navajo in 1951 practiced the peyote religion (despite strong tribal council opposition) as did one-third of Oklahoma Indians in 1965. The Native American Church claimed some 225,000 adherents in 1977.

The various forms of peyotist beliefs combine Indian and Christian elements in differing degrees. Among the Teton, for example, the Cross Fire group uses the Bible and sermons, which are rejected by the Half Moon followers, who, however, teach a similar Christian morality. In general, peyotist doctrine consists of belief in one supreme God (the Great Spirit), who deals with men through various spirits, which include the traditional waterbird or thunderbird spirits that carry prayers to God. In many tribes peyote itself is personified as Peyote Spirit, considered to be either God's equivalent for the Indians to his Jesus for the whites, or Jesus himself. In some tribes Jesus is regarded as an Indian culture hero returned, as an intercessor with God, or as a guardian spirit who has turned to the Indians after being killed by the whites. Peyote, eaten in the ritual context, enables the individual to commune with God and the spirits (including those of the departed) in contemplation and vision and so to receive from them spiritual power, guidance, reproof, and healing.

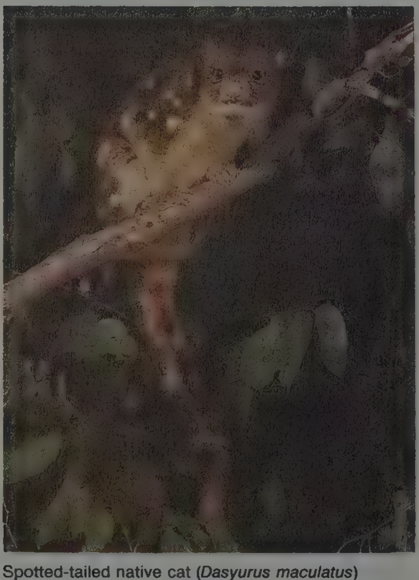
The rite characteristically, but not always, takes place in a tepee around a crescent-shaped, earthen altar mound and a sacred fire. The all-night ceremony usually commences about 8 PM Saturday and is led by a peyote "chief." The services include prayer, singing, sacramental eating of peyote, water rites, and contemplation; they conclude with a communion breakfast on Sunday morning. The way of life is called the Peyote Road and enjoins brotherly love, family care, self-support through steady work, and avoidance of alcohol.

Peyotism has been much persecuted. Although peyote was banned by government agents in 1888 and later by 15 states, Congress, backed by the Bureau of Indian Affairs, the churches, and some Indian groups, resisted repeated attempts from 1916 to 1937 to have its use prohibited. In self-defense, peyote groups sought incorporation under state laws—first in Oklahoma as the First-born Church of Jesus Christ in 1914, then as the Native American Church in 1918, and by 1960 in some further 11 states. In the 1960s appeals by peyotists in the name of constitutional freedom of religion were supported by anthropologists and others and upheld in several state supreme courts.

Arapaho peyote ceremony, watercolour by Carl Sweezy; in the collection of the University of Oklahoma Library

By courtesy of the Western History Collections, University of Oklahoma Library

native cat, any of the catlike Australian marsupials that make up the genus *Dasyurus* in the family Dasyuridae. All native cats are predators that hunt chiefly at night. Because they sometimes raid poultry yards, native cats have been persecuted and in some regions are extinct. Also contributing to their disappearance have been the destruction of their habitats and the introduction of such placental mammals as domestic cats, which compete with the native cats for food, and dogs and foxes, which prey on native cats.



Spotted-tailed native cat (*Dasyurus maculatus*)

Hans and Judy Beste—Ardea Photographics

Native cats have bushy tails and white-spotted upperparts. The eastern native cat (*D. viverrinus,* or *D. quoll*), surviving chiefly in the forests and open country of Tasmania, is 55 to 75 centimetres (22 to 30 inches) long, including its 20- to 30-cm tail. The western native cat (*D. geoffroii*) of the savannahs of southwestern and central Australia is almost the same size but has a relatively longer tail. The northern native cat (*D. hallucatus*) of tropical regions is generally smaller, as is the New Guinea native cat (*D. albopunctatus*), which occupies a variety of habitats on its native island. The largest species, the spotted-tailed native cat (*D. maculatus,* also called the tiger cat), has a length of 75 to 130 cm, including its 35- to 55-cm tail. This species occurs in the dense, moist forests of Tasmania and eastern Australia.

Native Dancer, byname THE GRAY GHOST (foaled 1950), U.S. racehorse (Thoroughbred) who won 21 of 22 starts and achieved widespread popularity as the first outstanding horse whose major victories were seen on national television. Sired by Polynesian out of Geisha, the gray colt was undefeated in nine races as a two-year-old. In the 1953 U.S. Triple Crown competition he met his only defeat, finishing second to Dark Star in the Kentucky Derby, but he won the Preakness Stakes and the Belmont Stakes. In 1954, although he was troubled by a foot injury, he won all four of his starts and was named Horse of the Year before being retired to stud. At his death, his offspring had won more than $4,000,000 in purses.

native element, any of a number of chemical elements that may occur in nature uncombined with other elements. The elements that occur as atmospheric gasses are excluded.

A brief treatment of native elements follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks; Chemical Elements.

Of the 92 chemical elements found in nature only 19 are known to occur as minerals. These native elements are commonly divided into three groups—namely, metals (platinum, iridium, osmium, iron, zinc, tin, gold, silver, copper, mercury, lead, chromium); semimetals (bismuth, antimony, arsenic, tellurium, selenium); and nonmetals (sulfur, carbon). In metals the mineral structure is usually either cubic close-packed or hexagonal close-packed. The semimetals and nonmetals have more complex structures. Several native elements (*e.g.,* carbon) have one or more polymorphic forms whose occurrence depends on the conditions of formation.

It is virtually impossible to make generalizations as to the occurrence of the native elements. They form under greatly contrasting physicochemical conditions and in all types of rocks. Even a single native element can occur in widely diverse environments. Native iron (kamacite), for example, is found primarily in meteorites. The iron meteorites called hexahedrites are almost completely composed of kamacite, and in those called octahedrites it is the principal constituent. Although terrestrial native iron is a great rarity, it has been found in igneous rocks (basalts), in carbonaceous sedimentary rocks, and in petrified wood.

Many of the other metals and certain non-metals are sufficiently abundant to form deposits of commercial importance. Native gold and silver, for example, are the principal ores of these metals.

Native Representation Act (New Zealand): *see* Maori Representation Act.

Nativity, a theme in Christian art depicting the newborn Jesus with the Virgin Mary and other figures, following descriptions of Christ's birth in the Gospels and Apocrypha. An old and popular subject with a complicated iconography, the Nativity was first represented in the 4th century, carved on Early Christian Roman sarcophagi, and was later included with other scenes from Christ's life in monumental decoration of Early Christian basilicas. It was a very important subject for Early Christian art from the 5th century because it emphasized the reality of the incarnation of Christ and the validity of the Virgin's newly established (431) title of Theotokos (Mother of God). The Early Christian version of the Nativity shows the Virgin seated, to emphasize that the birth was painless, and the Child,

"The Nativity at Night," oil painting by Geertgen tot Sint Jans, late 15th century; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, A.C. Cooper Ltd.

in swaddling clothes, lying in a manger. The two, along with an ox and an ass, are under the roof of a barnlike stable. Usually one or two shepherds, who symbolize the revelation of Christ to the Jews, and often also the Magi—Wise Men from the East who symbolize his revelation to the Gentiles—appear in the scene.

By the 6th century another version of the Nativity appeared in Syria, becoming universal in the East throughout the Middle Ages, and in Italy until the late 14th century. It differs from the earlier version, which was retained with some modifications in northwestern Europe, mainly in that it shows the Virgin lying on a mattress, thus ignoring the concept of the painless birth. The Child is again in swaddling clothes in a manger, and the ox and ass are retained, but the stable is located not in a barn but in a cave, as was the custom in Palestine. Angels usually hover above the cave, and Joseph sits outside it. The Magi and the shepherds are often present. The announcement of the miraculous birth to the shepherds by an angel and the journey of the Magi may be depicted simultaneously in the background. Another simultaneous represen-

Native elements

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	fracture or cleavage	refractive index or polished section data	crystal system space group	remarks
allemontite AsSb	tin-white; reddish gray	metallic	3–4	5.8–6.2	kidney-like masses	one perfect cleavage	fine graphic intergrowth of allemontite with arsenic or antimony	hexagonal $R\bar{3}m$	
amalgam									
gold-amalgam $\mathrm{Au_2Hg_3}$ (?)	yellowish	metallic		15.5	lumps or grains	conchoidal fracture		isometric, in part (?)	
moschellandsbergite $\mathrm{Ag_2Hg_3}$	silver-white	bright metallic	3½	13.5–13.7	dodecahedrons; massive	two distinct cleavages		isometric $Im3m$ (?)	
potarite $\mathrm{Pd_3Hg_2}$ (?)	silver-white	bright metallic	3½	13.5–16.1	grains or nuggets		intergrowth of "potarite groundmass" (white, isotropic, high reflectivity) and "potarite inclusions" (light gray; anisotropic)	isometric	
antimony Sb	tin-white	metallic	3–3½	6.6–6.7	massive	one perfect cleavage; two less so	brilliant white; very strong reflectivity	hexagonal $R\bar{3}m$	
arsenic As	tin-white, tarnishing to dark gray	nearly metallic on fresh surfaces	3½	5.6–5.8	granular massive; concentric nodules	one perfect cleavage	white; strong reflectivity; anisotropic	hexagonal $R\bar{3}m$	
arsenolamprite As	lead-gray	brilliant metallic	2	5.3–5.5	massive	one perfect cleavage			may be either impure native arsenic or a distinct modification
bismuth Bi	silver-white, with reddish hue; tarnishes iridescent	metallic	2–2½	9.7–9.8	network or tree-like crystal groups	one perfect and one good cleavage	brilliant creamy white, tarnishing yellow; anisotropic	hexagonal $R\bar{3}m$	sectile; when heated, somewhat malleable
carbon									
diamond C	pale to deep yellow or brown; white to blue-white; sometimes variable	adamantine to greasy	10	3.5	flattened octahedrons; dodecahedrons	one perfect cleavage; conchoidal fracture	$n = 2.4175$	isometric $Fd3m$	triboelectric; strong dispersion
graphite C	black to dark steel-gray	metallic	1–2	2.1–2.2	platy or flaky massive	one perfect cleavage	pleochroism and birefringence extreme	hexagonal $C\frac{6}{m}mc$ (?)	electrical conductor; greasy feel; thermoelectrically negative; thin fragments transparent and deep blue
cohenite $\mathrm{(Fe, Ni)_3C}$	tin-white, tarnishes to light bronze or gold-yellow		5½–6	7.2–7.7	elongated tabular crystals	three cleavages		orthorhombic $Pbnm$	strongly magnetic
copper Cu	light rose, tarnishes quickly to copper-red and brown	metallic	2½–3	8.95	plates and scales; wire-like, tree-like crystal groups; twisted bands; malformed crystals	no cleavage; hackly fracture	rose-white; isotropic; strong reflectivity	isometric $Fm3m$	highly ductile and malleable
gold Au	gold-yellow (when pure); silver-white to orange-red	metallic	2½–3	19.3	elongated or flattened crystals; wire-like, tree-like, or spongy forms	no cleavage; hackly fracture	brilliant gold-yellow; isotropic; high reflectivity	isometric $Fm3m$	very ductile and malleable
iridosmine $\mathrm{(Ir, Os)}$	tin-white to light steel-gray	metallic	6–7	19.0–21.0	flakes or flattened grains	one perfect cleavage	slightly yellowish white	hexagonal $C\frac{6}{m}mc$ (pure Os) $Fm3m$ (pure Ir)	slightly malleable; forms solid solution with siserskite, (Os, Ir), ranging from 77% Ir to almost 80% Os
iron Fe	steel-gray to iron-black	metallic	4	7.3–7.9	small blisters or large masses (terrestrial); plates and lamellar masses intergrown with nickel-iron (meteoritic)	one cleavage; hackly fracture	white; isotropic	isometric $Im3m$	magnetic; malleable

tation—the bathing of the Child by two midwives in the foreground—became standard in Eastern Nativities. It probably derives from classical scenes of the birth of the god Dionysus and is a prefiguration of Christ's Baptism. As the emblem of a major feast day, this version of the Nativity figured prominently, usually in its most complicated form, in the liturgical iconography of Byzantine church decoration.

In the late 14th century an abrupt transformation of the iconography of the Nativity occurred throughout western Europe, including Italy, and a second major version came into being. This was essentially an adoration; the most important change is that the Virgin is depicted no longer in the aftermath of childbirth but kneeling before the Child, who is now nude and luminous and lies not in a manger but on the ground on a pile of straw or a fold of the Virgin's mantle. Often Joseph, too, kneels in adoration. Most of the other details, except the ox and ass, are omitted, especially in earlier works. This version, which seems to have spread from Italy, follows in detail—and in fact almost certainly originates with—an account of a vision by St. Bridget

Native elements (continued)

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	fracture or cleavage	refractive index or polished section data	crystal system space group	remarks
lead Pb	lead-gray; gray-white on fresh surfaces	dull; metallic on fresh surfaces	1½	11.4	rounded masses; thin plates	no cleavage	fresh surfaces gray-white, isotropic, high reflectivity; quickly dulled	isometric Fm3m	very malleable; somewhat ductile
mercury Hg	tin-white	very brilliant metallic		13.596	isolated drops; occasionally in larger liquid masses			hexagonal (at −39° C)	liquid at normal temperatures
nickel-iron (Fe, Ni)	silver- to grayish-white	metallic	5	7.8–8.2	pebbles, grains, fine scales (terrestrial); intergrown with or bordering meteoritic iron (meteoritic)	no cleavage		isometric Fm3m	strongly magnetic; malleable; flexible
palladium Pd	whitish steel-gray	metallic	4½–5	11.9	grains	no cleavage	white; high reflectivity; isotropic	isometric Fm3m	ductile; malleable
platiniridium (Ir, Pt)	yellowish silver-white; gray on fresh surfaces	metallic	6–7	22.6–22.8	rounded or angular grains	hackly fracture		isometric Fm3m	somewhat malleable
platinum Pt	whitish steel-gray to dark gray	metallic	4–4½	14–19	grains or scales; sometimes in lumps or nuggets	no cleavage; hackly fracture	white; isotropic	isometric Fm3m	malleable; ductile; sometimes magnetic
schreibersite $(Fe, Ni)_3P$	silver- to tin-white; tarnishes to brass-yellow or brown	highly metallic	6½–7	7.0–7.3	plates; rods or needles	one perfect cleavage		tetragonal $I\bar{4}$	strongly magnetic
selenium Se	gray	metallic	2	4.8	crystals, often hollow or tube-like; glassy drops	one good cleavage	fairly high reflectivity; creamy white; pleochroic; very strongly anisotropic	hexagonal $C3_12$ or $C3_22$	electrical conductor; thin fragments transparent and red
silver Ag	silver-white; tarnishes gray to black	metallic	2½–3	10.1–11.1 (10.5 pure)	crystals, often in elongated, wire-like, or tree-like groups; massive as scales or coating	no cleavage; hackly fracture	brilliant silver-white; greatest reflectivity known; isotropic	isometric Fm3m	ductile and malleable
sulfur S									
rhombic (α-sulfur)	sulfur-, straw- to honey-yellow; yellowish brown or gray, greenish, reddish	resinous to greasy	1½–2½	2.07	transparent to translucent tabular crystals; spherical or kidney-like masses; crusts; powder	three imperfect cleavages; conchoidal to uneven fracture	$n = 1.957$	orthorhombic Fddd	electrical non-conductor; negatively charged by friction
monoclinic (β-sulfur)	light yellow: nearly colourless; brownish due to included organic matter		slightly greater than α-sulfur	1.958, 1.982	thick tabular or elongated crystals	two cleavages	$n = 2.038$	monoclinic	
nacreous (γ-sulfur)	light yellow; nearly colourless	adamantine	low	less than α-sulfur	minute transparent crystals	no observed cleavage		monoclinic	reverts slowly to α-sulfur at room temperature
tantalum Ta	grayish yellow	bright	6–7	11.2	minute crystals; fine grains			isometric Im3m	
tellurium Te	tin-white	metallic	2–2½	6.1–6.3	columnar to fine granular massive; minute crystals	one perfect cleavage	strongly anisotropic; white; very strongly reflective	hexagonal $C3_12$ or $C3_22$	
tin Sn	tin-white	metallic	2	7.3	irregular rounded grains; natural crystals unknown	hackly fracture		tetragonal $I\frac{4}{a}md$	ductile; malleable
zinc Zn	slightly grayish white	metallic	2	6.9–7.2		one perfect cleavage		hexagonal $C\frac{6}{m}mc$	though reported, existence in native form is doubtful

of Sweden, an influential 14th-century mystic. Universally adopted in western Europe by the 15th century, this version is widely depicted in altarpieces and other devotional works.

In the Renaissance, angels reappeared, and the scene was often combined with the adoration of the shepherds, which had recently developed as a separate theme. The midwives were still included occasionally. In the 16th century the Council of Trent outlawed the midwives, the ox and ass, and the bathing of Christ as ignoble, apocryphal, and theologically unsound (the bathing of the Child is inconsistent with the doctrine of a pure and supernatural birth).

In the 17th century a more prosaic representation reappeared, with the Virgin again reclining and holding the Child. After the 17th century, despite the decline of Christian religious art in general, the Nativity remained an important theme in the popular arts.

NATO: *see* North Atlantic Treaty Organization.

natrolite, hydrated sodium aluminosilicate mineral, $Na_2(Al_2Si_3O_{10}) \cdot 2H_2O$, in the zeolite family. It has been found in the form of colourless or white, glassy, slender crystals or fibrous masses filling cavities or fissures in basaltic rocks, as in Trentino, Italy; Brevik, Nor.; Belfast, N.Ire.; the Faroe Islands; and northeastern New Jersey, U.S. Natrolite was one of the first zeolite minerals for which cation-exchange properties (dissolved sodium, potassium, calcium, and magnesium readily replacing one another in the molecular structure) were discovered. It is used in softening water.

Natrolite is the principal member of a group of zeolite minerals whose molecular structure is predominantly chains of linked silicate and aluminate tetrahedra (four oxygen atoms arranged at the points of a triangular pyramid about a central silicon or aluminum atom); the relative scarcity of lateral bonds between chains results in the characteristic fibrous appearance of the group. Other zeolites in the natrolite group are mesolite, scolecite, thomsonite, and gonnardite; all have similar modes of occurrence, molecular structures, and physical properties, even though they have different crystal symmetries: mesolite and scolecite crystallize in the monoclinic system (three unequal axes with one inclined to the plane of the other two), whereas natrolite, thomsonite, and gonnardite crystallize in the orthorhombic system (three unequal axes at right angles to one another). Mesolite is chemically intermediate between natrolite and scolecite. For chemical formulas and detailed physical properties, *see* zeolite (table).

Natron, Lake, lake in northern Tanzania on the border with Kenya, lying in the East African Rift System, 70 miles (113 km) northwest of Arusha. The lake is 35 miles (56 km) long and 15 miles (24 km) wide and contains salt, soda, and magnesite deposits. The lake's warm water is an ideal breeding ground for the Rift Valley flamingos. The Gelai volcano (9,652 feet [2,942 m]) is at the lake's southeastern edge. Just west of Lake Natron at Peninj, archaeologists discovered the Peninj, or Natron, mandible—an almost perfectly preserved fossil hominid jaw containing a complete set of adult teeth. The specimen has been assigned to *Australopithecus boisei.*

Natsume Sōseki, pseudonym of NATSUME KINNOSUKE (b. Feb. 9, 1867, Edo [now Tokyo], Japan—d. Dec. 9, 1916, Tokyo), outstanding Japanese novelist of the Meiji period and the first to ably depict the plight of the alienated modern Japanese intellectual.

Natsume
By courtesy of the International Society for Educational Information, Tokyo

Natsume took a degree in English from the University of Tokyo (1893) and taught in the provinces until 1900, when he went to England on a government scholarship. In 1903 he became lecturer in English at the University of Tokyo. His reputation was made with two very successful comic novels, *Wagahai-wa neko de aru* (1905–06; *I Am a Cat*) and *Botchan* (1906; *Botchan: Master Darling*). Both satirize contemporary philistines and intellectual mountebanks. His third book, *Kusamakura* (1906; *The Three-Cornered World*), is a lyrical tour de force about a painter's sojourn in a remote village.

After 1907, when he gave up teaching to devote himself to writing, he produced his more characteristic works, which were sombre without exception. They deal with man's effort to escape from loneliness. His typical heroes are well-educated middle-class men who have betrayed, or who have been betrayed by, someone close to them and through guilt or disillusionment have cut themselves off from other men. In *Kōjin* (1912–13; *The Wayfarer*) the hero is driven to near madness by his sense of isolation; in *Kokoro* (1914) the hero kills himself; and in *Mon* (1910; "The Gate") the hero's inability to gain entrance to the gate of a Zen temple to seek religious solace is a frightening symbol of frustration, isolation, and helplessness. Natsume's last novel, *Michikusa* (1915; *Grass on the Wayside*), was autobiographical.

Natsume claimed that he owed little to the native literary tradition. Yet, for all their modernity, his novels have a delicate lyricism that is uniquely Japanese. It was through Natsume that the modern realistic novel, which had essentially been a foreign literary genre, took root in Japan.

Natta, Giulio (b. Feb. 26, 1903, Imperia, near Genoa, Italy—d. May 2, 1979, Bergamo), Italian chemist who contributed to the development of high polymers useful in the manufacture of films, plastics, fibres, and synthetic rubber. His achievements, along with those of Karl Ziegler of Germany, were honoured in 1963 with the Nobel Prize for Chemistry.

Natta took his doctorate in chemical engineering at Milan Polytechnic (1924) and held chairs in chemistry at the universities of Pavia, Rome, and Turin before returning to the Polytechnic as professor and research director of industrial chemistry (1938). His earlier work formed the basis of modern industrial syntheses of methanol, formaldehyde, butyraldehyde, and succinic acid. In 1953 he began intensive study of macromolecules. Using Ziegler's catalysts, he experimented with the polymerization of propylene and obtained polypropylenes of highly regular molecular structure. The properties—high strength, high melting points—of these polymers soon proved very commercially important.

Nattier, Jean-Marc (b. March 17, 1685, Paris, Fr.—d. Nov. 7, 1766, Paris), French Rococo painter noted for his portraits of the ladies of King Louis XV's court in classical mythological attire.

Nattier received his first instruction from his father, the portraitist Marc Nattier (*c.* 1642–1705), and from his uncle, the history painter Jean Jouvenet. He enrolled in the Royal Academy in 1703 and made a series of drawing of the Marie de Médicis painting cycle by Peter Paul Rubens in the Luxembourg Palace; the publication (1710) of engravings based on these drawings made Nattier famous. In 1715 he went to Amsterdam, where he painted portraits of the Russian tsar, Peter the Great, and his wife, Empress Catherine, though he declined the tsar's offer to go to Russia.

Nattier aspired to be a history painter, but the French financial crisis of 1720 all but ruined him, and he was henceforth obliged to turn to portraiture, which was more lucrative. He subsequently revived the genre of the allegorical portrait, in which a living person is depicted as a Greco-Roman goddess or other mythological figure. Nattier's graceful and charming portraits of court ladies in this mode were very fashionable, partly because he could beautify a sitter while also retaining her likeness. He served as official portraitist to the four daughters of Louis XV from 1745, painting those young ladies in innumerable guises and pursuits. Among Nattier's portraits using a more straightforward approach are the "Portrait of Marie Leczinska" and "The Artist Surrounded by His Family" (1730).

Natufian culture, Mesolithic culture of Palestine and southern Syria dating from about 9000 BC. Mainly hunters, the Natufians supplemented their diet by gathering wild grain; they likely did not cultivate it. They had sickles of flint blades set in straight bone handles for harvesting grain and stone mortars and pestles for grinding it. Some groups lived in caves, others occupied incipient villages. They buried their dead with their personal ornaments in cemeteries. Carved bone and stone artwork have been found.

natural bridge, also called NATURAL ARCH, naturally created arch formation resembling a bridge. Most natural bridges are erosion features that occur in massive, horizontally bedded sandstone or limestone. Some bridges, such as the Natural Bridge near Lexington, Va., are formed by the collapse of a cavern's roof that may leave remnant portions as bridges. Others may be produced by entrenched rivers eroding through meander necks to form cutoffs. Still others are produced

Natural Bridge, near Lexington, Va.
Bob Glaze—Artstreet

by exfoliation and may be enlarged by wind erosion. Superb examples can be found in the Natural Bridges National Monument and in Rainbow Bridge National Monument (*q.v.*), both in Utah.

Natural tunnels are often quite similar to bridges in origin. A related form is the sea arch, produced where remnant headlands may be cut through by waves. Collapse of the bridge portion of a sea arch commonly produces a sea stack.

natural childbirth, any of the systems of managing parturition in which the need for anesthesia, sedation, or surgery is largely eliminated by physical and psychological conditioning. Until the early 20th century, the term natural childbirth was thought of as synonymous with normal childbirth. In 1933 the British obstetrician Grantly Dick-Read wrote a book entitled *Natural Childbirth,* in which he postulated that excessive pain in labour results from muscular tension arising from fear of the birth process; he proposed that pregnant women attend a course of study to learn more about the birth process and to be instructed in breathing techniques and relaxation exercises useful during labour. Dick-Read's and other methods became popular in the mid-1950s.

Some of the natural childbirth methods that have developed from the Dick-Read method include those of Fernand Lamaze, Elizabeth Bing, Robert Bradley, and Charles Leboyer. Although there are differences among their methods, all share the basic belief that if the prospective mother learns and practices techniques of physical and psychological conditioning, her discomfort during delivery will be lessened. Preparation also includes full instruction and coaching on the anatomy and physiology of the birth process, thus enabling the mother to better cooperate and facilitate the delivery rather than to resist the process. Many of the methods encourage participation by the prospective father during labour and delivery, primarily to provide emotional support. *See also* Lamaze.

natural fibre, any hairlike raw material directly obtainable from an animal, vegetable, or mineral source and convertible into nonwoven fabrics such as felt or paper or, after spinning into yarns, into woven cloth. A natural fibre may be further defined as an agglomeration of cells in which the diameter is negligible in comparison with the length. Although nature abounds in fibrous materials, especially cellulosic types such as cotton, wood, grains, and straw, only a small number can be used for textile products or other industrial purposes. Apart from economic considerations, the usefulness of a fibre for commercial purposes is determined by such properties as length, strength, pliability, elasticity, abrasion resistance, absorbency, and various surface properties. Most textile fibres are slender, flexible, and relatively strong. They are elastic in that they stretch when put under tension and then partially or completely return to their original length when the tension is removed.

History. The use of natural fibres for textile materials began before recorded history. The oldest indication of fibre use is probably the discovery of flax and wool fabrics at excavation sites of the Swiss lake dwellers (7th and 6th centuries BC). Several vegetable fibres were also used by prehistoric peoples. Hemp, presumably the oldest cultivated fibre plant, originated in Southeast Asia, then spread to China, where reports of cultivation date to 4500 BC. The art of weaving and spinning linen was already well developed in Egypt by 3400 BC, indicating that flax was cultivated sometime before that date. Reports of the spinning of cotton in India date back to 3000 BC. The manufacture of silk and silk products originated in the highly developed Chinese culture; the invention and development of sericulture (cultivation of silkworms for raw-silk production) and of methods to spin silk date from 2640 BC.

With improved transportation and communication, highly localized skills and arts connected with textile manufacture spread to other countries and were adapted to local needs and capabilities. New fibre plants were also discovered and their use explored. In the 18th and 19th centuries, the Industrial Revolution encouraged the further invention of machines for use in processing various natural fibres, resulting in a tremendous upsurge in fibre production. The introduction of regenerated cellulosic fibres (fibres formed of cellulose material that has been dissolved, purified, and extruded), such as rayon, followed by the invention of completely synthetic fibres, such as nylon, challenged the monopoly of natural fibres for textile and industrial use. A variety of synthetic fibres having specific desirable properties began to penetrate and dominate markets previously monopolized by natural fibres. Recognition of the competitive threat from synthetic fibres resulted in intensive research directed toward the breeding of new and better strains of natural-fibre sources with higher yields, improved production and processing methods, and modification of fibre yarn or fabric properties. The considerable improvements achieved have permitted increased total production, although natural fibres' actual share of the market has decreased with the influx of the cheaper, synthetic fibres requiring fewer man-hours for production.

Classification and properties. Natural fibres can be classified according to their origin. The vegetable, or cellulose-base, class includes such important fibres as cotton, flax, and jute; the animal, or protein-base, fibres include wool, mohair, and silk (*qq.v.*); an important fibre in the mineral class is asbestos (*q.v.*).

The vegetable fibres can be divided into smaller groups, based on their origin within the plant. Cotton, kapok, and coir (*qq.v.*) are examples of fibres originating as hairs borne on the seeds or inner walls of the fruit, where each fibre consists of a single, long, narrow cell. Flax, hemp, jute, and ramie (*qq.v.*) are bast fibres, occurring in the inner bast tissue of certain plant stems and made up of overlapping cells. Abaca, henequen, and sisal (*qq.v.*) are fibres occurring as part of the fibrovascular system of the leaves. Chemically, all vegetable fibres consist mainly of cellulose, although they also contain varying amounts of such substances as hemicellulose, lignin, pectins, and waxes that must be removed or reduced by processing. The animal fibres consist exclusively of proteins and, with the exception of silk, constitute the fur or hair that serves as the protective epidermal covering of animals. Silk filaments are extruded by the larvae of moths and are used to spin their cocoons.

With the exception of mineral fibres, all natural fibres have an affinity for water in both liquid and vapour form. This strong affinity produces swelling of the fibres connected with the uptake of water, which facilitates dyeing in watery solutions.

Unlike most synthetic fibres, all natural fibres are nonthermoplastic—that is, they do not soften when heat is applied. At temperatures below the point at which they will decompose, they show little sensitivity to dry heat, and there is no shrinkage or high extensibility upon heating, nor do they become brittle if cooled to below freezing. Natural fibres tend to yellow upon exposure to sunlight and moisture, and extended exposure results in loss of strength.

All natural fibres are particularly susceptible to microbial decomposition, including mildew and rot. Cellulosic fibres are decomposed by aerobic bacteria (those that live only in oxygen) and fungi. Cellulose mildews and decomposes rapidly at high humidity and high temperatures, especially in the absence of light. Wool and silk are also subject to microbial decomposition by bacteria and molds. Animal fibres are also subject to damage by moths and carpet beetles; termites and silverfish attack cellulose fibres. Protection against both microbial damage and insect attacks can be obtained by chemical modification of the fibre substrate; modern developments allow treatment of natural fibres to make them essentially immune to such damage.

natural gas, colourless, highly inflammable gaseous hydrocarbon consisting primarily of methane and ethane. It is a type of petroleum that commonly occurs in association with crude oil.

A brief treatment of natural gas follows. For full treatment, *see* MACROPAEDIA: Fuels, Fossil; Industries, Extraction and Processing. For comparative statistical data on natural-gas production and reserves, *see* MICROPAEDIA: mining (table).

Besides methane and ethane, two volatile hydrocarbons that are gaseous under the normal atmospheric conditions at the surface of a well, natural gas may also contain heavier hydrocarbons such as propane, butane, pentane, and hexane, some of which condense at the surface and hence are known as natural-gas liquids. Other gases that frequently occur along with the gaseous hydrocarbons include carbon dioxide, hydrogen, hydrogen sulfide, nitrogen, and helium and argon.

Natural gas is frequently found with or near accumulations of oil because the same geologic conditions are favourable for generating both gaseous and liquid hydrocarbons. Most of the constituents of natural gas come from organic matter (the remains of land and aquatic plants) in sediments that have been transformed through geologic processes over extremely long periods of time. The gas that eventually resulted from these natural processes has become entrapped in reservoirs distributed in the Earth's strata.

Producers obtain natural gas by extracting it through wells drilled into the Earth. Some natural gases can be used as they are produced at the well, without any refinement, but most require processing. Generally, this consists of condensing the less volatile hydrocarbons such as propane and butane (yielding large quantities of liquefied petroleum gas; *q.v.*) and removing such undesirable constituents as water vapour, carbon dioxide, hydrogen sulfide, and other sulfur compounds. The remaining gas, consisting almost entirely of methane, is transported either in its naturally gaseous state by pipeline or, after liquefaction by cooling to −160° C (−256° F), by tankers. Liquefied natural gas (*q.v.*) occupies only about $^{1}/_{600}$ of the volume of the gas.

Although natural gas has been used since ancient times, it did not become an important source of energy until the 1930s, when improved pipeline technology allowed natural gas to compete with town gas, produced from coal, in the United States. Since that time, natural gas has been exploited increasingly as a residential and industrial fuel and as a chemical feedstock, particularly since the oil crises of the 1970s. Discoveries of major natural-gas fields in western Europe, Russia, North Africa, and the Middle East have contributed to this trend.

Natural History, American Museum of: *see* American Museum of Natural History.

Natural History Museum, formerly BRITISH MUSEUM (NATURAL HISTORY), British natural science museum that has national and international responsibilities for taxonomic and associated research based on its outstanding collection of specimens and its extensive libraries. It is located in South Kensington, London.

The museum was formerly an integral part of the British Museum, which originated in 1753 when the government acquired the collections of Sir Hans Sloane. Under the superintendency of Richard Owen, the natural history collections were moved to the current premises, which opened to the public in 1881. Designed especially for the purpose by Alfred Waterhouse, the building is an outstanding example of Victorian Romanesque architecture. It has been extended a number of times, mainly to provide storage and facilities for the museum's services. By act of Parliament in 1963, the Natural History Museum gained its own board of trustees and became fully independent of the British Museum. In 1986 the trustees took over responsibility for the adjacent Geological Museum, to which there is now direct access from the Natural History Museum. There is also a branch museum at Tring, Hertfordshire, 30 miles (50 km) northwest of London.

The museum's collections comprise almost 70 million specimens from all parts of the world. Among these are a large number of "type specimens," plants and animals from which a species has first been described and named. There are also highly significant historical collections, such as those of James Cook resulting from his expeditions to the Pacific and of Charles Darwin from his voyage on HMS *Beagle*. The collections are organized in departments of botany, entomology, mineralogy, paleontology, and zoology; a subdepartment of ornithology is based at Tring. Despite the academic nature of its work, the museum presents a number of popular displays on such subjects as the Earth, ecology, the origin of species, dinosaurs, mammals, and human biology.

natural law, in philosophy, system of right or justice held to be common to all humankind and derived from nature rather than from the rules of society, or positive law. Throughout the history of the concept, there have been disagreements over the meaning of natural law and over its relation to positive law.

Aristotle held that what was "just by nature" was not always the same as what was "just by law"; that there was a natural justice valid everywhere with the same force and "not existing by people's thinking this or that"; and that appeal could be made to it from the positive law. He drew his instances of the natural law, however, chiefly from his observation of the Greeks in their city-states, with their subordination of women to men, of slaves to citizens, and of barbarians to Hellenes. The Stoics, on the other hand, conceived an entirely egalitarian law of nature in conformity with the "right reason," or Logos, inherent in the human mind. The Roman jurists paid lip service to this notion, and St. Paul seems to reflect it when he writes of a law "written in the hearts" of the Gentiles (Romans 2:14–15).

St. Augustine of Hippo took up the Pauline mention and developed the idea of man having lived freely under the natural law before his fall and his subsequent bondage under sin and the positive law.

St. Thomas Aquinas propounded an influential systematization. The eternal law of the divine reason, he maintained, though it is unknowable to us in its perfection as it is in God's mind, is yet known to us in part not only by revelation but also by the operations of our reason. The law of nature, which is "nothing else than the participation of the eternal law in the rational creature," thus comprises those precepts that humankind is able to formulate, namely, the preservation of one's own good, the fulfillment of "those inclinations which nature has taught to all animals," and the pursuit of the knowledge of God. Human law must be the particular application of the natural law.

Other scholastic philosophers, for instance John Duns Scotus, William of Ockham, and, especially, Francisco Suárez, emphasized the divine will instead of the divine reason as the source of law. This "voluntarism" influenced the Roman Catholic jurisprudence of the Counter-Reformation, but the Thomistic doctrine was later revived and reinforced to become the main philosophical ground for the papal exposition of natural right in the social teaching of Leo XIII and his successors.

The epoch-making appeal of Hugo Grotius to the natural law belongs to the history of jurisprudence. Grotius insisted on the validity of the natural law "even if we were to suppose . . . that God does not exist or is not concerned with human affairs." A few years later Thomas Hobbes was arguing not from the "state of innocence" in which man had lived in the biblical Eden but from a savage "state of nature" in which men, free and equal in rights, were each one at solitary war with every other. After discerning the right of nature (*jus naturale*) to be "the liberty each man hath to use his own power for the preservation of his own nature, that is to say, of life," Hobbes defines a law of nature (*lex naturalis*) as "a precept of general rule found out by reason, by which a man is forbidden to do that which is destructive of his life" and then enumerates the elementary rules on which peace and society can be established. Grotius and Hobbes thus stand together at the head of that "school of natural law" which, in accordance with the tendencies of the Enlightenment, tried to construct a whole edifice of law by rational deduction from a fictitious "state of nature" followed by a social contract. In England, John Locke departed from Hobbesian pessimism to the extent of describing the state of nature as a state of society, with free and equal men already observing the natural law. In France, where Montesquieu had argued that natural laws were presocial and were superior to those of religion and of the state, Jean-Jacques Rousseau postulated a savage who was virtuous in isolation and actuated by two principles "prior to reason," self-preservation and compassion (innate repugnance against the sufferings of others).

The Declaration of Independence of the United States refers only briefly to "the Laws of Nature" before citing equality and other "unalienable" rights as "self-evident." The French Declaration of the Rights of Man and of the Citizen asserts liberty, property, security, and resistance to oppression as "imprescriptible natural rights." The philosophy of Immanuel Kant renounced the attempt to know nature as it really is, yet allowed the practical or moral reason to deduce a valid system of right with its own purely formal framework; and Kantian formalism contributed to the 20th-century revival of naturalistic jurisprudence.

On the level of international politics in the 20th century, the assertion of human rights was the product rather of an empirical search for common values than of any explicit doctrine about a natural law.

natural resources, conservation of: *see* conservation.

natural selection, process that results in the adaptation of an organism to its environment by means of selectively reproducing changes in its genotype, or genetic constitution.

A brief treatment of natural selection follows. For full treatment, *see* MACROPAEDIA: Evolution, The Theory of.

In natural selection, those variations in the genotype that increase an organism's chances of survival and procreation are preserved and multiplied from generation to generation at the expense of less advantageous ones. Evolution often occurs as a consequence of this process. Natural selection may arise from differences in survival, in fertility, in rate of development, in mating success, or in any other aspect of the life cycle. All such differences result in natural selection to the extent that they affect the number of progeny an organism leaves.

Gene frequencies tend to remain constant from generation to generation when disturbing factors are not present. Factors that disturb the natural equilibrium of gene frequencies include mutation, migration (or gene flow), random genetic drift, and natural selection. A mutation is a spontaneous change in the gene frequency that takes place in a population and occurs at a low rate. Migration is a local change in gene frequency when an individual moves from one population to another and then interbreeds. Random genetic drift is a change that takes place from one generation to another by a process of pure chance. Mutation, migration, and genetic drift alter gene frequencies without regard to whether such changes increase or decrease the likelihood of an organism surviving and reproducing in its environment. They are all random processes.

Natural selection moderates the disorganizing effects of these processes because it multiplies the incidence of beneficial mutations over the generations and eliminates harmful ones, since their carriers leave few or no descendants. Natural selection enhances the preservation of a group of organisms that are best adjusted to the physical and biological conditions of their environment and may also result in their improvement in some cases. *See also* evolution.

naturalism, in literature and the visual arts, late 19th- and early 20th-century movement that was inspired by adaptation of the principles and methods of natural science, especially the Darwinian view of nature, to literature and art. In literature it extended the tradition of realism, aiming at an even more faithful, unselective representation of reality, a veritable "slice of life," presented without moral judgment. Naturalism differed from realism in its assumption of scientific determinism, which led naturalistic authors to emphasize man's accidental, physiological nature rather than his moral or rational qualities. Individual characters were seen as helpless products of heredity and environment, motivated by strong instinctual drives from within and harassed by social and economic pressures from without. As such, they had little will or responsibility for their fates, and the prognosis for their "cases" was pessimistic at the outset.

Naturalism originated in France and had its direct theoretical basis in the critical approach of Hippolyte Taine, who announced in his introduction to *Histoire de la littérature anglaise* (1863–64; *History of English Literature*) that "there is a cause for ambition, for courage, for truth, as there is for digestion, for muscular movement, for animal heat. Vice and virtue are products, like vitriol and sugar." Though the first "scientific" novel was the Goncourt brothers' case history of a servant girl, *Germinie Lacerteux* (1864), the leading exponent of naturalism was Émile Zola, whose essay "Le Roman expérimental" (1880; "The Experimental Novel") became the literary manifesto of the school. According to Zola, the novelist was no longer to be a mere observer, content to record phenomena, but a detached experimenter who subjects his characters and their passions to a series of tests and who works with emotional and social facts as a chemist works with matter. Upon Zola's example the naturalistic style became widespread and affected to varying degrees most of the major writers of the period. Guy de Maupassant's popular story "The Necklace" heralds the introduction of a character who is to be treated like a specimen under a microscope. The early works of Joris-Karl Huysmans, of the German dramatist Gerhart

Hauptmann, and of the Portuguese novelist José Maria Eça de Queirós were based on the precepts of naturalism.

The Théâtre Libre was founded in Paris in 1887 by André Antoine and the Freie Bühne of Berlin in 1889 by Otto Brahm to present plays dealing with the new themes of naturalism in a naturalistic style with naturalistic staging. A parallel development occurred in the visual arts. Painters, following the lead of the realist painter Gustave Courbet, were choosing themes from contemporary life. Many of them deserted the studio for the open air, finding subjects among the peasants and tradesmen in the street and capturing them as they found them, unpremeditated and unposed. One result of this approach was that their finished canvases had the freshness and immediacy of sketches. Zola, the spokesman for literary naturalism, was also the first to champion Édouard Manet and the Impressionists.

Despite their claim to complete objectivity, the literary naturalists were handicapped by certain biases inherent in their deterministic theories. Though they faithfully reflected nature, it was always a nature "red in tooth and claw." Their views on heredity gave them a predilection for simple characters dominated by strong, elemental passions. Their views on the overpowering effects of environment led them to select for subjects the most oppressive environments—the slums or the underworld—and they documented these milieus, often in dreary and sordid detail. The drab palette of Vincent van Gogh's naturalistic painting "The Potato Eaters" (1885; Rijksmuseum, Amsterdam) was the palette of literary naturalism. Finally, they were unable to suppress an element of romantic protest against the social conditions they described.

As a historical movement, naturalism per se was short-lived; but it contributed to art an enrichment of realism, new areas of subject matter, and a largeness and formlessness that was indeed closer to life than to art. Its multiplicity of impressions conveyed the sense of a world in constant flux, inevitably junglelike, because it teemed with interdependent lives.

In American literature, naturalism had a delayed blooming in the work of Hamlin Garland, Stephen Crane, Frank Norris, and Jack London; and it reached its peak in the art of Theodore Dreiser. James T. Farrell's "Studs Lonigan" trilogy (1932–35) is one of the latest expressions of true naturalism.

naturalism, in philosophy, a theory that relates scientific method to philosophy by affirming that all beings and events in the universe (whatever their inherent character may be) are natural. Consequently, all knowledge of the universe falls within the pale of scientific investigation. Although naturalism denies the existence of truly supernatural realities, it makes allowance for the supernatural, provided that knowledge of it can be had indirectly—that is, that natural objects be influenced by the so-called supernatural entities in a detectable way.

Naturalism presumes that nature is in principle completely knowable. There is in nature a regularity, unity, and wholeness that implies objective laws, without which the pursuit of scientific knowledge would be absurd. Man's endless search for concrete proofs of his beliefs is seen as a confirmation of naturalistic methodology. Naturalists point out that even when one scientific theory is abandoned in favour of another, man does not despair of knowing nature, nor does he repudiate the "natural method" in his search for truth. Theories change; methodology does not.

While naturalism has often been equated with materialism, it is much broader in scope. Materialism is indeed naturalistic, but the converse is not necessarily true. Strictly speaking, naturalism has no ontological preference; *i.e.*, no bias toward any particular set of categories of reality: dualism and monism, atheism and theism, idealism and materialism are all per se compatible with it. So long as all of reality is natural, no other limitations are imposed. Naturalists have in fact expressed a wide variety of views, even to the point of developing a theistic naturalism.

Only rarely do naturalists give attention to metaphysics (which they deride), and they make no philosophical attempts to establish their position. Naturalists simply assert that nature is reality, the whole of it. There is nothing beyond, nothing "other than," no "other world" of being.

Naturalism's greatest vogue occurred during the 1930s and '40s, chiefly in the United States among philosophers such as F.J.E. Woodbridge, Morris R. Cohen, John Dewey, Ernest Nagel, and Sidney Hook.

naturalization, the act of investing an alien with the status of a national in a given state; it may be accomplished as the result of voluntary application, special legislative direction, marriage to a citizen, or parental action. Naturalization may also occur when one's home territory is annexed by a foreign power, to which one transfers one's citizenship.

The conditions under which the privilege of naturalization is granted vary from nation to nation. (International law, however, does impose some limits on the power of a state to naturalize persons, especially nonresidents.) In normal cases, the usual requirements for naturalization are a certain period of residence, which varies from 2 to 15 years, intention to reside permanently, a minimum age, capacity to act according to the law of the state of the former nationality or of the state applied to or of both, good character, physical and mental health, a sufficient command of the language of the prospective adopting country, ability to earn a livelihood or to support oneself, and evidence that, upon naturalization, the applicant will lose his former nationality or has taken steps to renounce it.

nature, law of, in logic, a stated regularity in the relations or order of phenomena in the world that holds, under a stipulated set of conditions, either universally or in a stated proportion of instances. For the philosophical law of nature, *see* natural law.

Laws of nature are of two basic forms: (1) a law is universal if it states that some conditions, so far as are known, invariably are found together with certain other conditions; and (2) a law is probabilistic if it affirms that, on the average, a stated fraction of cases displaying a given condition will display a certain other condition as well. In either case, a law may be valid even though it obtains only under special circumstances or as a convenient approximation. Moreover, a law of nature has no logical necessity; rather, it rests directly or indirectly upon the evidence of experience.

Laws of universal form must be distinguished from generalizations, such as "All chairs in this office are gray," which appear to be accidental. Generalizations, for example, cannot support counterfactual conditional statements such as "If this chair had been in my office, it would be gray" nor subjunctive conditionals such as "If this chair were put in my office, it would be gray." On the other hand, the statement "All planetary objects move in nearly elliptical paths about their star" does provide this support. All scientific laws appear to give similar results. The class of universal statements that can be candidates for the status of laws, however, is determined at any time in history by the theories of science then current.

Several positive attributes are commonly required of a natural law. Statements about things or events limited to one location or one date cannot be lawlike. Also, most scientists hold that the predicate must apply to evidence not used in deriving the law: though the law is founded upon experience, it must predict or help one to understand matters not included among these experiences. Finally, it is normally expected that a law will be explainable by more embracing laws or by some theory. Thus, a regularity for which there are general theoretical grounds for expecting it will be more readily called a natural law than an empirical regularity that cannot be subsumed under more general laws or theories.

Universal laws are of several types. Many assert a dependence between varying quantities measuring certain properties, as in the law that the pressure of a gas under steady temperature is inversely proportional to its volume. Others state that events occur in an invariant order, as in "Vertebrates always occur in the fossil record after the rise of invertebrates." Lastly, there are laws affirming that if an object is of a stated sort it will have certain observable properties. Part of the reason for the ambiguity of the term law of nature lies in the temptation to apply the term only to statements of one of these sorts of laws, as in the claim that science deals solely with cause and effect relationships, when in fact all three kinds are equally valid.

nature reserve, area set aside by a government for the purpose of preserving certain animals, plants, or both. A nature reserve differs from a national park (*q.v.*) in that the latter protects land and wildlife for public enjoyment, whereas a nature reserve protects animals for their own sake.

Endangered species are often kept in reserves, away from the hunters who brought them close to extinction. In the United States, numerous wildlife refuges have served this purpose, especially with respect to birds. Nature reserves are also numerous in Europe, India, Indonesia, and some African countries.

The origin of modern nature reserves lies in medieval times, when landowners established game preserves for the protection of animals that they hunted. The idea of protecting animals simply to keep them from dying out did not arise until the 19th century.

Nāṭya-śāstra, in full BHĀRATA NĀṬYAŚĀSTRA, detailed treatise and handbook on dramatic art that deals with all aspects of the classical Sanskrit theatre. It is believed to have been written before the 3rd century by the mythic Brahman sage and priest Bharata.

Its many chapters contain detailed treatment of all the diverse arts that are embodied in the classical Indian concept of the drama, including dance, music, poetics, and general aesthetics. Its primary importance lies in its justification of Indian drama as a vehicle of religious enlightenment.

nauarch, in ancient Greece, an admiral or supreme commander of the navy, used as an official title primarily in Sparta in the late 5th and early 4th centuries BC. The Spartan nauarch could hold office only once, for a period of one year, and being subject to the highest magistrates, the ephors, could be deposed if proved incompetent. Acting independently of the kings and hampered by no colleague, however, the nauarch exercised considerable power and influence.

Naudé, Gabriel (b. Feb. 2, 1600, Paris, Fr.—d. July 30, 1653, Abbeville), French physician and librarian, considered the first important theoretician of modern library organization. His treatise, *Avis pour dresser une bibliothèque* (1627; *Instructions Concerning Erecting of a Library*), was the first important study of library science.

Naudé studied medicine at Paris and Padua and practiced after 1626, but his first love was books and libraries. In 1629 he was called to Rome as librarian to Cardinal Bagni and later Cardinal Barberini. He had occasion to expose a falsely attributed book for Cardinal Richelieu, who then called him to Paris as his own librarian, and got him the honorary title of physician to King Louis XIII. He became librarian to Cardinal Mazarin in 1643, when the latter succeeded Richelieu as first minister of France. For Mazarin he collected some 40,000 books from all over Europe to constitute the Bibliothèque Mazarine, widely acclaimed as the best library of the period. In accord with the cardinal's wishes and his own, Naudé made the library's motto, "Come in, all you who desire to read"; the library was free and open to all. Adapting a library cataloging system devised earlier, Naudé used the following classifications for books in the Bibliothèque: theology, medicine, law, history, philosophy, mathematics, and humanities and the appropriate subdivisions. The Bibliothèque Mazarine was dispersed during the uprisings of the Fronde (1648–53), and Naudé was exiled to Sweden. He died en route to Stockholm.

Naugatuck, town (township) and borough, New Haven county, southwestern Connecticut, U.S. It lies along the Naugatuck River just south of Waterbury.

First settled in about 1704 by Samuel Hickox, it was called Judd's Meadows and South Farms. The town of Naugatuck (Algonquian: "one large tree," in reference to a landmark tree) originated as Salem Parish, or Salem Bridge. It was incorporated from parts of Waterbury, Bethany, and Oxford in 1844. The industrial borough of Naugatuck (established 1893) became coextensive with the town in 1895. Naugatuck includes Union City and part of the Naugatuck State Forest.

Abundant waterpower led to an early transition from farming to manufacturing, and the town's basic rubber industry was established in 1843 by Charles Goodyear, who perfected the vulcanization process. The economy is now well diversified to include the production of chemicals, plastics, metals, machinery, clocks, watches, and instruments. Pop. (1990) 30,625.

Naujan Lake, lake on the northeastern coastal plain of Mindoro, Philippines. It is the Philippines' fifth largest lake, with an area of 30 square miles (79 square km). The lake is 8.5 miles (14 km) long and 4 miles (6 km) wide and is a productive freshwater fishing site. It is the central feature of Naujan Lake National Park (established in 1956), which comprises a 5,377-acre (2,175-hectare) area of marshes and forest that serve as breeding grounds for marsh birds, crocodiles, and sailfinned lizards. Naujan Lake was formerly a popular hunting and sport-fishing area; fishing rights have been retained only by neighbouring towns, for whom the lake is a source of livelihood.

Naukratis, also spelled NAUCRATIS, ancient Greek settlement in the Nile River delta, on the Canopic (western) branch of the river. An *emporion* ("trading station") with exclusive trading rights in Egypt, Naukratis was the centre of cultural relations between Greece and Egypt in the pre-Hellenistic period. The station was established by Milesians in the 7th century BC, but Greeks from other cities also settled there. It flourished throughout the classical period but declined after Alexander's conquest of Egypt and the foundation of Alexandria (332).

The site of Naukratis was discovered in 1884 by W.M. Flinders Petrie and excavated by Petrie and Ernest Gardner (1884–86) and by D.G. Hogarth (1899, 1903). They uncovered dedications to deities and Greek pottery that threw light on the early history of the Greek alphabet and the commercial activity of various Greek states, especially in the 6th century BC.

naumachia (Latin, from Greek: "naval battle"), plural NAUMACHIAE, in ancient Rome, a mimic sea battle and the specially constructed basin in which such a battle sometimes took place. These entertainments also took place in flooded amphitheatres. The opposing sides were prisoners of war or convicts, who fought until one side was destroyed.

The earliest naumachia recorded (46 BC) represented an engagement between the Egyptian and Tyrian fleets and was given by Julius Caesar on an artificial lake that was constructed by him in the Campus Martius. In 2 BC Augustus staged a naumachia between Athenians and Persians in a basin newly constructed on the right bank of the Tiber at Rome. In the naumachia arranged by Claudius on Lake Fucino in AD 52, 100 ships and 19,000 men participated.

Naumann, Friedrich (b. March 25, 1860, Störmthal, Prussia [Germany]—d. Aug. 24, 1919, Travemünde, Ger.), political and social theorist, publicist, and reformer who became one of the most influential partisans of German liberalism combined with imperialism.

As a young pastor, Naumann had joined the Christian Social movement of the Prussian court chaplain Adolf Stoecker, but he was eventually repelled by Stoecker's social and theological conservatism. Through 1893 he shaped the journal *Die Hilfe* ("Assistance") into a forum for his ideas and, under the influence of the young sociologist Max Weber, founded the National Social Union (1896), an organization that combined a program of democratic and social reform with a call to national strength. After 1903, however, having failed to establish a political party based on his association, he joined the Freisinnige Vereinigung (Liberal Union)—later (1910) merged with the Progressive People's Party—and in 1907 was elected to the Reichstag (parliament).

During World War I Naumann was strongly opposed to a policy of German annexation of occupied territories, but his book *Mitteleuropa* (1915) provided the vision of a postwar German cultural and economic imperium in central Europe. In 1919 he was one of the founders of the Democratic Party, and he served as the party's leader until his death. He was a man of considerable intelligence and great personal integrity whose ideas exerted a wide-ranging influence over a whole generation of German liberal intellectuals.

Naumburg, city, Saxony-Anhalt *Land* (state), east-central Germany. It lies along the Saale River, near the mouth of the Unstrut River, southwest of Halle. Founded by the margraves of Meissen in about 1000, Naumburg was granted to the bishop of Zeitz when he transferred his seat there in 1028. It received town rights in 1142. It was a member of the Hanseatic League in the 15th century but fell to Saxony in 1564 and to Prussia in 1815. Naumburg's Romanesque and Gothic 13th–14th-century Cathedral of SS. Peter and Paul is notable, and there are remains of four churches from the 16th to the 18th century. Naumburg's industries include the manufacture of foodstuffs, textiles, machinery, and toys. Pop. (1988 est.) 31,784.

The Cathedral of SS. Peter and Paul at Naumburg, Ger.

W. Krammisch—Bruce Coleman Inc./EB Inc.

Nauplia, Modern Greek NÁVPLION, chief town of the *nomós* (department) of Argolís, in the Peloponnese, Greece, at the head of the Gulf of Argolis. The port, southeast of Argos, sits on the north slope of twin crags; Itche (or Its) Kale (279 feet [85 m]), the western crag, forms a small peninsula in the bay and is the site of a Hellenic fortress, while the much higher Palamídhion (705 feet), with a Venetian castle, dominates the port from the southeast. The tiny island of Boúrtzi off Nauplia has a Venetian fortress, the Castel Pasqualigo (1471), which was briefly used as a tourist hotel.

Nauplia fell to Argos about 625 BC and thereafter played little part in classical history. In earlier Mycenaean times, however, it probably was the maritime outlet for Argos, for the name Nauplia means "naval station." The town revived in Byzantine times but in AD 1210 was captured by the Franks and became, with Argos, a fief of the duchy of Náxos. In 1388 it was bought by the Venetians, who called it Napoli di Romania. It repelled several Turkish sieges but fell in 1540, becoming the capital of the Turkish Morea (Peloponnese). In 1686 Venice recovered it and fortified the Palamídhion rock, but Venice lost control of Nauplia again in 1715 to the Turks, who held it until the Greeks captured it in 1822 during the War of Greek Independence. From 1829 to 1834 Nauplia was the seat of the Greek government. In 1941 the British lost several

Venetian fortress on the island of Boúrtzi, off Nauplia, Greece

Farrell Grehan—Photo Researchers/EB Inc

large ships in the gulf while evacuating their forces through the port.

With its Byzantine, Frankish, and Venetian castles and fortifications, Nauplia retains a strong medieval character. On one corner of Síndagma (Constitution) Square is the mosque of Vouleftiko, in which the first assembly of free Greece met. Pop. (1991 prelim.) 11,453.

Nauru, Nauruan NAOERO, officially REPUBLIC OF NAURU, island republic in the southwestern Pacific Ocean, about 2,580 miles (4,160 km) southwest of Hawaii. Oval in shape, it has a circumference of 12 miles (19 km) and an area of 8 square miles (21 square km). Nauru's capital is Yaren administrative centre. Pop. (1994 est.) 10,200.

A brief treatment of Nauru follows. For full treatment, *see* MACROPAEDIA: Pacific Islands.

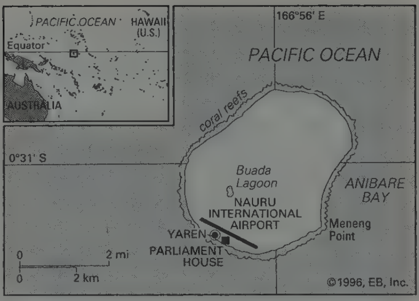
For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Nauru is an uplifted coral formation with a central plateau between 100 and 200 feet (30 and 60 m) high. The plateau is covered with beds of phosphate rock that are derived from rich deposits of guano. Buada Lagoon on the island is a depression that is filled intermittently with seepage water. Below the plateau a thin strip of level, fertile land encircles the island and is the major zone of human settlement and agriculture. Beyond a sandy beach is a fringing reef. The island's smooth circular coastline offers no usable harbours. Nauru is generally hot and humid and has daytime temperatures averaging 82° F (28° C). The annual rainfall averages 81 inches (2,060 mm), although occasionally there are severe droughts. Erratic rainfall causes periodic water shortages, necessitating occasional imports of potable water. The island's very porous soil limits vegetation mainly to coconut palms, pandanus, and various types of brush and scrub hardwood. Most plant life is restricted to the narrow coastal strip.

The people. About three-fifths of Nauru's population are indigenous Nauruans of Polynesian, Micronesian, and Melanesian ancestry. Other Pacific islanders constitute one-fourth of the population and include people from Kiribati, Tuvalu, the Philippines, and other islands. Chinese and Europeans make up the remainder. Many of the foreigners are migrant mine workers. The national language, Nauruan, is a distinct dialect blending Polynesian, Micronesian, and Melanesian elements; English is widely used and is taught in island schools. Christianity is the predominant religion. The population is concentrated almost entirely along the coastal strip.

The economy. Nauru's economy is almost exclusively based on the mining, processing, and export of phosphate. The country's gross national product (GNP) per capita is among the highest in the Pacific and the world. Agriculture is restricted to the coastal strip and occupies about 15 percent of the total land area. Coconuts, bananas, pineapples, and vegetables, as well as pigs and chickens, are raised, but these do not meet domestic needs. Fishing likewise is limited to satisfying local demand.

The mining of phosphate dominates the economy. This salt, which occurs on Nauru in the world's highest concentration, is strip-mined from the plateau and trucked to the railhead for primary crushing, then transported by narrow-gauge railway to a treatment plant, where the phosphate is dried, crushed further, and refined by calcination at high temperatures. The product is then loaded by a complex system of conveyor belts and cantilevers onto ships that must anchor to buoys beyond the reef. The state-controlled Nauru Phosphate Corporation operates the industry, and revenues from phosphate sales are divided, with about half the profit going to the national government and half being apportioned among Nauruan landowners, a long-term trust fund, and local government. Exhausted mine areas are being reclaimed using trash and waste, with the ultimate goal of their conversion to agriculture. It is predicted that, at current production rates, Nauru's phosphate deposits will be depleted by the year 2000. With fishing as the only potential industry to replace mining, the Nauruan government has invested its sizable profits from phosphate mining in shipping and aviation services, real estate in Australia, and other ventures that are expected to yield long-term returns.



Nauru

Most of Nauru's native labour force is employed in government or government-related jobs. Contract migrant labourers are hired for one-year renewable terms to work the phosphate mine. These workers are not eligible for residency, however, and advancement in the phosphate company is limited to Nauruans. By choice, many Nauruans are unemployed. The island's coastal-ring road is entirely paved, and there is an international airport near Yaren. The country's chief trading partners are Australia, New Zealand, the United Kingdom, and Japan.

Government and social conditions. Under the 1968 constitution, Nauru's chief of state, the president, is elected by the 18 members of the Nauruan Parliament, who are themselves elected every 3 years. The president appoints a cabinet of five or six members. Two modern hospitals and various clinics provide free medical and dental care, and education is free and compulsory between the ages of 6 and 16.

History. As suggested by its unique, blended language, Nauru probably was settled at differing periods by drift voyages from other Pacific islands. In 1798 a British navigator, John Fearn of the ship *Hunter,* was the first European to visit the island; he named it Pleasant, because of the friendly welcome extended by its inhabitants. Whalers often called there from the 1830s, and a number of beachcombers settled on the island. European-supplied firearms helped promote incessant interclan warfare between 1878 and 1888, leading the island's German settlers to request its incorporation in the German Marshall Islands Protectorate; this was finally granted in 1888. The island gradually became known by its native name, Nauru. Protestant missionaries arrived in 1899, with Roman Catholics following in 1903. After the discovery of phosphate on the island in 1899, a British company began in 1906 to exploit the deposits, dividing the profits with a German firm. Australians occupied Nauru in 1914 at the start of World War I. In 1919 the League of Nations granted Nauru as a joint mandate to Great Britain, New Zealand, and Australia. During World War II the Japanese occupied the island (1942–45) and forcibly deported 1,200 Nauruans, two-thirds of the population, of whom only 737 returned on Jan. 31, 1946.

Nauru was made a United Nations trust territory under Australian administration in 1947. Nauruans gained control of the phosphate mining by agreement and sale in 1967. The Nauru Legislative Council was created in 1965 and first elected in 1966. Nauru gained complete independence in 1968 and elected its first president. It became an associate member of The Commonwealth in 1969.

nausea (from Greek *nausia,* "seasickness"), feeling of discomfort in the pit of the stomach that is associated with a revulsion for food and an expectation that vomiting will follow, as it often does. Nausea results from the irritation of nerve endings in the stomach or duodenum, which in turn stimulate the centres in the brain that control nausea and vomiting. Nausea can be a symptom of disorders ranging from the trivial to the serious. It is most commonly caused by indigestion, by motion sickness, or by pregnancy. Nausea can result from eating too rapidly or from experiencing emotional stress during or just after a meal. The nausea experienced in seasickness and airsickness reflects a disturbance of the semicircular canals of the inner ear, which are the organs of balance. The nausea sometimes experienced in the early months of pregnancy is called morning sickness and usually occurs at breakfast time. It recurs daily for two or three weeks and then disappears without any treatment. Nausea may also arise from any of the causes of an abnormal lack of appetite—for example, shock, pain, intracranial pressure, badly fitting dentures, or disease of the liver or of the kidneys. Simple nausea is relieved by vomiting. *See also* vomiting.

Nauset, also called CAPE INDIANS, an Algonquian-speaking Indian tribe that occupied most of what is now Cape Cod, in Massachusetts. The Nauset probably came into contact with whites at an early date because of their location, and Samuel de Champlain is known to have encountered them in 1606. Their subsistence was probably based on fishing, but they are also known to have cultivated corn (maize) and beans. They were semisedentary, moving between fixed sites with seasonal changes in food resources.

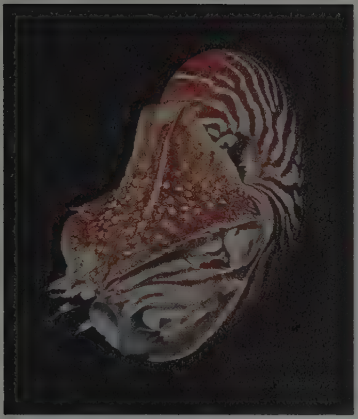
Although hostile to the Plymouth colonists at first, the Nauset became their friends, supplying food to the starving colonists in 1622. Most Nauset remained loyal to the settlers throughout King Philip's War. Many converted to Christianity before the war, and by 1710 all were organized into churches. In that year many died of fever, and by 1802 only four Nauset were said to survive. Other Indian tribes, however, driven from their own territories, had joined the Nauset, and a number of mixed descendants survive.

Naushahra (Pakistan): *see* Nowshera.

nautilus, plural NAUTILUSES, or NAUTILI, either of two genera of cephalopod mollusks: the pearly, or chambered, nautilus (*Nautilus*), to which the name properly applies; and the paper nautilus (*Argonauta*), a cosmopolitan genus related to the octopus.

The pearly nautilus has a smooth, coiled shell about 25 cm (10 inches) in diameter, consisting of about 36 chambers, the outermost of which it lives in. The chambers are connected by a tube that adjusts the gases in the chambers, allowing the shell to act as a float. *Nautilus* swims about the ocean bottom in search of shrimp or other prey. It uses up to 94 small, suckerless, contractile tentacles for capturing prey. *Nautilus,* the last surviving genus of the ancient order Nautiloidea, is important in paleontology for dating the strata in which it appears.

The paper nautilus is usually found near the surface of tropical and subtropical seas feeding on plankton; the females differ from other members of the order Octopoda in possessing a thin, unchambered, coiled shell, formed by large flaps, or membranes, on the dorsal arms, in which the eggs are laid and the young hatch. Large shells, which attain a diameter of 30 to 40 cm, are very fragile. The male is only about 1/20 the size of the female, possesses no



Chambered nautilus (*Nautilus*)
Douglas Faulkner

shell, and was once thought to be parasitic in the shell of the female. The female resembles the genus *Octopus* in other features.

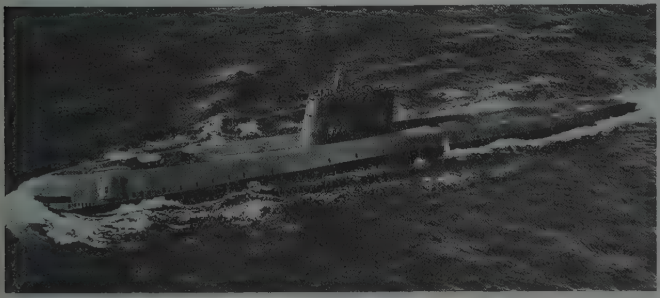
Nautilus, any of at least three historic submarines (including the world's first nuclear-powered vessel) and a fourth submarine famous in science fiction.

The American engineer Robert Fulton built one of the earliest submersible craft in 1800 in France under a grant from Napoleon. A collapsible mast and sail provided surface propulsion, and a hand-turned propeller drove the craft when submerged. A notable feature was the copper sheets over the iron-ribbed hull. Despite some experimental successes in diving and even in sinking ships, Fulton's *Nautilus* failed to attract development support from either the French or the British.

In 1870 Jules Verne's classic science-fiction novel *Twenty Thousand Leagues Under the Sea* was published, describing the voyage of Captain Nemo's *Nautilus* submarine.

In 1886 Andrew Campbell and James Ash of England built a *Nautilus* submarine driven by electric motors powered by a storage battery; it augured the development of the submarine powered by internal-combustion engines on the surface and by electric-battery power when submerged.

The name *Nautilus* was chosen for the U.S. Navy vessel launched Jan. 21, 1954, as the first submarine capable of prolonged, instead of temporary, submersion. Powered by propulsion turbines that were driven by steam produced by a nuclear reactor, the *Nautilus* was capable of traveling submerged at speeds in excess of 20 knots and furthermore could maintain such a speed almost indefinitely. Much larger than the diesel-electric submarines used during World War II, the *Nautilus* was 319 feet (97 m) long and displaced 3,180 tons. On Aug. 1–5, 1958, the *Nautilus,* under Commander William R. Anderson, made a historic underwater cruise from Point Barrow, Alaska, to the Greenland Sea, passing completely beneath the thick ice cap of the North Pole. The *Nautilus* set many standards for future nuclear submarines, including extensive protection against possible radiation contamination and auxiliary diesel-electric power. The vessel was decommissioned in 1980 and went on exhibit, beginning in 1985, at the U.S.S. Nautilus Memorial and Submarine Force Museum in New London, Conn.



USS *Nautilus*
By courtesy of the U.S. Navy

Nauvoo, city, Hancock county, western Illinois, U.S. It lies along the Mississippi River, 10 miles (16 km) south-southwest of Fort Madison, Iowa. Nauvoo's significance in Illinois history is especially related to the Mormon era. When the Mormons arrived in 1839, there were already a few buildings in what was called Commerce; renamed Nauvoo by their leader Joseph Smith, it grew to be a Mormon community of about 20,000. Following the exodus of the Mormons to Utah in 1846 (after the death of Smith and his brother at the hands of a mob at the jail in nearby Carthage), Nauvoo was settled temporarily by the Icarians, a group of socialists, chiefly of French origin.

Joseph Smith Mansion House, Nauvoo, Ill.
By courtesy of the Illinois Department of Commerce and Community Affairs

Nauvoo Historic Site includes the Joseph Smith Homestead (1802), the original log hut of the Smith family; the Joseph Smith Mansion House (1843), built as Smith's permanent residence; the Brigham Young Home; and the Nauvoo Historic Society Museum.

Wine and blue-cheese making, the milling of whole wheat flour, and tourism are the chief sources of income. There are extensive vineyards and apple orchards in the area. St. Mary's Priory, motherhouse of the Benedictine order of nuns, and St. Mary's Academy, a Roman Catholic boarding school for girls, were established in 1874 in the city. Nauvoo State Park is nearby. Inc. 1841. Pop. (1992 est.) 1,122.

Navāʾī, ʿAlī Shīr, in full MIR ʿALĪ SHĪR NAVĀʾĪ, Navāʾī also spelled NEVĀʾĪ (b. 1441, Herāt, Timurid Afghanistan—d. Jan. 3, 1501, Herāt), Turkish poet and scholar who was the greatest representative of Chagatai Turkish literature (written in an eastern Turkic dialect).

Born into an aristocratic military family, he studied in Herāt and in Meshed. After his school companion, the sultan Ḥusayn Bayqarah, succeeded to the throne of Herāt, Navāʾī held a number of offices at court. He was also a member of the Naqshbandī dervish order, and under his master, the renowned Persian poet Jāmī, he read and studied the works of the great mystics. As a philanthropist, he was responsible for much construction in the city. His other interests included miniature painting, music, architecture, and calligraphy.

Navāʾī devoted the latter part of his life to poetry and scholarship, writing first in Persian and then in Chagatai. He left four great divans, or collections of poems, belonging to different phases of his life. He also wrote five romances based on conventional themes in Islāmic literature, such as his famous rendition of the well-known story of Farhād and Shīrīn, in 12,000 lines. Among his main prose works are the *Muhakamat al-lugatayn* (*The Trial of the Two Languages*), a comparison of Turkish and Persian; the *Majālis an-nafāis* ("Séances of the Exquisite"), containing much autobiographical information and facts about the lives of Turkish poets; and *Mizan al-awzan* ("The Measure of Metres"), a treatise on Turkish prosody. Navāʾī's mastery of the eastern Turkic Chagataī language was such that it came to be known as "the language of Navāʾī."

Navajo, also spelled NAVAHO, the most populous of all Indian groups in the United States, with about 170,000 individuals in the late 20th century scattered throughout northwestern New Mexico, Arizona, and southeastern Utah. The Navajo speak an Apachean language, which, like the language of their Apache cousins, is classified in the Athabascan family. It is uncertain when the Navajo and Apache migrated to the Southwest from Canada, where most other Athabascan-speaking Indians still live, but it was probably between AD 900 and 1200. Those early Navajo would have borne more resemblance to contemporary Apache than to contemporary Navajo, because the Navajo came under the strong influence of the Pueblo Indians. These Pueblo influences included farming as the primary mode of subsistence, with a concomitant trend toward a sedentary existence. In historical times, farming has been supplemented—and, in some regions, superseded—by herding of sheep, goats, and cattle.

The Navajo resemble other Apachean peoples in their lack of a centralized tribal or political organization. Formerly, they were organized into small bands of related kinsmen, with local headmen. Similar groups, based on locality of residence rather than kinship, still exist, and many of these local groups have elected headmen. A Navajo local group is not a village or town but rather a collection of dwellings scattered over a wide area.

Navajo contacts with Pueblo Indians are recorded at least as early as the 17th century, when refugees from some of the Rio Grande Pueblos came to the Navajo after the Spanish suppression of the Pueblo Revolt. During the 18th century, some Hopi Indians left their mesas because of drought and famine and came to live with the Navajo, particularly in Canyon de Chelly in northeast Arizona. These Pueblo visits influenced the Navajo not only in agriculture but also in the arts. Painted pottery and the famous Navajo rugs, as well as elements of Navajo ceremonialism such as dry-sand painting, are all products of these contacts. Another famous Navajo craft, silversmithing, dates from the middle of the 19th century and was probably first learned from Mexican smiths.

The Navajo religious system was intricate. Some of the many myths related the emergence of the first people from various worlds beneath the surface of the earth; other stories justified the numerous rites that were performed. Some of these were simple rituals carried out by individuals or families for luck in travel, trade, and gambling and for protection of crops and herds. The more complex rites demanded a specialist, who was paid according to his skill and the length of the ceremonial. Most rites were primarily for curing bodily and psychiatric illness. In other ceremonies there were simply prayers or songs, and dry paintings might be made of pollen and flower petals. In some cases there were public dances and exhibitions at which hundreds or thousands of Navajo gathered. Many of the rites are still performed.

Although the Navajo never raided as extensively as the Apache, their raiding was serious enough to cause the U.S. government in 1863 to order Colonel Kit Carson to subdue them. This order resulted in the destruction of large amounts of crops and herds and the incarceration of about 8,000 Navajo, along with 400 Mescalero Apache, at Bosque Redondo, 180 miles (290 km) south of Santa Fe, N.M. This four-year (1864–68) captivity left a legacy of bitterness and distrust that has still not entirely disappeared.

The Navajo Reservation and government-allotted lands in the states of New Mexico, Arizona, and Utah today total more than 24,000 square miles (64,000 square km). The region, however, is mainly arid and generally will not support enough agriculture and livestock to provide a livelihood for everyone. Thousands earn their living as transient workers away from the Navajo country, and appreciable numbers have settled on irrigated lands along the lower Colorado River and in such places as Los Angeles and Kansas City, Mo. *Compare* Apache; Hopi; Pueblo Indians.

Navajo language, North American Indian language of the Athabascan family, spoken by the Navajo people of Arizona and New Mexico and closely related to Apache. Navajo is a tone language, meaning that pitch helps distinguish words. Nouns are either animate or inanimate. Animate nouns may be "speakers" (humans) or "callers" (plants and animals); inanimate nouns may be corporeal or spiritual. The Navajo fourth person is a grammatical category that enables the speaker to address someone who is present or within hearing distance without naming him or her; because names are thought to have power, the polite form avoids speaking another's name. Gender categories associate maleness with the static and femaleness with the active; thus "thought" (*Sá ah Naagháśi*) is male and "speech" (*Bik eh Hózhó*) is female. Some verb forms vary according to the physical shape of the direct object: for example, the verb form for holding a ball differs from that for holding a stick.

The Navajo language has been tenaciously preserved by its speakers.

Navajo National Monument, a complex of three historic cliff dwellings near the town of Tonalea in northeastern Arizona, U.S. Betatakin (Navajo: "Ledge House"), Keet Seel ("Broken Pottery"), and Inscription House are three of the best-preserved and most elaborate cliff dwellings known and occupy a total area of 360 acres (146 hectares). Keet Seel, the largest, was first discovered by whites in 1895. The three sites were made a national monument by presidential proclamation in 1909.

The dwellings were the principal home of the Kayenta Anasazi, a prehistoric people who lived there from about 1250 to 1300. The construction of the cliff dwellings was apparently the result of their evolution from hunters and gatherers to sedentary farmers, but they left because of climatic changes involving erosion and water shortages, which made farming impossible. The people probably moved to mesas to the south.

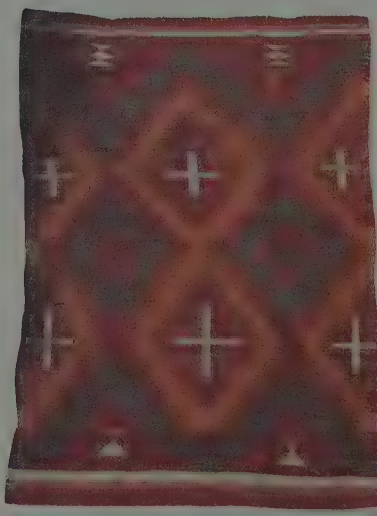
The 135 rooms of Betatakin are tucked into a cliffside alcove measuring 452 feet (138 m) high and 370 feet (113 m) wide. Also situated in a cliff alcove are the 160 rooms and 6 kivas (ceremonial houses) of Keet Seel. Inscription House (closed to the public since 1968) has 74 rooms. To visit the ruins, visitors must take guided tours led by park rangers.

Keet Seel cliff dwellings of the Kayenta Anasazi, Navajo National Monument, Arizona
Jeff Gnass

Navajo weaving, blankets and rugs made by the Navajo and thought to be some of the most colourful and best-made textiles produced by North American Indians. The Navajo, formerly a seminomadic tribe, settled in the southwestern United States in the 10th and 11th centuries and were well established by 1500. With a new life as a sedentary and agricultural people, the tribe began to practice weaving, which had been virtually unknown to them, learning from the Hopi how to build looms and construct fabrics on a large scale. The introduction of domestic sheep by Europeans revolutionized weaving by making a steady supply of wool available, and the Navajo began to raise sheep for wool.

The Hopi had limited their designs to striped patterns, but the Navajo introduced geometric shapes, diamonds, lozenges, and zig-zags. Symbolic representations of such phenomena as the elements, the seasons, and the times of day did not develop until about 1820. Mexican design influenced Navajo weaving.

Before 1800, Navajo blankets were largely made of natural-coloured wool—black, white, and a mixture of the two that produced gray; a limited amount of dyeing was done, with roots, herbs, and minerals from the rich soil of the area, primarily producing dark colours, like those of the Hopi. Shortly after the turn of the 19th century, however, red *bayeta* cloth purchased from the Spaniards was unraveled and the thread used to make Navajo textiles. The introduction of aniline dyes in the late 19th century led to a period in Navajo weaving characterized by bright and even gaudy designs. Vividly coloured yarns were used to weave into the rugs and blankets a broad range of decorative motifs based on commonplace modern objects; representations of automobiles, bottles, tomato cans, and airplanes, for example, found their way into the formerly dignified and restrained fabrics.


Traditional Navajo rug, *c.* 1900; Taylor Collection, Hastings, Eng.
Colin Taylor

More traditional, geometric designs subsequently regained their popularity and are once again the dominant patterns. Weaving remains a vital aspect of contemporary Navajo community life and of its economy.

naval academy: *see* military, naval, and air academies.

naval affairs: *see* military and naval affairs.

naval stores, products such as tar, pitch, turpentine, pine oil, rosin, and terpenes obtained from the pine and other coniferous trees, and originally used in maintaining wooden sailing ships. Naval stores are produced chiefly by the United States and France, with large amounts coming also from Greece, Spain, Portugal, and Mexico.

Gum naval stores are derived from the oleoresin, a fluid commonly called crude turpentine, that exudes from incisions made in the living trees. Wood naval stores are obtained by the chemical processing of deadwood.

Oleoresin, also called gum, or pitch, the raw material of gum naval stores, is a semifluid substance composed of resins dissolved in turpentine oil, its chief component being pinene. It is extracted from the pine by cutting through the sapwood into the heartwood of the tree, in which the resins accumulate, and collecting the exudate from the wound. From the cleansed and purified gum, turpentine is extracted by steam distillation, and the residual compounds harden into a pure, translucent, pale amber rosin.

Wood naval stores are derived from salvaged pinewood, such as tree stumps, and downwood, or lightwood, pine from which the bark and sapwood have fallen away in decay. Although methods of treating the wood vary, usually it is shredded and subjected to heat under pressure. The volatile components are driven off, condensed, and refined by fractional distillation; they yield wood turpentine and pine oil, the latter product unobtainable from the oleoresin of the living tree. The residual resin retained in the shredded wood is extracted by treatment with a hydrocarbon solvent. The resulting resinous solution is purified and the solvent evaporated to obtain wood rosin.

naval warfare, military operations conducted on, under, or over the sea. A nation's warships and other fighting craft, together with the personnel that operate them, are called a navy (*q.v.*).

Navan, Irish AN UAIMH, urban district and county seat of County Meath, Ireland. It lies at the confluence of the Rivers Boyne and Blackwater. The Great Motte, an imposing earthwork 52 feet (16 m) high, is on its western outskirts. The town was walled and fortified by Hugh de Lacy and later became an outpost of the English Pale (territory). At Donaghmore are remains of a 13th-century Celtic church and a round tower. Navan is a shopping and market centre; it manufactures furniture, carpets, and woolen goods. Lead and zinc deposits, discovered in 1970, are exploited nearby. Just northwest of Navan is Teltown Hill, site of an ancient royal residence, one of four built by the Irish king Tuathal. Pop. (1991 prelim.) 3,411.

navaratra, Sanskrit NAVARĀTRA ("nine nights"), in Hinduism, a festival of nine days occurring during the month of Asin, or Aśvina (September–October). It usually ends with the dasehra, or *daśahara,* celebration on the 10th day.

Among followers of the goddess Durgā, who are particularly predominant in Bengal and Assam, the Durgā-pūjā ("Rite of Durgā") is celebrated during this period. Special images of Durgā commemorating her victory over the buffalo-headed demon Mahiṣāsura are worshiped daily, and, on the 10th day (dasehra), they are taken in jubilant processions to nearby rivers or reservoirs for immersion in water. In addition to family feasting and visiting, the puja, or ritual, days are also celebrated with public concerts, recitations, plays, and fairs.

In other parts of India, the 10th day, dasehra, is associated with the victory of the god Rāma over the demon-king Rāvaṇa. In North India the Rām Līlā ("Play of Rāma") is the highlight of the festival. On successive nights different episodes of the epic poem the *Rāmāyaṇa* are dramatized by young actors elaborately costumed and masked; the pageant is always climaxed by the burning of huge effigies of the demons. Athletic tournaments and hunting expeditions are often organized.

Many other, lesser observances are associated with the festival of navaratra in varying ways across the country. On the first day of navaratra, a rite is celebrated in honour of the goddess of learning, Sarasvatī, in which she is worshiped together with the sacred books of the house; this is a favourite observance among the Bengali population of India. In parts of Mahārāshtra, the fifth day is given to the worship of the goddess Lalitā and is known as Lalitā-pañcamī ("Lalitā's Fifth Day").

Navarino (Greece): *see* Pylos.

Navarino, Battle of (Oct. 20, 1827), decisive naval engagement of the War of Greek Independence against Turkey. The battle was fought in the Bay of Navarin in the southwestern Peloponnese, between an Egyptian-Turkish fleet under Tahir Pasha and a combined British-French-Russian fleet under Admiral Sir Edward Codrington. The Egyptian-Turkish fleet (3 ships of the line, 15 frigates, and more than 50 smaller ships) was at anchor in the bay's harbour. The British-French-Russian fleet (totaling 11 ships of the line, 9 frigates, and 4 smaller ships), which had been sent to aid the Greek forces by intercepting Turkish supplies, met outside the harbour. Shortly after this fleet entered the harbour on October 20, the battle broke out. The superior European guns sent three-fourths of the Egyptian-Turkish fleet to the bottom and forced others aground. No European ships were sunk. Navarino was the last significant battle between wooden sailing ships. The Turkish defeat was so complete that within 10 months they began to evacuate Greece, an action that led to the creation of the independent Kingdom of Greece in 1832.

Navarre, Spanish NAVARRA, *comunidad autónoma* ("autonomous community") of northern Spain. It is roughly coextensive with the Spanish portion of the historical kingdom of Navarre and encompasses the modern *provincia* of Navarra. The autonomous community was established by the statute of autonomy of 1982. Navarre is bordered on the north by France.

History. The old kingdom of Navarre encompassed the modern autonomous community and extended north into the modern French *département* of Basses-Pyrénées. It was known as the kingdom of Pamplona until the last half of the 12th century. The city of Pamplona, the capital of present-day Navarre, was occupied by the Muslims after 711, but the Basque magnates of the region early achieved some autonomy, and about the year 798 one of them, Iñigo Arista, established himself as an independent ruler there and for a time accepted Frankish suzerainty. By the time of Garcia Iniguez (*c.* 860–880), this dynasty was strong enough to assume regal titles and to establish diplomatic and dynastic ties with the neighbouring Christian kingdom of Asturias. Under Sancho I Garcés (905–925), the rulers of Pamplona expanded their dominions south of the Ebro River, capturing Najera and much of La Rioja. Under Sancho III Garcés (1000–35), the Navarrese established a brief hegemony over all of Christian Spain. Sancho's empire proved short-lived, however, for at his death the kingdom was divided up into Navarre, Aragon, and Castile. In 1076 Sancho Ramírez of Aragon occupied Pamplona. Navarre was then ruled by the Aragonese crown until 1134, when it recovered its independence under Garcia IV, who reigned until 1150. A succession of French dynasties ruled Navarre after 1234.

Though Navarre at an early date ceased to have a frontier with the Muslims, many Muslims continued to live there. They were allowed to serve in the army and also provided an important source of skilled artisans. Large Jewish congregations (*aljamas*) existed in the chief towns and were protected by the Navarrese kings when persecution became serious elsewhere. Despite its small size in the later Middle Ages, Navarre played an important part in international politics, partly because it controlled the main pass into Spain in the western Pyrenees and was a buffer state between Gascony, Castile, and Aragon. The chief pilgrim roads from the north to Santiago de Compostela also traversed the kingdom.

In 1512 Ferdinand II of Aragon occupied the Spanish portion of Navarre, which was formally annexed to the Castilian crown in 1515. The Spanish portion was governed by a viceroy and retained many of its own laws and institutions until 1833, when it was fully incorporated into Spain. The French portion of Navarre, consisting of the northern slope of the western Pyrenees, remained a separate kingdom until 1589, when it was united with France.

Physical and human geography. The modern autonomous community of Navarre is bounded by the provinces of Huesca to the east, Zaragoza to the southeast, and La Rioja, Álava, and Guipúzcoa to the west. The Pyrenees mountain range extends southward from France and dominates the northern half of the province. This sector consists of a tangled relief of forested mountains and well-watered valleys. Pastoralism and dense stands of timber are the main sources of wealth. Precipitation is high in the Pyrenees and tapers off sharply toward the south. South-central Navarre consists of basins and hills that serve to focus commerce on the capital, Pamplona. In this transitional zone, cereal cultivation mingles with forestlands and livestock rearing. A Mediterranean climate prevails in the foothills and steppes of southern Navarre, which are drained by the Ebro River. The landscape is more arid and monotonous, with cultivation of cereals and sizable towns.

The population in Navarre is concentrated along the Ebro River and in Pamplona, where it has grown at the expense of towns in the lower Pyrenees. Large, compact towns predominate in the south; small villages predominate in the mountains, where the population has been depleted by emigration.

Navarre's agricultural output has been kept relatively low by the fragmentation of farms, but the use of tractors and fertilizers there is well above the national average. Milk, wool, and wood are produced in the Pyrenees and their foothills, and wheat, corn (maize), grapes, and vegetables are grown in the irrigated zones of the south. Navarre's manufacturing industries have expanded rapidly since 1964 and are concentrated around Pamplona. The chief products include metal parts, processed foods and beverages, and shoes. Services are also concentrated in Pamplona, which is the commercial centre of Navarre. Area 4,023 square miles (10,421 square km). Pop. (1992 est.) 521,670.

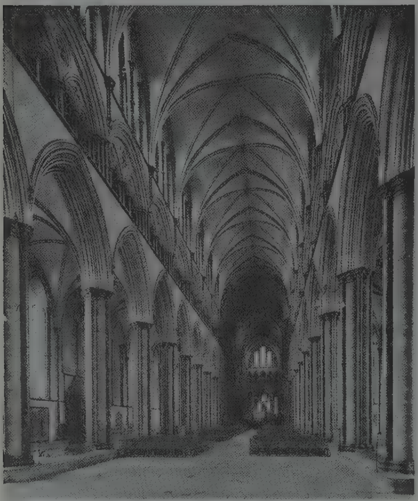
Navarrete, Juan Fernández de (Spanish painter): *see* Fernández de Navarrete, Juan.

Navas de Tolosa, Battle of Las, also called BATTLE OF AL-ʿUQĀB (July 16, 1212), major battle of the Christian reconquest of Spain in which the Almohads (a Muslim dynasty of North Africa and Spain) were severely defeated by the combined armies of Leon, Castile, Aragon, Navarre, and Portugal. The battle was fought about 40 miles (64 km) north of Jaén, in Andalusia, southern Spain.

Immobilized for several years by his crushing defeat at Alarcos (1195) at the hands of the Almohads, King Alfonso VIII of Castile and Leon gained the sympathy of the archbishop of Toledo, Rodrigo Jiménez de Rada, who proceeded to stir up religious indignation at the Muslim victory over Christians. A proclamation of a crusade was obtained from Pope Innocent III, which elicited further support from several French bishops; and, in the spring of 1212, contingents of French knights and Knights Templars began to converge on Toledo. After some delay, the crusade set out southward on June 21, augmented by the armies of Aragon, Castile, and Leon. Despite their success in taking two Muslim fortresses, the non-Spanish forces were soon discouraged by adverse climatic and living conditions and returned home. The armies of Navarre, however, were then recruited for the expedition.

Meanwhile, on June 22 the Almohad caliph Muḥammad an-Nāṣir had moved to Jaén, then the mountainous area around Baeza, intending to cut off the Christians at the plain of Las Navas de Tolosa. Soon after their arrival on July 12, the Christians took Castroferral with hopes of then reaching the Muslim encampment through the pass of La Llosa. The pass was heavily guarded, however, and it was through a local shepherd who directed the Christians to an alternate opening that they were able to reach the Muslim base. Alfonso himself led the Christians into battle and shattered the Almohad forces on July 16. An-Nāṣir fled, while Alfonso followed up his victory by immediately taking Baeza and Úbeda. The extensive effects of the Muslim defeat did not become apparent until after 1233, when the Almohad empire disintegrated owing to dynastic squabbles, and the Muslim hold on Spain, lacking a central leader, slipped rapidly before the armies of the Christian reconquest.

nave, central and principal part of a Christian church, extending from the entrance (the narthex) to the transepts (transverse aisle crossing the nave in front of the sanctuary in a cruciform church) or, in the absence of transepts, to the chancel (area around the altar). In a basilican church (*see* basilica), which has side aisles, nave refers only to the central aisle. The nave is that part of a church set apart for the laity, as distinguished from the chancel, choir, and presbytery, which are reserved for the choir and clergy. The separation of the two areas may be effected by screens or parapets, called cancelli. The term nave derives from the Latin *navis,* meaning "ship," and it has been suggested that it may have been chosen to designate the main body of the building because the ship had been adopted as a symbol of the church.



Nave, Salisbury Cathedral, England, begun 1220
A.F. Kersting

The form of the nave was adapted by the early Christian builders from the Roman hall of justice, the basilica. The nave of the early Christian basilica was generally lighted by a row of windows near the ceiling, called the clerestory; the main, central space was usually flanked on either side by one or two aisles, as in the Basilica of Old St. Peter's (AD 330) and San Paolo Fuori le Mura (380), both in Rome. A flat timber roof characteristically covered the nave until the Romanesque and Gothic eras, when stone vaulting became almost universal in the major churches of northern Europe.

Medieval naves were generally divided into many bays, or compartments, producing the effect of great length by the repetition of forms. The standard medieval division of the nave wall into ground-floor arcade, tribune (a vaulted gallery space over the side aisles), optional triforium arcade (a blind or open arcade between the tribune and clerestory), and clerestory became more flexible during the Renaissance, so that frequently—as in San Lorenzo (Florence; 1421–29) by Filippo Brunelleschi—the tribune and triforium are eliminated, and the nave wall is divided only into arcade and clerestory. During the Renaissance, the nave also was divided into fewer compartments, giving a feeling of spaciousness and balanced proportion between the height, length, and width. Extreme, dramatic effects, such as the marked verticality of the Gothic in cathedrals such as Reims (begun *c.* 1211), gave way to a more rationally designed nave space in which no single directional emphasis or sensation was stressed; St. Paul's Cathedral in London (1675–1711), rebuilt by Sir Christopher Wren after the Great Fire of 1666, provides a fine example.

navel, also called UMBILICUS, plural UMBILICI, or UMBILICUSES, in anatomy, a small depression in the abdominal wall at the point of attachment of the umbilical cord (*q.v.*). It indicates the point through which the mammalian fetus obtained nourishment from its mother through the blood vessels of the umbilical cord.

navigation, science of directing a craft by determining its position, course, and distance traveled. Navigation is concerned with finding the way, avoiding collision, conserving fuel, and meeting schedules.

A brief treatment of navigation follows. For full treatment, *see* MACROPAEDIA: Navigation.

Early mariners relied on natural phenomena to mark a course and guide the ship. The earliest sailors stayed within sight of shore and followed landmarks described in written accounts. Detailed knowledge of the prevailing winds allowed later mariners to set longer courses. The Phoenicians and Polynesians could sail out of sight of land because they learned how to use the positions of the stars and the planets to guide them.

The earliest instruments are still the principal navigational tools: compasses, logs, and charts. The magnetic compass was the first navigational aid that gave a constant reference point, helping navigators confirm wind directions on cloudy days and allowing for more accurate navigation in open water. When ships began to travel longer distances, it was discovered that true north was almost nowhere the same as magnetic north and that the discrepancy varied considerably from place to place. Magnetic compasses also were inaccurate whenever vessels pitched in heavy seas; the introduction of iron for shipbuilding caused further difficulty. Modern compasses used in both sea and air travel are stabilized by gyroscopes and housed in binnacles that compensate for the effects of the craft's motion and magnetism.

Ship speed was first calculated by dropping overboard a log attached to a reel of line knotted at regular intervals. As the log drifted astern, the line was played out; the number of knots exposed while a sandglass emptied gave the speed of the vessel in knots—that is, nautical miles per hour. The patent log came into use in the 19th century. This instrument is towed by the ship below the water surface; it measures the ship's speed by the rate of rotation of its vaned rotor. Pitot tubes are commonly used to calculate speed through the air as well as through the water. The L-shaped calibrated tube faces forward, and the force of the air or water outside the tube on a liquid inside the tube measures the speed of the vessel.

Extensive charts were first drawn up for the Mediterranean. By the Middle Ages detailed accounts of harbours, landmarks, and dangerous waters accompanied harbour-finding charts. These charts did not account for the curvature of the Earth, so that when sailors ventured out of the Mediterranean latitudes they found that such charts did not accurately represent distances or directions. Charts based on the Mercator projection corrected the directional inconsistencies while continuing to display rhumb lines (which were the same as compass bearings) as straight lines. Upon the advent of steamships and airplanes that traveled through the higher latitudes, some charts were based on gnomonic projections, which depicted great circle routes as straight lines.

In modern navigation, two methods are used for determining a position: fixing a position and dead reckoning. Information deduced from both methods is usually compared to obtain an accurate position.

Fixing a position requires charts detailing known locations, together with instruments that calculate a vessel's bearing relative to those locations. In offshore calculations, the navigator can measure the direction or bearing of a landmark with a sight fixed to a compass. This bearing can be indicated on a chart by a line. A second line drawn from a second bearing will intersect the first line and thus fix the position of the ship.

Fixing a vessel's position on the open sea became possible when latitude and longitude could be accurately determined. Latitude was determined by measuring the altitude—the angular distance above the horizon—of the polestar or the noonday Sun with a quadrant. Modern versions of the quadrant or sextant can provide latitudinal position within a few hundred feet. Longitude could not be as accurately reckoned until the 1700s. Because a vessel's position relative to celestial bodies constantly changes owing to the Earth's rotation, precise chronometers and tables showing the calculated positions of those bodies throughout the year had to be developed before longitude could be accurately fixed. Observation of the altitudes of a few identifiable stars at a known time made it possible to calculate the longitude of the position from which the measurements had been made.

In the 20th century, radio beacons have become standard reference points. Radio-beacon systems and satellite-transmission networks allow aircraft and ships to determine their position by timing the arrival of radio pulses from synchronized transmitters. Long-range-signal systems that cover the globe have been developed, permitting any sea or air vessel to fix its position if it has the appropriate receiving equipment on board.

Dead reckoning determines a ship's present position from an accurate history of its headings and speeds. Steering a craft with the necessary precision is a complex process. Modern steering mechanisms use gyroscopes, which maintain constant orientations regardless of the craft's motion, to measure headings. Systems have been devised for the continuous measurement of a craft's acceleration in each of three directions that are maintained by gyroscopes. These measurements can be converted to velocities and distances along each of the three directions; the result is a running record of the location of the craft relative to its initial position. This technique of using accelerometers and gyroscopes is known as inertial navigation.

Computerized inertial-guidance systems are extremely accurate. Submarines fitted with inertial-navigation systems have traveled under the polar ice cap with errors of less than a mile a week. Inertial navigators are also used to guide missiles and spacecraft. Dead reckoning has become more important as air traffic has swelled. Air-traffic controllers and space expeditions rely heavily on the ability to project a course and control the craft with precision throughout its flight.

Navigation Acts, in English history, a series of laws designed to restrict England's carrying trade to English ships, effective chiefly in the 17th and 18th centuries. The measures, originally framed to encourage the development of English shipping so that adequate auxiliary vessels would be available in wartime, became a form of trade protectionism during an era of mercantilism.

The first navigation act, passed in 1381, remained virtually a dead letter because of a shortage of ships. In the 16th century, various Tudor measures had to be repealed because they provoked retaliation from other countries. The system came into its own at the beginning of the colonial era, in the 17th century. The great Navigation Act passed by the Commonwealth government in 1651 was aimed at the Dutch, then England's greatest commercial rivals. It distinguished between goods imported from European countries, which could be brought in either English ships or ships of the country of origin, and goods brought from Asia, Africa, or America, which could travel to England, Ireland, or any English colony only in ships from England or the particular colony. Various fish imports and exports were entirely reserved to English shipping, as was the English coastal trade. The law was reenacted in 1660, and the practice was introduced of "enumerating" certain colonial products, which could be shipped directly only to England, Ireland, or another English colony. These included sugar (until 1739), indigo, and tobacco; rice and molasses were added during the 18th century. Nonenumerated goods could go in English ships from English colonies directly to foreign ports. From 1664 English colonies could receive European goods only via England. Scotland was treated as a foreign country until the Act of Union (1707) gave it equal privileges with England; Ireland was excluded from the benefits of the laws between 1670 and 1779.

Although English tonnage and trade increased steadily from the late 17th century, critics of the navigation system argue that this would have occurred in any case and that the policy forced up freight prices, thus ultimately making English manufactured goods less competitive. At first, colonial merchants benefited from an assured market, but the tightening of the laws in 1764 contributed to the unrest leading to the rebellion of England's American colonies; their achievement of independence made the first serious breach in the navigation system, and from then on exceptions were increasingly made. Enumeration was abandoned in 1822, and the navigation laws were finally repealed in 1849 and 1854.

navigation chart, map designed and used primarily for navigation. A nautical chart presents most of the information used by the marine navigator, including latitude and longitude scales, topographical features, navigation aids such as lights and radio beacons, magnetic information, indications of reefs and shoals, water depth, and warning notices. Such information allows both plotting a safe course and checking progress while sailing.

The first nautical charts were made at the end of the 13th century. The appearance of the magnetic compass 100 years earlier is considered to have been the catalyst for the development of charts. Earlier, seamen had relied on the proximity of a familiar coast, on the position of celestial bodies, or on meteorological phenomena such as, in the Indian Ocean, the monsoon winds. The less-predictable winds and weather of the Mediterranean spurred the development there of the first charts. These were plane charts (they took no account of the Earth's curvature) that were regularly crossed by rhumb, or wind, lines that corresponded to the directions that the wind rose.

Plane maps were not suitable for navigation in far northern or southern latitudes and by the 18th century were replaced by Mercator-projection charts that showed compass directions as straight lines. Projections other than the Mercator are also used, especially in very high latitudes.

Aeronautical charts are similar to nautical charts but emphasize such things as topography, heights of obstructions, airports, and airways. They are usually drawn on the Lambert conformal projection.

Navistar International Corporation, formerly (until 1986) INTERNATIONAL HARVESTER COMPANY, leading American producer of medium- and heavy-duty trucks and for many years a major manufacturer of farm and construction equipment. The company is a direct descendant of the business activities of Cyrus McCormick, particularly his invention of the mechanical reaper in 1831. Headquarters are in Chicago.

International Harvester was incorporated in 1902, merging McCormick Harvesting Machine Company with four smaller machinery makers. Shortly after, the company pioneered in motorized trucks by introducing high-wheeled "auto-wagons" for farmers. By the 1930s Harvester had entered the construction-equipment field with crawler-type tractors for farm and industrial use. The company soon became one of the largest manufacturers of earth-moving equipment. The firm entered the consumer home-appliance market after World War II, but sales proved disappointing, and the only consumer products manufactured by the late 20th century consisted of such items as lawn and garden tractors.

The biggest part of the company's business for decades was medium- and heavy-duty trucks, which long made it the leading manufacturer in this area. Other products included agricultural machinery, earth-moving equipment for the construction industry, and turbine-driven compressors, generators, and pumps for the energy business. After a devastating 172-day strike in 1979–80 that left its major product areas open to competitors, Harvester encountered economic difficulties and began cutting back its manufacturing and marketing operations in a number of overseas countries. In 1982 the company sold most of its American construction-equipment business, and in 1985 it disposed of most of its farm-equipment line at home and abroad to the J.I. Case subsidiary of Tenneco Inc. Under the terms of the latter sale, Harvester was obliged to change its name, which it did in 1986 to Navistar International Corporation. By that time its truck-manufacturing operations were basically its only business, though a huge one.

Navoi (city, Uzbekistan): *see* Nawoiy.

Navojoa, city, southern Sonora *estado* ("state"), northwestern Mexico. Lying along the Gulf of California coastal plain near the Mayo River, Navojoa is the commercial and manufacturing centre for a large area in which population and production have grown markedly since the 1950s with the development of irrigation for agriculture. Cotton, corn (maize), dates, and chick-peas are the principal crops; cattle are also raised. Major highways and railroads from Mexicali and Heroica Nogales to Mexico City pass through Navojoa, which also has air connections with Mexico City and the largest cities of northwestern Mexico. Pop. (2000 prelim.) 98,000.

Navotas, town, central Luzon, Philippines. The town lies between Manila Bay and Dagatdagatan Lagoon opposite Caloocan City, just north of Manila. It is an important fishing centre for the metropolis; as much as one-half of the total Philippine commercial fish catch is landed there. Bagoong (prawn paste) and other fish preparations are produced at Navotas and nearby Malabon. Pop. (1995) 229,039.

Návplion (Greece): *see* Nauplia.

Navratilova, Martina (b. Oct. 18, 1956, Prague, Czech.), Czech-born American tennis player who dominated women's tennis in the late 1970s and '80s.

Ranked number one in Czechoslovakia from 1972 to 1975, the left-handed Navratilova won international notice when she led her team to victory in the 1975 Federation Cup. In that year she went into exile in the United States, becoming a U.S. citizen in 1981.

From 1975 she was consistently one of the top five women players. She made her first claim to the number-one position in 1978, after winning the Virginia Slims championship and the Wimbledon women's singles final. In 1979 she again won the Wimbledon women's singles as well as the women's doubles and was ranked the undisputed top player.

In 1982 Navratilova won 90 of 93 matches, including 41 consecutive matches, and 15 tournaments, including the Wimbledon women's singles and the French Open women's singles. The following year she won 86 of 87 matches, the U.S. Open women's singles, the Wimbledon women's singles, and the Australian Open women's singles. Her victory in the French Open in 1984 entitled her to a $1,000,000 bonus from the International Tennis Federation in recognition of her Grand Slam sweep of the so-called Big Four tournaments in one year, even though technically her win of the Australian Open took place at the end of the 1983 calendar year; later, a controversial judgment denied her this Grand Slam title because of the timing of the Australian Open. In 1986, at Filderstadt, W.Ger., she became only the second player in modern tennis to win 1,000 matches.

By 1987 Navratilova had won the women's singles championships of the French Open twice (1982, 1984), the Australian Open three times (1981, 1983, 1985), the U.S. Open four times (1983, 1984, 1986, 1987), and Wimbledon a record nine times (1978, 1979, 1982–87, 1990). She also won 31 Grand Slam women's doubles championships and 6 Grand Slam mixed doubles championships. In 1987, along with her singles championship, she won both the women's doubles and the mixed doubles to become the first triple-crown champion at the U.S. Open since 1970. On winning her 158th title in 1992 in Chicago, Navratilova had accumulated more championships than any other player, male or female, in the history of tennis. She retired after the 1994 season, having won 167 titles in all.

Navsāri, also spelled NAOSARI, city, southeastern Gujarāt state, west-central India. It is situated in the coastal lowland along the Pūrna River. It is the home of the Pārsīs, descendants of Zoroastrians who emigrated from Persia, and contains their most venerated fire temples. The city is a market for cotton, millet, and timber and contains various milling, weaving, metal, and leather industries. Navsāri lies on the Western Railway and major highways. Pop. (1991) 126,089.

navy, a nation's warships and craft of every kind maintained for fighting on, under, or over the sea. A large modern navy includes aircraft carriers, cruisers, destroyers, frigates, submarines, minesweepers and minelayers, gunboats, and various types of support, supply, and repair ships, as well as naval bases and ports. There is also, necessarily, a vast organization for the administration and upkeep of these warships. Naval ships are the chief means by which a nation extends its military power onto the seas. Their two chief functions are to achieve sea control and sea denial. Control of the sea enables a nation and its allies to carry on maritime commerce, amphibious assaults, and other seaborne operations that may be essential in wartime. Denial of the sea deprives enemy merchant vessels and warships of safe navigation of the seas.

A brief historical treatment of Western navies follows. For full treatment of the history, types, and technological development of naval ships and craft, *see* MACROPAEDIA: War, Technology of. For the history of naval tactics and strategy, *see* War, Theory and Conduct of.

In early history the armed men of a tribe or town put to sea in such large boats or ships as might be available to give battle to enemies similarly equipped or to raid territory from the sea. The craft used in early naval warfare were at first vessels used for commerce or fishing, but later special types of craft specifically designed for war assumed a recognized place in the armouries of many peoples.

The most ancient warships were many-oared galleys, each ship requiring a large number of rowers. The result was that the personnel provided to man a fleet of those times had to be a considerable one. These great rowing galleys relied for their offensive powers on boarding or ramming, and they were used in great numbers in the Mediterranean as the war fleets of the armed forces of Athens, Alexander the Great, Carthage, Rome, Byzantium, the Italian republics, the Arabs, and Aragon.

The Roman Republic and Empire had to maintain a fleet not only to neutralize the threat arising from rival sea powers but also to deal with the piracy prevalent in the Mediterranean and with the consequent safeguarding of trade routes. The Roman navy included two main fleets and was always highly organized, with a body of soldiers, the *classici,* specially assigned for service afloat. The navy of the Byzantine Empire reached a high state of efficiency under the sovereigns of the Macedonian dynasty (867–1056). It consisted of an imperial fleet and of provincial squadrons. After the disorganization of the Byzantine Empire by Turkish invasions in the 12th century, the Byzantine navy withered. In the Middle Ages several Italian republics and monarchial states bordering on the Mediterranean possessed appreciable fleets. The oar-propelled galleys of the Mediterranean navies made their last great appearance in history at the Battle of Lepanto (1571). From then the scene of naval activity changed, and ships and fleets took upon themselves a new form, one fit for ocean sailing and fighting.

The form of warships for several hundred years to come was determined in the 16th and 17th centuries, when oar propulsion was replaced by arrays of sails and when cannons were mounted on ships. The broadside arrangement of guns was not compatible with the use of oars, and the oars themselves were made unnecessary by developments in the art of sailing. The standard fighting ship in the English navy became the galleon, a ship with two or three decks carrying its main batteries in the broadside and its lighter guns fore and aft. Such were the ships that won the great English victory in 1588 over the Spanish Armada, which contained large, slow ships with relatively few easily reloadable guns. The Spanish ships were supposed to close with the enemy so that the soldiers with which they were crowded could board the enemy vessels. Thus the English victory was that of a new conception of naval battle: the English ships refused to let the Spanish ships get close enough for boarding and pounded them with guns of superior firing capability.

It soon became evident that the ship that was powerful enough to be the mainstay of the fighting fleet was too large and too expensive—and also too heavy and too slow—to serve those functions of sea power that required numerous armed ships of good speed. For example, the pursuit and capture of enemy merchant vessels required the kind of ship that early became known as a cruiser. Thus during the 17th and 18th centuries the warship evolved into two major types. The main fighting ships of the fleet were known as ships of the line; these were two-deckers or three-deckers with heavy broadside armament as well as heavy timbers in their walls to keep out enemy shot. The other main type comprised the lighter and faster cruisers, of which the largest was the frigate, a vessel with one or two decks of guns of lesser calibre than those of the main fighting ships. Like the frigate (but smaller) was the corvette, and below it came the sloop of war, usually employed as a dispatch vessel.

The system of efficient sailing vessels fighting by means of broadside exchanges of their guns prevailed almost unchanged until the second half of the 19th century. At this time the harnessing of steam propulsion and the use of screw propellers rendered sails obsolete, iron (and later steel) plating replaced timbers in the hulls and protective sheathing of ships, and rifle-barreled, breech-loading guns firing high-explosive shells greatly increased the range and destructive power of warship batteries. These fundamental innovations culminated in the late 19th century in the development of the battleship, a heavily armoured, swiftly moving vessel equipped with huge, powerful, and extremely accurate long-range guns. The battleship reigned on the high seas until World War II, when the Japanese attack on U.S. naval forces at Pearl Harbor definitively established that aircraft-carrier–launched bomber planes could sink any and all surface ships, including battleships. Since then, naval air power (including missiles) has been the preeminent weapon of the world's fleets.

Modern combat ships fall into three major categories: (1) ships that fight chiefly by means of the aircraft launched from their decks, *i.e.,* aircraft carriers; (2) those that fight primarily with guns or with rocket-propelled missiles, *i.e.,* cruisers, destroyers, and battleships; and (3) those that fight mainly with underwater weapons such as mines, torpedoes, and depth charges, *i.e.,* submarines and destroyers.

The development of nuclear weapons brought about important changes in the role of sea power. Even if a nation under bombardment by numerous thermonuclear weapons could continue to maintain a navy, such a war would happen too fast to permit sea power to exercise any of its traditional functions. The development of nuclear-powered submarines that could launch intermediate-range ballistic missiles armed with thermonuclear warheads, however, created an entirely new role for sea power, that of nuclear deterrence. Such submarines became fundamental to deterring a potential aggressor from launching a surprise nuclear strike, chiefly because of the extreme difficulty of locating the submarines underwater. A potential aggressor would be deterred from launching a full-scale initial attack against a nation's more vulnerable land- and air-based nuclear forces by the prospect of facing a retaliatory strike by a fleet of nuclear-armed submarines.

Navy, Royal (United Kingdom): *see* Royal Navy, The.

Navy, United States: *see* United States Navy, The.

Nawābshāh, town, Sindh province, southern Pakistan. The town, originally called Nasrat, is connected by road and rail with Karāchi, Hyderābād, and Sukkur. A growing industrial centre, it manufactures small boats, refined sugar, soap, and cotton and silk textiles. A government college in the town is affiliated with the Mehran University of Engineering and Technology. The chief crops of the surrounding area are cotton, millet, sugarcane, and fruit. Pop. (1981) town, 102,139.

Nawānagar, Sir Ranjitsinhji Vibhaji, Maharaja Jam Sahib of, also called (until 1907) KUMAR SHRI ("Honourable Prince") RANJITSINHJI VIBHAJI (b. Sept. 10, 1872, Sarodar, India—d. April 2, 1933, Jāmnagar), one of the world's greatest cricket players and, later, a ruler of his native state in India.

After attending Trinity College, Cambridge (1890–93), he played for the Sussex cricket team in first-class county competition (1895–97, 1899–1904, 1908, 1912) and served as team captain (1899–1903). An unorthodox but graceful batsman, he scored the high total of 3,000 runs in 1899 and again in 1900. In 15 England-versus-Australia test matches, he scored 985 runs.

As maharaja of Nawānagar from March 1907, he was a progressive ruler and statesman and set an example by the simplicity of his personal life. He modernized his capital of Jāmnagar, developed the seaport of Nawānagar, and built roads, railways, and irrigation facilities. During World War I he was a British army staff officer in France, attaining the rank of colonel. In 1920 he represented the Indian states at the League of Nations Assembly, Geneva, and in 1932 he became chancellor of the Indian Chamber of Princes. He was knighted in 1917, 1919, and 1923.

nawbah, in Islāmic music, a suite of several movements, usually 8 to 10 but varying in form and duration depending on regional origin. The *nawbah* contains both instrumental and vocal pieces that are performed solo or by a group. Instrumental movements include the introductory improvisation (*taqsīm*) and various rhythmic introductions to vocal movements. Vocal movements are based on various poetic forms, primarily the ghazel, a solo love song. The same melodic mode (*maqām*) and a succession of rhythmic modes (*īqāʿāt*) may be used in all movements.

Nawoiy, Russian NAVOI, city, central Uzbekistan. Nawoiy is a natural-gas–based industrial city and a major chemical centre with industries that produce fertilizer and chemical fibres. There are also a large cement plant and a large district power station in the city. Pop. (1991 est.) 111,600.

Náxos, island, the largest of the Greek Cyclades islands in the Aegean Sea. The island's highest point is Mount Zeus (Zía Óros), which is about 3,290 feet (1,003 m) in elevation. The 165-square-mile (428-square-kilometre) island forms an *eparkhía* ("eparchy"). The capital and chief port, Náxos, on the west coast, is on the site of ancient and medieval capitals.

In ancient times, Náxos was famous for its wines and was a centre of the worship of the god Dionysus. According to legend, Dionysus found Ariadne asleep on the island's shore after she had been deserted by Theseus. Náxos was inhabited in the early Bronze Age by Cretans, Carians, and Thessalians. The island's artists played an important role in the development of Archaic sculpture. In the 7th and 6th centuries BC, a white, deep-grained marble was exported for statuary, contributing much to the island's prosperity.

During the 6th century BC the tyrant Lygdamis ruled Náxos in alliance with the tyrant Peisistratus of Athens. In 490 the island was captured by the Persians and treated with severity; Náxos deserted Persia in 480, joining the Greeks at the Battle of Salamis and then joining the Delian League. After revolting from the league in 471, Náxos was immediately captured by Athens, which controlled it until 404. In AD 1207 a Venetian captured Náxos, initiating the duchy of Náxos, which flourished until captured by the Turks in 1566. In 1770 the island was occupied by the Russians. Regained by the Turks in 1774, it joined the Greek kingdom in 1830 at the conclusion of the War of Greek Independence.

The fertile and well-watered valleys of Náxos produce outstanding white wine, citron, and citrus, but the chief export is emery. The inhabitants of the island are mainly Eastern Orthodox, though the island has a Roman Catholic archbishop and several convents. Excavations of a Mycenaean settlement have been made at Grotta, north of the capital. Pop. (1981) city, 3,735; island, 14,037.

Nāyanār, any of the Tamil poet-musicians of the 7th and 8th centuries AD who composed devotional hymns of great beauty in honour of the Hindu god Śiva. The images of the poets Ñānacampantar, Appar, and Cuntaramūrtti (often called "the three") are worshiped in South Indian temples as saints. They were approximately contemporary with their Vaiṣṇava counterparts, the Āḷvārs. The hymns of the Nāyanārs were collected in the 10th century by Nambi Āṇḍar Nambi as *Tēvāram* and set to Dravidian music for incorporation into the services of South Indian temples. An inscription of the Cōḷa king Rājarāja the Great (985–1014) records his introduction of the singing of the hymns in the great temple at Thanjāvūr (Tanjore). Often associated with the Nāyanārs, though probably slightly later in date, is the superb devotional poet Māṇikkavācakar, whose hymns are collected as *Tiruvācakam* ("Sacred Utterance").

Nāyar, also spelled NAIR, Hindu caste of the Indian state of Kerala. Before the British conquest in 1792, the region contained small, feudal kingdoms, in each of which the royal and noble lineages, the militia, and most land managers were drawn from the Nāyars and related castes. During British rule, Nāyars became prominent in politics, government service, medicine, education, and law.

Unlike most Hindus, Nāyars traditionally were matrilineal. Their family unit, the members of which owned property jointly, included brothers and sisters, the latter's children, and their daughters' children. The oldest man was legal head of the group. Rules of marriage and residence varied somewhat between kingdoms.

Between the 16th and 18th centuries, Nāyars in the central kingdoms of Calicut, Walluvanad, Palghat, and Cochin had highly unusual marriage customs that have been much studied. Before puberty a girl ritually married a Nāyar or a Nambūdiri Brahman. The husband could visit her (but was not obliged to); in some cases ritual divorce immediately followed the ceremony. After puberty the girl or woman could receive a number of visiting husbands of her own or a higher caste. Nāyar men might visit as many women of appropriate rank as they chose. Women were maintained by their matrilineal groups, and fathers had no rights or obligations in regard to their children.

Early in the British period, Nāyar armies were disbanded. Perhaps partly as a result, plural marital unions gradually died out in the 19th century. Children began to be maintained by their father, to support him in his old age, and to perform the ceremonies at his death. Laws passed in the 1930s enforced monogamy, permitted division of the matrilineal estate among male and female members, and gave children full rights of maintenance and inheritance from the father. By the mid-20th century it was increasingly common, especially in towns, for nuclear families to form separate residential and economic units.

Nayarit, *estado* ("state"), west-central Mexico, on the Pacific Ocean. It is bounded northwest by Sinaloa, northeast and east by Durango, and south by Jalisco. The Sierra Madre Occidental rises steeply from the narrow Pacific littoral and, running southeast, cuts the state's terrain into deep gorges and narrow valleys. Peaks include the volcanoes Ceboruco and Sangangüey. The coastal lagoons are well-known wild bird refuges. The main river, Grande de Santiago, flowing northwestward into Nayarit from Lake Chapala, is sometimes considered a continuation of the Lerma. The Santiago moves westward through Nayarit and empties north of San Blas, chief Pacific port of Nayarit; its valley is extremely fertile. Mining is important in the mountains, but the state is primarily agricultural. Its products include corn (maize), tobacco, sugarcane, cotton, beans, coffee, various woods, and medicinal plants. Major west-coast highways and railroads traverse Nayarit, linking Tepic, the state capital, with Mazatlán and the plateau cities. There are small, scattered villages of Cora and Huichol Indians throughout the Sierras. Area 10,417 square miles (26,979 square km). Pop. (1990) 824,643.

Nayler, James, Nayler also spelled NAYLOR (b. 1618, Ardsley, Yorkshire, Eng.—d. October 1660, London), one of the most prominent early English Quakers.

Nayler served in the Parliamentary army (1642–51) in the English Civil Wars and was for two years quartermaster under the general John Lambert. During this period he began preaching as an Independent until in 1651, after a meeting with George Fox at Wakefield, he became a Quaker. For three years he worked closely with Fox and underwent a 20-week imprisonment for blasphemy in 1653. In 1655 he went to London and achieved a prominent position among Quakers there but came under the unfortunate influence of certain overenthusiastic Quaker women who persuaded him that he was a reincarnation of Christ. In October 1656 Nayler and his entourage entered Bristol in procession imitating Christ's entry to Jerusalem. For this he was arrested, tried before Parliament, and sentenced to severe punishment and imprisonment. In 1658 he acknowledged his error in a letter to Parliament and was released in 1659. He was reconciled with Fox in 1660 and preached again in London until his death.

Nazarbayev, Nursultan, in full NURSULTAN ABISHEVICH NAZARBAYEV, Nazarbayev also spelled NAZARBAEV (b. 1940, Kazakhstan), president of Kazakhstan (from 1990), a reformist who sought regional autonomy for his Central Asian republic.

The son of Kazakh peasants, Nazarbayev graduated from a technical school in Dneprodzerzhinsk, Ukraine (1960), a technical school of the Karaganda Metallurgical Combine in Kazakhstan (1967), and the Higher Party School in Moscow (1976) and worked as a steelworker and engineer at the Karaganda plant off and on from 1960 to 1977. He joined the Communist Party in 1962 and rose through the ranks to become a deputy in the Supreme Soviet of the U.S.S.R. and eventually president of Kazakhstan after the elections of 1990, becoming also a member of the party's central Politburo. After the abortive August putsch by hard-liners in Moscow in 1991, which he opposed, Nazarbayev resigned from the Politburo (August 22). From then on, he sought cooperation among the former Soviet republics, but, having long decried Moscow's economic exploitation of Central Asia, he carefully nurtured Kazakhstan's independence in such cooperation.

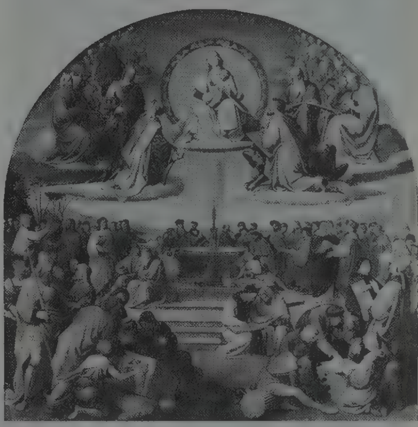
Nazaré, town and *concelho* (township), Leiria *distrito* ("district"), Portugal, north of Lisbon. Named for Christ's childhood home of Nazareth, this Atlantic fishing port and resort occupies two levels, the lower one extending along the beach. A pilgrimage chapel overlooks the town at 360 feet (110 m) from the upper level. The inhabitants, said to be of Phoenician origin, are among Europe's most distinctive people. The characteristic dress of the community and its religious ceremonies associated with fishing are local attractions. The port is also a centre for sardine and mackerel fishing. Pop. (1981) town, 6,954; (1987 est.) *concelho,* 16,000.

Nazarene, in the New Testament, a title applied to Jesus and, later, to those who followed his teachings (Acts 24:5). In the Greek text there appear two forms of the word: the simple form, *Nazarēnos,* meaning "of Nazareth," and the peculiar form, *Nazōraios*. Before its association with the locality, this latter term may have referred to a Jewish sect of "observants," or "devotees," and was later transferred to the Christians.

The term Nazarene is also applied to a Syrian Judeo-Christian sect of the 4th century AD. Although they accepted the divinity of Christ and his supernatural birth, the Nazarenes also maintained strict observance of Jewish laws and customs, a practice that had been dropped by the majority of Jewish Christians. They used a version of the Gospel in Aramaic called the Gospel According to the Hebrews, or the Gospel of the Nazarenes. Their relation to the Judeo-Christian sect of the Ebionites remains uncertain.

Arabs and Jews today employ the word Nazarene as a general designation for those of the Christian faith.

Nazarene, member of LUCAS BROTHERHOOD, or BROTHERHOOD OF SAINT LUKE, German NAZARENER, or LUKASBUND, one of an association formed by a number of young German painters in 1809 to return to the medieval spirit in art. Reacting particularly against 18th-century Neoclassicism, the brotherhood was the first effective antiacademic movement in European painting. The Nazarenes believed that all art should serve a moral or religious purpose; they admired painters of the late Middle Ages and early Renaissance and rejected most subsequent painting (promulgated by the European academies), believing that it abandoned religious ideals in favour of artistic virtuosity. They also thought that the mechanical routine of the academy system could be avoided by a return to the more intimate teaching situation of the medieval workshop. For this reason, they worked and lived together in a semimonastic existence.



"The Triumph of Religion in the Arts," oil painting by Friedrich Overbeck, one of the Nazarenes, 1840; in the Städel Art Institute, Frankfurt am Main

By courtesy of the Stadelsches Kunstinstitut, Frankfurt am Main

The brotherhood's original members were six Vienna Academy students. Four of them, Friedrich Overbeck, Franz Pforr, Ludwig Vogel, and Johann Konrad Hottinger, moved in 1810 to Rome, where they occupied the abandoned monastery of Sant'Isidoro. There they were joined by Peter von Cornelius, Wilhelm von Schadow, and others who at various times were associated with the movement. They soon acquired the originally derisive nickname Nazarenes because of their affectation of biblical style of hair and dress. The major project of the Nazarenes was to revive the medieval art of fresco painting. They were fortunate in receiving two important commissions, the fresco decoration of the Casa Bartholdy (1816–17) and the Casino Massimo (1817–29) in Rome, which brought their work to international attention. By the time of the completion of the Casino Massimo frescoes, all except Overbeck had returned to Germany and the group had dissolved.

The art of the Nazarenes, consisting largely of religious subjects executed in a conventional naturalistic style, was, for the most part, unimpressive, characterized by overcrowded compositions, overattention to detail, and lack of colouristic or formal vitality. Nevertheless, their aim of honest expression of deeply felt ideals had an important influence on subsequent movements, particularly the English Pre-Raphaelites of the mid-19th century. *See also* Pre-Raphaelite Brotherhood.

Nazarene, Church of the, U.S. Protestant church, the product of several mergers stemming from the 19th-century Holiness movement. The first major merger occurred in 1907, uniting the Church of the Nazarene (organized in California in 1895) with the Association of Pentecostal Churches of America (with origins in the northeastern states from 1886 to 1896) to form the Pentecostal

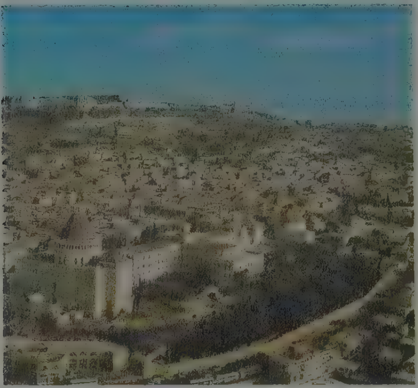
Church of the Nazarene. In 1908 the Holiness Church of Christ (with origins in the southwestern states from 1894 to 1905) joined the denomination. Later mergers brought in other groups. The term pentecostal, increasingly associated with "speaking in tongues," a practice foreign to the Nazarenes, was dropped from the name of the church in 1919.

The church government is similar to that of the Methodists, but local congregations have more autonomy. In worship there is emphasis on simplicity and revivalistic evangelism. In doctrine the church stands in the tradition of Arminian Methodism, emphasizing God's grace, and regards its unique mission to be the promotion of entire sanctification, which enables a person to live a sinless life, as a work of grace subsequent to conversion.

The headquarters of the church, a publishing house, and a theological seminary all are in Kansas City, Mo. The church also operates several colleges and numerous mission schools and hospitals. One of the larger Holiness bodies, its membership was more than 500,000 in the late 20th century.

Nazareth (Ethiopia): *see* Nazret.

Nazareth, Arabic AN-NĀṢIRA, Hebrew NAẔERAT, historic city of Lower Galilee, in northern Israel; it is the largest Arab city of the country. In the New Testament Nazareth is associated with Jesus as his boyhood home, and in its synagogue he preached the sermon that led to his rejection by his fellow townsmen. The city is now a centre of Christian pilgrimage.



Nazareth, Israel, with Annunciation Church in the left foreground

Keystone

The etymology of the city's name is uncertain; it is not mentioned in the Old Testament or rabbinic literature; the first reference is in the New Testament (John 1). The contempt in which this then insignificant village was held is expressed in the same chapter ("Can anything good come out of Nazareth?"). From there, Jesus went to perform his first miracle, that of the changing of water to wine at Cana (John 2). Nazareth had a Jewish population in Jesus' time; its Christian holy places are first mentioned after Christianity became the state religion of the Roman Empire (AD 313). The only site in Nazareth that can be definitely identified as dating back to New Testament times is the town well, now called St. Mary's Well; others are in dispute between the various churches.

During the Crusades, Nazareth was fought over bitterly; when the Norman-Sicilian crusader Tancred captured Galilee (1099), he set himself up as prince of Galilee, with his capital at Nazareth. After the crusaders' final expulsion from Palestine (1291), Christian influence waned, and when the Ottoman Turks took Palestine (early 16th century), they expelled all Christians from the city. Only under Fakhr ad-Dīn II, emir of Lebanon (reigned 1590–1635), were Christians permitted to return to Nazareth; Christian Arabs now form the majority of the population.

Nazareth's chief attractions are its many churches. Of these, the Roman Catholic Church of the Annunciation (completed 1966, on the site of a previous church of 1730 and a crusader foundation) is perhaps the best known. In it is the Grotto of the Annunciation, where, according to the New Testament, the archangel Gabriel appeared to the Virgin Mary and announced that she was to be the mother of Jesus (Luke 1:26–31). The grotto has part of a mosaic floor dating back to the 5th–6th century. The Church of the Annunciation is the largest Christian house of worship in the Middle East. Other important churches include Gabriel's Church, held by Greek Catholics to be the site of the Annunciation; the Synagogue-Church, on the traditional site of the synagogue where Jesus preached (Luke 4); the Church of Joseph, on the reputed site of Joseph's carpentry shop; the Mensa Christi ("Table of Christ") Church, where tradition holds that Jesus dined with the Apostles after his Resurrection; and the Basilica of Jesus the Adolescent, on a hill overlooking the city. Several of the churches have attached museums with holy relics.

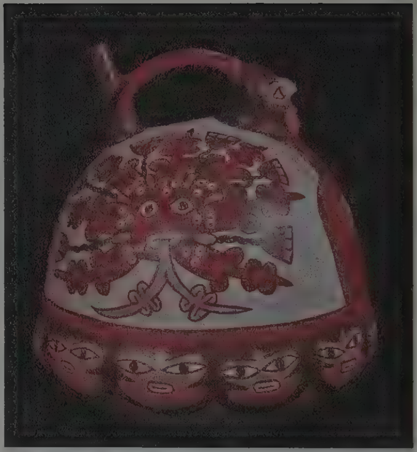
Modern Nazareth is a regional market and trade centre for the Arabs of Galilee; tourism and light manufacturing are also important. Many workers commute to industrial jobs in the Haifa Bay area and to agricultural and construction work in the Jewish settlements of the Plain of Esdraelon.

Beginning in 1957, the Jewish suburb called Naẓerat ʿIllit ("Upper Naẓareth") was built on the hills to the east of the city. It has auto-assembly, food-processing, and textile plants; some of Nazareth's Arabs work there. It also is the administrative seat of Israel's Northern district. Pop. (1990 est.) 52,000.

Nazas River, Spanish RÍO NAZAS, river in Durango and Coahuila states, northern Mexico. Formed in Durango by the confluence of the Oro (or Sestín) and Ramos rivers, which descend inland from the Sierra Madre Occidental and meet at El Palmito, the Nazas flows first southeast and then east-northeast to the Laguna district, where during the rainy season it would reach Mayrán Lagoon. Its total length was approximately 180 miles (290 km). As part of the land-redistribution program of the Laguna district, the Lázaro Cárdenas Dam was built across the Nazas at Palmito, Durango, impounding the river. Several large cities, including Lerdo, Gómez Palacio, and Torreón, lie on the river's banks.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Nazca, culture located on the southern coast of present-day Peru during the Early Intermediate Period (*c.* 200 BC–AD 600), so called from the Nazca Valley but including also the Pisco, Chincha, Ica, Palpa, and Acarí valleys. Nazca pottery is polychrome. Modeling was sometimes employed, particularly in the later phases; it is, however, rather simply done. In the polychrome painting it is not unusual for four or more colours to have been employed. Backgrounds are usually white or red, with designs outlined in black and filled in with various shades of red, orange, blue-gray, or purple. The designs are naturalistic (people, animals, birds, fish, plants) but quite stylized and often stiff or angular. Early Nazca pottery tends to be confined to either open bowl forms or double-spouted jars with flat bridge handles, and the painted designs are relatively uncomplicated and bold; the Late Nazca (Ica) style runs to other vessel forms, including some modeled effigies, and the designs incorporate more fine detail.



Polychrome vessel depicting a seated woman, Nazca culture, *c.* AD 600; in the Textile Museum, Washington, D.C.

Ferdinand Anton

Nazca Lines, group of huge animal figures and geometric forms scratched into the surface of several desert mesas north of Nazca in southern Peru. The figures, which include straight lines, triangles, spirals, a bird, a monkey, a spider, and flowers, are hundreds of feet in length and are thus virtually indecipherable from ground level; they are plainly visible from the air, however.

It is not known when or by whom the figures were created. They are known to predate the rise of the Incas in the 12th century. The purpose of the figures is also not known, although some seem to have had astronomical or calendrical significance, while others were probably ritual in nature. The lines have been preserved by the extreme dryness of the climate of the region.

Nazi (Sumerian deity): *see* Nanshe.

Nazi Party, byname of NATIONAL SOCIALIST GERMAN WORKERS' PARTY, German NATIONALSOZIALISTISCHE DEUTSCHE ARBEITERPARTEI (NSDAP), political party of the mass movement known as National Socialism (*q.v.*). Under the leadership of Adolf Hitler, the party came to power in Germany in 1933 and governed by totalitarian methods until 1945.

It was founded as the German Workers' Party by Anton Drexler, a Munich locksmith, in 1919. Hitler attended one of its meetings that year, and his energy and oratorical skills soon enabled him to take over the party. He ousted the party's former leaders in 1920–21 and renamed it the National Socialist German Workers' Party. In 1920 Hitler also formulated a 25-point program that became the permanent basis for the party. The program called for German abandonment of the Treaty of Versailles and for the expansion of German territory. These appeals for national aggrandizement were accompanied by a strident anti-Semitic rhetoric. The party's socialist orientation was basically a demagogic gambit designed to attract support from the working class.

Under Hitler the Nazi Party grew steadily in its home base of Bavaria. It organized strong-arm groups to protect its rallies and meetings. These groups drew their members from war veterans groups and paramilitary organizations and were organized under the name Sturmabteilung (SA; *q.v.*). In 1923 Hitler and his followers felt strong enough to stage the Beer Hall Putsch (*q.v.*), an unsuccessful attempt to take control of the Bavarian state government in the hope that it would trigger a nationwide insurrection against the Weimar Republic. The coup failed, the Nazi Party was temporarily banned, and Hitler was sent to prison for most of 1924.

Upon his release Hitler quickly set about rebuilding his moribund party, vowing to achieve power only through legal political means thereafter. The Nazi Party's membership grew from 25,000 in 1925 to about 180,000 in 1929. Its organizational system of gauleiters ("district leaders") spread through Germany at this time, and the party began contesting municipal, state, and federal elections with increasing frequency.

However, it was the effects of the Great Depression in Germany that brought the Nazi Party to its first real nationwide importance. The rapid rise in unemployment in 1929–30 provided millions of jobless and dissatisfied voters whom the Nazi Party exploited to its advantage. From 1929 to 1932 the party vastly increased its membership and voting strength; its vote in elections to the Reichstag (the German Parliament) increased from 800,000 votes in 1928 to about 14,000,000 votes in July 1932, and it thus emerged as the largest voting bloc in the Reichstag, with 230 members (38 percent of the total vote). By then big-business circles had begun to finance the Nazi electoral campaigns, and swelling bands of SA toughs increasingly dominated the street fighting with the communists that accompanied such campaigns.

When unemployment began to drop in Germany in late 1932, the Nazi Party's vote also dropped, to about 12,000,000 (33 percent of the vote) in the November 1932 elections. Nevertheless, Hitler's shrewd maneuvering behind the scenes prompted the president of the German republic, Paul von Hindenburg, to name him chancellor on Jan. 30, 1933. Hitler used the powers of his office to solidify the Nazis' position in the government during the following months. The elections of March 5, 1933, gave the Nazi Party 44 percent of the votes, and further unscrupulous tactics on Hitler's part turned the voting balance in the Reichstag in the Nazis' favour. On March 23, 1933, the Reichstag passed the Enabling Act, which "enabled" Hitler's government to issue decrees independently of the Reichstag and the presidency; Hitler in effect assumed dictatorial powers.

On July 14, 1933, his government declared the Nazi Party to be the only political party in Germany. On the death of Hindenburg in 1934 Hitler took the titles of Führer ("Leader"), chancellor, and commander in chief of the army, and he remained leader of the Nazi Party as well. Nazi Party membership became mandatory for all higher civil servants and bureaucrats, and the gauleiters became powerful figures in the state governments. Hitler crushed the Nazi Party's left, or socialist-oriented, wing in 1934, executing Ernst Röhm and other rebellious SA leaders at this time. Thereafter, Hitler's word was the supreme and undisputed command in the party. The party came to control virtually all political, social, and cultural activities in Germany. Its vast and complex hierarchy was structured like a pyramid, with party-controlled mass organizations for youth, women, workers, and other groups at the bottom, party members and officials in the middle, and Hitler and his closest associates at the top wielding undisputed authority.

Upon Germany's defeat, Hitler's suicide, and the Allied occupation of the country in 1945 at the end of World War II, the Nazi Party was banned, and its top leaders were convicted of crimes against peace and against humanity.

There have been minor Nazi parties in other countries (such as the United States), but after 1945 Nazism as a mass movement was virtually nonexistent.

Nazi-Soviet Nonaggression Pact: *see* German-Soviet Nonaggression Pact.

Nazım Hikmet Ran: *see* Hikmet, Nazım.

Nazimova, Alla, pseudonym of ALLA LEVENTON (b. June 4, 1879, Yalta, Crimea, Ukraine, Russian Empire—d. July 13, 1945, Los Angeles, Calif., U.S.), Russian-born and Russian-trained actress who won fame on the American stage and screen.

At age 17 Nazimova abandoned her training as a violinist and went to Moscow to work with V.I. Nemirovich-Danchenko and Konstantin Stanislavsky. She graduated into the Moscow Art Theatre but left to tour in the provinces and then work with the Paul Orleneff Company in St. Petersburg. She then visited the United States (1905), where, although she spoke not a word of English, she so impressed the Shubert brothers that they hired her on the condition she learn English in six months. She did, and she opened in *Hedda Gabler* on Nov. 13, 1906. During the next two years Nazimova was acclaimed for her portrayals of other Henrik Ibsen characters: Nora in *A Doll's House,* Hedwig in *The Wild Duck,* and Hilda in *The Master Builder.* She was so successful that the Shuberts built a theatre especially for her; on April 18, 1910, she opened the Nazimova Theatre, playing Rita Allmens in Ibsen's *Little Eyolf.*

Alla Nazimova in *Hedda Gabler*, 1936
Culver Pictures

Nazimova's fame led her to Hollywood, where from 1915 to 1925 she appeared in 17 motion pictures, from potboilers like *War Brides* (1916) and *Heart of a Child* (1920) to silent-screen versions of her stage successes. She returned to the stage in 1928 as Madame Ranevsky in Eva Le Gallienne's production of Anton Chekhov's *The Cherry Orchard.* Nazimova became a U.S. citizen in 1927 and went on to create the roles of Christine in Eugene O'Neill's *Mourning Becomes Electra* (1931) and O-Lan in Pearl Buck's *The Good Earth* (1932). She also directed and starred in two more very well-received New York City revivals of Ibsen, *Ghosts* (1935) and *Hedda Gabler* (1936). In her 60s Nazimova returned to Hollywood and appeared in several more feature films. Though she was considered the foremost interpreter of Ibsen's heroines, her exotic appearance and intense acting style were sometimes exploited to her disadvantage, as in the stereotyped "vamp" roles of her early Hollywood screen career.

Nazirite (from Hebrew *nazar,* "to abstain from," or "to consecrate oneself to"), among the ancient Hebrews, a sacred person whose separation was most commonly marked by his uncut hair and his abstinence from wine. Originally, the Nazirite was endowed with special charismatic gifts and normally held his status for life. Later, the term was applied to a man who had voluntarily vowed to undertake special religious observances for a limited period of time, the completion of which was marked by the presentation of offerings (Numbers 6; 1 Maccabees 3:49; Acts 21:24).

The early Nazirite was a holy man whose peculiar endowment, credited to his possession of "the Spirit of the Lord," was displayed in unusual psychic or physical qualities marked by spontaneity, ecstasy, and dynamic enthusiasm. In this respect he had much in common with the early ecstatic prophets and with diviners, such as Balaam (Numbers 22–24), both indigenous to the Middle East. Both the Nazirite and the prophet were also close to the warrior, who was likewise in a sacred state while on duty. Samson the Nazirite was a holy warrior whose special power was most closely related to his unshorn hair. In Israel such natural powers as were represented by the growth of hair were treated as signs of the power of the God of Israel, to be used in God's service.

The later Nazirite as described in Numbers 6 and in the Mishna was not a charismatic person. He simply retained the old requirements of long hair and abstinence from wine and was forbidden to touch a corpse. These requirements were treated as external signs of a vow.

Nazism, also spelled NAZIISM: *see* National Socialism.

Nazret, also called NAZARETH, town, central Ethiopia, 62 miles (100 km) southeast of Addis Ababa. It is a road junction and rail station on the main route between Addis Ababa and Dire Dawa. Beginning in the 1950s, economic development brought rapid population growth to Nazret. A giant sugar plantation and factory near the town increased employment, and another large farm raises civet cats for their civet, a secretion used in the manufacture of perfume. One of Ethiopia's chief exporters of oil cakes, oilseeds, and pulses has its headquarters in Nazret. There are hot springs in the vicinity. Pop. (1986 est.) 83,091.

Naẓẓām, Ibrāhīm an-, in full ABŪ ISḤĀQ IBRĀHĪM IBN SAYYĀR IBN HANĪʾ AN-NAẒẒĀM (b. *c.* 775, Basra, Iraq—d. *c.* 845, Baghdad), brilliant Muslim theologian, a man of letters, and a poet, historian, and jurist.

An-Naẓẓām spent his youth in Basra, moving to Baghdad as a young man. There he studied speculative theology under the great Muʿtazilite theologian Abū al-Hudhayl al-ʿAllāf but soon broke away from him to found a school of his own. It seems to have been an-Naẓẓām who began the struggle against the intellectual influences of Asiatic Hellenism, which the Muʿtazilites represented, a struggle that Muslim thinkers were to continue for centuries. In his theological thinking he was the first to formulate several problems that were of major importance to orthodox Muslim theologians. He convincingly argued that the material world had been created in time by God and did not exist from all eternity to all eternity. Much more important, though, was his discussion of the question of human free will. Muslim theology stressed the transcendent power of God, which brought into question the efficacy of human will in determining human actions. To an-Naẓẓām man consisted of two aspects. One was his material self, which was reflected in his actions and movements in the material world and which was under the sway of God's power. Man, however, was equally spirit, not subject to the determinism of the material world but free to make choices and thus become morally responsible.

NBA: *see* National Basketball Association.

NBC: *see* National Broadcasting Co., Inc.

NCAA: *see* National Collegiate Athletic Association.

NCR Corporation, formerly (1884–1974) NATIONAL CASH REGISTER CO., American manufacturer of cash registers, computers, and information-processing systems, based in Dayton, Ohio, U.S.

Although James Ritty invented the cash register in 1879, it was John H. Patterson (1844–1922) who, through aggressive marketing and innovative production and sales techniques, made the cash register a staple of the marketplace. Dissatisfied with his work as a coal dealer, Patterson in 1884 purchased for $6,500 a controlling interest in the ailing National Manufacturing Company, a maker of cash registers, in a rundown section of Dayton. Patterson improved the cash register, making it simpler to use, and sent out his highly motivated sales force to place the product in stores. He paid his salesmen generous commissions and introduced the idea of exclusive territory for each salesman. To allay customer fears of maintaining such complex machinery, he established a force of repairmen to service the products after the sale.

The company evolved in the 20th century, complementing its production of cash registers with the introduction of accounting machines in the 1920s, electronic products during World War II, business forms and computer hardware and software in the '60s, and microelectronics in the '70s. In the latter decade, under the leadership of presidents William S. Anderson and Charles E. Exley, Jr., NCR continued to develop new technology and expand its markets, but the company also underwent a thorough reorganization that included a sharp reduction in its labour force and the decentralization of its operations away from Dayton.

In 1991 the company was purchased by the AT&T Corporation and was renamed Global Information Solutions. As part of AT&T's split into three separate companies in 1996, the NCR Corporation was spun off to AT&T shareholders and resumed its original name. NCR's products include automated teller machines (ATMs), electronic office equipment, supermarket scanners, semiconductors, and multiuser computer systems. The company also operates a worldwide network of data-processing centres for businesses that do not have in-house data-processing systems.

Ndebele, also called TRANSVAAL NDEBELE, any of several Bantu-speaking African peoples who live primarily in Northern and Mpumalanga provinces in South Africa. The Ndebele are ancient offshoots of the main Nguni stock and began migrations to the Transvaal region in the 17th century.

The main group of Transvaal Ndebele traces its ancestry to Musi, or Msi, who, with his followers, diverged from a small group of Nguni people migrating down the southeastern coast of Africa and eventually settled in the Transvaal at the site of modern Pretoria. The descendants of Musi's people were joined in the 18th and 19th centuries by Nguni people fleeing from the wars of Dingiswayo and Shaka in Natal. The Transvaal Ndebele survived the Zulu raids by hiding in the bush. As a result, however, they were geographically divided into separate groups.

Like most Nguni peoples, all the Transvaal Ndebele groups resided in hamlets and relied on animal husbandry and the cultivation of corn (maize), millet, beans, sweet potatoes, and various other crops. Polygyny was permitted, and descent, succession, and inheritance followed the male line.

The Ndebele women continue their tradition of creating elaborate beadwork of all sorts and of painting the walls of their homes (both interior and exterior) with strong, brightly coloured geometric designs. Although the modern Ndebele have retained many of their unique customs, urbanization has affected their traditional culture patterns. Many Ndebele men are now employed in towns or mines, and many others are forced to leave their families for extended periods in search of work.

In 1979 many of the Transvaal Ndebele were resettled in a homeland, KwaNdebele, which became part of Eastern Transvaal (now Mpumalanga) province in 1994. Other Transvaal Ndebele were included in the homeland of Lebowa (now in Northern province).

Ndebele, also called NDEBELE OF ZIMBABWE, or NDEBELE PROPER, formerly MATABELE, Bantu-speaking people of southwestern Zimbabwe who live primarily around the city of Bulawayo. They originated early in the 19th century as an offshoot of the Nguni of Natal.

Mzilikazi, an Nguni military commander under Shaka, king of the Zulu, came into conflict with Shaka and in 1823 was forced to flee, migrating with his followers first to Basutoland (now Lesotho) and then north to the Marico Valley. In 1837, after his further defeat at the hands of the European settlers of the Transvaal (South African Republic), he moved northward, ultimately (*c.* 1840) settling in Matabeleland (Zimbabwe), where his successor, Lobengula, extended the tribe's power, absorbing Sotho, Shona, and other extraneous tribal elements. The establishment of the British South Africa Company (1890) led to further conflict with colonists, and the Matabele (as they were then known) were defeated in a war in 1893, after which they were administered by the company in separate districts.

Ndebele woman
Paul Almasy

The short-lived Matabele state became stratified into a superior class (Zansi), composed of peoples of Nguni origin; an intermediate class (Enhla), comprising people of Sotho origin; and an inferior class (Lozwi, or Holi), derived from the original inhabitants. Men of all classes were organized into age groups that served as fighting units. The men of a regiment, after marriage, continued to live in their fortified regimental village.

Contemporary Ndebele reside in hamlets of dispersed family homesteads called kraals. A circle of houses for a husband and his wives and children surrounds the cattle corral. A husband will allocate land and livestock to his wives; the eldest son of the first wife is the principal heir and inherits this property. Ndebele also practice the custom of levirate, in which men inherit the wives and children of their deceased brothers.

Corn (maize) is the staple crop of the Ndebele. Cattle are kept for milk, as a source of prestige, and for use in bridewealth payments and other exchanges. Men do all of the herding and milking and also hunt, while women do most of the farming.

N'Djamena, formerly FORT-LAMY, capital of Chad, on the southwestern border, adjacent to Cameroon. It lies on the east bank of the Chari (Shari) River at its confluence with the Logone River in an alluvial plain that is flooded during the rainy season (July–September). The city was founded in 1900 across the Chari River from Fort-Fureau (Kousseri), where French colonial troops defeated and killed the Sudanese adventurer Rābiḥ az-Zubayr, who had established a military hegemony in districts east of Lake Chad. It was named Fort-Lamy after a French major who also died in the battle, and it remained a small Kotoko settlement until after Chad's independence in 1960. Its name was changed to N'Djamena in 1973, and the city was occupied by Libyan forces in 1980–81 during the civil war that had begun in the mid-1960s.

N'Djamena is in the centre of cotton-growing, cattle-raising, and fishing areas and is thus an important market site. It has a refrigerated slaughterhouse and is the headquarters of many financial and light-industrial firms. The University of Chad was established in the city in 1971, and the National School of Administration in 1963. Affiliated with the National Institute of Human Sciences (1961) is the National Museum (1963), with collections specializing in paleontology, prehistory, and ethnography. The regional Lake Chad Basin Commission is headquartered in the city. N'Djamena is connected by road with Nigeria, The Sudan, and the Central African Republic, as well as with such major towns of Chad as Abéché and Sarh. It also has an international airport. Pop. (1993) 530,965.

Ndola, second largest town in Zambia, located on the Zaire border near Kitwe. It is linked by road and rail to the capital, Lusaka, and to Livingstone and thus to Zimbabwe, as well as to Zaire and Tanzania. Industries include a metallurgical plant, a sugar refinery, a tire factory, an auto-assembly plant, and various mine service industries. It is now the terminus of the Tazama fuel pipeline from Dar es-Salaam, Tanzania. The Northern Technical College was founded in 1964, and the Ndola Campus of the University of Zambia opened in 1978. Pop. (1990 prelim.) 376,311.

Ndongo, historical African kingdom of Mbundu people that extended inland from Luanda, Angola. It was bounded by the Dande River to the north, the Lucala River to the east, the Kwanza River to the south, and the Atlantic Ocean to the west.

Ndongo's ruler, the *ngola*, originally recognized the overlordship of the Kongo kingdom in the early 16th century. By the 1540s Ndongo enjoyed trade relations with the Portuguese slave traders of São Tomé, who established a settlement at Luanda. When Kongo tried to stop this infringement of its monopoly of Portuguese trade in the area, Ndongo routed Kongo's forces at Caxito on the Dande River in 1556 and achieved complete independence from its former overlord.

Hoping to profit from relations with Portugal, the *ngola* invited Portuguese emissaries to Ndongo. A group of Jesuits arrived, accompanied by the nobleman Paulo Dias de Novais. After being forcibly detained in Ndongo for several years, Dias returned to Portugal and then obtained from the king, in 1571, authorization to conquer and Christianize "Angola," the kingdom of the *ngola*. Dias landed with his army in 1575 at Luanda, where he built a fort. In 1579 he began to advance up the Kwanza toward Kabasa, the Ndongo capital. Ndongo resisted with prolonged guerrilla warfare. In the decades that followed, thousands were killed on each side. The Portuguese secured a 70-mile (113-kilometre) strip of land up the Kwanza to the mouth of the Lucala, where they built a fort at Massangano in 1583. It served as a base for the Portuguese capture of slaves for use in Brazil.

A peace treaty was negotiated in 1623 between the greatly reduced Ndongo—represented by the *ngola*'s sister, Ana de Sousa

Nzinga—and Portuguese Angola. The next year Nzinga succeeded to the throne and protested Portuguese violations of the treaty. She harboured fugitive slaves from Angola, welcomed into her army Portuguese-trained African soldiers, and encouraged Africans under Portuguese rule to rebel. Her stronghold was captured in 1626, and a Portuguese puppet replaced her on the Ndongo throne. Nzinga escaped to the kingdom of Matamba, conquered it, and continued to harass Portuguese Angola until 1656, when a new peace treaty was signed. In the 1660s the puppet king of Ndongo rebelled against Portuguese hegemony. Angola, reinforced with troops from Brazil, defeated him in 1671, and all Ndongo territory was incorporated into Angola.

NDP (Canada): *see* New Democratic Party.

Ne Win, U, also called SHU MAUNG (b. May 24, 1911, Paungdale, Burma [Myanmar]), Burmese general who was the leader of Burma (Myanmar) from 1962 to 1988.

Ne Win studied at University College, Rangoon (Yangôn), from 1929 to 1931, and in the mid-1930s he became involved in the struggle for Burmese independence from the British. During World War II, after the Japanese invasion of Burma, he was one of the Thirty Comrades who, in 1941, went to Hainan to receive military training from the Japanese. Ne Win was an officer in the Japanese-sponsored Burma National Army from 1943 to 1945, but, becoming disillusioned with the Japanese, he helped organize the underground resistance. After Burma gained independence from Britain on Jan. 4, 1948, he served as the second commander in chief of the army.

In 1958 Ne Win was asked to serve as prime minister in a caretaker government after former prime minister U Nu's administration had proved incapable of suppressing the ethnic insurgencies that were crippling the country. Ne Win held general elections in 1960, stepping down that same year after U Nu's reelection and the restoration of parliamentary government. However, on March 2, 1962, Ne Win carried out a coup d'état, imprisoning U Nu and establishing the Revolutionary Council of the Union of Burma, whose members were drawn almost exclusively from the armed forces.

In his subsequent rule, Ne Win combined a military dictatorship with a socialist economic program, the cornerstone of which was the nationalization of Burma's major economic enterprises. His government broke Indian, Chinese, and Pakistani traders' control over the country's economy, and it embarked on an ambitious though unsuccessful program of rapid industrialization. Ne Win steered a neutralist course in foreign policy and isolated Burma from contacts with the outside world. His regime made Burma into a one-party state in 1964; the sole party permitted to exist was the Burmese Socialist Program Party (BSPP), which had been founded by Ne Win and which was dominated by military officers. Ne Win and his colleagues formulated a new constitution in 1972–73 that provided for a one-party state in Burma. A new government was elected in 1974 with Ne Win as president (1974–81). He subsequently retained the post of chairman of the BSPP, remaining the country's preeminent leader.

By the late 1980s, Ne Win's socialist and isolationist policies had turned Burma into one of the world's poorest countries. Governmental corruption and mismanagement had driven a great deal of the country's economic activity underground into the black market, and Burma, which had once been a leading rice exporter, was beginning to experience food shortages. In late 1987 widespread antigovernment rioting broke out in the major cities, prompting Ne Win in July 1988 to resign from the chairmanship of the BSPP. The BSPP was replaced by the State Law and Order Restoration Council, which was also headed by military officers. Ne Win, however, remained active behind the scenes.

Neagh, Lough, Irish LOCH NEATHACH, lake in east-central Northern Ireland, about 20 miles (32 km) west of Belfast. It is the largest lake in the British Isles, covering 153 square miles (396 square km), with a catchment area of 2,200 square miles (5,700 square km). The chief feeders of the lake are the Upper River Bann, the River Blackwater, and the River Main, and it is drained northward by the Lower Bann. Lough Neagh averages 15 miles (24 km) wide, is 18 miles (29 km) long, and is for the most part only 40 feet (12 m) deep. Ancient deposits in Toome Bay, an indentation of the lake on its northwestern shore, have yielded the oldest-recorded human artifacts in Ireland. In 1959 flood-control works significantly lowered the lake level.

Neagle, Dame Anna, original name MARJORIE ROBERTSON, married name MARJORIE WILCOX (b. Oct. 20, 1904, London, Eng.—d. June 3, 1986, near London), British actress and dancer, known for her work in stage plays, musicals, and films. Her motion-picture career was guided by her husband, producer-director Herbert Wilcox.

Neagle debuted as a dancer in *The Wonder Tales* (London, 1917). Her first real lead was as a juvenile with Jack Buchanan in *Stand Up and Sing* (1931). Her other early leading roles included Olivia in *Twelfth Night* and Rosalind in *As You Like It* (1934), followed by *Peter Pan* (1937) and *Emma* (1944).

Neagle toured England during World War II, appearing in *Victoria Regina* and *French Without Tears*. She played four characters (Carol Beaumont, Nell Gwynn, Victoria, and Lillian Grey) in *The Glorious Days* on tour and in London (1952) and Stella Felby in *The More the Merrier* (1960). As Lady Hadwell in *Charlie Girl* she appeared in London and Australia for a five-year run (1965–71) and gave more than 2,000 performances. Neagle played in revivals of *No, No, Nanette* (1973) and *My Fair Lady* (1978–82). She appeared in more than 30 films, a majority of them produced by her husband; her screen appearances include those in *Victoria the Great* (1937), *Spring in Park Lane* (1948), and *Odette* (1950). She was named a Commander of the Order of the British Empire (1952) and later a Dame of the Order of the British Empire (1969).

Neamţ, *judeţ* (county), northeastern Romania. The Eastern Carpathian and sub-Carpathian mountains rise above settlement areas situated in the valleys of the county. Neamţ is drained to the southeast by the Bistriţa and Moldova rivers. Piatra-Neamţ (*q.v.*), one of the oldest settlements in Romania, is the county capital and has industries that produce chemicals, machinery, metal products, and paper. Other towns, including Roman, Bicaz, and Săvineşti, have metallurgical, textile, cement, and timber industries. Several hydroelectric power stations operate on the Bistriţa River, and the artificial Lake Izvorul Muntelui lies in the northwestern portion of the county.

Livestock raising and fruit growing are the county's major agricultural activities, particularly in the Crăcău River basin. The karstic Bicaz Gorges are a natural monument. Lake Roşu, another natural monument, contains a forest that was inundated during a landslide in 1938. Treetops rise from the lake. The Fortress of Neamţ (14th century) and the Neamţ Monastery, including a 15th-century church, were built by Stephen (Ştefan) the Great of Moldavia near Târgu Neamţ. Area 2,274 square miles (5,890 square km). Pop. (1992 prelim.) 577,600.

Neanderthal, also spelled NEANDERTAL, early form of *Homo sapiens* (*q.v.*) that inhabited much of Europe and the Mediterranean lands during the late Pleistocene Epoch, about 100,000 to 30,000 years ago. Neanderthal remains have also been found in the Middle East, North Africa, and western Central Asia.

A brief treatment of Neanderthals follows. For full treatment, *see* MACROPAEDIA: Evolution, Human.

The name derives from the discovery in 1856 of the first remains of the type in a cave above the Neander Valley in Germany, not far from Düsseldorf. The remains immediately caused a lively controversy as to whether they were remains of ancient humans or merely bones of modern humans distorted by disease.

The origins of Neanderthals cannot be established with any certainty. Forerunners of Neanderthal peoples may date to some 100,000 to 200,000 years ago. Skull fragments found in France are of that age, but they have characteristics more like modern *Homo sapiens* than like the earlier *H. erectus* who, chronologically, should be Neanderthal's forerunner.

However, Neanderthals were probably a product of the last (Riss-Würm) interglacial stage (75,000 to 115,000 years ago) in Europe. Jaws, teeth, and skull parts have been found in many places in Germany, France, Belgium, Italy, and Spain that are unquestionably recognizable as Neanderthalian.

The last (Würm) glacial stage in Europe was about 10,000 to 70,000 years ago, and it is from those times that the most numerous skeletal remains of Neanderthals have been found. These have given some idea of Neanderthal physiognomy and habits. Neanderthals were short, stout, and powerful in build. Cranial capacity equaled or surpassed that of modern humans, though their braincases were long, low, and wide and flattened behind. Their faces had heavy browridges, large teeth, and small cheekbones. The chest was broad, and the limbs were heavy, with large feet and hands. The Neanderthals appear to have walked in a more irregular, lateral fashion than do modern humans.

The Neanderthals were cave dwellers, although they occasionally built camps in the open air. They wore clothing, used fire, hunted small and medium-sized animals (*e.g.,* goats and small deer), and scavenged from the kills of large carnivores. They made and used a variety of stone tools and wooden spears. Their tool culture is known as the Mousterian industry (*q.v.*).

The Neanderthals were the first hominids to intentionally bury their dead, both individually and in groups, and they also cared for sick or injured individuals. Evidence of ritualistic treatment of animals, which are sometimes found with human skeletons, may indicate that they practiced a primitive form of religion.

Evidence from a few sites indicates that Neanderthals coexisted for several thousand years with the modern humans (*i.e.,* Cro-Magnons) that were living in Europe by 35,000 years ago. The nature of the Neanderthals' demise is no better understood than that of their evolutionary origins. They were certainly replaced by Cro-Magnons, but whether they were absorbed by the Cro-Magnons or simply died out in competition with them is unknown.

The taxonomic classification of the Neanderthals is still being debated. Originally they were classed as a separate species (*H. neanderthalensis*), and subsequently they were thought to represent a subspecies of *H. sapiens* (*H. sapiens neanderthalensis*); some workers, however, have begun to favour the original designation.

neap tide, tide of minimal range occurring near the time when the Moon and the Sun are in quadrature. This condition is geometrically defined as the time at which the line from the Earth to the Moon is at right angles to the line from the Earth to the Sun. Thus, the tide-producing effects of the Sun and the Moon cancel each other, and tidal ranges are usually 10 to 30 percent less than the mean tidal range. *See also* tide.

Neapolitan opera, style of Italian opera written chiefly by 18th-century composers working in Naples. *See* opera seria.

Near East, usually the lands around the eastern shores of the Mediterranean Sea, including northeastern Africa, southwestern Asia, and, occasionally, the Balkan Peninsula. The term Near East was used by the first modern Western geographers to refer to the nearer part of the Orient, a region roughly coextensive with the Ottoman Empire. Since World War II, the name has been largely supplanted by Middle East (*q.v.*), though frequently they are used interchangeably.

Nearchus (d. probably 312 BC), officer in the Macedonian army under Alexander the Great who sailed from the Hydaspes River in western India to the Persian Gulf and up the Euphrates River to Babylon.

Earlier, in 333, Alexander had made Nearchus satrap (provincial governor) of the newly conquered Lycia and Pamphylia in Anatolia. Nearchus embarked on his expedition in 325, when Alexander descended the Indus River to the sea. He chronicled the journey in a detailed narrative, a full abstract of which is included in Arrian's *Indica* (2nd century AD). Nearchus was unable to play any significant role in the struggles following Alexander's death (323); the statement of a late source that he recovered his former satrapies is doubtful.

Neath, Welsh GASTELL-NEDD, town, Neath Port Talbot county borough, historic county of Glamorgan (Morgannwg), Wales. About AD 75 the Romans chose the site on the River Neath (Nedd) for a fort, Nidum, to protect their road from Gloucester to Carmarthen at the lowest practicable river crossing. In the 12th century a castle was constructed. The adjoining town was granted a charter by William FitzRobert, 2nd earl of Gloucester, but in 1231 the castle was destroyed by the Welsh prince Llywelyn ap Iorwerth. The 12th-century Cistercian foundation, Neath Abbey, is now a ruin.

In 1584 a copper-smelting works was built in the town, using locally mined coal and Cornish ore brought cheaply by sea into the estuary. Other nonferrous metals (*e.g.,* tin, lead, and silver) were smelted there, too, and during the 19th and 20th centuries adjacent Briton Ferry became a centre for steelmaking. Most of these industries have since declined. Engineering concerns and other firms that make fabricated steel products are still important, and a large petrochemical industry has grown since World War II. As a shopping and service centre, the town of Neath is overshadowed by Swansea, 7 miles (11 km) to the west, but it still serves local industrial and mining communities. Pop. (1991) 45,965.

Neath Port Talbot, Welsh GASTELL-NEDD PORT TALBOT, county borough, southern Wales. Encompassing the Swansea Bay coast from the Kenfig Burrows in the south to the eastern outskirts of Swansea in the north, it extends inland across an area of wooded hills that form a sandstone plateau crossed by the broad valleys of the Rivers Afan, Neath, and Tawe. North of the Tawe valley the county borough extends into the foothills of Black Mountain. Neath Port Talbot lies entirely within the historic county of Glamorgan (Morgannwg).

Copper smelting and coal mining transformed the region during the Industrial Revolution. While many older industries have disappeared, Neath Port Talbot remains primarily industrial, with a range of manufacturing facilities. Coal mining has declined, but small mines in the eastern valleys still operate.

Aberavon, the beachfront section of the town of Port Talbot, is a popular seaside resort. The Margam Abbey Museum houses an important collection of inscribed and sculpted early Christian memorial stones. Area 171 square miles (442 square km). Pop. (1998 est.) 138,800.

neat's-foot oil, pale yellow fatty oil made by boiling the feet (excluding hooves), skin, and shinbones of cattle and used chiefly for dressing and waterproofing leather and as a lubricant. After the slaughterhouse scraps are rendered in water, the oil is skimmed off, filtered through cloth, and subjected to two pressings, the first yielding pure neat's-foot oil, used to lubricate fine machinery, the second, a lower grade, used in the textile and leather industries. The solid stearin obtained in the second pressing is used in soap manufacture.

Nebhapetre (king of Egypt): *see* Mentuhotep II.

Nebitdag, also spelled NEBIT-DAG, city and administrative centre of Balkan *oblast* (province), western Turkmenistan, at the southern foot of the Bolshoy (Great) Balkhan Ridge. Its name means "oil mountain," and it is the headquarters of the Turkmen oil industry. Nebitdag grew up on the Transcaspian Railway after large oil deposits had been discovered in the area in the early 1930s; it became a city in 1946. It has been carefully planned, with much greenery to mitigate the effects of the surrounding desert. Pop. (1997 est.) 87,800.

Neblina Peak, Portuguese PICO DA NEBLINA, peak in the Tapirapecó Mountains, Amazonas *estado* ("state"), northern Brazil, near the Venezuelan border. Reaching 9,889 feet (3,014 m) above sea level, it is the highest point in Brazil. Until Neblina was discovered in 1962, Bandeira Peak was thought to be Brazil's highest mountain.

Nebo (Mesopotamian deity): *see* Nabu.

Nebraska, constituent state of the United States of America lying in the west north-central region of the country. Nebraska is bounded by South Dakota on the north, Wyoming on the west, and Colorado and Kansas on the south. On the east the Missouri River separates the state from Missouri, Iowa, and South Dakota. Nebraska extends about 420 miles (680 km) from east to west and 210 miles (340 km) from north to south. The capital is Lincoln. Area 77,359 square miles (200,360 square km). Pop. (2000) 1,711,263.

A brief treatment of Nebraska follows. For full treatment, *see* MACROPAEDIA: United States of America.

Physical and human geography. Nebraska's land is a fairly continuous rolling plain, rising steadily in elevation from 840 feet (256 m) in the southeast to more than 5,000 feet (more than 1,520 m) near the Colorado-Wyoming boundaries. The vast Sand Hills country of the north-central and northwestern regions is a treeless, grass-covered rangeland. The state drains generally eastward to the Missouri River through the systems of the Niobrara, Platte, and Republican rivers.

The Nebraska climate is dry continental, exhibiting great extremes between summer and winter temperatures. Average July temperatures range from about 73° F (23° C) in the west to 78° F (26° C) in the southeast, and average January temperatures vary from about 24° F (−4° C) in the west to 20° F (−7° C) in the northeast. The growing season spans about 133 days in the western panhandle to 168 days in the southeast. Annual precipitation, averaging 33 inches (840 mm) in the southeast, decreases to 16 inches in the far west. Precipitation falls primarily as rain during the summer months. Soils throughout the state are generally well-suited for agriculture. In the drier western section, however, large-scale cropping requires irrigation.

Early settlement of Nebraska was primarily by European homesteaders who were largely recruited in their homelands by the railroads. Today most of the state's land is used for agriculture, and about one-third of the population lives in areas classified as rural. About two-fifths of the population lives in the metropolitan areas of the two largest cities, Omaha and Lincoln, in the extreme eastern part of the state.

Both agriculture and manufacturing contribute significantly to the state's economy—the former providing many of the raw materials for the latter. Farm and ranch production rank Nebraska high among the states in corn (maize), hay, wheat, sorghum, soybeans, sugar beets, cattle, and hogs. Industries include food processing, machinery, chemicals, printing and publishing, metals, and electrical, electronic, and transportation equipment. Petroleum is the state's principal mineral resource. Omaha is one of the main centres of the American insurance industry.

Nebraska is served by several railroads, and Omaha is an important river-barge port on the Missouri River. Interstate Highway 80, largely following the Platte River, carries a heavy volume of vehicle traffic across the state.

In less than two generations, Nebraska was converted from a wilderness into a state with more than one million people. Its cultural contributions have been centred on this frontier experience. Omaha and Lincoln support cultural activities and the arts. The University of Nebraska, with campuses in both cities, is the largest in the state. Scotts Bluff National Monument, Homestead National Monument, and Chimney Rock National Historic Site are preserved as testaments to Nebraska's role in America's western migration.

History. Various prehistoric peoples inhabited the area as early as 8000 BC. At the time of initial European contact, semisedentary Indian tribes, notably the Ponca, Omaha, Otoe (Ute), and Pawnee, inhabited eastern and central Nebraska. Western Nebraska was the hunting domain of the more nomadic Brulé and Oglala Sioux (Dakota), Arapahoe, Comanche, and Cheyenne.

Spanish and French explorers visited the region during the 16th to 18th centuries but did little to develop it. Nebraska was acquired by the United States as part of the Louisiana Purchase from France in 1803. In the 1840s the Platte River valley became a westward trail, as thousands of Americans headed for the Oregon, Mormon, and California trails. With the adoption of the Kansas-Nebraska Act of 1854, the organized Territory of Nebraska was established. Nebraska was admitted to the Union as the 37th state in 1867. The Homestead Act of 1862 officially opened the territory for settlement, but the completion of the Union Pacific Railroad in 1869 provided the impetus for rapid settlement. Since 1937 the state has had a unicameral, nonpartisan legislature—the only such legislative body in the nation.

Nebraska City, seat of Otoe county, southeastern Nebraska, U.S., on the Missouri River at the Iowa border. It originated around Fort Kearny (1846; moved west to Platte River site in 1848), was incorporated in 1854, and combined in 1857 with the adjacent settlements of Kearney City and South Nebraska City to form one incorporated community. Its growth as an unloading point on the river for westbound freight was sustained by the arrival of the Midland Pacific Railroad (1871). John Brown's Cave was a station for runaway slaves on the Underground Railroad. Markers indicate other historic spots, such as the Overland Trail passing point and the Pony Ex-

J. Sterling Morton House in Arbor Lodge State Historical Park, Nebraska City, Neb.

Milt and Joan Mann from CameraMann

press headquarters. The Nebraska School for the Visually Handicapped dates from 1876. A mixed farm economy is supplemented by small manufacturing (notably gas meters). The home of J. Sterling Morton (founder of Arbor Day) is in Arbor Lodge State Historical Park at the city's western edge. Pop. (1990) 6,547.

Nebraskan Glacial Stage, major division of Pleistocene time and deposits in North America (the Pleistocene Epoch occurred from 1,600,000 to 10,000 years ago). The Nebraskan Glacial Stage is the oldest generally recognized Pleistocene episode of widespread glaciation in North America; the Nebraskan was named for deposits in the state of Nebraska, although representative exposures in that state are rather poorly developed. The Nebraskan throughout North America is not well known; although its position as the earliest recognized of four Pleistocene glaciations in the Midwestern United States is well established, much remains to be done to delineate that position more precisely. Nebraskan deposits are best developed in Missouri, Nebraska, Iowa, and Kansas. Elsewhere, deposits designated as Nebraskan are not considered reliable. Authenticated Nebraskan deposits are rich in clays.

Nebuchadrezzar, biblical NEBUCHADNEZZAR, Akkadian NABU-KUDURRI-UṢUR, Greek NABUCHODONOSOR, or NABUGODONOSOR, name of Babylonian kings grouped below chronologically and indicated by the symbol •.

• **Nebuchadrezzar I** (fl. 12th century BC), most famous Babylonian king (reigned *c.* 1119–*c.* 1098 BC) of the 2nd dynasty of the Isin.

In revenge for earlier humiliating conquests and defeats that the Elamites had inflicted on Babylonia, Nebuchadrezzar led a grand campaign that resulted in the capture of Susa, the capital of Elam. The victory marked the end of Elam's domination of the region (the kingdom subsequently disintegrated into petty states) and afforded the return of the stolen cult statue of Marduk to its holy place at E-sagila (Marduk was to become the national deity of Babylon). Nebuchadrezzar was less successful in raids against Assyria.

• **Nebuchadrezzar II** (b. *c.* 630—d. *c.* 561 BC), the second and greatest king of the Chaldean dynasty of Babylonia (reigned *c.* 605–*c.* 561 BC). He was known for his military might, the splendour of his capital, Babylon, and his important part in Jewish history.

Nebuchadrezzar II was the oldest son and successor of Nabopolassar, founder of the Chaldean empire. He is known from cuneiform inscriptions, the Bible and later Jewish sources, and classical authors. His name, from the Akkadian Nabu-kudurri-uṣur, means "O Nabu, watch over my heir."

While his father disclaimed royal descent, Nebuchadrezzar claimed the third-millennium Akkadian ruler Naram-Sin as ancestor. The year of his birth is uncertain, but it is not likely to have been before 630 BC, for according to tradition Nebuchadrezzar began his military career as a young man, appearing as a military administrator by 610. He is first mentioned by his father as working as a labourer in the restoration of the temple of Marduk, the chief god of the city of Babylon and the national god of Babylonia.

In 607/606, as crown prince, Nebuchadrezzar commanded an army with his father in the mountains north of Assyria, subsequently leading independent operations after Nabopolassar's return to Babylon. After a Babylonian reverse at the hands of Egypt in 606/605, he served as commander in chief in his father's place and by brilliant generalship shattered the Egyptian army at Carchemish and Hamath, thereby securing control of all Syria. After his father's death on Aug. 16, 605, Nebuchadrezzar returned to Babylon and ascended the throne within three weeks. This rapid consolidation of his accession and the fact that he could return to Syria shortly afterward reflected his strong grip on the empire.

On expeditions in Syria and Palestine from June to December of 604, Nebuchadrezzar received the submission of local states, including Judah, and captured the city of Ashkelon. With Greek mercenaries in his armies, further campaigns to extend Babylonian control in Palestine followed in the three succeeding years. On the last occasion (601/600), Nebuchadrezzar clashed with an Egyptian army, with heavy losses; this reverse was followed by the defection of certain vassal states, Judah among them. This brought an intermission in the series of annual campaigns in 600/599, while Nebuchadrezzar remained in Babylonia repairing his losses of chariots. Measures to regain control were resumed at the end of 599/598 (December to March). Nebuchadrezzar's strategic planning appeared in his attack on the Arab tribes of northwestern Arabia, in preparation for the occupation of Judah. He attacked Judah a year later and captured Jerusalem on March 16, 597, deporting King Jehoiachin to Babylon. After a further brief Syrian campaign in 596/595, Nebuchadrezzar had to act in eastern Babylonia to repel a threatened invasion, probably from Elam (modern southwestern Iran). Tensions in Babylonia were revealed by a rebellion late in 595/594 involving elements of the army, but he was able to put this down decisively enough to undertake two further campaigns in Syria during 594.

Nebuchadrezzar's further military activities are known not from extant chronicles but from other sources, particularly the Bible, which records another attack on Jerusalem and a siege of Tyre (lasting 13 years, according to the Jewish historian Flavius Josephus) and hints at an invasion of Egypt. The siege of Jerusalem ended in its capture in 587/586 and in the deportation of prominent citizens, with a further deportation in 582. In this respect he followed the methods of his Assyrian predecessors.

Much influenced by the Assyrian imperial tradition, Nebuchadrezzar consciously pursued a policy of expansion, claiming the grant of universal kingship by Marduk and praying to have "no opponent from horizon to sky." From cuneiform fragments he is known to have attempted the invasion of Egypt, the culmination of his expansionist policy, in 568/567.

In addition to being a brilliant tactician and strategist, Nebuchadrezzar was also prominent in international diplomacy, as shown in his sending an ambassador (probably Nabonidus, a successor) to mediate between the Medes and Lydians in Asia Minor. He died about 561 and was succeeded by his son Awil-Marduk (Evil-Merodach of 2 Kings).

Nebuchadrezzar's main activity, other than as military commander, was the rebuilding of Babylon. He completed and extended fortifications begun by his father, built a great moat and a new outer defense wall, paved the ceremonial Processional Way with limestone, rebuilt and embellished the principal temples, and cut canals. This he did not only for his own glorification but also in honour of the gods. He claimed to be "the one who set in the mouth of the people reverence for the great gods" and disparaged predecessors who had built palaces elsewhere than at Babylon and had only journeyed there for the New Year Feast.

Little is known of his family life beyond the tradition that he married a Median princess, whose yearning for her native terrain he sought to ease by creating gardens simulating hills. A structure representing these hanging gardens cannot be positively identified in either the cuneiform texts or the archaeological remains.

Despite the fateful part he played in Judah's history, Nebuchadrezzar is seen in Jewish tradition in a predominantly favourable light. It was claimed that he gave orders for the protection of Jeremiah, who regarded him as God's appointed instrument whom it was impiety to disobey, and the prophet Ezekiel expressed a similar view at the attack on Tyre. A corresponding attitude to Nebuchadrezzar, as God's instrument against wrongdoers, occurs in the Apocrypha in 1 Esdras and, as protector to be prayed for, in Baruch. In Daniel (Old Testament) and in Bel and the Dragon (Apocrypha), Nebuchadrezzar appears as a man, initially deceived by bad advisers, who welcomes the situation in which truth is triumphant and God is vindicated.

There is no independent support for the tradition in Daniel of Nebuchadrezzar's seven years' madness, and the story probably arose from a fanciful later interpretation of texts concerned with events under Nabonidus, who showed apparent eccentricity in deserting Babylon for a decade to live in Arabia.

In modern times Nebuchadrezzar has been treated as the type of godless conqueror; Napoleon was compared to him. The story of Nebuchadrezzar is the basis of Giuseppe Verdi's opera *Nabucco,* while his supposed madness is the theme of William Blake's picture "Nebuchadnezzar." (H.W.F.S.)

BIBLIOGRAPHY. D.J. Wiseman, *Nebuchadrezzar and Babylon* (1985), examines his reign, the Babylonian Chronicle, and the capital city.

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nebula (Latin: "mist," or "cloud"), plural NEBULAS, or NEBULAE, any of various tenuous clouds of gas and dust that occurs in interstellar space. The term was formerly applied to any object outside the solar system that had a diffuse appearance and could not be resolved telescopically into a pointlike image, as in the case of a star. Today, astronomers use the word only in reference to clouds of interstellar matter within a single galaxy, such as the Milky Way system.

A brief treatment of such galactic nebulae follows. For full treatment, *see* MACROPAEDIA: Nebula.

Collectively, nebulae constitute only a small percentage of the mass of a galaxy. These interstellar clouds are commonly divided into two general classes according to appearance: dark nebulae and bright nebulae.

Dark nebulae are extremely dense, cold molecular clouds that contain roughly 50 percent of the entire interstellar matter of a galaxy. Their densities typically range from hundreds to millions or more hydrogen molecules per cubic centimetre. They appear as large, obscure, irregularly shaped areas in the sky. Their solid particles of dust either dim or completely blot out the light of the stars behind them as they absorb, scatter, or partially polarize radiation of wavelengths in the visible portion of the electromagnetic spectrum. Until the early 20th century, it was thought that dark nebulae were tunnels or "holes" in space, for some reason devoid of stars. The photographic work of the astronomers E.E. Barnard and Max Wolf provided evidence of their true nature.

Bright nebulae appear as faintly luminous, glowing surfaces. They emit their own light or reflect that of stars in their vicinity. Bright nebulae are frequently divided into five subclasses on the basis of their origin and visual properties: reflection, diffuse, planetary, supernova remnants, and diffuse ionized gas. The first two are essentially the same type of phenomenon observed under different conditions.

Reflection nebulae consist of cold molecular clouds of neutral hydrogen atoms. Dust particles in such clouds reflect the light of a nearby star. Nebulae of this kind would be seen as dark nebulae were it not for the bright star.

Diffuse nebulae are composed of hydrogen atoms ionized by a massive, hot neighbouring star—*i.e.,* one that is of stellar type O or B. This ionized gas radiates light in the form of bright emission lines, the most readily observable of which belong to the Balmer spectral line series (*see* spectral line series). Diffuse nebulae are commonly observed on the outer edge of a large molecular cloud wherein a star is forming. (The presence of such a nebula is thought to induce star formation.)

Planetary nebulae bear a superficial resemblance to planets, when viewed through a small telescope, hence the name. Most known planetary nebulae have at their centre an extremely hot star with a temperature of up to roughly 150,000 K. Gas ejected by the central star forms the shell or ring of such a nebula; the ultraviolet radiation from the stellar body ionizes the atoms of the gas, causing them to glow. Planetary nebulae expand at a rate of 24 to 56 km (14 to 35 miles) per second and are difficult to detect when they are more than 10,000 years old. More than 20,000 nebulae of this variety are known to exist in the Milky Way Galaxy, though only about 1,500 have been catalogued due to the obscuration by interstellar dust particles.

Supernova remnants are violently expanding clouds of gaseous matter that result from a stellar explosion known as a supernova. During the catastrophic explosion, most of a star's mass is hurled into space at speeds of many hundreds or even thousands of kilometres per second. At the brightest phase of the supernova event, the expanding cloud emits as much energy in one day as the Sun has done in the past 3,000,000 years. The Crab Nebula in the constellation Taurus is a prime example of a supernova remnant.

Diffuse ionized gas pervades nebular clouds. Astronomers have found that such gas constitutes a major component of the Milky Way Galaxy: it occurs not only close to the galactic plane but far from it as well. The diffuse ionized gas has been observed by faint emissions of positive hydrogen, nitrogen, and sulfur ions. Its origin remains a point of controversy.

NEC Corporation, major Japanese multinational corporation. Headquarters are in Tokyo.

Nippon Electric Company, Ltd. (NEC; officially NEC Corporation in 1983), was founded in 1899 with funding from the Western Electric Company of the United States. NEC was the first Japanese joint venture with a foreign company, and it enabled Western Electric to export its telephone equipment to the Japanese government. As Western Electric gained confidence in the integrity of Japan's patent system, it offered technical support that enabled NEC to manufacture telephone equipment.

In 1924 NEC helped to usher in Radio Tokyo, the first broadcast station in Japan, and in 1928 transmitted photographs of the coronation of Emperor Hirohito from Kyoto to Tokyo using a precursor of the facsimile.

Because of its strategic position as the main supplier of equipment to Japan's Ministry of Communication, the predecessor to Japan's telephone utility, NEC was involved in efforts to modernize the country's communications infrastructure. In the 1930s, NEC established the first telephone connection between Japan and China, by developing and installing 3,000 km (1,900 miles) of cable and equipment. Government support was also instrumental in NEC's establishment of its first research and development laboratory in 1939.

By 1954 NEC had embarked on computer research and development. In 1958 NEC built the first Japanese computer system that was not based on an IBM-compatible design. The next year, NEC built its first fully transistorized computer, the NEAC 2201.

Like other Japanese electronics firms, NEC was encouraged by Japan's Ministry of International Trade and Industry to collaborate with an American company, gaining access to technology in exchange for marketing the American company's goods in Japan. In 1962 NEC signed a 10-year accord with Honeywell Inc. Throughout the 1960s and '70s, NEC continued to penetrate the global computer market. Between 1964 and 1984, NEC's total sales grew from $270 million to $8 billion, 35 percent of which was in overseas business.

In Europe NEC participated in joint research and development of equipment and operating systems with Honeywell and the French government-controlled computer company Fédération des Equipes Bull, especially after 1970 when Honeywell took over General Electric Co.'s position in Bull-General Electric. In 1987 Honeywell, Bull, and NEC formed Honeywell-Bull Inc. Although Honeywell dropped out by the early 1990s, NEC maintained its investment, and, as the French government privatized the company, NEC emerged as Bull's largest shareholder.

In the United States, Japanese semiconductor companies were overtaking their American counterparts during the 1970s, putting pressure on the U.S. government for protectionist legislation. In response, NEC acquired Electronic Arrays, Inc., in 1978, becoming one of the first Japanese companies to locate some of its semiconductor operations in the United States.

In 1977 NEC announced its "C&C" (computers and communications) campaign. As Japan's preeminent telecommunications company, NEC contributed to developments in mobile telephony, fibre-optic networks, private branch exchanges, and microwave, digital, and satellite communications systems.

Besides mainframe computers, NEC was an early manufacturer of personal computers (PCs). In 1997 NEC merged its North American PC operations with Zenith Data Systems and Packard Bell to form Packard Bell–NEC, Inc. NEC also developed supercomputers. With billions of dollars in funding from the Japanese government, NEC engineered a custom computer processor for its Earth Simulator. Operational in 2002, the machine used more than 5,000 processors and outperformed its nearest rival fivefold. The Earth Simulator was built to model the weather—in particular, to give the government advance warning of typhoon conditions. (E.A.T.)

Nechako River, major tributary of the Fraser River, in central British Columbia, Canada. It originates at Kenney Dam and flows eastward for nearly 150 miles (240 km), draining the Nechako Plateau into the Fraser at Prince George, B.C. Stuart River, a 258-mile- (415-kilometre-) long tributary, joins the Nechako midway between Fort Fraser and Prince George, a stretch that is paralleled by the Canadian National Railway. Once a 287-mile- (462-kilometre-) long stream rising in Eutsuk Lake in the Coast Mountains of western British Columbia, the Nechako was bisected in 1952 by Kenney Dam as part of a colossal engineering project of the Aluminum Company of Canada, Ltd. The 340-foot (104-metre) dam created an 18,000,000-acre-foot (22,203,000,000-cubic-metre) reservoir (Lakes Ootsa, Whitesail, and Tahtsa), the overflow of which is tunneled westward through the Coast Mountains to Kemano, where it generates electricity for the giant Kitimat (*q.v.*) aluminum smelter.

Nechayev, Sergey Gennadiyevich, Nechayev also spelled NECHAEV (b. Sept. 20 [Oct. 2, New Style], 1847, Ivanovo, Russia—d. Nov. 21 [Dec. 3], 1882, St. Petersburg), Russian revolutionary known for his organizational scheme for a professional revolutionary party and for his ruthless murder of one of the members of his organization.

During 1868–69 Nechayev participated in the student revolutionary movement in St. Petersburg and composed his "Catechism of a Revolutionary," which embodied his militant philosophy and a morality under which any means was justified that served the revolutionary end. In March 1869 he went to Geneva, where he met the exiled Russian anarchist Mikhail Bakunin. A close collaboration between the two developed.

In September 1869 Nechayev returned to Moscow, where he founded a small secret revolutionary group, the People's Retribution (Russian: Narodnaya Rasprava), also called the Society of the Axe, based on the principles of the Catechism and requiring its members to submit unquestioningly to the will of the leader. When I.I. Ivanov, a student member of the group, protested Nechayev's methods, Nechayev organized his execution. The murder, committed in November 1869, was Nechayev's work, although other members of the group were present. When the crime was discovered, Nechayev escaped to Switzerland, but 67 members of his organization were brought to trial. Nechayev resumed contact with Bakunin and participated in revolutionary intrigues until his unprincipled behaviour discredited him in the eyes of Bakunin and other Russian émigrés. At the request of the Russian government, Nechayev was arrested by the Swiss police in 1872 and extradited to Russia. He was tried and sentenced to 20 years' imprisonment in the Peter-Paul Fortress, where he died of undetermined causes. Fyodor Dostoyevsky used Nechayev as a model for the character Pyotr Verkhovensky in *The Possessed*.

Necho, also spelled NEKO, or NECHAO, Greek NEKOS, Hebrew NECOH, or NECO, Assyrian NIKU, name of Egyptian rulers grouped below chronologically and indicated by the symbol •.

•Necho I (fl. *c.* 672–664 BC), governor of Sais, a city of the Egyptian Nile delta, under the Assyrians and ancestor of the 26th dynasty; he survived the frequent changes of political fortune in Lower Egypt between 670 and 660.

Necho's ancestor was probably a prince of Libyan descent of the 24th Egyptian dynasty. When in 671 Esarhaddon, king of Assyria, wrested Lower Egypt from Taharqa, the Cushite ruler of the 25th dynasty, Necho was among the local rulers installed by the Assyrians as vassals. After Esarhaddon's departure Taharqa's Cushite force reconquered Memphis and Lower Egypt (670–669), defeating the Assyrian occupation force and the Egyptian vassals. Esarhaddon's death in 669 stalled the Assyrian reaction, but Ashurbanipal, his son and successor, resumed the attack; his forces captured Memphis (667) and began an offensive into Upper Egypt. When Necho and other vassals conspired about 667 in an uprising led by Taharqa, they were detected by the Assyrians and were deported to Nineveh; but about 666–665 Ashurbanipal restored Necho as governor of Sais and later installed Necho's son, Psamtik I, under an Assyrian name, as ruler of Athribis in the Nile delta.

After Taharqa died (664), his nephew and successor, Tanutamon, led an invasion of Lower Egypt and captured Memphis. Necho thereafter remained loyal to the Assyrians.

•**Necho II** (fl. 6th–7th century BC), king of Egypt (reigned 610–595 BC), and a member of the 26th dynasty, who unsuccessfully attempted to aid Assyria against the Neo-Babylonians and later sponsored an expedition that circumnavigated Africa.

Necho II, bronze statue, 7th century
By courtesy of The University Museum, University of Pennsylvania

According to the Greek historian Herodotus, Necho began the construction of a canal from the Nile River to the Red Sea, probably in response to the growth of trade in the Egyptian Delta, but an oracle persuaded him to discontinue the project. A threat developed in Mesopotamia, where the Assyrian Empire was falling to the Babylonians. Necho ordered fleets to be built on the Mediterranean and Red seas, and with them he undertook a Syrian campaign in 608 BC to assist the battered Assyrian armies. When Josiah, king of Judah and an ally of the Neo-Babylonians, was slain in battle at Megiddo, Necho replaced Josiah's chosen successor with his own nominee and imposed tribute on Judah. In 606 the Egyptians routed the Neo-Babylonians, but at the great Battle of Carchemish (a Syrian city on the middle Euphrates River) in 605 the Neo-Babylonian crown prince, Nebuchadrezzar, soundly defeated Necho's troops and forced their withdrawal from Syria and Palestine. Egypt itself was threatened in 601, but Necho repelled the enemy and continued to promote anti-Babylonian coalitions in Syria and Palestine.

Herodotus also reports that Necho sent an expedition to circumnavigate Africa. His navigators apparently accomplished the feat, for they reported that, after a certain point in their voyage, the sun lay to their right (*i.e.,* northward), as they sailed around southern Africa.

Nechung oracle, oracle-priest of Tibet who, until the conquest of Tibet in 1959 by the People's Republic of China, was consulted on all important occasions. The priest chosen to be the Nechung oracle was the chief medium of Pe-har, a popular folk divinity incorporated into Buddhism, and resided at the Nechung (Gnas-chung-lcog) monastery near Drepung ('Bras-spungs), the centre of the Pe-har cult. The oracle is said to have first been appointed government adviser during the time of the fifth Dalai Lama (1617–82). He was required to journey to Lhasa once a year, during the New Year festivities, to prophesy the year's coming events, and was consulted whenever a search was conducted for a new Dalai Lama. Unofficial visitors were not normally allowed to consult him but were permitted to present questions to him when he was in a trance and after state business had been completed.

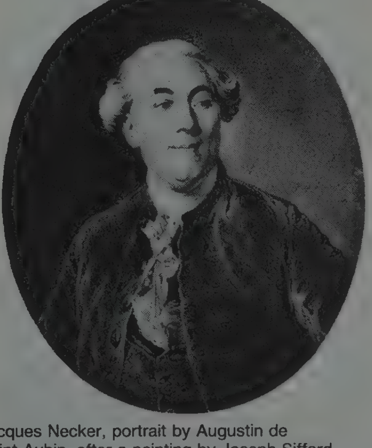
neck, in land vertebrates, the portion of the body joining the head to the shoulders and chest. Some important structures contained in or passing through the neck include the seven cervical vertebrae and enclosed spinal cord, the jugular veins and carotid arteries, part of the esophagus, the larynx and vocal cords, and the sternocleidomastoid and hyoid muscles in front and the trapezius and other nuchal muscles behind. Among the primates, humans are characterized by having a relatively long neck.

Neckar River, river, a right-bank tributary of the Rhine in southwestern Germany; it is 228 miles (367 km) long, rising in the Schwarzwald (Black Forest) near Schwenningen am Neckar, near the headwaters of the Danube River. The Neckar flows north and northeast, along the northwestern edge of the Schwäbische Alb (Swabian Jura), passing Tübingen and other small cities. At Plochingen it changes to a northwesterly course and flows through Stuttgart. As the river continues northward, its picturesque valley becomes broader and deeper, passing between vine-clad hills crowned by feudal castles. The river flows by Heilbronn to Eberbach, where it takes a tortuous westerly course, cutting through the wooded hills of the southern Odenwald. Winding by Neckarsteinach and Neckargemünd, it sweeps beneath the Königstuhl peak (1,857 feet [566 m]), passes Heidelberg, and enters the Rhine from the right at Mannheim. The Neckar is canalized as far as Plochingen and is navigable for 1,000-ton barges.

Necker, Anne-Louise-Germaine (French-Swiss writer): *see* Staël-Holstein, Anne-Louise-Germaine Necker, baronne de.

Necker, Jacques (b. Sept. 30, 1732, Geneva—d. April 9, 1804, Coppet, Switz.), Swiss banker and director general of finance (1771–81, 1788–89, 1789–90) under Louis XVI of France. He was overpraised in his lifetime for his somewhat dubious skill with public finances and unduly depreciated by historians for his alleged vacillation and lack of statesmanship in the opening phases of the French Revolution.

Early career. Necker was the younger son of Charles-Frédéric Necker, a lawyer from Küstrin in the Electorate of Brandenburg who had become a citizen of the Genevan republic in January 1726. At the age of 16, Jacques Necker became a clerk in the bank of a friend of his father, and in 1750 he was transferred to the bank's headquarters in Paris. In 1762 Necker was promoted to the position of junior partner. As a result of adroit speculation in the public funds and in the grain trade during the Seven Years' War, Necker became a prominent and wealthy banker. In 1772, at his wife's suggestion, Necker transferred his banking responsibilities to his brother, Louis. He then acquired a reputation as a writer on financial topics with a eulogy written in memory of Jean-Baptiste Colbert, Louis XIV's great finance minister, and with an attack (1775) on the current free-trade policy in corn. Though he was a foreigner and a Protestant, Necker was placed in virtual control of French finances, as director of the royal treasury, on Oct. 22, 1776, and was appointed director general of the finances on June 29, 1777.



Jacques Necker, portrait by Augustin de Saint-Aubin, after a painting by Joseph-Sifford Duplessis
H. Roger-Viollet

First ministry. In his first ministry, Necker made several cautious experiments in social and administrative reform. Some of these met with opposition from the privileged orders and were not extended, as had been hoped, to the country as a whole. Necker's principal mistake, however, was his misguided attempt to finance French participation in the American War of Independence without recourse to additional taxation. In trying to raise the necessary loans, Necker published in 1781 his celebrated *Compte rendu au Roi,* claiming a surplus of 10,000,000 livres in the hope of concealing an actual deficit of 46,000,000. The opposition of the leading minister, Jean-Frédéric Phelypeaux, comte de Maurepas, and the hostility of the queen, Marie-Antoinette, forced Necker to resign on May 19, 1781. He retired to Saint-Ouen, where he wrote his *De l'administration des finances de la France* to justify his policy (1784).

Outbreak of revolution. After both Charles-Alexandre de Calonne and Étienne-Charles de Loménie de Brienne had failed to solve the financial problems for which Necker was at least partially responsible, Necker himself was recalled as finance minister on Aug. 26, 1788. France was now on the verge of bankruptcy, in spite of the aristocracy's agreement to surrender its immunity from taxation. In the face of the financial crisis it was decided to summon a meeting of the States General (the representatives of the clergy, nobility, and commons), which was to set in motion the French Revolution. As the decision to summon the States General for 1789 had already been taken, Necker's main preoccupation lay in the field of politics rather than in finance, though he was too complacent in assuming that the surrender of the fiscal immunities of the nobility would remove his financial anxieties. In preparing for the meeting of the States General, Necker had to steer a difficult course between the claims of the Third Estate for double representation, which were conceded by the royal council on his recommendation in December 1788, and the insistence of the privileged classes on the traditional method of debate, order by order. He has often been blamed for not having clearly laid down the government's proposals for political as well as financial reform in his opening speech to the States General on May 5, 1789. He did, however, propose a reasoned program of social and constitutional reforms that was overlooked in the struggle over procedure. This struggle might have been avoided if Necker's suggestion for conciliation had been adopted. His program of liberal concessions to the National Assembly (formed between June 10 and June 17) was drastically modified by the court reactionaries just before the "royal session" of June 23, 1789. His objective was a limited constitutional monarchy with a bicameral legislature on the English model. His dismissal, on July 11, 1789, an overt sign of court reaction, did much to provoke the disturbances in Paris that culminated in the storming of the Bastille. Having retired to Switzerland, he received the summons to return to office on July 20, 1789.

In his third ministry Necker struggled ineffectively with the rapidly mounting deficit and was overshadowed by Talleyrand and the Count de Mirabeau, who dictated revolutionary finance at that stage. Necker's chief weakness as a politician was his vanity and his anxiety to preserve his popularity at all costs. After his final resignation (Sept. 18, 1790), he lived in retirement until his death in 1804.

(Al.G.)

BIBLIOGRAPHY. Robert D. Harris, *Necker: Reform Statesman of the Ancien Régime* (1979), is a sympathetic reevaluation of Necker's first ministry (1776–81); his *Necker and the Revolution of 1789* (1986) reassesses Necker's subsequent political career.

Necker, Suzanne, *née* CURCHOD (b. May 1739, Crassier, Switz.—d. May 6, 1794, Beaulieu, near Lausanne), Swiss wife of the French finance minister under Louis XVI, Jacques Necker; mother of Madame de Staël; and mistress of a brilliant Parisian salon. At first she was engaged to the English historian Edward Gibbon, but his father broke off the match. In 1764 she married Necker, then a banker, and encouraged him in his political career. Her salon attracted such figures as the naturalist Georges Buffon and the authors Jean-François de La Harpe and Jean-François Marmontel. Madame Necker also established a hospital in 1776 and was the author of several books.

Suzanne Necker, engraving by Johann Heinrich Lips

H. Roger-Viollet

Necker de Saussure, Albertine-Adrienne, *née* ALBERTINE-ADRIENNE DE SAUSSURE (b. 1766, Geneva—d. April 20, 1841, Vallée du Salève, near Geneva), Swiss woman of letters and author of a long-influential study on the education of women.

She was the daughter of a distinguished Swiss naturalist, and she married a noted botanist who was the nephew and namesake of Louis XVI's finance minister, Jacques Necker. Her husband was a cousin of Germaine Necker de Staël, who became her friend and sometime collaborator.

Reflecting her strongly religious orientation, the most important book of Mme Necker de Saussure, *L'Education progressive, ou étude sur le cours de la vie,* was a significant contribution to educational literature. The work was published in several volumes over the decade 1828–38; it was first translated into English (in part) in Boston (1835) and later (in full) in London (1839–43; 3 vol.). Other works include *Notice sur la caractère et lès écrits de Mme de Staël* (1820; "A Review of the Character and the Writings of Mme de Staël") and a French translation of August Wilhelm von Schlegel's *Über dramatische Kunst und Literatur* (1809–11) as *Cours de littérature dramatique,* 3 vol. (1814).

Necklace, Affair of the (French history): *see* Diamond Necklace, Affair of the.

necklaceweed: *see* baneberry.

Necoh, also spelled NECO (Egyptian rulers): *see under* Necho.

necromancy, communication with the dead, usually in order to obtain insight into the future or to accomplish some otherwise impossible task. Such activity was current in ancient times among the Assyrians, Babylonians, Egyptians, Greeks, Romans, and Etruscans; in medieval Europe it came to be associated with black (*i.e.,* harmful, or antisocial) magic and was condemned by the church.

Its practitioners were skilled magicians who used a consecrated circle in some desolate spot, often a graveyard, to protect themselves from the anger of the spirits of the dead. In the event of a premature or violent death, the corpse was thought to retain some measure of unused vitality, and so the use of parts of corpses as ingredients of charms came to be an important technique of witchcraft. Necromancy was especially popular in the Middle Ages and Renaissance, and its temptations and perils were vividly described in the Faust stories of Christopher Marlowe and Johann Wolfgang von Goethe.

necropolis (singular), plural NECROPOLISES, NECROPOLES, NECROPOLEIS, or NECROPOLI (from Greek *nekropolis,* "city of the dead"), in archaeology, an extensive and elaborate burial place of an ancient city. In the Mediterranean world, they were customarily outside the city proper and often consisted of a number of cemeteries used at different times over a period of several centuries. The locations of these cemeteries were varied. In Egypt many, such as western Thebes, were situated across the Nile River opposite the cities, but in Greece and Rome a necropolis often lined the roads leading out of town. One of the most famous necropolises was discovered in the 1940s under the central nave of St. Peter's Basilica in Rome.

necropsy: *see* autopsy.

necrosis, death of a circumscribed area of plant or animal tissue as a result of an outside agent; natural death of tissue is called necrobiosis. Necrosis may follow a wide variety of injuries, both physical (cuts, burns, bruises) and biological (effects of disease-causing agents). The sign of necrosis—dead tissue—is called a lesion; it is often of diagnostic value. Necrosis is brought about by intracellular enzymes that are activated upon injury and proceed to destroy damaged cells.

Nectanebo, also called NEKHTNEBF, or NEKHTNEBEF, name of Egyptian kings grouped below chronologically and indicated by the symbol •.

• **Nectanebo I** (fl. 4th century BC), first king (reigned 380–362 BC) of the 30th dynasty of Egypt; he successfully opposed an attempt by the Persians to reimpose their rule on Egypt (373).

When Nectanebo came to the throne, a Persian invasion was imminent. A powerful army, gathered by a previous king, Achoris (reigned 393–380 BC), and largely composed of Greek mercenaries, was entrusted by Nectanebo to the Athenian Chabrias. The Persians, however, succeeded in causing Chabrias' recall and marched against Egypt with a force of 220,000. The Egyptians suffered an initial reverse, but, through the indecision of the Persian general Pharnabazus, they were able to collect their forces, outflanking the delaying invaders near Mendes in the Nile delta and forcing them to retreat. Nectanebo was relieved of further Persian intervention during the rest of his rule because of satrap rebellions throughout the Persian empire.

Nectanebo also undertook much building activity, especially at Philae, Edfu, and Hermopolis Magna, and the arts in particular flourished during his reign.

• **Nectanebo II** (fl. 4th century BC), third and last king (reigned 360–343 BC) of the 30th dynasty of Egypt; he was the last of the native Egyptian kings.

Nectanebo, with the aid of the Spartan king Agesilaus II, usurped the throne from Tachos. A rival pretender almost succeeded in overthrowing the new king, but Agesilaus defeated him and left Nectanebo firmly established as ruler. His most powerful enemy was the Persian king Artaxerxes III Ochus, who, after an earlier, futile attempt, swept down through Phoenicia and Palestine, entered three mouths of the Nile at once, and easily took control of Egypt. Nectanebo fled first to Memphis and then to Upper Egypt; thereafter nothing more is known of him.

nectar, sweet, viscous secretion from the nectaries, or glands, in plant blossoms, stems, and leaves. It attracts fruit-eating bats, hummingbirds, and insects, who aid in effecting pollination by transferring from plant to plant the pollen that clings to their bodies. Nectar is the raw material used by the honeybee to produce honey. Mainly a watery solution of the sugars fructose, glucose, and sucrose, it also contains traces of proteins, salts, acids, and essential oils. Sugar content varies from 3 to 80 percent, depending upon such factors as flower species and soil and air conditions. Honeybees gather nectar mainly from the blossoms and rarely gather nectars having less than 15 percent sugar content.

In Greek mythology, nectar is the drink of the gods.

nectarine (*Prunus persica* variety *nectarina*), smooth-skinned peach of the family Rosaceae, known for more than 2,000 years and grown throughout the warmer temperate regions of both the Northern and Southern hemispheres. In tree shape and leaf characteristics the peach and nectarine are indistinguishable, but nectarine fruits look more like plums than peaches because of the smooth skin. The stones and kernels of the two fruits are alike in appearance. Nectarines have red, yellow, or white flesh and are a source of vitamins A and C. They are commonly eaten fresh, or cooked in conserves, jams, and pies.

Nectarine (*Prunus persica* var. *nectarina*)

J.C. Allen and Son

As in peaches, there are clingstone and freestone nectarines. When some peaches are crossed or self-pollinated, the resulting seeds that carry the factor for smooth skin may give rise to nectarines, while those that do not carry this factor will be peaches. Nectarines may sometimes appear on peach trees as a result of the process of bud variation, or bud sporting, a vegetative deviation from the normal. Cultivation of nectarines is essentially the same as for peaches, with best results usually obtained on well-drained sandy or gravelly loams, enriched with nitrogen.

Nectariniidae, songbird family, order Passeriformes, consisting of the sunbirds and spider hunters, about 116 species of small, brilliantly coloured birds widespread throughout the warmer forests of Africa and Asia.

Members range in size from 9 to 22 centimetres (3.5 to 8.5 inches) long. They have slender downcurved bills, partially tubular tongues, and short, rounded wings. They feed on small insects and sip nectar from small flowers (*e.g., Anthreptes, Nectarinia, Aethopyga*). The group called spider hunters (*Arachnothera*) are found primarily in the Orient.

The Nectariniidae belong to the songbird suborder (Passeres).

Nečuj-Levyc'kyj, Ivan: *see* Levitsky, Ivan.

NED: *see* New English Dictionary on Historical Principles, A.

Nederburgh, Sebastian Cornelius (b. March 7, 1762, The Hague—d. Aug. 3, 1811, 's-Gravezande, Neth.), conservative Dutch statesman who was chiefly responsible for the Charter of 1801, or Nederburgh's Charter, which established Dutch colonial policy after the government's takeover of the Dutch East India Company.

Nederburgh became a lawyer for the company in 1787. He went to Batavia (now Jakarta) and in 1791 was appointed governor general of the company, which was suffering financially. To save it, he proposed further economization and an increase in compulsory labour. He came into conflict with the progressive company official Dirk van Hogendorp, whose ideas were exciting interest at the time.

In 1801, when the Indies came under direct Dutch control, both men were called on to draw up a new charter for them. Nederburgh's ideas prevailed. The charter asserted that the colonies existed for the good of the mother country, prohibited free trade, and decreed that the colonies would be governed directly by a semi-autonomous native bureaucracy and indirectly by a Dutch bureaucracy. The charter called for the distinct separation of the executive, ruling branch, and the judiciary. The administration in Europe would be presided over by a Council for Asiatic Government. The charter indicated the main conservative trends in Dutch colonial policy that reappeared intermittently during the length of the Dutch stay in Indonesia.

Nederlandse Antillen (Caribbean Sea): *see* Netherlands Antilles.

Nederlandse Hervormde Kerk (Netherlands Reformed church): *see* Netherlands Reformed Church, The.

Nedham, Marchamont (journalist): *see* Needham, Marchamont.

Nedim, Ahmed (b. 1681, Constantinople—d. 1730, Constantinople), one of the greatest lyric poets of Ottoman Turkish literature.

The son of a judge, Nedim was brought up as a religious scholar and teacher and, winning the patronage of the grand vizier, Nevsheherli İbrahim Paşa, received an appointment as a librarian. Later, he became the Sultan's close friend—thus his name Nedim, meaning Boon Companion. He lived during the Tulip Age (Lâle Devri) of Ottoman history, in the reign of Sultan Ahmed III (1703–30), so called because a fad of tulip growing was one manifestation of the court's passion for beauty and pleasure during this unusually peaceful interlude in Ottoman history.

Nedim's *qaṣīdah*s ("odes") and *ghazal*s ("lyrics") are bright and colourful, and he excelled especially in the writing of charming and lively *şarqıs* ("songs"), which are still sung today. Filled with grace and joy, they are the perfect accompaniment to the exuberance of the Tulip Period. Nedim was a poet of the old school who freed himself from its fetters sufficiently to be able to express his personality and charm in an original way. His divan (collection of poems) exhibits his masterly handling of the language and accounts for his popularity. Nedim was killed during the religious and civil revolts against the frivolity of the court, which brought the Tulip Period to its close.

Needham, John Turberville (b. Sept. 10, 1713, London—d. Dec. 30, 1781, Brussels), English naturalist and Roman Catholic divine, first clergyman of his faith to become a member of the Royal Society of London (1768).

He was ordained in 1738 but spent much of his time as a teacher and tutor. His reading about animalcules (microscopic organisms) aroused an interest in natural science, and from 1746 to 1749 he studied in that field in London and Paris. He became a staunch advocate of the theories of spontaneous generation (life from inorganic matter) and vitalism (doctrine holding that life processes cannot be explained by the laws of chemistry and physics). In 1750 he presented a paper explaining the theory of spontaneous generation and attempting to offer scientific evidence supporting the theory. In 1767 he retired to the English seminary at Paris to pursue his scientific experiments. He also served as the director of the Imperial Academy in Brussels until 1780.

Needham, Marchamont, Needham also spelled NEDHAM (baptized Aug. 21, 1620, Burford, Oxfordshire, Eng.—d. Nov. 29, 1678, London), British journalist and publisher of the *Mercurius Britanicus,* an anti-Royalist commentary on news and politics and a forerunner of the modern newspaper.

Needham's father, an attendant to an aristocratic woman, died when Marchamont was an infant, and the boy was raised by his mother, an innkeeper, and her second husband. He studied at All Souls College, Oxford, and later, after contemplating the law and the practice of medicine, was an usher in the school of the Merchant Taylors. He settled on journalism as a career and then took up the Parliamentary cause in his first newsletter, issuing a defense, of which he was probably the primary author, against Royalist attacks in the *Mercurius Aulicus,* the Royalist publication.

Like Capt. Thomas Audley, who was sometimes identified as the editor of *Mercurius Britanicus* and the author of attacks on King Charles I (1625–49), Needham was arrested for his writing and released, many times—by both the Royalists and the Parliamentarians.

In 1647, two years before Charles I was beheaded, Needham suddenly changed political sides, supporting the Royalists and assailing the Cromwellians. He published *Mercurius Pragmaticus,* a violently anti-Parliament newsletter. Then in 1650, just as unpredictably, he reversed himself again and sided with the Parliamentarians in attacking the crown. He edited the *Mercurius Politicus,* which sought to discredit the Royalist cause and to champion that of the Commonwealth. Needham had to flee to Holland in 1660 but was later pardoned and returned to England to practice medicine. Gradually, however, he again took up his role of pamphleteer. As befitted one so mercurial and intense in his various loyalties, he was the subject of numerous satires and caricatures.

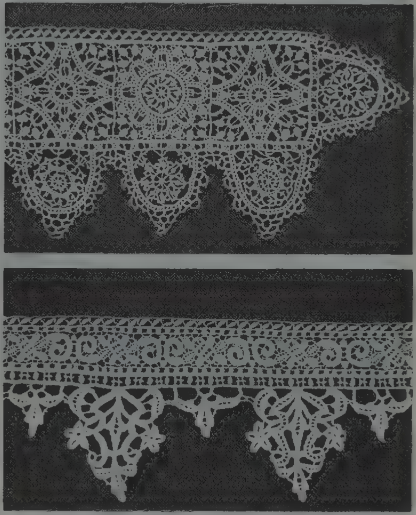
Needian Interglacial Stage, major division of Pleistocene time and deposits in The Netherlands (the Pleistocene Epoch began about 2,500,000 years ago and ended about 10,000 years ago). The Needian Interglacial followed the Waal and preceded the Drenthian Glacial Stage. The Needian has been correlated with the Hoxne Interglacial Stage of Great Britain and the Holstein Interglacial Stage of northern Europe. The tendency is to apply the term Holstein rather than Needian to the Dutch deposits; the term Needian is gradually losing favour in The Netherlands.

needle, basic implement used in sewing or embroidering and, in variant forms, for knitting and crocheting. The sewing needle is small, slender, rodlike, with a sharply pointed end to facilitate passing through fabric and with the opposite end slotted to carry a thread. Bone and horn needles have been used for at least 20,000 years. The earliest iron needles, dating to the 14th century, had no eye but had a closed hook to carry the thread. Eyed needles were manufactured in the Low Countries in the 15th century.

Modern sewing needles are made of steel. Crocheting needles are eyeless, with one hooked end, and made in several sizes, commonly of steel or plastic. Knitting needles are long, made of a variety of materials, and bluntly pointed at one or both ends, sometimes with a knob at the end opposite the point. The earliest were hooked, but modern needles are straight.

needle gun: *see* Dreyse rifle.

needle lace, with bobbin lace, one of the two main kinds of lace. In needle lace the design is drawn on a piece of parchment or thick paper, cloth-backed. An outlining thread stitched onto this serves as a supporting framework, and the lace is worked with a needle and a single thread in a succession of buttonhole stitches in varying degrees of tightness and in straight lines that support further stitches. The needle never penetrates the backing. When the work is finished, a knife is passed between the two layers of backing to cut the stitching thread and the lace is lifted off the pattern.



(Top) *Venise reticella* needle lace from Italy, 16th–17th century; (bottom) *Venise gothique* or *point d'ivoire* needle lace from Italy, 16th–17th century; both in the Museum Boymans-van Beuningen, Rotterdam

By courtesy of the Museum Boymans-van Beuningen, Rotterdam

The beginning of needle lace can be dated to the late 15th century. The question of its place of origin—Italy or Flanders—has not been resolved, but most agree that it was developed in Italy.

needlefish, any of the long, slim, primarily marine fishes of the family Belonidae (order Atheriniformes), found throughout temperate and tropical waters. Needlefish are adept jumpers, carnivorous in habit, and distinguished by long, slender jaws equipped with sharp teeth. They are silvery fish, with blue or green backs, and are edible. The family includes some 60 species, the largest growing about 1.2 m (4 feet) long. Among the species are the garfish (*Belone belone*) of Europe and the houndfish (*Tylosurus crocodilus*), found everywhere in the tropics.

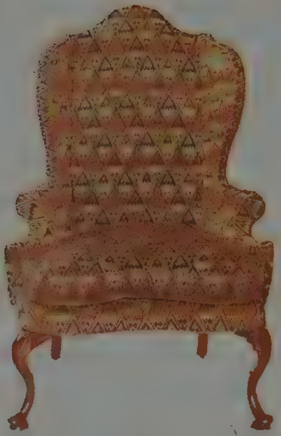
Needlefish (*Strongylura marina*)
Jim Annan—Annan Photo Features

needlegrass, any of the grasses of the genus *Stipa* (family Poaceae), consisting of about 150 species with a sharply pointed grain and a long, threadlike awn (bristle). In some species, such as porcupine grass (*Stipa spartea*), the sharp grain may puncture the faces of grazing animals.

European needlegrass (*Stipa pennata*)
Syndication International—Photo Trends

Most needlegrasses provide good forage in dry areas before the seed is formed. They grow from 0.3 to 1 m (1 to 3 feet) tall. Some are highly drought resistant. Esparto grass (*S. tenacissima* and a species of the genus *Lygeum*), also known as alfa, or halfa, is used in the western Mediterranean area to make ropes, cords, and paper.

needlepoint, type of embroidery known as canvas work until the early 19th century. In needlepoint the stitches are counted and worked with a needle over the threads, or mesh, of a canvas foundation. Either single- or double-mesh canvas of linen or cotton is used. If needlepoint is worked on a canvas that has 16 to 20 or more mesh holes per linear inch, the embroidery is called petit point; if the number of holes ranges from 7 or 8 to 16 squares per inch, it is called gros point; and, if the mesh openings are fewer than 7, it is known as quick point. From the 16th to the 18th century most needlepoint was petit point with 20 to 45 squares per linear inch.


English wing chair upholstered with canvas stitch embroidery (needlepoint) in Florentine, or bargello, stitches, *c.* 1720
The Colonial Williamsburg Foundation

There are more than 150 canvas embroidery stitches, most of which are a variation or combination of the long stitch, covering more than one mesh, or intersection of threads, and the tent stitch, which covers only one. Since the 16th century the most commonly used stitches have been the tent (or continental) stitch, the vertically worked Florentine stitch (also called the flame, bargello, or Hungarian stitch), and the cross-stitch. In the 20th century the basket weave, or diagonal, stitch has achieved widespread popularity. It produces a firmer fabric but also uses more yarn than the tent stitch.

Wool is generally used for needlepoint, though silk yarn also can be employed for embroidering. For petit point, finer crewel yarns are used, while gros point is most frequently worked in two-ply Persian yarn or four-ply tapestry yarn.

Needlepoint as it is known today can be said to have originated in the 17th century, when the fashion for furniture upholstered with embroidered fabrics prompted the development of a more durable material, canvas, to serve as the foundation for the embroidery.

Originally, needlepoint designs were drawn either by the amateur embroiderer, often from pattern books published in Europe since the 16th century, or by professional embroiderers, who, until the 18th century, were mostly attached to a court or a wealthy family. By the mid-18th century the number of professional embroiderers in Europe was so large that many opened shops where embroidery supplies were sold as well as needlepoint kits that included a designed canvas and all the materials needed to complete it.

Needles, city, San Bernardino county, southeastern California, U.S., on the Colorado River (impounded [south] to form Lake Havasu). It was founded in 1883 as a way station on the Atlantic and Pacific Railroad (now the Santa Fe) and was named after a group of isolated needlelike peaks just across the border in Arizona. The city experiences extremely high temperatures often exceeding 100° F (38° C) with a wide range of low humidity and is often described as one of the hottest cities in the nation. Palms, cottonwoods, tamarisks, and pepper trees shade the streets from the sweltering heat. Tourism (based on Colorado River and Mojave Desert recreational facilities and nearby mining and ghost towns) provides a major source of income. Fort Mohave Indian Reservation is immediately to the north. Inc. 1913. Pop. (1999 est.) 6,856.

Needletrades, Industrial and Textile Employees, Union of (UNITE), North American trade union formed in 1995 by the merger of the International Ladies' Garment Workers' Union (*q.v.*) and the Amalgamated Clothing and Textile Workers Union (*q.v.*). The union represents apparel workers in the United States, Canada, and Puerto Rico. Headquarters are in New York City.

Néel, Louis-Eugène-Félix (b. Nov. 22, 1904, Lyon, Fr.—d. Nov. 17, 2000, Brive-la-Gaillarde), French physicist, corecipient, with the Swedish astrophysicist Hannes Alfvén, of the Nobel Prize for Physics in 1970 for his pioneering studies of the magnetic properties of solids. His contributions to solid-state physics have found numerous useful applications, particularly in the development of improved computer memory units.

Néel was professor at the universities of Strasbourg (1937) and Grenoble (1946–76). During the early 1930s he studied, on the molecular level, forms of magnetism that differ from ferromagnetism. In ferromagnetism, the most common variety of magnetism, the electrons line up (or spin) in the same direction at low temperatures. Néel discovered that in some substances alternating groups of atoms align their electrons in opposite directions, thus neutralizing the net magnetic effect. This magnetic property is called antiferromagnetism. Néel's studies of fine-grain ferromagnetics provided an explanation for the unusual magnetic memory of certain mineral deposits that has provided information on changes in the direction and strength of the Earth's magnetic field.

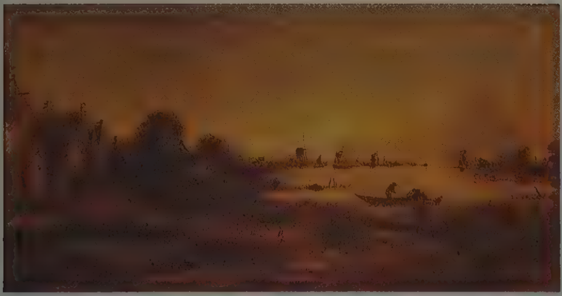
Néel was director of the Polytechnic Institute, Grenoble, from 1971 to 1976 and also of the Centre for Nuclear Studies, Grenoble, from 1956 to 1971. He wrote over 200 works on various aspects of magnetism. Mainly because of his contributions, ferromagnetic materials can be manufactured to almost any specifications for technical applications, and a flood of new synthetic ferrite materials has revolutionized microwave electronics.

Neemuch (India): *see* Nīmach.

Neenah, city, Winnebago county, east-central Wisconsin, U.S., on Lake Winnebago, just south of Appleton. The city, with adjoining Menasha, forms one economic and social community. It was first settled in 1835 and called Winnebago Rapids and in 1856 was renamed Neenah (Winnebago Indian for "water"). Flour milling was an early enterprise, but with the decline of wheat growing the city turned to the manufacture of paper products, now a major industry. Other manufactures include packaging and cast metal products. Inc. village, 1850; city, 1873. Pop. (1999 est.) city, 23,913; Appleton-Oshkosh-Neenah MSA, 348,100.

Neer, Aert van der, Aert also spelled AERNOUT, AART, or AERNOU (b. 1603/04, Amsterdam, Neth.—d. Nov. 9, 1677, Amsterdam), Dutch painter of the Baroque period, famous for his nocturnal landscapes.

Van der Neer probably did not begin his painting career until after 1630 and then was unable to make a reasonable living from his art. In 1658 he opened a wineshop, but this venture ended in bankruptcy in 1662. He probably reverted to painting, for he is described as a painter in the inventory that was made of his few belongings at the time of his death. Apart from a number of accomplished winter scenes, such as "Riverscape in Winter" (Rijksmuseum, Amsterdam) in the manner of Hendrik Avercamp, he specialized in canal and river landscapes seen by the light of late evening or early dawn or (most characteristic of all) by moonlight, as in "River Scene by Moonlight" (Rijksmuseum, Amsterdam). Within this limited range he had no rival among his contemporaries; his best pictures are distinguished by sensitive handling of subdued light and its reflections on water and in the windows of riverside houses. His son Eglon Hendrick van der Neer (1634–1703)

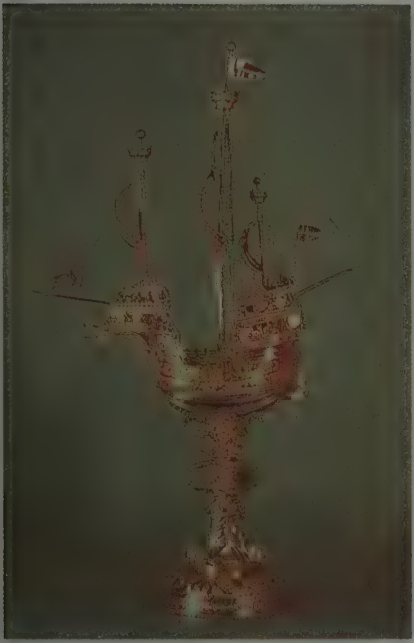


"River Scene by Moonlight," oil on panel by Aert van der Neer; in the Rijksmuseum, Amsterdam

By courtesy of Rijksmuseum, Amsterdam

and grandson Aert van der Neer the Younger were also painters.

nef, European vessel in the form of a medieval ship, often complete with rigging. Although occasionally made of Venetian glass, nefs were usually elaborately constructed of precious metals and sometimes had a hull of rock crystal, hardstone, or nautilus shell. Perhaps first used as a drinking vessel, it had, by the 14th century, become a table ornament to denote the host's place or a container (usually smaller) for salt and spices or table utensils. More rarely it was used as an alms dish in royal households. Although still being made in the early 17th century in Germany, the nef had declined in artistic importance and had virtually ceased to exist in the rest of Europe.



Silver-gilt nef, probably French, about 1530; in the British Museum

By courtesy of the trustees of the British Museum

Nef, John Ulric (b. June 14, 1862, Herisau, Switz.—d. Aug. 13, 1915, Carmel, Calif., U.S.), American chemist whose studies demonstrated that carbon can have a valence (*i.e.,* affinity for electrons) of two as well as a valence of four, thus greatly advancing the understanding of theoretical organic chemistry.

Brought to the United States by his father, Nef studied at Harvard University (A.B., 1884) and at the University of Munich (Ph.D., 1886), where he was a student of Alfred von Baeyer. After working a year in Baeyer's laboratory, Nef taught at Purdue University from 1887 to 1889 and at Clark University from 1889 to 1892, when he resigned to become professor of chemistry at the University of Chicago. Nef was a leader in establishing graduate study in the United States, bringing with him standards and techniques of the university organic-chemistry laboratories of Europe.

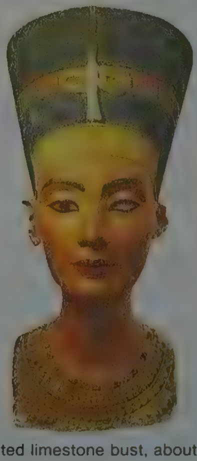
Nef's major research was in the chemistry of isocyanides, nitroparaffins, and fulminates, from the last of which came his work on carbon valence. His research resolved a disagreement between the German chemist Friedrich A. Kekule von Stradonitz, who had proposed the single valence of carbon as four, and Scottish chemist Archibald S. Couper, who proposed the variable valences of carbon as four and two. Nef's findings also enhanced the value of Couper's system of writing the structural formulas of organic compounds.

Neferkheperure Amenhotep (Egyptian king): *see* Akhenaton.

Nefertem, also spelled NEFERTUM, or NEFERTEMU, in ancient Egyptian religion, youthful god associated with the lotus flower. Nefertem was an ancient god, mentioned in the Pyramid Texts (*c.* 2350 BC), but he became more prominent during the New Kingdom (1539–*c.* 1075 BC) and later. As a lotus he was believed to have emerged from the primeval waters, and he was connected with the sun god because lotus flowers open in the sun. He also had a warlike aspect and could be depicted as a lion. He was most commonly represented holding a scimitar with a falcon's head and wearing a headdress of a lotus with a menat (ritual necklace counterpoise) on each side and a pair of plumes above.

Nefertiti, also spelled NEFERTIIT, or NOFRETETE (fl. 14th century BC), queen of Egypt and wife of King Akhenaton (reigned 1353–36 BC) who supported her husband's religious revolution and is thought by some to have adhered to the new cult of the sun god Aton even after the king began to compromise with the upholders of the old order.

Nefertiti is best known for her portrait bust, found at Tell el-Amarna (ancient Akhetaton), the king's new capital. Her parentage is uncertain, but some scholars believe she was an Asian princess from Mitanni. She appears prominently at her husband's side in reliefs found at Tell el-Amarna, and she was a faithful follower of his new cult. Nefertiti had six daughters, two of whom became queens of Egypt. In the 12th year of Akhenaton's reign, or possibly later, Nefertiti either retired after losing favour with the king or, less probably, died. Objects belonging to her have been found at the northern palace in Amarna, suggesting that she may have retired there.



Nefertiti, painted limestone bust, about 1350 BC; in the Egyptian Museum, Berlin

Bildarchiv Preussischer Kulturbesitz, Agyptisches Museum, Staatliche Museen zu Berlin–Preussischer Kulturbesitz, Berlin, photograph, Jurgen Liepe

Nef'i, pseudonym of ÖMER, also called NEF'I OF ERZURUM (b. *c.* 1572, Hasankale, Ottoman Empire—d. 1635, Constantinople), one of the greatest classical Ottoman poets and one of the most famous satirists and panegyrists in Ottoman Turkish literature.

Little is known of Nef'i's early life; he served as a minor government official in the reign of the sultan Ahmed I (1603–17). Not until the time of Sultan Murad IV (1623–40), himself a poet, did Nef'i gain court favour. He became famous as a court panegyrist and as a powerful satirist. Except for his patron, the sultan, Nef'i attacked the highest public figures with his vituperative pen. These sketches, often obscene and vulgar, reveal his most candid opinions of those in power. He often satirized a figure he had eulogized earlier in his career. Nef'i's biting invective earned him many enemies at the court; Bayram Paşa, deputy prime minister and brother-in-law of the sultan, finally secured his execution in 1635.

Nef'i is considered one of the finest qasida ("ode") writers of Ottoman literature. His famous divan, or collection of poems, contains many examples of his eloquent poetic style. Though his qasidas, mainly eulogies, are considered to be extremely tasteful and proper, his satiric works are held to be calumnious and abusive. Nef'i also left a Persian divan praised by his patron, Murad IV, who was a great admirer of Persian letters.

Nefta (Tunisia): *see* Nafṭah.

Nefusa Plateau (Libya): *see* Nafūsah Plateau.

Negapattam (India): *see* Nāgappattinam.

Negara National Park, park in the south-central part of the Malay Peninsula, West Malaysia, occupying 1,677 square miles (4,343 square km). Established in 1938 as King George V National Park, it consists largely of tropical rain forest and also encompasses the country's highest mountain—Mount Tahan (7,175 feet [2,187 m])—a wide plateau, game-fish rivers, and limestone outcroppings. Wildlife includes the elephant, tiger, leopard, bear, seladang (wild ox), sambar, rhinoceros, and Malayan tapir.

negative, photographic image that reproduces the bright portions of the photographed subject as dark and the dark parts as light areas. Negatives are usually formed on a transparent material, such as plastic or glass. Exposure of sensitized paper through the negative, done either by placing the negative and paper in close contact or by projecting the negative image onto the paper, reverses these tones and produces a positive photographic print.

Black-and-white negatives consist of grains of metallic silver chemically reduced during the development process from silver salts struck by light during exposure.

Colour negatives consist of three tonally reversed dye images that are formed along with a silver image during development. Chemical removal of the silver images leaves the three insoluble dye images superimposed in register. Some modern black-and-white films also use insoluble dyes to form the negative image.

negatron (physics): electron with a negative electric change (*see* electron).

To make the best use of the Britannica, consult the INDEX *first*

Negeri Sembilan, formerly NEGRI SEMBILAN, state (*negeri*), southwestern West Malaysia (Malaya), bounded by the states of Selangor (northwest), Pahang (north), Johor (east), and Melaka (south). Its area of 2,565 sq mi (6,642 sq km) is drained by the Linggi and Mirar rivers and has a 30-mile (48-km) coastline on the Strait of Malacca.

Its princes, who trace their ancestry from the monarchs of Śrivijaya (a maritime empire based on Sumatra), came from Minangkabau (Sumatra) and Celebes in the 14th century. The Minangkabaus brought a matrilineal society and laws known as Adat Perpateh to the peninsula. Their culture and architecture, while not widespread, are unique to the state.

Nine states (*negeri sembilan*), including parts of present-day Selangor, Melaka, Johor, and Pahang, were loosely confederated in 1773. The British, interested in the key tin-producing state of Sungei Ujong, offered the group protection after 1874, which was accepted. Negri Sembilan became one of the Federated Malay States (1895) and after World War II it joined the Federation of Malaya.

The state is now ruled by a constitutional sultan (Yang di-Pertuan Besar) selected from the territorial chiefs, a system peculiar among Malaysian states.

The inhabitants engage in paddy (rice) farming at the bottoms of the steep-sided valleys; fruit cultivation is also common and rubber trees are extensively grown. A few declining alluvial tin mines are in the western valleys and along the coast. The towns are dominated by Chinese and Indians. Negeri Sembilan contains part of the west coast "tin and rubber" belt road network, one of the few east–west peninsular routes, and there is a junction of railway lines on either side of the mountains at Gemas. The main towns are Seremban (*q.v.*; the capital), Kuala Pilah, and Port Dickson. Pop. (1982 est.) 573,789.

Negev, also spelled NEGEB, Hebrew HA-NEGEV (The Southland), arid region, southern part of Israel, occupying almost half of Palestine west of the Jordan, and about 60 percent of Israeli territory under the 1949–67 boundaries. The name is derived from the Hebrew verbal root *n-g-b,* "to dry," or "to wipe dry." Triangular shaped with the apex at the south, it is bounded by the Sinai Peninsula (west) and the Jordan Rift Valley (east). Its northern boundary, where the region blends into the coastal plain in the northwest, Har Yehuda (the Judaean Hills) in the north, and the Wilderness of Judaea (Midbar Yehuda) in the northeast, is indistinct. Many use an arbitrary line at about 30°25′ north latitude for the northern boundary. Within these limits, the Negev has an area of about 4,700 sq mi.

Geologically, the area is one of northeast–southwest folds, with many faults. Limestones and chalks predominate. A unique feature is the large elongate *makhteshim,* or erosion craters, surrounded by high cliffs. These were created by the erosion of upward-folded strata (anticlines), combined with horizontal stresses. The largest of these are Makhtesh Ramon, 23 mi (37 km) long and up to 5 mi wide, and ha-Maktesh ha-Gadol (The Great Crater), about 9 mi long and up to 4 mi wide. The floors of these craters expose chalks, marls, and gypsums, geologically much older than the walls or surrounding plateaus.

Biblical references such as Psalms 126:4 ("Restore our fortunes, O Lord, like the water-courses in the Negeb") point to the semi-arid character of the region from early recorded times. The Negev should not, however, be considered a desert as such; in the Beersheba area (altitude about 800 ft [250 m]), rainfall varies from 8 in. (200 mm) to 12 in. in some years. The latter amount permits unirrigated grain farming. Precipitation decreases to the south; the central Negev plateau (altitude 820–3,395 ft [250–1,035 m]) receives 3–4 in.; rainfall is negligible at Elat at the southern tip. The amount of rainfall varies considerably throughout the region from year to year. Flash flooding is common in the winter rainy season. Most of the rugged region is heavily dissected by wadis, or seasonal watercourses.

Remains of prehistoric and early historic settlements are abundant. Flint arrowheads of the Late Stone Age (*c.* 7000 BC) and implements of the Copper and Bronze ages (*c.* 4000–1400 BC) have been found on the central Negev plateau. The Negev was a pastoral region in biblical times, but the Nabataeans, a Semitic people centred in what is now Jordan, developed techniques of terracing and of conserving winter rains, which made the Negev a thriving agricultural area. It was an important granary of the Roman Empire. After the Arab conquest of Palestine (7th century AD), the Negev was left desolate; for more than 1,200 years it supported only a meagre population of nomadic Bedouin.

Modern agricultural development in the Negev began with three kibbutzim (collective settlements) in 1943; others were founded just after World War II, when the first large-scale irrigation projects were initiated. After the creation of the State of Israel (1948), the importance of development of this large portion of the country was realized. Under the National Water Plan pipelines and conduits bring water from northern and central Israel to the northwestern Negev, which has almost 400,000 ac (more than 160,000 ha) of fertile loess soils. Irrigation, combined with the area's year-round sunlight, produces fine crops of grain, fodder, fruits, and vegetables. Double-cropping is not uncommon.

Exploitation of mineral resources has accompanied agricultural development. Potash, bromine, and magnesium are extracted at Sedom (*q.v.*), at the southern end of the Dead Sea; copper is mined at Timnaʿ (*q.v.*); there are large deposits of ball clay and glass sand for the ceramic and glass industries; phosphate works have been established at Oron and Zefaʿ, and natural gas fields at Rosh Zohar.

Urbanization has come in the wake of modern settlement; Beersheba (*q.v.*), "capital of the Negev," is the largest city in Israel not in the environs of Tel Aviv–Yafo, Jerusalem, or Haifa. Planned cities in the Negev include ʿArad (founded 1961), Dimona (1955), and the port-city of Elat (settled 1949; *qq.v.*), Israel's outlet to the Red Sea.

Desert scene in the eastern Negev, near the Israel–Jordan frontier

Josef Muench

Neghelli, Rodolfo Graziani, marchese di (marquess of): *see* Graziani, Rodolfo.

negligee (French: "careless," or "neglected"), informal gown, usually of a soft, sheer fabric, worn at home by women. In the days of tightly corseted and laced clothing, the negligee was a loose-fitting gown worn during the rest period after lunch. The negligee was sometimes belted with a narrow sash or ribbon.

Woman wearing a negligee, "Lady Reading," chalk and pastel drawing by François Guérin; in the Albertina, Vienna

By courtesy of Graphische Sammlung Albertina, Vienna

Negligee garters in matching fabric were oftentimes designed to be worn with the gown. Women's dresses were also referred to as negligés after the Restoration of Charles II, when the trend was toward loose fashions characterized by "studied negligence."

negligence, in law, the failure to meet a standard of behaviour established to protect society against unreasonable risk. Negligence is the cornerstone of tort liability and a key factor in most personal injury and property-damage trials.

Roman law used a similar principle, distinguishing intentional damage (*dolus*) from unintentional damage (*culpa*) and determining liability by a behavioral standard. Germanic and French law early maintained very stringent liability for accidents and still do. Negligence became a basis of liability in English law only in 1825.

The doctrine of negligence originally applied to "public" professionals, such as innkeepers, blacksmiths, and surgeons, but it was probably prompted by industrialization and increased occupational accidents. At first, liability was harsh, but then it was softened to encourage industrial growth. The later trend is toward greater liability.

The doctrine of negligence does not require the elimination of all risk from a persons' conduct—only all unreasonable risk, which is measured by the seriousness of possible consequences. Thus, a higher standard applies to nitroglycerin manufacturers than to those making kitchen matches. In certain critical fields—*e.g.,* the milk industry—the law imposes liability for any mistakes, even when the strictest precautions are taken, a policy known as strict liability.

The standard of behaviour is external. Generally the law examines only conduct, not the excitability, ignorance, or stupidity that may cause it. The courts determine what the hypothetical "reasonable man" would have done in the situation. Such standards also demand a degree of foresight in anticipating the negligence of others—especially of special groups such as children.

The reasonable-man test presumes certain knowledge—*e.g.,* that fire burns, water may cause drowning, and cars may skid on wet pavement. Community custom will influence such presumptions, such as the practice of driving on a certain side of the road even on private roads, a situation in which laws do not apply. Emergencies, however, can soften the application of such standards.

Allowances may be made for physical (but not mental) handicaps, such as blindness, but the law demands that handicapped persons avoid needlessly placing themselves in situations in which their inability may cause harm. Other than distinguishing between children and adults, the doctrine of negligence does not usually consider factors of age or experience.

Ordinarily the plaintiff in a negligence suit must prove the defendant's negligence by a preponderance of the evidence, which may be circumstantial so long as it is not too speculative. In some situations, once the plaintiff has established an apparent connection between his injury and the defendant's apparent negligence, the latter must disprove that connection. This is the doctrine of *res ipsa loquitur* (Latin: "the matter speaks for itself"). Generally the damages recoverable for negligence are a monetary compensation for injuries or losses that are deemed to have flowed "naturally and proximately" from the negligent act. *See also* contributory negligence.

negligence, contributory (law): *see* contributory negligence.

Negra, Cordillera, range of the Andes Mountains in west central Peru. It extends for about 110 mi (180 km) southeast from the Santa River and rises to a height of 14,764 ft (4,430 m). The Santa River Valley separates the Cordillera Negra from the Cordillera Blanca, a range of permanently snowcapped mountains to the east. The mountains of the Cordillera Negra are without snow, hence their name, meaning "black."

Negreti, Jacopo: *see* Palma, Jacopo.

Negri Sembilan (West Malaysia): *see* Negeri Sembilan.

Negrín, Juan (b. Feb. 3, 1894, Las Palmas, Canary Islands, Spain—d. Nov. 14, 1956, Paris), Republican prime minister of Spain who held office during the last two years of the Spanish Civil War (1936–39). He was a determined wartime leader but was forced to rely heavily on Communist support during his time in power.

Negrín, of a prosperous merchant family, became a physiologist of repute and held a chair at Madrid University (1923–31). In 1929 he turned to politics and as a democratic Socialist was elected to the Cortes in 1931, 1933, and 1936. As wartime minister of finance (September 1936–May 1937) he played an important role in shipping much of Spain's gold reserves to the Soviet Union.

In May 1937 Negrín succeeded Largo Caballero as prime minister and from the outset committed himself to a policy of resolute resistance to the Nationalists. This stance led him to substantial reliance on the Soviet Union, the Republic's only source of arms. Negrín's Communist dependence contributed to the alienation of the non-Communist left and aroused suspicion among Western nations.

Negrín urged resistance even after the collapse of Catalonia (February 1939), but an anti-Communist military rising in Madrid favouring a negotiated peace forced his resignation in March. He was in exile in Paris until the German occupation, when he fled to Great Britain and then to the United States. He was prime minister of the Republican government in exile but resigned in 1945.

Negritude, French NÉGRITUDE, literary movement of the 1930s, '40s, and '50s that began among French-speaking African and Caribbean writers living in Paris as a protest against French colonial rule and the policy of assimilation. Its leading figure was Léopold Sédar Senghor (elected first president of the Republic of Senegal in 1960), who, along with Aimé Césaire from Martinique and Léon Damas from French Guiana, began to examine Western values critically and to reassess African culture.

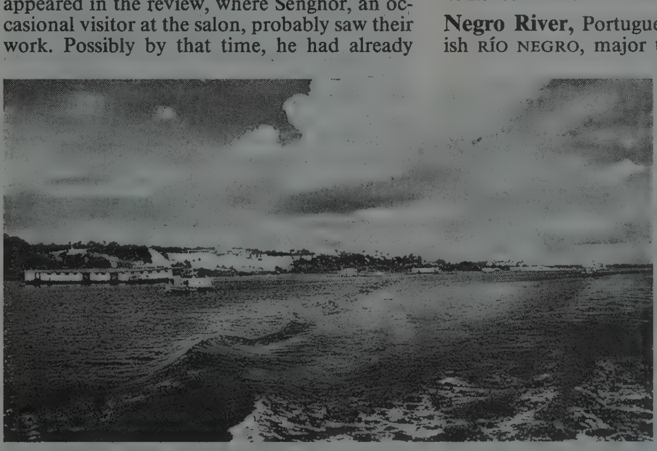
The Negritude movement was influenced by the Harlem Renaissance (*q.v.*), a group of black thinkers and artists (including novelists and poets) that emerged in the United States, in New York City, during the 1920s. The group was determined to throw off the masking (to use the word of critic Houston A. Baker, Jr.) and indirection that had necessarily attended black expression in a hostile society. The Harlem Renaissance is associated with such writers as poet Langston Hughes, but it was Claude McKay (*q.v.*), a somewhat lesser known figure, who caught the attention of Senghor. The Jamaican-born poet and novelist was one of the Harlem group's most prominent spokesmen. He believed that a writer should deal with important political subjects, and he himself had much to say about institutionalized racism.

McKay spent a good deal of time in France, where he got to know a West Indian family who held an informal salon attended by writers, musicians, and intellectuals, including visiting Americans. Members of the group that attended the salon began to publish *Revue du Monde Noir* ("Review of the Black World") in 1931. Poetry by McKay and Langston Hughes appeared in the review, where Senghor, an occasional visitor at the salon, probably saw their work. Possibly by that time, he had already read a novel of McKay's that was to affect him deeply. McKay's *Banjo,* a picaresque novel about black seamen in Marseilles notable in part for its portrayal of French treatment of black colonials, was translated into French in 1929. In any case, Senghor called McKay "the true inventor of [the values of] Negritude." Césaire said of *Banjo* that in it blacks were described for the first time "truthfully, without inhibition or prejudice." The word "Négritude," however, was coined by Césaire himself, in his 1939 poem "Cahier d'un retour au pays natal" ("Notebook of a Return to My Native Land").

The assertion of black pride by members of the Negritude movement was attended by a cry against assimilation. They felt that although it was theoretically based on a belief in universal equality, it still assumed the superiority of European culture and civilization over that of Africa (or assumed that Africa had no history or culture). They were also disturbed by the world wars, in which they saw their countrymen not only dying for a cause that was not theirs but being treated as inferiors on the battlefield. They became increasingly aware, through their study of history, of the suffering and humiliation of black people—first under the bondage of slavery and then under colonial rule. These views inspired many of the basic ideas behind Negritude: that the mystic warmth of African life, gaining strength from its closeness to nature and its constant contact with ancestors, should be continually placed in proper perspective against the soullessness and materialism of Western culture; that Africans must look to their own cultural heritage to determine the values and traditions that are most useful in the modern world; that committed writers should use African subject matter and poetic traditions and should excite a desire for political freedom; that Negritude itself encompasses the whole of African cultural, economic, social, and political values; and that, above all, the value and dignity of African traditions and peoples must be asserted.

Senghor treated all of these themes in his poetry and inspired a number of other writers: Birago Diop from Senegal, whose poems explore the mystique of African life; Jacques Rabemananjara, whose poems and plays glorify the history and culture of Madagascar; Cameroonians Mongo Beti and Ferdinand Oyono, who wrote anticolonialist novels; and the Congolese poet Tchicaya U Tam'si, whose extremely personal poetry does not neglect the sufferings of the African peoples. The movement largely faded in the early 1960s when its political and cultural objectives had been achieved in most African countries.

Negro River, Portuguese RIO NEGRO, Spanish RÍO NEGRO, major tributary of the Ama-



Negro River near Manaus, Braz.

Luis Villota

zon. It originates in several headstreams, including the Vaupés (Mapés) and the Guianía, which rise in the rain forest of eastern Colombia. The Guianía flows east and then arches northeast and southeast, forming the Colombian–Venezuelan border. Below its junction near San Carlos de Río Negro with the Brazo Casiquiare, a natural waterway that brings water from the Orinoco River in Venezuela, the river acquires the name Negro and enters Brazil. The Negro meanders generally east-southeastward, picking up the Branco River (*q.v.*) and other tributaries, to Manaus. There it joins the Solimões River (*q.v.*) to form the Amazon. Its length is about 1,400 mi (2,253 km), of which 850 mi are in Brazil. It is navigable for about 450 mi above its mouth.

Although settlement along its banks is sparse, the river is a major transportation artery. The clear, jet-black colour of the Negro's water, whence comes its name, is caused by the decomposition of organic matter in marginal swamps and its low silt content; its colour contrasts dramatically with the yellowish, silt-laden waters of the Branco and with the Amazon.

Negro River, Spanish RÍO NEGRO, river, southern Argentina, whose major headstreams, the Neuquén and the Limay, rise in the Andes Mountains near the Chilean border. At Neuquén city they meet to form the Negro, which flows generally east-southeastward across northern Patagonia and empties into the Atlantic Ocean southeast of Viedma and Carmen de Patagones. The length of the Negro is about 400 miles (640 km; 700 miles [1,125 km], including the Neuquén), but only the lower 250 miles (400 km) are navigable. The waters of the Negro are used for hydroelectricity and for irrigation of grains and fruit, including wine grapes and apples for export to Europe.

Negro River, Spanish RÍO NEGRO, Portuguese RIO NEGRO, river in Uruguay, rising in the southern highlands of Brazil just east of Bagé. The Negro flows southwestward into Uruguay, where it is dammed near Paso de los Toros to create the Río Negro reservoir, the largest man-made lake in South America (4,000 square miles [10,360 square km]). Downstream from another dam at Rincón de Baygorna, the river meanders westward past Mercedes to join the Uruguay River at Soriano. The confluence is marked by several islands, the largest of which are Vizcaíno, Lobos, and Infante. Although the Negro is approximately 500 miles (800 km) long, it is navigable for only 45 miles (72 km) upstream from its mouth.

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Negros, island, one of the Visayan group, central Philippines. It is separated from the island of Panay to the northwest by the Guimaras Strait and from Cebu island to the east by the Tañon Straits. The island is bordered on the north and south by the Visayan and Sulu seas, respectively.

Negros is shaped like a boot and is about 135 miles (217 km) long and 22 to 49 miles (35 to 79 km) wide. It has an area of 4,907 square miles (12,710 square km). A lofty central mountain range runs nearly the island's entire length and is deeply dissected by erosion. The range contains Mount Canlaon, an active volcano that at 8,071 feet (2,460 m) is the highest point in Negros. The island's major rivers are the Binalbagan, Ilog, Tolong, and Tanjay. The southeastern peninsula (the toe of the boot) contains the crater lakes of Danao and Balinsasayan. Most of southwestern Negros comprises the Tablas, an undeveloped plateau with a varied landscape.

The island's coastal areas are densely populated. The eastern coast has only discontinuous piedmont plains, but the western coast's plains are among the broader Philippine lowlands, being from 5 to 30 miles (8 to 48 km) wide and extending for nearly 100 miles (160 km) along the shoreline. Visayans live in the coastal areas, while Negritos inhabit the forested upland interior. The island's main linguistic division reflects the separation of the eastern and western coastal areas from each other by the central mountain range: Hiligaynon, from Panay, is widely spoken in western Negros, whereas Cebuano, from Cebu, is dominant on the eastern coast.

Negros produces about 50 percent of the Philippines' sugar and is one of the wealthiest and most politically influential regions in the nation. The sugarcane farms and centrals (mills that produce raw sugar from cane) are concentrated in the north and west. Large numbers of migrant sugar workers annually cross the strait from Panay to harvest the cane. Rice, coconuts, bananas, papayas, and mangoes are secondary crops raised on Negros, and corn (maize) is the major food crop. Timber extraction and processing is important. Mineral deposits include copper, mined at Sipolay, and gypsum, coal, and rock phosphates; salt is produced in the east.

Bacolod on the northwestern coast is the largest city on the island and is an important sugar exporter. Bais has a large paper mill, and Cadiz is an important fishing port. Other cities include Escalante, La Carlota, Dumaguete, and Bago. A highway links Canlaon, a city in the north-central part of Negros, with other cities and towns all along the coast of the island. Pop. (1990 prelim.) 3,168,000.

Neguib, Moḥammed: *see* Naguib, Muḥammad.

Nehavend, Battle of (642): *see* Nahāvand, Battle of.

Neheh (Egyptian religion): *see* Hu, Sia, and Heh.

Nehemiah, also spelled NEHEMIAS (fl. 5th century BC), Jewish leader who supervised the rebuilding of Jerusalem in the mid-5th century BC after his release from captivity by the Persian king Artaxerxes I. He also instituted extensive moral and liturgical reforms in rededicating the Jews to Yahweh.

Nehemiah was the cupbearer to King Artaxerxes I at a time when Judah in Palestine had been partly repopulated by Jews released from their exile in Babylonia. The Temple at Jerusalem had been rebuilt, but the Jewish community there was dispirited and defenseless against its non-Jewish neighbours. Distressed at news of the desolate condition of Jerusalem, Nehemiah obtained permission from Artaxerxes to journey to Palestine to help rebuild its ruined structures. He was provided with an escort and with documents that guaranteed the assistance of Judah's Persian officials. So about 444 BC Nehemiah journeyed to Jerusalem and aroused the people there to the necessity of repopulating the city and rebuilding its walls. Nehemiah encountered hostility from the (non-Jewish) local officials in neighbouring districts, but in the space of 52 days the Jews under his direction succeeded in rebuilding Jerusalem's walls.

Nehemiah then apparently served as governor of the small district of Judea for 12 years, during which he undertook various religious and economic reforms before returning to Persia. On a second visit to Jerusalem he strengthened his fellow Jews' observance of the Sabbath and ended the custom of Jewish men marrying foreign-born wives. This latter act helped to keep the Judaeans separate from their non-Jewish neighbours. Nehemiah's reconstructive work in Palestine was subsequently continued by the religious leader Ezra (*q.v.*).

Nehemiah's story is told in the Book of Nehemiah, part of which indeed seems to be based upon the memoirs of Nehemiah. The book itself, however, was compiled by a later, anonymous writer who apparently also compiled the books of Ezra and the Chronicles.

Nehemiah, Book of (Bible): *see* Ezra and Nehemiah, books of.

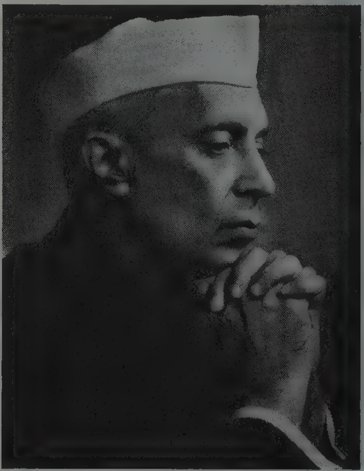
Neher, Erwin (b. March 20, 1944, Landsberg, Ger.), German physicist, winner with Bert Sakmann (*q.v.*) in 1991 of the Nobel Prize for Physiology or Medicine for their research into basic cell function and for the development of the patch-clamp technique, a laboratory method that can detect the passage of very small electrical currents through the cell membrane. It is used to study cell functions.

Neher earned a degree in physics from the Technical University of Munich and then attended the University of Wisconsin at Madison, where he was awarded a master of science degree in 1967. From 1968 to 1972 Neher did graduate work and postdoctoral work at the Max Planck Institute for Psychiatry, Munich. He first developed the idea of the patch-clamp technique in his doctoral thesis and earned his Ph.D. from the Technical University of Munich in 1970.

In 1972 Ernst went to Max Planck Institute for Biophysical Chemistry, Göttingen, and two years later began his collaboration with Sakmann. This collaboration continued despite Neher's move to the University of Washington in Seattle and, later, to Yale University. Neher and Sakmann presented their patch-clamp findings at a scientific gathering in 1976. Neher returned to the Max Planck Institute in Göttingen that same year and in 1983 was made director of the institute's membrane biophysics department.

Nehru, Jawaharlal, byname PANDIT (Hindi: "Pundit," or "Teacher") NEHRU (b. Nov. 14, 1889, Allahābād, India—d. May 27, 1964, New Delhi), first prime minister of independent India (1947–64), who established parliamentary government and became noted for his "neutralist" policies in foreign affairs. He was also one of the principal leaders of India's independence movement in the 1930s and '40s.

Early years. Nehru came of a family of Kashmiri Brahmans, noted for their administrative aptitude and scholarship, that had migrated to India early in the 18th century. He was the son of Motilal Nehru, a renowned



Jawaharlal Nehru, photograph by Yousuf Karsh, 1956

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lawyer and one of Mahatma Gandhi's prominent lieutenants. Jawaharlal was the eldest of four children, two of whom were daughters. A sister, Vijaya Lakshmi Pandit, later became the first woman president of the U.N. General Assembly.

Until the age of 16, Nehru was educated at home by a series of English governesses and tutors. Only one of these, a part-Irish, part-Belgian theosophist, Ferdinand Brooks, appears to have made any impression on him. Jawaharlal also had a venerable Indian tutor who taught him Hindi and Sanskrit. In 1905 he went to Harrow, a leading English school, where he stayed for two years. Nehru's academic career was in no way outstanding. From Harrow he went to Trinity College, Cambridge, where he spent three years earning an honours degree in natural science. On leaving Cambridge he qualified as a barrister after two years at the Inner Temple, London, where in his own words he passed his examinations "with neither glory nor ignominy."

Four years after his return to India, in March 1916, Nehru married Kamala Kaul, who came from a Kashmiri family settled in Delhi. Their only child, Indira Priyadarshini, was born in 1917; she would later (under her married name of Indira Gandhi) also serve as prime minister of India.

Political apprenticeship. On his return to India, Nehru at first tried to settle down as a lawyer. But, unlike his father, he had only a desultory interest in his profession and did not relish either the practice of law or the company of lawyers. At this time he might be described, like many of his generation, as an instinctive nationalist who yearned for his country's freedom, but, like most of his contemporaries, he had not formulated any precise ideas on how it could be achieved.

Nehru's autobiography discloses his lively interest in Indian politics. His letters to his father over the same period reveal their common interest in India's freedom. But not until father and son met Gandhi and were persuaded to follow in his political footsteps did either of them develop any definite ideas on how freedom was to be attained. The quality in Gandhi that impressed the two Nehrus was his insistence on action. A wrong, the Mahatma argued, should not only be condemned, it should be resisted. Earlier, Nehru and his father had been contemptuous of the run of contemporary Indian politicians, whose nationalism, with a few notable exceptions, consisted of interminable speeches and long-winded resolutions. Jawaharlal was also attracted by Gandhi's insistence on fighting Great Britain without fear or hate.

Nehru met Gandhi for the first time in 1916 at the annual meeting of the Indian National Congress Party in Lucknow. Gandhi was 20 years his senior. Neither seems to have made any initially strong impression on the other. Nehru did not assume a leardership role in Indian politics, however, until his election as Congress president in 1929, when he presided over the historic Lahore session that proclaimed complete independence as India's political goal. Until then the objective had been dominion status.

Nehru's close association with the Congress Party dates from 1919 in the immediate aftermath of World War I. This period saw a wave of nationalist activity and governmental repression culminating in the massacre of Amritsar in April 1919; 379 persons were killed and at least 1,200 wounded when the local British military commander ordered his troops to fire on a crowd of unarmed Indians assembled for a meeting.

When, late in 1921, the prominent leaders and workers of the Congress Party were outlawed in some provinces, Nehru went to prison for the first time. Over the next 24 years he was to serve another eight periods of detention, the last and longest ending in June 1945, after an imprisonment of almost three years. In all, Nehru spent more than nine years in jail. Characteristically, he described his terms of incarceration as normal interludes in a life of abnormal political activity.

His political apprenticeship with the Congress lasted from 1919 to 1929. In 1923 he became general secretary of the party for two years and again, in 1927, for another two years. His interests and duties took him on journeys over wide areas of India, particularly in his native United Provinces, where his first exposure to the overwhelming poverty and degradation of the peasantry had a profound influence on his basic ideas for solving these vital problems. Though vaguely inclined toward Socialism, Nehru's radicalism had set in no definite mold. The watershed in his political and economic thinking was his tour of Europe and the Soviet Union during 1926–27. Nehru's real interest in Marxism and his Socialist pattern of thought stem from that tour, even though it did not appreciably increase his knowledge of Communist theory and practice. His subsequent sojourns in prison enabled him to study Marxism in more depth. Interested in its ideas, but repelled by some of its methods, he could never bring himself to accept Karl Marx's writings as revealed scripture. Yet from then on, the yardstick of his economic thinking remained Marxist, adjusted, where necessary, to Indian conditions.

Struggle for Indian independence. After the Lahore session of 1929, Nehru emerged as the leader of the country's intellectuals and youth. Hoping that Nehru would draw India's youth, at that time gravitating toward extreme leftist causes, into the mainstream of the Congress movement, Gandhi had shrewdly elevated him to the presidency of the Congress Party over the heads of some of his seniors. The Mahatma also correctly calculated that, with added responsibility, Nehru himself would be inclined to keep to the middle way.

After his father's death in 1931, Jawaharlal moved into the inner councils of the Congress Party and became closer to the Mahatma. Although Gandhi did not officially designate him his political heir until 1942, the country as early as the mid-1930s saw in Nehru the natural successor to Gandhi. The Gandhi–Irwin pact of March 1931, signed between the Mahatma and the British viceroy, Lord Irwin (later Lord Halifax), signalized a truce between the two principal protagonists in India. It climaxed one of Gandhi's more effective civil-disobedience movements, launched the year before, in the course of which Nehru had been arrested.

Hopes that the Gandhi–Irwin pact would be the prelude to a more relaxed period of Indo-British relations were not borne out; Lord Willingdon (who replaced Irwin as viceroy in 1931) jailed Gandhi in January 1932, shortly after the Mahatma's return from the Second Round Table Conference in London. He was charged with attempting to mount another civil-disobedience movement; Nehru was also arrested and sentenced to two years' imprisonment.

The Round Table Conferences in London, held to advance India's progress to self-government, eventually resulted in the Government of India Act of 1935, giving the Indian provinces a system of popular autonomous government. Ultimately, it provided for a federal system composed of the autonomous provinces and princely states. Although federation never came into being, provincial autonomy was implemented. During the mid-1930s Nehru was much concerned with developments in Europe, which seemed to be drifting toward another world war. He was in Europe early in 1936, visiting his ailing wife, shortly before she died in a sanitarium in Switzerland. Even at this time he emphasized that in the event of war India's place was alongside the democracies, though he insisted that India could only fight in support of Great Britain and France as a free country.

When the elections following the introduction of provincial autonomy brought the Congress Party to power in a majority of the provinces, Nehru was faced with a dilemma. The Muslim League under Mohammed Ali Jinnah (who was to become the creator of Pakistan) had fared badly at the polls. Congress, therefore, unwisely rejected Jinnah's plea for the formation of coalition Congress-Muslim League governments in some of the provinces, a decision on which Nehru had not a little influence. The subsequent clash between the Congress and the Muslim League hardened into a conflict between Hindus and Muslims that was ultimately to lead to the partition of India and the creation of Pakistan.

Imprisonment during World War II. When, at the outbreak of World War II in September 1939, the viceroy, Lord Linlithgow, committed India to war without consulting the autonomous provincial ministries, the Congress Party's high command withdrew its provincial ministries as a protest. Congress's action left the political field virtually open to Jinnah and the Muslim League. Nehru's views on the war differed from those of Gandhi. Initially, the Mahatma believed that whatever support was given to the British should be given unconditionally and that it should be of a nonviolent character. Nehru held that nonviolence had no place in defense against aggression and that India should support Great Britain in a war against Nazism, but only as a free nation. If it could not help, it should not hinder.

In October 1940, Gandhi, abandoning his original stand, decided to launch a limited civil-disobedience campaign in which leading advocates of Indian independence were selected to participate one by one. Nehru was arrested and sentenced to four years' imprisonment. After spending a little more than a year in jail, he was released, along with other Congress prisoners, three days before the bombing of Pearl Harbor in Hawaii. When the Japanese carried their attack through Burma to the borders of India in the spring of 1942, the British government, faced by this new military threat, decided to make some overtures to India. Prime Minister Winston Churchill dispatched Sir Stafford Cripps, a member of the war Cabinet who was politically close to Nehru and also knew Jinnah, with proposals for a settlement of the constitutional problem. Cripps's mission failed, however, for Gandhi would accept nothing less than independence.

The initiative in the Congress Party now passed to Gandhi, who called on the British to leave India; Nehru, though reluctant to embarrass the war effort, had no alternative but to join Gandhi. Following the Quit India resolution passed by the Congress Party in Bombay on Aug. 8, 1942, the entire Congress working committee, including Gandhi and Nehru, was arrested and imprisoned. Nehru emerged from this—his ninth and last detention—only on June 15, 1945.

Within two years India was to be partitioned and free. A final attempt by the viceroy, Lord Wavell, to bring the Congress Party and the Muslim League together failed. The Labour government that had meanwhile displaced Churchill's wartime administration dispatched, as one of its first acts, a Cabinet mission to India and later also replaced Lord Wavell with Lord Mountbatten. The question was no longer whether India was to be independent but whether it was to consist of one or more independent states. While Gandhi refused to accept partition, Nehru reluctantly but realistically acquiesced. On Aug. 15, 1947, India and Pakistan emerged as two separate, independent countries. Nehru became independent India's first prime minister.

Achievements as prime minister. In the 35 years from 1929, when Gandhi chose Nehru as president of the Congress session at Lahore, until his death as prime minister in 1964, Nehru remained—despite the Chinese debacle of 1962—the idol of his people. His secular approach to politics contrasted with Gandhi's religious and traditionalist attitude, which during the Mahatma's lifetime had given Indian politics a religious cast—misleadingly so, for, although Gandhi might have appeared to be a religious conservative, he was actually a social nonconformist trying to secularize Hinduism. The real difference between Nehru and Gandhi was not in their attitude to religion but in their attitude to civilization. While Nehru talked in an increasingly modern idiom, Gandhi was harking back to the glories of ancient India.

The importance of Nehru in the perspective of Indian history is that he imported and imparted modern values and ways of thinking, which he adapted to Indian conditions. Apart from his stress on secularism and on the basic unity of India, despite its racial and religious diversities, Nehru was deeply concerned with carrying India forward into the modern age of scientific discovery and technological development. In addition, he aroused in his people an awareness of the necessity of social concern with the poor and the outcast and of respect for democratic values. One of the achievements of which he was particularly proud was the reform of the ancient Hindu civil code that finally enabled Hindu widows to enjoy equality with men in matters of inheritance and property.

Internationally, Nehru's star was in the ascendant until October 1956, when India's attitude on the Hungarian revolt against the Soviets brought his policy of nonalignment under sharp scrutiny. In the United Nations, India was the only nonaligned country to vote with the Soviet Union on the invasion of Hungary, and thereafter it was difficult for Nehru to command credence in his calls for nonalignment. In the early years after independence, anticolonialism had been the cornerstone of his foreign policy, but, by the time of the Belgrade conference of nonaligned countries in 1961, Nehru had substituted nonalignment for anticolonialism as his most pressing concern. In 1962, however, the Chinese threatened to overrun the Brahmaputra River valley as a result of a long-standing border dispute. Nehru called for Western aid, making virtual nonsense of his nonalignment policy, and China withdrew.

Kashmir—claimed by both India and Pakistan—remained a perennial problem throughout Nehru's term as prime minister. His tentative efforts to settle the dispute by adjustments along the cease-fire lines having failed, Pakistan, in 1948, made an unsuccessful attempt to seize Kashmir by force. In solving the problem of the Portuguese colony of Goa—the last remaining colony in India—Nehru was more fortunate. Although its military occupation by Indian troops in December 1961 raised a furor in many Western countries, in the hindsight of history, Nehru's action is justifiable. With the withdrawal of the British and the French, the Portuguese colonial presence in India had become an anachronism. Both the British and the French had withdrawn peacefully. If the Portuguese were not prepared to follow suit, Nehru had to find ways to dislodge them. After first trying persuasion, in August 1955 he had permitted a group of unarmed Indians to march into Portuguese territory in a nonviolent demonstration. Even though the Portuguese opened fire on the demonstrators, killing nearly 30, Nehru stayed his hand for six years, appealing meanwhile to Portugal's Western friends to persuade its government to cede the colony. When India finally struck, Nehru could claim that neither he nor the government of India had ever been committed to nonviolence as a policy.

Nehru's health showed signs of deteriorating not long after the clash with China. He suffered a slight stroke in 1963, followed by a more debilitating attack in January 1964. He died a few months later from a third and fatal stroke.

Assessment. While assertive in his Indianness, Nehru never exuded the Hindu aura and atmosphere clinging to Gandhi's personality. Because of his modern political and economic outlook, he was able to attract the younger intelligentsia of India to Gandhi's movement of nonviolent resistance against the British and later to rally them around him after independence had been gained. Nehru's Western upbringing and his visits to Europe before independence had acclimatized him to Western ways of thinking. Throughout his 17 years in office, he held up democratic socialism as the guiding star. With the help of the overwhelming majority that the Congress Party maintained in Parliament during his term of office, he advanced toward that goal. The four pillars of his domestic policies were democracy, socialism, unity, and secularism. He succeeded to a large extent in maintaining the edifice supported by these four pillars during his lifetime.

Nehru's only child, Indira Gandhi, served as India's prime minister from 1966 to 1977 and from 1980 to 1984. Her son, Rajiv Gandhi, was prime minister from 1984 to 1989.

(F.R.M./Ed.)

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Nehru, Motilal, in full PANDIT MOTILAL NEHRU (b. May 6, 1861, Delhi, India—d. Feb. 6, 1931, Lucknow), a leader of the Indian independence movement, cofounder of the Swaraj ("Self-rule") Party, and the father of India's first prime minister, Jawaharlal Nehru.

Motilal, a member of a prosperous Brahman family of Kashmiri origin, early established a lucrative law practice and was admitted to the Allahābād High Court in 1896. He shunned politics until middle age, when, in 1907, at Allahābād, he presided over a provincial conference of the Indian National Congress, a political organization striving for dominion status for India. He was considered a moderate (one who advocated constitutional reform, in contrast to the extremists, who employed agitational methods) until 1919, when he made his newly radicalized views known by means of a daily newspaper he founded, *The Independent.*

The massacre of hundreds of Indians by the British at Amritsar in 1919 prompted Motilal to join Gandhi's Non-cooperation Movement, giving up his career in law and changing to a simpler, non-Anglicized style of life. In 1921 both he and Jawaharlal were arrested by the British and jailed for six months.

In 1923 Motilal helped found the Swaraj Party (1923–27), the policy of which was to win election to the Central Legislative Assembly and obstruct its proceedings from within. In 1928 he wrote the Congress Party's Nehru Report, a future constitution for independent India based on the granting of dominion status. After the British rejected these proposals, Motilal participated in the civil-disobedience movement of 1930, for which he was imprisoned. He died soon after release.

Nehru-Liaqat Pact: *see* Delhi Pact.

Nei-chiang, Pinyin NEIJIANG, city in central Szechwan *sheng* (province), China. Situated on the T'o River, it is also at the junction of the Ch'eng-tu–Chungking railway and the southern branch line to I-pin. These railways were completed in 1956, making Nei-chiang an important transportation and commercial centre.

In medieval times the locality was an important salt-producing area, but in recent times its name has been associated with the cultivation of sugarcane; it is commonly referred to as the sugar capital of Szechwan. Nei-chiang and the nearby towns of Pai-ma-ch'ang and Hoshih-ssu have large sugar-refining plants and also manufacture sweet preserves and alcohol. This industry, formerly carried on by hand in hundreds of small plants, was centralized after 1949 and modernized; the small local plants now produce molasses. By-products of the sugar mills are used in paper manufacture and are also used to produce fertilizer, animal-feed cake, and glucose. Nei-chiang also has an engineering industry and produces sugar-processing equipment and farm implements, as well as a textile industry. Pop. (1990 est.) 256,012.

nei yeh (Taoism): *see* hsin-shu.

Neidhart VON REUENTHAL (b. *c.* 1180, Bavaria [Germany]—d. *c.* 1250), late medieval German knightly poet who, in the period of the decline of the courtly love lyric, introduced a new genre called *höfische Dorfpoesie* ("courtly village poetry"). It celebrated, in summer and winter dancing songs, the poet's love of village maidens rather than noble ladies.

The summer songs open with a description of the season, followed by a dance on the village green and a love episode dealing with a knight's (Neidhart's) conquest of a village belle. The winter songs, usually more satirical, describe a dance in a farmhouse and ridicule the boorish peasant youths who are the knight's rivals for the village beauty. A winter song often ends with a brawl. The novelty of Neidhart's settings and his coarse humour inspired many imitators, and mockery of the peasants became a popular theme. In the 15th century many spurious satires of peasants were attributed to him.

neighbourhood house: *see* social settlement.

Neihardt, John Gneisenau (b. Jan. 8, 1881, near Sharpsburg, Ill., U.S.—d. Nov. 3, 1973, Columbia, Mo.), American poet, novelist, and short-story writer who described the history of American Indians, especially the Sioux.

Neihardt grew up in Kansas and Nebraska, and it was his contact with the residents of those states, both white and Indian, that led him to write such works as *The Lonesome Trail* (1907), a collection of short stories about pioneering heroes and the Omaha Indians. The lyric sequence *A Bundle of Myrrh* (1908) appeared the following year and established his reputation as a lyric poet. *Black Elk Speaks* (1932) is an autobiographical narrative of the life of a Sioux Indian warrior and holy man.

From 1910 to 1938 Neihardt was a literary critic for various newspapers. During the 1940s he worked for the Bureau of Indian Affairs, and from 1948 to 1965 he taught English at the University of Missouri, Columbia.

Neihardt spent almost 30 years on his major work, *A Cycle of the West* (1949), containing five book-length narrative poems covering the period from the opening of the Missouri Territory until Indian resistance ended in the

1890s. The work is old-fashioned, but it is an authentic, vital picture of the frontier and the people who battled for its control.

The novel *When the Tree Flowered* (1951), one of Neihardt's last works, is a sympathetic study of American Indian life.

neilah, Hebrew NEʿILA, or NEʿILAH, in Judaism, the last of the five Yom Kippur services. As the concluding rite of Yom Kippur, the service is the most sacred of the yearly liturgy and is expressed in melodies of great solemnity. When the shofar (ritual ram's horn) sounds at the close of the neilah, the synagogue service ends and the daylong fast marking Yom Kippur is over.

In ancient times groups of laymen attended the sacrifice at the Second Temple in Jerusalem as representatives of the common people. Each day before sunset, when the Temple gates were being closed, these deputations prayed the neilah; simultaneously, villagers outside Jerusalem joined their representatives in spirit by reciting the neilah on their own. The neilah was also recited on public fast days. Modern Jews view the neilah as the symbolic closing of the gates of heaven when God's final judgment is passed on man.

Neill, A.S., in full ALEXANDER SUTHERLAND NEILL (b. Oct. 17, 1883, Forfar, Forfarshire, Scot.—d. Sept. 23, 1973, Aldeburgh, Suffolk, Eng.), Scottish educator and author who founded the Summerhill School (*q.v.*) and championed free self-development in the education of children.

The son of a schoolteacher, Neill graduated from the University of Edinburgh with an M.A. degree in 1912 and became headmaster of the Gretna Green School in Scotland in 1914. He recorded his initial teaching experiences in the autobiographical novel *A Dominie's Log* (1916) and wrote several sequels to this work, with some of them being reprinted in 1975 as *The Dominie Books of A.S. Neill* (*dominie* is Scottish for "schoolteacher").

Neill and others founded an international school near Dresden, Ger., in 1921. The school was moved to Sonntagberg, Austria, three years later but was soon closed because its unconventional curriculum and teaching methods were opposed by the local authorities. In 1924 Neill moved the school to Lyme Regis, Dorset, in England, and named it Summerhill after the building he had leased for its quarters. In 1927 he moved the school to its permanent home in Leiston, Suffolk. Summerhill School became internationally known for its self-governing student-teacher body and its flexible curriculum that emphasizes the student's own motivation to learn. Neill drew considerable criticism for his permissive attitudes toward academic discipline, however.

Neill's principal book about his educational methods, *Summerhill: A Radical Approach to Child Rearing* (1960), stimulated debates about alternatives to conventional schooling. The book was more influential in the United States and West Germany than in Great Britain. His other books include *The Problem Child* (1926), *The Problem Parent* (1932), *The Problem Family* (1949), *The Free Child* (1953), and an autobiography, *Neill! Neill! Orange Peel!* (1972).

Neilson, James Beaumont (b. June 22, 1792, Shettleston, Lanark, Scot.—d. Jan. 18, 1865, Queenshill, Kirkcudbright), Scottish inventor who introduced the use of a hot-air blast instead of a cold-air blast for the smelting of iron, thus greatly advancing the technology of iron production.

In 1817 Neilson was appointed foreman of the Glasgow Gasworks. Soon afterward he became manager and engineer, and he remained with the firm for 30 years.

During the early 19th century, ironworkers in Great Britain believed that a blast of cold air was the most efficient method for smelting iron. Neilson demonstrated that the opposite was true. His idea, first tested at the Clyde Ironworks, Glasgow, was patented in 1828. Use of the hot blast tripled iron output per ton of coal and permitted the profitable recovery of iron from lower-grade ores. It also made possible the efficient use of raw coal and lower grades of coal instead of coke and permitted the construction of larger smelting furnaces.

Neiman Marcus, prestigious department-store chain. It was founded in Dallas, Tex., U.S., in 1907, and from the beginning its owners featured unusual merchandise. It caters to the opulently wealthy, supplying unique and extravagant gift items. The store also offers moderate-income customers a more standard selection of fashions and department-store items. Special promotions and services, many of which were developed by Stanley Marcus, have made Neiman Marcus a retailing legend. The company's glossy Christmas catalog has become famous for its sensational displays as well as its bizarre, exotic, and unique Christmas gift creations. Neiman Marcus gained a reputation as "the store that can get you anything."

In 1951 Neiman Marcus opened its first branch store; by the early 21st century it had more than 30 stores in the United States. The company was acquired by Broadway-Hale Stores, Inc. (now Carter Hawley Hale Stores, Inc.), in 1969, and Harcourt General gained controlling interest of Neiman Marcus Group, which included Neiman Marcus and the retailer Bergdorf Goodman, in 1987. In 1999 Neiman Marcus Group became a publicly held company.

Neisse River, Polish NYSA, either of two rivers now in southwestern Poland (until 1945, in Germany). The better-known Nysa Łużycka, or Lusatian Neisse, is the longer (157 miles [252 km]) and more westerly; it forms part of the German-Polish frontier (*see* Oder–Neisse Line). The Nysa Kłodzka (Glatzer Neisse), or Neisse of the city of Kłodzko (Glatz), is the shorter (113 miles [182 km]) and lies entirely within Poland. Both rise in the Sudeten mountains, flow northward, and empty into the Oder River.

Neith, also spelled NEIT, ancient Egyptian goddess who was the patroness of the city of Sais in the Nile River delta. Neith was worshiped as early as predynastic times (*c.* 3000 BC), and several queens of the 1st dynasty (*c.* 2925–2775 BC) were named after her. She also became an important goddess in the capital city of Memphis. Her principal emblem was a pair of crossed arrows shown against the background of a leather shield. A further emblem was a bow case, which the goddess was sometimes depicted wearing on her head in place of a crown. But Neith was usually depicted as a woman wearing the red crown associated with Lower Egypt, holding crossed arrows and a bow. In mythology she was the mother of the crocodile god Sebek, and later of Re. The worship of Neith was particularly prominent in the 26th dynasty (664–525 BC), when Egypt's capital was located at Sais.

Neiva, city and capital of Huila *departamento,* south-central Colombia, on the upper Magdalena River. After unsuccessful attempts by Juan de Cabrera in 1539 and by Juan Alonso in 1550 to establish a permanent settlement, the city was officially founded in 1612, when Captain Diego de Ospina claimed it for the Spanish crown; he named it for the Neiva River in Haiti. Its citizens were active in the struggle for independence from Spain (1810–20) as well as in Colombia's civil war (1899–1903). Neiva is primarily an agricultural centre for cotton, rice, corn (maize), and sesame, and it manufactures cotton goods and cement and processes marble. The city is the southern terminus of the Atlantic Railway that runs via Puerto Berrío to Santa Marta on the Caribbean Sea. The rural atmosphere of the city inspired the works of José Eustasio Rivera (1889–1928), the Colombian poet and novelist. Pop. (1999 est.) 300,052.

Nejd (Saudi Arabia): *see* Najd.

Nekhbet, in Egyptian religion, vulture goddess who was the protector of Upper Egypt and especially its rulers.

Nekhbet was frequently portrayed as spreading her wings over the pharaoh while grasping in her claw the cartouche symbol or other emblems. She was sometimes depicted suckling the pharaoh. Her special colour was white, in contrast to the red regalia of her counterpart, Buto, goddess of Lower Egypt. She also appeared as a woman, often with a vulture's head, wearing a white crown. The centre of Nekhbet's cult was al-Kāb (Greek: Eileithyiaspolis), but her principal epithet made her the goddess of Hierakonpolis (or Nekhen), the ancient town opposite al-Kāb, on the west bank of the Nile River.

Nekhbet hovering over Menkauhor, relief, 5th dynasty

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Nekrasov, Nikolay Alekseyevich (b. Dec. 10 [Nov. 28, Old Style], 1821, Nemirov, Ukraine, Russian Empire—d. Jan. 8 [Dec. 27, 1877], 1878, St. Petersburg, Russia), Russian poet and journalist whose work centred on the theme of compassion for the sufferings of the peasantry. Nekrasov also sought to express the racy charm and vitality of peasant life in his adaptations of folk songs and poems for children.

Nekrasov, lithograph

Novosti Press Agency

Nekrasov studied at St. Petersburg University, but his father's refusal to help him forced him into literary and theatrical hack work at an early age. His first book of poetry was published in 1840. An able businessman, he published and edited literary miscellanies and in 1846 bought from Pyotr Pletnev the magazine *Sovremennik* ("The Contemporary"), which had declined after the death of its founder, Aleksandr Pushkin. Nekrasov managed to transform it into a major literary journal and a paying concern, despite constant harassment by the censors. Both Ivan Turgenev and Leo Tolstoy published their early works in *Sovremennik,* but after 1856, influenced by its subeditor, Nikolay Chernyshevski, it began to develop into an organ of militant radicalism. It was suppressed in 1866, after the first attempt to assassinate Alexander II. In 1868 Nekrasov, with Mikhail Saltykov (Shchedrin), took over *Otechestvenniye zapiski* ("Notes of the Fatherland"), remaining its editor and publisher until his death.

Nekrasov's work is uneven through its lack of craftsmanship and polish and a tendency to sentimentalize his subjects, but his major poems have lasting power and originality of expression. *Moroz krasny-nos* (1863; "Red-nosed Frost," in *Poems,* 1929) gives a vivid picture of a brave and sympathetic peasant woman, and his large-scale narrative poem, *Komu na Rusi zhit khorosho?* (1879; *Who Can Be Happy and Free in Russia?,* 1917), shows to the full his gift for vigorous realistic satire.

nekton, the assemblage of pelagic animals that swim freely, independent of water motion or wind. Only three phyla are represented by adult forms. Chordate nekton include numerous species of bony fishes, the cartilaginous fishes such as the sharks, several species of reptiles (turtles, snakes, and saltwater crocodiles), and mammals such as the whales, porpoises, and seals. Molluscan nekton include the squids and octopods. The only arthropod nekton are decapods, including shrimps, crabs, and lobsters.

Herbivorous nekton are not very common, although a few nearshore and shallow-water species subsist by grazing on plants. Of the nektonic feeding types, zooplankton feeders are the most abundant and include, in addition to many bony fishes, such as the sardines and mackerel, some of the largest nekton, the baleen whales. The molluscans, sharks, and many of the larger bony fishes consume animals bigger than zooplankton. Other fishes and most of the crustaceans are scavengers.

Nektonic species are limited in their areal and vertical distributions by the barriers of temperature, salinity, nutrient supply, and type of sea bottom. The number of nektonic species and individuals decreases with increasing depth in the ocean.

Nelligan, Émile (b. Dec. 24, 1879, Montreal, Que., Can.—d. Nov. 18, 1941, Montreal), French-Canadian poet who was a major figure in the École Littéraire de Montréal ("Montreal Literary School").

Nelligan attended the Collège Sainte-Marie in Montreal but abandoned his studies to concentrate on writing. In 1899, after three years of intense poetic activity, he was hospitalized for schizophrenia; he spent the rest of his life in institutions.

Like other members of the Montreal School, Nelligan was influenced by the French Parnassian and Symbolist poets; his work recalls that of Charles Baudelaire and Paul Verlaine in particular. Nelligan's poems, known for their lyricism, are written in a melancholy and nostalgic, and sometimes hallucinatory, voice; they are noted for their unusual symbols, evocative language, and musical rhythms. Themes of dreaming, childhood, music, and death pervade his work. Nelligan used conventional poetic forms: of his approximately 160 poems, nearly half are sonnets or rondels. The best known are "Vaisseau d'or" ("The Ship of Gold") and "La Romance du vin" ("The Song of Wine").

Nelligan's reputation grew steadily during the 20th century. The most comprehensive critical edition of his work, *Poésies complètes,* appeared in 1952; an English translation of his complete works was published in 1983. Le Prix Émile Nelligan, which began in 1979, is awarded to outstanding poets.

Nelson, city, southeastern British Columbia, Canada, on the western arm of Kootenay Lake, a few miles south of Kokanee Glacier Provincial Park and 408 miles (657 km) east of Vancouver. The discovery of gold at nearby Fortynine Creek in 1867 led to the development of several mines near Cottonwood Creek Delta, the original townsite. Founded in 1887, the community was first known as Stanley or Salisbury. In 1888 it was renamed in honour of Hugh Nelson, then lieutenant governor of British Columbia.

A sawmill in Nelson, B.C.
John de Visser

In 1907 Nelson became the first city in the province to undertake municipal hydroelectric development on the Kootenay River. It is now a service point for an extensive farming, lumbering, and mining area and is also the chief administrative centre for the Kootenay region. Industries include railroad repair shops, sawmills, and transportation and communication utilities. The Kootenay Museum displays Indian flint and historical items of the Dukhobors, who were members of a Russian religious sect that immigrated to western Canada at the end of the 19th century. Nelson has been the scene of the World's Midsummer Curling Bonspiel Championships since 1945 and is a base for fishing, hunting, skiing, and water sports. Inc. city, 1897. Pop. (1991) 8,760.

Nelson, port city and unitary authority, northern South Island, New Zealand, on an inlet at the head of Tasman Bay, at the mouth of the Matai River. Settled by the New Zealand Company in 1842 and named after British admiral Lord Nelson, it was delayed in its development by a Maori attack two years later. Declared a city and the seat of an Anglican bishopric in 1858, it prospered during the gold rush of the 1860s.

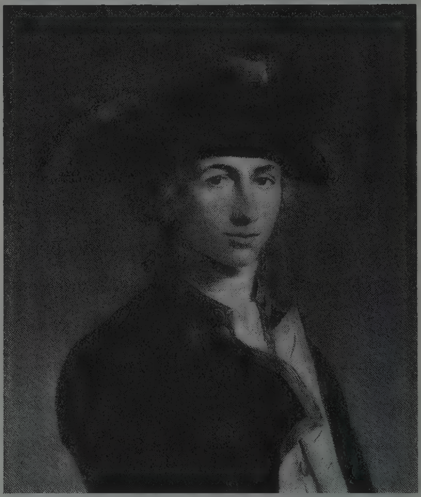
Nelson is a resort and retirement centre, particularly for people from Wellington, 103 miles (165 km) east, on the other side of Cook Strait. It serves a productive agricultural and livestock region; industries include food-processing plants, sawmills, and engineering works. The port exports tobacco, fruit, timber, and meat and imports petroleum products. In the city are an Anglican cathedral; the Suter Art Gallery (1895; rebuilt 1978); and the Cawthorn Institute (1919), which conducts chemical, biological, and environmental research. Pop. (1991) city, 37,943; (1992 est.) urban area, 47,800.

Nelson, Baby Face, byname of GEORGE NELSON, original name LESTER GILLIS (b. 1908, Chicago, Ill., U.S.—d. Nov. 27, 1934, near Fox River Grove, Ill.), American gunman and bank robber noted for his vicious killings and youthful looks.

From petty crime Nelson graduated into labour racketeering, working for Al Capone (1929–31) and other bootleg bosses; he was let go, however, proving too violent even for them. He then turned to bank robberies, joining with John Dillinger on two occasions (1934). Listed as Public Enemy Number One by the Federal Bureau of Investigation (FBI), he was killed in a wild shoot-out with FBI agents.

Nelson, Horatio Nelson, Viscount, DUKE (duca) DI BRONTE, also called (1797–98) SIR HORATIO NELSON, or (1798–1801) BARON NELSON OF THE NILE AND BURNHAM-THORPE (b. Sept. 29, 1758, Burnham Thorpe, Norfolk, Eng.—d. Oct. 21, 1805, at sea, off Cape Trafalgar, Spain), British naval commander in the wars with Revolutionary and Napoleonic France, who won crucial victories in such battles as those of the Nile (1798) and of Trafalgar (1805), where he was killed by enemy fire on the HMS *Victory.* In private life he was known for his extended love affair with Emma, Lady Hamilton, while both were married.

Early years. Horatio Nelson was the sixth of 11 children of the village rector, Edmund Nelson, and his wife, Catherine. The Nelsons were genteel, scholarly, and poor. The family's most important connection from which Nelson could expect preferment was that with a distant relation, Lord Walpole, the descendant of Sir Robert Walpole, who had been prime minister earlier in the century. Decisive for Nelson's life, however, was his mother's brother, Captain Maurice Suckling, who was to become comptroller of the British Navy. When Horatio's mother died, Captain Suckling agreed to take the boy to sea.



Lord Nelson, detail of an oil painting by J.F. Rigaud; in the National Maritime Museum, Greenwich, Eng.
By courtesy of the National Maritime Museum, Greenwich, Eng.

Nelson's first years in the navy were a mixture of routine experience and high adventure. The former was gained particularly in the Thames estuary, the latter in a voyage to the West Indies by merchant ship and a dangerous and unsuccessful scientific expedition to the Arctic in 1773. Nelson had his first taste of action in the Indian Ocean. Soon after, struck down by fever—probably malaria—he was invalided home, and, while recovering from the consequent depression, Nelson experienced a dramatic surge of optimism. From that moment, Nelson's ambition, fired by patriotism tempered by the Christian compassion instilled by his father, urged him to prove himself at least the equal of his eminent kinsmen.

In 1777 Nelson passed the examination for lieutenant and sailed for the West Indies, the most active theatre in the war against the American colonies. Promoted to captain in 1779, at the early age of 20, he was given command of a frigate and took part in operations against Spanish settlements in Nicaragua, which became targets once Spain joined France in alliance with the American Revolutionaries. The attack on San Juan was militarily successful but ultimately disastrous when the British force was almost wiped out by yellow fever; Nelson himself was lucky to survive.

In 1783, after the end of the American Revolution, Nelson returned to England by way of France. On his return to London he was cheered by the appointment, in 1784, to command a frigate bound for the West Indies. But this was not to be a happy commission. By rigidly enforcing the Navigation Act against American ships, which were still trading with the British privileges they had officially lost, he made enemies not only among merchants and shipowners but also among the resident British authorities who, in their own interest, had failed to enforce the law. Under the strain of his difficulties and of the loneliness of command, Nelson was at his most vulnerable when he visited the island of Nevis in March 1785. There he met Frances Nisbet, a widow, and her five-year-old son, Josiah. Nelson conducted his courtship with formality and charm, and in March 1787 the couple was married at Nevis.

Returning with his bride to Burnham Thorpe, Nelson found himself without another appointment and on half pay. He remained unemployed for five years, aware of "a prejudice at the Admiralty evidently against me, which I can neither guess at, nor in the least account for"—but which may well have been connected with his enforcement of the Navigation Act. Within a few days of the execution of King Louis XVI of France in January 1793, however, he was given command of the 64-gun *Agamemnon.*

Service in the Mediterranean. From this moment, Nelson the enthusiastic professional was gradually replaced by Nelson the commander of genius. The coming months were probably his most tranquil emotionally. At home waited a loving wife, whose son he had taken to sea with him. His ship, fast and maneuverable, and his crew, superbly trained, pleased him. His task was to fight the Revolutionary French and support British allies in the Mediterranean. Assigned to the forlorn defense of the port of Toulon against the revolutionaries—among them a 24-year-old officer of artillery, Napoleon Bonaparte—Nelson was dispatched to Naples to collect reinforcements. He later gratefully recognized that he owed the success of his mission largely to the British minister—the adroit and scholarly Sir William Hamilton, who had lived at Naples for 30 years and whose vivacious young wife, Emma, was in the queen's confidence.

When Toulon fell, Lord Hood, Nelson's commander, moved his base to Corsica, where Nelson and his ship's company went ashore to assist in the capture of Bastia and Calvi, where a French shot flung debris into Nelson's face, injuring his right eye and leaving it almost sightless. At the end of 1794, Hood was replaced by the uninspiring Admiral William Hotham, who was subsequently replaced by Sir John Jervis, an officer more to Nelson's liking. At the age of 60, Jervis was an immensely experienced seaman who quickly recognized Nelson's qualities and who regarded Nelson "more as an associate than a subordinate Officer." The arrival of Jervis coincided with an upsurge of French success by land so that the British were forced to abandon their Mediterranean bases and retreat upon Gibraltar and the Tagus.

Battles of Cape St. Vincent and the Nile. Making for a rendezvous with Jervis in the Atlantic off Cape St. Vincent, Nelson found himself sailing in mist through a Spanish fleet of 27 ships. The Spaniards were sailing in two divisions and Jervis planned to cut between the two and destroy one before the other could come to its assistance. But he had miscalculated, and it became clear that the British ships would not be able to turn quickly enough to get into action before the Spanish squadrons closed up. Without orders from Jervis, Nelson hauled out of line and attacked the head of the second Spanish division. While the rest of Jervis' fleet slowly turned and came up in support, Nelson held the two Spanish squadrons apart, at one time fighting seven enemy ships. The efficiency of British gunnery was decisive, and he not only boarded and captured one enemy man-of-war but, from her deck, boarded and took a second.

The Battle of Cape St. Vincent won for Jervis the earldom of St. Vincent and for Nelson a knighthood, which coincided with his promotion by seniority to rear admiral. His first action in command of a major independent force, however, was disastrous. In the course of an assault on Tenerife, a grapeshot shattered his right elbow, and back in his flagship the arm was amputated. In the spring of 1798 Nelson was fit enough to rejoin the Earl of St. Vincent, who assigned him to watch a French fleet waiting to embark an expeditionary force.

Cruising off the port in his flagship, the *Vanguard,* Nelson was struck by a violent northwesterly gale that blew his squadron off station and carried the French well on their way to their destination, Egypt. The British set out in pursuit, Nelson believing that the French were going either to Sicily or Egypt. After a somewhat confused chase the British caught up with the French squadron in the harbour at Alexandria near the mouth of the Nile. There the British saw the harbour crowded with empty French transports and, to the east, an escorting French squadron of 13 ships anchored in a defensive line across Abū Qīr Bay near the mouths of the Nile. Once the signal to engage had been hoisted in the *Vanguard,* Nelson's ships attacked the French. With the French ships immobilized, the attacking British ships could anchor and concentrate their fire on each enemy before moving on to demolish their next target. Its outcome never in doubt from its beginning at sunset, the battle raged all night. By dawn the French squadron had been all but annihilated. The strategic consequences of the Battle of the Nile were immense, and Nelson took immediate steps to broadcast the news throughout the Mediterranean as well as hastening it to London.

At Naples, the most convenient port for repairs, he was given a hero's welcome, stage-managed by Lady Hamilton. A prolonged British naval presence in Naples was useful in supporting the shaky military strength of King Ferdinand, the one major ruler in Italy to be resisting the southward march of the French, who had already taken Rome and deposed the pope.

The love affair that developed between Nelson and Emma Hamilton came at a time of crisis. With Nelson's encouragement, King Ferdinand had indulged his own fantasies of glory and, openly joining the alliance of Great Britain, Russia, and Austria against the French, led his own insignificant army to recapture Rome. Not only was this a disastrous failure but the French counteroffensive drove him back to Naples, which itself then fell. Nelson had to evacuate the Neapolitan royal family to Sicily, and at Palermo it became obvious to all that his infatuation with Emma Hamilton was complete. She had proved herself indispensable company to him.

Blockade of Naples and battle of Copenhagen. In the summer of 1799, Nelson's squadron supported Ferdinand's successful attempt to recapture Naples, but word of his dalliance with Emma had reached the Admiralty, and his superiors began to lose patience. Bonaparte had escaped from Egypt to France, and the French still held Malta when Lord Keith, who had replaced St. Vincent as commander in chief, decided that the enemy's next objective would be Minorca. Nelson was ordered to that island with all available ships but refused on the grounds that he expected the threat to be toward Naples. Events justified him, but to disobey orders so blatantly was unforgivable. The Admiralty, also angered by his acceptance of the dukedom of Bronte in Sicily from King Ferdinand, sent him an icy order to return home.

In 1800 he returned, but across the continent in company with the Hamiltons. When the curious little party landed in England, it was at once clear that he was the nation's hero, and his progress to London was triumphal. Emma was pregnant by Nelson when he was appointed second in command to the elderly admiral Sir Hyde Parker, who was to command an expedition to the Baltic. Shortly before sailing, Nelson heard that Emma had borne him a daughter named Horatia.

Parker's fleet sailed for the first objective, Copenhagen, early in 1801. At first Nelson's advice was not sought; then, as Danish resistance became increasingly likely, he could record, "Now we are sure of fighting, I am sent for." By the stratagem of taking the fleet's ships of shallower draught through a difficult channel, Nelson bypassed the shore batteries covering the city's northern approaches. The next morning, April 2, he led his squadron into action. There was to be no room for tactical brilliance; only superior gunnery would tell. The Danes resisted bravely, and Parker, fearing that Nelson was suffering unacceptable losses, hoisted the signal to disengage. Nelson disregarded it, and, an hour later, victory was his; the Danish ships lay shattered and silent, their losses amounting to some 6,000 dead and wounded, six times heavier than those of the British.

Before this success could be followed by similar attacks on the other potential enemies, Tsar Paul of Russia died and the threat faded. Parker was succeeded by Nelson, who at last became a commander in chief. The Admiralty, well aware of his popular appeal, now made maximum use of it by giving him a home command. At once he planned an ambitious attack on the naval base of Boulogne in order to foil a possible French invasion. He did not take part himself, and the operation was a gory failure. A second attempt was abandoned because of peace negotiations with France, and in March 1802 the Treaty of Amiens was signed.

At last there was time to enjoy the fruits of his victories. Emma had, on Nelson's instructions, bought an elegant country house, Merton Place, near London, and transformed it into an expensive mirror for their vanities. At last her husband rebelled, but it was too late for change, and he appeared reconciled to his lot when, early in 1803, he died with his wife and her lover at his side.

Victory at Trafalgar. Bonaparte was known to be preparing for renewed war, and, two days before it broke out, Nelson, in May 1803, was given command in the Mediterranean, hoisting his flag in the *Victory.* Once again he was to blockade Toulon, now with the object of preventing a rendezvous between the French ships there with those at Brest in the Atlantic and, after Spain declared war on Britain, with

Spanish ships from Cartagena and Cádiz. A combined force of that size could well enable Bonaparte to invade England; and in early 1805, Napoleon, who the previous year had crowned himself emperor, ordered the fleets to converge for this purpose. The French and Spanish squadrons were to burst through the British blockade; run for the West Indies; and after ravaging British possessions and trade, return across the Atlantic in a single invincible fleet to destroy the British near Ushant, an island off Brittany, and take control of the English Channel while it was crossed by an invading army of 350,000.

In March, Admiral Pierre Villeneuve, who was to be in overall command, broke out of Toulon under cover of bad weather and disappeared. Nelson set off in pursuit. Villeneuve cut short his marauding, but his fleet was intercepted and damaged by a British squadron. Failing to win control of the English Channel, he ran south to Cádiz.

Nelson put into Gibraltar, made dispositions for the blockade of Cádiz, and returned to England. During his 25 days at home, he planned the strategy for the confrontation with the Franco-Spanish fleets that seemed inevitable; 34 enemy ships were blockaded in Cádiz by smaller numbers under Admiral Cuthbert Collingwood. Although Napoleon, abandoning the plan of a cross-Channel invasion, began to redeploy the Grand Army, in Britain the danger of invasion seemed as pressing as ever, and Nelson appeared the country's hope.

When his orders came, Nelson on September 15 sailed in the *Victory.* He was now at the height of his professional powers. Worshiped by his officers and sailors alike, he was confident that his captains understood his tactical thinking so well that the minimum of consultation would be required. On his 47th birthday he dined 15 captains in his flagship and outlined his plans to bring on a "pell-mell battle" in which British gunnery and offensive spirit would be decisive. He planned to advance on the Franco-Spanish fleets in two divisions to break their line and destroy them piecemeal. This was the final abandonment of the traditionally rigid tactics of fighting in line of battle.

After receiving Napoleon's orders that he must break the blockade, Villeneuve, on October 20, sailed out of Cádiz. At dawn next day, the Franco-Spanish fleets were silhouetted against the sunrise off Cape Trafalgar, and the British began to form the two divisions in which they were to fight, one led by Nelson, the other by Collingwood. As the opposing fleets closed, Nelson made his famous signal, "England expects that every man will do his duty." The Battle of Trafalgar raged at its fiercest around the *Victory,* and a French sniper, firing from the mast of the *Redoutable,* shot Nelson through the shoulder and chest. He was carried below to the surgeon, and it was soon clear that he was dying. When told that 15 enemy ships had been taken, he replied, "That is well, but I had bargained for 20." Thomas Hardy, his flag captain, kissed his forehead in farewell and Nelson spoke his last words, "Now I am satisfied. Thank God, I have done my duty."

Although the victory of Trafalgar finally made Britain safe from invasion, it was, at the time, overshadowed by the news of Nelson's death. A country racked with grief gave him a majestic funeral in St. Paul's Cathedral, and his popularity was recorded in countless monuments, streets, and inns named after him and, eventually, in the preservation at Portsmouth of the *Victory.* Emma Hamilton and his daughter, however, were ignored. Emma died, almost destitute, in Calais nine years later. Horatia, showing her father's resilience, married a clergyman in Norfolk and became the mother of a large and sturdy family.

Assessment. Nelson had finally broken the unimaginative strategic and tactical doctrines of the previous century and taught individual officers to think for themselves. His flair and forcefulness as a commander in battle were decisive factors in his two major victories—the battles of the Nile and Trafalgar. In the former, he had destroyed the French fleet upon which Napoleon Bonaparte had based his hopes of Eastern conquest, and in the latter he had destroyed the combined French and Spanish fleets, thus ensuring the safety of the British Isles from invasion and the supremacy of British sea power for more than a century. Spectacular success in battle, combined with his humanity as a commander and his scandalous private life, raised Nelson to godlike status in his lifetime, and after his death at Trafalgar in 1805, he was enshrined in popular myth and iconography. He is still generally accepted as the most appealing of Britain's national heroes. (T.Po./Ed.)

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Nelson, Samuel (b. Nov. 10, 1792, Hebron, N.Y., U.S.—d. Dec. 13, 1873, Cooperstown, N.Y.), associate justice of the United States Supreme Court (1845–72).

Against the wishes of his parents, who wanted him to enter the ministry, Nelson studied law and was admitted to the bar in 1817. His practice in the town of Cortland, New York, grew quickly; and Nelson was appointed postmaster, served as a presidential elector for James Monroe, and was a delegate to the New York constitutional convention, in which he advocated the abolition of property requirements for suffrage. He was appointed in 1823 judge of the sixth circuit and in 1831 associate justice of the state Supreme Court. In 1845, after an unsuccessful bid for the U.S. Senate, Nelson was named to the U.S. Supreme Court by President John Tyler.

A hard-working member of the court, Nelson became an authority on international and maritime law and patent law and often addressed himself primarily to the technical aspects of the cases before the court. The only justice who did not enter into the political and constitutional aspects of the Dred Scott case, he declared merely that the slave Dred Scott was not a citizen of Missouri and therefore could not sue in a federal court.

He opposed the expansion of federal power and urged conciliation with the Confederacy during the American Civil War. In 1871 he was named by President Ulysses S. Grant to the Joint High Commission that met at Geneva to settle the *Alabama* claims. He was a close friend of the novelist James Fenimore Cooper and retired from the court in 1872 to Cooperstown.

Nelson, William Rockhill (b. March 7, 1841, Fort Wayne, Ind., U.S.—d. April 13, 1915, Kansas City, Mo.), American journalist, editor, and publisher who helped found *The Kansas City* (Mo.) *Evening Star* (1880). Among U.S. publishers he was a pioneering advocate of focusing investigative reporting on local municipal corruption instead of merely printing the exposés of nationally famed muckrakers.

Nelson was the headstrong son of a strict Episcopalian father, who sent the boy to Notre Dame College. He was sent home after two years but continued his studies and won admittance to the bar in 1862. He practiced law, made a fortune in road-building contracts, lost much of it, and turned to Democratic politics. He managed the Indiana presidential campaign of Samuel J. Tilden (1876). With Samuel E. Morss, he bought the *Fort Wayne* (Ind.) *Sentinel* in 1878. The partners sold the paper after a year and a half, moving then to Kansas City, where they founded the *Evening Star.* Under Nelson's direction the *Evening Star* became noted for its crusades against municipal corruption and in favor of civic reform.

Nelson built the *Star* into one of the nation's most successful papers. Selling for two cents initially, the paper increased its circulation from 3,000 in September 1880 to 50,000 in 1893. The paper became *The Kansas City Star* in 1885. In 1901 Nelson acquired the *Kansas City Times,* a morning paper, and continued to take an active role in the operations of both. The papers used the Associated Press news service and increasingly stressed international as well as local news. Nelson remained a political independent, supporting candidates of his personal choice; the editorial policies of his newspapers reflected his independent stance.

Pursuing his interest in civic improvement, Nelson bequeathed his newspapers and fortune, estimated at more than $6,000,000, to his wife and daughter; on the death of the survivor the remainder was to be used to found an art museum. Partly as a result of the bequest, the William Rockhill Nelson Gallery of Art and Mary Atkins Museum of Fine Arts was opened in 1933.

Nelson-Atkins Museum of Fine Arts, formerly WILLIAM ROCKHILL NELSON GALLERY OF ART AND MARY ATKINS MUSEUM OF FINE ARTS, art museum in Kansas City, Mo., that ranks among the 10 largest in the United States.

Opened in 1933, the Nelson-Atkins Museum has more than 50 galleries and a number of period rooms. The museum's outstanding feature is its collection of East Asian art. The collection of Chinese landscape paintings is one of the finest in the West, and the museum's holdings of Chinese ceramics and decorative arts are also noteworthy. Besides European paintings from the Renaissance on, the museum also has notable collections of ancient Egyptian sculpture, Japanese paintings and prints, and English pottery. The E.F. Pierson Sculpture Garden was dedicated in 1972, and the Henry Moore Sculpture Garden opened in 1989.

The museum is situated on 20 acres (8 hectares) of ground in south Kansas City. The gallery and museum were named respectively for a founder and editor of the *Kansas City Evening Star,* William Rockhill Nelson, and for Mary Atkins. Both left bequests to finance construction of the museum.

Nelson Lakes National Park, park in northern South Island, New Zealand. The park was established in 1956 and has an area of 393 square miles (1,018 square km). It is named after its chief focal points, the scenic lakes of Rotoiti and Rotoroa. The park is bounded by the Braeburn and Muntz ranges (northwest), Robert Range (north), St. Arnaud Range (east), and Ella Range (west). These mountain ranges have an average elevation of 5,000 feet (1,500 m). The three rivers whose course is wholly within the park are the Travers (flowing into Lake Rotoiti), the Sabine, and the D'Urville (flowing into Lake Rotoroa). The park's rugged, mountainous terrain is covered with beech forests, and near the lakes are scattered rimu, matai, miro, rata, and kahikatea and other distinctive trees. Deer and opossum have done considerable damage to vegetation. Other wildlife includes chamois, wild pig, bat, and hare. There are facilities for camping and boating, and the rugged terrain also offers mountaineering, hunting, skiing, and fishing. The headquarters are at St. Arnaud.

Nelson River, river in northern Manitoba, Canada, that begins by draining Lake Winnipeg, flows northward, and ends by discharging into Hudson Bay near York Factory. Its 400-mile (644-kilometre) course is the ultimate outlet for a basin of 444,000 square miles (1,150,000 square km). Together with the Bow and North and South Saskatchewan rivers, it forms a 1,600-mile (2,575-kilometre) waterway extending as far west as the Canadian Rockies. It was discovered in 1612 by the English explorer Sir Thomas Button, who named it after his sailing master. The Hudson Bay Railway, a branch of the Canadian National Railway, now follows most of the river's course. Power for the nickel-mining operations at Thompson on the Burntwood River, a major tributary, is generated from Kelsey Dam, which lies on the Nelson about 150 miles (240 km) downstream from Lake Winnipeg. Another hydropower installation is at Kettle Rapids farther downstream.

Nelspruit, town, capital of Mpumalanga province, South Africa. It lies along the Krokodil (Crocodile) River, among domed granite hills. In 1891 the railway from Delagoa Bay (site of modern Maputo, Mozambique) reached a farm owned by the Nel family known as Nelspruit ("Nel's Stream"). A railway station was built there, and Nelspruit was proclaimed a village in 1905 and a municipality in 1940. The surrounding agricultural area produces oranges and other citrus fruits, tobacco, peanuts (groundnuts), mangoes, avocados, cattle, and timber. Nelspruit lies along the tourist route running northeast to Kruger National Park. Pop. (1984 est.) mun. 48,330.

Nelumbonaceae, the lotus-lily family of the water-lily order (Nymphaeales), consisting of two species of attractive aquatic plants. One of these species is the sacred lotus of the Orient (*Nelumbo nucifera*) and is found in tropical and subtropical Asia. The other species is the American lotus, or water chinquapin (*N. lutea,* or *N. pentapetala*), found in the eastern United States and southward to Colombia.

Some authorities consider the two species to constitute a separate order (Nelumbonales) because of important botanical characteristics that suggest a different evolutionary origin from the other water lilies. Unlike other water lilies, the plants of Nelumbonaceae have pores in the seed coat but lack latex-bearing tubes; there are also chromosomal differences. The family is further characterized by circular, centrally stalked, slightly hairy leaves up to about 60 cm (2 feet) across, with the margins turned up, forming a funnel- or saucer-shaped depression. The leaves extend, in the Asian species, as much as 2 m (6.5 feet) above the water instead of floating on it. The large, attractive flowers also stand high above the water on strong, leafless stalks. They may be up to 25 cm across and have a number of petals, which close at night. The flowers of the sacred lotus, which stand as much as 1.8 m above the water, are pink or rose-coloured and fragrant. The American lotus has pale yellow flowers that rise about 60 cm above the water.

Many varieties of the sacred lotus exist in cultivation, including dwarf forms and colour varieties ranging from white to red. The plant's many nutlike fruits are produced in the flat upper surface of a spongy receptacle or expanded, fleshy, capsulelike structure, which is wider at the upper end than at the base. The whole structure dries at maturity, breaks off, and floats about, releasing the seeds, actually the true fruits, through numerous holes in the flat surface. The seeds sink to the bottom and establish new plants. The dried receptacles are used by florists in dried arrangements.

Sacred lotus (*Nelumbo nucifera*)
Derek Fell

The whole plant of both species is edible. The rootstocks (rhizomes) of *N. nucifera* are eaten in Asia either boiled or preserved in sugar and are the source of the starch known as lotus meal. The boiled young leaves are eaten as a vegetable. Even the stamens are used in Southeast Asia for flavouring tea. The American lotus is similarly edible, especially the large rhizomes, which were once a source of starchy food for the American Indians.

The plants are particularly beneficial to wildlife. Beaver, for instance, eat the rootstocks, and fish obtain shade and shelter among the underwater portions of the plants.

The seeds of the Oriental lotus have been ascribed remarkable powers of longevity and, under ideal conditions, may survive many years. Seeds recovered from an ancient peat bog in Manchuria have been shown by radioactive carbon dating to be some 1,000 years old, yet were capable of germinating.

Neman River, Lithuanian NEMUNAS, German MEMEL, or NJEMEN, Polish NIEMEN, river in Belarus and Lithuania. The Neman River is 582 miles (937 km) long and drains about 38,000 square miles (98,000 square km). It rises near Minsk in the Minsk Upland and flows west through a broad, swampy basin; it then turns north into Lithuania, cutting through terminal moraines in a narrow, sinuous valley. Near Kaunas, where there is a hydroelectric plant, it turns west and crosses another marshy basin to enter the Kurisches Gulf of the Baltic Sea south of Klaipeda (Memel; hence the river's German name). Navigation on the river is possible for 416 miles (670 km) to Belitsa; much timber is rafted.

Nemanjić DYNASTY, Nemanjić also spelled NEMANJA, ruling Serbian family that from the late 12th to the mid-14th century developed the principality of Raška into a large empire.

The dynasty traced its descent from Stefan Nemanja, who, as *veliki župan,* or grand chieftain, of the Serb region of Raška from 1169 to 1196, began to expand his domain while remaining a vassal of the Byzantine emperor. His son, Stefan Prvovenčani (the "First-Crowned"), was granted the title of king of Raška by Pope Honorius III in 1217. His younger brother, Rastko (later canonized as St. Sava), became in 1219 the first archbishop of an independent Serbian Orthodox church.

The succeeding Nemanjić kings were Stefan's sons Stefan Radoslav, Stefan Vladislav, and Stefan Uroš I, who was succeeded by his sons Stefan Dragutin and Stefan Uroš II (also called Stefan Milutin; reigned 1282–1321). Stefan Uroš II took substantial territory in Macedonia from Byzantium. His son, Stefan Uroš III (reigned 1322–31), expanded the state eastward into Bulgaria before being dethroned by his own son, Stefan Dušan (reigned 1331–55). In a series of wars against the Byzantines, Stefan Dušan, the greatest of the Nemanjić kings, conquered all of Albania, Macedonia, and Montenegro and drove farther south to take Epirus, Aetolia, and Thessaly (in Greece). He was crowned emperor in 1346. Serbs consider Dušan's reign to be their Golden Age, during which the law code called the Zakonik was promulgated, many churches and monasteries were built, and agriculture, industry, and trade developed.

Stefan Dušan's son and successor, Stefan Uroš V (from 1355), was a weak ruler under whom the Serbian empire dissolved into fragments ruled by rival princes. The Serbian principalities were compelled to accept the suzerainty of the Byzantine emperor before falling to the advancing power of the Ottoman Turks after 1371.

nematocyst, minute, elongated or spherical capsule that is found chiefly in members of the phylum Cnidaria (*e.g.,* jellyfish, corals, sea anemones). The capsule, which occurs on the body surface, is produced by a special cell called a cnidoblast and contains a coiled, hollow, usually barbed thread, which quickly turns outward (*i.e.,* is everted) from the capsule upon proper stimulation. The purpose of the thread, which often contains poison, is to ward off enemies or to capture prey.

When stimulated, a lidlike structure on the top of the capsule pops aside, and the thread is everted with a twisting motion. As eversion and twisting proceed, the barbs act like a drill, penetrating into (and pulling the thread into) the foreign object. If a toxin is present, it passes through the hollow thread, penetrating and paralyzing the victim's tissues. After eversion, the thread separates from the nematocyst. The threads of some nematocysts ensnare small prey by wrapping about them. The stinging effect of nematocysts in the Portuguese man-of-war and other jellyfish (*qq.v.*) can be extremely painful to humans and may cause paralysis, shock, and even death.

nematode, also called ROUNDWORM, any worm of the class Nematoda (phylum Aschelminthes, though many authorities consider the Nematoda to be a distinct phylum). Nematodes are among the most abundant animals, occurring as parasites in animals and plants or as free-living forms in soil, freshwater, marine environments, and even such unusual places as vinegar and beer malts. The number of named species is about 15,000, but it is probable that only a small proportion of the free-living forms have been identified. A great deal of research has been conducted on the parasitic forms because most of them

Nematode (*Ascaris lumbricoides*)
Javier Palaus Soler—Ostman Agency

have some medical, veterinary, or economic importance.

Nematodes are bilaterally symmetrical, elongate, and usually tapered at both ends. They also possess a pseudocoel, a fluid-filled body cavity between the digestive tract and the body wall. The sexes are separate in most species, but some are hermaphroditic (*i.e.,* have both male and female reproductive organs in the same individual). Nematodes range in size from microscopic to 7 m (about 23 feet) long, the largest being the parasitic forms found in whales. Nematode parasites of animals occur in almost all organs of the body, but the most common sites are in the alimentary, circulatory, and respiratory systems. Some of these worms are known by such common names as hookworm, lungworm, pinworm, threadworm, whipworm, and eelworm. Nematodes can cause a variety of diseases, including filariasis, ascariasis, and trichinosis. *See also* aschelminth.

Nemea, Battle of (394 BC), battle in the Corinthian War (395–387 BC) in which a coalition of Greek city-states sought to destroy the ascendancy of Sparta after its victory in the Peloponnesian War. The Spartans' defeat of the troops from Thebes, Corinth, Athens, and Argos temporarily broke the force of the coalition. On the battlefield in the Nemea River valley (near modern Neméa), the outnumbered Spartans' skill in hoplite warfare (use of heavily armoured foot soldiers) enabled them to encircle and crush the Athenians before turning against the other opponents.

Consult the INDEX *first*

Nemean Games, in ancient Greece, athletic and musical competitions held in honour of Zeus, in July, at the great Temple of Zeus at Nemea, in Argolis. They occurred biennially, in the same years as the Isthmian Games, *i.e.,* in the second and fourth years of each Olympiad. Their origin was attributed to such legendary figures as Heracles and Adrastus of Argos. The presidency of the games was held by the city of Cleonae until about 460 BC, thereafter by Argos. Winners in the competitions were awarded a wreath of fresh wild celery. After 573 BC the games were open to all Greeks, and the Nemea became one of the great panhellenic festivals. A group of archaeologists from the University of California, Berkeley, which began work at Nemea in 1973, discovered the remains of a stadium on a hillside near the temple.

Nemerov, Howard (b. March 1, 1920, New York, N.Y., U.S.—d. July 5, 1991, University City, near St. Louis, Mo.), American poet, novelist, and critic whose poetry, marked by irony and self-deprecatory wit, is often about nature. In 1978 Nemerov received the Pulitzer Prize and the National Book Award for *The Collected Poems of Howard Nemerov,* which appeared in 1977.

After graduating from Harvard University in 1941, Nemerov served as a pilot (1941–45) in World War II in a unit of the Royal Canadian Air Force attached to the U.S. Army Air Force. After the war he taught at Hamilton College, Clinton, N.Y. (1946–48); Bennington College, Bennington, Vt. (1948–66); and Brandeis University, Waltham, Mass. (1966–69). In 1969 he became professor of English at Washington University, St. Louis, Mo. From 1963 to 1964 he was consultant in poetry to the Library of Congress. He was poet laureate of the United States in 1988–89 and served a second term in that post in 1989–90.

Nemerov's first book of verse, *The Image and the Law* (1947), was followed by many others, including *The Salt Garden* (1955), *Mirrors and Windows* (1958), *New and Selected Poems* (1960), *The Next Room of the Dream: Poems and Two Plays* (1962), *Blue Swallows* (1967), *Gnomes and Occasions* (1973), *The Western Approaches* (1975), *Sentences* (1980), *Inside the Onion* (1984), and *War Stories* (1987). As a social critic, he produced powerfully satiric poems.

Nemerov's fiction includes *The Melodramatists* (1949), a novel of the dissolution of a Boston family; *The Homecoming Game* (1957), a witty tale of a college professor who flunks a small college's football hero; and *A Commodity of Dreams and Other Stories* (1960). Among his considerable body of critical writing are *Journal of the Fictive Life* (1965), *Reflections on Poetry and Poetics* (1972), and *Figures of Thought: Speculations on the Meaning of Poetry and Other Essays* (1978).

nemertean: *see* ribbon worm.

Nemery, Gaafar Mohamed el- (president of The Sudan): *see* Nimeiri, Gaafar Mohamed el-.

Nemesianus, Marcus Aurelius Olympius (fl. *c.* AD 280), Roman poet born in Carthage who wrote pastoral and didactic poetry.

Of his works there survive four eclogues and an incomplete poem on hunting (*Cynegetica*). Two small fragments on bird catching (*De aucupio*) are also generally attributed to him. The four eclogues are in the Virgilian tradition and are also influenced by Calpurnius. They are purely imitative and of conventional form and imagery, yet they are attractive because of their smooth diction and melodious movement. The *Cynegetica* gives instruction about dogs, horses, and hunting equipment; it is a gracefully written piece in the literary genre of Virgil's *Georgics* and of the *Cynegetica* of Grattius.

Nemesis, in Greek religion, two divine conceptions, the first an Attic goddess and the second an abstraction of indignant disapproval, later personified. Nemesis the goddess (perhaps of fertility) was worshiped at Rhamnus in Attica and was very similar to Artemis (a goddess of wild animals, vegetation, childbirth, and the hunt). In post-Homeric mythology, she was pursued by Zeus, the chief god, who eventually turned himself into a swan and caught her in the form of a goose. Nemesis then laid an egg from which Helen was hatched.

That Nemesis the abstraction was worshiped, at least in later times, is beyond doubt. She signified particularly the disapproval of the gods at human presumption, and her first altar was said to have been erected in Boeotia by Adrastus, leader of the Seven Against Thebes. In Rome, especially, her cult was very popular, particularly among soldiers, by whom she was worshiped as patroness of the drill ground (Nemesis Campestris).

Nemesis, classical sculpture; in the Vatican Museum

H. Roger-Viollet

Nemesius OF EMESA (fl. late 4th century), Christian philosopher, apologist, and bishop of Emesa (now Ḥimṣ, Syria) who was the author of *Peri physeōs anthrōpou* (Greek: "On the Nature of Man"), the first known compendium of theological anthropology with a Christian orientation. The treatise considerably influenced later Byzantine and medieval Latin philosophical theology.

A man of extensive culture, Nemesius integrated elements from various sources of Hellenistic philosophical and medical literature. He used the experimental physiology of the 2nd-century Greek physician Galen and the observations of other men of science, the philosophy of Neoplatonic Idealism (Alexandrian influence), and Aristotelian Realism (Antiochene influence). The result is a Christian synthesis that cannot be characterized as representing any specific philosophical school. "On the Nature of Man" lacks logical unity in its arrangement of material, and its abrupt ending indicates that the work was unfinished or was intended for revision. The opening chapter criticizes the concepts of man advanced by the Greeks from Plato to the 3rd-century Christian sectarians; it then emphasizes the place of man in the plan of creation as delineated in the Mosaic literature of the Old Testament and in the letters of St. Paul. Because man bridges the spiritual and material worlds, Nemesius maintains, he requires a unique intelligent principle of life, or soul, proportionate to his dignity and responsibility. He submits that the soul must be an incorporeal, intellectual entity, subsistent in itself, immortal, and yet designed to be one with the body. Nemesius implies that it preexists the body but not in the manner of the Platonic myth. Alluding to Antiochene doctrine on Christology, he suggests, in an original manner, that the body-soul relationship parallels Christ's union of the divine Word with his human nature in the incarnation. In subsequent chapters Nemesius examines the function of the brain, the operation of the senses, imagination, memory, reasoning, and speech; this treatment provided medieval philosophers with a wealth of data from Greek Stoic and other classical empirical philosophers. After considering the emotional and irrational (instinctive) functions of the soul, termed involuntary passions, Nemesius concludes with a study of human will. Repudiating Stoic fatalism and astrology and advocating the Christian belief in divine providence, he explains free will as a concomitant of reason: if man is rational, he must operate with a freedom of choice; otherwise his intelligent, deliberative powers are meaningless. Either as a cause or an effect of immortality, volitional powers are given to mutable man so that he might become immutable.

Such teaching became the keystone of medieval and Renaissance Christian psychology, mediated by other Greek authors from the 5th to the 8th century. Nemesius' work was sometimes attributed to the eminent 4th-century Greek theologian Gregory of Nyssa because of faulty Latin translations.

Nemi, Lake, Italian LAGO DI NEMI, crater lake in Lazio (Latium) *regione,* central Italy. It lies in the outer ring of the ancient Alban crater, in the Alban Hills, east of Lake Albano and 15 miles (24 km) southeast of Rome. About 3.5 miles (5.5 km) in circumference and 110 feet (34 m) deep, it is drained via a tunnel about 2 miles (3 km) long. In ancient times it was included in the territory of Aricia (modern Ariccia) and was called Lacus Nemorensis and sometimes the Speculum Dianae ("Mirror of Diana") from a temple and grove (*nemus*) sacred to that goddess. Excavations (now filled in) led to the discovery of the temple, a comparatively small building (98 by 52 ft), although it had been one of the richest in Latium. The remains of the temple precinct—a large platform, the back of which is formed by a wall of concrete, with niches, resting against the cliffs—are situated a little above the level of the lake, on the northeast.

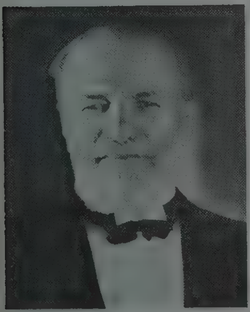
It had long been known that two Roman galleys rested on the lake bottom on the west side, but attempts to raise them were unsuccessful; they were raided by divers in 1895 and some of the most valuable objects were removed. Finally, in the 1920s, the water level was lowered, and the ships were raised. They were pleasure ships of the period of the emperor Caligula, one measuring 210 by 66 ft, the other 233 by 80 ft. Many of the objects found on the ships are in museums in Rome, but the ships unfortunately were burned by the retreating German army on May 31, 1944.

Neminātha (Jaina saint): *see* Ariṣṭanemi.

Nemirovich-Danchenko, Vladimir Ivanovich (b. Dec. 23 [Dec. 11, old style], 1858, Ozurgety, Russia—d. April 25, 1943, Moscow), Russian playwright, novelist, producer, and cofounder of the famous Moscow Art Theatre.

At the age of 13, Nemirovich-Danchenko was directing plays and experimenting with different stage effects. He received his formal education at Moscow State University, where his talents as a writer and critic began to appear. As a young dramatist, his plays, which were presented at the Maly Theatre (Moscow), were highly praised and respected, and he received at least two awards for playwriting.

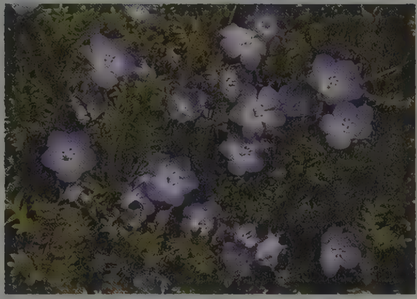
In 1891 he became an instructor of dramatic art at the Moscow Philharmonic Society. Olga Knipper, Vsevolod Meyerhold and Yevgeny Vakhtangov were only a few of the actors and directors who came under his influence and who eventually went on to win recognition on the Russian stage. As a teacher, Nemirovich-Danchenko expounded his ideas on theatrical art, the most important of which, such as the need for longer, organized rehearsals and a less rigid acting style, were subsequently incorporated by Konstantin Stanislavsky into his Method system of acting. In 1897, realizing that the Russian stage was in need of drastic reform, Nemirovich-Danchenko called a meeting with Stanislavsky to outline the aims and policies of a new theatre, an actor's theatre, first named the Moscow Art and Popular Theatre. Although Stanislavsky was given absolute authority over staging the productions, the contributions of Nemirovich-Danchenko were considerable. Both as producer and as literary adviser, he was chiefly responsible for the reading and selection of new plays, and he instructed Stanislavsky on matters of interpretation and staging as well.



Nemirovich-Danchenko
H. Roger-Viollet

Nemirovich-Danchenko encouraged both Anton Chekhov and Maksim Gorky to write for the theatre, and he is credited with the successful revival of Chekhov's *Seagull* after it had failed dismally at the Aleksandrinsky Theatre. Applying the dramatic reforms of the Moscow Art Theatre to light opera, Nemirovich-Danchenko founded the Moscow Art Musical Studio in the early 1920s and achieved outstanding success with his staging of *La Périchole* and *Lysistrata* in New York City (1925). His autobiography was translated as *My Life in the Russian Theater* (1936).

Nemophila, genus of annual herbs of the family Hydrophyllaceae. The about 13 species, most of which bear blue or white, bell-like blooms, are North American, mostly Pacific coast in origin. Baby blue-eyes (*N. menziesii*) often blooms conspicuously along the borders of moist woodlands in California.



Baby blue-eyes (*Nemophila menziesii*)
G.E. Nicholson

Its five-lobed, wheel-shaped flowers range in colour from blue to white and may have blue veins; the blossoms measure up to 4 centimetres (1½ inches) across. The leaves are divided into five to nine lobes. The plants, sometimes creeping, can grow to about 50 cm tall.

Nemours, town, Seine-et-Marne *département,* Île-de-France region, north central France, south of Fontainebleau, and south-southeast of Paris. Called Nemoracum in Roman times, the locality, pleasantly situated on the Loing River, derived its name from the woods (Latin *nemora*) surrounding it. Fortified in the Middle Ages by the dukes of Nemours, it was in English hands from 1420 to 1437. In 1528 King Francis I of France gave the duchy to the House of Savoy. Philip of Orléans, younger brother of Louis XIV, received it as an appanage (grant) in 1672. The town is the ancestral home of the du Pont de Nemours family, members of which are now chemical manufacturers in Delaware, U.S. Nemours has a medieval castle, rebuilt in the 15th and 17th centuries, which houses a museum. Gothic and Renaissance styles are blended in the 16th-century church of Saint-Jean-Baptiste. Glass is manufactured. Pop. (1982) 11,624.

Nemours, DUKES OF, titled French nobility of several creations, notably in branches of the houses of Armagnac, Savoy, and Orleans, grouped below chronologically and indicated by the symbol •.

• **Nemours, Jacques d'Armagnac, duc de** (duke of), also called (until 1462) COMTE DE CASTRES (b. 1433—d. Aug. 4, 1477, Paris), peer of France who engaged in conspiracies against Louis XI. He was the first of the great dukes of Nemours.

In 1404 the duchy of Nemours had been granted to Charles III of Navarre; but, upon his death in 1425, the succession was intermittently contested between his daughters' consorts and their heirs. Finally, in 1462, Louis XI of France confirmed it to Jacques d'Armagnac, an heir hitherto known as the comte de Castres. On both his paternal and maternal sides he was descended from the royal house of France.

As a lieutenant of the King, he pacified Roussillon (1463); but, feeling ill-compensated for his services, he joined the Ligue du Bien-Public (League of Public Weal) against Louis XI in 1465. Detached from this conspiracy by the grant of the governorship of the Île-de-France, he nevertheless engaged in further treasonable acts, for which he was pardoned in 1470. He began conspiring again, however, and was taken prisoner at Carlat in 1476. He was transported from place to place and finally installed in a miserable cage in the Bastille. The following year he was condemned by Parlement and beheaded.

• **Nemours, Louis d'Armagnac, duc de** (duke of), also called (until 1500) COMTE DE GUISE (b. 1472—d. April 28, 1503, Cerignola, Apulia, Kingdom of Naples), third son of Jacques d'Armagnac, duc de Nemours, and last of the ducal House of Armagnac.

The duchy of Nemours and all other honours forfeited by his father were restored to Louis' elder brother, Jean d'Armagnac, by acts of 1484 and 1492. Louis inherited the duchy on the latter's death in 1500. He had accompanied Charles VIII of France on his Italian campaigns and was named viceroy of Naples by Louis XII in 1501. In the ensuing wars between France and Spain over control of southern Italy, Nemours was killed at the Battle of Cerignola.

• **Nemours, Giuliano de' Medici, duc de** (duke of): *see* Medici, Giuliano de'.

• **Nemours, Jacques de Savoie, duc de,** (duke of), COMTE (count) DE GENEVOIS, MARQUIS DE SAINT-SORLIN (b. Oct. 12, 1531, Vauluisant, Champagne, Fr.—d. June 15, 1585, Annecy), noted soldier and courtier during the French wars of religion.

He won a military reputation in the French royal service on the eastern frontier and in Piedmont in the 1550s and against the Huguenots and their German allies in the 1560s. His amorous exploits at the Valois court were also admired; the chronicler Pierre de Brantôme characteristically calls him "the paragon of chivalry." After being considered for marriage to Elizabeth I of England in 1559–60, Nemours became interested in Anne d'Este, wife of François de Lorraine, 2^{e} duc de Guise; and after Guise's death (1563) he repudiated a solemn promise of marriage to Mlle de La Garnache (Françoise de Rohan, who had borne him a son and whose cause was taken up by her Albret and Bourbon relatives) in order to marry Anne in 1566. He later retired to his Savoyard appanage of Genevois and died of the gout.

• **Nemours, Charles-Emmanuel de Savoie, duc de** (duke of), PRINCE DE GENEVOIS (b. 1567—d. July 1595), eldest son of the former duke, Jacques de Savoie.

A supporter of the Holy League sponsored by the Roman Catholic Guises, he was appointed governor of Lyonnais just before he was arrested at Blois in King Henry III's coup against the Guises (1588), when the Duc de Guise was assassinated. Escaping to Paris, Nemours quarrelled with the Duc de Mayenne, withdrew to Lyonnais, took Vienne for the League, but was taken prisoner (1593) by the archbishop of Lyon, Pierre d'Epinac. He escaped again but died while preparing a new expedition against Lyon.

• **Nemours, Henri I de Savoie, duc de** (duke of), also called (until 1595) MARQUIS DE SAINT-SORLIN (b. Nov. 2, 1572, Paris—d. July 10, 1632, Paris), brother and successor of the former duke, Charles-Emmanuel.

Henri had helped the Roman Catholic Savoyards to capture Saluzzo (1588) and had fought for the Holy League in Daupiné, of which he became governor in 1591. Becoming duc de Nemours in 1595, he submitted the following year to King Henry IV. After taking part in campaigns at Rouen and Amiens, he retired to his estates at Annecy. When the Spanish went to war against Savoy in 1615, however, Nemours raised an army to cooperate with them, but he had to make peace in 1616. In 1618 he married Anne de Lorraine-Aumale, the only child of the Duke d'Aumale. He passed the rest of his life in Paris, brilliant at court as a patron of ballet and the arts.

•**Nemours, Charles-Amédée de Savoie, Duke** (duc) **de** (b. April 1624—d. July 30, 1652, Paris, France), son of Henri I de Savoie and ducal successor to his short-lived brother, Louis de Savoie.

Charles-Amédée married Elisabeth de Bourbon, daughter of the Duke de Vendome, in 1643. He commanded troops in the wars against the Spaniards in Flanders in 1645–46, fighting in many battles and being wounded in the leg at the Battle of Mardick. During the second phase (1650–53) of the Fronde, he took the side of the aristocratic rebels. He caused dissension among his coconspirators by flirting with the Duchess de Longueville and with Mme de Chatillon (Isabelle Angelique de Montmorency) and by quarreling with his brother-in-law, François, Duke de Beaufort, who shot him fatally in a duel.

•**Nemours, Henri II de Savoie, Duke** (duc) **de** (b. 1625—d. Jan. 14, 1659, Paris, France), younger brother of Charles-Amédée de Savoie, whom he succeeded as duke in 1652.

Henri had been trained for the church and was named archbishop of Reims in 1651. He was relieved of his vows in order to succeed his childless brother and eventually, on May 22, 1657, married Marie d'Orléans, daughter of Henri II, Duke de Longueville. Gentle, but sickly and afflicted with epilepsy, he died childless, the last of his house.

•**Nemours, Louis-Charles-Philippe-Raphaël d'Orléans, Duke** (duc) **de** (b. Oct. 25, 1814, Paris, France—d. June 26, 1896, Versailles), second son of King Louis-Philippe. After the abdication of his father in 1848 he tried until 1871 to unite exiled royalists and restore the monarchy.

Louis d'Orléans, Duke de Nemours, lithograph by Antoine Maurin
By courtesy of the Bibliotheque Nationale, Paris

A colonel of cavalry from 1826, Nemours was elected king of the Belgians in 1831, but Louis-Philippe refused that crown in his son's name. Nemours was present at the French siege of Antwerp in 1832 and later accompanied three expeditions to Algeria (1836, 1837, and 1841). His conservatism antagonized the liberal opposition in France, and in 1840 the Chamber of Deputies refused to grant the dowry proposed for his marriage to Princess Victoria of Saxe-Coburg-Gotha. In 1842 the death of his elder brother, Ferdinand, Duke d'Orléans, made Nemours the prospective regent of France in the event of Louis-Philippe's dying before Ferdinand's son Louis-Philippe-Albert, Count de Paris, should have come of age. But again his conservatism and unpopularity worked against him, and certain factions desired that, instead of Nemours, Ferdinand's wife, the Duchess d'Orléans (Helena of Mecklenburg-Schwerin), become regent for her son.

On the outbreak of revolution in 1848, Nemours organized the defense of the Tuileries to cover King Louis-Philippe's escape and then tried to accompany the Duchess d'Orléans to the Chamber of Deputies to press her son's claims. Instead, the deputies proclaimed the Second Republic. Nemours, the duchess, and her children fled, and Louis-Philippe abdicated.

In exile in England, Nemours sought to effect a reconciliation between the house of Orléans and the Count de Chambord, the exiled grandson of Charles X and a pretender to the French throne, as the indispensable preliminary to a restoration of the monarchy in France. After the Franco-German War and the removal of the legal disabilities of the French princes (1871), Nemours returned to France and was restored to his army rank of divisional general. An attempt by the Count de Chambord to reunite France under a Bourbon monarchy failed, and Nemours's hopes of a restoration were dashed.

Nemours, Marie d'Orleans-Longueville, Duchess (duchesse) **de** (b. March 5, 1625, Paris, France—d. June 16, 1707, Paris), sovereign princess of Neuchâtel (from 1699), best known for her *Mémoires* (1709).

The daughter of Henri II d'Orleans, Duke de Longueville, and his first wife, Louise de Bourbon-Soissons, Marie lost her mother at age 12 and in 1642 came under the authority of her stepmother, the celebrated intriguer of the Fronde, Anne-Geneviève de Bourbon-Condé, Duchess de Longueville. Raised in a strict, studious atmosphere, Marie came to have little in common with her scandalous stepmother and eventually fled to Dieppe and then to Flanders (1651) upon the renewed outbreak of the wars of the Fronde. For a time she was considered a possible bride for the Duke of York and even for Charles II of England, who had asked her hand. She eventually married Henri II, Duke de Nemours (1657), a near-invalid, who died in 1659, leaving her childless. The rest of her life was spent in a cruel, arduous legal battle with her stepmother's relatives, trying to establish her own inheritance. She lost her case as far as the French property was concerned (1698), but she did establish her right to the sovereign principality of Neuchâtel (1699). In her *Mémoires* she dealt with the Fronde, writing with sympathy toward her father and with particular hatred for her stepmother and other Condés.

Nemunelis, Vyte: *see* Brazdžionis, Bernardas.

Nemuro, city, eastern Hokkaido, Japan. It was founded as a post town in 1869 by a resident commissioner with 130 administrative staff members and their families. In 1880 it gained municipal status as a *machi* (township). Hanasaki, its port on the northern shore of Nemuro Peninsula, was the main base for fishing (salmon and trout) and seaweed-gathering boats and floating crab canneries. Before World War II, Nemuro was the administrative and governmental supply centre for the Kuril Islands. U.S. bombing in 1945 destroyed most of the city, and the Russian occupation of the Kuril Islands contributed to a long period of economic stagnation. The introduction of food-processing factories for fish and dairy products stimulated the economy and led to the city's renewed growth in the 1950s and '60s. Pop. (1990) 36,914.

Nen River, Wade-Giles romanization NEN CHIANG, Pinyin NEN JIANG, also called NONNI RIVER, river in northeastern China. The Nen River is the principal tributary of the Sungari River, which is itself a tributary of the Amur River. The Nen River proper rises in the area where the Greater and Lesser Khingan ranges come together in northern Heilungkiang province and Inner Mongolia. It then flows southward, forming part of the border between these two areas as it crosses the northern section of the Manchurian Plain to join the Sungari just east of Ta-an in Kirin province. It receives the waters of a great many tributaries that run off the eastern slopes of the Greater Khingan and the western slopes of the Lesser Khingan ranges. Although annually frozen for some four months in winter and subject to serious flooding during the summer months, especially around its confluence with the Sungari, the Nen River is an important water route, navigable by small steamers as far as Tsitsihar (Ch'i-ch'i-ha-erh) and by small craft much farther to the north. The river was even more important in the early period of Chinese settlement in Heilungkiang in the 19th century, when rivers were virtually the only means of communication.

In the wide, flat Manchurian Plain, the gradient of the Nen River is very low and the river's course meanders. The plain is subject to flooding during the spring thaw and again during the summer. The plain itself is wet and in places waterlogged, having many salt bogs, swamps, and brackish lakes. The total length of the Nen River is 725 miles (1,170 km).

Nenadović, Matija, byname PROTA ("Archpriest") MATIJA (b. 1777, Brankovina, near Valjevo, Serbia—d. Nov. 29, 1854, Valjevo), Serbian priest and patriot, the first diplomatic agent of his country in modern times. He is often called Prota Matija, because, as a boy of 16, he was made a priest and, a few years later, became archpriest (prota) of Valjevo.

His father, Aleksa Nenadović, was a local magistrate and one of the most popular and respected public men among the Serbs at the beginning of the 19th century. When the Turkish Janissaries tried to intimidate the Serbs by murdering all their principal men, Aleksa was one of the first victims. This action, however, instead of preventing, actually provoked the Serbian revolt of February 1804. Nenadović became deputy commander of the insurgents of the Valjevo district (1804) but did not hold the post for long, because the Serbian revolutionary leader Karageorge sent him in 1805 on a secret mission to St. Petersburg and afterward employed him almost constantly as Serbia's diplomatic envoy to Russia, Austria, Bucharest, and Constantinople. After the fall of Karageorge (1813), the new leader of the Serbs, Miloš Obrenović, sent Nenadović as representative of Serbia to the Congress of Vienna (1814–15), where he pleaded the Serbian cause and forced his hitherto almost unknown people on the notice of Europe.

In his *Memoirs,* Nenadović gives a fascinating account of the course of the first insurrection and of early attempts to establish a native government in Serbia.

nene, also called HAWAIIAN GOOSE (*Branta sandvicensis*), endangered species of goose of the family Anatidae (order Anseriformes). The nene is a relative of the Canada goose that evolved in the Hawaiian Islands into a nonmigratory, nonaquatic species with shortened wings and half-webbed feet. The nene is about 65 cm (25 inches) long and has a gray-brown barred body, dark-streaked buffy neck, and black face. It feeds on berries and grasses on high lava slopes. Predation by introduced mammals—including dogs, cats, pigs, and mongooses—coupled with human hunting had, by 1911, reduced the nene population to a few small flocks. From that year shooting of the nene was forbidden, but nevertheless the species declined further, reaching about 30 in 1952. In captivity, the nene has been successfully bred, but flocks released into the wild have failed to propagate enough to form self-sustaining colonies. Hawaii now rigidly protects the nene, its official state bird.

Nenets, Russian (singular) NENETS, plural NENTSY, formerly SAMOYED, or YURAK, ethnolinguistic group inhabiting northwestern Russia, from the White Sea on the west to the base of the Taymyr Peninsula on the east and from the Sayan Mountains on the south to the Arctic Ocean on the north. At present the Nenets are the largest group speaking Samoyedic, a branch of the Uralic language family. They numbered about 34,000 in the late 20th century. Their name comes from the word *nenets,* meaning "man." Descended from people formerly inhabiting southwest Siberia, the Nenets are reindeer pastoralists, fishermen, and hunters (especially of wild reindeer) of the tundra, but they also include small groups of forest dwellers. Ethnographers generally refer to them as the Forest Nenets and the Tundra Nenets. The former group is much smaller (roughly five percent of the total Nenets population) and its language, considered seriously endangered because few if any children learn it, is spoken by only about 1,500 people. The language of the Tundra Nenets, the larger of the two groups, is spoken by more than 25,000 people, but children in some regions are not learning it. The Forest Nenets live near the Pur River and on tributaries of the Middle Ob. The Tundra Nenets inhabit three principal regions: an area west of the Ural Mountains, the Ob and Yamal peninsulas, and regions on the Taimyr Peninsula and the Yenisey River.

Nenets child, Yamal Peninsula, northwestern Siberia, Russia, 1996
© Liivo Niglas

Smaller groups of peoples related to the Nenets include the Enets (Entsy, or Yeniseys), the Nganasans (Tavgis), and the Selkups. In some areas Turkic languages and Russian have replaced Samoyedic dialects. Under Soviet administration, communal, collective production was introduced among the Nenets, with reindeer keeping remaining the main activity.

Reindeer breeding provides the Nenets with meat, lard, and blood for food; skins for making clothes, footwear, and winter tents; leather for making lassos, harnesses, and summer footwear; tendons for making thread; and horn for making various implements. A herd of 70 to 100 reindeer furnishes everything needed by a household.

Descent is traced through the paternal line; clans of people claiming common ancestry have their own territories, as well as common burial and sacrificial grounds and clan symbols and signs. Individuals marry outside their own clan. Women are in a subordinate position. There are several classes of shamans, with different abilities.

Nenets, autonomous *okrug* (district), Arkhangelsk *oblast* (province), northwestern Russia. The *okrug* extends along the northern coast of European Russia, from Mezen Bay to Baydarata Bay. The surface is a level plain, broken by the northern ends of the Timan Hills and the Urals. In the east the *okrug* is underlain by part of the Pechora coal basin. In the central part of the *okrug* is an oil and natural-gas province in which several oil and gas deposits have been discovered. The *okrug* is covered by tundra. The Nenets people live chiefly by reindeer herding. Many groups are settled in permanent villages. Russians live mainly in the administrative centre, Naryan-Mar, and the urban district of Amderma. Area 68,100 square miles (176,400 square km). Pop. (1996 est.) 48,000.

Nenni, Pietro Sandro (b. Feb. 9, 1891, Faenza, Italy—d. Jan. 1, 1980, Rome), journalist and politician who was leader of the Italian Socialist Party (PSI), twice foreign minister, and several times vice-premier of Italy.

The son of a peasant, Nenni first became a journalist. When Italy invaded Libya in September 1911, Nenni organized a strike against the campaign. He was jailed for his activities and met Benito Mussolini in prison. He joined the PSI in 1921. In 1922, when Mussolini came to power, Nenni, an ardent antifascist, attacked him in the newspaper *Avanti,* of which he was chief editor. In 1925 he was arrested for publishing a booklet on the Fascists' murder of Socialist leader Giacomo Matteotti, and in the following year, after the suppression of *Avanti,* he fled to Paris. During the Spanish Civil War, Nenni was cofounder and political commissar of the Garibaldi Brigade. In 1940 he was arrested in Vichy France by the German Gestapo, taken back to Italy in 1943, and interned on the island of Ponza by Mussolini. In August of the same year, he was released by order of Marshal Pietro Badoglio. Nenni was then elected secretary-general of the PSI and in 1945 became vice-premier in the government of Feruccio Parri. Elected to the Constituent Assembly in 1946, he became vice-premier again in Christian Democrat Alcide De Gasperi's coalition government. In 1946 Nenni was named foreign minister, but in January 1947 the PSI split and Nenni, heading the party's left wing, made an alliance with the Communists. For almost a decade the alliance opposed Christian Democrat governments.

Nenni broke with the Communists after the Soviet invasion of Hungary in 1956. In 1963 he finally brought the PSI back into a full-fledged coalition with the Christian Democrats under Aldo Moro. He served as foreign minister in 1968–69 and was vice-premier in three successive cabinets, but, when the centre-left alliance collapsed in 1969, Nenni resigned as head of the PSI. Nenni was made a senator for life in 1970 and in June 1979 was elected president of the Senate.

Nennius (fl. *c.* 800), Welsh antiquary who between 796 and about 830 compiled or revised the *Historia Brittonum,* a miscellaneous collection of historical and topographical information including a description of the inhabitants and invaders of Britain and providing the earliest-known reference to the British king Arthur. In the preface to the *Historia* he describes himself as a disciple of Elvodugus (d. 809), chief bishop in Gwynedd.

The *Historia Brittonum* has survived in about 35 manuscripts, dating from the early 10th to the 13th century. Besides the preface, it contains an account of the six ages of the world, a description of the inhabitants and invaders of Britain, a section on St. Patrick, a list of 12 victories ascribed to Arthur, some Anglian genealogies, and accounts of 28 cities and of various "marvels" in Britain. The fullest manuscript (British Museum Manuscript Harleian 3859) also contains two later interpolations.

The controversy as to whether Nennius himself composed the *Historia Brittonum* or merely adapted and edited an earlier version is still unresolved.

Nentsy (people): *see* Nenets.

neo-: *see* below and *see also* unhyphenated words with this prefix.

Neo-Confucianism, in China, a rationalistic revival of Confucian philosophy in the 11th century AD that exercised profound influence on Chinese thought for the next 800 years. *See* Confucianism.

Neo-Confucianism, in Japan, the official guiding philosophy of the Tokugawa period (1603–1867). This philosophy profoundly influenced the thought and behaviour of the educated class. The tradition, introduced into Japan from China by Zen Buddhists in the medieval period, provided a heavenly sanction for the existing social order. In the Neo-Confucian view, harmony was maintained by a reciprocal relationship of justice between a superior, who was urged to be benevolent, and a subordinate, who was urged to be obedient and to observe propriety.

Neo-Confucianism in the Tokugawa period contributed to the development of the bushido (code of warriors). The emphasis of Neo-Confucianism on the study of the Chinese Classics furthered a sense of history among the Japanese and led in turn to a renewed interest in the Japanese classics and a revival of Shintō studies (*see* Fukko Shintō). Most significantly, Neo-Confucianism encouraged scholars to concern themselves with the practical side of human affairs, with law, economics, and politics.

Three main traditions of Neo-Confucian studies developed in Japan. The Shushigaku, based on the Chinese school of the philosopher Chu Hsi, became the cornerstone of education, teaching as cardinal virtues filial piety, loyalty, obedience, and a sense of indebtedness to one's superiors. The Ōyōmeigaku centred upon the teachings of the Chinese philosopher Wang Yang-ming, who held self-knowledge to be the highest form of learning and placed great emphasis on intuitive perception of truth. The Kogaku school attempted to revive the original thought of the Chinese sages Confucius and Mencius, which it felt had been distorted by the other Japanese Neo-Confucian schools.

Neo-Destour (political party): *see* Democratic Constitutional Rally.

Neo-Expressionism, diverse art movement (chiefly of painters) that dominated the art market in Europe and the United States during the early and mid-1980s. Neo-Expressionism comprised a varied assemblage of young artists who had returned to portraying the human body and other recognizable objects, in reaction to the remote, introverted, highly intellectualized abstract art production of the 1970s. The movement was linked to and in part generated by new and aggressive methods of salesmanship, media promotion, and marketing on the part of dealers and galleries.

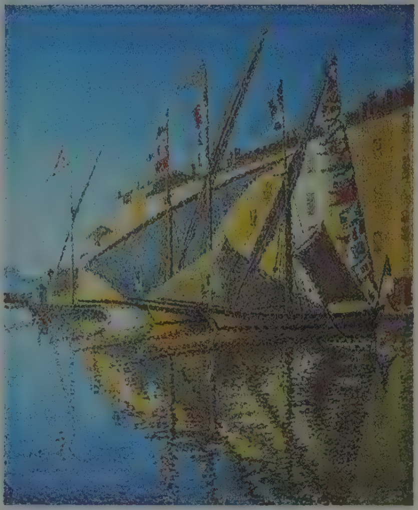
Neo-Expressionist paintings themselves, though diverse in appearance, presented certain common traits. Among these were: a rejection of traditional standards of composition and design; an ambivalent and often brittle emotional tone that reflected contemporary urban life and values; a general lack of concern for pictorial idealization; the use of vivid but jarringly banal colour harmonies; and a simultaneously tense and playful presentation of objects in a primitivist manner that communicates a sense of inner disturbance, tension, alienation, and ambiguity (hence the term Neo-Expressionist to describe this approach). Among the principal artists of the movement were the Americans Julian Schnabel and David Salle, the Italians Sandro Chia and Francesco Clemente, and the Germans Anselm Kiefer and Georg Baselitz. Neo-Expressionism was controversial both in the quality of its art products and in the highly commercialized aspects of its presentation to the art-buying public.

Neo-Hegelianism, the doctrines of an idealist school of philosophers that was prominent in Great Britain and in the United States between 1870 and 1920. The name is also sometimes applied to cover other philosophies of the period that were Hegelian in inspiration—for instance, those of Benedetto Croce and of Giovanni Gentile. Neo-Hegelianism in Great Britain developed originally as a natural sequel to the semipopular work of Samuel Taylor Coleridge and Thomas Carlyle. Its exponents sought to give philosophical expression to a widely felt antipathy to the prevailing materialism and utilitarianism and turned to the writings of G.W.F. Hegel and the German school as containing penetrating, if oracular, statements of an alternative view.

The British Neo-Hegelians—notably T.H. Green (1836–82), Edward Caird (1835–1908), and F.H. Bradley (1846–1924)—were opposed to materialism and to naturalism in metaphysics; to analyses of consciousness in terms of sensation and of the association of ideas in theory of knowledge; to psychologism and to formalism in logic; and to the "greatest happiness" principle as well as to the doctrine of duty for duty's sake in ethics. In politics they dissociated themselves from the prevailing individualism and tended to look on the state as a living community rather than a mutual-benefit society. Their attitude toward religion was ambiguous; for, though they were in general sympathetic to religious claims, they made no secret of the fact that they could not accept them at their face value. Much of the popular attraction of their philosophy, indeed, sprang from its seeming to provide a rational alternative to the religious beliefs that were increasingly difficult to reconcile with new scientific knowledge and the theory of evolution; and one reason for its decline may have been that, as religious difficulties ceased to be a central preoccupation, less need was felt of such a substitute for religion as this philosophy offered.

Neo-Hegelianism in the United States sprang from the work of the Boston Transcendentalists, whose knowledge of German philosophy was, however, mostly secondhand; it owed much of its advance to the efforts of William Torrey Harris (1835–1909) and to the *Journal of Speculative Philosophy,* which he founded in 1867. Its most distinguished and determined proponent was Josiah Royce (1855–1916), though Royce's idealism, with the special place that it assigned to the will, was closer to the ideas of Johann Gottlieb Fichte than to those of Hegel himself. Royce's distinguished contemporaries Charles Sanders Peirce and William James both repudiated his metaphysics; yet Peirce had described himself as an "idealist" in his early life, and even James had experienced the Hegelian influence to some extent. The same was true of James's successor John Dewey, who began life as a Hegelian and, despite his antipathy to absolutes, retained certain Hegelian features in his thought, notably a tendency to denounce abstractions and a reserved attitude toward the claims of formal logicians.

Neo-Impressionism, movement in French painting of the late 19th century that reacted against the empirical realism of Impressionism (*q.v.*) by relying on systematic calculation and scientific theory to achieve predetermined visual effects. Whereas the Impressionist painters spontaneously recorded nature in terms of the fugitive effects of colour and light, the Neo-Impressionists applied scientific optical principles of light and colour to create strictly formalized compositions. Neo-Impressionism was led by Georges Seurat, who was its original theorist and most significant artist, and by Paul Signac, also an important artist and the movement's major spokesman. Other Neo-Impressionist painters were Henri-Edmond Cross, Albert Dubois-Pillet, Maximilien Luce, Théo Van Rysselberghe, and, for a time, the Impressionist painter Camille Pissarro. The group founded a Société des Artistes Indépendants in 1884.



"Sailing-boats in the Harbour at St. Tropez," Neo-Impressionist painting by Paul Signac, oil on canvas, 1893; in the Von der Heydt-Museum der Stadt Wuppertal, Ger.

By courtesy of the Von der Heydt-Museum der Stadt Wuppertal, Ger.

The terms divisionism and pointillism originated in descriptions of Seurat's painting technique, in which paint was applied to the canvas in dots of contrasting pigment. A calculated arrangement of variously coloured dots, based on optical science, was intended to be perceived by the retina as a single hue. The entire canvas was covered with these dots, which defined form without the use of lines and bathed all objects in an intense, vibrating light. In each picture the dots were of a uniform size, calculated to harmonize with the overall size of the painting. In place of the hazy forms of Impressionism, those of Neo-Impressionism had solidity and clarity and were simplified to reveal the carefully composed relationships between them. Though the light quality was as brilliant as that of Impressionism, the general effect was of immobile, harmonious monumentality, a crystallization of the fleeting light of Impressionism.

Signac's later work showed an increasingly spontaneous use of the divisionist technique, which was more consistent with his poetic sensibility. Seurat, however, continued to adopt a theoretical approach to the study of various pictorial and technical problems, including a reduction of the expressive qualities of colour and form to scientific formulas. By the 1890s the influence of Neo-Impressionism was waning, but it was important in the early stylistic and technical development of several artists of the late 19th and early 20th centuries, including Vincent van Gogh, Paul Gauguin, Henri de Toulouse-Lautrec, and Henri Matisse.

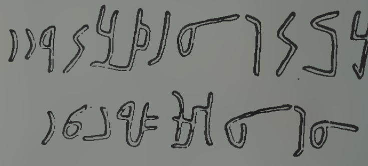
Neo-Melanesian language: *see* Melanesian Pidgin.

Neo-Paganism, any of several spiritual movements that attempt to revive the ancient polytheistic religions of Europe and the Middle East. These movements have a close relationship to ritual magic and modern witchcraft. Neo-Paganism differs from them, however, in striving to revive authentic pantheons and rituals of ancient cultures, though often in deliberately eclectic and reconstructionist ways, and by a particularly contemplative and celebrative attitude. Typically people with romantic feelings toward nature and deep ecological concerns, Neo-Pagans centre their dramatic and colourful rituals around the changes of the seasons and the personification of nature as full of divine life, as well as the holy days and motifs of the religions by which their own groups are inspired.

Modern Neo-Paganism has roots in 19th-century Romanticism and activities inspired by it, such as the British Order of Druids (which, however, claims an older lineage). Sometimes associated with extreme nationalism, Neo-Pagan groups and sentiments were known in Europe before World War II, but contemporary Neo-Paganism is for the most part a product of the 1960s. Influenced by the works of the psychiatrist Carl Jung and the writer Robert Graves, Neo-Paganists are more interested in nature and archetypal psychology than in nationalism.

Neo-Paganism in the postwar decades has flourished particularly in the United States and the United Kingdom and in Scandinavia. Some of the major Neo-Pagan groups are the Church of All Worlds, the largest of all the pagan movements, which centres on worship of the earth-mother goddess; Feraferia, based on ancient Greek religion and also centred on goddess worship; Pagan Way, a nature religion centred on goddess worship and the seasons; the Reformed Druids of North America; the Church of the Eternal Source, which has revived ancient Egyptian religion; and the Viking Brotherhood, which celebrates Norse rites. Beginning in the late 1970s, some feminists, open to feminine personifications of the deity, became interested in witchcraft and Neo-Paganism.

neo-Sinaitic alphabet, writing system used in many short rock inscriptions in the Sinai Peninsula, not to be confused with the Sinaitic inscriptions, which are of much earlier date and not directly related. Neo-Sinaitic evolved out of the Nabataean alphabet in the 1st century AD and was in use perhaps until the 4th century AD; inscriptions date primarily from the 2nd and 3rd centuries. The chief importance of the neo-Sinaitic alphabet is as the probable link between the Nabataean alphabet and the Arabic.



Neo-Sinaitic inscription

From *The Alphabet* by David Diringer. Copyright 1948 by David Diringer. With permission of Funk & Wagnalls Publishing Company, Inc. and Hutchinson Publishing Group Ltd.

neo-Thomism, modern revival of the philosophical and theological system known as Thomism (*q.v.*).

Neo-Volcánica, Cordillera, also called EJE VOLCÁNICO (Spanish: "Volcanic Axis"), volcanic mountain range traversing central Mexico from Cape Corrientes on the west coast, southeast to Jalapa and Veracruz on the east coast. The nation's cultural-historical centre, the Cordillera forms the southern boundary of Mexico's Mesa Central and contains such volcanic peaks as Citlaltépetl (Orizaba; 18,406 feet [5,610 m]), Popocatépetl (17,930 feet [5,465 m]), and Iztaccíhuatl (Ixtacihuatl; 17,159 feet [5,230 m]). The mountains enclose numerous basins and plateaus. The temperate climate and rich volcanic soil, protected by the surrounding peaks, became the locus of the Aztec civilization in the 13th century. The Aztecs built Tenochtitlán, their capital city, on the islands of Lake Texcoco. When Hernán Cortés destroyed the city in 1521, he established Mexico City on the same site. It rapidly became the economic, industrial, and political centre of Mexico, and by the late 20th century it had over 9,800,000 residents. The Cordillera Neo-Volcánica is mined extensively for silver and for lead, zinc, copper, and tin. The population of Mexico City has fostered the development of commercial agriculture in many of the valleys and basins.

Neoclassicism: *see* Classicism and Neoclassicism.

neodymium (Nd), chemical element, rare-earth metal of transition Group IIIb of the periodic table. Neodymium is silvery-white colour and tarnishes in air to form an oxide which chips, exposing the metal to further oxidation. The metal must be sealed in a plastic covering or kept in mineral oil for preservation. It reacts gradually with cold water and rapidly with hot water to liberate hydrogen. Carl Auer von Welsbach discovered neodymium (1885) by separating ammonium didymium nitrate prepared from didymia (a mixture of rare-earth oxides) into a neodymium fraction and a praseodymium fraction by repeated crystallization. Of the rare earths, only cerium and yttrium are more plentiful than neodymium. In the igneous rocks of the Earth's crust it is more than twice as abundant as lead and about half as plentiful as copper. Neodymium occurs in the minerals monazite and bastnaesite and is a product of nuclear fission. Ion-exchange techniques have supplanted fractional crystallization for separation and purification of neodymium. The metal itself is prepared by electrolysis of the fused halides or by thermoreduction of the fluoride with calcium or lithium.

The metal is used in the electronics industry, in the manufacture of steel, and as a component in a number of alloys, among them misch metal (15 percent neodymium), used for cigarette-lighter flints. Its compounds are used in the ceramics industry for glazes and to colour glass. The crude oxide is used to counteract the green colour of iron(II) compounds in glass; and the more pure compound is used in the production of the only known glass that is bright purple in colour. This neodymium glass can be used instead of ruby as a laser material. A mixture of neodymium and praseodymium absorbs light in the region of the harmful sodium-D (spectral) lines and therefore is used in the glass of welders' and glassblowers' goggles.

Natural neodymium is a mixture of seven different isotopes: neodymium-142 (27.1 percent), neodymium-144 (23.8 percent), neodymium-146 (17.2 percent), neodymium-143 (12.2 percent), neodymium-145 (8.3 percent), neodymium-148 (5.8 percent), and neodymium-150 (5.6 percent). All are stable except the weakly radioactive neodymium-144, the lightest natural nuclide that decays by alpha emission. Two allotropes (structural forms) exist; at room temperature the structure is hexagonal close-packed. The element forms trivalent compounds such as the oxide Nd_2O_3 and the hydroxide $Nd(OH)_3$; the Nd^{3+} ion is stable in water. A few divalent compounds have been prepared such as the diiodide NdI_2, and the dichloride $NdCl_2$; the Nd^{2+} ion is unstable in aqueous solution.

atomic number	60
atomic weight	144.240
melting point	1,021° C (1,870° F)
boiling point	3,068° C (5,554° F)
specific gravity	7.007 (25° C)
valence	3
electronic config.	2-8-18-22-8-2 or $(Xe)4f^4 5d^0 6s^2$

neoevolutionism, school of anthropological thought concerned with long-term, directional, "evolutionary" culture change and with the regular patterns of development that may be seen in unrelated, widely separated cultures. Neoevolutionist anthropology, a development of the mid-20th century, addresses the relation between the long-term "progressive" change (general evolution) characteristic of human culture in general, and the short-term, localized social and ecological adjustments that cause specific cultures to differ from one another as they adapt to their own unique environments (specific evolution). Further, neoevolutionists investigate the ways in which different cultures adapt to similar environments and examine the similarities and differences in the long-term cultural developments of comparable groups. Because most neoevolutionists are interested in the environmental and technological adjustments of the groups they study, many are identified with the cultural ecological approach to ethnography.

Neoevolutionary anthropological thought emerged in the 1940s, in the work of the American anthropologists Leslie A. White and Julian H. Steward and others. White, who was interested in general evolution, hypothesized that cultures became more advanced as they became more efficient at harnessing energy, both through technology and social organization. Steward, in classifying native cultures of North and South America, focused on the parallel developments of unrelated groups in similar environments; he discussed evolutionary change in terms of what he called "levels of sociocultural integration" and "multilinear evolution." In the years since White's and Steward's seminal work, neoevolutionary approaches were, variously, accepted, challenged, rejected, and revised. Nonetheless they continued to generate a lively controversy among archaeologists and anthropologists interested in long-term cultural and social change.

Neogaean realm: *see* Neotropical region.

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Neogene Period, latest of the two divisions of the Cenozoic Era (66.4 million years ago to the present). The Neogene includes the Miocene and Pliocene epochs (23,700,000 to 1,600,000 years ago) and is considered by some to encompass the time up to the present. The Neogene, which means "new born," was designated as such to emphasize that the marine and terrestrial fossils found in the strata of this time were more closely related to each other than to those of the preceding period called the Paleogene (*q.v.*). The term Neogene is widely used in Europe as a geologic division, but is generally not employed in North America, where the Cenozoic Era is simply divided into the Tertiary Period (66,400,000 to 1,600,000 years ago) and the Quaternary Period (1,600,000 years ago to the present).

Neoglaziovia, genus of the pineapple family (Bromeliaceae), containing two species of perennial South American herbs. Both are native to Brazil and have purple flowers.

The leaves of *N. variegata,* a reedlike plant, are up to 1.2 m (4 feet) long. They contain a fibre known as caroa, which is used to make rope, fabric, netting, and packing material.

Neogrammarian, German JUNGGRAMMATIKER, any of a group of German scholars that arose around 1875; their chief tenet concerning language change was that sound laws have no exceptions. This principle was very controversial because there seemed to be several irregularities in language change not accounted for by the sound laws, such as Grimm's law (*q.v.*), that had been discovered by that time. In 1875, however, the Danish linguist Karl Verner explained the apparent exceptions to Grimm's law; his formulation of the principle governing those exceptions is known as Verner's law (*q.v.*). Subsequently, many other important sound laws were discovered and formulated to account for other apparent exceptions, and, by the end of the 19th century, the hypothesis of the regularity of sound change had been generally accepted.

Neolithic Period, also called NEW STONE AGE, final stage of cultural evolution or technological development among prehistoric humans. It was characterized by stone tools shaped by polishing or grinding, dependence on domesticated plants or animals, settlement in permanent villages, and the appearance of such crafts as pottery and weaving. The Neolithic followed the Paleolithic Period, or age of chipped-stone tools, and preceded the Bronze Age, or early period of metal tools.

A brief treatment of the Neolithic Period follows. For full treatment, *see* MACROPAEDIA: Prehistoric Peoples and Cultures.

The Neolithic stage of development was attained during the Holocene Epoch (the last 10,000 years of Earth history). During this time, humans learned to raise crops and keep domestic livestock, and were thus no longer dependent on hunting, fishing, and gathering wild plants. Neolithic cultures made more useful stone tools by grinding and polishing relatively hard rocks, rather than merely chipping softer ones down to the desired shape. The cultivation of cereal grains enabled Neolithic peoples to build permanent dwellings and congregate in villages, and the release from nomadism and a hunting-gathering economy gave them the time to pursue specialized crafts.

Archaeological evidence indicates that the transition from food-collecting cultures to food-producing ones gradually occurred across Asia and Europe from a starting point in the Fertile Crescent. Cultivation and animal domestication first appeared in southwestern Asia by about 9000 BC, and a way of life based on farming and settled villages had been firmly achieved by 7000 BC in the Tigris and Euphrates river valleys (now in Iraq and Iran) and in what are now Syria, Israel, Lebanon, and Jordan. These earliest farmers raised barley and wheat and kept sheep and goats, later supplemented by cattle and pigs. Their innovations spread from the Middle East northward into Europe by two routes: across Turkey and Greece into central Europe, and across Egypt and North Africa and thence to Spain. Farming communities appeared in Greece as early as 7000 BC, and farming spread northward throughout the continent over the next four millennia. This long and gradual transition was not completed in Britain and Scandinavia until after 3000 BC and is known as the Mesolithic Period (*q.v.*).

Neolithic technologies also spread eastward to the Indus River valley of India by 5000 BC. Farming communities based on millet and rice appeared in the Huang Ho (Yellow River) valley of China and in Southeast Asia by about 3500 BC. Neolithic modes of life were achieved independently in the New World. Corn (maize), beans, and squash were gradually domesticated in Mexico and Central America from 6500 BC on, though sedentary village life did not commence there until much later, at about 2000 BC.

In the Old World the Neolithic Period was succeeded by the Bronze Age (*q.v.*) when human societies learned to combine copper and tin to make bronze, which replaced stone for use as tools and weapons.

neon (Ne), chemical element, inert gas of Group 0 (noble gases) of the periodic table, used in electric signs and fluorescent lamps.

Colourless, odourless, tasteless, and lighter than air, neon gas occurs in minute quantities in the Earth's atmosphere and trapped within the rocks of the Earth's crust. Though neon is about 3½ times as plentiful as helium in the atmosphere, dry air contains only 0.0018 percent neon by volume. This element is more abundant in the cosmos than on Earth. Neon liquefies at −246.048° C (−411° F) and freezes at a temperature only 2½° lower. When under low pressure, it emits a bright orange-red light if an electrical current is passed through it. This property is utilized in neon signs (which first became familiar in the 1920s), in some fluorescent and gaseous conduction lamps, and in high-voltage testers.

Neon was discovered (1898) by the British chemists Sir William Ramsay and Morris W. Travers as a component of the most volatile fraction of liquefied crude argon obtained from air. It was immediately recognized as a new element by its unique glow when electrically stimulated. The gas is produced industrially by the fractional distillation of liquid air; the most volatile fraction is composed of a mixture of helium, neon, and nitrogen. Nitrogen is removed by condensation under increased pressure and reduced temperature, followed by adsorption on highly cooled charcoal. Neon is separated from helium by selective adsorption on activated charcoal at low temperatures. Processing 88,000 pounds of liquid air will produce one pound of neon.

No stable chemical compounds of neon have been observed. Molecules of the element consist of single atoms. Natural neon is a mixture of three stable isotopes: neon-20 (90.92 percent); neon-21 (0.26 percent); and neon-22 (8.82 percent).

atomic number	10
atomic weight	20.183
melting point	−248.67° C (−415.5° F)
boiling point	−246.048° C (−411° F)
density (1 atm, 0° C)	0.89990 g/litre
valence	0
electronic configuration	2-8 or $1s^22s^22p^6$

Neoorthodoxy, influential 20th-century Protestant theological movement in Europe and America; it was known in Europe as crisis theology and dialectical theology. The name crisis theology referred to the crisis of Christendom that occurred after World War I. The phrase dialectical theology referred to the apparently contradictory statements made in the interests of "truth" by theologians in order to point out both the majesty of human life and the limits of human thought.

The theologians in the movement were called Neoorthodox because they spoke the traditional language of the Christian Church as found in the Bible, the creeds, and the main line of orthodox Protestant theology. They wrote of the Trinity, the Creator, the Fall of man and original sin, Jesus Christ the Lord and Saviour, justification, reconciliation, and the Kingdom of God. The Neoorthodox theologians were involved in active social Christianity. They found the language of classic Reformation Protestantism more adequate for coping with social realities than the language of the theological liberalism in which they had been trained.

None of these theologians liked the term Neoorthodoxy, given them by others, for they repudiated the literalism of orthodoxy. They were modernists in that they accepted modern critical methods of interpreting the Bible and thus knew that it contained much that is not literally true. The miracle of the Christian faith for them was Jesus Christ and his gospel proclaimed in the church for the salvation of the world. In Europe the outstanding theologian of the movement was Karl Barth, and in the United States it is generally held that the works of Reinhold Niebuhr constituted the most important Neoorthodox writing. Other important Neoorthodox theologians included Emil Brunner, Rudolf Bultmann, Nikolay Berdyayev, and Paul Tillich.

According to Neoorthodox theology God as the sovereign Other is the Person who places man under an inviolable responsibility, the source of which is neither in man nor in his world. God speaks his Word to man, and in this personal act he lays his claim upon man and obligates him to respond and thus to exist as a human being.

Jesus Christ is the Word become flesh for our salvation. God reveals himself in the freedom and love of Jesus and in his forgiveness. But forgiveness reveals man's sin. Therefore, man knows God and knows himself as a sinner; without such knowledge he knows neither God nor himself. The knowledge of sin leads to an acknowledgment of both man's misery and his grandeur and is the antidote both to despair and to pride and to the degradation of human culture that follows these twin evils.

Sin for Neoorthodoxy is the violation of persons as seen in contrast to the love of God in Jesus for sinners. It is man's rebellion against his limited life and powers that comes both before and after his repudiation of responsibility, which in turn is the sign of death both for the individual and for the community. From sin come dehumanization and the consequent evils of egotism, stupidity, and guilt, as well as the loneliness, the loss of meaning, anxiety, enmity, and cruelty that plague human life. The Neoorthodox defend such a view of sin as biblical and in line with a realistic knowledge of the condition of man.

Neoorthodox criticism of modern culture led to an examination of political and economic institutions with a new awareness of their significance for responsible human existence. These theologians argued, from their various individual perspectives, that religion, ethics, economics, and politics are aspects of a larger whole that is the culture of a society and that these aspects cannot be understood and dealt with separately. Therefore, the theologians concerned themselves with social institutions and problems and attempted to understand the controversial issues of the day, such as Communism, race relations, and nuclear weapons, from a Christian viewpoint.

Neoplatonism, the last school of Greek philosophy, given its definitive shape in the 3rd century AD by the one great philosophical and religious genius of the school, Plotinus. The ancient philosophers who are generally classified as Neoplatonists called themselves simple "Platonists," as did the philosophers of the Renaissance and the 17th century whose ideas derive from ancient Neoplatonism. *See* Platonism.

neoprene, any of a class of elastomers, or rubberlike synthetic organic compounds of high molecular weight (polymers), made by chemical combination of the simpler compound 2-chloro-1,3-butadiene (chloroprene); it is used in numerous products, such as shoe soles, hoses, and adhesives, that require better resistance than natural rubber to oil, solvents, heat, and weathering.

The neoprenes, discovered in 1931, were the first synthetic rubbers developed in the United States. They are ordinarily vulcanized by using magnesium oxide or zinc oxide, although sulfur is sometimes employed. The products are too expensive for use in making tires, but their resistance to chemicals and to oxidation makes them valuable in specialized applications. *See also* rubber, synthetic.

neoprioniodiform, conodont, or small toothlike phosphatic fossil of uncertain affinity, that is characterized by a main terminal cusp, varying numbers of subsidiary cusps or denticles that may be completely fused, and an underside region that is deeply grooved. Several genera are included in the neoprioniodiforms, including excellent guide fossils for the Ordovician Period.

Neoptolemus, in Greek legend, the son of Achilles, the hero of the Greek army at Troy, and of Deïdamia, daughter of King Lycomedes of Scyros; he was sometimes called Pyrrhus, meaning Fair. In the last year of the Trojan War the Greek hero Odysseus brought him to Troy after the Trojan seer Helenus had declared that the city could not be captured without the aid of a descendant of Aeacus, who had helped to build its walls; Neoptolemus was Aeacus' great-grandson. He fought bravely and took part in the capture of Troy but committed the sacrilege of slaying the aged king Priam at an altar. By Andromache, Priam's daughter-in-law, he was the father of Molossus, ancestor of the Molossian kings. He later married Hermione but shortly thereafter was murdered at Delphi.

Neorealism Italian NEOREALISMO, Italian literary and cinematic movement, flourishing especially after World War II, seeking to deal realistically with the events leading up to the war and with the social problems that were engendered during the period and afterwards.

Literature. The movement was rooted in the 1920s and, though suppressed for nearly two decades by Fascist control, emerged in great strength after the Fascist regime fell at the end of World War II. *Neorealismo* is similar in general aims to the earlier Italian movement *verismo* (Realism), from which it originated, but differs in that its upsurge was brought about by the intense feelings, experiences, and convictions that Fascist repression, the Resistance, and the war had instilled in its many gifted writers. Added impetus was given the movement by the translation of many socially conscious U.S. and English writers during the 1930s and 1940s.

Among the outstanding Neorealist writers are Nobel Prize-winning poet Salvatore Quasimodo and the fiction writers Alberto Moravia, Ignazio Silone, Carlo Levi, Vasco Pratolini, Carlo Bernari, Cesare Pavese, Elio Vittorini, Carlo Cassola, Italo Calvino, Curzio Malaparte (in postwar writings), and Carlo Emilio Gadda.

The emergence of Neorealism during the Fascist years was sporadic. Moravia wrote perhaps the first representative work in *Gli indifferenti* (1929; first Eng. trans., 1932, best trans., *The Time of Indifference,* 1953). Ignazio Silone was internationally known for anti-Fascist works written from Swiss exile, beginning with *Fontamara* (1930; Eng. trans., 1934); and Elio Vittorini wrote veiled criticism of the Fascist regime in a brilliant, Hemingway-like novel, *Conversazione in Sicilia* (1941; *Conversation in Sicily,* 1948). Many Neorealist writers were driven into hiding (Moravia), put in prison (Pavese, Vittorini), or sent into exile (Silone, Levi); many others joined the Resistance (Vittorini, Calvino, Cassola); some took refuge in introspective movements such as Hermeticism (Quasimodo) or in translating the works of others (Pavese, Vittorini).

After the war the movement exploded in full strength. Vasco Pratolini left his autobiographical work behind and published such vivid and moving accounts of the Florentine poor as *Il quartiere* (1944; *The Naked Streets,* 1952) and one of the finest novels of the Neorealist movement, *Cronache di poveri amanti* (1947; *A Tale of Poor Lovers,* 1949). Curzio Malaparte, who had repudiated his earlier Fascist loyalties, produced two powerful novels about the war, *Kaputt* (1944; Eng. trans., 1946) and *La pelle* (1949; *The Skin,* 1952). Elio Vittorini wrote openly about his Resistance experiences in *Uomini e no* (1945; "Men and Non-men").

And Carlo Levi earned international fame with his compassionate study of the plight of peasants in southern Italy (where he had been exiled), *Cristo si è fermato a Eboli* (1945; *Christ Stopped at Eboli*).

Other writers also felt the compulsion to communicate life as it then was or as it had been. Salvatore Quasimodo emerged from Hermeticism and began to publish poetry about the war and social problems, beginning with *Giorno dopo giorno* (1947; "Day After Day"). Moravia resumed his writing and published many outstanding Neorealistic novels. Cesare Pavese contributed two accounts of his life in a fascist prison and many introspective novels about contemporary despair. Italo Calvino and Carlo Cassola left stirring accounts of the Resistance experience, Calvino in *Il sentiero dei nidi di ragno* (1947; *The Path to the Nest of Spiders*) and Cassola in *Il taglio del bosco* (1959; "Timber Cutting") and *La ragazza di Bube* (1960; *Bubo's Girl*).

Motion pictures. The Neorealistic movement in film paralleled the Italian literary movement. The films' style was a documentary-like objectivity; actors either were or looked like ordinary people involved in commonplace situations. Although Neorealist productions were often crudely and hastily made, their radical departure from the escapist idealization of traditional moviemaking and their boldness in handling contemporary themes had an international impact.

The first of such pictures to appear was Roberto Rossellini's *Open City* (1945), an antifascist film showing the brutal decisions imposed on the Italians by the Nazi occupation. Rossellini's *Paisan* (1946), six vignettes of the war in Italy, had a similar harrowing quality. Other important Neorealist films were Vittorio De Sica's *Shoeshine* (1946) and *The Bicycle Thief* (1948), dealing with the everyday life of working-class Italians, and Luchino Visconti's *La terra trema* (1948; *The Earth Trembles*), a story of impoverished Sicilian fishermen, which used no professional actors. After 1950 the trend of Italian films turned from realism toward fantasy, symbolism, and literary themes.

Neoregelia, genus of about 40 species of epiphytes (plants that are supported by other plants and have aerial roots exposed to the humid atmosphere) of the pineapple family (Bromeliaceae) native to tropical South America. Several species, including *N. carolinae,* are grown as indoor ornamentals for their colourful flowers and leaves.

Blushing bromeliad (*Neoregelia carolinae*)
G.E. Hyde—EB Inc.

Neoregelia leaves are often mottled, marbled, or banded. They form a rosette with small white, blue, or purple flowers deep in the centre of the cup. The leaves of some species bear spines or scales, and the central leaves often become coloured during flowering periods.

Neosho, city, seat (1839) of Newton county, southwest Missouri, U.S. It lies in the Ozark Mountains, 20 miles (32 km) southeast of Joplin. Founded in 1839, its name, of Osage Indian derivation, meaning "clear and abundant water," probably refers to the nine flowing springs (the largest of which is at Big Spring State Park) within the city limits. During the American Civil War, Neosho was the scene of many skirmishes; actual battles were fought at Newtonia, 12 miles (19 km) east (April 30, 1861, and Oct. 28, 1864). A marker in the Neosho courthouse yard commemorates the meeting of the Civil War Secession Legislature (October 1861).

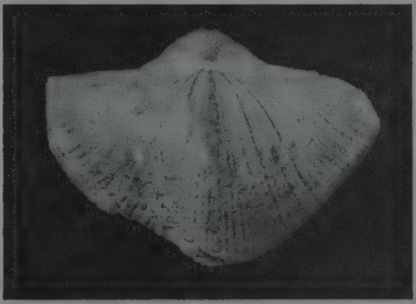
The city's economy depends on agriculture (poultry, dairying), light manufactures (including clothing, wire products, and furniture), and rocket-engine testing facilities. There are lead and zinc mines in the vicinity. One of the oldest U.S. fish and wildlife service hatcheries (1887) is at Neosho. Crowder College (1964), on the site of Fort Crowder, is nearby. The painter Thomas Hart Benton was a native son. Inc. 1855. Pop. (1990) 9,254.

Neosho River, river rising north of Council Grove in Morris county, Kan., U.S., and flowing generally southeast into Oklahoma, where it is also known as the Grand, to join the Arkansas River, near Fort Gibson, after a course of about 460 miles (740 km).

It has a drainage area of 12,660 square miles (32,789 square km), and flow at its mouth varies from 133,000 cubic feet (3,800 cubic m) per second to as little as 35 cubic feet (1 cubic m). In Kansas, irrigation and flood-control installations along the river include dams and reservoirs at Council Grove and below Neosho Rapids (John Redmond Dam). In Oklahoma, Grand Lake (Lake of the Cherokees) is impounded by Pensacola Dam on the east edge of the Cherokee Plain, Fort Gibson Dam and Reservoir is near the confluence of the Neosho and Arkansas rivers, and Markham Ferry Dam is southeast of Pryor.

Neosho is an Osage Indian word meaning "clear and abundant water." The crossing of the river at Council Grove was a starting point for the Santa Fe Trail.

Neospirifer, genus of extinct brachiopods (lamp shells) found as fossils in Late Carboniferous to Permian marine rocks (the period of time from the Late Carboniferous to the end of the Permian was about 245 to 320 million years ago); many species are known. The shell or valves of *Neospirifer* are robustly developed and frequently well preserved as fossils. A prominent furrow, or sulcus, and a distinctive ridge, or fold, are generally developed in the shell, aiding rapid identification. *Neospirifer* is a useful index fossil for stratigraphic correlations.



Neospirifer
By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

neotenin: *see* juvenile hormone.

neōteros (Greek: "newer one"), plural NEŌTEROI, any of a group of poets who sought to break away from the didactic-patriotic tradition of Latin poetry by consciously emulating the forms and content of Alexandrian Greek models. The *neōteroi* deplored the excesses of alliteration and onomatopoeia and the ponderous metres that characterized the epics and didactic works of the Latin Ennian tradition. They wrote meticulously refined, elegant, and sophisticated epyllia (brief epics), lyrics, epigrams, and elegies. They cultivated a literature of self-expression and a light poetry of entertainment and introduced into Latin literature the aesthetic attitude later known as "art for art's sake."

First arising in the 2nd century BC, the school was essentially non-Roman; it centred on the Milanese poet-teacher Publius Valerius Cato, and most of its adherents came from remote regions of northern Italy. Among them is Catullus, who, during the Ciceronian period (70 to 43 BC) of the Golden Age, wrote finely wrought love lyrics and epyllia in Latin and Greek.

In the Augustan Age (43 BC to AD 18), the influence of the *neōteroi* can be discerned particularly in the pastoral idylls of Virgil and the elegies of Sextus Propertius and Tibullus and in a general refinement of works of the didactic-patriotic tradition. Two centuries later a group called the novel poets modeled themselves after the *neōteroi,* writing in Greek and following Greek models.

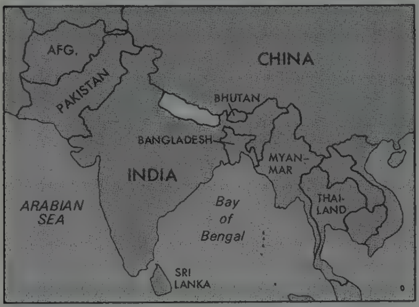
Neotropical region, also called NEOGAEAN REALM, or SOUTH AMERICAN REGION, one of the six major biogeographic areas of the world defined on the basis of its characteristic animal life. It extends south from the Mexican desert into South America as far as the subantarctic zone. It includes such animals as the llama, tapir, deer, pig, jaguar, puma, a variety of opossums, many rodents and fishes, and extremely rich insect and bird populations. The vegetational division roughly corresponding to the region is called the Neotropical kingdom. Among the conspicuous plants are ornamental grasses, ancestors of garden flowers, agaves, the rubber tree, and a variety of timber trees.

Nepal, officially KINGDOM OF NEPAL, Nepali NEPĀL ADHIRĀJYA, landlocked country of southern Asia, bordered on the north by Chinese Tibet and the Himalayas and bounded by India to the east, south, and west. It covers an area of 56,827 square miles (147,181 square km). The capital is Kāthmāndu. Nepal extends for about 500 miles (800 km) from southeast to northwest and for about 90 to 150 miles (140 to 240 km) from north to south. It contains some of the most rugged and difficult mountainous terrain in the world. As a result of its years of geographic and self-imposed isolation, Nepal is one of the least-developed nations of the world. The population of Nepal in 1990 was estimated to be 18,910,000.

A brief treatment of Nepal follows. For full treatment, *see* MACROPAEDIA: Nepal.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Nepal has four physiographic belts in succession from south to north: the Tarai plain along the Indian border, the forested Churia foothills and the Inner Tarai zone to the north, the mid-mountain region, and the Great Himalaya Range. The Tarai plain is low (600 to 1,200 feet [180 to 360 m] in elevation), flat, and fertile, being a northern extension of the Gangetic Plain some 16 to 20 miles (26 to 32 km) wide. In the south it is agricultural, and where it joins the foothills it is marshy and forested. The sparsely populated Churia Hills and the Inner Tarai region rise to the rugged Mahābhārat Mountain Range, which has elevations of 2,000–3,000 feet (600–9,100 m); the intermontane basins are forested. The mid-mountain region, between the Mahābhārat Range and the Great Himalayas, has a complex system of ranges between 8,000 and 14,000 feet (2,400 and 4,300 m) that enclose the Kāthmāndu and the Pokhara valleys, two flat basins drained by the Bāghmati and Seti rivers, respectively. The densely settled Kāthmāndu valley is the political and cultural hub of the nation. The Great Himalayan Range, from 14,000 to more than 29,000 feet (4,300 to 8,800 m) in elevation, contains several of the world's highest peaks—Everest, Kānchenjunga I, Makālu I, Cho Oyo, Dhaulāgiri I, Manāslu I, and Annapūrna I—all above 26,400 feet (8,040 m); Mount Everest (29,028 feet) is the world's highest. The Kosi, Nārāyāni (Gandak), and Karnāli rivers run southward through transverse valleys of the Himalayan chain. They are Nepal's major rivers and have large reserves of hydroelectric power.



Nepal

The climate of Nepal ranges from subtropical monsoon conditions in the Tarai region to alpine conditions in the Great Himalayas. Annual precipitation is between 70 and 75 inches (1,800 and 1,900 mm) in the eastern Tarai and between 30 and 35 inches (760 and 890 mm) in western Nepal. Flooding is a serious problem in the low-lying areas of the Tarai plain during the monsoon season (July–mid-October). Average winter (November-March) temperatures vary from 66° F (19° C) in the southern Tarai region to 55° F (13° C) in the intermontane basins, and summer (April-June) from 82° F (28° C) to 70° F (21° C) in the same regions.

One of Nepal's principal natural resources is its forests, which cover about one-sixth of the country and provide valuable timber, firewood, and medicinal herbs. At the lowest elevations are tropical, humid, deciduous forests that harbour tigers, leopards, deer, monkeys, and a few Indian rhinoceroses. Above 4,000 feet (1,200 m), the forests are evergreen and deciduous (oak, maple, magnolia), with occasional leopards and bears on the central Himalayan slopes. Between 10,000 and 12,000 feet (3,050 and 3,650 m) are coniferous forests with hare, deer, antelope, and small carnivores; above that are subalpine and alpine meadows of rhododendron and juniper, harbouring musk deer and wild sheep.

The people. The early settlement of Nepal was accomplished by large-scale emigrations of Mongoloid groups from Tibet and of Indo-Aryan peoples from northern India. Nepalese of Indo-Aryan ancestry constitute the great majority of the total population. Tibeto-Nepalese peoples form a significant minority of the country's population. Nepali, a derivative of Sanskrit, is the official language; Newari, a language of the Tibeto-Burman family, and numerous other main languages are also spoken. Some nine-tenths of the population is Hindu, and a small minority is Buddhist.

Although its birth and death rates are both relatively high, Nepal's population is growing at a fairly rapid rate. More than two-fifths of the population is younger than 15 years of age. Nearly all the population is located in rural areas. The urban population is mostly concentrated in Kāthmāndu. The government is trying to reduce the high population density in the Tarai region with improved transportation and communication networks, area-development projects, and the installation of small industries in rural areas to encourage the growth of smaller urban centres.

The economy. Nepal has a market economy largely based on agriculture; economic development has been heavily subsidized by China, India, Germany, the United States, Canada, Switzerland, and multinational agencies. The gross national product (GNP) per capita is one of the lowest in the world.

Agriculture accounts for about one-half of the GNP and employs more than nine-tenths of the work force. Less than one-fifth of the total land area is arable, and agricultural productivity is very low. A hydroelectric station southeast of Kāthmāndu has increased the land under irrigation to about 5 percent. Nepal is agriculturally self-sufficient, but regions of the country suffer major dislocations in food supply and demand.

Rice is the leading staple. Corn (maize), wheat, potatoes, sugarcane, and millet are also widely grown. Nepal is a major producer of medicinal herbs, which grow on the slopes of the Himalayas. Cattle, buffalo, goats, and sheep are raised.

Forestry is an important industry. Hardwood predominates in roundwood removal and is mostly used for fuel; wood supplies most of the energy consumed in Nepal. The wide use of wood for fuel has resulted in widespread deforestation and severe erosion.

The growing industrial sector accounts for much less than one-tenth of the GNP and employs less than 1 percent of the work force. The government has promoted the use of domestic raw materials in manufacturing, and leading manufactures include cotton garments, bricks, tiles, paper, construction materials, and processed foods. Traditional products such as baskets, edible oils, and cotton cloth are produced by cottage industries.

Tourism is becoming an increasingly important source of foreign exchange. The Kāthmāndu valley, however, is the only area equipped with the necessary amenities for foreign tourists.

Electricity is largely generated by hydroelectric-power stations. Per capita consumption of electricity lags behind that of most other Asian countries, and supplies of electricity are severely limited even in the cities.

Expenditures (including those for development) by the central government greatly exceed recurrent revenues, which are largely derived from tariffs and excises and from taxes on businesses and individuals. The difference between recurrent revenues and expenditures is made up by external aid. Foreign aid finances large portions of the government's five-year development plans.

India dominates Nepal's foreign trade and has granted only limited transit rights. Nepal's major exports include cotton garments, cereals, jute, timber, oilseeds, ghee (a clarified butter), potatoes, medicinal herbs, and hides. Capital and consumer goods, mineral fuels, and chemicals dominate imports.

Government and social conditions. Nepal is a democratic constitutional monarchy. The constitution (1990) provides for a bicameral government consisting of a House of Representatives (lower house) with 205 elected members and a 60-member National Council (upper house), a third of whose members retire every two years. Except for those acts that fall exclusively within the king's right, the king must act only with the advice and consent of the Council of Ministers. The constitution can only be amended by a two-thirds majority in the lower house.

The standard of living in Nepal is low, and infant mortality is extremely high; the average life expectancy is only 54 years. The social-welfare system consists of village development programs that attempt to provide basic necessities. Health facilities are inadequate and inaccessible to most of the rural population. Overcrowding and poor sanitation, as well as shortages of medical personnel, are common. Gastrointestinal diseases are endemic, and hepatitis, cholera, tuberculosis, and typhoid are widespread. Disorders related to nutritional deficiencies—such as goitre, mental retardation, deafmuteness, and beri-beri—are widespread and are a clear index of the country's relatively low per capita food supply. Most housing is made from materials such as mud, wattle, bamboo and other woods, and stone, with thatch or slate roofs.

About one-third of the men and one-tenth of the women are literate. Extensive construction of government schools, however, has made education more widely available, and literacy is gradually increasing. Five-year primary education (free since 1975) and secondary education are provided in government and private schools. The only university is Tribhuvan University (chartered in 1959) in Kāthmāndu.

Newspapers and periodicals are published in Nepali and English, and radio is the most important form of mass communication because of the extent of illiteracy. Television broadcasting began in Kāthmāndu in 1986.

Cultural life. The cultural heritage of Nepal, particularly contributions made by the Newar people of the Kāthmāndu valley to sculpture, painting, and architecture, is a source of great pride. Hindu religious themes are reflected in sculpture, architecture, and drama. Music and dance are favourite pastimes. Drums and wind instruments required in religious ceremonies have been preserved from ancient times. Devotional songs with folk and classical elements are an important feature of most religious and family occasions.

History. Buddhist and Brahmanic Hindu versions of Newar legends dominate the early history of Nepal. The ancient Indian classics contain references to the Nepal valley and lower hill areas. During the 3rd century BC, the emperor of India, Aśoka, supposedly visited Nepal.

During the Licchavi dynasty in the 4th or 5th century AD, commerce through the Himalayan passes transformed the isolated Nepal Valley into an intellectual and cultural centre. In the mid-7th century contact with China was initiated as the two countries exchanged missions. The Malla dynasty ruled Nepal between the 10th and 18th century. Yaksa Malla (reigned *c.* 1429–82) divided the kingdom into three independent principalities, which by the 16th century were ruled by independent dynasties.

In 1769 the Gurkhas, led by Prithvi Narayan Shah, conquered the Nepal Valley. He moved the capital to Kāthmāndu, providing the foundation for modern Nepal.

From 1775 to 1951 Nepali politics were characterized by conflict between the royal family and several noble families. Often the Shah rulers were relegated to honorary positions, while the political power was concentrated within a dominant noble family.

The British conquest of India forced the Nepali rulers to seek an accommodation with the British to preserve their independence. In 1860 an agreement was reached that permitted the recruitment of Nepalis for service in the British Indian Army.

In 1950 Nepalis living in India formed an alliance with members of the royal family to oust the Rana regime, the dominant noble family since 1846. With support from the Indian government at New Delhi, royal Nepali sovereignty was restored, and revolutionary forces gained a position in the administration.

A constitution was approved in 1959, and parliamentary elections were held. Controversy arose between crown and Cabinet in 1960, and King Mahendra dismissed the congress and imprisoned many members. In 1962 a new constitution was promulgated giving the crown much greater authority. Though the country was then nominally a constitutional monarchy, the king for many years exercised autocratic control over the country's multitiered system of panchayats, or councils, which extended from the village to the national level. The king was able to dominate the Council of Ministers and much of the National Assembly without opposition because political parties were banned under the constitution. In 1972 King Mahendra died and was succeeded by his son Birendra. Birendra continued the nonparty political system established by his father. In 1990 a series of demonstrations and protests over the king's autocratic rule forced him to lift the ban on political parties and to accept a new cabinet composed largely of opposition political figures. That year a new constitution was also approved that provided for a multiparty democracy and a bicameral parliament. In 2001 most members of the royal family were killed by the crown prince (who also died after the shooting), ushering in a period of political turmoil.

Nepālganj, also spelled NEPALGUNJ, town, southwestern Nepal. It is situated in the Tarai, a low, fertile plain northeast of Nānpāra, India. Nepālganj is a trading centre for rice, wheat, corn (maize), oilseeds, and hides produced in the surrounding area. The largest town in western Nepal, it is 4 miles (6 km) from a railway terminus across the border in India. It also has road connections to villages to the west and to a nearby airfield and is the terminus of a trail leading north to Tibet. Nepālganj has a hospital. Pop. (2000 est.) 63,653.

Nepali language, Eastern Pahari dialect spoken in Nepal. *See* Pahari languages.

Nepali literature, the body of writings in the Nepali language of Nepal. Before the Gurkha (Gorkha) conquest of Nepal in 1768, Nepalese writings were in Sanskrit and Newari as well as Nepali (the latter being the language of the Gurkha conquerors). These writings consisted of religious texts, chronicles, gift-deeds, and so on. The extant material in Nepali, with the possible exception of the memoirs (*c.* 1770) of the Gurkha king Prithvi Narayan Shah, has more historical than literary interest. Literary writing in the Nepali language began only in the 19th century.

About 1830 there arose a school of Nepali poets who wrote on themes from the Hindu epics *Rāmāyaṇa* and *Bhāgavata-Purāṇa* in a language that is more Sanskrit than Nepali and that was heavily influenced by classical Sanskrit themes and poetic metres. They were followed in mid-century by Bhānubhakta, whose Nepali version of the *Rāmāyaṇa* achieved great popularity for the colloquial flavour of its language, its religious sincerity, and its realistic natural descriptions. The poet Lekhnāth Pauḍyāl in the early 20th century also tended to the colloquial and used the rhythms of popular songs in some of his poems.

The advent of modern literature in Nepal really began in the 1920s and '30s with the work of Bālkrishṇa Sama, who wrote lyric poetry, plays based on Sanskrit and English models, and some short stories. Sama and his great contemporary, the poet Lakṣmīprasād Devkoṭā), discarded the earlier Sanskrit-dominated literary tradition and adopted some literary forms of the West, notably prose poetry, tragic drama, and the short story. In their poetry these writers dealt with such themes as love and patriotism as well as the problems of injustice, tyranny, and poverty faced by Nepal in the 20th century. Modern Nepali drama, of which Sama was the chief practitioner, was influenced in its depiction of contemporary social problems by Western playwrights, notably Henrik Ibsen. In the hands of such writers as Viṣveṣvaraprasād Koirālā and Bhavānī Bhiksu, the Nepali short story also centred on modern-day Nepal's social problems and the need for reform.

Nepenthales, an order of carnivorous plants, belonging to the class Magnoliopsida, also called dicotyledon (characterized by two seed leaves). The order consists of three families: the Droseraceae, containing the sundews and the Venus's-flytrap; the Nepenthaceae, consisting of the Old World pitcher plants; and the Sarraceniaceae, containing the New World pitcher plants. All of the order's approximately 195 species have adapted to poor soil conditions. They have leaves that are ingeniously adapted as pitfalls and traps to capture insects, digest them, and absorb the nutrients. Exotic plant collections often include species of this order, but otherwise Nepenthales' members are of no economic value.

The features that link the three families (in addition to the carnivorous habit) include simple and alternately arranged leaves, low numbers of perianth parts (sepals and petals) arranged in whorls, superior ovary (situated above the perianth), and seeds shed from a dry capsule.

The family Droseraceae contains species with leaves modified as real traps—*i.e.,* active mechanisms that clamp shut or coil about victims lured by nectar secretions and delicate odours. The family's members are mainly herbs found in bogs, damp heaths, and wet savannas and are distributed mainly in the Southern Hemisphere. They are divided into 4 genera and 103 species. The principal genus is *Drosera* (the sundews), with about 100 species. The Droseraceae are characterized by the presence of petals, separate stamens, bisexual flowers (stamens and pistil in the same flower), and a one-chambered ovary.

Drosera species are most numerous in Australia and adjacent areas and in southern Africa. Only a few species grow in eastern North America and Eurasia. *Drosera* species vary from several centimetres to 1 m (3 feet) or more in height. The smallest species often are hidden among the mosses in a sphagnum bog. The sundews of the Northern Hemisphere usually produce 1 to 20 erect flowers on a single flower stalk that rises from a rosette of basal leaves to a height of 15–20 cm (6–8 inches). Each slender leaf is covered with several hundred tiny bristlelike tentacles, each of which is topped with a reddish knob (in reality a gland) that exudes a clear, sticky, mucilaginous liquid. This sea of glistening, honey-fragrant drops lures midges, gnats, mosquitoes, and other tiny insects, who alight on the leaves. The mucilage on the tentacles smears and smothers the insect, whose struggles stimulate further secretions of the sticky liquid. Within minutes adjacent tentacles bend slowly over onto the insect, who becomes hopelessly engulfed by a web of sticky stalks. After a few days to a week, digestion is completed and the leaf straightens out, resetting the trap, and the remains of the previous victim fall off or are washed or blown away.

Each of the three remaining genera—*Dionaea, Aldrovanda,* and *Drosophyllum*—of the Droseraceae is noted for having only one species, for limited distribution, and for its habitat preference. Venus's-flytrap (*Dionaea muscipula*), for example, is restricted to the coastal plain of the two Carolinas in the United States, where it grows along edges of ponds and wet depressions.

The Nepenthaceae family has a relatively limited geographic range, woody climbers, absence of petals, unisexual flowers and plants, stamens united into a column, flower clusters capable of growing terminally, a four-chambered ovary, and the formation of unique pitchers.

The single genus *Nepenthes* lends its name to the family and to the order. It encompasses 80 species native to rain forests of northern Australia, the Philippine Islands, Malaysia, and the Seychelles, with its centre of concentration on the island of Borneo. They capture insects by means of pitcher-shaped leaves that function as pitfalls. The prey is attracted to the large showy leaves by nectar, and it slips from a treacherous lip into the pitcherlike hollow leaf, which is a cistern of digestive liquid from which there is no escape.

The members of *Nepenthes* are woody vines of the Old World that climb over vegetation by means of modified leaves, which may attain a length of 1 to 3 m. The leaves possess a broadened linear base that elongates into a strong, slender tendril. This twining tendril becomes transformed at its tip into a pitcher that is held upright. The pitcher consists of a bulging tube with a slippery rim surrounding the top opening. An unhinged lid arches over the orifice. The underside of the lid and the rim of the pitcher are beset with nectar glands, and red markings on the outside of the pitcher are additionally attractive to potential prey. Insects that successfully negotiate the corrugated lip of the pitcher lose their footing on the crumbly, waxy surface lining the upper half of the pitcher's interior. They drop into the lower part of the pitcher, which is crowded with more than 6,000 digestive glands per square centimetre.

The Sarraceniaceae (*q.v.*) family has 3 genera containing 15 species of low perennial herbs found in bogs and wet savannas of the Americas. The largest genus is *Sarracenia,* with eight or nine species found in the Atlantic coastal regions of North America. The plants consist of a basal cluster of leaves arising from a short, creeping rhizome. The hollow tubular leaves are shaped like urns, trumpets, or small pitchers. They are carefully constructed pitfalls that entrap insects lured to the mouth of the leaf by nectar-secreting glands and glistening surfaces. Downward-pointing hairs in the throat of the pitcher prevent the insect's escape, and the exhausted prey falls into the digestive liquor at the pitcher's bottom, where it is digested.

Members of the Sarraceniaceae typically have five sepals, petals either five in number or absent, many separate stamens, bisexual flowers, and a three- or five-chambered ovary.

The major means of reproduction among the Nepenthales is sexual. Small plants of this order produce solitary flowers, but, in the majority of species, inflorescences are up to 30 cm long and sometimes branched. The basic number of flower parts is five in the Droseraceae and Sarraceniaceae and four in the Nepenthaceae. Stamens may number up to 24. Carpels number three, four, or five to constitute a single pistil that is differentiated into an ovary, separate styles, and pollen-receptive stigmas. Seeds are much more numerous in the pitcher plants than in the sundews. Nectar, fetid odours, and bright colours attract many kinds of insects that effectively pollinate the Nepenthales. Following fertilization, the ovules become the seeds and the ovary the fruit. The dry capsule (fruit) splits open to release seeds. *See also* pitcher plant; sundew; Venus's-flytrap.

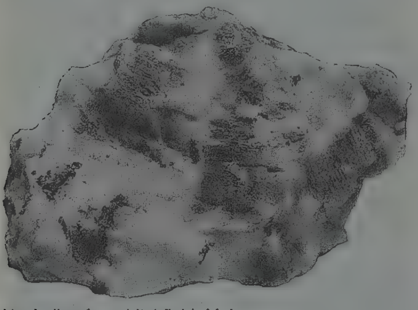
Nepenthes, genus of flowering plants commonly called pitcher plants and belonging to the family Nepenthaceae, order Nepenthales. About 80 species are known, mostly native to Southeast Asia and Australasia. The common North American plants that are more often designated by the name pitcher plant (*q.v.*) are of the family Sarraceniaceae.

Nepenthes species are perennial, shrubby, sometimes herbaceous plants, often climbing by their leaves, and anchored in the soil or growing as epiphytes (*i.e.,* obtaining support, but not nourishment, from another plant or some other aerial structure). The leaves are alternate and have a winged or expanded portion followed by a constricted, often coiled tendril. This is terminated by a hanging but upright, cylindrical or urn-shaped, often highly coloured, insect-trapping, pitcher-shaped structure with a lid. Water within the pitcher drowns insects that fall inside.

Pitcher plant (*Nepenthes*)
Gerald Cubitt

The flowers, which have no petals, are inconspicuous. Cultivated species include *N. dominii, N. hookeriana, N. mastersiana, N. phyllamphora,* and *N. veitchii.*

nepheline, also called NEPHELITE, or ELEOLITE, the most common feldspathoid mineral, an aluminosilicate of sodium and potassium ($Na_3KAl_4Si_4O_{16}$). It is sometimes used as a substitute for feldspars in the manufacture of glass and ceramics. Nepheline is the characteristic mineral of alkaline plutonic rocks, particularly nephelinesyenites and nepheline-gneisses. It occurs in beautiful crystal form with mica, garnet, and sanidine feldspar on Monte Somma, Vesuvius, Italy. For detailed physical properties, *see* feldspathoid (table).



Nepheline from Litchfield, Maine
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

Carnegieite is synthetic, high-temperature nepheline. Kaliophilite is the high-temperature form of kalsilite, the potassium-rich variety of nepheline. Kaliophilite is unstable at normal temperatures and rarely occurs in nature.

nephelinesyenite, medium- to coarse-grained intrusive igneous rock, a member of the alkali-syenite group (*see* syenite) that consists largely of feldspar and nepheline. It is always considerably poorer in silica and richer in alkalies than granite. The extraordinarily varied mineralogy of the nephelinesyenites and their remarkable variation in habit, fabric, appearance, and composition have attracted much attention; more petrographic research has been devoted to them than to any other plutonic rock. Nephelinesyenite from Canada is used to replace feldspar in the manufacture of ceramic and glass products.

The feldspar in nephelinesyenite may be cryptoperthite or, rarely, a mixture of albite and microcline. Nepheline is sometimes wholly or partly replaced by sodalite or cancrinite. The commonest dark silicate is green pyroxene; and alkaline amphibole (green, brown, or blue) is also abundant. In some areas pyroxene is virtually absent, and it is replaced by a mixture of hornblende and biotite. Rocks that contain more than 30 percent (by volume) of either dark silicates or nepheline usually are not called nephelinesyenite. Quartz and calcium-rich plagioclase feldspar are absent, but calcite is almost never absent and may be abundant. Minerals rich in zirconium, titanium, and rare earths occur frequently and sometimes in great abundance.

The amount of nephelinesyenite and related volcanic or plutonic rocks in the lithosphere is very small, yet they occur in great variety on every major landmass, and volcanic representatives are known from a considerable number of oceanic islands. Plutonic nepheline rocks ordinarily occur in small complexes, some quite isolated, but most in close association with effusive rocks of similar composition.

nephelinite, silica-poor (basic) lava that contains nepheline and pyroxene and is usually completely crystallized. Despite its wide geographic distribution and occasional extensive local development, it is a very rare rock. Known only from Tertiary strata (about 2,500,000 to 65,000,000 years in age), nephelinites are abundant in the Canary Islands, the Azores, the Cape Verde Islands, and Isla Fernando de Noronha off the coast of Brazil. The pyroxene in nephelinites may be either titanium-rich augite or aegirine; plagioclase, if present, is commonly labradorite. Varieties rich in leucite and haüynite are well known. Biotite is characteristic in some types; amphibole is scarce. Accessory minerals may include sanidine, melilite, sodalite, perovskite, apatite, and chromite.

nephelometry and turbidimetry, in analytical chemistry, methods for determining the amount of cloudiness, or turbidity, in a solution based upon measurement of the effect of this turbidity upon the transmission and scattering of light. Turbidity in a liquid is caused by the presence of finely divided suspended particles. If a beam of light is passed through a turbid sample, its intensity is reduced by scattering, and the quantity of light scattered is dependent upon the concentration and size distribution of the particles. In nephelometry the intensity of the scattered light is measured, while, in turbidimetry, the intensity of light transmitted through the sample is measured. Nephelometric and turbidimetric measurements are used in the determination of suspended material in natural waters and in processing streams. The technique is also used for determination of sulfur in coal, oil, and other organic materials; the sulfur is precipitated as barium sulfate.

nephridium, unit of the excretory system in many primitive invertebrates and also in the amphioxus; it expels wastes from the body cavity to the (usually aquatic) exterior. The evolution of nephridia encouraged tissue specialization by eliminating the need for all cells of an organism to be in contact with seawater for diffusion of metabolic wastes.

Nephridia occur in two forms. The simpler, more primitive protonephridia, found in flatworms, ribbon worms, and rotifers, are usually scattered among the other body cells. More advanced, segmented invertebrates, such as earthworms, possess the more complex metanephridia, usually arranged in pairs.

The protonephridium consists of a hollow cell located in the body cavity and a duct leading from it to an exterior opening, called a nephridiopore. Fluid in the body cavity filters into the hollow cell, called a flame bulb (or flame cell) if it possesses cilia, or a solenocyte if it has a flagellum. In either form, the cilia or the flagellum wave filtered urine down the tube to the outside.

The metanephridium tubule lacks a flame cell and opens directly into the body cavity. Cilia lining the tubule draw up cavity fluids and conduct them to the exterior; tubule cells actively reabsorb useful nutrients as they pass. Analogous structures, the renette and the lateral canal are characteristic of nematodes.

nephrite, a gem-quality silicate mineral in the tremolite–actinolite–ferrotremolite series of amphiboles. It is the less prized but more common of the two types of jade, usually found as translucent to opaque, compact, dense aggregates of finely interfelted tufts of long, thin fibres. It may be distinguished from jadeite (*q.v.*), jade's other form, by its splintery fracture and oily lustre. Ordinarily coloured green, nephrite is commonly mottled or flecked with dark inclusions.

Nephrite occurs in low-grade, regionally metamorphosed rocks. China's most important source of nephrite throughout history has been the region of Khotan (Ho-t'ien) and Yarkand in central Asia. Other important sources include the Lake Baikal area, Siberia; South Island, New Zealand; near Kotzebue, Alaska; along the Sweetwater River, Wyoming; and the canton of Graubünden, Switzerland. Great boulders of nephrite have been found near Jordanów (Jordansmühl) in Silesia, Poland, and in the valleys of the Turnagain and Fraser rivers in British Columbia. Nephrite was found in 1960 at Mashaba, Rhodesia, the first find on the African continent. In 1965 the mineral was found near Hualien, Taiwan (Formosa).

nephritis (medicine): *see* Bright's disease.

nephroblastoma, also called EMBRYOMA, or WILMS' TUMOUR, malignant renal (kidney) tumour of early childhood. In 75 percent of the cases, the tumour grows before the age of five; about two-thirds of the instances are apparent by two years of age. The tumour grows rapidly and can approach the weight of the rest of the body. It rarely appears in adults. In its early stages the nephroblastoma causes no symptoms. Later, symptoms may indicate fever, distortion of the kidney mass, evidence of secondary tumours elsewhere in the body, abdominal and flank pain, weight loss, nausea, loss of appetite, and vomiting.

The tumour begins in the outer (cortical) tissue of the kidney. At first it is surrounded by a dense fibrous capsule. It is usually a grayish-white, soft mass. The tumour tends to destroy the whole kidney and spreads to neighbouring organs. It often causes secondary tumours (metastases) in the lungs, liver, brain, and bones.

The usual treatment of a nephroblastoma, if diagnosis is early enough, is a course of radiation before an operation, removal of the mass by surgery, and postoperative irradiation. Sometimes chemicals are given to slow the cell growth.

nephrology, branch of medicine concerned with the study of kidney functions and the treatment of kidney diseases. The first scientific observations of the kidney were made by Lorenzo Bellini and Marcello Malpighi in the middle of the 17th century, but true physiological understanding of the kidney began with Carl Ludwig's 1844 hypothesis that blood pressure forces waste fluids out of the renal capillaries into the ducts (nephrons) of the kidney. In 1899, Ernest Starling further explained the function of the kidney by proposing that osmotic pressures helped to concentrate the urine there; this theory was confirmed by A.N. Richards in the 1920s.

Clinical nephrology, the treatment of kidney diseases, emerged from the disciplines of urology and cardiology as more knowledge was gained about kidney functions. Despite increased information, however, there was little that could be done to treat patients with severe renal (kidney) disease before the 1950s. The first artificial kidney capable of removing blood impurities by hemodialysis was developed during World War II but could be used only for temporary, reversible renal collapse. It was not until Belding Scribner in 1960 demonstrated the usefulness of the permanent Teflon arteriovenous shunt that repeated hemodialysis for chronic renal disease became feasible. Instantly, the outlook for patients with irreversible kidney disease changed from certain death to 90-percent survival. The long-range prospects for these patients was further enhanced by the development of kidney transplants, first successfully performed in 1954 on identical twins; transplants from cadavers, which were more generally applicable, also began in the 1950s.

nephron, functional unit of the kidney, the structure that actually produces urine in the process of removing waste and excess substances from the blood. There are about 1,000,000 nephrons in each human kidney. The most primitive nephrons are found in the kidneys (pronephros; *q.v.*) of primitive fish, amphibian larvae, and embryos of more advanced vertebrates. The nephrons found in the kidneys (mesonephros; *q.v.*) of amphibians and most fish, and in the late embryonic development of more advanced vertebrates, are only slightly more advanced in structure. The most advanced nephrons occur in the adult kidneys, or metanephros (*q.v.*), of land vertebrates, such as reptiles, birds, and mammals.

Each nephron in the mammalian kidney is a long tubule, or extremely fine tube, about 30–55 mm (1.2–2.2 inches) long. At one end this tube is closed, expanded, and folded into a double-walled cuplike structure. This structure, called the renal corpuscular capsule, or Bowman's capsule, encloses a cluster of microscopic blood vessels—capillaries—called the glomerulus. The capsule and glomerulus together constitute the renal corpuscle. Blood flows into and away from the glomerulus through tiny arteries called arterioles, which reach and leave the glomerulus through the open end of the capsule. In the renal corpuscle, fluid filters out of the blood in the glomerulus through the inner wall of the capsule and into the nephron tubule. As this filtrate passes through the tubule, its composition is altered by the secretion of certain substances into it and by the selective reabsorption of water and other constituents from it. The final product is urine, which is conveyed through the collecting tubules into the renal pelvis.

nephrosclerosis, hardening of the walls of the small arteries and arterioles (small arteries that convey blood from arteries to the even smaller capillaries) of the kidney. This condition is caused by hypertension (high blood pressure). Hypertension can be present in a person for 20 to 30 years without evidence of kidney involvement; such persons usually die of other effects of hypertension such as congestion of blood in the heart, hardening of the heart tissue, or cerebral (brain) hemorrhage. If these maladies do not occur first, there is usually some eventual renal (kidney) involvement. Nephrosclerosis is classified as either benign or malignant.

Benign nephrosclerosis is a gradual and prolonged deterioration of the renal arteries. First the inner layer of the walls of smaller vessels thickens, and gradually this thickening spreads to the whole wall, sometimes closing the central channel of the vessel. Fat then becomes deposited in the degenerated wall tissue. The larger arteries gain an excess of elastic tissue, which may block their channels. Both of these conditions cause the blood supply to the vital kidney areas to be blocked, and tissue deterioration ensues.

In malignant nephrosclerosis a similar process occurs but at a much faster rate. The disease may develop so rapidly that there is little time for gross kidney changes to occur. The surface of the kidney, however, is nearly always covered with large red blotches at points where bleeding has occurred. In the malignant disease the arteriole walls thicken and may be closed off by rapid cell growth. The nuclei of these cells die, and the elastic fibres disappear. With the loss of the elastic fibres, the walls of the vessels become much more fragile and easily distended. Severe ruptures and hemorrhages are not infrequent. The arterioles often suffer spasms that can force blood through lesions in the vessel walls; the tissues become swollen as a result.

The symptoms of nephrosclerosis include impaired vision, blood in the urine, loss of weight, and the accumulation of urea and other nitrogenous waste products in the blood, a condition known as uremia. Treatment includes the administration of antihypertensive drugs, elimination of infection and of any obstruction, and other measures for relief of chronic renal failure.

nephrotic syndrome, also called NEPHROSIS, group of signs of kidney malfunction, including a low level of albumin (a protein) and a high level of lipids (fats) in the blood, proteins in the urine, and the accumulation of fluid in the tissues. It may result from streptococcal infection, lupus erythematosus, or heavy-metal poisoning.

The nephrotic syndrome occurs usually in young children or young adults. Persons affected may lack appetite and experience irritability, vomiting, and diarrhea. High levels of fluids in the tissues can cause a 50 percent increase in body weight. In children the syndrome includes gross swelling of the face, while in adults the legs are most frequently afflicted. Low blood pressure and low plasma volume from lack of serum proteins occasionally cause severe vascular collapse. Protein malnutrition also leads to muscle wasting and growth retardation, especially in children. In treatment, attention is given to alleviation of the underlying disease and to elimination of the tissue fluids by inducing urination.

Nepos, Cornelius (b. *c.* 100 BC—d. *c.* 25 BC), Roman historian, correspondent and friend of Cicero, and the friend to whom Catullus dedicated his poems.

Nepos came, like Catullus, from northern Italy. His principal writings were *De viris illustribus* ("On Famous Men"), comprising brief biographies of distinguished Romans and foreigners; *Chronica,* which introduced to the Roman reader a Greek invention, the universal comparative chronology; *Exempla,* which consisted of anecdotes; possibly a universal geography to match the *Chronica;* and biographies of the elder Cato and Cicero. There survive only one complete and one partial book from the *De viris illustribus;* the biographies in these extant texts are mostly quite brief, being a few characteristic anecdotes strung together to illustrate trite moral principles. Nepos is not notable as a literary stylist; he wrote simply, but without elegance or purity.

Nepos, Julius (d. May 9, 480), last legitimate Western Roman emperor (reigned 474–475).

Born of a distinguished family, Nepos was sent by the Eastern ruler Leo I to govern Italy as augustus (emperor). He at once deposed the Western emperor, Glycerius, whom Leo regarded as a usurper. Nepos proclaimed himself emperor in June 474. A year later he was obliged to recognize the independence of the Visigothic kingdom centred near present Toulouse, Fr. Later that year the patrician Orestes rose against Nepos and forced him to flee to Dalmatia (August 475). Nepos lived at Salonae (near modern Split, Croatia) for five years, recognized in the East as emperor, though Orestes had proclaimed his young son, Romulus Augustulus, as emperor in the West. Nepos was eventually murdered by friends of Glycerius.

Neptune, Latin NEPTUNUS, in Roman religion, originally the god of freshwater; by 399 BC he was identified with the Greek Poseidon and thus became a deity of the sea. His female counterpart, Salacia, was perhaps originally a goddess of leaping springwater, subsequently equated with the Greek Amphitrite.

Neptune holding his trident, classical sculpture; in the Lateran Museum, Rome

Alinari—Art Resource

Neptune's festival (Neptunalia) took place in the heat of the summer (July 23), when water was scarcest; thus, its purpose was probably the propitiation of the freshwater deity. Neptune had a temple in the Circus Flaminius at Rome; one of its features was a sculptured group of marine deities headed by Poseidon and Thetis. In art Neptune appears as the Greek Poseidon, whose attributes are the trident and the dolphin.

Neptune, the eighth major planet from the Sun. Discovered in 1846, it was named after the Roman god of the sea.

A brief treatment of Neptune follows. For full treatment, *see* MACROPAEDIA: Solar System.

Neptune travels around the Sun in an elliptical orbit at an average distance of 4.504 billion km (2.799 billion miles). At this distance, it takes the planet 165 years to complete one orbit. Neptune is more than 17 times as massive as the Earth, and its volume exceeds that of the latter by 44 times. It has an equatorial diameter of roughly 49,528 km (30,775 miles). Neptune consists largely of hydrogen and helium. It has no apparent solid surface, but it may have a core of ice and rocky material. The planet's atmosphere, particularly the outer layers, contains substantial amounts of methane gas. Absorption of red light by the atmospheric methane is responsible for Neptune's deep blue colour.

Considerable atmospheric turbulence was detected by the U.S. Voyager 2 space probe during its 1989 flyby of Neptune. Winds moving at 300 metres per second (700 miles per hour) and higher were observed by the spacecraft, as was an enormous storm system—the so-called

Great Dark Spot—in the planet's southern hemisphere. Above this system drift delicate clouds resembling those of the cirrus variety, and closer to the south pole are broad cloud bands of varying shades of blue.

Because of its great distance from the Sun, Neptune receives only a limited amount of solar radiation. Temperature measurements, however, suggest that the planet has an internal heat source just like Jupiter and Saturn. Even though Neptune receives about 2.5 times less sunlight than neighbouring Uranus, its effective radiating temperature is roughly the same as that of the latter (about 59 K).

As in the case of the other giant outer planets and the Earth, Neptune is surrounded by a magnetic field. Though not nearly as strong as those of the other planets, Neptune's field traps solar wind and galactic cosmic-ray particles (*e.g.,* energetic protons and electrons) in a belt around the planet that is somewhat akin to the Earth's Van Allen radiation belts. By analyzing radio emissions from the Neptunian magnetic field, astronomers have determined that the rotational period of the planet is 16.11 hours. Neptune's axis of rotation is tilted approximately 29° to the plane of the planet's orbit around the Sun, which is similar to those of the Earth and Mars (23.5° and 25°, respectively).

Voyager 2 observations revealed that Neptune is encircled by at least four rings, which are populated largely by dust-sized particles. The particles of the outermost ring are not distributed uniformly; there are five bright arclike regions of greater density distributed along a 45° segment of the ring.

Neptune also has eight known satellites. Only two of these, Triton and Nereid, had been observed prior to the Voyager 2 flyby. Triton is the largest of the eight satellites and is almost as big as the Earth's Moon. The other Neptunian satellites range in diameter from 58 to 416 km (36 to 258 miles). Apart from Triton, the moons of Neptune are irregularly shaped and have very dark surfaces.

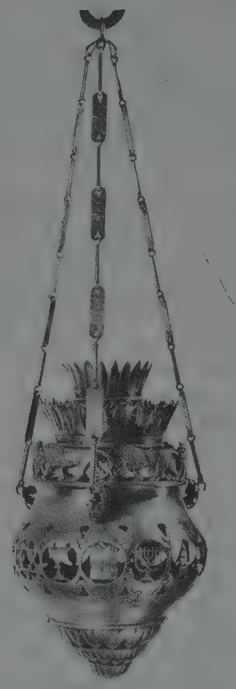
neptunium (Np), radioactive chemical element of the actinide series in Group IIIb of the periodic table, first transuranium element to be artificially produced, atomic number 93. Though traces of neptunium have subsequently been found in nature, where it is not primeval but produced by neutron-induced transmutation reactions in uranium ores, Edwin M. McMillan and Philip H. Abelson first found neptunium in 1940 after uranium had been bombarded by neutrons from the cyclotron at Berkeley, Calif. Neptunium has been produced in weighable amounts in breeder reactors as a by-product of plutonium production from uranium-238 (about one part neptunium is produced for every 1,000 parts plutonium). All neptunium isotopes are radioactive; the stablest is neptunium-237, with a half-life of 2,140,000 years, and among the most unstable is neptunium-232, with a half-life of 13 minutes.

Neptunium, a silvery metal, exists in three crystalline modifications; the room-temperature form (alpha) is orthorhombic. Neptunium is chemically reactive and similar to uranium with oxidation states from +3 to +6. Neptunium ions in aqueous solution possess characteristic colours: Np^{3+}, pale purple; Np^{4+}, pale yellow-green; NpO_2^+, green-blue; NpO_2^{2+}, varying from colourless to pink or yellow-green, depending on the anion present.

atomic number	93
stablest isotope	237
melting point	640° C (1,184° F)
specific gravity (alpha)	20.45
valence	3,4,5,6
electronic config.	2-8-18-32-22-9-2 or $(Rn)5f^46d^17s^2$

neptunium series, set of artificially produced and unstable heavy nuclei that are genetically related through alpha and beta decay. It is one of four radioactive series (*q.v.*).

ner tamid (Hebrew: "eternal light"), lamp that burns perpetually in Jewish synagogues before or near the ark of the Law (*aron ha-qodesh*).



Ner tamid, Russian or Polish, 1884

By courtesy of The Jewish Museum, New York City; photograph, Art Resource

It reminds the congregation of the holiness of the Torah scrolls that are stored within the ark and calls to mind God's abiding presence and his providential care of the Jewish people. The *ner tamid* also represents the light that burned continuously in the western section of the ancient Temple of Jerusalem.

Nerbudda River (India): *see* Narmada River.

Nerchinsk, also spelled NERČINSK, town, Chita *oblast* (province), east-central Russia. The town lies along the Nercha River just above the latter's confluence with the Shilka. Nerchinsk was founded as a fort in 1654. Once it served as an important customs post and trading centre on the route to China, but the town declined when it was bypassed by the Trans-Siberian Railroad in the late 19th century. There are minor electromechanical and food-processing industries in the town. Pop. (1991 est.) 16,900.

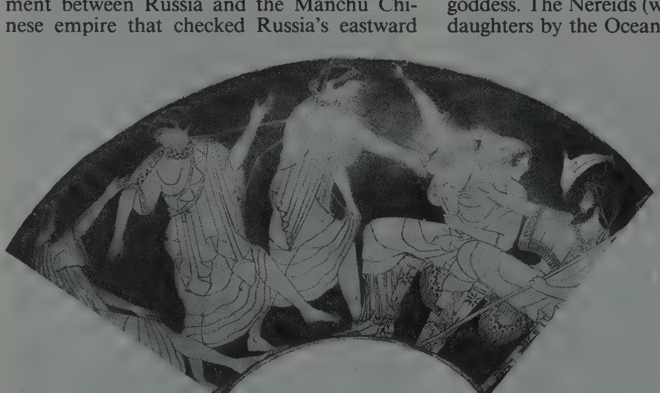
Nerchinsk, Treaty of (1689), peace settlement between Russia and the Manchu Chinese empire that checked Russia's eastward expansion by removing its outposts from the Amur River basin. By the treaty's terms Russia lost easy access to the Sea of Okhotsk and Far Eastern markets but secured its claim to Transbaikalia (the area east of Lake Baikal) and gained the right of passage to Peking for its trade caravans. The border between the two countries was set along the Stanovoy Range and the Argun River. A success for V.V. Golitsyn's foreign policy, the treaty prevented Russia's potential military defeat and gained China's implied recognition of Russia as a state of equal status, an accomplishment not achieved by other European countries. Confirmed and expanded by the Treaty of Kyakhta (or Kiakhta; 1727), the Nerchinsk treaty remained the basis of Russo-Chinese relations until 1858–60.

Nereid, in Greek religion, any of the daughters (numbering 50 or 100) of the sea god Nereus (eldest son of Pontus, a personification of the sea) and of Doris, daughter of Oceanus (the god of the water encircling the flat Earth). The Nereids were depicted as young girls, inhabiting any water, salt or fresh, and as benign toward humanity. They were popular figures in Greek literature. The best known of the Nereids were Amphitrite, consort of Poseidon (a sea and earthquake god); Thetis, wife of Peleus (king of the Myrmidons) and mother of the hero Achilles; and Galatea, a Sicilian figure loved by the Cyclops Polyphemus.

Nereid, one of the eight known satellites of Neptune. It was discovered photographically by the American astronomer Gerard Peter Kuiper in 1949. Nereid orbits Neptune with a period of 360.2 days; the orbit is highly elliptical and inclined to the planet's equator. The satellite's mean distance from Neptune is 5,511,000 km (3,424,400 miles). Nereid is exceedingly faint, making observations with even the largest ground-based telescopes very difficult. Thus, little is known about Nereid, but data returned by the U.S. Voyager 2 space probe in 1989 suggests that it is an asteroid-like object. Nereid has a diameter of about 340 km (210 miles).

Neretva River, river flowing in Bosnia and Hercegovina and in Croatia. The Neretva River rises on Lebršnik Mountain and flows northwest past Konjic to Jablanica (Jablaničko) Lake, then southwest via Mostar to enter the Adriatic Sea. Its total length is 140 miles (225 km). The upper course of the river runs through canyons and gorges in uninhabited country. The Jablanica Dam created a lake for a hydroelectric station. The lower valley of the Neretva enjoys the Mediterranean climate of the Dalmatian coast.

Nereus, in Greek religion, sea god called by Homer "Old Man of the Sea," noted for his wisdom, gift of prophecy, and ability to change his shape. He was the son of Pontus, a personification of the sea, and Gaea, the Earth goddess. The Nereids (water nymphs) were his daughters by the Oceanid Doris, and he lived



Nereus and the Nereids, detail of a red-figure cup; in the Louvre

Alinari—Art Resource

Nereus struggling with Heracles, detail from a Greek water jar found at Vulci, *c.* 490 BC; in the British Museum

By courtesy of the trustees of the British Museum

with them in the depths of the sea, particularly the Aegean. Aphrodite, the goddess of love, was his pupil. The Greek hero Heracles, in his quest for the golden apples of the Hesperides, obtained directions from Nereus by wrestling with him in his many forms. Nereus frequently appears in vase paintings as a dignified spectator.

Nergal, in Mesopotamian religion, secondary god of the Sumero-Akkadian pantheon. He was identified with Irra, the god of scorched earth and war, and with Meslamtaea, He Who Comes Forth from Meslam. Cuthah (modern Tall Ibrāhīm) was the chief centre of his cult. In later thought he was a "destroying flame" and had the epithet *sharrapu* ("burner"). Assyrian documents of the 1st millennium BC describe him as a benefactor of men, who hears prayers, restores the dead to life, and protects agriculture and flocks. Hymns depict him as a god of pestilence, hunger, and devastation.

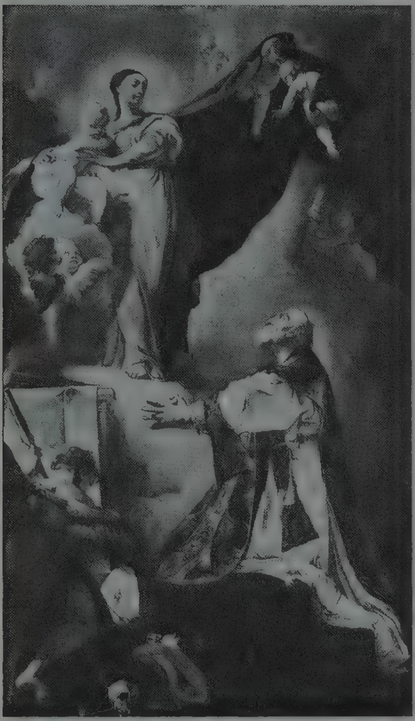
The other sphere of Nergal's power was the underworld, of which he became king. According to one text, Nergal, escorted by demons, descended to the underworld where the goddess Ereshkigal (or Allatum) was queen. He threatened to cut off her head, but she saved herself by becoming his wife, and Nergal obtained kingship over the underworld.

Nergal did not figure prominently in epics and myths, although he did have a part in the *Epic of Gilgamesh* and the deluge story. The cult of Nergal was widespread beyond the borders of Sumer and Akkad, where it first appeared. He had a sanctuary at Mari (modern Tell al-Ḥarīrī), on the Euphrates. He is named in inscriptions of Assyrian kings, and evidence of his cult is found in Canaan and at Athens.

Nergal, holding his lion-headed staffs, terra-cotta relief from Kish, *c.* 2100–*c.* 1500 BC; in the Ashmolean Museum, Oxford, Eng.

By courtesy of the Ashmolean Museum, Oxford, Eng

Neri, Saint Philip, Italian SAN FILIPPO NERI (b. July 21, 1515, Florence—d. May 26, 1595, Rome; canonized 1622; feast day May 26), Italian priest and one of the outstanding mystics during the Counter-Reformation and founder of the Congregation of the Oratory (now the Institute of the Oratory of St. Philip Neri, also called Oratorians), a congregation of secular priests and clerics. He went to Rome *c.* 1533, where he tutored, studied, and undertook many charitable works. In 1548 he founded a society of laymen dedicated to the care of the poor, convalescents, and pilgrims. After ordination in 1551 he moved to the ecclesiastical community at San Girolamo della Carità in Rome. There he held religious conferences that became so popular that a large room was built over the church nave to accommodate his audiences. This room was called the Oratory, a name that subsequently referred to those who met there and to the devotional, charitable, and recreational activities that Philip instituted, including musical performances (hence "oratorio").



"Madonna and Child Appearing to San Filippo Neri," oil painting by Giovanni Battista Piazzetta (1682–1754); in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., Samuel H. Kress Collection, 1961

Philip was rector of the church of San Giovanni from 1564 to 1575, during which period he ordained his disciples. In 1575 Pope Gregory XIII granted him Sta. Maria in Vallicella, where he established the Institute of the Oratory. A house was built for the priests, and Philip, elected provost of the congregation in 1577, resided there after 1583.

Although Philip helped influence Pope Clement VIII to absolve (1595) King Henry IV of France from excommunication, he had little to do with contemporary political events. Noted for his personal spirituality, he underwent numerous ecstatic religious experiences, and many miracles were attributed to him. Several lives have been translated into English, including those by F.I. Antrobus (1902) and T.A. Pope (1926); V.J. Matthews' *St. Philip Neri* appeared in 1934.

Nerina, Nadia, original name NADINE JUDD (b. Oct. 21, 1927, Cape Town), South African prima ballerina renowned for her remarkable versatility of roles. After touring South Africa in 1942, she went to England in 1945, where she studied under Dame Marie Rambert.

Nerina became prima ballerina of the Royal Ballet in 1951, excelling in both classical, especially *La Fille mal gardée,* and modern repertoires. In the U.S.S.R. she appeared as guest artist with the Bolshoi and Leningrad Kirov ballets. Nerina continued as ballerina with the Royal Ballet as a soloist from 1967 to 1969 and retired in 1969. She remained active in ballet and was a British jury member for the third International Ballet Competition in Moscow in 1977.

neritic zone, shallow marine environment extending from mean low water down to 200-metre (660-foot) depths, generally corresponding to the continental shelf. Neritic waters are penetrated by varying amounts of sunlight, which permits photosynthesis by both planktonic and bottom-dwelling organisms. The zone is characterized by relatively abundant nutrients and biologic activity because of its proximity to land. Coarse, land-derived materials generally constitute the bottom sediments, except in some low-latitude regions that favour production of calcium carbonate sediments by such organisms as algae, bacteria, and corals.

Nernst, Walther Hermann (b. June 25, 1864, Briesen, Prussia—d. Nov. 18, 1941, Muskau, Ger.), German scientist, one of the founders of modern physical chemistry. His formulation of the third law of thermodynamics gained him the 1920 Nobel Prize for Chemistry. Simply stated, the law postulates that, at a temperature above absolute zero, all matter tends toward random motion and all energy tends to dissipate.

Educated at the universities of Zürich, Graz (Austria), and Würzburg, in 1887 Nernst became an assistant to Wilhelm Ostwald who, with Jacobus van't Hoff and Svante Arrhenius, was establishing the independence of physical chemistry. He was appointed to the physics department of the University of Göttingen in 1890 and in 1905 went to the University of Berlin where he was director of the Institute for Experimental Physics from 1924 to 1933.

Nernst's research concerning the theory of galvanic cells, the thermodynamics of chemical equilibrium, the properties of vapours at high temperature and of solids at low temperature, and the mechanism of photochemistry has had important applications in industry and science.

Nernst was also interested in applied science. He invented an improved electric light and an electronically amplified piano. His influential textbook of theoretical chemistry was first published in 1893. In later years he concerned himself chiefly with astrophysical theories.

Nero, in full NERO CLAUDIUS CAESAR AUGUSTUS GERMANICUS, also called (AD 50–54) NERO CLAUDIUS CAESAR DRUSUS GERMANICUS, original name LUCIUS DOMITIUS AHENOBARBUS (b. Dec. 15, AD 37, Antium, Latium—d. June 9, 68, Rome), the fifth Roman emperor (AD 54–68), stepson and heir of the emperor Claudius. He became infamous for his personal debaucheries and extravagances and, on doubtful evidence, for his burning of Rome and persecutions of Christians.

Upbringing. Nero's father, Gnaeus Domitius Ahenobarbus, died in about AD 40, and Nero was brought up by his mother, Agrippina the Younger, a great-granddaughter of the emperor Augustus. After poisoning her second husband, Agrippina incestuously became the wife of her uncle, the emperor Claudius, and persuaded him to favour Nero for the succession, over the rightful claim of his own son, Britannicus, and to marry his daughter, Octavia, to Nero. Having already helped to bring about the murder of Valeria Messalina, her predecessor as the wife of Claudius, in 48, and ceaselessly pursuing her intrigues to bring Nero to power, Agrippina eliminated her opponents among Claudius' palace advisers, probably had Claudius himself poisoned in 54, and completed her work with the poisoning of Britannicus in 55. Upon the death of Claudius she at once had Nero proclaimed emperor by the Praetorian Guard, whose prefect, Sextus Afranius Burrus, was her partisan; the Senate thus had to accept a fait accompli. For the first time absolute power in the Roman Empire was vested in a mere boy, who was not yet 17.

Nero, portrait bust; in the Roman National Museum, Rome

Anderson—Alinari from Art Resource

Early reign. Agrippina immediately eliminated the powerful freedman Narcissus, who had always opposed her aims. She hoped to control the government, but Burrus and Nero's old tutor, the Stoic philosopher Lucius Annaeus Seneca, though they owed their influence to Agrippina, were not content to remain her tools. They encouraged Nero to act independently of her, and a growing coolness resulted in Nero's relations with his mother. In 56 Agrippina was forced into retirement. From that time until 62, Burrus and Seneca were the effective rulers of the empire.

Brought up in this atmosphere, Nero might well have begun to behave like a monster upon his accession as emperor in 54 but, in fact, behaved quite otherwise. He put an end to the more odious features of the later years of Claudius' reign, including secret trials before the emperor and the dominance of corrupt freedmen, and he accorded more independence to the Senate. The testimony of contemporaries depicts Nero at this time as a handsome young man of fine presence but with soft, weak features and a restless spirit. Up to the year 59, Nero's biographers cite only acts of generosity and clemency on his account. His government forbade contests in the circus involving bloodshed, banned capital punishment, reduced taxes, and accorded permission to slaves to bring civil complaints against unjust masters. Nero himself pardoned writers of epigrams against him and even those who plotted against him, and secret trials were few. The law of treason was dormant: Claudius had put 40 senators to death, but, between the murders instigated by Agrippina in 54 and the year 62, there were no like incidents in Nero's reign. Nero also inaugurated competitions in poetry, in the theatre, and in athletics as counter-attractions to gladiatorial combats. He saw to it that assistance was provided to cities that had suffered disaster and, at the request of the Jewish historian Josephus, gave aid to the Jews.

Artistic pretensions and irresponsibility. While directing the government themselves, Burrus and Seneca had largely left Nero uncontrolled to pursue his own tastes and pleasures. Seneca urged Nero to use his autocratic powers conscientiously, but he obviously failed to harness the boy's more generous impulses to his responsibilities. At first Nero hated signing death sentences, and the extortions of Roman tax collectors upon the populace led him in 58 to unrealistically suggest that the customs dues should be abolished. Even later Nero was capable of conceiving grandiose plans for conquests or the creation of public works, but for the most part he used his position simply to gratify his own personal pleasures. His nocturnal rioting in the streets was a scandal as early as 56, but the emergence of real brutality in Nero can be fixed in the 35-month period between the putting to death of his mother at his orders in 59 and his similar treatment of his wife Octavia in June 62. He was led to the murder of Agrippina by her insanity and her fury at seeing her son slip out of her control, to the murder of Octavia by his having fallen in love with Poppaea Sabina, the young wife of the senator (and later emperor) Otho, and by his fear that his repudiated wife was fomenting disaffection at court and among the populace. He married Poppaea in 62, but she died in 65, and he subsequently married the patrician lady Statilia Messalina.

Seeing that he could do what he liked without fear of censure or retribution, Nero began to give rein to inordinate artistic pretensions. He fancied himself not only a poet but also a charioteer and lyre player, and in 59 or 60 he began to give public performances; later he appeared on the stage, and the theatre furnished him with the pretext to assume every kind of role. To the Romans these antics seemed to be scandalous breaches of civic dignity and decorum. Nero even dreamed of abandoning the throne of Rome in order to fulfill his poetical and musical gifts, though he did not act on these puerile ambitions. Beginning about 63 he also developed strange religious enthusiasms and became increasingly attracted to the preachers of novel cults. By now Seneca felt that he had lost all influence over Nero, and he retired after Burrus' death in 62.

The great fire that ravaged Rome in 64 illustrates how low Nero's reputation had sunk by this time. Taking advantage of the fire's destruction, Nero had the city reconstructed in the Greek style and began building a prodigious palace—the Golden House—which, had it been finished, would have covered a third of Rome. During the fire Nero was at his villa at Antium 35 miles (56 km) from Rome and therefore cannot be held responsible for the burning of the city. But the Roman populace mistakenly believed that he himself had started the fire in Rome in order to indulge his aesthetic tastes in the city's subsequent reconstruction. According to the *Annals* of the Roman historian Tacitus and to the *Nero* of the Roman biographer Suetonius, Nero in response tried to shift responsibility for the fire on the Christians, who were popularly thought to engage in many wicked practices. Hitherto the government had not clearly distinguished Christians from Jews; almost by accident, Nero initiated the later Roman policy of halfhearted persecution of the Christians, in the process earning himself the reputation of Antichrist in the Christian tradition.

The approaching end. Meanwhile, the imperial government had had some success in the east. The great foreign-policy problem of the time was that of Armenia. Since the reign of Augustus, it had been Roman policy to appoint vassal kings there and so make Armenia a buffer state against Parthia, Rome's implacable foe in the east. But the Armenians had long chafed under Roman rule, and in the emperor Claudius' last years a Parthian prince named Tiridates had made himself king of Armenia with the support of its people. In response, Nero's new government took vigorous action, appointing an able general, Gnaeus Domitius Corbulo, to the command. Prolonged military operations by Corbulo led in 66 to a new settlement; Tiridates was recognized as king, but he was compelled to come to Rome to receive his crown from Nero.

Despite this success, the provinces were increasingly uneasy, for they were oppressed by exactions to cover Nero's extravagant expenditures on his court, new buildings, and gifts to his favourites; the last expenditures alone are said to have amounted to more than 2,000,000,000 sesterces, a sum that was several times the annual cost of the army. A revolt in Britain was headed by Queen Boudicca (Boadicea) in 60 or 61, and an insurrection in Judaea lasted from 66 to 70. Nero had many antagonists by this time. The great conspiracy to make Gaius Calpurnius Piso emperor in 65 reveals the diversity of his enemies—senators, knights, officers, and philosophers. That the conspiracy included military officers was an ominous sign, but Nero did not give way to panic; slaves kept him out of danger by warning him of plots that were hatching among their masters. And he did not altogether abandon his lenient attitude. Out of 41 participants in the Piso conspiracy, only 18 died (including Seneca and the poet Lucan), either by order or from fear; the others were exiled or pardoned.

At the end of the year 66, Nero undertook a long visit to Greece that was to keep him away from Rome for 15 months, and during his absence he entrusted the consulate to one of his freedmen. On this trip Nero engaged in new displays of his artistic prowess, and he walked about garbed as an ascetic, barefoot and with flowing hair. His enthusiasm for Greek culture also prompted him to free a number of Greek cities in honour of their glorious past. In the four months following his return to Rome in February 68, his delirious pretensions as both an artist and a religious worshiper aroused the enmity not only of the Senate and those patricians who had been dispossessed by him but also of the Italian middle class, which had old-fashioned moral views and which furnished most of the officers of the army. Even the common soldiers of the legions were scandalized to see the descendant of Caesar publicly perform on stage the parts not only of ancient Greek heroes but of far lower characters. "I have seen him on stage," Gaius Julius Vindex, the legate who rebelled against him, was to say, "playing pregnant women and slaves about to be executed."

At the news of revolts brewing throughout the empire—that of the provincial governor Servius Sulpicius Galba in Spain, the rebellion of the provincial governor Julius Vindex at Lyon in Gaul (France), and others on the eastern frontier—Nero only laughed and indulged in further megalomaniacal displays instead of taking action. "I have only to appear and sing to have peace once more in Gaul," he is reported to have said. Meanwhile, the revolt spread and the legions made Galba emperor; the Senate condemned Nero to die a slave's death: on a cross and under the whip. The Praetorian Guard, his palace guard, abandoned him, and his freedmen left to embark on the ships he kept in readiness at Ostia, the port of Rome. Nero was obliged to flee the city. According to Suetonius, he stabbed himself in the throat with a dagger.

The Roman populace and the Praetorian Guard later came to regret that they had lost such a liberal patron, but to his subjects in general, Nero had been a tyrant, and the revolt his misrule provoked sparked a series of civil wars that for a time threatened the survival of the Roman Empire and caused widespread misery.

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Nero, Golden House of: *see* Golden House of Nero.

Nero Claudius Drusus: *see* Drusus Germanicus, Nero Claudius.

Neruda, Pablo, original name NEFTALÍ RICARDO REYES BASOALTO (b. July 12, 1904, Parral, Chile—d. Sept. 23, 1973, Santiago), Chilean poet, diplomat, and politician who was awarded the Nobel Prize for Literature in 1971. He was perhaps the most important Latin American poet of the 20th century.

Neruda

Camera Press

Early life and love poetry. Neruda was the son of José del Carmen Reyes, a railway worker, and Rosa Basoalto. His mother died within a month of Neruda's birth, and two years later the family moved to Temuco, a small town farther south in Chile, where his father remarried. Neruda was a precocious boy who began to write poetry at age 10. His father tried to discourage him from writing and never cared for his poems, which was probably why the young poet began to publish under the pseudonym Pablo Neruda, which he was legally to adopt in 1946. He entered the Temuco Boys' School in 1910 and finished his secondary schooling there in 1920. Tall, shy, and lonely, Neftalí read voraciously and was encouraged by the principal of the Temuco Girls' School, Gabriela Mistral, a gifted poet who would herself later become a Nobel laureate.

Neftalí started to publish his poems, first in the local newspapers and later in magazines published in the Chilean capital, Santiago. In 1921 he moved to Santiago to continue his studies and become a French teacher. There he experienced loneliness and hunger and took up a bohemian lifestyle. His first book of poems, *Crepusculario,* was published in 1923. The poems, subtle and elegant, were in the tradition of Symbolist poetry, or rather its Hispanic version, Modernismo. His second book, *Veinte poemas de amor y una canción desesperada* (1924; *Twenty Love Poems and a Song of Despair*), was inspired by an unhappy love affair. It became an instant success and is still one of Neruda's most popular books. The verse in *Twenty Love Poems* is vigorous, poignant, and direct, yet subtle and very original in its imagery and metaphors. The poems express young, passionate, unhappy love perhaps better than any book of poetry in the long Romantic tradition.

The experimental poet as diplomat. At age 20, with two books published, Neruda had already become one of the best-known Chilean poets. He abandoned his French studies and began to devote himself entirely to poetry. Three more books appeared in quick succession: *Tentativa del hombre infinito* (1926; "Attempt of the Infinite Man"); *Anillos* (1926; "Rings"), in collaboration with Tomás Lago; and *El hondero entusiasta* (1933; "The Enthusiastic Slingshooter"). Yet his poetry was not a steady source of income, so he translated hastily from several languages and published magazine and newspaper articles. Neruda's future looked uncertain without a steady job, so he managed to get himself appointed honorary consul to Rangoon in Burma (now Yangôn, Myanmar). For the next five years he represented his country in Asia. He continued to live in abject poverty, however, since as honorary consul he received no salary, and he was tormented by loneliness.

From Rangoon Neruda moved to Colombo in Ceylon (now Sri Lanka). He increasingly came to identify with the South Asian masses, who were heirs to ancient cultures but were downtrodden by poverty, colonial rule, and political oppression. It was during these years in Asia that he wrote *Residencia en la tierra, 1925–1931* (1933; *Residence on Earth*). In this book Neruda moves beyond the lucid, conventional lyricism of *Twenty Love Poems*, abandoning normal syntax, rhyme, and stanzaic organization to create a highly personalized poetic technique. His personal and collective anguish gives rise to nightmarish visions of disintegration, chaos, decay, and death that he recorded in a cryptic, difficult style inspired by Surrealism. These puzzling and mysterious poems both attract and repel the reader with the powerful and awe-inspiring vision they present of a modern descent into hell.

In 1930 Neruda was named consul in Batavia (modern Jakarta), which was then the capital of the Dutch East Indies (now Indonesia). There he fell in love with a Dutch woman, Maria Antonieta Hagenaar, and married her. In 1932 Neruda returned to Chile, but he still could not earn a living from his poetry. In 1933 he was appointed Chilean consul in Buenos Aires, Arg. There he met the Spanish poet Federico García Lorca, who at that time was traveling in Argentina, and who was to become a close friend and an enthusiastic defender of Neruda's poetry.

Marxist commitment and poetry. In 1934 Neruda took up an appointment as consul in Barcelona, Spain, and soon he was transferred to the consulate in Madrid. His success there was instantaneous after García Lorca had introduced him. Neruda's new friends, especially Rafael Alberti and Miguel Hernández, were involved in radical politics and the Communist Party. Neruda shared their political beliefs and moved ever closer to communism. In the meantime, his marriage was foundering. He and his wife separated in 1936, and Neruda met a young Argentine woman, Delia del Carril, who would be his second wife until their divorce in the early 1950s.

A second, enlarged edition of the *Residencia* poems entitled *Residencia en la tierra, 1925–35,* was published in two volumes in 1935. In this edition, Neuda begins to move away from the highly personal, often hermetic poetry of the first *Residencia* volume, adopting a more extroverted outlook and a clearer, more accessible style in order to better communicate his new social concerns to the reader. This line of poetic development was interrupted suddenly by the outbreak of the Spanish Civil War in 1936, however. While García Lorca was executed by the Nationalists and Alberti and Hernández fought at the front, Neruda traveled in and out of Spain to gather money and mobilize support for the Republicans. He wrote *España en el corazón* (*Spain in My Heart*) to express his feelings of solidarity with them. The book was printed in 1937 by Republican troops working with improvised presses near the front lines.

In 1937 Neruda returned to Chile and entered his country's political life, giving lectures and poetry readings while also defending Republican Spain and Chile's new centre-left government. In 1939 he was appointed special consul in Paris, where he supervised the migration to Chile of many defeated Spanish Republicans who had escaped to France. In 1940 he took up a post as Chile's consul general in Mexico. He also began work on a long poem, *Canto general* (1950; "General Song"), resonant with historic and epic overtones, that would become one of his key works. In 1943, during a trip to Peru, Neruda climbed to the ancient Inca city of Macchu Picchu. The strong emotions aroused by the sight of this spectacular ruin inspired one of his finest poems, *Alturas de Macchu Picchu* (1943; *Heights of Macchu Picchu*). This powerful celebration of pre-Columbian civilization would become the centrepiece of *Canto general*.

In the meantime, Neruda suffered a stunning reversal in his native country. He had returned to Chile in 1943, was elected a senator in 1945, and also joined the Communist Party. He campaigned for the leftist candidate Gabriel González Videla in the elections of 1946, only to see President Videla turn to the right two years later. Feeling betrayed, Neruda published an open letter critical of Videla; as a consequence, he was expelled from the Senate and had to go into hiding to avoid arrest. In February 1948 he left Chile, crossing the Andes Mountains on horseback by night with the manuscript of *Canto general* in his saddlebag.

In exile Neruda visited the Soviet Union, Poland, Hungary, and Mexico. In Mexico he again met Matilde Urrutia, a Chilean woman whom he had first encountered in 1946. Their marriage would last until the end of his life, and she would inspire some of the most passionate love poems written in Spanish in the 20th century. The third volume of Neruda's *Residencia* cycle, *Tercera residencia, 1935–45* (1947), completed his rejection of egocentric angst and his open espousal of leftwing ideological concerns. His Marxist political beliefs receive their culminating expression in *Canto general*. This epic poem celebrates Latin America—its flora, its fauna, and its history, particularly the wars of liberation from Spanish rule and the continuing struggle of its peoples to obtain freedom and social justice.

Later years. In 1952 the political situation in Chile once again became favourable, and Neruda was able to return home. By now his works had been translated into many languages. Rich and famous, he built a house on Isla Negra, facing the Pacific Ocean, and also maintained houses in Santiago and Valparaíso. While traveling in Europe, Cuba, and China, Neruda embarked upon a period of incessant writing and feverish creation. One of his major works, *Odas elementales* (*Elemental Odes*), was published in 1954. Its verse was written in a new poetic style: simple, direct, precise, and humorous, and it contained descriptions of everyday objects, situations, and beings, *e.g.,* "Ode to the Onion" and "Ode to the Cat." Many of the poems in *Odas elementales* have been widely anthologized. Neruda's poetic output during these years was stimulated by his international fame and personal happiness; 20 books of his appeared between 1958 and his death in 1973, and 8 more were published posthumously. In his memoirs, *Confieso que he vivido* (1974), Neruda summed up his life through reminiscences, comments, and anecdotes.

In 1969 Neruda campaigned for the leftist candidate Salvador Allende, who appointed him ambassador to France after being elected president of Chile. While already ill with cancer in France, Neruda in 1971 learned that he had been awarded the Nobel Prize for Literature. After traveling to Stockholm to receive his prize, he returned to Chile bedridden and terminally ill and survived by only a few days his friend Allende, who died in a right-wing military coup.

Assessment. Neruda's body of poetry is so rich and varied that it defies classification or easy summary. It developed along four main directions, however. His love poetry, such as the youthful *Twenty Love Poems* and the mature *Los versos del Capitán* (1952; *The Captain's Verses*), is tender, melancholy, sensuous, and passionate. In "material" poetry, such as *Residencia en la tierra,* loneliness and depression immerse the author in a subterranean world of dark, demonic forces. His epic poetry is best represented by *Canto general,* which is a Whitmanesque attempt at reinterpreting the past and present of Latin America and the struggle of its oppressed and downtrodden masses toward freedom. And finally there is Neruda's poetry of common, everyday objects, animals, and plants, as in *Odas elementales.*

These four trends correspond to four aspects of Neruda's personality: his passionate love life; the nightmares and depression he experienced while serving as a consul in Asia; his commitment to a political cause; and his ever-present attention to details of daily life, his love of things made or grown by human hands. Many of his other books, such as *Libro de las preguntas* ("Book of Questions"), reflect philosophical and whimsical questions about the present and future of humanity. Neruda was one of the most original and prolific poets to write in Spanish in the 20th century, but despite the variety of his output as a whole, each of his books has unity of style and purpose. (M.E.Du.)

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Nerva, in full NERVA CAESAR AUGUSTUS, original name MARCUS COCCEIUS NERVA (b. *c.* AD 30—d. end of January 98), Roman emperor from Sept. 18, 96, to January 98, the first of a succession of rulers traditionally known as the Five Good Emperors.

A member of a distinguished senatorial family, Nerva was distantly related by marriage to the Julio-Claudian house and had been twice consul (AD 71 and 90) when, on the assassination of the emperor Domitian, he became emperor. A number of elder statesmen emerged from retirement to help him govern the empire. The keynote of Nerva's regime was a skillfully propagandized renunciation of the terrorist means by which Domitian had imposed his tyranny. An agrarian reform measure and the last *lex populi* in Roman history were implemented in Italy. The one imaginative innovation commonly attributed to Nerva's government, the system of *alimenta,* or trusts for the maintenance of poor children in Italy, may have been the work of Trajan. In order to secure the succession, Nerva in 97 adopted and took as his colleague Marcus Ulpius Trajanus (Trajan), governor of one of the German provinces, who became emperor on Nerva's death.

Nerval, Gérard de, pseudonym of GÉRARD LABRUNIE (b. May 22, 1808, Paris, France—d. Jan. 26, 1855, Paris), French Romantic poet whose themes and preoccupations presaged those of the Symbolists and Surrealists.

Nerval's father, a doctor, was sent to serve with Napoleon's Rhine army; his mother died when he was two years old, and he grew up cared for by relatives in the countryside at Montefontaine in the Valois. The memory of his childhood there was to haunt him as an idyllic vision for the rest of his life. In 1820 he went to live with his father in Paris and attend the Collège de Charlemagne, where he met the poet Théophile Gautier, with whom he formed a lasting friendship. Nerval received a legacy from his grandparents and was able to travel in Italy, but the rest of his inheritance he poured into an ill-fated drama review. In 1828 Nerval produced a notable French translation of Goethe's *Faust* that Goethe himself praised and which the composer Hector Berlioz drew freely upon for his opera *La Damnation de Faust.*

In 1836 Nerval met Jenny Colon, an actress with whom he fell passionately in love; two years later, however, she married another man, and in 1842 she died. This shattering experience changed his life. After her death Nerval traveled to the Levant, the result being some of his best work in *Voyage en Orient* (1843–51; "Voyage to the East"), a travelogue that also examines ancient and folk mythology, symbols, and religion.

During the period of his greatest creativity, Nerval was afflicted with severe mental disorders and was institutionalized at least eight times. In one of his finest works, the short story "Sylvie," which was written in 1853 and included in *Des Filles du feu* (1854; "Girls of Fire"), he re-creates the countryside of his happy childhood in lucid, musical prose. The memory of Jenny Colon dominates the longer story *Aurélia* (1853–54), in which Nerval describes his obsessions and hallucinations during his periods of mental derangement. *Les Chimères* (1854; "The Chimeras") is a sonnet sequence of extraordinary complexity that best conveys the musical quality of his writing. Nerval's years of destitution and anguish ended in 1855 when he was found hanging from a lamppost in the rue de la Vieille Lanterne, Paris.

Nerval viewed dreams as a means of communication between the everyday world and the world of supernatural events, and his writings reflect the visions and fantasies that constantly threatened his grip on sanity. He attained the summit of his art whenever he combined his exquisite taste with his infallible intuition for the appropriate image by which to transcribe his dreams of a lost paradise of beauty, fulfillment, innocence, and youth.

nerve, filament of nervous tissue that conducts nervous impulses and connects parts of the nervous system with other organs. *See* nervous system.

nerve cell (biology): *see* neuron.

Nervi, Pier Luigi (b. June 21, 1891, Sondrio, Italy—d. Jan. 9, 1979, Rome), Italian engineer and architect, internationally renowned for his technical ingenuity and dramatic sense of design, especially as applied to large-span structures built of reinforced concrete. His important works include a prefabricated 309-foot-span arch for the Turin Exhibition (1949–50) and the first skyscraper in Italy, the Pirelli Building (1955) in Milan, a collaborative design.

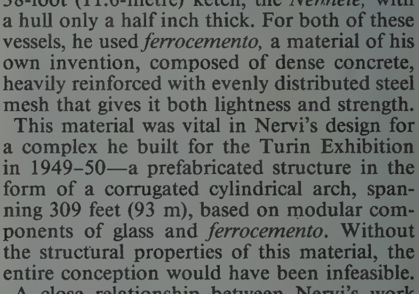
Nervi graduated from the University of Bologna in 1913. During World War I he served as a lieutenant in the Corps of Engineers of the Italian army, and after the war he worked as an engineer in Bologna and Florence. In 1926–27 he designed his first significant work, a cinema in Naples, and followed it with the municipal stadium (Berta Stadium) in Florence, built in 1930–32.

In 1932 Nervi and a cousin in Rome formed the contracting firm of Nervi and Bartoli, with which he would remain through the rest of his career. In 1935 the Italian air force held a competition for a series of hangars to be built throughout Italy. Nervi conceived them as concrete vaults, with huge spans, that could be constructed at low cost, and he was commissioned for the project. Between 1935 and 1941 he built hangars in Obertello, Orvieto, and Torre del Lago. All of these structures were destroyed during World War II.

Each of these early structures showed the growth of conceptual design that resulted from Nervi's ceaseless search for new solutions to structural problems. His creativity was not confined to the design of buildings; during World War II, he attempted to construct vessels made of concrete for the Italian navy, but the project was not completed. After the war, he did succeed in building a 165-ton, motor-powered, concrete sailboat, with a hull 1.4 inches (3.6 cm) thick. Subsequently he built a 38-foot (11.6-metre) ketch, the *Nennele,* with a hull only a half inch thick. For both of these vessels, he used *ferrocemento,* a material of his own invention, composed of dense concrete, heavily reinforced with evenly distributed steel mesh that gives it both lightness and strength.

This material was vital in Nervi's design for a complex he built for the Turin Exhibition in 1949–50—a prefabricated structure in the form of a corrugated cylindrical arch, spanning 309 feet (93 m), based on modular components of glass and *ferrocemento.* Without the structural properties of this material, the entire conception would have been infeasible.

A close relationship between Nervi's work and his austere life was evident. His solutions to building problems were always direct, transmitting to the ground by the shortest path the stresses developed within the structures. His works were relatively unaffected by



Nervi

Henri Cartier-Bresson—Magnum

the changes in taste that accompanied the advent of new forms in architecture. As a professor at the University of Rome from 1947, Nervi taught that a designer can develop truthful solutions in three ways: by understanding the pure harmony of the laws of the physical world that regulate the equilibrium of forces and the resistance of materials; by honestly interpreting the essential factors of each problem; and by rejecting the limitations of the solutions of the past.

In 1950, when the United Nations Educational, Scientific and Cultural Organization (UNESCO) decided to build its new headquarters in Paris, Nervi was one of the architects selected to design it. Marcel Breuer, one of his collaborators, described Nervi's participation in the project as "a continuous search for a system: a system of geometric rhythm," and later he said of him: "If there is a notion that arrogance and reckless irresponsibility are the very attributes of genius, a notion that to be a genius means not to be quite human, there is Nervi to disprove this notion."

In 1955, in association with a group of architects, Nervi helped design the first skyscraper in Italy, the Pirelli Building; it was the first office building to use a long-span structure—80 feet (25 m). Although architects and engineers in the United States had long experience in the design and construction of skyscrapers, they had invariably designed them around frameworks consisting of series of smaller spans. For the Pirelli Building, Nervi used experimental models—as he often had—which he tested in the laboratory at Bergamo. His second skyscraper was built in Montreal, again in collaboration, and his third was Australia Square (1962–69; Sydney), a cylindrical tower of 50 stories. At the time, this was the tallest concrete structure in the world. In 1957 and 1958–59, for the 1960 Rome Olympic Games, Nervi designed two sport palaces.

His first building in the United States was commissioned by the Port of New York Authority: the George Washington Bridge Bus Terminal, in Manhattan, built in 1961–62. Subsequently he designed a precast, vaulted field house for Dartmouth College in New Hampshire (1961–62) and, in collaboration with Pietro Belluschi, the Cathedral of San Francisco, four vertical-warped surfaces dramatically enclosing the vertical space of the main nave. In 1961 Harvard University appointed Nervi to the Charles Eliot Norton Chair of Poetry and in 1963 awarded him an honorary degree; he later received the Gold Medal from the American Institute of Architects in recognition of his work.

After years of intense practice in Italy and abroad, Nervi reduced his activities as a builder in the late 1960s. Assisted by two of his sons, Antonio, a structural engineer, and Mario, an architect, he began to confine his activities largely to designs. An increasing number of his projects now were done in association with foreign architects.

Although Nervi's primary concern was never aesthetic, many of his works, nonetheless, reached the realm of poetry. His buildings achieved remarkable expressive force, as in the geometry of the slabs in the Gatti wool factory (1953), in Rome, and the mezzanine of the Palace of Labour, in Turin. Through his use of interpenetrating planes, of folded and bent plates, and of warping surfaces, Nervi introduced a new three-dimensional vocabulary into architectural design. He reminded architects that "materials, statics, the technology of construction, economic efficiency and functional needs are the vocabulary of the architectural speech."

Nervi's contribution has been compared to that of another builder whose work revolutionized architecture—Joseph Paxton, who built the Crystal Palace for the Great Exhibition of 1851 in London. In both instances, highly rational and innovative structures resulted from a continuous process of devoted search and development, with an emphasis on modular construction, prefabrication, and extreme physical and visual lightness.

(E.F.C.)

MAJOR WORKS. Berta Stadium, Florence (1930–32); hangar for the Italian Air Force, Orvieto (1936); Exhibition Hall, Turin, Italy (Salone B, 1948–49; Salone C, 1950); Kursaal Beach Casino roof, Ostia, Italy (1950); Sala delle Feste delle Terme, Chianciano, Italy (1952); UNESCO headquarters, Paris, with Marcel Breuer and Bernard Zehruss (1953–58); Pirelli Building, Milan (1955–59); Palazzetto dello Sport, Rome (1957); Flaminio Stadium, Rome (1958–59); Palazzo del Lavoro (Palace of Labour), Turin (1961); George Washington Bridge Bus Terminal, New York City (1961–62); Place Victoria, Montreal (1962–65); Cathedral of San Francisco (1970); Coliseum, Richmond, Va. (1971); Auditorium, Vatican City (1971).

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Nervo, Amado, original name JUAN CRISÓSTOMO RUIZ DE NERVO (b. Aug. 27, 1870, Tepic, Mex.—d. May 24, 1919, Montevideo), poet and diplomat, generally considered the most distinguished Mexican poet of the late 19th- and early 20th-century literary movement known as Modernismo. Nervo's introspective poetry, characterized by deep religious feeling and simple forms, reflects his struggle for self-understanding and inner peace in an uncertain world.

Nervo abandoned his studies for the priesthood in 1888 to begin a career as a newspaperman in Mazatlán. In 1894 he moved to Mexico City, where he wrote his first novel, *El bachiller* (1895; "The Baccalaureate"), and his first volume of poetry in the modernist idiom, *Perlas negras* (1898; "Black Pearls"). In 1898 he was one of the founders of the *Revista moderna* ("Modern Review"), which soon became one of the most influential journals of Modernismo.

Nervo lived in Madrid (1905–18), serving as secretary to the Mexican legation there and spending a considerable amount of time in Paris literary circles. During that period he wrote most of the poems, essays, and short stories that have been collected in 29 volumes. The titles of his later works, in which appear the poems generally considered to be his finest—"Serenidad" (1914; "Serenity") and "Plenitud" (1918; "Plenitude")—reflect his achievement of the inner peace for which he had striven throughout his life, attained in some measure through the study of Buddhist philosophy.

After his return to Mexico in 1918, Nervo was appointed minister to Argentina and Uruguay, serving in Montevideo until his death.

nervous system, in anatomy, an organized group of cells specialized for the conduction of a stimulus impulse from a sensory receptor through a nerve cell network to the site at which the response occurs.

A brief treatment of the nervous system follows. For full treatment, *see* MACROPAEDIA: Nerves and Nervous Systems.

For a depiction of some of the structures that make up the human nervous system, shown in relation to other parts of the gross anatomy, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

The nervous system enables a multicellular animal to respond to changes in its external and internal environment. Nerve tissue is composed primarily of cells called neurons, which are specialized to receive stimuli and conduct electrochemical impulses. There are three general types of neurons: sensory neurons, which relay information from the senses; motor neurons, which carry impulses to effectors; and interneurons, which transmit impulses between sensory and motor neurons.

A typical vertebrate neuron consists of dendrites, a cell body (also called a soma), and an axon. The dendrites are fibres that receive stimulation from a sense receptor or nerve impulses from another neuron. The dendrites isolate the received stimulus—in the form of a change in electrical potential—and in most cases conduct it toward the cell body and axon. The axon is the fibre that, upon stimulation to a certain threshold, generates a nerve impulse, transmitting it away from the cell body, to another neuron or to an effector muscle or gland.

A synapse is the junction between two neurons. When a nerve impulse arrives at the terminals of an axon, a neurotransmitter chemical (*e.g.,* acetylcholine or norepinephrine) is released in small spheres called synaptic vesicles. The neurotransmitter diffuses across the minute space, known as the synaptic cleft, and binds to receptor molecules on the receiving sites of the cell. Depending upon the amount of neurotransmitter and the type of receptor, a new nerve impulse is either excited or inhibited. The neurotransmitter is then destroyed by enzymes or taken up by the axon terminals, thereby limiting the duration of the response. In some cases, the transmission of nerve impulses is electrical; *i.e.,* the arriving impulse passes directly from the presynaptic to the postsynaptic sites of the cell through open channels called gap junctions.

Nervous systems are of two general types: diffuse and centralized. The diffuse nervous system is more primitive; it is found only in lower invertebrates, particularly among the coelenterates (*e.g.,* jellyfishes and hydras), which are radially symmetrical. In a diffuse-type system, there is no brain and the nerve cells are distributed throughout the organism in a netlike pattern.

Most other animals that have a nervous system show some degree of centralization, meaning that some portion of the system has a dominant role in coordinating information and directing responses. Even the radially symmetrical echinoderms (starfishes and their allies) have a dominant central nerve ring, from which extend radial nerves. Echinoderms, however, have no brain. A central nervous system composed of a brain and one or more major nerve cords seems to have been an evolutionary outgrowth of bilateral symmetry, the body plan that characterizes most higher invertebrates and all vertebrates. Certain of the flatworms are the most primitive animals to show such a central nervous system, though their brain is little more than a slight swelling of the nerve cords in the head region of the animal. A more complex central nervous system is found among the annelids (*e.g.,* earthworms and leeches) and the arthropods (*e.g.,* insects and crustaceans), which have a definite brain and ventral nerve cords. Centralization reaches its apogee in the vertebrates, which have a well-developed brain and a dorsal nerve cord (the spinal cord).

The human nervous system consists of two main parts: the central nervous system (the brain and spinal cord) and the peripheral nervous system (the nerves that carry impulses to and from the central nervous system). It is distinguished from those of other higher vertebrates by the size and degree of specialization of the cerebral cortex, the part of the brain that analyzes the input of the senses, controls most voluntary muscular movement, and is the seat of reasoning, memory, and learning. The brainstem, which connects the brain to the spinal cord, plays a special role in controlling reflexes, conducting impulses to the viscera (internal organs), regulating the internal environment of the body, and maintaining an ideal state of activity within the nervous system itself.

The spinal cord is a relay centre for impulses coming from and going to the body from the region of the neck down. A sensory neuron may synapse directly with a motor neuron in the spinal cord, producing a spinal reflex such as the familiar knee-jerk response. More commonly, however, the sensory neuron will synapse with interneurons in the spinal cord. If appropriate, one or more of these interneurons will excite motor neurons, initiating a reflex response. Other interneurons may carry the sensory information to the brain, which may direct further responses. These responses are transmitted through still other interneurons in the spinal cord to the appropriate motor neurons.

The peripheral nervous system consists of 12 pairs of cranial nerves and 31 pairs of spinal nerves. All but one of the cranial nerves are concerned with the sensory or motor activities of the head and neck. (The one exception is the vagus nerve, which innervates a number of visceral organs.) Each spinal nerve is attached to the spinal cord by an afferent (sensory) root and an efferent (motor) root. These two roots merge just outside the cord to form a large mixed nerve (*i.e.,* one that contains both sensory and motor neurons), which eventually divides into many branches that innervate a particular region of the body.

The motor neurons of the peripheral nervous system compose two distinct subsystems: the somatic system, which innervates skeletal muscles, and the autonomic system, which controls the heart, the glands, and the smooth muscles that make up the walls of the blood vessels and the respiratory, digestive, excretory, and reproductive tracts. The actions of the somatic system are, by and large, subject to conscious control. By contrast, most actions of the autonomic system are involuntary responses.

The pathways of nerve fibres in the autonomic system are classified as either sympathetic or parasympathetic. Most organs are supplied by both types, each controlling a different, usually antagonistic, response. The sympathetic system generally responds to stress situations, preparing the body for action. For example, the sympathetic system triggers an increase in blood pressure, blood sugar, and sweat; dilation of the pupils; and a diversion of blood flow to the muscles. The parasympathetic system tends to initiate and maintain routine functions of the viscera—*e.g.,* digestion or excretion.

Nearly every mechanism of the nervous system is susceptible to damage or disease, the results of which range in severity from transient tics and minor personality changes to paralysis, major disruptions of the personality, and death. Infections, tumours, trauma, and congenital defects involving the spinal cord can result in paralysis. Diseases that attack motor neurons, such as Parkinson's disease and chorea, can cause such symptoms as uncontrollable shaking, difficulty in speaking, and stooped posture. For malformations of the nervous system, *see* neural tube defect.

Nesbenebded (Egyptian king): *see* Smendes.

Nesbit, E(dith) (b. Aug. 15, 1858, London—d. May 4, 1924, New Romney, Kent, Eng.), British children's author, novelist, and poet.

Nesbit spent her childhood in France and Germany and later led an ordinary country life in Kent, which provided scenes for her books. She was interested in socialism and was one of the founders of the association known as the Fellowship of New Life, out of which grew the Fabian Society.

Nesbit began writing fiction for children in the early 1890s, and she eventually produced more than 60 books for juveniles, as well as some less-successful novels and collections of poetry for adults. Her children's books are marked by vivid characterizations, ingenious plots, and an easy, humorous narrative style. She wrote both tales of fantasy or magic, in which children in everyday circumstances are confronted with an extraordinary character or event, and naturalistic comedies of juvenile behaviour or childish misadventure.

Among her best-known books are *The Story of the Treasure Seekers* (1899), *The Wouldbegoods* (1901), *The Revolt of the Toys, and What Comes of Quarreling* (1902), *Five Children and It* (1902), and *The Story of the Amulet* (1906), in which an ancient Egyptian priest suddenly materializes in 19th-century London.

Nesch, Rolf (b. Jan. 7, 1893, Oberesslingen, Ger.—d. Oct. 28, 1975, Oslo), German–Norwegian printmaker, one of the first artists to use metal collage in printmaking, thereby producing heavily embossed graphics.

Nesch was educated in Dresden, Ger., but fled to Norway as a political refugee in 1933 after his art had been labeled degenerate by the Nazi regime. He originally studied under E.L. Kirchner, and he worked successively in Expressionist, Surrealist, and abstract formats. Nesch's methods of attaching metal strips of soldering wire to the printing plate to produce embossed graphics, which he developed in the 1930s, eventually led him to make mosaic constructions using metal, wood, and coloured glass and stones affixed to the plate, which then itself became a work of art.

Nesebŭr, formerly (until 1934) MESEMBRIA, historic town and resort, eastern Bulgaria, on the Black Sea coast. Nesebŭr is situated on an island connected to the mainland by a narrow strip of land. The Greek colony of Mesembria was founded on the site late in the 6th century BC and thrived on the trade between Greece and Thrace. It was relatively unimportant during the Roman occupation but regained its former prosperity during Byzantine times. Nesebŭr's gradual decline under the Turks was accelerated by the development of the nearby port of Burgas after 1878.

Narrow, cobbled streets, stone and wooden houses, and trim courtyards sheltering fig trees and arbors are characteristic of Nesebŭr. The town also contains more than 40 churches, many of which are now in ruins. The oldest, the now-roofless Old Metropolitan Church, dates from the 6th century; the most recent is the late 12th-century New Metropolitan Church. Beach facilities for tourists have been developed on the mainland. Pop. (1986 est.) 8,248.

Nesimi, Seyid İmadeddin (d. *c.* 1418, Aleppo, Syria), one of the greatest Turkish mystical poets of the late 14th and early 15th centuries.

Very little about his early life is known. He became acquainted with the founder of an extremist religious sect, the Ḥurūfīs, the Iranian mystic Faḍl Allāh of Astarābād, who was flayed to death for his heretical beliefs in 1401/02. Ḥurūfism was based on a kabbalistic philosophy associated with the numerological significance attributed to the letters of the alphabet and their combinations (hence the name, *ḥurūf,* Arabic "letters"). Nesimi seems to have studied with various mystical teachers before he met Faḍl Allāh, but after their meeting he became a zealous adherent of the sect, acting as missionary. Regarded as a heretic by the ulama—*i.e.,* those learned in the Muslim sciences—of Aleppo, he was accused of heresy and suffered the same fate as his master in about 1418.

Nesimi wrote two divans (collections of poetry), one in Persian and one in Turkish, and a number of poems in Arabic. The Turkish *Dīvān,* which is considered his most important work, contains 250–300 ghazals ("lyrics") and more than 150 rubaʿis ("quatrains"). He expresses in his poetry both Ṣūfī and Ḥurūfī sentiments. Abounding in allusions to the martyred Faḍl Allāh, the poet's ecstatic verse repeats the basic Ḥurūfī conception that man is the incarnation of God. His lyrical and elegant style makes him one of the most prominent early divan masters, assuring him an important place in Turkish literary history.

Nesiotes (sculptor): *see* Critius and Nesiotes.

Neşri, byname of HÜSEYIN IBN EYNE BEG (b. Karaman, Ottoman Empire—d. *c.* 1520, Bursa [now in Turkey]), historian who was a prominent figure in early Ottoman historiography.

There is a great deal of controversy over the events of his life. It seems that he lived in the city of Bursa and was probably a member of the ulama (the learned religious leaders) and a poet of minor distinction. From his chronicle it is learned that he was in the Ottoman army camp near Gebze when the sultan Mehmed II died on May 3, 1481, and that he went to Constantinople, the Ottoman capital, where he observed the riots of the Janissary corps that took place after the sultan's death. These events, which are mentioned in his history, appear to be the only ones to which he was an actual witness.

His *Cihannüma* ("The Cosmorama") was, as the title suggests, designed to be a universal history. The sixth part, the longest section of which is devoted to a history of the Ottoman dynasty, was presented to Sultan Bayezid II and is the only part extant. Neşri relied heavily on the work of an earlier Ottoman historian, Aşıkpaşazâde's *Tevârih-i Âl-i Osman* ("The Chronicles of the House of Osman"), as a source. He also used the royal calendars, a type of almanac prepared to provide the court with astrological information and containing lists of historical events. Neşri is considered a true historian in that he appears to have examined his sources carefully and to have tried to establish the correct facts and chronology objectively.

Ness, Eliot (b. April 19, 1903, Chicago—d. May 7, 1957), American crime fighter, head of a nine-man team of law officers called the "Untouchables," who opposed Al Capone's underworld network in Chicago.

A graduate of the University of Chicago, Ness was 26 when, in 1929, he was hired as a special agent of the U.S. Department of Justice to head the Prohibition bureau in Chicago, with the express purpose of investigating and harassing Al Capone. Because the men, all in their 20s, whom he hired to help him were extremely dedicated and unbribable, they were nicknamed the Untouchables. The public learned of them when big raids on breweries, speakeasies, and other places of outlawry attracted newspaper headlines (reporters being invited to the raids). The Untouchables' infiltration of the underworld secured evidence that helped send Capone to prison for income-tax evasion.

Later, Ness was in charge of the alcohol-tax unit of the U.S. Department of the Treasury (1933–35) and then director of public safety in Cleveland, Ohio (1935–41). During World War II (1941–45), he was director of the Division of Social Protection of the Federal Security Agency in Washington, D.C. After the war he went into private business.

Ness, Loch, body of water lying in Inverness district, Highland region, Scotland. It has the largest volume of fresh water in Great Britain, reaching a depth of 788 feet (240 m) and a length of about 23 miles (36 km). It lies in the Great Glen that bisects the Highlands, forming part of the system of waterways across Scotland that Thomas Telford (a Scottish civil engineer) linked by means of the Caledonian Canal (opened 1822).

Loch Ness, Inverness, Scotland, showing the monastery at Fort Augustus at the head of the loch

A.F. Kersting

The watershed of Loch Ness extends to more than 700 square miles (1,800 square km), the loch being fed by several rivers, including the Oich and the Enrick. Its outlet is the River Ness, which flows into the Moray Firth. Seiches (surface oscillations), caused by differential heating, are common on the loch. The sharp rise and fall of the level of the loch is one reason for the scanty flora of the waters, another being the great depths reached near the shoreline. The abyssal fauna is also sparse.

Like some other very deep lochs in Scotland and Scandinavia, Loch Ness is said to be inhabited by an aquatic monster. Many sightings of the so-called Loch Ness monster have been reported, and the possibility of its existence—perhaps in the form of a solitary survivor of the long-extinct plesiosaurs—continues to intrigue many.

Nesselrode, Karl Vasilyevich, Count (Graf), in full KARL ROBERT VASILYEVICH, COUNT NESSELRODE (b. Dec. 13 [Dec. 2, Old Style], 1780, Lisbon, Port.—d. March 23 [March 11], 1862, St. Petersburg, Russia), foreign minister of imperial Russia (1822–56) whose policy toward the Ottoman Empire helped precipitate the Crimean War (1853–56).

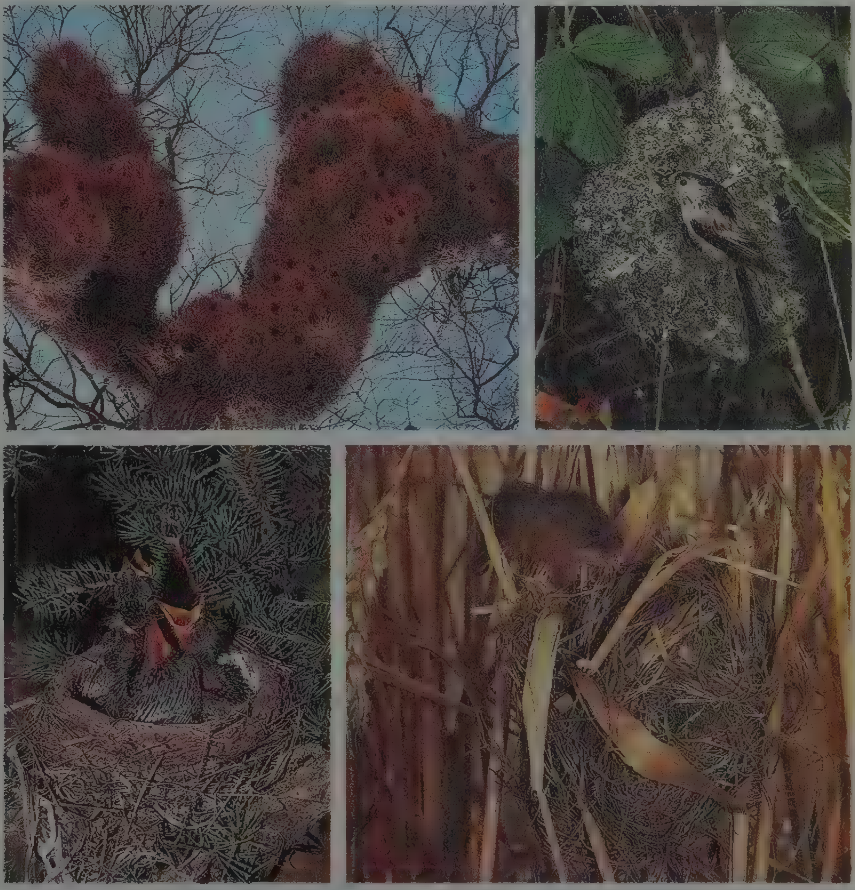
The son of a German count of the Holy Roman Empire who served as Russia's ambassador to Portugal, Nesselrode entered the Russian navy at the age of 16. When he failed to distinguish himself in the armed forces, he transferred to the diplomatic corps and served in the Russian embassies to Prussia and the Netherlands (1801–06) and as diplomatic secretary to several generals during the war against Napoleonic France (1806–07). After assisting in the conclusion of the Franco-Russian peace of Tilsit (1807), he was attached to the Russian embassy at Paris, where he attempted unsuccessfully to avoid a renewal of war between France and Russia.

After France's defeat Nesselrode attended the Congress of Vienna (1814–15), where he urged the Russian emperor Alexander I (reigned 1801–25) to support the restoration of the Bourbons in France. In 1816, despite damage done to his prestige by the discovery of a Franco-Austrian agreement aimed against Russia, Nesselrode was appointed director of the college of foreign affairs and in 1822 assumed full control of the conduct of Russia's foreign affairs.

After the accession of Emperor Nicholas I (1825), Nesselrode tried to maintain the Ottoman Empire as a power dependent on Russia. To this end, he arranged a defensive alliance with the Turks (Treaty of Unkiar Skelessi; 1833) but abandoned it owing to objections by the British, who feared Russian influence in the Mediterranean. Instead, he concluded an Anglo-Russian alliance that led to the Straits Convention of 1841, an international agreement recognizing the Ottoman sultan's right to prevent warships of any nation from passing through the straits leading to the Black Sea. The two powers also agreed to support the Ottoman Empire.

After the outbreak of the Hungarian Revolution of 1848, Nesselrode, who had restrained Nicholas from intervening in the French revolutions of 1830 and 1848, suggested that Russia aid Austria in suppressing it; this act not only crushed the Hungarian rebels but also contributed to the general misconception that Russia was the most powerful nation in Europe. Encouraged by this success, Russia's leaders assumed a more active role in foreign affairs, and, in attempting to curb France's growing influence over the Ottoman Empire, they helped precipitate an international crisis in 1853. Nesselrode, trying to avoid hostilities, prolonged diplomatic negotiations but could not prevent the onset of the Crimean War. At its conclusion he signed the Treaty of Paris (1856), which destroyed the results of his patient efforts to establish Russian preponderance in the Balkan Peninsula. Retiring from the foreign office, he retained only his post as imperial chancellor, which he had held since 1845.

nest, structure created by an animal to house its eggs, its young, or, in some cases, itself. Nests are built by a few invertebrates, especially the social insects, and by some members of all the major vertebrate groups.



Nests of the (top left) social weaver (*Philetairus socius*); (top right) long-tailed tit (*Aegithalos caudatus*); (bottom left) American robin (*Turdus migratorius*); (bottom right) Old World harvest mouse (*Micromys minutus*)

(Top left) Sven-Olof Lindblad from The National Audubon Society Collection—Photo Researchers; (top right) Stephen Dalton from The National Audubon Society Collection—Photo Researchers; (bottom left) Jeff Foott—Bruce Coleman Inc.; (bottom right) G.I. Bernard—Oxford Scientific Films

The social insects (termites, ants, bees, and wasps) build the only true nests found among the arthropods. These nests are often elaborate systems of chambers and tunnels, above or below ground. Chambers are often provided for the queen, eggs, larvae, and pupae, as well as passages for ventilation and movement.

The nests of fishes vary from shallow depressions scooped in sand or gravel (used by many groups) to enclosed structures constructed of plant materials, such as those constructed by male sticklebacks, which use a secretion produced by the kidneys as a binding material.

Among amphibians, only certain frogs build nests, which may be simple mud basins (some *Hyla* species) or floating masses of hardened froth (many diverse groups).

A few reptiles build nests; most do not. The alligator (*Alligator mississipiensis*) builds a mound of mud and vegetation in which the eggs are laid and guarded by the female. Cobras build nests of leaves and forest debris, carried by kinking their necks, and both sexes guard the eggs.

The nests of birds, by far the most commonly observed nest builders, are highly varied, from no real structure at all (*e.g.,* those of falcons, owls, many seabirds and shorebirds) to the elaborate retort-shaped nests of weavers (Ploceidae), woven with grass strands tied with knots. Certain African weavers and American Baltimore orioles, or hangnests, suspend the nest (made of long grass stems and vegetable fibres) by a long fibrous strand or rope attached to the bough of a tree. Between these extremes lie the majority of bird nests, cup-shaped or domed and constructed of twigs, leaves, mud, feathers, or even spiderwebs. A few species make extensive use of saliva as a cement for mud-built nests, especially the swallow tribe, the South American ovenbird, and the flamingo. The use of salivary glands in nest building reaches its extreme with the swifts, which glue small twigs to the inside of a chimney to form a tiny basket or, as in the case of the Asiatic edible swifts, use saliva alone. Bird nests vary in diameter from about 2 cm (about ¾ inch), in the nests of the smaller hummingbirds, to more than 2 m (6½ feet), in those of the larger eagles, and in weight from a few grams to more than a ton.

Many smaller mammals—such as the harvest mouse, the squirrel, and the rabbit—build nests in trees, on the ground, or in burrows. The echidna and the duck-billed platypus actually use their nests for laying eggs. Nests for mammals may function as permanent homes or merely as places to bear and rear young.

Nestlé SA, multinational manufacturer of food products. It is headquartered in Vevey, Switz., and operates factories, sales offices, depots, and other units in more than 70 countries. Nestlé's chief products are condensed and powdered milk; baby foods; cheeses; chocolate products; candies; instant coffees and teas; soups; seasonings and condiments; preserved and canned meats, fruits, and vegetables; frozen foods; ice cream; bottled water; and wine. The company also produces pharmaceuticals and cosmetics in addition to running restaurants and hotels.

The company dates to 1866, when two separate Swiss enterprises were founded that would later form the core of Nestlé. In August of that year, Charles A. and George Page, brothers from the United States, established the Anglo-Swiss Condensed Milk Company in Cham, Switz. In September, in nearby Vevey, Henri Nestlé developed a milk-based baby food and soon began marketing it. In the succeeding decades both enterprises aggressively expanded their businesses throughout Europe and the United States. (Henri Nestlé retired in 1875, but the company, under new ownership, retained his name in Farine Lactée Henri Nestlé.) In 1877 Anglo-Swiss added milk-based baby foods to its products, and in the following year the Nestlé company added condensed milk, so that the firms became direct and fierce rivals.

In 1905, however, the companies merged to become the Nestlé and Anglo-Swiss Condensed Milk Company, a name retained until 1947, when the name Nestlé Alimentana SA was adopted as a result of the acquisition of Fabrique de Produits Maggi SA (founded 1884) and its holding company, Alimentana SA of Kempttal, Switz.; Maggi was a major manufacturer of soup mixes and related foodstuffs. The company shortened its name to the present one in 1977.

From the beginning of the century the Nestlé company began diversifying. In 1904 it bought chocolate rights that would eventually result in products under the Peter, Kohler, Nestlé, and Cailler brands. In 1927 it acquired rights from the cheesemakers Gerber & Company AG. In 1937 the company invented instant coffee, which it began producing under the name Nescafé the following year. In 1960 it acquired control of Crosse & Blackwell (founded 1830) and affiliated companies in Great Britain, Australia, South Africa, the United States, and elsewhere.

Many acquisitions of American food companies followed, including Libby, McNeill & Libby in 1970, the Stouffer Corporation in 1973, and one of America's largest food companies, the Carnation Company, in 1985. Nestlé's acquisition of Ralston Purina in 2002 created a new division, Nestlé Purina PetCare.

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Nestor, in Greek legend, king of Pylos (Navarino) in Elis. All of his brothers were slain by the Greek hero Heracles (the Roman Hercules), but Nestor escaped. In the *Iliad* he is about 70 years old and sage and pious; his role is largely to incite the warriors to battle and to tell stories of his early exploits, which contrast with his listeners' experiences, shown to be soft and easy. In the *Odyssey* he entertains Telemachus.

Nestor (b. *c.* 1056, Kiev [now in Ukraine]—d. Oct. 27, 1113, Kiev), a monk in Kievan Rus of the Monastery of the Caves in Kiev (from about 1074), author of several works of hagiography and an important historical chronicle.

Nestor wrote the lives of SS. Boris and Gleb, the sons of St. Vladimir of Rus, who were murdered in 1015, and the life of St. Theodosius, abbot of the Monastery of the Caves (d. 1074). A tradition that was first recorded in the 13th century ascribes to him the authorship of the *Povest vremennykh let* ("Tale of Bygone Years"; *The Russian Primary Chronicle: Laurentian Text*), the most important historical work of early medieval Rus. Modern scholarship, however, regards the *Chronicle* as a composite work, written and revised in several stages, and inclines to the view that the basic (though not final) version of the document was compiled by Nestor about 1112. The *Chronicle,* extant in several medieval manuscripts, the earliest dated 1377, was compiled in Kiev. It relates in detail the earliest history of the eastern Slavs down to the second decade of the 12th century. Emphasis is laid on the foundation of the Kievan state—ascribed to the advent of Varangians (a tribe of Norsemen) in the second half of the 9th century; the subsequent wars and treaties between Rus and Byzantium; the conversion of Rus to Christianity in about 988; the cultural achievements of the reign of Yaroslav the Wise of Kiev (1019–54); and the wars against the Turkic nomads of the steppe.

Written partly in Old Church Slavonic, partly in the Old Russian language based on the spoken vernacular, the *Chronicle* includes material from translated Byzantine chronicles, west and south Slavonic literary sources, official documents, and oral sagas. This borrowed material is woven with considerable skill into the historical narrative, which is enlivened by vivid description, humour, and a sense of the dramatic.

Nestorian, member of a Christian sect originating in Asia Minor and Syria out of the condemnation of Nestorius and his teachings by the councils of Ephesus (AD 431) and Chalcedon (AD 451). Nestorians stressed the independence of the divine and human natures of Christ and, in effect, suggested that they were two persons loosely united. In modern times they are represented by the Church of the East, or Persian Church, usually referred to in the West as the Assyrian, or Nestorian, Church. Most of its members—numbering about 170,000—live in Iraq, Syria, and Iran.

Christianity in Persia faced intermittent persecution until the Persian Church in 424 formally proclaimed its full independence of Christian churches elsewhere, thereby freeing itself of suspicions about foreign links. Under the influence of Barsumas, the metropolitan of Nisibis, the Persian Church acknowledged Theodore of Mopsuestia, the chief Nestorian theological authority, as guardian of right faith, in February 486. This position was reaffirmed under the patriarch Babai (497–502), and since that time the church has been Nestorian.

Nestorius had been anathematized at Ephesus in 431 for denouncing the use of the title Theotokos ("God-Bearer") for the Blessed Virgin, insisting that this compromised the reality of Christ's human nature. When supporters of Nestorius gathered at the theological school of Edessa, it was closed by imperial order in 489, and a vigorous Nestorian remnant migrated to Persia.

The Persian Church's intellectual centre then became the new school in Nisibis, which carried on the venerable traditions of Edessa. By the end of the 5th century there were seven metropolitan provinces in Persia and several bishoprics in Arabia and India. The church survived a period of schism (*c.* 521–*c.* 537/539) and persecution (540–545) through the leadership of the patriarch Mar Aba I (reigned 540–552), a convert from Zoroastrianism, and also through the renewal of monasticism by Abraham of Kashkar (501–586), the founder of the monastery on Mount Izala, near Nisibis.

After the Arab conquest of Persia (637), the Caliphate recognized the Church of the East as a millet, or separate religious community, and granted it legal protection. Nestorian scholars played a prominent role in the formation of Arab culture, and patriarchs occasionally gained influence with rulers. For more than three centuries the church prospered under the Caliphate, but it became worldly and lost leadership in the cultural sphere. By the end of the 10th century there were 15 metropolitan provinces in the Caliphate and 5 abroad, including India and China. Nestorians also spread to Egypt, where Monophysite Christianity acknowledged only one nature in Christ. In China a Nestorian community flourished from the 7th to the 10th century. In Central Asia certain Tatar tribes were almost entirely converted, Christian expansion reaching almost to Lake Baikal in eastern Siberia. Western travelers to the Mongol realm found Nestorian Christians well-established there, even at the court of the Great Khan, though they commented on the ignorance and superstition of the clergy. When during the 14th century the Church of the East was virtually exterminated by the raids of the Turkic leader Timur, Nestorian communities lingered on in a few towns in Iraq but were concentrated mainly in Kurdistan, between the Tigris River and Lakes Van and Urmia, partly in Turkey and partly in Iran.

In 1551 a number of Nestorians reunited with Rome and were called Chaldeans, the original Nestorians having been termed Assyrians. The Nestorian Church in India, part of the group known as the Christians of St. Thomas, allied itself with Rome (1599), then split, half of its membership transferring allegiance to the Syrian Jacobite (Monophysite) patriarch of Antioch (1653). In 1898 in Urmia, Iran, a group of Nestorians, headed by a bishop, were received in the communion of the Russian Orthodox church.

Nestorius (b. late 4th century AD, Germanicia, Syria Euphratensis, Asia Minor [now Maras, Turkey]—d. *c.* 451, Panopolis, Egypt), early bishop of Constantinople whose views on the nature and person of Christ led to the calling of the Council of Ephesus in 431 and to Nestorianism, one of the major Christian heresies. A few small Nestorian churches still exist. (*See also* Nestorian.)

Life and career. Nestorius was born of Persian parents. He studied at Antioch (now in Turkey), probably as the pupil of Theodore, bishop of Mopsuestia. He became a monk at the nearby Monastery of St. Euprepius and, after being ordained a priest, acquired a great reputation for asceticism, orthodoxy, and eloquence. Owing to this reputation, Nestorius was nominated by the Eastern Roman emperor Theodosius II to become bishop of Constantinople in 428. His debut was a stormy one, however, for he immediately set to work extirpating heretics of every sort, showing leniency only to Pelagians.

A crisis developed when Nestorius' domestic chaplain, Anastasius, on Nov. 22, 428, preached a sermon in which he objected to the title Theotokos ("God-Bearer") as applied to Mary. Many were scandalized, for the term had long been in use. Nestorius, who had already expressed doubts on the subject, supported Anastasius and, on Christmas Day, began a series of addresses arguing that Mary was not Theotokos. Nestorius considered that, unless carefully qualified, the term Theotokos as applied to Mary compromised Christ's full humanity. To many people it seemed that Nestorius himself was denying the divinity of Christ and regarding him as a mere man who had been adopted by God as his son. In the resulting controversy, Nestorius' opponents found an ally in Cyril, bishop of Alexandria, whose intervention set in motion a series of events that finally led to Nestorius' downfall.

Cyril's motive was twofold. He sincerely believed that Nestorius was undermining the purity of the faith; Nestorius' refusal to style Mary as Mother of God seemed to Cyril to deny the unity of the God-man. As bishop of Alexandria, Cyril also was eager to belittle the rival see of Constantinople, as his immediate predecessor, Theophilus, had done in the case of John Chrysostom. Theological and political considerations were thus combined.

Both sides appealed to Pope Celestine I, who had already been offended by Nestorius' tactlessness. In August 430 Celestine held a church council in Rome which decided that correct Christology required the use of the term Theotokos and requested Nestorius to disown his errors. When Cyril, who had been authorized to execute the sentence upon Nestorius, produced a string of provocative anathemas for him to subscribe to or face excommunication, Nestorius and his allies took alarm, and he persuaded the emperor Theodosius to convene a general church council. It was Nestorius' hope that the council would result in the condemnation of Cyril. When the council met at Ephesus in 431, however, Nestorius found himself hopelessly outmaneuvered by Cyril. (*See* Ephesus, councils of.)

Nestorius' teaching was condemned and he himself was deposed from his see. Theodosius was induced to ratify these decisions, and Nestorius was relegated to his former monastery near Antioch. After languishing there in exile for four years (431–435), he was transferred to the Great Oasis (now the Oasis of Khārijah) in the Libyan Desert about 436 and was later removed to Panopolis in Upper Egypt. During his exile, he wrote the *Book of Heraclides of Damascus,* which he intended as a defense of his teaching and a history of his life. The sole treatise from his pen to have survived, it was discovered in 1895 in a Syriac translation. Nestorius died in Panopolis about 451, protesting his orthodoxy.

Nestorianism. Nestorius is regarded as one of the principal heretics in Christology, and the heresy traditionally linked with his name, Nestorianism, was formally condemned at the church councils of Ephesus (431) and Chalcedon (451). Nestorianism, as it was understood at the time, so insisted upon the full humanity of Christ's human nature that it was believed to divide him into two persons, one human and the other divine. Whereas orthodox Christology holds that Christ has two natures, divine and human, ineffably united in one person, or hypostasis, Nestorianism so stresses their independence as to suggest that they are in effect two persons, or hypostases, loosely joined by a moral union. Nestorianism envisages the divine Word as having associated with itself at the incarnation a complete, independently existing man. From the orthodox point of view, Nestorianism therefore denies the reality of the incarnation and represents Christ as a God-inspired man rather than as God-made-man. Since the 5th century all the principal branches of the Christian church have united in condemning Nestorianism and have affirmed that Christ is a single person, at once wholly human and wholly divine. Even the so-called Nestorian church is not Nestorian in the strict sense, though it venerates Nestorius and refuses to accept the title Theotokos.

It is questionable, however, whether Nestorius himself ever taught, or intended to teach, the heresy named for him. Indeed, he repudiated such views, and Cyril's attacks on him were based on a misunderstanding. The fact is that Nestorius repeatedly affirmed the perfect unity of the incarnate Christ, and he repudiated any suggestion of there being two persons existing side by side in his being. Nestorius can be better understood as the victim of his own intolerant personality and crudely provocative rhetoric, and as having been the loser in one of the rivalries between great episcopal sees that were a feature of the time.

What Nestorius actually taught was a prosopic union. The Greek term *prosōpon* means the external, undivided presentation, or manifestation, of an individual that can be extended by means of other things—*e.g.,* a painter includes his brush within his own *prosōpon.* So the Son of God used manhood for his self-manifestation, and manhood was, therefore, included in his *prosōpon,* so that he was a single object of presentation.

Nestorianism was crushed within the Roman Empire but survived outside its frontiers. The Christian church in Persia adopted it, largely to obtain the protection of its rulers by assuring them that its religion was not that of their enemies the Romans. Nestorianism has continued until today, though its adherents are few, with groups being found in Iraq, India, Iran, Syria, and North and South America.

(J.N.D.K./Ed.)

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Néstos River, Modern Greek NÉSTOS POTAMÓS, Bulgarian MESTA, river in southwestern Bulgaria and western Thrace, Greece. The Néstos rises on Kolarov peak of the Rila Mountains of the northwestern Rhodope (Rodopi) Mountains. The river's upper confluents separate the Rila and Pirin ranges from the main Rhodope massif. Crossing the Bulgarian frontier into Greece, the Néstos divides Greek Macedonia from Greek Thrace. From just west of Stavroúpolis to its mouth on the Aegean Sea, 150 miles (240 km) from its source, it forms the boundary between Kaválla and Xánthi *nomoí* (departments). Above Paranéstion, however, the river is confined to inaccessible gorges as it traverses the sparsely populated, mountainous Dráma *nomós* (department). West of Xánthi the Néstos reaches the marshy, alluvial coastal plain of Khrisoúpolis (Chrysopolis).

Nestroy, Johann, in full JOHANN NEPOMUK EDUARD AMBROSIUS NESTROY (b. Dec. 7, 1801, Vienna, Austria—d. May 25, 1862, Graz), one of Austria's greatest comic dramatists, and a brilliant character actor who dominated the mid-19th-century Viennese popular stage.

After a career as an opera singer (1822–31) in several European cities, Nestroy returned to Vienna and began writing and acting. His 50 plays, which are virtually all adaptations of plots from earlier plays or novels, characteristically revolve around a brilliant, detached central character (played by Nestroy himself) whose part requires a virtuoso performance in language, diction, and timing in order to convey its sharp nuances. Nestroy made use of satire, irony, and parody to dissect the newly rich bourgeoisie, as well as a number of the leading figures of Viennese society. From 1854 until he retired in 1860 he managed the Carl-Theater in Vienna.

Among his best-known works are *Der böse Geist Lumpazivagabundus oder Das Liederliche Kleeblatt* (1833; "The Evil Spirit Lumpazivagabundus, or the Roguish Trio"); *Der Zerrissene* (1844; *A Man Full of Nothing*); *Das Mädl aus der Vorstadt, oder Ehrlich währt am längsten* (1841; "The Lass from the Suburb, or Honesty is the Best Policy"); *Einen Jux will er sich machen* (1842; "He Intends to Have a Fling"), adapted by Thornton Wilder as *The Matchmaker* and later adapted as the musical play and film *Hello Dolly!*; and *Kampl oder: Das Mädchen mit den Millionen und die Nähterin* (1852; "Kampl; or, The Millionairess and the Seamstress").

net, an open fabric of thread, cord, or wire, the intersections of which are looped or knotted so as to form a mesh. Nets are primarily used for fishing.

The early stages in the manufacture and use of nets are difficult to trace because materials were perishable and tools simple, but there is strong evidence that nets were employed by the hunter-gatherers of southern Europe from Upper Paleolithic times. Primitive netting was fabricated with thread or cord made from a wide range of vegetable fibres (bark, bast, leaves, roots, and stems) and animal tissues (hide, sinew, hair, intestine, and baleen).

Modern nets, generally machine-made, are composed either of vegetable fibres (such as cotton, hemp, flax, manila, and sisal) or of man-made fibres (such as nylon, polyester, polypropylene, and polyethylene). The man-made fibres are inherently rotproof, whereas vegetable fibres must be treated against rot with substances such as tar.

The primary types of net used for fishing are drift nets, surrounding (encircling, or encompassing) nets, and trap nets. Drift nets—which include gill and trammel nets used at the surface and bottom-set nets used on the seabed—capture fish by entangling them. Gill and trammel nets are used principally to catch herring and salmon and are the most common drift nets. In commercial fishing, a long fleet of drift nets, often several miles in length, is suspended vertically with a line of corks or other floats at the top and a line of lead weights at the bottom. Adjustable floats maintain the net at the desired depth, and lighted marker buoys are placed at intervals. These nets are dropped from a ship at sunset because they can be seen by the fish if dropped during daylight. After the boat anchors, the net drifts all night. As a fish attempts to swim through a gill net, its head penetrates the mesh, and a section of twine slips under its gill cover, entangling it. The trammel net, on the other hand, is composed of two outer panels of large-mesh netting enclosing an inner panel of finer netting. It entangles the fish in pockets formed by the passing of the inner net through the mesh of the outer net.

Surrounding nets are fine, heavy nets that capture fish by encircling them. Seine nets, trawls, dredges, and long lines are all varieties of surrounding nets. Of these, the most widely used are the seine and the trawl. Beach, or drag, seines can be hauled onto a beach with their contents; others, called purse seines, are operated from boats in deep water far from the shore. A steel cable that runs through rings at the bottom of the purse seine is pulled up to close the net. Seine nets (also known as ring, or round, nets) are used to catch sardines, herring, pilchards, salmon, and tuna. The other principal form of surrounding net is the trawl, a bag-shaped net that is dragged by a specialized vessel (trawler) along the bottom of the sea or in midwater. Trawls are used to catch cod, haddock, plaice, and sole, which are trapped in the net when it is pulled to the surface.

Trap nets are stationary nets that are staked to the shore or in estuaries. They form a labyrinth-like chamber into which fish can easily enter, and from which they cannot easily escape. Salmon, trout, and eels are the principal catch.

Although nets are primarily used in commercial fishing, they also are used in land capture of animals (birds, butterflies, and much larger animals), and they have many uses in industry, sports, and horticulture.

Netaji (Indian revolutionary): *see* Bose, Subhas Chandra.

Netanya, also spelled NATANYA, city, west-central Israel. It lies on the Mediterranean coast, 19 miles (30 km) north of Tel Aviv–Yafo. Because of its proximity to the West Bank, the city was a frequent target of bombings by Palestinian terrorists at the beginning of the 21st century.

Netanya was founded in 1928 and named for the American-Jewish merchant and philanthropist Nathan Straus (1848–1931). The site was originally established as a noncollective agricultural settlement (moshav) devoted to citrus cultivation. Jewish immigration from Nazi-held European countries after 1933, and further immigration after World War II, gave it an increasingly urban character, and Netanya is now the focus of a large urban agglomeration.

Diamond cutting and polishing, which constitutes one of Israel's most important industries, is centred there. Although diamond trading is principally conducted on the Diamond Exchange at Ramat Gan, most of the actual workshops are at Netanya. A new industrial area developed in Netanya since 1950–52 includes textile mills and factories producing rubber and plastic articles, complex machinery, and raw materials for the pharmaceutical industries. Just south of the city is one of Israel's largest breweries. Netanya has also developed as a resort centre. Inc. 1948. Pop. (1999 est.) 154,900.

Netanyahu, Benjamin, byname BIBI (b. Oct. 21, 1949, Tel Aviv, Israel), Israeli politician and diplomat who was his country's prime minister from 1996 to 1999.

Netanyahu's father was the historian Benzion Netanyahu. In 1963 the family moved to Philadelphia, where Netanyahu attended high school. He enlisted in the Israeli military in 1967 and later joined the elite special operations unit Sayeret Matcal. In 1972 he participated in the rescue of a hijacked airliner at Ben-Gurion Airport near Tel Aviv. He attended the Massachusetts Institute of Technology in 1972–75 (M.B.A. 1976), interrupting his studies in 1973 to serve in the Yom Kippur War.

In the 1980s Netanyahu served his country as a deputy to the Israeli ambassador to the United States (1982–84) and as Israel's ambassador to the United Nations (1984–88). Elected to the Knesset (Israeli parliament) as a member of the Likud party in 1988, he became deputy minister of foreign affairs (1988–91) and a deputy minister in the coalition cabinet of Labour Prime Minister Yitzhak Rabin (1991–92). He was elected leader of the Likud in 1993.

Netanyahu was noted for his opposition to the Israel-PLO peace accords signed in Oslo in 1993 and the resulting Israeli withdrawals from the West Bank and Gaza Strip. By early 1995 the governing Labour Party was favoured to win elections scheduled for the following year, but Rabin's assassination weakened Labour's appeal, and a series of suicide bombings in Israel by Muslim militants early in 1996 was instrumental in turning public opinion in Likud's favour. Netanyahu narrowly defeated Prime Minister Shimon Peres in the May 29, 1996, election, the first in which the prime minister was directly elected. At 46, he became the youngest person ever to serve as Israel's prime minister.

Netanyahu's tenure was marked by deteriorating relations with Syria and the Palestinians. His decision in September 1996 to open an ancient tunnel near Al-Aqsa Mosque angered Palestinians and sparked intense fighting. With tensions still high, Netanyahu reversed his earlier opposition to the Oslo accords and agreed to withdraw Israeli troops from most of the West Bank town of Hebron, though pressure from his government's right wing led him to reduce the amount of land to be transferred to Palestinian control during the next phase of Israel's scheduled withdrawal from the West Bank. In 1998 Netanyahu and Palestinian leader Yāsir ʿArafāt participated in talks that led to the Wye Memorandum, the terms of which included placing as much as 40 percent of the West Bank under Palestinian control. In response, several right-wing factions resigned from Netanyahu's governing coalition.

In 1998 the Knesset dissolved the government, and new elections were called for May 1999. Hindered by a fragmented right and by voters' dislike of his inconsistent peace policies and his often abrasive style, Netanyahu was defeated by the Labour candidate Ehud Barak.

netball, popular game in girls' schools in England and several other Commonwealth countries, similar to six-player girls' basketball in the United States. It is played on a hard-surfaced rectangular court 100 feet long and 50 feet wide (30 by 15 m), clearly marked into three zones with half circles 16 feet in radius at either end for shooting. The goalposts stand 10 feet high with ringed nets at the top through which the ball must pass from above to score a point. The rings are 15 inches (38 cm) in diameter, and the ball is of leather or rubber, about 8.5 inches in diameter and 14–16 ounces (400–450 g) in weight.

The game is played between two teams, each consisting of seven players—three centre players, two attackers, and two defenders, with each player restricted in movement to certain areas of the court. The ball must be passed from hand to hand from player to player, and no one may run with it. The centre players try to pass the ball up the court into the circle for the attackers to shoot (only the two attackers may shoot). The defenders, by guarding their opponents and by intercepting passes, try to prevent goals from being scored. A game consists of four 15-minute periods or two 20-minute halves.

At the beginning of the 21st century, there were more than two million netball players worldwide. In 1998 netball became a medal sport at the Commonwealth Games.

Netherlandic language, English DUTCH, or FLEMISH, Netherlandic NEDERLANDS, Flemish VLAAMS, a West Germanic language that is the national language of The Netherlands and, with French, one of the two official languages of Belgium. Although speakers of English usually call the Netherlandic of The Netherlands "Dutch" and the Netherlandic of Belgium "Flemish," they are the same language.

Netherlandic, which occurs in both standard and dialectal forms, is the language of most of The Netherlands, of northern Belgium, and of a relatively small part of France along the North Sea, immediately to the west of Belgium. Netherlandic is also used as the language of administration in Suriname and the Netherlands Antilles. Afrikaans, which is a derivative of Netherlandic, is one of the official languages of South Africa.

The spoken language exists in a great many varieties ranging from Standard Netherlandic (Algemeen Beschaafd Nederlands, or "General Cultured Netherlandic")—the language used for public and official purposes, including instruction in schools and universities—to the local dialects that are used among family, friends, and others from the same village (these exist in far more variety than does the English of North America). Standard Netherlandic is characterized grammatically by the loss of case endings in the noun.

In Belgium efforts were made to give Netherlandic equal status with French, which had assumed cultural predominance during the period of French rule (1795–1814). In 1938 Netherlandic was made the only official language of the northern part of Belgium.

The use of Standard Netherlandic together with the local dialect is much more widespread among the people of The Netherlands than it is in Belgium. The dialects of the area bounded roughly by Amsterdam, The Hague, and Rotterdam are closer to Standard Netherlandic than are those of the other dialect areas.

Together with English, Frisian, and German, Netherlandic is a West Germanic language. It derives from Low Franconian, the speech of the Western Franks, which was restructured through contact with speakers of North Sea Germanic along the coast (Flanders, Holland) in the period around AD 700. The earliest documents in the Netherlandic language date from approximately the end of the 12th century, although a few glosses, names, and occasional words appeared somewhat earlier.

Netherlandish art, Early: *see* Early Netherlandish art.

Netherlands, Reformed Churches in The: *see* Reformed Churches in The Netherlands.

Netherlands, The, officially KINGDOM OF THE NETHERLANDS, Dutch NEDERLAND, or KONINKRIJK DER NEDERLANDEN, byname HOLLAND, country located in northwestern Europe. Extending 175 miles (282 km) from north to south and 110 miles (177 km) from east to west, the country is bounded on the north and west by the North Sea, on the east by Germany, and on the south by Belgium. The national capital is Amsterdam and the seat of government is The Hague. Area 16,163 square miles (41,863 square km), of which almost 20 percent is inland water. Pop. (1992 est.) 15,163,000.

The Netherlands

A brief treatment of The Netherlands follows. For full treatment, *see* MACROPAEDIA: Netherlands, The.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The Netherlands is divided into two distinct regions. The higher one, in the south and east, consists mostly of undulating plains and a few high ridges rarely exceeding 350 feet (107 m) above sea level. Vaalser Hill (1,053 feet [321 m]), in the extreme southeast, is the highest point in the country. The low region, in the southwest, west, northwest, and north, constitutes most of the country and consists of the common delta of the Rhine, Meuse (Dutch and Flemish: Maas), and Schelde (French: Escaut) rivers. The coastal areas of The Netherlands are almost completely below sea level. Much of this part of the country has been wrested from the sea by a process of careful water management, drainage, and reclamation that dates back to the 12th century, though the really large projects were carried out in the 20th century. Since the 12th century some one-fifth of The Netherlands' land area has been reclaimed from the sea. Steam, diesel, and electric pumps have replaced windmills in keeping the polders (flat land diked against the sea) drained.

A long range of coastal sand dunes, reinforced by high man-made dikes, encloses the polders and protects a great part of the low region from encroaching tides, enabling the reclaimed lands to be used for agriculture and settlement. The largest reclaimed areas in the north are in the IJsselmeer (Lake IJssel [formerly part of the Zuiderzee]), which was created by a barrier dam in the 1930s; and those lands in the south (involving the estuaries of the Rhine, Meuse, and Schelde rivers) reclaimed by the dams of the Delta Project, which in the 1980s and '90s closed the sea inlets of the southwestern province of Zeeland. The Rhine, Meuse, and Schelde are the country's largest rivers.

The climate of The Netherlands is temperate and largely influenced by the North Sea and the Gulf Stream. The average temperature is about 49° F (9° C), ranging from 35° F (2° C) in January to 63° F (17° C) in July. The country's average annual rainfall is 31 inches (790 mm), with rainfall being highest in summer (August). A long growing season and excellent grazing lands on the polders have greatly helped the nation's dairy industry. The Netherlands ranks among the top exporters of cheese, butter, and eggs in the world. Almost three-fifths of the land is used for agriculture, about one-third of it in pasture and more than one-fourth in farms and market gardens. Export-oriented cultivation of ornamental plants, flowers, and bulbs, especially the tulip—the country's national symbol—has become a major industry. Hothouse cultivation produces cucumbers, tomatoes, lettuce, and flowers—all chiefly for export.

The Netherlands' reserves of natural gas are one of the largest in western Europe and provide about one-half of domestic energy requirements. Other mineral resources include petroleum, salt, and coal.

The people. The ethnic composition is predominantly Dutch with some Turks, Moroccans, and Germans. The modern Dutch are believed to be descended from a mixture of pre-Germanic and Germanic groups that later came to be identified as Frisians, Saxons, and Franks. Immigrants to The Netherlands have historically included French Huguenots, Salzburgers, Swiss, Spanish and Portuguese Jews, Indonesians, and Surinamese. The nation is about equally divided between Roman Catholics and Protestants, although as much as one-third of the population profess no religious affiliation.

The annual rate of population growth of The Netherlands continued to decline in the late 20th century. The birth rate, which is less than half that of the period of 1945–54, is relatively low; the low death rate is relatively unchanged. Life expectancy is high: 74 years for males and 80 for females. Those under 15 years of age constitute a relatively low 18 percent of the population and those over 60 a substantial 17 percent.

Immigration, which exceeds emigration, is mostly from Turkey, Morocco, the United Kingdom, and the former Dutch colony of Suriname. Emigration has declined since 1975. The major destinations of emigrants are Turkey, the United Kingdom, and Germany.

Although the country's overall population density is high, two-fifths of the population lives in the three west-central provinces of Zuid-Holland, Noord-Holland, and Utrecht, in which are located the cities of Amsterdam, Rotterdam, The Hague, and Utrecht. In the northeastern provinces the population density is markedly lower. There is an internal movement of population from the western to the eastern provinces. Urban areas account for more than 88 percent of The Netherlands' population.

The economy. The Netherlands has a developed market economy based largely on financial services, light and heavy industries, and trade. Industries are heavily concentrated in the provinces of Noord-Holland, Zuid-Holland, and Utrecht. The gross national product (GNP) is growing more rapidly than the population; the GNP per capita is similar to those of other developed western European countries.

The agricultural sector accounts for less than 5 percent of the gross domestic product (GDP) and employs a similar percent of the work force. Agriculture is highly mechanized and dominated by truck farming. Although wheat and certain other staples must be imported, the country is one of Europe's largest exporters of farm produce. Chief crops include sugar beets, potatoes, vegetables and melons, and wheat. Dairy cattle are raised principally in Friesland and Noord-Holland; large numbers of pigs are also raised.

Because of The Netherlands' scarcity of mineral resources, it is dependent on large imports of metallic ores, fuels, and other raw materials. The one exception to this is the natural gas found in Groningen province and the North Sea. Much of western Europe's petroleum is imported through the port city of Rotterdam, which has a complex of storage facilities, oil refineries, and petrochemical works. Electricity is generated mainly by domestic and imported fuels.

The country's manufacturing industries account for approximately one-fifth of the GDP and employ one-sixth of the work force. Industries are concentrated in the urban agglomerations of Amsterdam, Utrecht, Haarlem, Rotterdam, and The Hague. Chief manufactures include foodstuffs, synthetic fibres, petroleum products, and electrical machinery.

The Netherlands Trade Union Confederation, formed in 1975 by the federation of two large trade unions, represents approximately 1,000,000 workers; separate unions represent Roman Catholics and Protestants. The Foundation of Labour was established in 1945 and mediates between employers and employees.

Exports from The Netherlands equal about one-half of its GNP. Rotterdam is Europe's leading port and is linked by an extensive network of inland waterways to the western European hinterland. The Netherlands belongs to the Benelux Economic Union; most of the country's external trade is with other members of the European Economic Community. Principal trading partners include Germany, Belgium and Luxembourg, the United Kingdom, and France.

Government and social conditions. The Kingdom of The Netherlands, which includes the self-governing island of Aruba and the former colony of the Netherlands Antilles, is a constitutional monarchy with a parliamentary form of government. As head of state the hereditary monarch has mainly formal prerogatives. The country's 1814–15 Constitution, which was subsequently revised and amended, vests legislative power in a bicameral parliament, the Staten-Generaal (States General), composed of a 75-member First Chamber and a 150-member Second Chamber. The members of the First Chamber are elected to six-year terms by members of provincial councils; members of the Second, which has greater authority, are directly elected to four-year terms. Executive power is exercised by an appointed Cabinet under the leadership of the prime minister. The judiciary is headed by the Supreme Court.

Social welfare programs receive a major share of budget expenditures (about one-fifth of the total). Programs include old-age, disability, and survivors pensions, children's allowances, and reimbursement of exceptional medical expenditures for all residents. Employees receive health benefits and services, compensation for work injury, and unemployment relief. Health conditions are comparable to those of other developed countries. A chronic housing shortage led to controversial government programs, including subsidization of both public and private construction, and rent control in urban areas.

The Dutch population is almost entirely literate. Education is compulsory between the ages of 5 and 16. The educational system consists of both public and state-subsidized private schools. The majority of children attend private, usually denominational schools. Higher education is provided through colleges, universities, and technical institutes.

The press is vigorous in terms of both diversity and editorial quality. The Dutch broadcasting system is operated by the Netherlands Broadcasting Corporation, encompassing several private organizations of religious, political, and independent orientations that provide the majority of programming.

Cultural life. The predominant art form in The Netherlands has been painting. Not surprisingly, the country contains several notable art museums. Located in Amsterdam are the Rijksmuseum, particularly noted for its collection of 17th-century Dutch paintings; the Rijksmuseum Vincent van Gogh, housing hundreds of paintings and drawings by van Gogh; and the Stedelijk Museum, which contains a large collection of contemporary art. The Rijksmuseum Kröller-Müller in Otterlo also contains a world-renowned collection of paintings by van Gogh. Mauritshuis in The Hague has a large collection of 17th-century paintings, and the Boymans–van Beuningen Museum in Rotterdam is also notable.

The 20th-century movement known as De Stijl widely influenced Western art and architecture. Prominent in the movement were Piet Mondrian and Theo van Doesburg.

Dutch theatre and literature are little known internationally. Musical life, however, is intense, and the Amsterdam Concertgebouw Orchestra is world famous.

History. Celtic and Germanic tribes inhabited the Netherlands at the time of the Roman conquest (1st century BC). In the early 5th century AD, an invasion of Germanic tribes ended Roman rule. The Frankish Merovingian dynasty followed the Romans but was supplanted in the late 7th century by Pepin II and his successors, the most famous of whom was Charlemagne.

From the early 10th to the mid-14th century, secular and ecclesiastical principalities emerged and struggled for dominance. In the early 16th century the Netherlands became a province of the Spanish Habsburgs. During the Reformation the northern provinces were converted to Calvinism, and Prince William of Orange (1533–84) led a Calvinist-inspired revolt against Spain. In 1579 the northern provinces broke away from Spain and established the United Provinces of the Netherlands.

War between the United Provinces and Spain continued into the 17th century, but in 1648 Spain finally recognized Dutch independence. During the 17th century the Netherlands, with extensive colonial holdings, became the leading commercial nation in Europe. Following English efforts to curtail Dutch maritime power, the Netherlands went to war with England in 1652–54. In 1688 the English Parliament invited William of Orange, stadtholder, and his wife, Mary Stuart, to rule England as William III and Mary II. William then used the combined resources of England and the Netherlands to wage war on Louis XIV's France. During the 18th century, Dutch maritime power declined, and commerce became more dependent on the English.

Following the French Revolution, the Netherlands became the Batavian Republic (1795–1806), a French protectorate. After 1814 the new Kingdom of The Netherlands included Belgium and Luxembourg until the Belgians gained independence in the revolt of 1830. A new constitution (1848) was modeled after the British system, giving the States General (the parliament) supreme power. In the late 19th century, The Netherlands underwent industrial expansion and began to regain the prosperity that it had lost during the previous century.

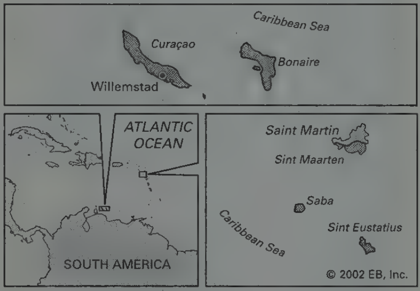
The Netherlands remained neutral during World War I but was occupied by Germany during World War II. During the occupation many hostages were taken and many Jews were deported to concentration camps.

After the war The Netherlands abandoned its neutral status and joined the North Atlantic Treaty Organization (1949) and the European Economic Community (1958; now part of the European Union). Postwar governments were composed of Catholic People's and Labour party coalitions. From the late 1950s until the early '70s the reorganized Catholic People's Party, which included Protestants, controlled the government. Since the 1970s, governing coalitions have included at least two of the three main parties (Christian Democrats, Liberals, and Labour) in various combinations.

From the 1950s until the '70s, The Netherlands enjoyed an economic boom, and its political parties united in support of generous social welfare benefits. By the end of the 20th century, The Netherlands had acquired an international reputation for liberal social policies, including lenient drug laws, legal recognition of same-sex partnerships, tolerance for minorities, and environmental protections.

Netherlands, United Provinces of the: *see* Dutch Republic.

Netherlands Antilles, Dutch NEDERLANDSE ANTILLEN, five islands in the Caribbean Sea, an autonomous part of The Netherlands since 1954. The islands are in two widely separated groups: the northern group lies at the northern end of the Lesser Antilles and consists of Sint Eustatius, the southern part of Saint Martin (Dutch: Sint Maarten), and Saba; the southern islands lie about 500 miles (800 km) to the southwest, off the coast of Venezuela, and consist of Bonaire and Curaçao (until 1986 the island of Aruba was also included). The capital, on Curaçao, is Willemstad. Area 309 square miles (800 square km). Pop. (1994 est.) 197,069.



Netherlands Antilles

A brief treatment of the Netherlands Antilles follows. For full treatment, *see* MACROPAEDIA: West Indies.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The southern islands, less than 50 miles (80 km) off the Venezuelan coast, are rather low-lying, rocky, and dry. The larger of the islands is Curaçao (171 square miles [444 square km]), with the highest elevations, rising to 1,230 feet (375 m). Bonaire, the smaller island (111 square miles [288 square km]), about 20 miles (32 km) east of Curaçao, has elevations of up to 787 feet (240 m). The southern islands have a dry tropical climate, annual rainfall often falling below 22 inches (550 mm) per year. The average temperature of 81° F (27° C) varies little year-round, and the easterly trade winds offer moderating breezes. The sparse vegetation includes a variety of cacti and other drought-resistant plants. The islands are out of the general path of Caribbean hurricanes.

The northern islands consist of volcanic rock, and elevations are higher than in the southern group, reaching 2,910 feet (887 m) on Saba. The northern islands are also smaller, the largest being Saint Martin (33 square miles [85 square km]), only the southern portion (13 square miles [34 square km]) of which is part of the Netherlands Antilles. The rainfall and vegetation are heavier in the northern islands than in the southern.

The people. The racially mixed population of the Netherlands Antilles includes strains of European, African, and American Indian stock. The predominantly black northern group reflects the cultural influence of its British-related neighbours, while the southern islands, with stronger ties to Venezuela and Colombia, show a more marked Latin influence. Whites form small minorities on all of the islands except Saba, where there is about an even division between black and white. Curaçao has about three-fourths of the total population, most of whom live in Willemstad, the Netherlands Antilles' largest city. The next most populous island is the Dutch part of Saint Martin.

Papiamento, a mixture of Spanish, Portuguese, and Dutch, is common in the south, as is Spanish; English is also spoken, especially in the northern group. Dutch is the official language, though it is not widely spoken. About three-fourths of the population is Roman Catholic, and one-tenth of the people are members of various Protestant denominations. There are also several small Jewish communities, said to be the oldest continuous Jewish communities in the Americas.

The economy. The southern islands' proximity to the Venezuelan oil fields, their location on well-established shipping routes, and their deep natural harbours have made the refining, storage, and transshipment of oil the mainstay of the economy, particularly on Curaçao. The government offers many important fiscal and tax incentives to encourage the development of new industry, especially tourism, which has become a major business on all five islands and has lessened the islands' dependence on petroleum refining. The islands' relative political stability has made the territory attractive to foreign investment, and Willemstad has become a Caribbean centre for banking and other financial services. Agriculture, especially in the southern islands, is limited by insufficient rainfall and thin topsoil. Aloes for pharmaceutical products and oranges for Curaçao liqueur are grown on Curaçao. Most food must be imported. The only natural resources on the islands are phosphates and salt, and, with the exception of oil refining on Curaçao, there are only a few light industries. Almost all manufactured goods must be imported. Saint Martin has developed a fishing industry, and there is some livestock raising. Most of the islands' drinking water is obtained through distillation. The gross national product (GNP) declined during the 1980s because of the downturn in world demand for petroleum, Aruba's separation from the Netherlands Antilles, and a static tourist industry on the islands, but the petroleum and tourist trades improved somewhat by the mid-1990s. Venezuela, the United States, and The Netherlands are among the islands' main trading partners.

Transportation is considerably more developed in the economically more important southern islands. Most of the islands' roads are on Curaçao. All of the islands have airfields, those on Curaçao, Bonaire, and Saint Martin being of international class. Interisland air service is also provided. The main port is Willemstad.

Government and social conditions. Executive authority is vested in the sovereign of The Netherlands and is exercised by a governor nominated by the local government and appointed by the crown. A Council of Ministers responsible to the Legislative Assembly is appointed by the governor for his assistance. The Assembly, called the Staten, has 22 members elected to four-year terms by popular vote. The islands are allotted members proportionally, with Curaçao having the largest number. The central government is fully autonomous in internal affairs, and there are local governments for Curaçao, Bonaire, and the northern group of islands.

The Netherlands Antilles has a relatively high standard of living by comparison with other Caribbean islands. The state's generally strong economy and a stable government have brought improved conditions in housing and social welfare. Health is enhanced by a dry tropical climate, and high health standards are maintained on the islands, all of which have hospital facilities. Birth and death rates are low compared to other developing nations. School attendance is fairly high, although it is not compulsory, and illiteracy is rare. Higher education is available at the University of the Netherlands Antilles (founded in 1970) in Willemstad. The islands have both radio and television broadcast facilities. Daily papers and a number of weekly and monthly periodicals are printed in Papiamento, Dutch, or English.

History. In 1499 Alonzo de Ojeda, a Spanish navigator, landed on Curaçao, and in 1527 the Spanish took possession of that island as well as Bonaire and Aruba. Peaceful Arawak Indians inhabited the islands at the time of the Europeans' arrival. The Dutch Windward Islands to the north were occupied by warlike Carib Indians when the islands were sighted by Christopher Columbus in 1493. The Dutch came to Curaçao in 1643, wishing to establish an entrepôt for the flourishing trade of the region. Bonaire and Aruba were occupied about the same time, and the Dutch remained in control of the three islands thereafter, except for brief periods of British rule during the Napoleonic Wars. The Dutch Windward Islands changed hands numerous times but remained in Dutch hands from the beginning of the 19th century. In 1845 the six islands (then including Aruba) were officially formed into the Netherlands Antilles. The emancipation of slaves in 1863 was a blow to the economy of Curaçao, which was the Caribbean centre of the slave trade. The territory did not fully recover until the early 1900s, with the discovery of the Venezuelan oil fields and the subsequent development of oil refineries in the southern islands. In 1954 the islands became an integral part of The Netherlands, with full autonomy in domestic affairs. A movement toward full independence made progress during the 1970s and early '80s. In 1986 Aruba seceded from its federation with the Netherlands Antilles, although, like the remaining five islands, it remained linked to The Netherlands in matters of defense and foreign affairs. In 1994 the remaining constituent members of the Netherlands Antilles voted to preserve their federation.

Netherlands East Indies (Indonesia): *see* Dutch East Indies.

Netherlands Reformed Church, The, Dutch NEDERLANDSE HERVORMDE KERK, largest Protestant church in The Netherlands, the successor of the established Dutch Reformed Church that developed during the Protestant Reformation in the 16th century. Reforming interest emerged in the Netherlands early in the Reformation. The emperor Charles V instituted the Inquisition against the Reformation in the Netherlands as early as 1522. The struggle for freedom from Spain was begun by the Netherlands as a protest in demand for greater liberties, including religious, within Charles's empire. Eventually, the Netherlands became free, and the Reformed Church was established. The first general synod of the Dutch Reformed Church took place in 1571, and, subsequently, other synods were held. The presbyterian form of church government was adopted, and the Belgic Confession (1561) and the Heidelberg Catechism (1562) were accepted as the doctrinal standards.

In the 17th century a theological controversy arose over the doctrine of predestination—*i.e.,* that God elects or chooses those who will be saved. The followers of Jacobus Arminius, a Dutch professor and theologian, rejected the strict Calvinist doctrine of predestination, while the followers of Franciscus Gomarus, a Dutch theologian, upheld a strict interpretation of predestination. To settle the controversy, the Synod of Dort (1618–19) was convened. It produced the canons of Dort, which condemned the theology of the Arminians (also called Remonstrants) and set forth a strict interpretation of predestination. These canons, along with the Belgic Confession and the Heidelberg Catechism, came to constitute the theological basis of the Dutch Reformed Church.

In 1798 the Dutch Reformed Church was disestablished, but it remained partly under government control. In 1816 King William I reorganized the church and renamed it The Netherlands Reformed Church. Theological disputes in the 19th century resulted in separations from the church, but it nevertheless remained the dominant Protestant church in The Netherlands.

In the 20th century the church grew stronger, and in 1951 it adopted a new constitution. Many private Protestant schools were established after public schools stopped teaching religion.

Netherlands school (music): *see* Franco-Netherlandish school.

Netjerykhet (Egyptian king): *see* Djoser.

Neto, Agostinho, in full ANTÔNIO AGOSTINHO NETO (b. Sept. 17, 1922, Icolo e Bengo, Angola—d. Sept. 10, 1979, Moscow Russia, U.S.S.R.), poet, physician, and first president of the People's Republic of Angola.

Neto first became known in 1948, when he published a volume of poems in Luanda and joined a national cultural movement that was aimed at "rediscovering" indigenous Angolan culture (similar to the Negritude movement of the French-speaking African countries). His first of many arrests for political activities came shortly thereafter in Lisbon, where he had gone to study medicine.

Neto returned home as a doctor in 1959 but was arrested in the presence of his patients in June 1960 because of his militant opposition to the colonial authorities. When his patients protested his arrest, the police opened fire, killing some and injuring 200. Neto spent the next two years in detention in Cape Verde and in Portugal, where he produced a new volume of verse. In 1962 he managed to escape to Morocco, where he joined the Angolan liberation movement in exile. At the end of 1962 he was elected president of the Movimento Popular de Libertação de Angola (MPLA).

When in 1975 Angola became independent, it was divided among its three warring independence movements. The MPLA forces, however, with Cuban help, held the central part of the country, including the capital, and Neto, a Marxist, was proclaimed president.

Neto was widely recognized as a gifted poet. His work was published in a number of Portuguese and Angolan reviews and was included in Mário de Andrade's *Antologia da Poesia Negra de Expressão Portuguesa* (1958).

Netscape Communications Corp., American developer of Internet software, with headquarters in Mountain View, Calif.

The company was founded in 1994 as Mosaic Communications Corp. by James Clark and Marc Andreessen. Clark had previously founded and been chairman of Silicon Graphics, Inc. In 1993, while a student at the University of Illinois, Urbana-Champaign, Andreessen had led the development of the Mosaic Internet browser. With the ability to display colourful graphics and a simple point-and-click interface for finding, viewing, and downloading data, Mosaic made the Internet widely accessible for the first time beyond the scientific branches of academia and the government.

In 1994 the company made available its new browser, Navigator, over the Internet. As part of an out-of-court settlement with the University of Illinois, which had trademarked the Mosaic name, the company soon changed its name to Netscape Communications. Meanwhile, Netscape continued to extend its line of server applications and to roll out Navigator upgrades, adding features such as electronic mail (*q.v.*) and news. By 1996 Netscape claimed that more than 38 million people were using Navigator, making it the most popular personal-computer application ever.

In the fall of 1995, the Microsoft Corporation (*q.v.*) began an urgent campaign to turn toward the Internet by offering its own free browser. As a result, Netscape's market share among browser users, previously estimated at over 80 percent, began to decline. Netscape also placed a greater emphasis on sales of server applications and corporate services, and it released a new product, Communicator, which combined the Navigator browser with workgroup-collaboration features designed to appeal to corporate customers.

In an effort to regain market momentum, Netscape declared Navigator and Communicator free and made the programs' source code available to other developers for customizing and enhancement. Netscape was purchased by America Online, Inc., in November 1998.

netsuke, ornamental togglelike piece, usually of carved ivory, used to attach a medicine box, pipe, or tobacco pouch to the obi (sash) of a Japanese man's traditional dress. During the Tokugawa period (1603–1868), netsukes were an indispensable item of dress as well as being fine works of miniature art.

Netsuke, carved ivory, 19th century; in the Tokyo National Museum

By courtesy of the Tokyo National Museum

Because the members of the newly risen merchant class, ranking below the samurai, were not permitted to wear jewelry, netsukes took the place of other personal adornment. Originally carved from boxwood, netsukes were first made in various kinds of ivory during the first half of the 18th century. In the latter part of the 18th century, netsuke makers devised a method of inlaying, using coral, ivory, pearl shell, horn, and precious metals on lacquer and wood; some of these substances also were used for inlaying ivory. Even very small ivory netsuke carvings were sometimes inlaid in this manner. With the end of the Tokugawa regime, leading to new customs of dress, and the introduction of the cigarette shortly thereafter, netsukes became obsolete, though some were still carved to supply the demand of foreign residents and tourists. *See also* inrō.

network: *see* computer network.

Netzahualcóyotl (Mexico): *see* Nezahualcóyotl.

Neu Lauenburg (Papua New Guinea): *see* Duke of York Islands.

Neuber, Caroline, *née* FRIEDERIKE CAROLINE WEISSENBORN (b. March 9, 1697, Reichenbach, Saxony [Germany]—d. Nov. 30, 1760, Laubegast, near Dresden), actress-manager, a major influence on the development of modern German theatre.

Rebelling against her tyrannical father, she ran away with a young clerk, Johann Neuber, at the age of 20 and married him in 1718. They served their theatrical apprenticeship in the traveling companies of Christian Spiegelberg (1717–22) and Karl Caspar Haack (1722–25). In 1727 they formed their own company and were granted a patent by the elector of Saxony, Frederick Augustus I, to perform at the Leipzig Easter Fair. As early as 1725 Caroline Neuber's acting had attracted the attention of Johann Christoph Gottsched, the critic and drama reformer who modeled his work on classical French tragedy and comedy. "Die Neuberin," as he came to call her, substituted in her company a careful learning of parts and rehearsal for the heavily improvised farces and harlequinades that then dominated the German stage. The collaboration of Gottsched and Neuber, which lasted until 1739, is usually regarded as the turning point in the history of German theatre and the start of modern German acting.

Caroline Neuber, lithograph by C. Lödel after E.G. Hausmann

Deutsche Fotothek Dresden

Returning to Leipzig in 1737 after three years of engagements in other German cities, the Neuber company found that their patent, after the death of Augustus in 1733, had gone to the company of Johann Ferdinand Müller, a proponent of the old improvisations and harlequinades. Caroline Neuber reacted with a bravura gesture: on stage she enacted the banishment of Harlequin from the theatre. The company never regained its hold, and the addition of musical interludes between the acts proved inadequate to offset the current popularity of the musical shows. In 1740, on the invitation of the empress Anna, the Neuber company introduced modern theatre to Russia. But the empress died in 1741, and by the time the company returned to Leipzig, Gottsched had allied himself with another company. His differences with Caroline Neuber intensified: she replaced the togas he had specified for his play *Der sterbende Cato* with flesh-coloured tights; he attacked her in his reviews; she represented him in a prologue as a bat-eared censor; an obscene pamphlet in reply cast aspersions on the actress' private life.

In 1747 she quit the stage but in the following year returned with a new company, which successfully presented G.E. Lessing's first play, *Der junge Gelehrte.* Indifferent success, however, dogged the company as it played at Dresden, Frankfurt, and Warsaw, as well as Leipzig. In 1753–54 Caroline Neuber attempted to establish herself in Vienna but failed; and the outbreak of the third Silesian War (1756), her husband's death (1759), and the bombardment of Dresden (1760) forced her to leave. She died in a peasant's hut, and, although she was refused burial in holy ground, a monument was erected in 1776, commemorating her as "the foundress of good taste in the German theatre." She had already been immortalized as Madame Nelly in J.W. von Goethe's *Wilhelm Meister.*

Neubrandenburg, city, Mecklenburg–West Pomerania *Land* (state), northeastern Germany, near the northern end of Tollense Lake, where the Tollense River flows out of the lake. It lies about 53 miles (85 km) south of Stralsund. Founded in 1248 by the margraves of Brandenburg as a fortified outpost, it lay near the intersection of a trade route running between Schwerin and Güstrow and the road from Stralsund to Berlin. The town passed to Mecklenburg about 1300 and was the capital of the duchy of Mecklenburg-Stargard from 1352 to 1471. During those years it prospered, chiefly as a result of its weaving industry and its function as a market centre. Its fortunes declined thereafter, as it was plundered during the Thirty Years' War, devastated by two great conflagrations (1679, 1737), and further battered by the Napoleonic wars. Neubrandenburg recovered somewhat in the second half of the 19th century.

Though its medieval fortifications are well-preserved, most of its medieval buildings were destroyed by bombing in World War II. Much rebuilt after 1952, Neubrandenburg has engineering, food-processing, chemical, wood, leather, and paper industries as well as the Institute of Agricultural Sciences of the University of Greifswald. Pop. (1998 est.) 77,312.

Neuchâtel (French), German NEUENBURG, *canton,* western Switzerland, bordering France to the northwest and Lake Neuchâtel to the southeast and bounded by the cantons of Bern on the northeast and Vaud on the southwest. It lies in the central Jura Mountains and is drained by Lake Neuchâtel (leading to the Rhine) and Le Doubs River (leading to the Rhône). Its three regions are a low-lying strip along the lake called Le Vignoble (from its vineyards); an intermediate region, Les Vallées, comprising the two principal valleys of the canton (the Ruz Valley, watered by the Seyon, and the Travers Valley, watered by L'Areuse), which lie at an elevation of 2,300 feet (700 m); and the highest region, the Neuchâteloises Mountains (3,000–3,500 feet [915–1,065 m]), mainly composed of a long valley in which stand the industrial centres of La Chaux-de-Fonds, Le Locle, La Sagne, Les Ponts-de-Martel, and La Brévine. Neuchâtel (*q.v.*) is the capital.

Novum Castellum (Neuchâtel) was first mentioned in the will of Rudolf III, the last king of Burgundy, who died in 1032. About 1034 the town and its territories were granted in fief to Count Ulrich von Fenis, whose dynasty gradually increased its dominion, until by 1373 it held practically all the area of the present canton. In 1406 Neuchâtel entered into union with Bern. It passed in the early 15th century to the lords of Freiburg im Breisgau in the German Rhineland and in 1504 to the French ducal house of Orléans-Longueville. The Reformation was introduced there in 1530 by Guillaume Farel, the French preacher, and Neuchâtel became a principality in 1648. With the extinction of the house of Orléans-Longueville in 1707, the area passed to Frederick I, the first king of Prussia. The nominal role of the Prussian king lasted until 1848, with a brief interval from 1806 to 1814 when the principality was granted by Napoleon to his marshal, Louis-Alexandre Berthier. It was admitted to the Swiss Confederation in 1815 as the 21st canton and the only nonrepublican member, its hereditary rulers the last to maintain their position in Switzerland. A republican form of government was established by a peaceful revolution in 1848, and after long negotiations and several attempts at counter-revolution, including the so-called Neuchâtel crisis (1856), the king of Prussia renounced his claims to sovereignty in 1857.

The population is mainly French-speaking and about two-thirds Protestant and one-third Roman Catholic. In addition to excellent wineries, some fruit is grown in Le Vignoble, and horses are raised. There are pastures for cattle in the valleys, and some cheese is made. The most valuable mineral product is asphalt, concentrated in the Travers Valley. The most characteristic industry is watchmaking, which has been prominent since the early 18th century in the highland valleys of La Chaux-de-Fonds, Le Locle, and Fleurier. An oil refinery is located at Cressier. Road and rail communications are highly developed. Area 310 square miles (803 square km). Pop. (1999 est.) 165,594.

Neuchâtel (French), German NEUENBURG, capital (since 1815) of Neuchâtel *canton,* western Switzerland, on the northwestern shore of Lake Neuchâtel, at the mouth of the Seyon River, partly on the slopes of the Chaumont (3,566 feet [1,087 m]) and partly on land reclaimed from the lake. A Burgundian town by the 11th century, it was chartered in 1214. It was the centre of the former countship and principality (1648–1707) of Neuchâtel. Historic landmarks include the medieval castle (now the seat of the cantonal administration) and the Collégiale Notre-Dame (12th–13th century), now Protestant and containing the monumental tomb of the counts (1372). There are several fine 17th- and 18th-century patrician dwellings, including the Hôtel du Peyrou (*c.* 1765) and the town hall (1784–90), which is in classic style. The town's institutions include the University of Neuchâtel (founded as an academy in 1838), the Institute of Physics, the Swiss Laboratory of Horological Research, the commercial school, the conservatory of music, the museum and public library in the Collège Latin, the cantonal observatory, and the fine Musée des Beaux-Arts. The city has an important wine market and its manufactures include watches, chocolate, tobacco, and paper. Pop. (1998 est.) 31,740.

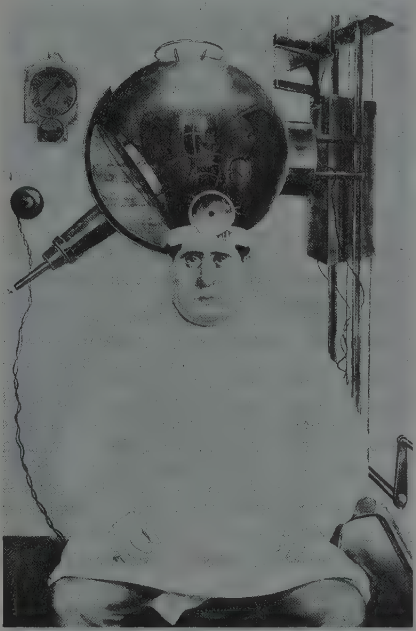
Neuchâtel, Lake, French LAC DE NEUCHÂTEL, German NEUENBURGERSEE, Latin LACUS EBURODUNENSIS, largest lake wholly in Switzerland; its area of 84 square miles (218 square km) is divided among the cantons of Neuchâtel, Vaud, Fribourg, and Bern. Lakes Neuchâtel, Biel (Bienne), and Morat, connected by canals, are survivors of a former glacial lake in the lower Aare valley, at the base of the Jura Mountains. Lake Neuchâtel is about 23.5 miles (38 km) long and from 3.75 to 5 miles (6 to 8 km) wide; it lies at an elevation of 1,407 feet (429 m), and its greatest depth is 502 feet (153 m). The Thièle River enters at its southwestern end and issues from it at its northeastern end. The lake also receives the Areuse and Broye rivers. The northwestern shore (Neuchâtel canton) is the most thickly settled, and the slopes are covered with vineyards. On the north shore is La Tène, famous for prehistoric finds, which gives its name to the late Iron Age culture.

Neuchâtel crisis (1856–57), tense episode of Swiss history that had repercussions among the Great Powers of Europe. The Congress of Vienna (1814–15), in its general settlement of territorial questions after the Napoleonic Wars, ordained that Neuchâtel (or Neuenburg) should have a dual status: it was to be a canton of the reorganized Swiss Confederation and, at the same time, a hereditary principality belonging personally to the king of Prussia but separate from the Prussian kingdom. This arrangement caused dissatisfaction among the people of Neuchâtel, and in March 1848, when the Swiss were revising their constitution and when France, Germany, Austria, and Italy were all being shaken by revolutionary movements, a successful insurrection established a republic there. Frederick William IV of Prussia, preoccupied with his kingdom's troubles, could take no effective counteraction at the time. Four years later, in the London Protocol of 1852, the other Great Powers formally acknowledged his rights in Neuchâtel, but with the proviso that Prussia should do nothing to assert them without their concurrence. In September 1856 there was an unsuccessful pro-Prussian coup d'etat in Neuchâtel, conducted by loyalist aristocrats under the leadership of members of the family of Pourtalès. When its leaders were arrested, Frederick William appealed to the Swiss Federal Council for their release and also asked the French emperor Napoleon III to intercede for them. The Swiss at first persisted in declaring that the rebels must be brought to trial. Prussia severed diplomatic relations with Switzerland and began preparations for war—though it remained doubtful whether the south German states, under Austrian influence, would allow Prussian troops to cross their territory and though Great Britain was ready to back France in support of Switzerland. Napoleon III at last, in January 1857, induced the Swiss to release the prisoners into temporary exile, on the understanding that he would then negotiate a final settlement of the main question in Switzerland's favour; and, after a conference of the neutral powers in Paris (March–April), a treaty was signed on May 26, 1857, whereby Frederick William renounced his sovereignty over Neuchâtel, keeping only the princely title.

Neue Künstlervereinigung, English NEW ARTISTS' ASSOCIATION, group founded in 1909 by Wassily Kandinsky, Alexey von Jawlensky, Gabriele Münter, and numerous others who were united by opposition to the official art of Munich rather than by similarity of style. Joined by Adolf Erbslöh, Alexander Kanoldt, Alfred Kubin, Marianne von Werefkin, Karl Hofer, and several other artists as well as lay people, the group held its first exhibition in December 1909, at Moderne Galerie Tannhäuser, Munich. The works exhibited, which primarily reflected Jugendstil and Fauvist styles, were not favourably received by the critics or the public. Their second exhibition, held September 1910 at Tannhäuser, was international in scope, including, in addition to their works, those of Pablo Picasso, Georges Braque, Georges Rouault, Kees van Dongen, André Derain, Maurice de Vlaminck, Henri Le Fauconnier, and David and Vladimir Burlyuk. The exhibition was denounced for, among other things, including foreign artists, especially Russians, who were considered dangerous to Bavarian culture.

While preparing for their third exhibition, held December 1911 at Tannhäuser, differences in aesthetic outlook caused a split in the group, partially brought on by the jury's rejection of Kandinsky's large, rather abstract painting, "Last Judgment." Franz Marc (the last painter to join the group) and Kandinsky, favouring freedom of expression, were aligned against the more conservative art historian Otto Fischer (who later became the group's spokesman), Kanoldt, and Erbslöh. Kandinsky and Marc left the association (as did Münter and Kubin) and together formed Der Blaue Reiter, exhibiting their works that same month at Tannhäuser, in rooms adjoining those of the Neue Künstlervereinigung.

Neue Sachlichkeit (German: New Objectivity), a group of German artists in the 1920s whose works were executed in a realistic style (in contrast to the prevailing styles of Expressionism and Abstraction) and who reflected what was characterized as the resignation and cynicism of the post-World War I period in Germany. The term was fashioned in 1924 by Gustav F. Hartlaub, director of the Mannheim Kunsthall. In a 1925 exhibition assembled at the Kunsthalle, Hartlaub displayed the works of the members of this group: George Grosz, Otto Dix, Max Beckmann, Georg Schrimpf, Alexander Kanoldt, Carlo Mense, Georg Scholz, and Heinrich Davringhausen.



"Dr. Mayer-Hermann," by the Neue Sachlichkeit painter Otto Dix, oil and tempera on wood, 1926; in the collection of the Museum of Modern Art, New York

By courtesy of the Museum of Modern Art, New York, gift of Philip C. Johnson

Various trends and styles have been noted within Neue Sachlichkeit. Three subdivisions are sometimes proposed. The Veristic includes the socially critical (and frequently bitter) works of Grosz, Dix, and the early Beckmann. The Monumental, or classical, is represented by Schrimpf, Kanoldt, Mense, and Davringhausen, whose paintings displayed smooth, cold, and static qualities, partially derived from the Italian *pittura metafisica* (*see* Metaphysical painting); the term Magic Realism, one of the names sometimes applied to the entire Neue Sachlichkeit movement, best describes the style of these particular painters. Finally, the Rousseau school includes works by Walter Spiess and Scholz, for example, which are deliberately naive, emulating the style of the French painter Henri Rousseau.

Although many Neue Sachlichkeit artists continued working in representational styles after the 1920s, the movement itself ended with the rise of Nazism.

Neue Zürcher Zeitung (German: "New Zürich Newspaper"), abbreviation NZZ, daily newspaper published in Zürich and generally considered one of the world's great newspapers.

It was founded as a weekly, the *Zürcher Zeitung*, in 1780. Reorganized in 1821, the paper became the *Neue Zürcher Zeitung* and appeared twice weekly. By 1869—the year after the paper became a joint stock company with shares held by Zürich citizens—there were two daily editions, and in 1894 there were three daily editions.

NZZ is tabloid in size but not in demeanour. Its gray visage is one of the most austere in the world. The paper is characterized by careful, nonsensational, thoughtful reporting; by highly informed and extremely thorough analysis; and by background information that is supplied as a context for every important story. The large proportion of space that *NZZ* devotes to international news is remarkable by any other paper's standards. It maintains a correspondent, and sometimes two—an economist and a political observer—in more than 30 major world cities. Since its founding, *NZZ* has appealed to intellectuals, government officials, business and political leaders, and others interested in deep coverage of significant world developments.

To ensure accuracy and objectivity, the paper has sometimes withheld its coverage of major events until they could be reported dispassionately. On the other hand, *NZZ* has never hesitated to present the facts when they were assembled—it was banned in Germany from 1934 onward for reporting that Hermann Göring, and not the Communists, had been responsible for the Reichstag fire. Since 1945, during the Cold War years and after, the *Neue Zürcher Zeitung* has won wide acclaim for its balanced news coverage. Its regular readers are numerous in every important world capital, from the Kremlin to the White House.

Neuenburg (Switzerland): *see* Neuchâtel.

Neuenburgersee (Switzerland): *see* Neuchâtel, Lake.

Neuengamme-Ring, series of German Nazi concentration camps situated in marshy country near the community of Neuengamme, a suburb of the port of Hamburg. The first camp was established in 1940 to provide slave labour for local armaments industries, and a string of related camps was added from 1942 on as the inmate population expanded. According to German estimates, some 82,000 prisoners died in these camps, many from disease, malnutrition, and exhaustion, others from the effects of medical experiments, and several thousand on May 3, 1945, during a British air raid on Elbe River ships to which inmates had been transferred.

Neuf, Pont (bridge): *see* Pont Neuf.

Neuhof, Theodor, Baron, Neuhof also spelled NEUHOFF (b. Aug. 24/25, 1694, Cologne—d. Dec. 11, 1756, London), German adventurer. An indefatigable intriguer in military, political, and financial affairs throughout Europe, he was for a time (1736–43) the nominal king of Corsica under the style of Theodore I.

After serving in the French and Bavarian armies, Neuhof went to England and then to Spain to conduct negotiations on behalf of Sweden. Later he was involved in the speculations of the Scottish financier John Law. In Genoa he convinced some Corsican prisoners that he would free their island from Genoese tyranny if they made him king. With their help and that of merchants in Tunis, he landed on Corsica, where he was proclaimed king. At first he fought successfully against Genoa, but, after his defeat, a civil war broke out on Corsica, and he fled late in 1736. Twice, in 1738 and 1743, he returned to the island but failed to reestablish his authority. Imprisoned in London for debt, he secured his release by mortgaging his "kingdom."

Neuilly, Treaty of (Nov. 27, 1919), peace treaty between Bulgaria and the victorious Allied powers after World War I that became effective Aug. 9, 1920. Under its terms Bulgaria was forced to cede lands to Yugoslavia and Greece (thus depriving it of an outlet to the Aegean) involving the transfer of some

300,000 people; to reduce its army to 20,000 men; and to pay reparations, 75 percent of which were later remitted.

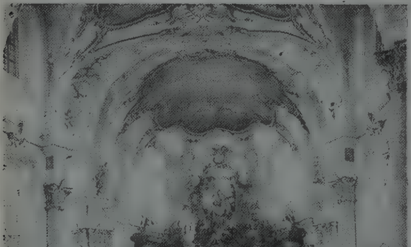
Neuilly-sur-Seine, residential northwestern suburb of Paris, France. It lies in Hauts-de-Seine *département,* west of the capital and north of the Bois de Boulogne. Its main thoroughfare is the wide avenue de Charles de Gaulle, which is a prolongation of the Champs-Élysées and of the avenue de la Grande Armée. The 18th-century Pont de Neuilly, which bridges the avenue over the Seine River at the suburb's western border, is regarded as an outstanding piece of engineering; it was rebuilt and widened to 115 feet (35 m) in 1935–40. Pop. (1999) 59,874.

Neukölln, *Bezirk* (district) in the southern part of the city of Berlin, Germany. Medieval village churches still mark the centres of the four old villages—Rixdorf, Britz, Buckow, and Rudow—around which the district grew. During World War II Neukölln suffered far less damage from Allied bombing than did other parts of Berlin, and as a consequence after the war many businesses and industries relocated there. Large housing estates were built, and Neukölln became the most populous district in the city. While it is a shopping and entertainment centre, meat-packing, chemical, pharmaceutical, motor-vehicle, and other plants also give the district a strong industrial base. Area 17 square miles (45 square km). Pop. (1990 est.) 303,100.

Neumann, Balthasar, in full JOHANN BALTHASAR NEUMANN (b. 1687, Eger, Bohemia, Austrian Habsburg domain [now Cheb, Czech Republic]—d. Aug. 19, 1753, Würzburg [Germany]), German architect who was the foremost master of the late Baroque style.

Neumann was apprenticed to a bell-founder and in 1711 emigrated to Würzburg, where he gained the patronage of that city's ruling prince-bishop, a member of the Schönborn family, after working on military fortifications. In 1719 Neumann began directing construction of the first stage of the new Residenz (palace) for the prince-bishop in Würzburg, and he was soon entrusted with the planning and design of the entire structure. Work on the Residenz continued at intervals after Neumann's own death in 1753, though by the 1740s it had advanced far enough for the painter G.B. Tiepolo to decorate the palace's enormous ceilings.

Neumann began designing other buildings as well, starting in the 1720s with the Schönborn Chapel (1721–36) in Würzburg Cathedral, the priory church at Holzkirchen (1726–30) outside Würzburg, and the abbey church at Münsterschwarzach (1727–43). He did buildings for other members of the Schönborn family and was eventually put in charge of all major building projects in Würzburg and Bamberg, including palaces, public buildings, bridges, a water system, and more than a dozen churches. Neumann designed numerous palaces for the Schönborns, including those for the prince-bishops at Bruchsal (1728–50) and Werneck (*c.* 1733–45). In the 1740s he designed his masterpiece, the pilgrimage church at Vierzehnheiligen (1743–53), as well as the pilgrimage church known as the Käppele (1740–52) near Würzburg and the abbey church at Neresheim (1747–53).


Interior of the church of Vierzehnheiligen, Ger., by Balthasar Neumann, 18th century
GEKS

Neumann showed himself a great master of composition in the interiors of his churches and palaces. The walls and columns in his buildings are diminished, disguised, or opened up to create startling and often playful effects while nevertheless retaining a sense of symmetry and harmony. Neumann made ingenious use of domes and barrel vaults to create sequences of round and oval spaces whose light, airy elegance is highlighted by the daylight streaming in through huge windows. The free and lively interplay of these elements is accented by a lavish use of decorative plasterwork, gilding, and statuary and by wall and ceiling murals.

Neumann, John von (mathematician): *see* von Neumann, John.

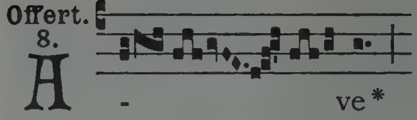
Neumann, Saint John (Nepomucene) (b. March 28, 1811, Prachatice, Bohemia [now in Czech Republic]—d. Jan. 5, 1860, Philadelphia, Pa., U.S.; canonized 1977; feast day January 5), bishop of Philadelphia, a leader in the Roman Catholic parochial-school system in the United States.

After studies at the University of Prague, Neumann's interest in missions in the United States took him to New York, where he was ordained in 1836. In 1840 he joined the Redemptorists, a religious congregation dedicated to parish and foreign missions, and later became superior of all Redemptorists in the United States. In 1852 Pope Pius IX named him bishop of Philadelphia.

Neumann spent the rest of his life building churches, schools, and asylums for his diocese. He was devoted to education and was the first ecclesiastic to organize a diocesan school system in the United States. Neumann was canonized as the first American male saint in 1977.

Neumann line, any of the fine, straight, scratchlike marks that appear when some iron meteorites are cut open and the exposed surface polished and etched. The lines reveal an internal structure thought to result from some violent strain, such as a collision between astronomical bodies, that the meteorite was subjected to before its fall. They are named for their discoverer, German mineralogist Franz Ernst Neumann (1798–1895).

neume, in musical notation, a sign for one or more successive musical pitches, predecessor of modern musical notes. Neumes have been used in Christian (*e.g.,* Gregorian, Byzantine) liturgical chant as well as in medieval polyphony (music in several voices, or parts) and some secular monophony (music consisting of a single melodic line). Early neumes developed from Greek textual accents that were gradually modified into shapes showing pitch direction and vocal ornament. These staffless, or chironomic, neumes facilitated recall of a memorized melody in accordance with the semi-oral musical practices of the time. Before long, neumes were "heighted" so as to suggest specific melodic lines. A musical staff of four lines evolved about the year 1000. Neumes placed on the staff showed exact pitch, allowing a singer to read an unfamiliar melody. By about 1200, neumes had assumed the characteristic square shapes still used in the modern notation of Gregorian chant. Whether and how neumes indicated rhythm remains a subject of controversy. Musical notes with time values evolved from neumes in the last half of the 13th century.



Neumatic notation from the plainsong "Ave Maria"
From *Liber Usualis* (1952); reproduced by permission of Desclee & Co., Belgium

A distinct system of neumes is employed for the notation of the Buddhist chant of India, Tibet, China, and Japan. It is perhaps a borrowing from the Nestorians of ancient Central Asia.

Neuquén, *provincia,* west-central Argentina. It is bordered by the high peaks of the Andes Mountains and Chile (west), the Colorado River and tributaries (north), and the Limay River (south). The western part of the *provincia* has intermontane lakes with some stands of forest. In the east are large plains with stunted vegetation and many saline deposits. The city of Neuquén (*q.v.*), the *provincia* capital, is at the confluence of the Neuquén and Limay rivers, which form the Negro River at the extreme eastern corner of the *provincia.* In addition to part of Nahuel Huapí National Park, the *provincia* has the Lanín and Laguna Blanca national parks.

Apples, pears, grapes, and plums grown in irrigated valleys adjacent to the lower Neuquén and Limay rivers provide an important source of income; sheep are grazed in the west. The exploitation of petroleum and natural gas remains significant near Neuquén city and the town of Cutral-Có. Area 36,324 square miles (94,078 square km). Pop. (1999 est.) 540,384.

Neuquén, city, capital of Neuquén *provincia,* west-central Argentina. It is located at the confluence of the Neuquén and Limay rivers, which there form the Negro River. Founded in 1904, the city is a market centre for the adjacent fruit-growing area, which became more productive in the 1970s with the completion of the El Chocón Dam on the Limay River and the Cerros Colorados Dam on the Neuquén River. Fruits are processed locally, and many bodegas (wine cellars) are nearby. The city's industries manufacture heavy equipment and construction materials for the oil fields to the north and west. Pop. (1989 est.) 327,374.

neural crest, group of embryonic cells that are pinched off during the formation of the neural tube (the precursor of the spinal cord) but that do not remain as a part of the central nervous system. The cells of the neural crest migrate to numerous locations in the body and contribute to the formation of diverse structures, mostly associated with the nervous system. The factors determining their migration and differentiation are not known.

The most conspicuous of the neural crest derivatives are the melanocytes, cells in the deep layers of the epidermis that contain pigment and are responsible for skin coloration. In the head region the neural crest cells contribute significantly to the formation of the facial bones. Odontoblasts, the cells that give rise to the dentine of the teeth, have their origin in the neural crest, as do many of the cranial nerve cells. The neural crest also contributes to the formation of the meningeal covering of the brain and is the source of Schwann cells, which surround and insulate nerve fibres in the peripheral nervous system. In addition to Schwann cells and melanocytes, the neural crest of the trunk region gives rise to paired chains of sympathetic nerve ganglia and to certain cells of the adrenal gland.

neural tube defect, any congenital defect of the brain and spinal cord as a result of abnormal development of the neural tube (the precursor of the spinal cord) during early embryonic life, usually accompanied by defects of the vertebral column or skull. In normal development a plaque of nerve tissue forms along the surface of what will become the back of the fetus; this tissue folds into a closed tube that develops into the structures of the central nervous system. Malformations occur because the tube fails to close properly, because parts of it are missing, or because part of the tube is blocked.

Failure of the tube to close in some degree is the basic defect underlying spina bifida, meningocele, myelocele, and meningomyelocele. Spina bifida is caused by the failure of the vertebrae to form over the back of the spinal cord, leaving the nerve unprotected. It usually occurs in the sacral or lumbar regions at the base of the spine, the final section of the neural tube to close. All the other neural tube defects in this group are particular forms of spina bifida.

In spina bifida occulta, or hidden spina bifida, the vertebrae fail to completely enclose the spinal cord, but the latter is normal in form and is covered by the skin of the back. This form of the defect has no effect on body functions and may go undetected for life.

In more serious forms of spina bifida, part of the spinal cord is left uncovered by the skin or actually protrudes from the spinal column. In myelocele, the spinal cord is exposed so that nerve tissue lies exposed on the surface of the back without even a covering of skin or of the meninges, the membranous tissue surrounding the brain and spinal cord. Meningocele occurs when these meninges protrude through the vertebral defect, forming a fluid-filled sac. Meningomyelocele is a compound defect in which the protruding sac contains some nervous tissue as well. If any of these defects communicate with the central canal of the spinal cord, the prefix syringo- is added to the name; hence, a syringomyelocele is an open defect containing nerve tissue and opening into the spinal cord.

Children born with the more serious forms of spina bifida experience paralysis in those parts of the body below the site involved. The legs may be completely paralyzed, and bladder and bowel functions may be absent or impaired. Spina bifida defects can be treated surgically early in life; success is greatest with meningocele, because paraplegia or other disabilities associated with myelocele can complicate therapy.

Another form of open neural tube defect, encephalocele, occurs when a meningeal sac containing brain tissue protrudes from the skull. The outlook for affected individuals depends on the amount of nervous tissue involved.

Hydrocephalus, an accumulation of fluid within the brain, occurs when normal passages for the cerebrospinal fluid that fills the neural tube are partially or completely blocked. The brain and skull are greatly enlarged because of the fluid pressure. Hydrocephalus occurs in one or two of every 1,000 live births and was routinely fatal until surgical techniques for shunting the excess fluid out of the central nervous system were developed; today it need not cause any intellectual impairment if recognized and treated promptly.

neuralgia, cyclic attacks of acute pain occurring in the distribution of a peripheral sensory nerve; the cause of the pain is unknown, and pathological changes in nerve tissue cannot be found. Neuralgia is frequently confused with another disorder, neuritis, but the terms are not synonymous. There are two principal types of neuralgia: trigeminal neuralgia (tic douloureux) and glossopharyngeal neuralgia.

Trigeminal neuralgia is a complex of symptoms of unknown cause characterized principally by brief attacks of severe pain along any of the branches of the trigeminal nerve (lying on the skull in front of the ear). The disease may occur at any age after puberty but usually begins somewhat after middle age. It affects women more frequently than men. The intense pain is usually described by patients as "stabbing," "shooting," or "lightning-like" and extremely brief. In early stages of the disease, these pains last for less than a minute or two, with weeks or months between attacks. As the condition progresses, the periods between attacks become shorter. Areas around the nose and mouth become hypersensitive and, when touched, trigger an attack. Attacks are also touched off by talking, eating, drinking, or exposure to cold. Analgesics offer temporary relief. The condition can be cured permanently by severing the sensory root of the nerve proximal to the ganglion. Simple decompression of the roots and of the posterior part of the ganglion have had some good results.

Glossopharyngeal neuralgia is a relatively rare disorder characterized by recurring severe pain in the pharynx, tonsils, back of the tongue, and middle ear. The cause is unknown, and the disease usually has its onset after age 40, more frequently in males than in females. The pains may be excruciating, beginning in the throat and radiating to the ears or down the side of the neck. They may occur spontaneously or be triggered by sneezing, coughing, yawning, chewing, or talking. The attacks are usually separated by long intervals and, when they do occur, last only a few seconds to a minute or two. Medical treatment is usually ineffective, for the attack subsides before analgesics exert their action. Surgery is indicated in extreme cases. *See also* neuritis.

Neurath, Konstantin, Baron (Freiherr) **von** (b. Feb. 2, 1873, Klein-Glattbach, Ger.—d. Aug. 14, 1956, Enzweihingen, W.Ger.), German diplomat who was Adolf Hitler's foreign minister from 1933 to 1938.

After studying law at the Universities of Tübingen and Berlin, Neurath entered the German foreign service in 1903. After World War I he served as minister to Denmark (from 1919), ambassador to Italy (from 1922), and ambassador to Great Britain (from 1930). From June 1932 he was foreign minister in the Papen and Schleicher cabinets and retained his post after Hitler became chancellor in 1933. In this post Neurath lent a veneer of conservative respectability to Hitler's expansionist foreign policy. In February 1938 he was ousted by Hitler in favour of Joachim von Ribbentrop, and in March 1939 he was appointed *Reichsprotektor* for Bohemia and Moravia. During his tenure of office there, he abolished the Czech political parties and trade unions, instituted the Nürnberg racial laws in the protectorate, and made Czechoslovakian industry work for the German war effort. Nevertheless, in September 1941 Neurath was told by Hitler that his rule was "too lenient" and was dismissed.

He was captured by French troops in the closing days of World War II in Europe and was brought to trial before the International Military Tribunal at Nürnberg, found guilty, and sentenced to 15 years of imprisonment. He was released from Spandau prison in November 1954 after serving eight years and one month.

neuritis, inflammation of one or several nerves. The characteristic symptoms of neuritis include pain and tenderness; impaired sensation, strength, and reflexes; and abnormal circulation and sweating in the distribution of the inflamed nerve or nerves.

A unique feature of the nerve fibre is its extraordinary length. In its course a nerve may lie next to skin or bone or it may pass through muscles or tunnels. All these anatomic vicissitudes represent hazards, and, indeed, neuritis frequently results from such mechanical injuries as adjacent tissues pressing on a nerve or blows delivered on a nerve running just underneath the skin. Nerve fibres are housed in connective tissue that may become infected, scarred, or invaded by tumours, events that may cause injury to nerve fibres.

There are many causes of neuritis, but in general it may be said that when neuritis affects one nerve (mononeuritis) or a plexus of nerves (plexitis), the cause commonly is a mechanical one; that when several single nerves are affected simultaneously (mononeuritis multiplex), the cause often is a vascular or allergic one; and that when widely separated nerves are affected (polyneuritis), the cause often is toxic, metabolic, viral, or allergic. The symptoms of neuritis are usually confined to the specific portion of the body served by the inflamed nerve.

Inflammations of sensory neurons in a nerve fibre cause sensations of tingling, prickling, burning, boring, or stabbing pains that are worse at night and are aggravated by touch or temperature change. The inflammation of the motor part of a nerve (*i.e.,* those neurons that transmit impulses to muscles) causes symptoms ranging from muscle weakness to complete paralysis. Muscles in the area served by the affected nerve lose tone, become tender, and may atrophy. A notable form of mononeuritis is Bell's palsy, which is caused by the inflammation of a facial nerve and which causes a characteristic distortion of the facial muscles.

The treatment of neuritis is directed toward the causative agent. Analgesics may be required for pain. Under proper therapy, recovery is usually rapid in less severe cases; repetition of the original cause may bring about recurrence. In severe cases, recovery may be incomplete, with some residual motor and sensory disturbances. *See also* neuralgia.

neurofibromatosis, either of two hereditary disorders characterized by distinctive skin lesions and by benign, progressively enlarging tumours of the nervous system. Neurofibromatosis type 1, also known as von Recklinghausen's disease, is much the more common of the two disorders and is present in about one of every 3,000 live births. This type is characterized by the presence of café-au-lait (pale brown) spots on the skin and the formation of numerous benign soft tumours arising from the abnormal growth of nerves. The café-au-lait spots may be present at birth or infancy, and the neurofibromas and other tumours appear in late childhood or early adulthood; the latter can sometimes result in grossly disfiguring effects owing to their large size. The course of the disease is progressive in most cases. Neurofibromatosis type 2 is a much rarer inherited disease marked by tumours of the auditory canal in the ear and by small numbers of café-au-lait spots.

Neurofibromatosis 1 is passed on as an autosomal dominant trait, and the child of someone with the disease has a 50-percent chance of developing it. About half of all cases of the disorder, however, result from genetic mutation at conception rather than from familial inheritance. In 1990 scientists identified a gene on human chromosome 17 that is responsible for neurofibromatosis type 1; a defective version of this gene allows nerve cells to grow without restraint, resulting in neurofibromas.

neurogenic arthropathy, also called CHARCOT'S JOINT (after Jean-Martin Charcot, a 19th-century French neurologist), massive destruction of a stress-bearing joint, with development of large flanges and spurs of new bone at the sides of the joint. The condition eventually causes inability to use the joint but is accompanied by little or no sensation of pain or discomfort. The disorder accompanies damage to the nervous system in which sensory knowledge of joint position and strength is lost; the affected individual is not aware of overuse or injury so that destructive changes can develop quickly.

The most common cause of Charcot's joint is tabes dorsalis, a form of nervous system disease that occurs in untreated tertiary venereal syphilis; the knee, hip, ankle, and lower back are most often affected. Neurogenic arthropathy of the foot occurs as a complication of diabetes. Other diseases that destroy the sense of joint position or of pain may also cause Charcot's joint, such as leprosy, spinal cord injury, or pernicious anemia. Treatment involves complete protection of the joint from further stress or injury, commonly by the use of a brace.

neurohormone, any of a group of substances produced by specialized cells (neurosecretory cells) structurally typical of the nervous, rather than of the endocrine, system. The neurohormones pass along nerve-cell extensions (axons) and are released into the bloodstream at special regions called neurohemal organs. Neurohormones thus constitute a linkage between sensory stimuli (events or conditions perceived by the nervous system) and chemical responses (endocrine secretions that act on other tissues of the endocrine system or on tissues of other systems, such as those involved with excretion or reproduction).

The neurohormones in most mammals include oxytocin and vasopressin, both of which are produced in the hypothalamic region of the brain and secreted into the blood by the neurohypophysis (part of the pituitary gland). A second group of neurohormones, called releasing hormones (the first of which was chemically identified in 1969), also originates in the hypothalamus. The members of this group, however, are transmitted within the neural cells to a second locus in the brain, from which they pass in the bloodstream to the adenohypophysis, which also is a part of the pituitary gland. There they either stimulate or inhibit the release of the various adenohypophysial hormones.

A third group of neurohormones includes the enkephalins and other endorphins, first observed in 1975 in the course of investigations of the mechanism of action of morphine and other analgesics. The endorphins are effective in relieving pain, a property apparently related to their function as neurotransmitters, passing nerve impulses from one neuron to another. Their neurohormonal activity is manifested by their stimulation of the secretion of somatotropin and vasopressin by an indirect process involving a site (other than the secretory neuron) in the central nervous system. *See also* endorphin.

neurolinguistics, the study of the neurological mechanisms underlying the storage and processing of language. Although it has been fairly satisfactorily determined that the language centre is in the left hemisphere of the brain in right-handed people, controversy remains concerning whether individual aspects of language are correlated with different specialized areas of the brain. One kind of research carried on in this field is the study of aphasia, a condition of the brain in which language ability is impaired or destroyed. Temporary aphasia has been induced by electrically stimulating the cortex of conscious patients in order to determine the location of the various functions of language. Although very general centres of language have been proposed, it seems that there are no highly specialized centres. Several cases have been reported of patients who, after having their left hemisphere of the brain removed, adapted in the right hemisphere the language function that the left hemisphere had had. In general, however, though progress is being made in this field, very little is known for certain about the neurological aspects of language.

neurology, medical specialty concerned with the diagnosis and treatment of functional or organic disorders of the nervous system (*i.e.,* the brain, spinal cord, and nerves).

The modern science of neurology has developed in the past two centuries. The first scientific studies of nerve function in animals were done in the early 18th century by Stephen Hales and Robert Whytt, but clinical neurology was still relatively unexplored territory until the middle of the 19th century.

Important contributions to neurological knowledge were made in the mid- and late 19th century. New knowledge was gained about the causes of aphasia, epilepsy, and about motor problems arising from brain damage. The mapping of the functional areas of the brain through selective electrical stimulation also began at this time. Despite these contributions, however, most new knowledge of the brain and nervous functions came from studies of animals and from the microscopic analysis of nerve cells.

The diagnosis of neurological disease was greatly improved by Hans Berger's invention in the 1920s of the electroencephalograph, which records electrical brain activity. With this device, with the analysis of cerebrospinal fluid obtained by the spinal tap, and with the development of cerebral angiography (*q.v.*), neurologists were able to increase the precision of their diagnoses and develop specific therapies and rehabilitative measures. Further aiding the diagnosis of brain disorders were the development of computerized axial tomography (CAT scans) in the early 1970s and nuclear magnetic resonance (NMR) imaging in the 1980s, both of which yielded detailed, noninvasive views of the inside of the brain. (*See* brain scanning.)

Another major development was the introduction of specific drug therapies for neurological conditions. The identification of chemical agents in the central nervous system and the elucidation of the roles these substances play in the transmitting and blocking of nerve impulses led in the mid- and late 20th century to a wide array of drugs that could correct or alleviate various neurological disorders. Neurological surgery, or neurosurgery, is a medical specialty related to neurology. It is perhaps the most difficult and delicate of the surgical disciplines, but it too has benefited from CAT scans and other increasingly precise methods of locating lesions and other abnormalities in nervous tissues. Neurological disorders have always been among the most subtle and baffling of human illnesses, and despite continuing advances in their field, neurologists remained unable to effectively treat many disorders of the nervous system.

neuromuscular blocking agent, also called CURARIFORM DRUG, any of various drugs that interfere with the transmission of stimulatory impulses from nerve to muscle. The drugs affect the action of acetylcholine, a compound that is released by nerve endings and taken up by receptor sites in muscle cells to initiate muscle contraction.

Competitive or stabilizing neuromuscular blocking agents compete with acetylcholine for the receptor sites. Curare and its synthetic analogs are such drugs, used to induce muscle relaxation in surgery.

Depolarizing agents produce an immediate and prolonged depolarization of the muscle receptors, thus paralyzing muscle response by preventing the receptors from responding to acetylcholine. *See also* ganglion blocking agent.

neuromuscular junction, also called MYONEURAL JUNCTION, site of chemical communication between a nerve fibre and a muscle cell. It is analogous to the synapse between two neurons. A nerve fibre divides into many terminal branches, each terminal ending on a region of muscle fibre called the end-plate. Embedded in the end-plate are thousands of receptors, which are long protein molecules that form channels through the membrane. Upon stimulation by a nerve impulse, the terminal releases a chemical neurotransmitter (acetylcholine) from spheres called synaptic vesicles. The neurotransmitter then binds to the receptors, the channels open, and sodium ions flow into the end-plate. This initiates the end-plate potential (*q.v.*), the electric event that leads to contraction of the muscle fibre.

neuron, also called NERVE CELL, basic cell of the nervous system in vertebrates and most invertebrates from the level of the cnidarians upward. It transmits nerve impulses. A typical neuron has a cell body containing a nucleus and two or more long fibres. Impulses are carried along one or many of these fibres, the dendrites, to the cell body; in higher nervous systems, only one fibre, the axon, carries the impulse away from the cell body. Bundles of fibres from neurons are held together by connective tissue and form nerves. Some neurons of large vertebrates are several feet long. A sensory neuron is a nerve cell that transmits impulses from a receptor such as those in the eye or ear to a more central location in the nervous system. A motor neuron is a nerve cell that transmits impulses from a central area of the nervous system to an effector such as a muscle.

neuronal junction (biology): *see* synapse.

neuropteran, a member of the insect order Neuroptera, which is now generally restricted to the lacewings but formerly included also the dobsonflies and alderflies (now assigned to the order Megaloptera) as well as the snakeflies (order Raphidiodea). Between them the three groups comprise some 4,600 species.

A brief treatment of neuropterans follows. For full treatment, *see* MACROPAEDIA: Insects.

The three orders that constitute the broad sense of neuropteran are thought to have evolved from a common stem, that of the scorpionfly (Mecoptera), from which they diverged at different times during the Carboniferous Period (about 325,000,000 to 345,000,000 years ago). There are structural resemblances between the three orders, and they live in similar habitats. Neuropterans are found all over the world.

Neuropterans have long antennae and two pairs of transparent, net-veined wings, which in lacewings range from 2 to 50 mm (0.08 to 2 inches) in span. Although the wings are intricately structured, these insects are not strong fliers. When at rest the wings fold, rooflike, over the body. The neuropterans are generally carnivorous, feeding mostly upon smaller, soft-bodied insects, such as mites, ants, and aphids, and on insect eggs and larvae. Their mouth structures are adapted for piercing and chewing. The larvae of most Neuroptera species live on land; megalopteran larvae are aquatic, while raphidiodean larvae live under loose tree bark. Like the adult forms, the larval forms are generally predacious.

Neuropterans lay their eggs loosely in soil or cement them to some surface. The females of the Megaloptera lay their eggs in water. Raphidiodean females have an ovipositor, or egg-laying organ, with which they deposit their eggs in fissures in tree bark. Neuropteran larvae spin double cocoons, one inside the other. After pupation the emerging adults generally cut themselves free with their mandibles.

Little is known of the feeding habits of the adult neuropterans except that they are frequently nocturnal. Both larval and adult forms serve as food for many larger species of insects, as well as for birds and bats. They are also an important food source for trout and other freshwater fish and are often used as bait.

neurosecretory cell, a type of neuron, or nerve cell, whose function is to translate neural signals into chemical stimuli. Such cells produce secretions (neurohormones) that pass along the nerve cell axon and are typically released into the bloodstream at special regions (neurohemal organs) in which the axon endings are in close contact with blood capillaries. Neurosecretory cells occur in most multicellular animals and are usually distinguished from other neurons by the unusually large size of the cell nucleus, axon endings, and the cell itself.

neurosis: *see* psychoneurosis.

neurotransmitter, also called CHEMICAL TRANSMITTER, or TRANSMITTER SUBSTANCE, any of a group of chemical agents released by neurons (nerve cells) to stimulate neighbouring neurons, thus allowing impulses to be passed from one cell to the next throughout the nervous system.

The site where neurons meet is called the synapse and consists of the axon terminal (transmitting end) of one cell and the dendrite (receiving end) of the next. A microscopic gap called a synaptic cleft exists between the neurons. When a nerve impulse arrives at the axon terminal of one cell, a chemical substance is released through the presynaptic membrane, traveling in milliseconds across the synaptic cleft to the postsynaptic membrane of the adjoining neuron. The chemical release is stimulated by the cell's electrical activity.

Although a large number of chemical substances are believed to act as neurotransmitters, only a few have been identified. Among those known are acetylcholine, norepinephrine (noradrenalin), dopamine, and serotonin. Some chemical agents, such as acetylcholine, excite (activate) neurons, while others act as inhibiting substances. Research has shown that some psychoactive (mind-altering) drugs function by changing synaptic activities. *See also* nervous system.

Neusalz (Poland): *see* Nowa Sól.

Neusatz (Yugoslavia): *see* Novi Sad.

Neuschwanstein, elaborate castle built atop a rock ledge over the Pöllat Gorge in the Bavarian Alps (near Füssen, Ger.) by order of Bavaria's King Louis II, called "Mad Ludwig." Begun in 1869 and left unfinished at Louis's death in 1886, this lavish stronghold is an eccentric romantic reconstruction of a medieval castle, complete with walled courtyard, indoor garden, spires, towers, and an artificial cave. Its two-story throne room is modeled after a Byzantine basilica; stars decorate its blue vaulted ceiling, which is supported by red porphyry columns.

Louis was a patron of Richard Wagner, and wall paintings throughout the castle depict Wagnerian themes: the life of Parsifal in the 4th-floor Singers' Hall; the Tannhäuser saga in the study; Lohengrin in the great parlour.

Neuschwanstein became a popular tourist attraction in the 20th century.

Neuse River, river in northeast-central North Carolina, U.S. It is formed by the junction of the Flat and Eno rivers in Durham county. Named for the Neusiok Indians, it flows about 300 miles (480 km), generally southeast past Kinston, the head of navigation. At New Bern, 35 miles (56 km) from the Atlantic Ocean, the Neuse is joined by the Trent River to form an estuary 5 miles (8 km) wide and about 40 miles (64 km) long. The river flows past Croatan National Forest on its way to the Atlantic Ocean.

Neuserre, also spelled NYUSERRE, sixth king of the 5th dynasty (*c.* 2465–*c.* 2325 BC) of Egypt; he is primarily known for his temple to the sun-god Re at Abū Jirāb (Abu Gurab) in Lower Egypt. The temple plan, like that built by Userkaf (the first king of the 5th dynasty), consisted of a valley temple, causeway, gate, and temple court, which contained an obelisk (the symbol of Re) and an alabaster altar. The sun-temple reliefs revealed an exceptionally high development of artistry and technique. Few written records were left from Neuserre's reign, but the pyramid he used as a burial place has been located at Abū Ṣīr near the sun temples of Abū Jirāb. Though impressive in size, Neuserre's pyramid was exceeded both in height and in length by his sun temple, indicating the unusual prominence of the cult of Re during the 5th dynasty.

Neusiedler Lake, German NEUSIEDLERSEE, Hungarian FERTŐ-TÓ, lake in Burgenland (eastern Austria) and northwestern Hungary, named from the Austrian town of Neusiedl and the Hungarian word for "swamp lake." Formed several million years ago during the Pleistocene Epoch, probably as a result of tectonic subsidence, it is Austria's lowest point (377 feet [115 m] above sea level). The lake is 22 miles (36 km) long and 4–9 miles (6–14 km) wide. Neusiedler Lake is fed by a small stream and probably by underground sources and is slightly saline with no natural outflow. It is very shallow (rarely more than 4–6 feet deep) and fluctuates in level and size (135 square miles [350 square km]) with climatic variations. A canal (built 1873–95) connects it to the Rabnitz (Hungarian: Répce) River, which is a tributary of the Danube. A heavy reed growth along the lake's shores supports many species of rare and migratory birds, which are protected by an international sanctuary and a biological station. The lake provides raw materials for the cellulose industry and serves as a recreation area for nearby Vienna. Major lakeside towns are Neusiedl, Podersdorf, and the wine centre of Rust.

Neusiedler Lake from Burgenland, Austria

Toni Schneiders—Bruce Coleman

Neusohl (Slovakia): *see* Banská Bystrica.

Neuss, city, North Rhine-Westphalia *Land* (state), western Germany. It lies on the west bank of the Rhine, opposite Düsseldorf.

Founded about 12 BC as a Roman fortress (the Novaesium of Tacitus), it was captured by the Franks and renamed Niusa. It was chartered in 1187–90. As the chief town of the northern part of the archbishopric of Cologne, it was unsuccessfully besieged by Charles the Bold in 1474–75. It was sacked by Alessandro Farnese in 1586 and passed to Prussia in 1816. The Church of St. Quirinus (1209), with its Baroque dome (1741), and the town hall (1634–38) were damaged in World War II but have been restored. The 13th-century Obertor (a massive gatehouse, part of the medieval fortifications) houses the Clemens-Sels Museum, and the Zeughaus (1639), or arsenal, is a concert hall.

Neuss is now an important rail junction, port, grain market, and industrial centre. Its harbour is accessible to small oceangoing ships. The city's manufactures include machinery, chemicals, and processed foods. Pop. (1991 est.) 147,019.

Neustadt an der Weinstrasse, formerly NEUSTADT AN DER HAARDT, city, Rhineland-Palatinate *Land* (state), southwestern Germany. It lies on the eastern slope of the Haardt Mountains, at the mouth of the Speyer-Bach. Founded in 1220 and chartered in 1275, its historic buildings include the Casimirianum (the seat of Heidelberg University, 1578–83, now a convention hall), the town hall (formerly a Jesuit college), and the Stiftskirche ("Collegiate Church"), which is a Gothic abbey church dating from the 14th century.

Neustadt is the administrative centre of Rheinhessen-Pfalz district. The city is located in the Weinstrasse ("Wine Route"), the centre of the German wine trade. The Deutsche Weinlesefest ("Wine Festival") is held annually in the city, which is also the site of a training and research institute of viticulture and horticulture. The city's convenient location and picturesque setting at the foot of Mount Kalmit (2,208 feet [673 m]) make it a favourite tourist base. Its other economic activities include food processing and the manufacture of metal products and paper. Pop. (1991 est.) 51,988.

Neustettin (Poland): *see* Szczecinek.

neuston, group of organisms found on top of or attached to the underside of the surface film of water. The neuston includes insects such as whirligig beetles and water striders, some spiders and protozoans, and occasional worms, snails, insect larvae, and hydras. It is distinguished from the plankton, which only incidentally becomes associated with the surface film.

Neustria, during the Merovingian period (6th–8th century) of early medieval Europe, the western Frankish kingdom, as distinct from Austrasia, the eastern kingdom. By derivation, Neustria was the "new" (French *neuf;* German *neu*) land—*i.e.,* the area colonized by the Franks since their settlement in northern Gaul. It corresponded roughly to the area of present France west of the Meuse and north of the Loire rivers. In the 7th century Austrasia and Neustria were rivals, but the victory of Pepin of Herstal, mayor of the palace in Austrasia, over the Neustrians at Tertry (687) assured the ultimate ascendancy of Austrasia. In the later Merovingian period, Neustrian writers used the names Neustria and Francia (France) interchangeably, implying that Neustria formed the heart and core of the Frankish lands. Later, the name Neustria came to denote a much smaller area, and, by the 11th and 12th centuries, it was sometimes used synonymously with Normandy.

Neutra (Slovakia): *see* Nitra.

Neutra, Richard Joseph (b. April 8, 1892, Vienna, Austria—d. April 16, 1970, Wuppertal, W.Ger.), Austrian-born American architect known for his role in introducing the International Style into American architecture.

Neutra, 1968

By courtesy of Dion Neutra, Richard and Dion Neutra Architects and Associates

Educated at the Technical Academy, Vienna, and the University of Zürich, Neutra, with the German architect Erich Mendelsohn, won an award in 1923 for a city-planning project for Haifa, Palestine (now in Israel). Neutra moved to the United States the same year, working briefly for the firm of Holabird and Roche in Chicago and at Taliesin in Spring Green, Wis., with Frank Lloyd Wright.

Neutra's most important early work was the Lovell House, Los Angeles (1927–29), which has glass expanses and cable-suspended balconies and is stylistically similar to the work of Le Corbusier and Ludwig Mies van der Rohe in Europe. Throughout the 1930s he designed houses in the International Style.

Shortly after World War II, Neutra created his most memorable works: the Kaufmann Desert House, Palm Springs, Calif. (1946–47), and the Tremaine House, Santa Barbara, Calif. (1947–48). Elegant and precise, these houses are considered exceptionally fine examples of the International Style. Carefully placed in the landscape, Neutra's houses often have patios or porches that make the outdoors seem part of the house. He believed that architecture should be a means of bringing man back into harmony with nature and with himself and was particularly concerned that his houses reflect the way of life of the owner.

During the 1950s and '60s Neutra's works included office buildings, churches, buildings for colleges and universities, housing projects, and cultural centres. After 1966 he was in partnership with his son, the firm name becoming Richard and Dion Neutra Architects and Associates. He died while on a tour of Europe. Among his voluminous writings are *Survival Through Design* (1954), *Life and Human Habitat* (1956), and an autobiography, *Life and Shape* (1962).

Neutral, French NEUTRE, a confederacy of Iroquoian-speaking Indians who lived in what are now southern Ontario, western New York, northeastern Ohio, and southeastern Michigan. They received their name from the French because they were neutral in the known wars between the Iroquois and the Huron before the mid-17th century. Their neutrality did not extend to all other tribes, and during the early 17th century the Neutral were at war with groups to the west, particularly the Potawatomi. Neutral villages of bark-covered houses were situated on high, defensible ground; their economy was based on agriculture, supplemented by game, which was plentiful in this area.

During the war between the Huron and the Iroquois in 1648–49, the Neutral attempted to gain favour with the Iroquois by seizing those Huron who had sought refuge with them as well as other Huron; the Iroquois nevertheless attacked and destroyed the Neutral in 1650–51. The last mention of them as an independent group was a report of 800 members of the tribe living in the vicinity of Detroit, Mich., in 1653. The remainder were either killed or absorbed by the Iroquois.

neutral monism, in the philosophy of mind, theories that hold that mind and body are not separate, distinct substances but are composed of the same sort of neutral "stuff."

David Hume, an 18th-century Scottish skeptic, developed a theory of knowledge that led him to regard both minds and bodies as collections of "impressions" ("perceptions"), the primary data of experience. Bertrand Russell, a 20th-century British logician and philosopher, called the neutral entities "sensibilia" and argued that mind and matter are "logical constructions." William James, the American pragmatist, held that the neutral primary stuff is not a series of atomistic perceptions but is a "booming, buzzing confusion" that he termed "pure experience," with mind, or consciousness, and body as names of discernible functions within it.

Neutral-monist theories have been criticized as inadequate in their account of either mind or body. Hume himself said (*A Treatise of Human Nature*) that his concept of mind as a bundle of perceptions inadequately accounts for the identity and simplicity of the mind. Others have criticized the notion that physical bodies comprise some sort of primary experience as implicitly idealistic. Hence, the central problem for neutral monism is seen as that of specifying clearly the nature of the neutral stuff without qualifying it in an exclusively mental or physical fashion.

neutralism, also called NONALIGNMENT, in international relations, the peacetime policy of avoiding political or ideological affiliations with major power blocs. The policy was pursued by such countries as India, Yugoslavia, and many of the new states of Asia and Africa during the period of the Cold War (1945–90). These countries refused, for the most part, to align themselves with either the communist bloc, led by the Soviet Union, or the Western bloc, led by the United States. Though neutralist in this sense, they were not neutral or isolationist, for they participated actively in international affairs and took positions on international issues.

Neutralism must also be distinguished from neutrality, which is a term in international law referring to the rules that states are obliged to follow during a legal state of war in which they are not belligerents.

The widespread espousal of neutralism as a distinct policy was a post-World War II phenomenon, but similar policies were followed, though to a lesser extent, prior to that period. The so-called isolationist policy and the avoidance of entangling alliances, advocated for the United States by presidents George Washington and Thomas Jefferson and pursued during the European wars between France and Great Britain following the French Revolution and for a century after the peace of 1815, were analogous to the 20th-century policy of neutralism.

In the second half of the 20th century, many nations took up the position of neutralism. With the meeting at the Bandung Conference (1955) of 29 countries for the purpose of, among other issues, establishing their neutralism, the Nonaligned Movement was conceived. The first meeting of the nonaligned nations was in Belgrade in 1961. A growing number of neutral nations met again in 1964, 1970, and roughly every three years thereafter. The some 100 states that eventually became involved in this movement justified their position on a number of grounds. They declined to assume that the United States, the Soviet Union, or any other country necessarily intended to embark upon aggressive action designed to violate their territorial integrity, and therefore they refused to enter into alliances or collective defense arrangements directed against particular states. The new nations of Asia and Africa, which made up the largest group of neutralist states, were mostly former colonies of the western European powers. These new nations were, on the one hand, wary of permanent and close alignments with these powers in the Western bloc for fear of being drawn into a newer form of dependence; on the other hand, though generally attracted by offers of economic assistance from (and often the anti-Western rhetoric of) various communist countries, they feared that intimate ties with the Soviet Union could also threaten their independence. As a practical matter, a neutralist policy often enabled them to get much-needed economic assistance from both power blocs.

The Nonaligned Movement experienced considerable difficulty in establishing a unified policy on many issues in international affairs. Many of the member nations were enemies (such as Iran and Iraq), and true nonalignment proved an elusive goal. With the end of the Cold War and the breakup of the Soviet Union (1991), neutralism lost much of its usefulness as a guiding principle in many nations' foreign relations.

neutrality, the legal status arising from the abstention of a state from all participation in a war between other states, the maintenance of an attitude of impartiality toward the belligerents, and the recognition by the belligerents of this abstention and impartiality. Under international law this legal status gives rise to certain rights and duties between the neutral and the belligerents.

The laws concerning the rights and duties of neutrality are contained, for the most part, in the Declaration of Paris of 1856, Hague Convention V, 1907 (neutrality in land war), and Hague Convention XIII, 1907 (neutrality in maritime war). One of the first recommendations of the last convention was that, when war breaks out between certain powers, each nation wishing to remain impartial should normally issue either a special or general declaration of neutrality. Such a declaration, however, is not required by international law. A neutral state may, during the course of the hostilities, repeal, change, or modify its position of neutrality, provided that such alterations are applied without bias to all belligerents.

The most important of the rights that result from a state of neutrality is the right of territorial integrity. Belligerents may not use a neutral's territory as a base of operations or engage in hostilities therein. This right applies not only to neutral territory and water but extends to air space above that territory as well. Under the Hague Rules of Air Warfare, 1923 (which never became legally binding), neutrals have the right to defend their air space from passage of belligerent aircraft. The emergence of ballistic missiles and space satellites as tools of warfare, however, has raised questions regarding the extent of a state's upper boundary.

A neutral also has the right to maintain diplomatic communications with other neutral states and with the belligerents; the right to demand compliance with its domestic regulations designed to secure its neutrality; and the right to require belligerents not to interfere with the commercial intercourse of its citizens, unless such interference is warranted by international law.

The events of World Wars I and II foreshadowed a breakdown of some of the basic concepts of neutrality. With the German invasion of Belgium, the Italian invasion of Greece, the British occupation of Iceland, and the passage by the United States of the Lend-Lease Act (1941), the traditional rules of neutrality appeared no longer viable. By the middle of the 20th century new developments in the law of neutrality were evident. (1) The total character of modern war, with its use of economic as well as mechanized means of warfare, has sharply reduced the traditional area of freedom of the neutral. (2) Under the provisions of the Charter of the United Nations, neutrality, as a permissive legal status, disappears for those members that the Security Council "calls upon" or requires in specific instances to take military or other measures of coercion against an aggressor (Articles 41, 48). (3) The socialization of national economies may result in a lessening of neutral trade; many business enterprises that could formerly trade with belligerents as private traders could no longer legally do so as state enterprises.

Neutre (people): *see* Neutral.

neutrino, type of fundamental particle with no electric charge, little or no mass, and one-half unit of spin. Neutrinos belong to the family of particles called leptons, which are not subject to the strong nuclear force. There are three types of neutrino, each associated with a charged lepton—*i.e.,* the electron, muon, and tau.

The electron-neutrino was proposed in 1930 by the Austrian physicist Wolfgang Pauli to explain the apparent loss of energy in the process of beta decay, a form of radioactivity. The Italian-born physicist Enrico Fermi further elaborated (1934) the proposal and gave the particle its name. An electron-neutrino is emitted along with a positron in positive beta decay, while an electron-antineutrino is emitted with an electron in negative beta decay.

Neutrinos are the most penetrating of subatomic particles because they react with matter only through the weak interaction. Neutrinos do not cause ionization, because they are not electrically charged. Only 1 in 10 billion, traveling through matter a distance equal to the Earth's diameter, reacts with a proton or neutron. Electron-neutrinos were first experimentally observed in 1956, when a beam of antineutrinos from a nuclear reactor produced neutrons and positrons by reacting with protons.

Another type of neutrino, produced when pi mesons (pions) decay, was conclusively shown (1962) to be a different species: the muon-neutrino. Although they are as unreactive as the other neutrinos, muon-neutrinos were found to produce muons but never electrons when they react with protons and neutrons. In the mid-1970s, particle physicists discovered yet another variety of charged lepton, the tau. A tau-neutrino and tau-antineutrino are associated with this third charged lepton.

All types of neutrino have masses much smaller than those of their charged partners, if indeed they have any mass at all. For example, experiments show that the mass of the electron-neutrino must be less than 0.0004 that of the electron. There is, however, no compelling theoretical reason for the mass of the neutrino to be exactly zero. Indeed, the shortfall in the number of neutrinos detected on Earth from the nuclear reactions in the core of the Sun (the so-called mystery of the missing solar neutrinos) may well be explicable if one or more of the neutrino types has a small mass. *See also* lepton.

neutron, one of the constituent particles of every atomic nucleus except ordinary hydrogen; it has no electrical charge and its mass is nearly 1,840 times that of the electron.

A brief treatment of neutrons follows. For full treatment, *see* MACROPAEDIA: Atoms: Their Structure, Properties, and Component Particles.

Neutrons and protons constitute more than 99.9 percent of an atom's mass. These two types of nuclear particles, commonly called nucleons, interact through the so-called strong force and bond in various proportions to form the different atomic species of the chemical elements. The neutron possesses an intrinsic angular momentum (*q.v.*) and a magnetic moment—*i.e.,* it behaves like a minute magnet in ways that suggest that it is an entity of moving electric charges. Like the proton and other baryons, the neutron appears to consist of three quarks, extremely small subatomic particles that are thought to be among the fundamental components of matter (*see also* quark).

A free neutron—one that is not incorporated into a nucleus—is subject to radioactive decay of a type called beta decay. It can break down into a proton, an electron, and an antineutrino (the antimatter counterpart of the neutrino, a particle with no charge and little or no mass). Because it readily disintegrates in this manner, the neutron does not exist in nature in its free state but must be produced artificially. Since free neutrons are electrically neutral, they pass unhindered through the electrical fields within atoms and so constitute a penetrating form of radiation, interacting with matter almost exclusively through relatively rare collisions with atomic nuclei.

The neutron was discovered in 1932 by the English physicist James Chadwick. Within a few years after this discovery, many investigators throughout the world were studying the properties and interactions of the particle. It was found that various elements, when bombarded by neutrons, undergo fission—*i.e.,* a type of nuclear reaction that occurs when the nucleus of a heavy element is split into two nearly equal fragments. During this reaction each fissioned nucleus gives off additional free neutrons, as well as those bound to the fission fragments. In 1942 a group of American researchers, under the leadership of the physicist Enrico Fermi, demonstrated that enough free neutrons are produced during the fission process to sustain a chain reaction. This development led to the construction of the atomic bomb. Subsequent technological breakthroughs resulted in the large-scale production of electric power from nuclear energy. The absorption of neutrons by nuclei exposed to the high neutron intensities available in nuclear reactors has also made it possible to produce large quantities of radioactive isotopes useful for a wide variety of purposes (*see* radioactive isotope). Furthermore, the neutron has become an important tool in pure research. Knowledge of its properties and structure is essential to an understanding of the structure of matter in general. Nuclear reactions induced by neutrons are valuable sources of information about the atomic nucleus and the force that binds it together.

neutron, thermal: *see* thermal neutron.

neutron bomb, also called ENHANCED RADIATION WARHEAD, specialized type of small thermonuclear weapon that produces minimal blast and heat but which releases large amounts of lethal radiation. The neutron bomb delivers blast and heat effects that are confined to an area of only a few hundred yards in radius. But within a somewhat larger area it throws off a massive wave of neutron and gamma radiation, which can penetrate armour or several feet of earth. This radiation is extremely destructive to living tissue. Because of its short-range destructiveness and the absence of long-range effect, the neutron bomb would be highly effective against tank and infantry formations on the battlefield but would not endanger cities or other population centres only a few miles away. It can be carried in a Lance missile or delivered by an 8-inch (200-millimetre) howitzer, or possibly by attack aircraft.

In strategic terms, the neutron bomb has a theoretical deterrent effect: discouraging an armoured ground assault by arousing the fear of neutron bomb counterattack. The bomb would disable enemy tank crews in minutes, and those exposed would die within days. U.S. production of the bomb was postponed in 1978 and resumed in 1981.

neutron capture, type of nuclear reaction in which a target nucleus absorbs a neutron (uncharged particle), then emits a discrete quantity of electromagnetic energy (gamma-ray photon). The target nucleus and the product nucleus are isotopes, or forms of the same element. Thus phosphorus-31, on undergoing neutron capture, becomes phosphorus-32. The heavier isotope that results may be radioactive, so that neutron capture, which occurs with almost any nucleus, is a common way of producing radioactive isotopes.

Neutron capture is also named neutron-gamma, or (η,γ), reaction from the bombarding particle (η for neutron) and the emitted particle (γ for gamma-ray photon) and sometimes called neutron radiative capture because of the prompt emission of only electromagnetic radiation. Among the natural elements, boron, cadmium, and gadolinium are the best absorbers of slow neutrons by the capture process.

neutron optics, branch of physics dealing with the wave behaviour of neutrons, the electrically neutral subatomic particles that are present in all atomic nuclei except those of ordinary hydrogen. A beam of free neutrons, produced in nuclear reactors by ejecting neutrons from the core of atoms in reactions such as fission, is reflected, scattered, or diffracted by materials on which the beam is directed.

In particular, in contrast to fast neutrons, which act more exclusively as particles when they strike materials, slow neutrons have longer wavelengths of about 10^{-10} metre (or about an angstrom unit), which corresponds to the distance between atoms in crystals. Slow neutrons scattered by the atoms in solids undergo mutual interference (similar to the behaviour of X rays and light) to form diffraction patterns from which details of crystal structure and magnetic properties of solids are deduced.

neutron star, any of a class of extremely dense, compact stars thought to be composed primarily of neutrons. Neutron stars are typically about 20 km (12 miles) in diameter but have a mass roughly the same as the Sun's. Thus, their mean densities are extremely high—about 10^{14} times that of water. This approximates the density inside the atomic nucleus, and in some ways a neutron star can be conceived of as a gigantic nucleus held together by its own gravity. In the centre of the star, where the pressure is greatest, the material is thought to consist mainly of hyperons and mesons. The intermediate layers are mostly neutrons and are probably in a "superfluid" state. The outer 1 km (0.6 mile) is solid, in spite of the high temperatures, which might be as high as 1,000,000 K. The surface of this solid layer, where the pressure is lowest, is composed of an extremely dense form of iron.

Another important characteristic of neutron stars is the presence of very strong magnetic fields, upwards of 10^{12} gauss, which causes the surface iron to be polymerized in the form of long chains of iron atoms. The individual atoms become compressed and elongated in the direction of the magnetic field and can bind together end-to-end, forming "whiskers," which probably extend out from the surface. Below the surface, the pressure becomes much too high for individual atoms to exist.

The discovery of pulsars in 1967 provided the first evidence of the existence of neutron stars. Pulsars are generally believed to be rotating neutron stars. The very short periods of the Crab and Vela pulsars (33 and 83 milliseconds, respectively) rule out the possibility that they might be white dwarfs. The pulses appear to result from electrodynamic phenomena generated by their rotation and their strong magnetic fields, as in a dynamo. There is also evidence that certain binary X-ray sources, such as Hercules X-1, contain neutron stars. Cosmic objects of this kind appear to emit X rays by compression of material from companion stars accreted onto their surfaces.

Most investigators believe that neutron stars are formed by supernova explosions in which the collapse of the central core of the supernova is halted by rising neutron pressure as the core density increases to about 10^{15} grams per cubic cm. If the collapsing core is more massive than about two solar masses, however, a neutron star cannot be formed, and the core would presumably become a black hole (*q.v.*).

Neuwied, city, Rhineland-Palatinate *Land* (state), western Germany, on the right bank of the Rhine (there bridged to Weissenthurm) near the Wied stream, just northwest of Koblenz. Founded in 1653 by the Count of Wied for religious refugees, it was chartered in 1662 and became a flourishing commercial and craftsman's town in the 18th century. Seat of the county (principality after 1784) of Wied-Neuwied until 1806, when it was included in the duchy of Nassau, the town passed to Prussia in 1815. In 1904 it absorbed the village of Heddesdorf, where Roman fortifications have been excavated. One of the city's historic landmarks is the Baroque castle (1707–57) of the princes of Wied. Industries include iron and steel production, engineering, and the manufacture of wood products and chemicals and of pumice building materials made from the local volcanic sand. Pop. (1998 est.) 67,566.

Consult the INDEX *first*

Neva, Battle of the (July 15, 1240), military engagement in which the Novgorod army defeated the Swedes on the banks of the Neva River; in honour of this battle the Novgorod commander, Prince Alexander Yaroslavich, received the surname Nevsky. The conflict between the Swedes and the Novgorodians was based largely on Swedish efforts to expand into northwestern Russia and to force the conversion of the Russians from Greek Orthodoxy to Roman Catholicism. Calculating that the Mongol conquest of Russia (1240) had deprived Novgorod of military support from other Russian cities, the Swedes, led by Earl Birger, landed at the Neva's mouth and attempted to block Novgorod's approach to the Baltic Sea. Alexander led an army against them and destroyed most of the Swedish force. Birger sailed back to Finland with the few Swedish survivors.

Neva River, river in St. Petersburg *oblast* (province), northwestern Russia. The river issues from Lake Ladoga at Petrokrepost and flows 46 miles (74 km) west to the Gulf of Finland in the Baltic Sea. Its drainage basin covers 109,000 square miles (282,000 square km) and includes Lakes Ladoga, Onega, and Ilmen and the Svir and Volkhov rivers. Freeze-up lasts from early December to late April. The river derives importance not only from its navigability by large ships—it forms part of the White Sea–Baltic and Volga-Baltic waterways—but also from the presence of St. Petersburg city at its mouth.

Nevada, constituent state of the United States of America lying in the arid Great Basin portion of the western mountain region of the country. The capital is Carson City.

A brief treatment of Nevada follows. For full treatment, *see* MACROPAEDIA: United States of America.

Separated by the Sierra Nevada from California on the west, Nevada is also bounded by Oregon and Idaho to the north, Utah to the east, and Arizona to the southeast. Nevada extends about 480 miles (720 km) north to south and 320 miles (515 km) east to west.

Human settlement in the area has spanned more than 20,000 years. Cave dwellers left picture writings on rocks in the Valley of Fire in southern Nevada, and Basket Makers and Pueblo Indians also flourished there. At the time of initial European contact, the main Indian groups in the area were the Mohave, Paiute, Shoshoni, and Washoe.

Spanish missionaries from New Mexico and Hudson Bay Company fur traders traversed the region in the 18th and early 19th centuries. During the 1830s and '40s American settlers and gold seekers traveled across the Great Basin to reach California. Nevada came under U.S. sovereignty through the Mexican Cession of 1848. The discovery of the Comstock Lode, a rich deposit of silver, in 1859 at Virginia City brought a rapid influx of settlers and prospectors, prompting the formation of the Nevada Territory in 1861. In need of silver and Senate votes during the American Civil War, the federal government encouraged Nevadans to seek admission to the Union. Congress accepted the proposed state constitution and voted Nevada the 36th state in 1864. The state prospered and declined through boom and bust cycles of mining and cattle raising until the 1930s, when a combination of legal gambling, reduced divorce requirements, and the construction of the Hoover Dam established the basis for economic growth. In the 1950s the state became the main testing site for atomic-energy experiments and the site of major military munitions depots. About 85 percent of Nevada's land is owned by the federal government.

Most of Nevada lies within America's Basin and Range Province. The Great Basin section of this area is characterized by rugged parallel mountain ranges, long, flat valleys, and sandy, alkaline deserts. The flow of the state's rivers is sustained largely by melting winter snows and spring rainfall. Almost all drain into alkaline lakes or shallow mudflats that have no outlets and largely evaporate during the summer. The Colorado River flows through dammed reservoirs along the southeastern boundary.

The climate is semiarid and arid. The high Sierra Nevada along the western boundary cause clouds of Pacific origin to drop their moisture before reaching Nevada. Rainfall varies from 4 inches (100 mm) in the southeast to 24 inches (610 mm) in the northwestern mountains. Temperatures vary from an average July high in the south of 86° F (30° C) to an average January low in the north of 24° F (−4° C). Climate and soil conditions are not suitable for cultivation without irrigation, but ranching and forage production is well developed in most valleys.

Nevada has experienced rapid population growth since the 1950s. Nonetheless, it remains one of the least densely populated states. About 85 percent of the population is classified as urban, and most of the urban population is concentrated in the metropolitan areas of the two largest cities, Las Vegas and Reno. Almost 90 percent of the population is white; only a small percentage is black. About one-half of the 13,200 American Indians live on reservations scattered across the state. Some 54,000 Nevadans are Spanish-speaking, and several thousand others trace their ancestry to Basque sheepherders.

Although the traditional bases of Nevada's economic life, mining and agriculture, remain important, they are far overshadowed by tourist-supported trade and service industries and governmental activity. A surge in gold-mining activities occurring during the 1980s increased the state's mineral-production value, reversing the trend caused by the virtual shutdown of the copper industry in 1977. Other important minerals mined are silver, barite, and mercury. Tourism and its related activities in the Las Vegas and Reno areas constitute the state's leading industry. Long centres of legal and state-regulated gambling, these cities are also major convention and entertainment centres. Liberal divorce laws made Nevada a place for quick and simple divorces. The rural counties of central Nevada have legalized, regulated prostitution. Las Vegas and Reno offer excellent opportunities for scenic and recreational activities at Lake Mead and Lake Tahoe. Military and defense installations and other government agencies are major employers in the state.

Nevada's tourism industry is heavily dependent on air transportation, and both Las Vegas and Reno have international airports. Three major railroads and two interstate highways cross Nevada from east to west.

Nevadans traditionally have mingled rural conservatism and the individualism of the Old West. With the sophisticated resort industries and the influx of residents, however, Las Vegas and Reno have developed marked metropolitan characteristics. Both cities support symphony orchestras, have commercial and public art galleries, and regularly feature famous entertainers. The University of Nevada at Reno and the University of Nevada, Las Vegas, sponsor lectures, concerts, and theatrical productions. Nevada's frontier heritage is commemorated at festivals, pageants, parades, and rodeos. The partially restored ghost town of Virginia City, most famous of all the western mining camps, and the old federal mint building (Nevada State Museum) in Carson City emphasize the state's mining traditions. Area 110,561 square miles (286,352 square km). Pop. (2000) 1,998,257.

Nevadan orogeny, a mountain-building event in the Sierra Nevada region of eastern California, believed to have taken place in the latest Jurassic time (about 144 million years ago). The term now is generally expanded for numerous orogenic pulses in the western portion of the Cordilleran Geosyncline of western North America that range in age from Late Jurassic to Early Cretaceous (from about 163 million to 97.5 million years ago).

Evidence for the early phases of the Nevadan orogeny consists of Late Jurassic igneous intrusions and folding and thrust faulting on the western slope of the Sierra Nevada and in the Klamath Mountains of northern California. Medial and late phases of the Nevadan orogeny are represented by the formation of vast batholiths (igneous bodies greater than about 104 square km [40 square miles] in area) of Early Cretaceous age in southern California, the Sierra Nevada, in Idaho, and in British Columbia. Folding and faulting of strata in western Nevada also may be attributed to the Nevadan orogeny.

The Nevadan orogeny may have been the result of underthrusting of the western portion of the North American Plate by oceanic crust, along a former oceanic trench located in the western portion of the Cordilleran Geosyncline.

Nevado de Toluca National Park, park in Mexico *estado* ("state"), central Mexico. It is situated in the municipality of Zinacantepec, on the Mexico–Toluca–Guadalajara highway west of Mexico City. Established in 1936, it has an area of 259 square miles (671 square km). The park lies in the Nevado de Toluca (or Zinantecatl) Mountains, which rise above 15,025 feet (4,580 m). Among the park's chief features are an extinct, snowcapped volcano 10,381 feet (3,164 m) high, in the crater of which are picturesque lagoons that reflect glaciers and clouds. The crater's rim is reached by a road that is said to be the highest in the country. The lower slopes of the mountains are heavily wooded with pine and oyamel.

Nevāʾī, ʿAlī Shīr (Turkish poet): *see* Navāʾī, (Mīr) ʿAlī Shīr.

névé (snow): *see* firn.

Nevele Pride (foaled 1965), American harness racehorse (Standardbred), the fastest trotter in history. He won 57 victories out of the 67 races he entered, earning more than $870,000 in his career of three seasons. Foaled by Thankful and sired by Star's Pride, Nevele Pride was irritable and eccentric, occasionally kicking and biting dignitaries as well as his grooms. Trained and driven by Stanley Dancer, he won 26 of his 29 contests as a two-year-old and set a world record for the mile at Lexington, Ky. He went on to set further records as a three-year-old, and again as a four-year-old. In 1969, running against time at Indianapolis, Ind., he beat Greyhound's 31-year-old world record by running the mile in 1:54$\tfrac{4}{5}$. In 1968 Nevele Pride won the trotting Triple Crown: the Hambletonian, the Kentucky Futurity, and the Yonkers Futurity. In 1969 his owners Louis Resnick and Nevele Acres sold Nevele Pride to the Stoner Creek Stud of Lexington, Ky., for the highest price ever paid for a trotter, $3,000,000. In his career Nevele Pride was named Harness Horse of the Year for three consecutive years and established eight world trotting records, including mile records for a five-eighths-mile track (1:58), mile track (1:54$\tfrac{4}{5}$) and half-mile track (1:56$\tfrac{4}{5}$ sec). He raced the last two years with a hairline crack in his left front pastern. In 1975 his foal Nevele Thunder was syndicated for a then record $1,500,000.

Nevelson, Louise, *née* BERLIAWSKY (b. Sept. 23(?), 1899/1900, Kiev—d. April 17, 1988, New York City), American sculptor known for her large, monochromatic abstract sculptures and environments in wood and other materials.

In 1905 she moved with her family from the Ukraine to Rockland, Me. She married businessman Charles Nevelson in 1920 and later left her husband and child to pursue her artistic ambitions. In 1929 she began studying with Kenneth Hayes Miller at the Art Students League in New York City, and in 1931 she studied with Hans Hofmann in Munich.

Nevelson's first individual exhibition was held in New York City in 1941. Her early figurative sculptures in wood, terra-cotta, bronze, and plaster (*e.g.,* "Ancient Figure," 1932) show a preoccupation with blockish, interlocking masses that recall the sculpture of Central America (where she traveled in the 1940s) and anticipate her mature style. It was also in the figurative work that her characteristic found objects (objets trouvés) first appeared, here as stylized features and appendages (*e.g.,* "The Circus Clown," 1942).

After enduring years of poverty and critical neglect, Nevelson by the 1950s had both developed her mature sculptural style and begun to earn significant critical recognition. By this time she was working almost exclusively with abstract forms. She is best-known for works dating from this period; these consist of open-faced wooden boxes that are stacked to make freestanding walls. Within the boxes are displayed carefully arranged and highly suggestive collections of abstract-shaped objects mingled with chair legs, pieces of balustrades, and other found objects and pieces of bric-a-brac. The boxes and their contents are painted a single colour, usually black, though she coloured sculptures in white or gold as well. These accumulations of architectural debris and vaguely recognizable objects elicit a sense of mystery and antiquity while also achieving infinitely varied formal tensions between the objects so displayed, thanks to her skill at arranging them. Many of these pieces bear mystical titles (*e.g.,* "Sky Cathedral," 1958; "Silent Music II," 1964; "Sky Gate—New York," one of her largest wall sculptures, World Trade Center, New York City, 1978).

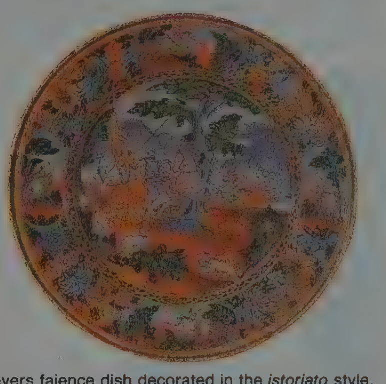
Major museums began purchasing Nevelson's wall sculptures in the late 1950s, and in the following decades she won recognition as one of the foremost sculptors of the second half of the 20th century. In 1967 the first major retrospective of her work was presented at the Whitney Museum of American Art in New York City. During the 1970s and '80s Nevelson expanded the variety of materials used in her sculptures, incorporating objects made of aluminum, Plexiglas, and Lucite.

Nevers, city, capital of Nièvre *département,* Bourgogne *région,* central France, south-southeast of Paris. Situated on the high right bank of the Loire River at its confluence with the Nièvre River, it is a typical old provincial town that has been modernized after the establishment of new industries in the vicinity. At the end of the Roman era it was known as Nevirnum, a name believed to be a contraction of its earlier Roman name Noviodunum Aeduorum. In the Middle Ages it changed hands among the powerful families of Europe several times. In the 16th century it was acquired by the Gonzaga family of Mantua who introduced the manufacture of ceramics into Nevers. The cathedral of Saint-Cyr-et-Sainte-Juliette, built between the 11th and 16th centuries, has been restored after being severely damaged by bombing in World War II. The former palace of the dukes of Nevers now houses the law courts. The chapel of the Saint-Gildard convent contains the body of St. Bernadette Soubirous, the visionary of Lourdes, who lived at Nevers from 1860 to 1879. The modern industrial economy of the city includes electrical and nonelectrical machinery, railway equipment, rubber, and the traditional ceramics, which are somewhat in decline. Pop. (1982) 42,768.

Nevers, Ernie, byname of ERNEST ALONZO NEVERS (b. June 11, 1903, Willow River, Minn., U.S.—d. May 3, 1976, San Rafael, Calif.), American collegiate and professional football and baseball player, who was considered one of the greatest football players of all time.

Nevers played at tackle for Superior (Wis.) High School, and as a fullback at Stanford University (Calif.) he was called by Pop Warner the greatest player he had ever coached. He was All-American (1925) and won 11 letters at Stanford, in baseball and basketball as well as in football. He played professional football with the National Football League (NFL) Duluth Eskimos (1926–28) and with the NFL Chicago Cardinals as a player-coach (1929–31), after which he retired. During his brief career, he was a brilliant iron-man player. His 40 points (six touchdowns, four conversions) scored in a game against the Chicago Bears in 1929 remained a league record in the 1980s. Nevers also played professional baseball as a pitcher with the American League St. Louis Browns (1926–28). After retirement from football as a player, he was coach at Lafayette College (Easton, Pa.; 1936) and served on the coaching staff at the University of Iowa (Iowa City; 1937). He served in the Marine Corps during World War II and after the war was a businessman in San Francisco. He was elected to the football Hall of Fame in 1963.

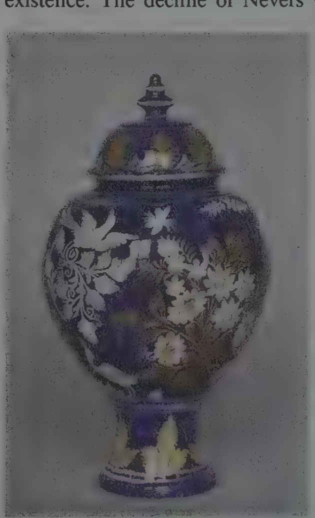
Nevers faience, French tin-glazed earthenware introduced from Italy to Nevers in 1565, by two brothers named Corrado. As the Conrade family, they and their descendants dominated Nevers faience manufacture for more than a century. The earliest authenticated piece of Nevers, dated 1589, is a large oval polychrome dish depicting a mythological subject, the triumph of Galatea.


Nevers faience dish decorated in the *istoriato* style, mid-17th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Although inspired by Italian models, this first period of Nevers faience already showed a freedom in interpretation that was to grow more distinctive in the post-Conrade period, after 1674. Nevers became the first French centre to use Chinese decorative motifs. Nevers also shows the Chinese influence in choice of colour, though it added a distinctive manganese purple to the original blue and white of the Chinese ware of the time.

At almost the same period, Nevers produced vases in the "Persian manner" (*Bleu Persan*); these too were free interpretations. Besides these costly wares, Nevers produced cheaper ones: the so-called *faience parlante,* pots and plates illustrated with scenes from everyday life treated in a satirical manner, and the *faience patriotique,* bearing political slogans of the time. Only six factories remained in 1797 out of the 11 in 1743; two of these are still in existence. The decline of Nevers was caused


Nevers faience jar in the "Persian manner," second half of the 17th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

less by the Revolution than by the competition of cheaper English earthenware.

Nevers glass figure, any of the ornamental glassware made in Nevers, Fr., from the late 16th century through the early 19th. Only a few inches high, they have been mistaken for fine porcelain but were made of glass rods and tubes and were often made on a wire armature. The subjects are religious, mythological, historical, allegorical, or anecdotal. Nevers glass owes its origins, like Nevers faience, to an influx of Italian workers in the 16th century, notably to the Sarode family. The first known French glassworkers in Nevers were Jean Prestereau (1595) and his son Léon. Allegedly, Louis XIII, as a child, played with toy glass animals from Nevers. Similar glass objects were made elsewhere in France; and often it is difficult to distinguish Nevers wares, though the figures are, like Nevers faience, generally dull yellow, white, red, or blue.

Nevers glass figure made in Nevers, Fr., 17th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Neves, city, Rio de Janeiro state, Brazil, on the eastern shore of the Baía de Guanabara opposite Rio de Janeiro city, just southwest of São Gonçalo. Originally a Guarulhos Indian village, Neves in 1566 became the site of one of the first chapels constructed in the Baía de Guanabara region, the Nossa Senhora de Neves (Our Lady of the Snows) chapel, built by João Afonso Malheiro. A suburb of Rio de Janeiro as well as of Niterói, the largest eastern bay city, just to the south, Neves, together with São Gonçalo to the northeast, now constitutes the most important suburban industrial centre in the Greater Rio area. It has an important nonmetallic-mineral industry (extraction and processing of barite, quartz, ceramic clays, granite dimension stone), with a large metallurgical plant and shipyards; other industries produce machinery, rubber, and chemical and pharmaceutical products. Railroads and highways link Neves with downtown Niterói as well as with inland communities. It is the terminus of a railroad that runs eastward to Cape Frio. Pop. (1980 prelim.) 138,130.

Nevi'im (Hebrew), English THE PROPHETS, the second division of the Hebrew Bible, or Old Testament, the other two being the Torah (the Law) and the Ketuvim (the Writings, or the Hagiographa). In the Hebrew canon the Prophets are divided into (1) the Former Prophets (Joshua, Judges, Samuel, and Kings) and (2) the Latter Prophets (Isaiah, Jeremiah, Ezekiel, and the Twelve, or Minor, Prophets: Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi).

This canon, though somewhat fluid up to the early 2nd century BC, was finally fixed by a council of rabbis at Jabneh (Jamnia), now in Israel, *c.* AD 100.

The Protestant canon follows the Septuagint, the Greek version of the Old Testament. It calls the Former Prophets the Historical Books, and subdivides two of them into I and II Samuel and I and II Kings. Some Roman Catholic and Eastern Orthodox versions further divide Kings into four books. I and II Maccabees are also included in the Roman and Eastern canons as historical books.

The Prophets in the Protestant canon include Isaiah (which appears in two books in some Catholic versions), Jeremiah, and Ezekiel from the Hebrew Latter Prophets. The Minor Prophets (The Twelve) are treated as 12 separate books; thus the Protestant canon has 17 prophetic books. The Roman Catholics accept the book of Baruch, including as its 6th chapter the Letter of Jeremiah, both considered apocryphal by Jews and Protestants.

Neville, John: *see* Northumberland, John Neville, earl of.

Neville, Ralph Neville, 4th Baron: *see* Westmorland, Ralph Neville, 1st earl of.

Neville, Richard: *see* Warwick, Richard Neville, 1st (or 16th) earl of.

Neville's Cross, Battle of (Oct. 17, 1346), English victory over the Scots—under David II—who, as allies of the French, had invaded England in an attempt to distract Edward III from the Siege of Calais (France). Edward, however, had foreseen the invasion and left a strong force in the northern shires. The battle took place near Durham and resulted in a decisive defeat for the Scots. David was captured, southern Scotland was occupied, and the English were able to pursue the French war. David remained a prisoner of the English until 1357.

Nevin, Ethelbert Woodbridge (b. Nov. 25, 1862, Edgeworth, Pa., U.S.—d. Feb. 17, 1901, New Haven, Conn.), U.S. composer of light songs and piano pieces.

Nevin studied in New York City, Boston, and Berlin, first appearing as a pianist in Pittsburgh (1886) and later in Boston, Chicago, New York City, and other U.S. cities. His early songs on English and German texts were influenced by Schubert and Schumann. His later pieces, in a lighter style, include the much-loved "Rosary" (1898) and "Mighty lak' a Rose" (1900). His best known piano piece was "Narcissus" (1891), from the *Water Scenes*.

His brother Arthur Finley Nevin (1871–1943), a composer and conductor, did research on the music of the Blackfoot Indians and used this music in his opera *Poia* (Berlin, 1910).

Nevin, John Williamson (b. Feb. 20, 1803, Strasburg, Pa., U.S.—d. June 6, 1886, Lancaster, Pa.), U.S. Protestant theologian and educator who contributed to the "Mercersburg theology"—a movement that attempted to counter the popular Protestant revivalism of antebellum America.

After graduating from the Princeton Theological Seminary in 1826, Nevin taught there and at the Western Theological Seminary before teaching at the Mercersburg Seminary (Pa.), a German Reformed institution (1840–53). He also headed Marshall College (1841–53), teaching at Franklin and Marshall College after its merger in 1853 and serving as president from 1866 to 1876.

In 1843 Nevin published *The Anxious Bench,* an influential criticism of the revivalism and disregard for confessional traditions of such evangelists as Charles Grandison Finney. Nevin argued for the importance of church life and the sacramental side of Christianity, particularly for the importance of the Roman Catholic doctrines of Baptism and the Eucharist. These ideas, expressed in the *Mercersburg Review,* which he co-founded and edited from 1849 to 1853, were the foundation of the Mercersburg theology, a philosophy also influenced by F.A. Rauch (1806–41) and Philip Schaff (1819–93).

Nevin's other major writings include *Biblical Antiquities,* 2 vol. (1827); *The Mystical Presence* (1846); and *History and Genius of the Heidelberg Catechism* (1847). A biography by Theodore Appel, *The Life and Work of John Williamson Nevin,* was published in 1889.

Nevinnomyssk, city, Stavropol *kray* (region), western Russia, on the Kuban River at the mouth of the Bolshoy (Great) Zelenchuk River. Until the mid-1950s it was an agricultural market town, but in 1962 a chemical complex utilizing nearby natural gas reserves was constructed. A fertilizer plant was opened in 1962, and enlarged in 1965. Since 1968 plastics and chemical fibres have been manufactured. Nevinnomyssk is a rail centre, with freight yards and workshops; it is also the starting point of the Nevinnomyssk Canal, which provides irrigation to Stavropol and Krasnodar *kray* and Rostov *oblast*. Pop. (1997 est.) 133,000.

Nevins, Allan (b. May 20, 1890, Camp Point, Ill., U.S.—d. March 5, 1971, Menlo Park, Calif.), U.S. historian, author, and educator, known especially for his eight-volume history of the American Civil War and his biographies of American political and industrial figures. He also established the country's first oral history program.

Nevins was raised on a farm in western Illinois and educated at the University of Illinois. While completing postgraduate studies there, he wrote his first book, *The Life of Robert Rogers* (1914), about the Colonial American frontier soldier who fought on the Loyalist side. After graduation Nevins joined the New York *Evening Post* as an editorial writer and for nearly 20 years worked as a journalist. During this period he also developed his credentials as a historian; he compiled and edited a collection of documents entitled *American Social History as Recorded by British Travellers* (1923); wrote two works on U.S. history, *The American States During and After the Revolution, 1775–1789* (1924) and *The Emergence of Modern America, 1865–1878* (1927); and produced a biography of explorer John Charles Frémont, *Frémont, The West's Greatest Adventurer* (1928).

In 1928 he accepted a post at Columbia University (New York City), where he remained for the next 30 years. While at Columbia Nevins produced an impressive body of work, including two Pulitzer Prize-winning historical biographies: *Grover Cleveland, A Study in Courage* (1932) and *Hamilton Fish, The Inner History of the Grant Administration* (1936). In 1948 he inaugurated the oral history movement in the United States, establishing at Columbia a project for preserving on tape interviews with notable figures whose views of current affairs would interest future historians.

Mandatory retirement from the Columbia faculty (1958) ended neither his career as a teacher nor his scholarly contributions as a historian. Having established himself as a leading authority on the American Civil War with the major portion of his eight-volume work—*Ordeal of the Union,* 2 vol. (1947), *The Emergence of Lincoln,* 2 vol. (1950), and *The War for Union,* 4 vol. (1959–71)—Nevins headed the nation's Civil War Centennial Commission (1961–66) and helped to edit the commission's 15-volume Impact Series. He joined the Huntington Library, San Marino, Calif., served as a visiting professor at the University of Oxford (1964–65), and wrote the final volumes of his Civil War series.

Among his other works are *John D. Rockefeller, The Heroic Age of American Enterprise,* 2 vol. (1940; rewritten and expanded as *A Study in Power: John D. Rockefeller, Industrialist and Philanthropist,* 1953); a three-volume work (in collaboration with Frank E. Hill) on Henry Ford and the Ford Motor Company; and, with Henry Steele Commager, *America, The Story of a Free People* (1942).

Nevison, John, also called WILLIAM NEVISON, Nevison also spelled NEVINSON (b. 1630/40, Yorkshire, Eng.—d. March 15, 1685, Knavesmire, near York), Yorkshire highwayman of Restoration England, made famous in ballads and folklore.

Beginning as a youthful thief, Nevison furthered his escapades in Holland, where he was arrested for thievery and imprisoned, escaped, fought with English regiments in Flanders, and then deserted for England. In Yorkshire he became an extortioner and highwayman, eventually in partnership with Thomas Tankard and Edward Bracy. Arrested more than once, he managed reprieves and escapes; but, betrayed by an inn mistress, he was again arrested, tried, and hanged at Knavesmire.

Nevsky, Aleksandr (prince of Novgorod): *see* Alexander Nevsky, Saint.

nevus, plural NEVI, congenital skin lesion, or birthmark, caused by abnormal pigmentation or by proliferation of blood vessels and other dermal or epidermal structures. Nevi may be raised or may spread along the surface of the skin. In other types, such as the blue nevus, proliferative tissue is buried deep within the dermis, the lower layer of the skin.

Most types of nevi are formed by the overgrowth of normal skin components that retain their usual functions. Some nevi, however, are precancerous and lose their normal organization when they become malignant. Premalignant nevi include the sebaceous nevus, a congenital formation containing hair follicles and sebaceous glands, and the giant pigmented, or bathing trunk, nevus, a large, irregular, dark brown or black patch associated with malignant melanoma. Some pigmented nevi, such as the blue nevus and the junctional nevus, may be associated with skin cancers but are not considered precancerous. Other pigmented nevi may be associated with systemic diseases; café-au-lait spots, light brown spots that can occur anywhere on the body, occur naturally in 10 percent of the white population but may also be a symptom of Albright's disease. Mongolian spot, a blue-black patch on the lower back, occurs in 90 percent of American Indian, black, and Asiatic persons.

Although pigmented nevi are among the most common of these skin growths, other varieties of nevus are also known. Vascular nevi, or hemangiomas, produce the familiar "port wine stain" birthmark; they are composed of blood vessels and often resolve themselves with time. Epidermal nevi, of which the sebaceous nevus is an example, develop from the proliferation of normal epidermal tissues and are usually flesh-coloured or yellowish.

New Age movement, religious movement that was popular in the 1970s and '80s. It looked forward to a "New Age" of love and offered a taste of the coming era through personal transformation. The movement adhered to esotericism, a religious perspective based on the acquisition of mystical knowledge known in the West since the 2nd century AD, originally as Gnosticism and then later as Rosicrucianism, theosophy, and ritual magic.

The roots of the movement can be found in the late 19th century when Helena Petrovna Blavatsky, cofounder of the Theosophical Society, announced a New Age. Her ideas were continued by disciples such as Annie Besant in the 20th century. As expectations of a New Age increased in the 1960s, a new organization was formed, the Universal Foundation. Its wealthy leader, Anthony Brooke, predicted an apocalyptic event in 1967. Although the event never took place, a network of New Age groups emerged.

The idea of a New Age movement was born in 1970, with the ideas of American theosophist David Spangler. He believed that the release of new waves of spiritual energy, signaled by astrological changes (*e.g.,* the movement of the Earth into a new cycle known as the Age of Aquarius), had initiated the coming of the New Age. He suggested that people use this energy to make manifest the New Age. Spangler's view made believers in the New Age responsible for its arrival.

Spangler presented his ideas in a set of popular books beginning with *Revelation: The Birth of a New Age* (1976) and attracted many leaders from older occult organizations to the growing movement. Simultaneously, periodicals were published to disseminate information and to create a sense of community within the movement, and bookstores opened that sold New Age books, videos, and meditative aids.

The movement predicted that a New Age of heightened spiritual consciousness and international peace would arrive and bring an end to all society's ills. This transformation would result from the spiritual awakening of the general population. The movement also held that a foretaste of the New Age could be obtained through personal spiritual growth, and some believed that the New Age had already arrived.

Traditional occult practices (*e.g.,* tarot reading, astrology, and yoga) were used to assist personal transformation and to bring about "planetary healing" and societal transformation. Believers in the New Age sought to integrate divinatory practices (astrology, tarot, and I Ching) with psychological counseling.

Channeling and the use of crystals were identified with the movement. Many New Agers claimed to establish contact with preternatural or extraterrestrial entities who spoke through them on a wide range of spiritual topics. Crystals were thought to be reservoirs of transformative powers that could be released for personal benefit and were popular items at New Age stores and conventions.

Despite the popularity of the Harmonic Convergence—a set of gatherings at various places around the world on Aug. 16–17, 1987, designed to bring about a leap in human consciousness—the New Age movement had lost its momentum by the end of the 1980s. At that time, Spangler and the editors of several New Age periodicals announced that although they still adhered to the movement's goals, they no longer believed in the coming New Age. By the mid-1990s, New Agers in Europe spoke of the move from "New Age to Next Stage."

The New Age movement proved to be one of the West's most significant religious phenomena of the 20th century. Although its vision of social transformation died, the movement attracted hundreds of thousands of adherents. More than one-fifth of adults in the West give credence to astrology; an equal number have practiced some form of meditation. Three to five million Americans identified themselves as New Agers or as accepting the movement's beliefs in the late 1980s. The continuing presence of New Age thought is evident in the New Age bookstores and organizations that are found in nearly every urban centre.

(J.G.M.)

New Albany, city, seat (1819) of Floyd county, southeastern Indiana, U.S. It lies along the Ohio River (bridged) opposite Louisville, Ky. It was founded in 1813 by Joel, Abner, and Nathaniel Scribner, who named the settlement for Albany, N.Y., the capital of their home state. By the 1840s and early '50s, New Albany had become the largest city in Indiana and, owing to its location just below the falls of the Ohio and near abundant forests, an important steamboat-building centre. The modern city's diversified manufactures include plastics, machinery, metal products, and plywood. Indiana University Southeast (1941) is in the city. The boyhood home (*c.* 1830) of poet-dramatist William Vaughn Moody is preserved, as are the Scribner House (1814) and the Culbertson Mansion (1867–69). Inc. city, 1839. Pop. (2000) 37,603.

New Apostolic Church, church organized in Germany in 1863, as the Universal Catholic Church, by members of the Catholic Apostolic Church who believed that new apostles must be appointed to replace deceased apostles and rule the church until the Second Coming. The present name was adopted in 1906.

The church emphasizes the gifts of the Holy Spirit, which include prophecy, speaking in tongues, and healing. Sacraments are baptism, Holy Communion, and holy sealing (the "dispensing and reception of the Holy Spirit"). Sealing can only be conferred by the laying on of hands on the head of a member by an apostle, and it assures the member of participation in Christ's rule on Earth for 1,000 years after he returns. Like the Latter-day Saints, the church teaches that the sacraments can be received by a living member for a dead person.

The church is ruled by the chief apostle and the other apostles, who appoint bishops, district elders, pastors, and evangelists. By the late 20th century the New Apostolic Church had more than 2,000,000 members, most of them in Germany. Its headquarters are in Zürich, Switz.

New Artists' Association: *see* Neue Künstlervereinigung.

New Bedford, city, Bristol county, southeastern Massachusetts, U.S. It lies at the mouth of the Acushnet River on Buzzards Bay, 54 miles (87 km) south of Boston. The site, settled by Plymouth colonists in 1652, was originally part of Dartmouth. A fishing community was established there in 1760. By 1765 it had developed into a whaling port and shipbuilding centre. The *Dartmouth,* which in 1767 was the first ship launched there, was one of the "teaships" involved in the Boston Tea Party (1773). Because the town's deepwater harbour was used by American privateers during the American Revolution, it was attacked (Sept. 5, 1778) and burned by British forces. Following

The Seamen's Bethel (chapel), New Bedford, Mass., with cenotaphs described in Herman Melville's *Moby Dick* on the walls

Mark Sexton

a rapid recovery, it was separately incorporated (1787) as the town of New Bedford. By 1820 New Bedford was one of the world's leading whaling ports; in the mid-19th century three-fifths of the U.S. whaling fleet, which totaled more than 700 vessels, was registered there. The site was immortalized by Herman Melville in *Moby Dick.*

Following the decline in whaling, New Bedford turned to the manufacture of cotton fabrics but was adversely affected by the movement of the textile industry to the Southeast during the 1920s. A diversified economy now prevails with the manufacture of electrical equipment and machinery, rubber goods, textiles, and photography supplies. Services and trade are also important. The city is still a major fishing port.

The New Bedford Whaling Museum, the 19th-century fishing schooner *Ernestina,* and the Seamen's Bethel (Whaleman's Chapel) reflect the city's historic and seafaring past. A 13-block section of the city was designated as New Bedford Whaling National Historical Park in 1996. Inc. city, 1847. Pop. (2000) city, 93,768; New Bedford PMSA, 175,198.

New Bern, city, seat (1722) of Craven county, eastern North Carolina, U.S. It lies at the confluence of the Neuse and Trent rivers. The second oldest town in the state, New Bern was settled in 1710 by Freiherr (baron) Christophe von Graffenried of Bern, Switz. It was incorporated in 1723 after near destruction by Native Americans and served as the colonial and state capital from 1746 to 1792. Tryon Palace, built in 1767–70 by the royal governor, was the first capitol; it was restored (1952–59) as a state historic site. The first and second provincial congresses in North Carolina opposing the British met there in 1774 and 1775. New Bern had a thriving seaport trade through Pamlico Sound until it was captured by Union forces in 1862 and occupied for the remainder of the American Civil War. Its connection with the Intracoastal Waterway and the port at Morehead City (southeast) has made it the service centre for nearby summer resorts, a U.S. Marine Corps air station, and farmlands. The city's manufactures today include chemicals, boats, wood products, and plumbing fixtures.

The New Bern National Cemetery has the graves of many Civil War dead. One of the first public schools for African Americans was established in New Bern in 1862, and Craven Community College was opened in 1965. Pop. (2000) 23,128.

New Britain, largest island of the Bismarck Archipelago, southwestern Pacific, in Papua New Guinea. It is situated 55 miles (88 km) east of the Huon Peninsula of mainland eastern New Guinea. Measuring 370 miles (600 km) long by 50 miles (80 km) at its widest, the crescent-shaped island has an area of approximately 14,100 square miles (36,500 square km) and a 1,000-mile (1,600-kilometre) coastline bordered by reefs. From narrow coastal plains, it rises to a rugged central mountain spine composed of the Whiteman, Nakanai, and Baining ranges, with several peaks exceeding 7,000 feet (2,100 m). There are three areas of active volcanism: in the extreme west, on the north coast bordering Open and Kimbe bays, and in the northeast on the Gazelle Peninsula near Rabaul, where the Matupi and Vulcan cones present a constant threat to that town, the largest settlement on the island. An eruption in 1937 killed 263 people. The island has an equatorial climate.

New Britain was sighted in 1616 by the Dutch navigator Jakob Le Maire, who believed it was part of a landmass including New Guinea and New Ireland. His theory was disproved (1699–1700) by William Dampier, an Englishman who named the island, and Philip Carteret, who found St. George's Channel (east) in 1767. As Neu-Pommern (New Pomerania), the island became part of a German protectorate in 1884. It was mandated to Australia following World War I, taken by the Japanese in 1942, and reoccupied in 1945. It subsequently formed part of the UN Trust Territory of New Guinea and was administered by Australia. It became part of Papua New Guinea in 1975 when that nation attained independence.

The most developed and populous area of the island is the Gazelle Peninsula in the northeast, where, on the rich coastal plains, copra and cocoa are produced and marketed through Rabaul, Kokopo, and Keravat. These same crops (as well as oil palms) are raised at other points along the coast and shipped from smaller harbours such as Talasea in the northwest. A feature of this development was the success of local cooperative societies. A variety of other crops is grown for local consumption. In the interior, a system of shifting cultivation is practiced involving a rotation of plots used only at long intervals. Other island resources are timber, copper, gold, iron, and coal. Pop. (1990 prelim.) 302,023.

New Britain, city, coextensive with the town (township) of New Britain, Hartford county, central Connecticut, U.S. Settled as the Stanley Quarter to the north in 1686 and followed later by the Great Swamp settlement to the south, the area became the New Britain parish of Farmington in 1754. In 1785 Berlin town, including New Britain parish, was separately incorporated from Farmington. Metalworking began in New Britain in the 18th century. By 1850 it was a manufacturing centre producing tools, locks, and other hardware. Such products and machinery are also the city's principal modern industries. It is the seat of Central Connecticut State University (1849). Inc. town and borough, 1850; city, 1871; town and city consolidated, 1905. Pop. (2000) 71,538.

New Brunswick, one of four Atlantic provinces of Canada and one of four original members of the Dominion of Canada (1867). With Nova Scotia and Prince Edward Island, it forms the grouping known as the Maritime Provinces. With an area of 28,355 square miles (73,440 square km), it is bounded on the west by the U.S. state of Maine, on the north by the province of Quebec, on the east by the Gulf of St. Lawrence and the Northumberland Strait, and on the south by the Bay of Fundy. Its capital is Fredericton.

A brief treatment of New Brunswick follows. For full treatment, *see* MACROPAEDIA: Canada.

New Brunswick was a part of the original Acadia, a seaward region inhabited by Micmac and Malecite Indians of the Algonquian-speaking group. Prior to the mid-18th century there were only a small number of French fur traders and settlers in the region. Acadia subsequently was the scene of a British-French struggle for control of the territory. Following the British capture of Fort Beauséjour in 1755, the French-speaking Acadians were expelled to reduce French influence in the area. A British proclamation in 1763 incorporated the area now known as New Brunswick into Nova Scotia; a few hundred Acadians returned, and a small number of New Englanders settled in the area. It remained sparsely populated until the influx of some 14,000 loyalist refugees from the United States after the American Revolution; as a result the area was separated from Nova Scotia, and the province of New Brunswick was established in 1784. The British government gave very little encouragement to its new province until 1808, when Britain granted tariff preferences to the timber resources of the North American colonies, a move made when Napoleon's blockade cut off the Baltic supply of shipbuilding timber to the British. For New Brunswick, this historical incident provided an opportunity that helped usher in the so-called age of wood, wind, and water, an era of prosperity based on timber exports and a flourishing shipbuilding industry. Self-government was granted by Britain in 1848. In 1854 New Brunswick signed a reciprocity treaty with the United States. New Brunswick entered into confederation with Canada in 1867.

New Brunswick's forest cover has been increasing since 1950 and now occupies about 90 percent of the province. The principal trees are balsam fir, red and black spruce, pine, and hemlock. There are increasing numbers of deer and moose. Several rivers are famous for their Atlantic salmon, while trout, bass, and pickerel also attract sport fishing.

Forestry and lumbering are the province's largest industries, and pulp and paper production represents its largest single component, with many sawmills operating. The forests supply material for lumber, plywood, chipboard, fuel, and Christmas trees and provide wide employment. Fishing continues to be important in the provincial economy, with lobster, crab, scallops, cod, and various other North Atlantic species making up the bulk of the catch. In the second half of the 20th century, the mining of zinc, copper, lead, and silver in the northeast had become increasingly important. New Brunswick's industrial development has been spurred by the development of hydroelectric power, supplemented by coal- and oil-fired and nuclear generating stations.

Saint John is a major port through which a high proportion of Canada's external trade passes. This is especially true during the winter months when traffic on the St. Lawrence Seaway is curtailed. The province is served by highways, airlines, and railways.

New Brunswick's government since entering the Canadian Confederation in 1867 has comprised the unicameral Legislative Assembly, elected (by universal adult suffrage) generally to a four-year term. The leader of the majority party in the assembly becomes the premier and selects the Executive Council from the assembly. Another member of the executive branch is the lieutenant governor, chosen by Canada's governor-general as the British monarch's representative.

Compulsory elementary and secondary public education is free through grade 12 and features bilingual English and French instruction. Vocational and technical training are offered in secondary school and also for adults. Higher education is available from the University of New Brunswick, with a campus (Canada's oldest, founded in 1785) at Saint John and another campus at Fredericton; l'Université de Moncton, with three branch campuses, offering bilingual instruction; the private Mount Allison University at Sackville, founded 1842 as a Wesleyan institution; and St. Thomas University at Fredericton, a Roman Catholic institution.

New Brunswick has a favourable cultural climate. The Acadians, against all odds, have preserved their French cultural inheritance, and the province has a large French-speaking minority. Fredericton is the home of the first native Anglo-Canadian school of poetry, that of William Bliss Carman (1861–1929) and Sir Charles Roberts (1860–1943). Lord Beaverbrook, the British newspaper magnate who grew up in New Brunswick, left as a legacy to his home province the Lord Beaverbrook Art Gallery, which houses treasures of English and Canadian painting. Many artists of national repute reside in the province. Fredericton is also famous for its Playhouse theatre. All four of the province's universities support creative arts. A pioneer village has been reconstructed at Kings Landing near Fredericton. The Fort Beauséjour National Historic Park near Sackville reminds visitors of the French and British roots of the province. Pop. (1999) 754,741.

New Brunswick, city, seat of Middlesex county, eastern New Jersey, U.S. It lies along the Raritan River, at the terminus of the old Delaware and Raritan Canal, 22 miles (35 km) south-southwest of Newark. The site, first known as Prigmore's Swamp, was settled in 1681 by John Inian. Called Inian's Ferry (1713), it was renamed for George I of England, who was also the Duke of Brunswick. George II granted it a town charter in 1730. General George Washington's troops, retreating from New York, occupied the town in 1776, evacuating at the approach of the British under General William Howe, who remained there for about seven months. Washington returned after the Battle of Monmouth (1778) and, while there, issued orders for the march south culminating in the victorious Battle of Yorktown. During this period the town's port was a base for privateers who preyed upon British ships around Manhattan.

The Camden and Amboy Railroad (later the Pennsylvania) reached New Brunswick in 1838. Since the late 19th century, when Robert W. and James W. Johnson established a firm (Johnson & Johnson) to make adhesive tape and surgical dressings, New Brunswick has been a major producer of hospital supplies and pharmaceuticals. The city's other manufactures include clothing, chemicals, leather goods, and automobile parts.

Rutgers University was founded there as Queen's College in 1766 and was made the state university in 1945. New Brunswick Theological Seminary, the oldest theological school in the United States, founded in 1784, has been in the city since 1810. On Nov. 6, 1869, New Brunswick was the scene of the first intercollegiate football game, between Rutgers and Princeton. Inc. city, 1784. Pop. (1992 est.) 42,387.

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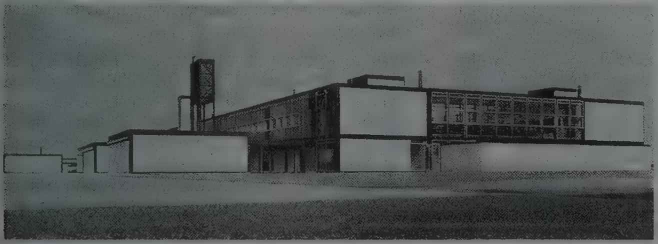
New Brutalism, one aspect of the International Style of architecture that was created by Le Corbusier and his leading fellow architects Ludwig Mies van der Rohe and Frank Lloyd Wright and that demanded a functional approach toward architectural design. The name was first applied in 1954 by the English architects Peter and Alison Smithson to the post-1930 style of the major French architect Le Corbusier.

Le Corbusier's expressionist interpretation of the International Style involved the use of monumental sculptural shapes and of raw, unfinished molded concrete, an approach that, in contrast to Mies van der Rohe's use of glass and steel, represented a New Brutalism to the English architects. Brutalism, as a reform movement, advocated the return to functionalist principles—in services, materials, and structure. The Smithsons, Sir Denys Lasdun, and other New Brutalist architects displayed a willful avoidance of polish and elegance in their buildings, in which such structural elements as steel beams and precast concrete slabs are exposed to view and convey a stark, austere rectilinearity.



Hunstanton School, Norfolk, Eng., by Alison and Peter Smithson, 1954, in the style known as New Brutalism

The Architectural Review

New Caledonia, officially TERRITORY OF NEW CALEDONIA AND DEPENDENCIES, French TERRITOIRE DE LA NOUVELLE-CALÉDONIE ET DÉPENDANCES, French overseas territory in the southwestern Pacific, consisting of the islands of New Caledonia and Walpole, the Isle of Pines (Île des Pins), and the island groups known as Loyalty, Bélep, Huon and Surprise, and Chesterfield. Since 1975 France has also claimed Matthew and Hunter islands, but this is disputed by Vanuatu. The territory extends northwestward in a double chain and is located about 900 miles (1,450 km) northwest of New Zealand. The Chesterfields, a small group of uninhabited atolls, lie about 370 miles (595 km) west of the northern tip of New Caledonia island. Nouméa on New Caledonia island is the territorial capital. Area 7,172 square miles (18,576 square km). Pop. (1994 est.) 183,000.

A brief treatment of New Caledonia follows. For full treatment, *see* MACROPAEDIA: Pacific Islands.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. New Caledonia island, known as Grande Terre ("Mainland"), at 6,467 square miles (16,750 square km) constitutes most of the territory's land area. It is a cigar-shaped high continental island, approximately 250 miles (400 km) long and 30 miles (48 km) wide, with a chain of mountains running down the centre of the island and rising to the highest peaks in the territory, Mount Panié (5,341 feet [1,628 m]) and Mount Humboldt (5,308 feet [1,618 m]). The nearby Isle of Pines and Bélep Islands are geologically part of New Caledonia, the whole island group being surrounded by a great barrier and fringing reef. The island group is tilted toward the southwest, where excellent harbours are found in drowned valleys. The mountains slope steeply downward to rolling hills and the coastal plains. Rivers, which are found only on the main island, are swift and carry heavy silt loads in periodic floods.

Of the other islands, Maré and Lifou in the Loyalty group and Walpole are raised atolls, and Maré has two interior volcanic hills. Lifou is noted for its coral limestone caves. The remaining islands are atolls or reef islands; Matthew and Hunter are active volcanoes.

The climate is subtropical, with mean annual temperatures at sea level ranging between 71° F (22° C) and 75° F (24° C). Rainfall, heaviest from December to March, when typhoons also may strike, annually averages 80 inches (2,000 mm) on the south-southeast sides of the higher mountainous islands, where the trade winds blow, and ranges down to 40 inches (1,016 mm) on the west-northwest sides. Droughts occasionally occur on the islands' drier western sides.

About three-fourths of the vegetation is unique to the islands, and it is largely drought-resistant. Conifers dominate higher elevations of New Caledonia island and give way to beach forest with lianas and brush. In drier parts of the western coast of New Caledonia island, niaouli, or cajeput, trees and savanna-like grassland occur, while mangroves are found in swampy coastal areas.

Mammals are rare but include the Polynesian rat, bats, feral pigs, and the introduced Sumatra deer. Birds are more common and include duck, cuckoo, flycatcher, rail, parakeet, pigeon, the flightless kagu, and shore birds. There are lizards, scorpions, and centipedes, and insects, including colourful butterflies, are numerous. Fish, turtles, sea snakes, and crustaceans proliferate in the reef and surrounding sea.

The main island has rich mineral deposits of nickel, iron ore, manganese, silver, chromite, and cobalt. Its reserves of nickel are among the largest in the world. Phosphate deposits occur on some of the atolls and raised coral islands.

The people. Indigenous Melanesians (Kanaks) constitute more than two-fifths of the population of New Caledonia; Europeans, mainly French, about one-third; Wallisians and Tahitians one-eighth; and Javanese and others, including Vietnamese, the remainder. The Loyalty Islanders have a Polynesian intermixture. New Caledonia island's Melanesians live primarily on reservations, which constitute less than 10 percent of the island but include almost all of the Loyalty group, Bélep, and the Isle of Pines. French is the official language, and a number of Melanesian dialects are spoken. Most New Caledonians are Christian, almost two-thirds being Roman Catholic and about one-fifth Protestant. Muslims, mainly Javanese, make up a small fraction of the population. The birth rate is significantly higher than those of developed countries, but the death rate is somewhat lower. One-third of the population is less than 15 years old. Life expectancy is about 69 years. The coastal and urban areas of New Caledonia have the highest population density; about two-fifths of the total population lives in Nouméa.

The economy. The developing, mainly free-enterprise economy is based largely on mining and metallurgy and on tourism and is highly dependent on France. The gross national product (GNP) per capita ranks among the highest of those of developing countries. Depressed metal prices worldwide in the 1970s and political strife in the '80s, however, have resulted in periods of economic recession.

Agriculture contributes about 2 percent of the gross domestic product (GDP), although only 1 percent of the land is arable. More than one-seventh of the labour force is employed in agriculture. Cash crops include coffee, copra, and coconut-palm oil. Potatoes, vegetables, and corn (maize) are grown commercially, and yams, taro, and sweet potatoes are grown for subsistence, mainly by the Melanesians. The small islands rely heavily on coconuts, copra, subsistence crops, and fishing. Pastures occupy about 15 percent of the land, and cattle, pigs, and goats are raised for domestic needs. About one-third of the land is forested, but lumbering does not fully meet domestic needs. Commercial fishing includes aquaculture of shrimp, oysters, and trochus, besides sea fishing.

Mining and metallurgy are principal industries and account for about 28 percent of the GDP. New Caledonia ranks among the leading nickel-mining nations worldwide. A foundry on the outskirts of Nouméa produces partly refined nickel for export. Chromite ore is also mined. Other industries produce corrugated iron sheets, cement, soap, chemicals, plastics, beer, and soft drinks.

Tourism has grown considerably with hotel expansion; it provides a major source of foreign-exchange earnings. Cruise ships account for more than two-fifths of tourists annually.

Shipping between the islands is important; Nouméa is the principal port, and there are more than 20 smaller ports. Nouméa has an international airport, and the domestic Air Calédonie serves numerous local airfields.

In the early and mid-1980s New Caledonia's exports were far below imports in value, largely because of slackness in the world nickel market. Nickel ore, ferronickel, and nickel matte are the main exports (about three-fourths of the total), followed by chromite, fish, coffee, and copra. Imports are mainly fuels, machinery, transport equipment, and food products. The main trading partners are France, Japan, the United States, and Australia.

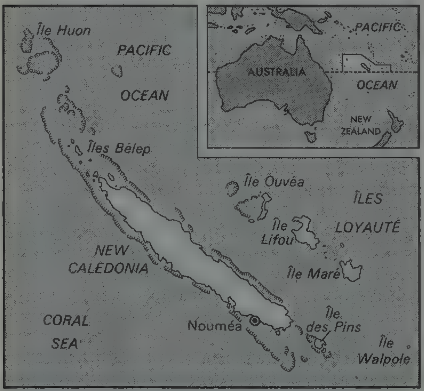
Government and social conditions. As a French Overseas Territory, New Caledonia sends two deputies to the French National Assembly and one to the Senate. The territory is administered by three autonomous regional councils that are overseen by a French-appointed high commissioner. The three regional councils together form the Territorial Congress, an advisory legislative house that has its own elected president. The 54 members of the Territorial Congress are elected by universal suffrage.

Nouméa's Gaston Bourret Hospital and the Pasteur Institute for research, supported by inland medical centres staffed by military health personnel, augment private clinics and doctors. The Department of Education supervises church and free public primary, secondary, and vocational schools. French-government Radio Nouméa broadcasts in French daily, and there is also one government-controlled television channel. There are several daily newspapers, as well as other weekly and monthly publications.

Nouméa is the site of the headquarters of the South Pacific Commission, founded 1947. In 1983 the government set up the Land Reform Board and the Office for the Development of the Interior and the Islands to oversee redistribution of land to the Melanesians. Nouméa has a museum and a marine- and botanical-research centre, and there are several music, dance, and ethnic associations.

History. Lapita, on the Foué Peninsula on New Caledonia island, is the type site for lapita ware, which indicates an Austronesian presence in the area about 2000–1000 BC. On the Isle of Pines, obsidian from New Britain was excavated, indicating long-distance trade, and there are also very early earthen and stone mounds. Melanesian paddle-incised ceramics on the Isle of Pines have been dated to about 900 BC, and there is also a distinctive ethnographic ware, akin to Papua New Guinea types. Taro terraces also indicate the existence of a sophisticated culture before the time of European contact.

While Louis-Antoine de Bougainville may have sighted the islands in 1768, Captain James Cook in 1774 landed and named the main island New Caledonia (after the Roman name for Scotland). Bruni d'Entrecasteaux in 1792 was the first French explorer, and in the 1830s London Missionary Society members reached the Loyalty islands. Roman Catholic French missionaries followed in 1840. The French annexed the group in 1853 after missionaries and, in 1850, the members of a French survey ship were killed and eaten by the islanders. New Caledonia was under French military governors from 1853 to 1884 and was a penal colony from 1864 to 1897. Nickel was discovered in 1863, but development, which began in 1870, was hampered by frequent indigenous uprisings until 1917. New Caledonians joined General Charles de Gaulle's Free French movement in 1940, and beginning in 1942 the United States used the islands as a military base, built roads and airfields, and began the modernization process. In 1946 the group became a French Overseas Territory, and in 1958 the first popular election of ministers and members of the Council of Government was held. The council was increased in size in 1976 as demands for autonomy grew. In the early 1980s the native Melanesians (Kanaks) pressed for independence from France. Although the Kanaks were a minority, their movement gained momentum and led, in 1984, to a proposal from French President François Mitterrand for five years of autonomy to culminate in a vote for independence in 1989. When the plan was rejected in elections in November 1984, largely through the efforts of the anti-independence factions (mostly people of French descent), militant Kanaks reacted violently, and a period of riots, general strikes, and disruption campaigns ensued. After sending troops to the island to restore order, the French government had to postpone independence. Many Kanaks refused to participate in a 1987 referendum in which the New Caledonian electorate voted overwhelmingly in favour of remaining part of France. In 1988 the country was placed under direct French rule for a year as a step toward an independence referendum in 10 years.



New Caledonia and Dependencies

New Castile, Spanish CASTILLA LA NUEVA, historic provincial region, central upland Spain. It generally includes the area of the Moorish kingdom of Toledo annexed to the former kingdom of Castile in the 11th century AD. In modern Spanish geographic usage, New Castile as an administrative region included the provinces of Ciudad Real, Cuenca, Guadalajara, Madrid, and Toledo. Its area was 27,940 square miles (72,363 square km). After 1979 all but Madrid were incorporated into the new *comunidad autónoma* ("autonomous community") of Castile-La Mancha (*q.v.*). For history, *see* Castile.

New Castle, city, New Castle county, northern Delaware, U.S. It is just south of Wilmington, on the Delaware River, there linked to New Jersey by the twin Delaware Memorial Bridges. The original settlement, called Santhoeck, was established in 1651, when Peter Stuyvesant, the Dutch administrator, built Fort Casimir there. The settlement was seized by the Swedes in 1654 but was regained by the Dutch in 1655. It was named Niew Amstel and was made the Dutch capital of the southern Delaware region, but it was renamed in 1664 (probably for William Cavendish, Earl, later Duke, of Newcastle), after its capture by the British that year. William Penn, the English Quaker, took possession of it in 1682. An early cultural centre, New Castle was the seat of the Lower Counties-on-Delaware (1704–76). On Sept. 21, 1776, a convention of counties meeting there formed the state of Delaware, and New Castle served briefly as state capital until the latter was moved to Dover in 1777. Three signers of the Declaration of Independence (George Read, George Ross, and Thomas M'Kean) at one time lived in New Castle.

The Immanuel Church (Episcopal; 1703–*c.* 1710) is a historic landmark. Other colonial landmarks include Amstel House Museum (*c.* 1730); Old Dutch House, perhaps the state's oldest dwelling, built in the late 1600s and now maintained as a museum; the Old State (Court) House (restored); and The Green (town square), laid out by Peter Stuyvesant in 1655. Wilmington College was opened (1967) in New Castle. The city's industries include the manufacture of rayon, steel, shoes, paint; and drugs. Inc. 1875. Pop. (1990) 4,837.

The old Immanuel Church, New Castle, Del.

Milt and Joan Mann—CameraMann

New Castle, city, seat (1822) of Henry county, eastern Indiana, U.S. It lies along the Blue River, 50 miles (80 km) east of Indianapolis. Founded in 1819 and named by Ezekiel Leavell for his hometown in Kentucky, it was incorporated in 1839. In 1900 a decade of expansion began when automobile and piano manufacturing, as well as other industries, were started there. During this same period, the large-scale commercial growing of roses was developed. New Castle's diversified manufactures now include automobile parts and steel products. A nearby farm, now a state memorial, was the birthplace (1867) of aviation pioneer Wilbur Wright. Pop. (1990) 17,753.

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New Castle, city, seat (1849) of Lawrence county, western Pennsylvania, U.S. It lies at the juncture of the Shenango, Mahoning, and Beaver rivers and in the foothills of the Allegheny Mountains, 20 miles (32 km) southeast of Youngstown, Ohio. Originally the site of a Delaware Indian capital, it was settled in about 1798 by John Stewart, who built an iron furnace and named the place for the English industrial city of Newcastle upon Tyne. Laid out in 1802, it became the terminus for the Erie Extension Canal in 1833. Local deposits of coal, iron ore, limestone, and fire clay provided a natural base for industry. The city's manufactures include steel and allied products, pottery, chemicals, and leather goods. Moraine State Park and the McConnell's Mill recreation area are nearby. Inc. borough, 1825; city, 1869. Pop. (1990) 28,334.

New China News Agency (NCNA), Pinyin XINHUA, Wade-Giles romanization HSINHUA, news agency of the People's Republic of China, founded in 1929 as the press outlet of the Chinese Communist Party. The agency is headquartered in Peking and has offices around the world. NCNA has domestic and international services for Chinese and non-Chinese media. Like other news media in China, it operates under governmental control, and its releases reflect official policies and promote state programs. These strictures were greatly tightened in the 1960s during the Cultural Revolution, when many Chinese journalists were jailed for deviating from its standards, but were substantially relaxed after the fall from power of the Gang of Four a decade later.

New Church, also called SWEDENBORGIANS, church organized in the General Conference of the New Church, the General Convention of the New Jerusalem in the U.S.A., and the General Church of the New Jerusalem. Its members are followers of the theology of Emanuel Swedenborg, the 18th-century Swedish scientist, philosopher, and theologian. Swedenborg did not himself found a church, but he believed that his writings would be the basis of a "New Church," which he related to the New Jerusalem mentioned in the biblical Book of Revelation.

Shortly after Swedenborg's death, a group of his followers in England decided to establish a separate church. In 1788 the first building for New Church worship was opened in Great East Cheap, London, and was rapidly followed by others. In 1789 a conference met in the London church, and, except for 1794–1806 and 1809–14, the General Conference of the New Church has met annually.

Swedenborg's writings on religion were introduced into the United States in the 1780s. The first society was organized in Baltimore in 1792, and the first American ministers were ordained in 1798. The General Convention of the New Jerusalem in the U.S.A. was founded in 1817 in Philadelphia. Differences of interpretation within the convention led to the formation in 1897 of a separate group, the General Church of the New Jerusalem.

Worship in the Swedenborgian churches is almost always liturgical. Preaching of the Scriptures is based on Swedenborg's teaching that Scripture should be interpreted spiritually. Baptism and the Lord's Supper are the two sacraments of the church. To the established Christian festivals is added New Church Day (June 19).

Church government in the three New Church groups varies. The British General Conference and the U.S. General Convention annually appoint a general council, which, with a ministerial council, is the controlling authority. The General Church is episcopal. Candidates for the ministry, apart from those trained in Africa for service there, normally pass through a full-time four-year course in one of the two U.S. colleges (in Cambridge, Mass., and Bryn Athyn, Pa.) or in Woodford Green, Essex, Eng., before being ordained.

The three groups have extensive mission operations, with emphasis on Africa. New Church societies, generally small, are found in many parts of the world. Australia has its own conference, closely allied to that in Britain. The New Church groups in continental Europe are nearly all assisted from the United States.

New Comedy, Greek drama from about 320 BC to the mid-3rd century BC that offers a mildly satiric view of contemporary Athenian society, especially in its familiar and domestic aspects. Unlike Old Comedy, which parodied public figures and events, New Comedy features fictional average citizens and has no supernatural or heroic overtones. Thus, the chorus, the representative of forces larger than life, recedes in importance and becomes a small band of musicians and dancers who periodically provide light entertainment.

The plays commonly deal with the conventionalized situation of thwarted lovers and contain such stock characters as the cunning slave, the wily merchant, the boastful soldier, and the cruel father. One of the lovers is usually a foundling, the discovery of whose true birth and identity makes marriage possible in the end. Although it does not realistically depict contemporary life, New Comedy accurately reflects the disillusioned spirit and moral ambiguity of the bourgeois class of this period.

Menander introduced the New Comedy in his works about 320 BC and became its most famous exponent, writing in a quiet, witty style. Although most of his plays are lost, *Dyscolus* survives, along with large parts of *Perikeiromenē, Epitrepontes,* and *Samia.* Menander's plays are mainly known through the works of the Roman dramatists Plautus and Terence, who translated and adapted them, along with other stock plots and characters of Greek New Comedy, for the Roman stage. Revived during the Renaissance, New Comedy influenced European drama down to the 18th century. The commedia erudita, plays from printed texts popular in Italy in the 16th century, and the improvisational commedia dell'arte that flourished in Europe from the 16th to the 18th century used characters and plot conventions that originated in Greek New Comedy. They were also used by Shakespeare and other Elizabethan and Restoration dramatists. Rodgers and Hart's *The Boys from Syracuse* (1938) is a musical version of Shakespeare's *Comedy of Errors,* which in turn is based on Plautus' *Menaechmi* and *Amphitruo,* which are adaptations of Greek New Comedy.

New Criticism, post-World War I school of Anglo-American literary critical theory that insisted on the intrinsic value of a work of art and focused attention on the individual work alone as an independent unit of meaning. It was opposed to the critical practice of bringing historical or biographical data to bear on the interpretation of a work.

The primary technique employed in the New Critical approach is close, analytic reading of the text, a technique as old as Aristotle's *Poetics.* The New Critics, however, introduced refinements into the method. Early seminal works in the tradition were those of the English critics I.A. Richards (*The Principles of Literary Criticism,* 1924) and William Empson (*Seven Types of Ambiguity,* 1930). The movement did not have a name, however, until the appearance of John Crowe Ransom's *The New Criticism* (1941), a work that loosely organized the principles of this basically linguistic approach to literature.

To the New Critics, poetry was a special kind of discourse, a means of communicating feeling and thought that could not be expressed in any other kind of language. It differed qualitatively from the language of science or philosophy, but it conveyed equally valid meanings. Such critics set out to define and formalize the qualities of poetic thought and language, utilizing the technique of close reading with special emphasis on the connotative and associative values of words and on the multiple functions of figurative language—symbol, metaphor, and image—in the work.

New Deal, the domestic program of the administration of U.S. President Franklin D. Roosevelt between 1933 and 1939, which took action to bring about immediate economic relief as well as reforms in industry, agriculture, finance, waterpower, labour, and housing, vastly increasing the scope of the federal government's activities. The term was taken from Roosevelt's speech accepting the Democratic nomination for the presidency on July 2, 1932. Reacting to the ineffectiveness of the administration of President Herbert Hoover in meeting the ravages of the Great Depression, American voters the following November overwhelmingly voted in favour of the Democratic promise of a "new deal" for the "forgotten man." Opposed to the traditional American political philosophy of laissez-faire, the New Deal generally embraced the concept of a government-regulated economy aimed at achieving a balance among conflicting economic interests.

Much of the New Deal legislation was enacted within the first three months of Roosevelt's presidency, which became known as the Hundred Days. The new administration's first objective was to alleviate the suffering of the nation's huge number of unemployed workers. Such agencies as the Works Progress Administration (WPA) and the Civilian Conservation Corps (CCC) were established to dispense emergency and short-term governmental aid and to provide temporary jobs, employment on construction projects, and youth work in the national forests. Before 1935 the New Deal focused on revitalizing the country's stricken business and agricultural communities. To revive industrial activity, the National Recovery Administration (NRA) was granted authority to help shape industrial codes governing trade practices, wages, hours, child labour, and collective bargaining. The New Deal also tried to regulate the nation's financial hierarchy in order to avoid a repetition of the stock market crash of 1929 and the massive bank failures that followed. The Federal Deposit Insurance Corporation (FDIC) granted government insurance for bank deposits in member banks of the Federal Reserve System, and the Securities and Exchange Commission (SEC) was formed to protect the investing public from fraudulent stock-market practices. The farm program was centred in the Agricultural Adjustment Administration (AAA), which attempted to raise prices by controlling the production of staple crops through cash subsidies to farmers. In addition, the arm of the federal government reached into the area of electric power, establishing in 1933 the Tennessee Valley Authority (TVA), which was to cover a seven-state area and supply cheap electricity, prevent floods, improve navigation, and produce nitrates.

In 1935 the New Deal emphasis shifted to measures designed to assist labour and other urban groups. The Wagner Act of 1935 greatly increased the authority of the federal government in industrial relations and strengthened the organizing power of labour unions, establishing the National Labor Relations Board (NLRB) to execute this program. To aid the "forgotten" homeowner, legislation was passed to refinance shaky mortgages and guarantee bank loans for both modernization and mortgage payments. Perhaps the most far-reaching programs of the entire New Deal were the Social Security measures enacted in 1935 and 1939, providing old-age and widows' benefits, unemployment compensation, and disability insurance. Maximum work hours and minimum wages were also set in certain industries in 1938.

Certain New Deal laws were declared unconstitutional by the U.S. Supreme Court on the grounds that neither the commerce nor the taxing provisions of the Constitution granted the federal government authority to regulate industry or to undertake social and economic reform. Roosevelt, confident of the legality of all the measures, proposed early in 1937 a reorganization of the court. This proposal met with vehement opposition and ultimate defeat, but the court meanwhile ruled in favour of the remaining contested legislation. Despite resistance from business and other segments of the community to "socialistic" tendencies of the New Deal, many of its reforms gradually achieved national acceptance. Roosevelt's domestic programs were largely followed in the Fair Deal of President Harry S. Truman (1945–53), and both major U.S. parties came to accept most New Deal reforms as a permanent part of the national life.

New Delhi, the capital of India, constituting part of the city and union territory of Delhi (*q.v.*).

New Democratic Party (NDP), French NOUVEAU PARTI DÉMOCRATIQUE, Canadian political party with a democratic socialist position, favouring a mixed public-private economy, broadened social benefits, and an internationalist foreign policy.

The party grew out of the Co-operative Commonwealth Federation (CCF), founded in 1933 as Canada's first political party representing small farmers and workers. By the time the CCF came to power in Saskatchewan in 1944, it had a national organization, ran candidates in all sections of the country, and polled an appreciable popular vote; but it was never large enough to become the official opposition, nor did it hold the balance of power between the two major parties, the Liberals and the Progressive Conservatives. In 1956 most of Canada's labour groups united in the Canadian Labour Congress, which in August 1961 formed the New Democratic Party, incorporating the CCF but welding a stronger working arrangement with organized labour. (The provincial party in Saskatchewan retained the CCF name until 1967.) The NDP's longtime base has been among the farmers of Manitoba and Saskatchewan and the urban workers of British Columbia and Ontario. It was able to form governments in Saskatchewan, Manitoba, and British Columbia intermittently from the 1940s to the 1990s, in the Yukon Territory from the 1980s, and in Ontario, Canada's largest and richest province, in the 1990s.

New Economic Policy (NEP), the economic policy of the government of the Soviet Union from 1921 to 1928, representing a temporary retreat from its previous policy of extreme centralization and doctrinaire socialism. The policy of War Communism, in effect since 1918, had by 1921 brought the national economy to the point of total breakdown. The Kronshtadt Rebellion of March 1921 convinced the Communist Party and its leader, Vladimir Lenin, of the need to retreat from socialist policies in order to maintain the party's hold on power. Accordingly, the 10th Party Congress in March 1921 introduced the measures of the New Economic Policy. These measures included the return of most agriculture, retail trade, and small-scale light industry to private ownership and management while the state retained control of heavy industry, transport, banking, and foreign trade. Money was reintroduced into the economy in 1922 (it had been abolished under War Communism). The peasantry were allowed to own and cultivate their own land, while paying taxes to the state. The New Economic Policy reintroduced a measure of stability to the economy and allowed the Soviet people to recover from years of war, civil war, and governmental mismanagement. The small businessmen and managers who flourished in this period became known as NEP men.

But the NEP was viewed by the Soviet government as merely a temporary expedient to allow the economy to recover while the Communists solidified their hold on power. By 1925 Nikolay Bukharin had become the foremost supporter of the NEP, while Leon Trotsky was opposed to it and Joseph Stalin was noncommittal. The NEP was dogged by the government's chronic inability to procure enough grain supplies from the peasantry to feed its urban work force. In 1928–29 these grain shortages prompted Joseph Stalin, by then the country's paramount leader, to forcibly eliminate the private ownership of farmland and to collectivize agriculture under the state's control, thus ensuring the procurement of adequate food supplies for the cities in the future. This abrupt policy change, which was accompanied by the destruction of several million of the country's most prosperous private farmers, marked the end of the NEP. It was followed by the reimposition of state control over all industry and commerce in the country by 1931.

New England, region, northeastern United States, including the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

The region was named by Captain John Smith, who explored its shores in 1614 for some London merchants. New England was soon settled by English Puritans whose aversion to idleness and luxury served admirably the need of fledgling communities where the work to be done was so prodigious and the hands so few. During the 17th century the population's high esteem for an educated clergy and enlightened leadership encouraged the development of public schools as well as such institutions of higher learning as Harvard (1636) and Yale (1701). Isolated from the mother country, New England colonies evolved representative governments, stressing town meetings, an expanded franchise, and civil liberties. The area was initially distinguished by the self-sufficient farm, but its abundant forests, streams, and harbours soon promoted the growth of a vigorous shipbuilding industry as well as of seaborne commerce across the Atlantic Ocean.

In the 18th century, New England became a hotbed of revolutionary agitation for independence from Great Britain, and its patriots played leading roles in establishing the new nation of the United States of America. In the early decades of the republic, the region strongly supported a national tariff and the policies of the Federalist Party. In the 19th century, New England was characterized culturally by its literary flowering and a deep evangelical dedication that frequently manifested itself in zeal for reform: temperance, abolition of slavery, improvements in prisons and insane asylums, and an end to child labour. The antislavery movement finally came to predominate, however, and New England stoutly supported the cause of the Union in the American Civil War (1861–65).

As the American frontier pushed westward, migrants from New England transplanted their region's patterns of culture and government to new frontiers in the Midwest. The Industrial Revolution successfully invaded New England in this period, and manufacturing came to dominate the economy. Such products as textiles, shoes, clocks, and hardware were distributed as far west as the Mississippi River by the itinerant Yankee peddler. Both before and after the American Civil War, a new labour force from Ireland and eastern Europe flooded New England's urban centres, causing an ethnic revolution and forcing the traditional Protestant religions to share their authority with Roman Catholicism.

The 20th century witnessed many changes in New England. In the years following World War II, the region's once-flourishing textile and leather-goods industries virtually deserted the region for locations farther south. This loss came to be offset by advances in the transport-equipment industry and such high-technology industries as electronics, however, and by the late 20th century New England's continued prosperity seemed assured owing to the proliferation of high-technology and service-based economic enterprises in the region.

New England, Council for, in British American colonial history, joint stock company organized in 1620 by a charter from the British crown with authority to colonize and govern the area now known as New England. Drawing from landed gentry rather than merchants, the company was dominated by its president, Sir Ferdinando Gorges, who intended to distribute the land as manors and fiefs among the council's 40 members with the idea of establishing a monolithic, aristocratic, Anglican province. This plan was unsuccessful, however, and New England colonization was dominated by two vigorous, Nonconformist, middle-class enterprises—the Pilgrims (1620) and the Massachusetts Bay Company (1629). To untangle confused land titles under the council and to resolve conflicting lines of political authority, the Massachusetts Bay Company took possession of its charter directly from the king, thus eliminating the Council for New England as an intermediary.

New England Confederation, also called UNITED COLONIES OF NEW ENGLAND, in British American colonial history, a federation of Massachusetts, Connecticut, New Haven, and Plymouth established in May 1643 by delegates from those four Puritan colonies. Several factors influenced the formation of this alliance, including the solution of trade, boundary, and religious disputes, but the principal impetus was a concern over defense against attacks by the French, the Dutch, or the Indians. Because of their divergence from accepted Puritan precepts, Rhode Island and Maine were refused admission to the confederation.

According to its articles of agreement, the New England Confederation was to be "a firme and perpetual league of friendship and amytie," and its government was to be composed of a directorate of eight commissioners, two from each colony. The commissioners were expected to meet annually or more often, if necessary. The articles authorized the commissioners to fix quotas for men and expenses during wartime, to arbitrate disputes with foreign powers or other colonies, to ensure extradition of escaped servants, prisoners, and other fugitives, and to regulate Indian affairs. Six affirmative votes were required to approve the decisions of the confederation; failing that, the pending issue would be referred to the legislatures of the member colonies.

The New England Confederation did achieve some of its goals, but the alliance ultimately proved to be weak, since its decisions were only advisory and were often ignored by Massachusetts, its strongest member. The confederation's influence declined with the merger of Connecticut and New Haven (1662–65), though it continued to exist until the Massachusetts charter was forfeited in 1684. The New England Confederation had represented the first significant effort by English colonists to form an intercolonial alliance for mutual benefit.

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New England Glass Company, American glass company that was situated in East Cambridge, Mass., from about 1818 until 1888. In the latter year the company's owner, Edward D. Libbey, met a strike of his workers by moving the factory to Toledo, Ohio, where it is still active as the Libbey-Owens-Ford Company. The New England Glass Company made a large variety of wares ranging from pocket bottles and tumblers to attractive art glasses by techniques of molding, mechanical pressing, cutting, and engraving. Some of the finest of blown glass was produced by this factory; it was characterized by its high lead content, simplicity of line, and careful finish. New England glass was also famous for its rich colours, especially a ruby red. Another specialty of great public appeal was silvered glass, used to make doorknobs and tableware in imitation of silver. It is from the last decades of its production that some of the company's most successful art glasses date: a peachblow glass (*q.v.*), called Wild Rose, which is an opaque, coloured glass with a glossy finish shading from white to deep rose; the amberina glass (*q.v.*), with pale amber and ruby tones; and the Pomona, which has a frosted surface and a light-yellow colour.

New England Range, also called NORTHERN TABLELAND, section of the Eastern Highlands, or Great Dividing Range, northeastern New South Wales, Australia. The range extends 200 mi (320 km) north from the Moonbi Range (near Tamworth) to the Queensland border and 80 mi from east to west (10–50 mi inland from the coast). It is Australia's largest plateau, having 9,000 sq mi (23,000 sq km) above an elevation of 3,000 ft (900 m). The loftiest point is at Round Mountain (5,300 ft) on the eastern escarpment. The New England Range is generally wooded and is the source of many rivers, including the Richmond, Macleay, Clarence, Gwydir, Namoi, and Macintyre. The numerous river valleys are fertile and intensively cultivated with mixed crops, fruits, and potatoes. Cattle and sheep are grazed, timber is cut, and diamonds, sapphires, emeralds, gold, and tin are mined. Major centres are Inverell, Armidale, Glen Innes, and Tenterfield, which are linked by the New England (north–south) and the Oxley, Gwydir, and Bruxner (east–west) highways. The New England National Park, established in 1935, occupies 90 sq mi on the eastern slope of the range, 45 mi east of Armidale.

New England Renaissance: *see* American Renaissance.

New English Dictionary on Historical Principles, A (NED), the title of the original edition (1884–1928) of The Oxford English Dictionary (*q.v.*), which was the revised and corrected edition published in 1933.

New Forest, district, county of Hampshire, England, comprising the New Forest and its urbanized coastal fringe flanking Southampton Water and The Solent, together with rural areas around Ringwood and Fordingbridge in the west of the county. The old harbour of Hythe and the modern oil terminal of Fawley on Southampton Water are closely associated with the city (and district) of Southampton. Just to the west the Cistercian Abbey of Beaulieu has been developed into a major tourist attraction. From the old port borough of Lymington the residential and resort settlements along The Solent coast almost meet Christchurch, beyond the county boundary. Among them New Milton is the chief settlement. The Forestry Commission has its national headquarters at Lyndhurst. The district has an area of 291 sq mi (753 sq km). Pop. (1998 est.) 171,000.

New France, French NOUVELLE-FRANCE (1534–1763), the French colonies of continental North America, initially embracing the shores of the St. Lawrence River, Newfoundland, and Acadia (Nova Scotia) but gradually expanding to include much of the Great Lakes region and parts of the trans-Appalachian West.

The name Gallia Nova (New France) was first recorded in 1529 on a map prepared by the brother of Giovanni da Verrazano, who, in the service of France, had explored the coasts of North America in 1524 from what is now the Carolinas north to Nova Scotia. Then in 1534 the French seaman Jacques Cartier entered the Gulf of St. Lawrence and took possession of New France for King Francis I. In succeeding years Cartier ascended the St. Lawrence as far as the Lachine Rapids, to where Montreal now stands, and attempted, with Jean-François de La Rocque, sieur de Roberval, to found a colony near what is now Quebec. The colony failed, but out of these explorations the French fur trade with the Indians of the gulf and the river began.

Samuel de Champlain was employed in the interests of successive fur-trading monopolies and sailed into the St. Lawrence in 1603. In the next year he was on the Bay of Fundy and had a share in founding the first French colony in North America—that of Port Royal, now Annapolis Royal, Nova Scotia. In 1608 he began the settlement that was named Quebec, selecting a commanding site that controlled the narrowing of the St. Lawrence River estuary.

The fort at Quebec, however, attracted few residents, and Cardinal Richelieu, the chief minister of France, felt impelled to found in 1627 the Company of New France (Compagnie de la Nouvelle-France), popularly known as the Company of the Hundred Associates (Compagnie des Cent-Associés). It was granted the colony of New France, then comprising the whole St. Lawrence Valley, and for 15 years from 1629 it was to have complete monopoly of the fur trade. In return it was to take to New France 200 to 300 settlers a year. But war with England began, the company's first fleet was captured, and in 1629 Quebec itself surrendered to the English. It was restored by the Treaty of St. Germain in 1632, but the Company of New France never recovered from the blow, although it controlled New France until 1663. French colonization was slow for many years to come, and the fur trade remained the chief concern of everyone except the missionaries.

In 1663 King Louis XIV decided to cancel the charter of the Company of New France and make New France into a royal province, with a governor as the ceremonial and military head of the colony. In addition to creating a royal colony, the King sent a military commander, Alexandre de Prouville, the marquis de Tracy, and a regiment of soldiers who in 1666 defeated the Iroquois and forced them to make peace. It was then possible to proceed to populate and develop New France. More than 3,000 settlers, including girls of marriageable age, were sent out in the 1660s. Few followed thereafter, but by natural increase the population began to expand rapidly.

The first intendant, Jean Baptiste Talon (1665–68 and 1670–72), stimulated colonization and industry. He also pressed the exploration of the far west. Louis Jolliet explored the Mississippi until he was sure it flowed into the Gulf of Mexico, not into the Pacific Ocean. In 1671 Simon François d'Aumont (or Daumont, sieur de St. Lusson) at Sault Ste. Marie took possession of all the interior of the North American continent for France as an extension of New France.

Meanwhile, Britain and France were competing intensely for land and trade on the American continent. During King William's War (the North American extension of the War of the Grand Alliance; 1689–97), a New England fleet and army under Sir William Phips seized Acadia, but the French defied Phips's attempt to take Quebec in 1690. Then the French, under Louis de Buade, comte de Frontenac, began a series of border raids on New England, and finally marched into the Iroquois country. Meanwhile the brilliant young Canadian Pierre le Moyne, sieur d'Iberville, had conquered Hudson Bay, saved Acadia, and overrun Newfoundland. The war was ended by the Treaty of Rijswujk (1697) with New France holding Hudson Bay (but not Newfoundland) as well as all its former possessions. This was the work of Canadians, with little help from France. D'Iberville then set off to found Louisiana, another part of New France, in 1699. In 1700 and 1701 peace was made between the Iroquois and New France, and between the Iroquois and the Indian allies of New France. There were to be no more Iroquois wars, and New France stood at the height of its fortunes.

Its decline began almost at once. The English and their American colonists were to conquer all New France, but it was done in two stages. The first ended in 1713 with the conclusion of the War of the Spanish Succession. In 1710 Acadia had been seized again by the British, but in the next year an English expedition under Sir Hovenden Walker suffered serious losses along the St. Lawrence River and returned home. Most of the fighting was done in Europe, however, and the English victories there enabled them, by the Treaty of Utrecht that concluded the war, to recover Hudson Bay, limit French rights in Newfoundland, force the cession of Acadia (without Cape Breton Island), and to get a foothold in the western fur trade.

In 1756 the Seven Years' War in Europe began, and the American phase of this conflict, the French and Indian War, was to settle the fate of New France. For two years the French troops and Canadian militia were victorious. Then the British and American strength, fed by British sea power, began to tell. In 1758 Louisburg fell; in 1759 James Wolfe captured Quebec; and in 1760 Montreal surrendered and with it all of New France.

When the war was finally ended and peace was made by the Treaty of Paris in 1763, all New France east of the Mississippi, outside the environs of New Orleans, was ceded to Great Britain. Only two little islands, St. Pierre and Miquelon near Newfoundland, and the French fishing rights in Newfoundland, were left to France. But in what now became the province of Quebec more than 60,000 French Canadians became British subjects.

New General Catalogue of Nebulae and Clusters of Stars (*NGC*), basic reference list of star clusters, nebulas, and galaxies. It was compiled in 1888 by Danish astronomer Johan Ludvig Emil Dreyer, who based his work on earlier lists made by the Herschel family of British astronomers. Dreyer included some 8,000 celestial objects, a total raised to about 13,000 by his first and second *Index Catalogues* (*IC*), published in 1895 and 1908, respectively. With these supplements the *NGC* covers the entire sky, although many objects visible with modern instruments are not listed.

An object may be known by several designations; *e.g.*, the Crab Nebula is also called NGC 1952 and M 1, the latter being its number in the Messier catalog.

New Georgia Group, volcanic island group in the Solomon Islands, southwestern Pacific Ocean, 90 mi (145 km) northwest of Guadalcanal. The main islands (northwest to southeast) are Vella Lavella, Ranongga, Gizo, Kolombangara (cone-shaped, with a solfataric volcano, 5,800 ft [1,768 m]), Vona Vona, New Georgia (the largest, 50 mi long and 20 mi across at its widest point), Rendova, Tetepare, Vangunu, and Nggatokae. The islands are picturesque, surrounded by extensive reefs and lagoons; they are rugged and well forested, with a virtual absence of animal life and an abundance of rivers. New Georgia rises to two peaks, Vina Roni (3,300 ft) in the north and Nanggala Hill (2,670 ft) in the centre. Timber is produced on Gizo, New Georgia, and Kolombangara. Other products include copra, taro, sweet potatoes, and yams. During World War II, Japanese airfields were established at several places on New Georgia. U.S. forces took the islands from the Japanese on Oct. 7, 1943, after an intense struggle that began on June 29.

New Glarus, village, Green County, southern Wisconsin, U.S., on a branch of the Sugar River, 22 mi (35 km) southwest of Madison. Founded in 1845 by 193 immigrants from the canton of Glarus in Switzerland who had been driven from their homes by famine, it was organized on a semi-communal basis, with mineral rights and all streams and springs owned in common and the land apportioned by lot. The village (inc. 1901) is still largely populated by descendants of the original settlers. Located in a rich dairying region, New Glarus is noted for its Swiss cheese, as well as for Swiss-style embroidery. Tourism is important. Swiss Historical Village includes replicas of the buildings originally constructed on the site and a replica of a Swiss chalet. A Heidi (drama) Festival is held in June, a Swiss Volksfest celebrating Swiss Independence Day is held in August, and the Wilhelm Tell Festival in September includes the presentation of Friedrich Schiller's drama *Wilhelm Tell*. New Glarus Woods State Park is just south of the village. Pop. (1990) 1,899.

New Glasgow, town, Pictou county, northern Nova Scotia, Canada. It lies along the East River, 104 miles (167 km) northeast of Halifax. Founded in 1809, following the discovery of local coal deposits in 1798, it was named by William Fraser, a Scot, who surveyed the site and envisaged another Glasgow on the Clyde (the East River). It developed as a shipbuilding port and as a service centre for a farming and coal-mining region. The town now manufactures railway and heavy machinery, boilers, fabricated steel, tires, pulp and paper, and mattresses. *Samson,* the first Canadian locomotive built (1839) to operate on steel rails, may be seen at the town's Canadian National Railway station. Inc. 1875. Pop. (1991) 9,905.

New Granada, Viceroyalty of, Spanish VIRREINATO DE NUEVA GRANADA, in colonial Latin America, a Spanish viceroyalty, established temporarily between 1717 and 1724 and permanently in 1740, that included present Colombia, Panama (after 1751), Ecuador, and Venezuela and had its capital at Santa Fé (present-day Bogotá).

The separation of these territories from the viceroyalty of Peru, one of the principal colonial administrative changes effected by the Bourbon monarchs of Spain, reflected the growing population and increasing commercial importance of the area in the early 18th century. Subsequent commercial and political reforms and rising European demand for colonial products led to a period of prosperity and intellectual and cultural activity, which, however, exacerbated the divisions between peninsular Spaniards and middle- and upper-class Creoles. The viceroyalty ceased to exist in 1810, when most of the component jurisdictions ejected their Spanish officials. Initially the new governments swore allegiance to the Spanish monarch, and they did not begin to declare independence until the following year. A series of civil wars facilitated the temporary reconquest of the United Provinces of New Granada by Spain between 1814 and 1816, and the liberation of the area from Spanish rule was not completed until 1823. The name Estado de Nueva Granada ("State of New Granada") was adopted by Colombia in the period 1830–58.

New Granada Treaty (1846): *see* Bidlack Treaty.

New Guinea, island of the eastern Malay Archipelago, in the western Pacific Ocean, north of Australia. It is bounded by the Pacific Ocean to the north, the Bismarck and Solomon seas to the east, the Coral Sea and Torres Strait to the south, and the Arafura Sea to the southwest. The island covers an area of about 309,000 square miles (800,000 square km). New Guinea is administratively divided into two parts: its western half comprises Irian Jaya (formerly Irian Barat), a *provinsi* ("province") of Indonesia; and its eastern half comprises the major part of Papua New Guinea, an independent parliamentary state from 1975. *See also* Irian Jaya; Papua New Guinea. The second largest island in the world (after Greenland), New Guinea is about 1,500 miles (2,400 km) long (from northwest to southeast) and about 400 miles (650 km) wide at its widest (north to south) part.

An unbroken chain of mountains with peaks more than 13,000 feet (4,000 m) in elevation extends across New Guinea from the northwest to the southeast, rising to 16,503 feet (5,030 m) at Mount Jaya in western Irian Jaya. The summits of the chain are glaciated, and the mountains incorporate extinct volcanoes and elongated, fertile highland basins usually more than 4,900 feet (1,490 m) in elevation. To the north of the mountain chain is a deep structural trench occupied by the valleys of the Mamberamo, Sepik, Ramu, and Markham rivers. Fronting the north-central coastal plains of New Guinea is a series of fault-rimmed mountains that generally lie below 11,500 feet (3,505 m). The mostly lowland Bomberai Peninsula and the more mountainous Doberai Peninsula constitute the extreme northwestern part of the island.

South of the central mountain chain is the Fly-Digul shelf, a vast swampy plain crossed by numerous rivers including the Fly, Bian, Digul, Mapi, Pulau, and Lorentz. To the southeast the Owen Stanley Range extends about 200 miles (320 km) and forms a wide peninsula, separating the Solomon Sea to the north from the Coral Sea to the south.

The climate of New Guinea is basically tropical, with mean annual maximum temperatures ranging between 86° and 90° F (30° and 32° C) in the lowlands; daytime temperatures in the highlands generally exceed 72° F (22° C) year-round. The southeast trade winds blow for about seven months each year, and rainfall on the southward-facing slopes of the central highlands frequently exceeds 300 inches (7,620 mm) annually. Consequently, the Fly-Digul shelf and bordering highlands are one of the world's wettest places and also one of the least-inhabited. The central highlands receive rain throughout the year totaling between 100 and 160 inches (2,540 and 4,065 mm). Port Moresby on the southeastern coast receives only about 40 inches (1,016 mm) of rain per year.

Mangrove swamp is found along the coastline almost everywhere, and farther inland it is succeeded by nipa palm. Large stands of sago palm are found along the deltas and rivers of the southern coast. Primary lowland rain forest covers much of New Guinea up to about 3,300 feet (1,005 m) above sea level. In the central highlands above 3,300 feet, stands of oak, beech, and pine are common. Throughout most of the highland basins, much of the natural vegetation has been removed by the relatively intensive agriculture of the highlanders. The central highlands are the most densely populated part of the island. Swidden (slash-and-burn, or shifting) cultivation is practiced in the forested foothills to the north of the central highlands and in the grasslands of the Mamberamo and Sepik river basins, where the population is sparse. The north coast is also generally well populated.

New Guinea has a rich variety of plant life including orchids, figs, and species of false beech. Wildlife includes many reptiles and such marsupials as the tree kangaroo and phalanger. Notable birds are the cassowary (a large, flightless bird), the spectacular birds of paradise, and parrots.

Almost the whole of New Guinea is occupied by speakers of Papuan languages, the original settlers of the island, who live mainly in the interior and southern sections. Papuan societies are characterized by leadership invested in local "big men" and by reciprocal gift giving. Ethnic composition is complex among the Papuans, who speak some 700 different languages. On the northern coast, the eastern coast, and many of the offshore islands there are communities of speakers of Austronesian (Melanesian) languages. There are also some Polynesians, Chinese, and Europeans. Several pidgins, such as Tok Pisin and Hiri Motu, are widely spoken; Indonesian (the official language of Indonesia) and English (the official language of Papua New Guinea) are also spoken. Although about a third of Papua New Guinea's population is Roman Catholic and more than a quarter are Lutherans, traditional religious beliefs and rituals are still widely practiced, and most of the island's population is animist.

Copper and gold are the main mineral resources of the island. One of the largest concentrations of copper in the world is at Tembagapura, about 25 miles (40 km) southwest of Mount Jaya in Irian Jaya. Another major deposit of copper has been developed just inside Papua New Guinea among the headwaters of the Fly River at Ok Tedi. Large amounts of gold also are produced at Ok Tedi. Petroleum is produced in the Doberai Peninsula area of Irian Jaya and near Lake Kutubu in the central highlands of Papua New Guinea. Natural gas has been discovered in the Fly-Kikori area in Papua New Guinea.

The bulk of New Guinea's population are subsistence farmers. Yams, taro, sago, and bananas are the lowland staple foods, and the sweet potato is the main highland food; pig husbandry is widespread. Cash crops in Papua New Guinea include coffee, cacao, copra, palm oil, tea, and rubber; skyjack tuna, prawns, and timber are also exported. Internal transport consists of a few secondary coastal roads, riverboats, and airways, with the latter becoming increasingly important.

New Guinea was possibly occupied as early as 50,000 years ago; by about 7000 BC sedentary agriculture with extensive swamp drainage and irrigation was practiced in the highland basins. The island, especially the western half, was known to Indonesian and Asian seafarers centuries before it was known to Europeans. The Portuguese in 1511 were the first Europeans to sight the island but made no landing until 1527.

The Dutch claimed the western half of the island in 1828 as part of the Dutch East Indies. In the 1870s Captain John Moresby of Great Britain surveyed the southeastern coast, and by 1884 the southeastern quadrant of New Guinea had been annexed by Great Britain. The German New Guinea Company took over administration of the northeast quadrant in the same year. The administration of British New Guinea was passed to Australia in 1904, and its name was changed to the Territory of Papua.

Following World War I, German New Guinea was taken over by Australia as a mandated territory of the League of Nations in 1921. After Japan temporarily occupied large parts of the island during the early years of World War II, Australia combined its administration of the Territory of Papua and the New Guinea mandate into the Territory of Papua and New Guinea. Also after the war, the western half of the island, known as Irian Barat, was returned to Dutch control. Indonesia became independent in 1949, and a plebiscite was held in 1969 to decide Irian Barat's future; as a result it was annexed to Indonesia as the province of Irian Jaya. Papua New Guinea was granted independence within the British Commonwealth in 1975. Pop. (1990) Irian Jaya, 1,648,708; (1990 prelim.) Papua New Guinea, 3,097,559; entire island including minor adjoining islands, 4,746,267.

New Guinea plateless turtle: *see* pitted shell turtle.

New Hampshire, constituent state of the United States of America lying in the New England region of the country. The state capital is Concord.

A brief treatment of New Hampshire follows.

For full treatment, *see* MACROPAEDIA: United States of America: *New Hampshire.*

Facing the Atlantic Ocean along a short 13-mile (21-kilometre) southeastern coastline, New Hampshire is also bounded by Massachusetts on the south, Vermont on the west, Maine on the east, and the Canadian province of Quebec on the north. The state extends about 180 miles (290 km) from north to south and 90 miles from east to west.

The first European settlers found the region inhabited by various tribes of the Algonquian Indian culture, the most powerful of which were the Pennacooks. The first European settlement was a fishing and trading village established near Portsmouth in 1623. Settlements at Exeter, Dover, and Hampton followed shortly, and in 1641 the area came under the jurisdiction of Massachusetts. New Hampshire became a separate crown colony in 1679. After the American Revolution, in which the people of New Hampshire supported overwhelmingly the aims of the revolutionary leaders, New Hampshire became the ninth state to ratify the Constitution in 1788. The traditional annual town meeting serves to shape policy in virtually all the incorporated towns. Local government in New Hampshire's cities takes the form of a city council, a council-manager, or a commission system. Because it holds the earliest presidential primary election in the nation, New Hampshire has often furnished the first testing ground for successful candidates.

New Hampshire lies entirely within the Appalachian system, but it can be divided into three main regions: (1) the White Mountains, covering the northern one-third of the state and rising to 6,288 feet (1,917 m) at Mount Washington; (2) the glacier-scoured region of low mountains and lakes covering most of the southern two-thirds of the state; and (3) a narrow strip of coastal plain along the Atlantic Ocean. The ice sheet of the last glacial age covered the entire state, sculpting most of its present physical features. The state drains generally southward through the Merrimack and Connecticut river systems.

The New Hampshire climate is temperate, with cool summers and cold winters. The average summer temperature at Concord in the south is 70° F (21° C), and the average winter temperature at Mount Washington in the north is 6° F (−14° C). Average yearly precipitation at the two locations is 39 and 74 inches (990 and 1,880 mm), respectively, and is evenly distributed throughout the year. Annual snowfall averages 60 inches (1,524 mm) in the south and 200 inches (5,080 mm) on the northern mountains. Soils are not generally suitable for large-scale cultivation except in the river valleys. Forests cover more than 80 percent of the land.

Settlement of New Hampshire was primarily by English and Scots-Irish Protestants. Their descendants can be found in almost every town and city occupying the same property, even the same house, for several successive generations. The second largest ethnic group is the French Canadians, who first began to arrive immediately after the American Civil War seeking economic opportunities in the industrial cities. About half of the population is classified as urban, and only a tiny fraction is nonwhite. The people of the state are largely concentrated in the southern region. The area nearest to Boston has evolved into a commuter suburban region.

The economy of New Hampshire is based primarily on manufacturing and tourism. The main agricultural activities are dairying and the production of fruits and vegetables. The forests of the state provide lumber, paper, pulp, and maple syrup and sugar. The main mining activity is granite quarrying. Traditional shoemaking and textile and apparel industries have given over to electrical- and electronic-goods manufacturing. Tourists—attracted by the distinctiveness of the landscape and the varied seasonal recreational opportunites—account for a large portion of retail sales and service income.

New Hampshire's transportation facilities lie generally outside the mainstream of the nation's traffic flow, although the interstate-highway system provides rapid access northward from Boston. Many of the state's highways utilize scenic covered bridges and tree-lined country lanes. The main seaport is at Portsmouth, and the U.S. Navy has submarine building and repair facilities at its Portsmouth Naval Shipyard, located in Kittery (Maine) across the Piscataqua River from Portsmouth.

New Hampshire has a long-standing continuity of cultural and educational institutions. The MacDowell Colony for writers and composers, the Saint-Gaudens National Historic Site, and the Currier Gallery of Art are important in the arts. Summer theatres flourish in resort areas. Dartmouth College and the University of New Hampshire provide excellent higher-education opportunities. Area 9,279 square miles (24,032 square km). Pop. (2000) 1,235,786.

New Hampshire Grants, in the period before the American Revolution, the territory that subsequently became the state of Vermont. The area was initially claimed by New Hampshire, and the first land grant there was issued in 1749 by the first governor of New Hampshire, Benning Wentworth. By 1764, 131 townships had been chartered. In 1765 New York, which also claimed the territory, began issuing grants of its own, some of which conflicted with those already made by New Hampshire. Armed conflicts between the rival claimants were common, and the Green Mountain Boys (*q.v.*) were organized to expel the settlers from New York. The dispute was resolved when Vermont (originally New Connecticut) was established as an independent republic in 1777.

New Hampshire v. Louisiana (108 U.S. 76 [1883]), U.S. Supreme Court case (combined with *New York* v. *Louisiana*) concerning an attempt by the states of New Hampshire and New York to force Louisiana to pay interest on state bonds owned by citizens of the plaintiff states and assigned to those states for collection. Laws had been passed by New Hampshire in 1879 and by New York in 1880 under which a citizen of either of those states who held a valid, overdue claim against another state could assign the claim to his state in writing; the state attorney general could then bring suit against the defaulting state, and money that was recovered, less the costs of litigation, was to be given to the original owner. The Supreme Court dismissed the cases on the ground that the laws in question violated the spirit and purpose of the Eleventh Amendment to the United States Constitution, according to which "the judicial power of the United States shall not be construed to extend to any suit" brought against one of the United States by citizens of another state.

New Harmony, town, Posey county, southwestern Indiana, U.S., on the Wabash River, at the Illinois border, 22 miles (35 km) northwest of Evansville. The site was first occupied by prehistoric Mound Builders and later was a camping ground for Piankashaw and other Indians. The settlement of Harmonie was founded in 1814–15 by George Rapp, a German Pietist preacher who had first come to Pennsylvania in 1803 with his followers from Württemberg, Ger. When they later moved west, a prosperous Indiana colony evolved, but unrest brought on by hostile neighbours spurred the Rappite leaders to sell their holdings in 1825 to Robert Owen, a British reformer, who first came to the United States to found a cooperative community based on plans for mankind's salvation through "rational" thinking, cooperation, and free education. Owen renamed the town New Harmony. He was aided by William Maclure, a geologist, businessman, and philanthropist, who agreed to finance the schools and supply teachers, scientific equipment, and a library.

About 1,000 settlers responded to Owen's public appeal, but most were misfits who ate his rations, argued over government, and were unable to perform the menial tasks vital to such a community. Farms and workshops lay idle while virtual anarchy reigned. By May 1827, Owen's cash had been absorbed by payments for land and supplies, and he returned to Britain in 1828. The property was divided among Maclure and Owen's three sons, who, with some of the scientists and teachers, stayed on to develop one of the most notable pre-Civil War cultural centres in the United States. A laboratory, built by David Dale Owen (first U.S. geologist), was headquarters for what later became the U.S. Geological Survey. It has since been restored.

New Harmony is now an agricultural-trading centre. The town was made a national historic landmark in 1965, and many of the Harmonist and Rappite buildings have been restored, including the Fauntleroy Home (1822–40), the Rapp-Maclure Mansion (1814), Barrett-Gate House (1814), Dormitory Number 2 (1822), and the Restored Labyrinth (shrubbery) with its baffling pathways. The Roofless Church (1959) has a Jacques Lipchitz sculpture. The ashes of theologian Paul Tillich are interred in Tillich Park. The Workingmen's Institute (1894) was one of the nation's first free public libraries. Inc. 1850. Pop. (2000) 916.

New Haven, city, coextensive with the town ("township") of New Haven, New Haven county, south-central Connecticut, U.S. It is a port of entry on Long Island Sound at the Quinnipiac River mouth. Originally settled as Quinnipiac in 1638 by a company of English Puritans led by John Davenport and Theophilus Eaton, it was renamed in 1640, probably for Newhaven, Sussex, Eng. In 1643 it combined with several adjacent towns, including Milford and Guilford, to form the New Haven Colony, of which Eaton was governor until his death in 1658. Reluctantly, in 1664 New Haven Colony accepted absorption into the more liberal and democratic Connecticut Colony, which was based on Hartford and enjoyed a royal charter. From 1701 New Haven was co-capital with Hartford, a position it maintained in both colony and state until 1875. During the American Revolution it was sacked (July 5, 1779) by Loyalist forces under General William Tryon. The town was an important centre of Abolitionist sentiment during the American Civil War.

The Green, a park in downtown New Haven, Conn.
Ewing Galloway

New Haven's preeminence in many industrial fields is manifest in the number of inventions that first appeared there. These include Eli Whitney's mass-production technique, Charles Goodyear's vulcanized rubber, Samuel Colt's improved repeating revolver, Lee De Forest's Audion (elementary radio tube), and sulfur matches. The Winchester repeating rifle (the gun that "tamed the West") was made there, and the Winchester Gun Museum is there. Diversified manufacturing and shipping are the modern economic mainstays. In 1957 New Haven was one of the first Eastern cities to undertake wholesale urban renewal of its decaying downtown area, now exemplified in Church Street Center.

New Haven is noted for its educational and cultural institutions. It is the seat of Yale University (founded 1701 at Saybrook and moved to New Haven in 1716), Southern Connecticut State University (1893), Albertus Magnus College (1925), and South Central Connecticut Community College (1968). Pop. (1990) city, 130,474; New Haven–Meriden MSA, 530,180.

New Haven Railroad: *see* New York, New Haven and Hartford Railroad Company.

New Hebrides (islands, southwestern Pacific Ocean): *see* Vanuatu.

New Hope, borough and artists' colony, Bucks county, southeastern Pennsylvania, U.S., in a scenic wooded region along the west bank of the Delaware River (there bridged to Lambertville, N.J.), 33 miles (53 km) north-northeast of Philadelphia. The site, originally called Coryell's Ferry, was first settled in 1715. The present community, deriving its name from New Hope Mills (1790), was founded by William Lathrop in 1900 and has gained fame as a refuge for painters, writers, composers, and actors. New Hope abounds in craft shops, book shops, and galleries. It is crossed by a reconstructed section of the old Delaware Canal (in operation 1831–58), now a tourist attraction with mule-drawn barges. One of the nation's oldest summer theatres, the Bucks County Playhouse (dating from the 1780s), is in the borough. The New Hope and Ivyland Railroad comprises 14 miles (22.5 km) of track and a steam-powered train and coaches of the Victorian era. Washington Crossing State Park is 7 miles (11 km) south. Inc. 1837. Pop. (1990) 1,400.

New Humanism, critical movement in the United States between 1910 and 1930, based on the literary and social theories of the English poet and critic Matthew Arnold, who sought to recapture the moral quality of past civilizations in an age of industrialization and materialism. Reacting against the scientifically oriented philosophies of literary realism and naturalism, New Humanists refused to accept deterministic views of human nature. They argued that: (1) human beings are unique among nature's creatures; (2) the essence of experience is fundamentally moral and ethical; and (3) the human will, although subject to genetic laws and shaped by the environment, is essentially free. With these points of contention, the New Humanists—Paul Elmer More, Irving Babbitt, Norman Foerster, and Robert Shafer, to name only a few—outlined an entire program and aesthetic to incorporate their beliefs. By the 1930s the New Humanists had come to be regarded as cultural elitists and advocates of social and aesthetic conservatism, and their influence became negligible.

New Iberia, city, seat (1868) of Iberia parish, southern Louisiana, U.S., on the Bayou Teche (connected via canal with the Gulf Intracoastal Waterway), 20 miles (32 km) southeast of Lafayette. First settled in the 18th century by French, Spanish, and Acadians, it bears the ancient name of Spain (Iberia) and was laid out in 1835. In 1863 it was occupied (with nearby salt mines) by Union forces. It developed as a processing and shipping centre for salt, sugarcane, rice, peppers, vegetables, and oil and acquired some light manufacturing. New Iberia has retained strong French characteristics and is the site of Shadows-on-the-Teche, a restored antebellum mansion. The Louisiana Sugar Cane Festival is held annually in September. Nearby are the Longfellow-Evangeline State Commemorative Area, a federal livestock experimental station, and Avery and Jefferson islands, noted for their scenic gardens. Inc. 1839. Pop. (1990) 31,828.

New Ireland, island of the Bismarck Archipelago and *provinsi* ("province"; established 1977) of Papua New Guinea. The island, lying just north of New Britain, from which it is separated by St. George's Channel, stretches for about 220 miles (350 km) from northwest to southeast but is very narrow, with the southeastern portion only 30 miles (48 km) wide and the 150-mile (241-kilometre) northwestern arm no broader than 15 miles (24 km) and as narrow as 5 miles (8 km). It is generally rugged, especially in the south, where the Rossel Mountains rise to more than 7,050 feet (2,150 m), and in the north, where the Schleinitz Range reaches 4,859 feet (1,481 m). Limestone highlands occupy much of the northwest, the Lelet Plateau averaging 2,000 feet (610 m) in elevation. Lihir island and Ambitle on New Ireland show solfataric and hot-spring activity, but there are no active volcanoes. There is a fringe of coastal plain leached by centuries of bush burning, and there are few good harbours.

New Ireland was sighted in 1616 by the Dutch navigator Jakob Le Maire, who believed it was part of a landmass including New Britain and New Guinea. This theory was disproved when Philip Carteret found St. George's Channel in 1767 and named the island Nova Hibernia (New Ireland). An unsuccessful settlement attempt was made in 1880. Annexed by Germany in 1884, it was renamed New Mecklenburg. After World War I the island was mandated to Australia. Occupied by the Japanese in 1942, it became part of the UN Trust Territory of New Guinea, administered by Australia, after World War II. When Papua New Guinea achieved independence in 1975, it became part of that country.

Commercial development is dominated by copra production, particularly on the east coast of New Ireland. Most of the inhabitants live in the north. This section is administered from Kavieng, the chief port, which is linked by an east-coast road to Samo. The southern portion is administered from Namatanai. The island of New Ireland has an area of 3,340 square miles (8,651 square km); the province, which includes Lavongai (New Hanover), the St. Matthias, Tabar, Lihir, Tanga, and Feni island groups, and Djaul Island, has an area of 3,700 square miles (9,600 square km). Pop. (1987 est.) province, 78,900.

New Jersey, constituent state of the United States of America lying on the Atlantic seaboard in the Middle Atlantic region of the country. The capital is Trenton.

A brief treatment of New Jersey follows. For full treatment, *see* MACROPAEDIA: United States of America: *New Jersey.*

New Jersey's only land boundary is with New York on the north. To the east lies the Atlantic Ocean, to the northeast across the Hudson River is New York City, and to the west across the Delaware River and Bay are Pennsylvania and Delaware. The state extends about 170 miles (270 km) from north to south and 75 miles (120 km) from east to west.

At the time of European exploration and settlement, the New Jersey area was inhabited by the Lenni-Lenape (Delaware) Indians. The first European to land in the area was the Florentine explorer Giovanni de Verrazano, sailing under the French flag in 1524. Henry Hudson, an Englishman exploring for the Dutch, arrived in 1609. The first settlements were fortified Dutch and Swedish trading posts along the Hudson and Delaware rivers.

The English took control of the region from the Dutch in 1664. In 1676 the province was divided into East Jersey and West Jersey, the former going to Sir George Carteret and the latter to a group of Quakers. The division continued until 1702, when New Jersey was reunited as a royal colony under the governor of New York. In 1738 New Jersey became a separate colony with its own governor and assembly. Early in the American Revolution, the colonial forces won key battles at Trenton (1776), Princeton (1777), and Monmouth (1778). Princeton was twice the site of the national capital during periods of 1783 and 1784. New Jersey became the third state to ratify the U.S. Constitution in 1787.

New Jersey can be divided into four parallel physiographic regions running northeast to southwest: (1) the rugged Ridge and Valley section of the northwest, where the Appalachians slice across the corner of the state; (2) the New England section, a southern extension of the ancient rocks of New England, to the southeast; (3) the rolling central Piedmont containing the industrial cities, the Hudson Palisades, and marshy meadowlands; and (4) the Coastal Plain, containing rich farmland, sandy beaches, dunes, marshes, and the Pine Barrens.

The New Jersey climate is humid continental, with a marked difference in winter temperature between the northwest and southeast. In the north the average temperature in winter is 28° F (−2° C) and in summer, 70° F (21° C). In the south the average temperature in winter is 35° F (2° C) and in summer, 71° F (22° C). Precipitation averages range from 44 to more than 48 inches (1,120 to 1,220 mm) a year, with August being the wettest month. The growing season is about 150 days in the north and 200 days along the southern coast. Soil conditions throughout the state are well suited for agriculture, and most of the land not built on or covered by marshes or forest is farmed.

New Jersey is the most densely populated state in the country. The population is unequally distributed geographically; roughly three of every four Jerseyans live north of Trenton, and 60 percent within 30 miles (48 km) of New York City. Across the Hudson from New York City is the industrial sprawl of New Jersey's four largest cities—Newark, Jersey City, Paterson, and Elizabeth. Every day thousands of New Jersey commuters travel from suburban homes to jobs in New York City and Philadelphia. Statewide, 89 percent of the population lives in areas classified as urban, thus making New Jersey one of the most urbanized states of the United States. Italian-Americans constitute the state's largest ethnic group. About 13 percent of the state's population is black, and about 7 percent is Hispanic.

The economy of New Jersey is based primarily on manufacturing, which employs about one-third of the work force. New Jersey's major manufactures are chemicals, in which it leads the nation, and electronic equipment. It holds high national ranking in the production of clothing, electrical machinery, toys, sporting goods, and stone, glass, and clay products. About 10 percent of the nation's research dollars are spent in New Jersey research facilities and laboratories. The resort industry, centred on the Atlantic shore, is also a major factor in the state's economy. Atlantic City, with its Boardwalk, fine old hotels, and gambling casinos, is one of the nation's largest year-round resorts and convention centres. Prosperous truck farms grow almost every kind of temperate-climate fruit and vegetable, but the spread of industry and housing is costing New Jersey much of its valuable farmland.

The New Jersey transportation system is primarily a funnel for goods and people moving between New York City and points north and between Philadelphia, Delaware, and points south. Its freeways and turnpikes, railroads, and airports are among the busiest in the world. The Port Authority of New York and New Jersey is a bistate commission empowered to finance and operate transportation facilities in the New York City metropolitan area. It oversees airports, tunnels, bridges, piers and container terminals, commuter bus and rail lines, and truck terminals. A similar, but smaller, transit complex exists in the Camden area, linking the South Jersey area with Philadelphia.

New Jersey, often regarded as a cultural adjunct of New York City and Philadelphia, has helped correct its reputation with the opening of the Garden State Arts Center and the Meadowlands sports complex. Museums, many operated in conjunction with historic sites or buildings, manifest rich cultural traditions focusing on the works of accomplished citizens such as Thomas Edison, Walt Whitman, and Woodrow Wilson. Major institutions include Rutgers and Princeton universities, as well as such institutions as the Institute for Advanced Study, the Educational Testing Service, and Bell Laboratories. Area 7,787 square miles (20,168 square km). Pop. (2000) 8,414,350.

New Jersey, State University of: *see* Rutgers, The State University of New Jersey.

New Kensington, city, Westmoreland county, western Pennsylvania, U.S., on the Allegheny River, and near the Pennsylvania Turnpike, just northeast of Pittsburgh. Established in 1891 by a group of Pittsburgh merchants interested in the reduction of aluminum, it was laid out on the site of Fort Crawford (built during the American Revolutionary period) and named for Kensington in London. Incorporated as a borough in 1892, it absorbed neighbouring Parnassus in 1931 and became a city in 1934.

New Kensington's manufactures include aluminum, steel, glass, textiles, and metal and petroleum products. Several industrial research-and-development centres are also located in the area. The New Kensington campus of Pennsylvania State University was opened in 1958. Pop. (2000) 14,701.

New Lisbon (Angola): *see* Huambo.

New Liskeard, town, Timiskaming district, eastern Ontario, Canada, at the northern end of Lake Timiskaming (an expansion of the Ottawa River), near the Quebec border. Originally known as Thornloe, the town developed on land that the provincial government opened for settlement in 1822. Its present name was derived from Liskeard, Eng., the birthplace of the town's founder, John Armstrong.

A market and distributing town for the surrounding farming, lumbering, and cobalt- and silver-mining region, New Liskeard also serves as a hunting and fishing resort. Industries include ironworks, dairies, canneries, and pulp and lumber mills. Pop. (2001) 4,906.

New London, city, coextensive with the township of New London, New London county, southeastern Connecticut, U.S. It is a port of entry on Long Island Sound at the mouth of the Thames River. Founded by John Winthrop the Younger in 1646, it was called Pequot until 1658. New London was chartered as a city in 1784. In 1709 Connecticut's first printing press was established there. A rendezvous of privateers during the American Revolution, it was attacked and burned (Sept. 6, 1781) by a large British force under the command of Benedict Arnold. New London has one of the deepest harbours on the Atlantic coast. The whaling industry began there in 1784, flourished in the early 19th century, but declined after 1846.

Playing field of the U.S. Coast Guard Academy, New London, Conn.

Alan Pitcairn from Grant Heilman

New London is the seat of the U.S. Coast Guard Academy (1876) and site of a U.S. Navy submarine base (1916) and the Underwater Sound Laboratory. These establishments greatly influence its economy, which includes the building of nuclear submarines. The city is the seat of Connecticut College (1911). Nearby is the Connecticut Arboretum and Mitchell College (1938). The Lyman Allyn Museum houses colonial artifacts. The annual Yale-Harvard boat races on the Thames finish at New London. The Eugene O'Neill Memorial Theater Center is in nearby Waterford. Pop. (2000) city, 25,671; New London–Norwich MSA, 293,566.

New Madrid, city, seat (1821) of New Madrid county, southeast Missouri, U.S., on the Mississippi River. It originated as an Indian trading post about 1783. The town was initiated in 1789 by an American Revolutionary War veteran, George Morgan, who had received a land grant from Spain, but it did not begin to flourish in farming and trade until after the purchase of the Territory of Louisiana by the United States in 1803. New Madrid's growth was slowed by violent earthquakes in 1811–12, as well as floods and shifting of the river's course, which caused several removals of the city to different sites. The town was the site of an American Civil War battle in 1862.

New Madrid's economic mainstay is diversified agriculture (cotton, soybeans, corn [maize], grain sorghum, and livestock). Aluminum ingots, electrical conductors, and clothing are manufactured there, and there is some lumbering. The Lilbourn site, a fortified prehistoric Indian ceremonial centre, is 6 miles (10 km) west. Inc. 1808. Pop. (2000) 3,334.

New Madrid Fault, also called NEW MADRID SEISMIC ZONE, deep-seated fracture in the Earth's crust trending southwest-northeast through Arkansas, Missouri, Tennessee, and Kentucky, U.S. Lying in the central area of the North American Plate, the rift is about 45 miles (70 km) wide and 190 miles (300 km) long. The deep fracture is overlaid by thick layers of rock, which in turn are overlaid by deep, unstable alluvial material relating to the Mississippi, Missouri, and Ohio rivers.

On Dec. 16, 1811, and Jan. 23 and Feb. 7, 1812, a series of three earthquakes—the largest in recorded American history—occurred near the frontier town of New Madrid, Mo. (epicentre 36.6° N 89.6° W), each measuring greater than magnitude 8.0. (Milder aftershocks occurred daily for more than a year.) The first shock was felt from Canada to New Orleans and as far away as Boston, Mass., and Washington, D.C. In the end, some 3,000 to 5,000 square miles (7,800 to 13,000 square km) were visibly scarred with the effects—causing such topographical changes as fissures, landslides, and upheavals, the creation and destruction of lakes and swamps, and the wasting of forests.

New Market, town, Shenandoah county, northwestern Virginia, U.S., in the Shenandoah Valley. Laid out in 1784 and early known as Crossroads, it was incorporated in 1796 and renamed for the famous English horseracing town. This small farming-resort community gained a place in American Civil War history when Confederate General John C. Breckinridge, in desperation, ordered the 257 cadets of the Virginia Military Institute in Lexington to join the fight in the hills to the north against the Union army of General Franz Sigel. The boy-cadets, under General Scott Shipp, marched 90 miles (145 km) from Lexington in three days and distinguished themselves against seasoned forces, taking prisoners and capturing a battery. The improbable battle (May 15, 1864), in which 10 cadets were killed and 47 were wounded, ended with Sigel's retreat northward. New Market Battlefield Park commemorates the cadets' heroism. Endless Caverns (north) and Shenandoah Caverns (south) are known for vivid colouring and fantastic rock formations. Pop. (2000) 1,637.

New Mexico, constituent state of the United States of America lying in the southwestern mountain region of the country. The capital is Santa Fe.

A brief treatment of New Mexico follows. For full treatment, *see* MACROPAEDIA: United States of America: *New Mexico.*

Rectangular except for a small panhandle in the southwestern corner, New Mexico is bounded on the north by Colorado, on the east by Oklahoma and Texas, on the south by Texas and the Mexican state of Chihuahua, and on the west by Arizona. New Mexico also touches Utah at a single point at its northwestern corner. The state extends about 400 miles (640 km) from north to south and 350 miles (560 km) from east to west.

Human settlement in the area has probably spanned 10,000 years. An agricultural Indian civilization developed irrigation systems, pueblos, and cliff dwellings whose ruins still dot the state. The more nomadic and aggressive Navajo and Apache Indians arrived from the north only a few centuries before the Spanish.

Treasure-seeking Spaniards from Mexico, notably Francisco Vázquez de Coronado, made the initial European contact in the early 16th century, thus establishing Spain's claim to the area. The first permanent Spanish settlement was made at Santa Fe, the present capital, in 1610. Missionary work was the predominant activity during the 1600s. Considerable Spanish settlement took place during the 1700s, Albuquerque being founded along the Rio Grande in 1706. Trade with the United States over the Santa Fe Trail had begun by 1821, when New Mexico became a part of the independent Republic of Mexico. The territory was ceded to the United States in 1848 following the end of the Mexican War. The New Mexico Territory was organized in 1850, and the eastern portion became New Mexico, the 47th state, in 1912.

New Mexico can be divided into three regions: (1) the high Great Plains of the eastern one-third, containing the Llano Estacado, (2) the north-south–running ranges of the Rocky Mountains of the central one-third, and (3) the high, mountainous plateau country of the western one-third. The Continental Divide traverses the entire length of western New Mexico. Most of the state has an elevation of more than 4,000 feet (1,200 m) above sea level. The Rio Grande, Pecos, and Canadian are the main rivers draining to the Atlantic, while the San Juan and Gila are the main rivers draining to the Pacific.

The climate of New Mexico is mostly semiarid and arid with low humidity and abundant sunshine. The mean annual temperature is 54° F (12° C), but seasonal extremes range from 116° to −50° F (47° to −46° C). Temperatures rise or fall by 5° F (3° C) with every 1,000 feet (305 m) of elevation, and nighttime temperatures tend to fall sharply. The average annual precipitation is 13 inches (330 mm), varying from 8 to 10 inches (203 to 255 mm) in the lower areas to 40 inches (1,015 mm) in the high mountains. Generally, precipitation is greatest in the eastern third of the state, least in the western third.

Between 1970 and 1980 New Mexico, like the other Sun Belt states, experienced a high rate of population increase (28 percent). The 144 percent population gain between 1940 and 1980 was in large part a result of the proliferation of federal expenditures in the state for defense and research and the discovery of oil and other minerals. In spite of the tremendous growth rate, New Mexico remains one of the most sparsely populated states. About two-fifths of the population is of Spanish origin, about one-half of whom are Mexican-Americans while the others are descendants of the original Spanish settlers, or Hispanos. Somewhat less than a tenth are American Indians, the largest tribal groups of which are the Navajo, Pueblo, Ute, Jicarilla, Mescalero Apache, and Zuni. Almost three-fourths of the population lives in areas classified as urban. The Albuquerque metropolitan area contains about one-third of the state's total population.

New Mexico's economy is largely dependent on the export of raw materials and on federal government expenditures. All of New Mexico's major rivers except the Gila are dammed within the state, and irrigated farming is the most important form of agriculture. The sale of beef accounts for more than one-half of agricultural-marketing receipts, followed by milk and hay. Oil and natural gas are by far the most important mineral resources, but the state also produces much of the country's supply of potash and uranium. Food processing, petroleum refining, smelting, construction materials, and railroad maintenance are leading industrial activities. Basic research and testing in nuclear energy have provided for the development of offshoot industries such as ordnance, electronics, and precision instruments. Large tourist expenditures in the state are a result of the distinctive Indian and Hispanic cultures, the varied scenery afforded by the natural landscape, and sporting and recreational opportunities.

The historical atmosphere of New Mexico and its fusion of three cultures—Indian, Hispanic, and Anglo—is represented by its unique architecture. Attracting artists in all fields from many parts of the nation and the world, Taos was the first to have an important art community, but it is now rivaled by Santa Fe and Albuquerque. Local Indians produce high-quality pottery, blankets, and silver jewelry. Spanish music and folk art have been largely preserved, and the Spanish language is widely spoken. Higher education is led by the University of New Mexico, in Albuquerque, established in 1888. The National Park Service administers Carlsbad Caverns National Park and numerous national monuments and historic sites. Area 121,593 square miles (314,925 square km). Pop. (2000) 1,819,046.

New Milford, borough (town), Bergen county, northeastern New Jersey, U.S., immediately north of Hackensack on the east bank of the Hackensack River. Early Dutch settlers established a plantation-type farm called Vriesendael, which was pillaged by Delaware Indians in 1643. In 1675 David Demarest (or des Marest), a French Huguenot, and his sons received a land grant, which included the former farm area. Two years later they established the first permanent settlement. Their mill, known as Demarest Landing, became a shipping point for iron ore. The home of Demarest's son Samuel is preserved in replica near the Steuben House Museum; the house of another son, David, stands on River Road. The New Bridge Inn (1739) is still in operation.

Originally included in Palisades township (organized in the 1800s), the borough was established in 1922 when three small settlements—Peetzburg, New Milford Manor, and New Bridge—amalgamated and incorporated as New Milford. It is primarily a residential suburb of New York City. Pop. (2000) 16,400.

New Model Army, army formed in February 1645 that won the English Civil War for Parliament. When war broke out in 1642, Parliament had at its command the local militia, or trainbands, of those districts supporting its cause, notably London, the eastern counties, and southeast England. But militia were always unwilling to fight far from their homes, so in addition Parliament authorized (as did King Charles I) its prominent supporters to raise troops of horse and infantry companies from among their own tenants and associates. These private parliamentary armies were perhaps in better condition than those raised for the king, because Parliament provided for their pay; but strategically they were not effective because of the lack of unified command. Toward the end of 1644 a dispute about the conduct of the war developed between Henry Montagu, Earl of Manchester, one of the main parliamentary generals, and his lieutenant general, Oliver Cromwell. In December Cromwell argued in a major speech that the war would never be brought to a conclusion unless Parliament's military resources were improved. There was already some general feeling that members of Parliament holding military command might be tempted to prolong the war in order to continue their personal power. As a result, the New Model Army was brought into existence; it was planned to comprise 11 regiments of horse of 600 men each, 12 regiments of foot of 1,200 men each, and 1,000 dragoons (mounted infantrymen). The cavalry, always easier to raise, were mainly veterans drawn from the original armies of Manchester, the Earl of Essex, and Sir William Waller; the infantry included some veterans from the armies, with a majority of pressed men drawn from London, the east, and southeast. In April 1645, by the Self-Denying Ordinance, members of Parliament resigned all military and civil office and command acquired since November 1640. Sir Thomas Fairfax (afterward 3rd Baron Fairfax—the "younger" Fairfax) was appointed captain general of the New Model Army, with authority to appoint his senior officers. The army's organization and the thorough training of its men were accomplished by Fairfax, not Cromwell, who, despite the Self-Denying Ordinance, became his leader of horse just before the great parliamentary victory at Naseby (June 14, 1645). After Naseby the army was mainly occupied in sieges, but it obtained such political power that eventually its authority eclipsed that of Parliament. Under Cromwell it won Dunbar and Worcester, the great battles of the Commonwealth period, against Charles II and the Scots.

New Moon, Hebrew ROSH ḤODESH (Hebrew: "Head of the Month"), the start of the Hebrew month, a minor Jewish festival on which fasting and mourning are not allowed. The modern observance consists principally in preserving the ancient custom of reciting a blessing on the Sabbath preceding the New Moon and in singing or reciting an abbreviated form of the Hallel psalms on the New Moon itself. In Old Testament times, Jews visited the Temple of Jerusalem for a special sacrifice, held a family celebration, and generally abstained from business and work.

New Nationalism, in U.S. history, political philosophy of Theodore Roosevelt, an espousal of active federal intervention to promote social justice and the economic welfare of the underprivileged; its precepts were strongly influenced by Herbert Croly's *The Promise of American Life* (1910). Roosevelt used the phrase "New Nationalism" in a 1910 speech in which he attempted to reconcile the liberal and conservative wings of the Republican Party. Unsuccessful, he became a Progressive and went on to promulgate his ideas as that party's presidential candidate in the election of November 1912. His program called for a great increase of federal power to regulate interstate industry and a sweeping program of social reform designed to put human rights above property rights. With the Republican vote split, Roosevelt and his New Nationalism went down to defeat before Democratic candidate Woodrow Wilson and his New Freedom.

New Negro Movement (literature): *see* Harlem Renaissance.

New Norfolk, town, southern Tasmania, Australia, on the Derwent River. In 1807–08 the inhabitants of Norfolk Island in the South Pacific Ocean were resettled in the area, and in 1811 the town site was chosen by Governor Lachlan Macquarie and named Elizabeth Town after his wife. It was renamed in 1827 by the settlers for their earlier island home. New Norfolk was gazetted a shire in 1863. Linked to Hobart (14 miles [23 km] southeast) by rail and the Lyell Highway, the town serves a locale yielding most of the hops used for brewing in Australia, as well as apples, oats, and sheep. Since 1941 the principal local industry has been the production of the nation's newsprint. Australia's first fish hatchery, Salmon Ponds (1864), is located on the Plenty River. Historic buildings include Bush Inn (Australia's oldest licensed hotel; 1815) and St. Matthew's Church (1825). Pop. (1996) 5,286.

New Orleans, city, state of Louisiana, southeastern U.S. The state's largest city, New Orleans commands the mouth of the great Mississippi–Missouri river system; it has developed a solid economic base as a major port, tourist resort, and industrial, educational, and medical centre. Area city, 199 square miles (516 square km); metropolitan area, 1,907 square miles (4,938 square km). Pop. (2000) city, 484,674; New Orleans MSA, 1,337,726.

A brief treatment of New Orleans follows. For full treatment, *see* MACROPAEDIA: New Orleans.

New Orleans is coextensive with Orleans parish (county) and is the core of an expanding metropolitan area defined by the parishes of Orleans, St. Bernard, Jefferson, and St. Tammany. The city is divided by the Mississippi River, which flows from the west to its mouth 110 miles (180 km) southeast in the Gulf of Mexico; the principal settlement is on the east (left) bank. Lake Pontchartrain borders the city to the north. Because the city's terrain lies as low as 5 feet (1.5 m) below sea level and has an average rainfall of 57 inches (1,425 mm), a levee system and proper drainage have been important. New Orleans has a moderate climate, with an average summer temperature of 77° F (25° C) and a winter average of 60° F (16° C).

New Orleans is primarily a commercial centre, with manufacturing playing a secondary role in its economic life. The busy harbour is the foundation of the metropolitan economy. A 30-year plan (1970–2000), called Centroport U.S.A., attempted to switch much of the port's activities from the Mississippi River to wharves and industrial complexes along the Gulf, thereby freeing river frontage for residential and recreational development.

The New Orleans metropolitan area is a fast-growing industrial region. Major manufactures include food products; clothing and accessories; stone, clay, and glass articles; primary metal and fabricated metal items; and transportation equipment. In recent years the petrochemical industry has become important, but it has also been the source of serious water pollution. Major exports include grains, agricultural products, fabricated metals, chemicals, textiles, oils, petroleum products, tobacco, and paperboard.

The decision to found New Orleans was made in 1717, and work began the next year. The original city was located on the east bank of the Mississippi along a sharp bend of the river. On the west bank a section called Algiers arose, linked since 1958 to the east bank by the Greater New Orleans Bridge.

The Creole architecture of the Vieux Carré (French: "Old Square"), or French Quarter, creates the atmosphere of a foreign city, combining native architectural ingenuity with adaptations of French colonial traditions and West Indian Spanish colonial styles. Important sites include Jackson Square, the French Market, Royal Street, Bourbon Street, Preservation Hall, and Dixieland Hall. World-renowned Creole cuisine is featured in many of the city's restaurants.

The cultural life of New Orleans is a synthesis of contributions by both whites (of French, Spanish, Irish, German, and Italian descent) and blacks, who constitute nearly equal parts of the population. The black heritage is particularly rich; it was here that black musicians gave birth to a fusion of blues, dance tunes, and hymns that became known as New Orleans jazz. Another major attraction of the city is the festive celebrations of its winter carnival and Mardi Gras. Other attractions include the city's unique above-ground cemeteries, the Aquarium of the Americas, the Historic Voodoo Museum, and the Contemporary Arts Center. Among New Orleans' institutions of higher learning are Tulane University (1834) and its affiliated institutions.

The Mississippi River–Gulf Outlet, part of a system of channels and passages between the river and the Gulf, has shortened ship passage to the Gulf by 40 miles (64 km). Several railways operate out of New Orleans with direct connections to many cities. The international airport is located 12 miles (19 km) from the city.

New Orleans, Battle of (Jan. 8, 1815), U.S. victory against Great Britain in the War of 1812. In the autumn of 1814 a British fleet of more than 50 ships commanded by General Edward Pakenham sailed into the Gulf of Mexico and prepared to attack New Orleans, which is strategically located at the mouth of the Mississippi River. On December 1 General Andrew Jackson, commander of the U.S. Army of the Southwest, hastened to the defense of the city. Jackson's army of between 6,000 and 7,000 troops consisted chiefly of militiamen and volunteers from southern states. Because of slow communications, news of the peace treaty between Britain and the United States that had been signed at Ghent (Dec. 24, 1814) did not reach the United States in time to avert the battle, in which Jackson's troops fought against 7,500 British regulars who stormed their position on Jan. 8, 1815. So effective were the earthworks and the barricades of cotton bales with which the Americans had fortified their position that the fighting lasted only half an hour, ending in a decisive U.S. victory and a British withdrawal. British casualties numbered more than 2,000 (289 killed); American, only 71 (31 killed). News of the victory reached Washington, D.C., at the same time as that of the Treaty of Ghent and did much to raise the low morale of the capital. The Battle of New Orleans greatly enhanced the reputation of Jackson as a national hero.

New Orleans, Battle of (April 25, 1862), naval action by Union forces seeking to capture the city during the American Civil War. A Union naval squadron of 43 ships under Admiral David G. Farragut entered the lower Mississippi near New Orleans and soon breached the heavy chain cables that were stretched across the river as a prime defense. Realizing that resistance was useless, Confederate General Mansfield Lovell withdrew his 3,000 troops northward, and the city fell on April 25. On May 1 General B.F. Butler led 15,000 Union troops into the city to take command for the remainder of the war. The permanent loss of New Orleans was considered one of the worst disasters suffered by the Confederacy in the western theatre of the war.

New Orleans Race Riot (July 1866), after the American Civil War, incident of white violence directed against black urban dwellers in Louisiana; the event was influential in focusing public opinion in the North on the necessity of taking firmer measures to govern the South during Reconstruction. With the compliance of local civilian authorities and police, whites in late July killed 35 New Orleans black citizens and wounded more than 100. This race riot was similar to many others throughout the South and, together with the establishment of the highly restrictive black codes, helped win a commanding majority for the Radical Republicans and their vigorous Reconstruction policies in the November 1866 national elections.

New Orleans style, in music, the first method of group jazz improvisation. Developed near the turn of the 20th century, it was not recorded first in New Orleans but rather in Chicago, Los Angeles, and Richmond, Indiana. Divided by many experts into white (the Original Dixieland Jazz Band and the New Orleans Rhythm Kings, which first recorded in 1917 and 1922, respectively) and black (cornetist Joe "King" Oliver's Creole Jazz Band and Kid Ory's Spike's Seven Pods of Pepper Orchestra, which first recorded in 1923 and 1922, respectively), it is traditionally said to have placed great emphasis on collective improvisation, all musicians simultaneously playing mutual embellishments. This was the case in the first recordings, but a portion was also given to solos and accompaniment in which a single instrument, such as cornet, occupied the foreground while others, such as clarinet and trombone, played obbligato with combinations of guitar and/or banjo and/or piano chording insistently on almost every beat. Many journalists use the term New Orleans style to designate those black musicians who performed in Chicago between 1915 and the early 1930s after having left their native New Orleans. Aside from Oliver and Ory, the strongest of these players were trumpeter Louis Armstrong, clarinetist–soprano saxophonist Sidney Bechet, clarinetist Jimmie Noone, drummer Warren "Baby" Dodds, and his brother, clarinetist Johnny Dodds. Armstrong and Bechet, in particular, helped to move the emphasis away from ensemble improvisation to a focus on solo improvisation, anticipating the later Dixieland (*q.v.*) style.

Revivals of the pre-1920s style included one with trumpeter Bunk Johnson, a black New Orleans native who was rediscovered by two jazz historians in 1939 and who reactivated his career in the 1940s; and another at Preservation Hall, an organization in New Orleans that into the 1990s continued to present improvised combo music by men who had lived in New Orleans during the music's formative period. Samuel Charters' *Jazz: New Orleans 1885–1963* (1963) is a historical study. *See also* Chicago style.

New People's Army (NPA), military arm of the Communist Party of the Philippines, Marxist-Leninist (CPP-ML), which is a Communist organization dedicated to achieving power in the Philippines by means of revolutionary insurrection. The CPP-ML was originally a Maoist faction that broke away from the largely passive, Soviet-oriented Philippine Communist Party in 1968–69 and formed the New People's Army shortly afterward. The NPA soon began guerrilla warfare against the regime of President Ferdinand Marcos, assassinating government officials and ambushing army troops. It gradually increased its strength through the 1970s and '80s, growing from about 350 armed members in 1971 to more than 20,000 by the late 1980s. The NPA spread from its original base in northern Luzon to islands throughout the Philippine archipelago, fashioning a nationwide network of supporters in rural areas and later in major cities as well. By the late 1980s the NPA had become the chief threat to the elected government of President Corazon Aquino, with whom the NPA refused to come to a negotiated settlement.

New Philadelphia, city, seat (1808) of Tuscarawas county, east-central Ohio, U.S. It lies along the Tuscarawas River, adjacent to the city of Dover, 20 miles (32 km) south of Canton. It was founded in 1803 by John Knisely, a tavern keeper from York, Pa. Named for Philadelphia, Pa., the community developed after the American Civil War, when the utilization of large local coal and clay deposits spurred industrial development.

Manufactures include textile machinery, construction equipment, machine tools, ceramics, plastics, and industrial fans. The Tuscarawas Campus of Kent State University (1968) is in the city. Ohio's major flood-control and recreation project, the Muskingum Watershed Conservancy District, is headquartered in New Philadelphia. The nearby Zoar Village (now a state memorial) was a commercial settlement (1817–98) founded by German Separatists. Ohio's first village, Schoenbrunn Village (1772–98; now restored as a state memorial), lies a few miles southeast. Inc. town, 1833; city, 1883. Pop. (2000) 17,056.

New Plymouth, city ("district") and port, Taranaki local government region, western North Island, New Zealand. It lies along North Taranaki Bight at the base of Mount Egmont (Taranaki). The settlement was founded in 1841 by the New Plymouth Company under the auspices of the New Zealand Company. In time, land disputes between New Plymouth's English immigrants and the native Maoris built up to the open hostilities of the 1860 Taranaki War. The town was designated a borough in 1877 and a city in 1949.

New Plymouth is New Zealand's chief dairy centre. Its artificial harbour makes it a major port, importing cement, petroleum products, and fertilizer and exporting dairy products and meats, which are chiefly produced in the vicinity and processed within the city. New Plymouth, noted for its parks, lies close to Egmont National Park and is a resort centre. Pop. (1999 est.) urban area, 48,900; (2001) district, 66,165.

New Providence Island, principal island of The Bahamas, between Andros Island (west) and Eleuthera Island (east). With a length of 21 miles (34 km) and a width of 7 miles, the island is mostly flat, with swamps and several shallow lakes. Nassau, the chief city, is also the capital of The Bahamas. New Providence's name supposedly derives from a 16th-century governor's thanks to Divine Providence for surviving a shipwreck: the "New" was added later to avoid confusion with a pirate stronghold off British Honduras. The island was settled in the late 17th century with the establishment of several British forts. Agriculture and fishing are important factors in the local economy; the island's rum reaches an international market. A world-famous tourist area has developed around the city of Nassau. Pop. (2000) 210,832.

New Quebec (region, Canada): *see* Nouveau-Québec.

New Republic, The, weekly journal of opinion that was one of the most influential liberal magazines in the United States from its founding in 1914. The magazine was begun by Willard Straight with Herbert David Croly as its editor. The journal reflected the progressive movement and sought reforms in American government and society. Among its early editors or contributors were Randolph Bourne, Walter Lippmann, and Malcolm Cowley.

Early on, *The New Republic* supported the formation of labour unions, the eight-hour workday, and woman suffrage. It also supported President Woodrow Wilson's foreign policy during World War I but later broke with him and opposed the Versailles Treaty. The magazine declined in the 1920s, when its liberal viewpoint was out of favour, but it revived in the 1930s. After early opposing him, *The New Republic* ended up supporting President Franklin D. Roosevelt's administration and his New Deal. In 1946 Roosevelt's former vice president, Henry A. Wallace, became the journal's editor and moved it further to the left until he was forced to resign. *The New Republic* adhered to its liberal orientation from the 1950s through the '70s, but in the 1980s the magazine began displaying an array of editorial opinion and commentary that reflected the resurgence of conservatism in American political thought. *The New Republic* has remained an influential journal of political commentary and analysis.

New Republic Party, Afrikaans NUWE REPUBLIKEINSE PARTY (NRP), South African political party founded in 1977 as the direct successor to the United Party (*q.v.*), which had governed South Africa from 1934 to 1948 and served as the major opposition party from 1948 on.

The majority faction of the United Party, seeing its party disintegrating by defections to other new parties and to the ruling National Party, decided formally to disband the party on June 28, 1977. On the next day the group founded the New Republic Party. The new party then had a holdover of 23 seats in the House of Assembly; the next year, in the general elections, the representation dropped to 10 members. In the elections of 1981 the representation declined further, to eight seats. The party's position as the major liberal opposition to the National Party had decisively been yielded to the Progressive Federal Party.

Generally liberal on nonracial questions, the New Republic Party favours a new federation of races governed by a parliament controlled by whites but containing representatives from other racial groups.

New River, river formed by the junction of North and South forks in Ashe county, northwestern North Carolina, U.S. It flows north across Virginia into West Virginia and joins the Gauley River, there dammed for hydropower, after a course of 255 miles (410 km), to form the Kanawha River in south-central West Virginia. Near Radford, Va., the New River is dammed to form Clayton Lake (hydroelectricity), and near Hinton, W.Va., the Bluestone Dam impounds a large flood-control reservoir. The 1,700-foot (518-metre) steel arch span of the New River Gorge Bridge, completed in 1977 near Fayetteville, W.Va., is the world's longest.

New Rochelle, city, Westchester county, southeastern New York, U.S. It lies along Long Island Sound, just northeast of New York City. Founded in 1688 by a group of Huguenot refugees, it was named for La Rochelle in France. Its modern suburban-residential character is emphasized by parks, golf courses, and shoreline recreation facilities. There are a few local light industries producing electrical equipment, surgical instruments, and plumbing supplies. The Thomas Paine Monument (dedicated in 1899), the postcolonial Paine Cottage (now a museum), and the Paine Memorial House (erected in 1925) honour the revolutionary author, who lived in a farm cottage in the locality from 1804 to 1806. Fort Slocum, used as a military base from 1862 to 1966, on offshore David's Island, is now privately owned. The College of New Rochelle was founded in 1904 and Iona College in 1940. Inc. village, 1857; city, 1899. Pop. (2000) 72,182.

New Romney, town ("parish"), Shepway district, county of Kent, England. It was formerly one of the medieval Cinque Ports (*q.v.*) of the English Channel coast but is now more than a mile from the sea. It is surrounded by Romney Marsh, a level tract built up largely in historic times by the silting of a former inlet. The marsh has been reclaimed to form very rich grazing for the summer fattening of a distinctive local breed of sheep. The River Rother once entered the sea at New Romney but changed its course in 1287, and the gradual accretion of land behind the shingle spit of Dungeness brought about the decline, as ports, of New Romney, Winchelsea, and Rye. Before 1563 the Brodhull, or annual assembly of the Cinque Ports, was held at New Romney. The town's old buildings still provide evidence of its former dignity and wealth, and many records of the Cinque Ports are kept in the town hall. Pop. (1991) 8,340.

New St. Mary (Florence): *see* Santa Maria Novella.

New St. Peter's Basilica: *see* Saint Peter's Basilica.

New Sarum (England): *see* Salisbury.

New School for Social Research, private coeducational institution of higher learning in New York City. The New School was established in 1919 as an informal centre for adult education, and it soon became the first American university to specialize in the continuing higher education of adults. The school received its charter in 1934, and that same year it established a graduate faculty of political and social science that was staffed mainly by refugee academics from Nazi Germany.

The New School now consists of the aforementioned graduate faculty, which grants advanced degrees in the social sciences; a division for adult education; a graduate school of management; a liberal-arts college; and the Parsons School of Design, a New York City-based art and design college that merged with the New School in 1970.

New Scotland Yard: *see* Scotland Yard.

New Shoreham, town, Rhode Island, U.S., coextensive with Block Island (*q.v.*).

New Siberian Islands, Russian NOVOSIBIRSKYE OSTROVA, archipelago, northeastern Russia, lying north of eastern Siberia in the Arctic Ocean, and dividing the Laptev Sea to the west from the East Siberian Sea to the east. It is separated from the Siberian mainland by Dmitry Laptev Strait.

The archipelago is administratively part of Yakutiya. The area of the islands is about 14,500 square miles (38,000 square km). The New Siberian Islands consist of three groups: to the south the Lyakhovskye Islands, separated by Sannikova Strait from the New Siberian Islands proper, and to the northeast the small De Long Islands. The New Siberian Islands proper consist of the large islands of Novaya Sibir, Belkovsky, Kotelny, and Faddeyevsky. Between the last two lies Bunge Island, a low sandy plain occasionally inundated by the sea.

The New Siberian Islands do not rise above 1,227 feet (374 m). The climate is severe and typically Arctic, with snow covering the ground for over nine months of the year. The vegetation is poor tundra, even bushes being absent, and there is much swamp and barren sand. Fauna include the Arctic fox, northern deer, and lemming, with an abundant bird life in summer.

New Smyrna Beach, city, Volusia county, northeastern Florida, U.S. It lies 14 miles (23 km) south of Daytona Beach, on the Atlantic coast, there bisected by the Hillsborough River (lagoon).

The site, once occupied by the Indian village of Caparaco and the Spanish mission of Atocuimi (1696), was colonized in 1767 by a mixed immigrant group of Greeks, Minorcans, and Italians led by Andrew Turnbull, a Scottish physician, who named the place New Smyrna for his wife's Turkish birthplace. Because of Revolutionary strife, the colony was abandoned in 1777 but not before sugarcane and indigo were planted and a system of irrigation-and-drainage canals was built. In 1803 settlement was renewed with land grants. Under the stimulus of the Florida East Coast Railway and the Atlantic Intracoastal Waterway, it developed as a processing and distribution point for citrus, farm produce, and seafood (especially shrimp). Tourism, boating, and sport fishing became economic assets, and in 1937, reflecting the white, sandy shore, "Beach" was added to the city's name. Industrial parks were subsequently established. New Smyrna Sugar Mill Historic Memorial (1830) is immediately west, and Canaveral National Seashore runs southward for 25 miles (40 km). Inc. town, 1887; city, 1903. Pop. (2000) 20,048.

New South Wales, state of southeastern Australia, occupying both coastal mountain and interior tableland parts of the continent. It is bounded by the Pacific Ocean to the east and the states of Victoria to the south, South Australia to the west, and Queensland to the north. It has an area of 309,433 square miles (801,428 square km).

A brief treatment of New South Wales follows. For full treatment, *see* MACROPAEDIA: Australia.

Physical and human geography. New South Wales is Australia's focal point of commercial farming, industry, and culture. Its dominant geographic feature is the Great Dividing Range, which separates the narrow coastal strip from the great plains to the west. The coastal strip varies from less than 10 to more than 50 miles (16 to 80 km) in width and is bounded along its entire length by a natural barrier of steep mountains and beyond them by a series of high plateaus, or tablelands, which slope gently to the west. The plains cover nearly two-thirds of the state. With the exception of the coastal strip, a great deal of New South Wales is naturally fertile, but agricultural potential is severely limited by inadequate and uncertain rainfall.

The natural vegetation ranges from the dense semitropical forest of the northeastern coast to the sparse plant life of the western plains. About a fifth of the state is forested, and a much larger area is covered with bush and shrub. The rich bird life includes many species of parrot and cockatoo, the flightless emu, the mound-building scrub turkey, and the mallee bird. Most of the species of marsupials (mammals that do not develop a placenta but carry their young in an external pouch) are represented. They include the wombat, the koala, the common and ring-tailed possum, the common and long-nosed bandicoot, and a variety of kangaroos and wallabies. Several species of poisonous snakes are found throughout the state.

Nearly two-thirds of the population of New South Wales is of British origin, many of Irish descent. Most of the rest are of southern European or Asian origin. Aborigines make up about 2 percent of the population.

The rural economy can be divided into four regions. The coastal strip is mostly used for dairy farming, the tablelands for sheep and cattle raising, and their western slopes for wheat cultivation. The plains are the sites of the great sheep stations, for more than 100 years the cornerstone of the state's economy. They still provide about a third of Australia's wool. The tenure of landholdings in New South Wales is mostly either freehold or leasehold from the Crown. Tenancy, as understood in Europe, is uncommon, and, except in the Western Division, most land is occupied by its owners. About three-fifths of the acreage under crops is devoted to wheat. Oats, corn (maize), and rice are also grown. Wine is produced in the Hunter Valley. New South Wales is economically the most important state of Australia in terms of livestock, timber, minerals, and manufactured goods.

The most developed mineral resource is coal, which is found in the central coastal area. Other mineral resources include silver, lead, zinc, copper, tin, and rutile. New South Wales is the most important timber-producing state, accounting for about half of Australia's production. Tuna fishing is the most important marine fishery.

New South Wales's economy is, like Australia's, essentially a developed private-enterprise economy, although the state government owns and manages the railways, some coal mines, and the production of electricity.

The state parliament is bicameral, and voting for the Legislative Assembly is compulsory. The three principal political parties are the Liberal, the Country, and the Australian Labor parties. The state has an Industrial Commission to settle industrial disputes, although the Australian Conciliation and Arbitration Commission (a national body) has become predominant.

New South Wales's capital, Sydney, has the oldest of Australia's symphony orchestras, housed in the Sydney Opera House (opened 1973). The Art Gallery of New South Wales has the best collection of Australian painting in Australia.

History. Originally, the name New South Wales was applied to the entire eastern third of Australia after the British explorer Captain James Cook claimed the territory for the British crown in 1770. New South Wales was gradually reduced to its present area as new territories were carved out: Tasmania, South Australia, Victoria, and Queensland (proclaimed in the 19th century), and the Australian Capital Territory. First settlement of the eastern coast consisted strictly of convicts and their jailers. By about 1815 other settlers had begun to arrive, attracted by the prospect of pastoral industry. Wool and fisheries products were exported to England, and New South Wales began to develop rapidly. The Aboriginal population that had inhabited the region was ravaged by disease and massacred for resistance to encroachment upon the land. The independent colony became an Australian state with the establishment of a Commonwealth government in 1901. Pop. (1991 prelim.) 5,731,926.

New South Wales, Art Gallery of, in Sydney, Australia, government-maintained art museum founded in 1874 with a grant from the state government. A new extension opened in 1972. The original resolution establishing the gallery authorized buying in London and in Sydney, and English 19th-century paintings and contemporary British art are particularly well represented. The museum has supported Australian artists since its foundation, and consequently it has one of the best collections of Australian art in the world.

New South Wales Corps (1789–1818), British military force formed for service in the convict colony of New South Wales; it figured prominently in the early history of Australia. With the arrival of the corps in 1790–92, the colony gained a new dynamic force: officers and soldiers received land grants, becoming soldier-settlers; many officers became involved in business ventures, most notably the rum trade; and the ranks of the corps also provided the colony with explorers, surveyors, and scholars. From the time of the departure of the colony's first governor, Arthur Phillip, in December 1792, until the arrival of Governor John Hunter in September 1795, the colony was administered by the commanding officer of the corps, first Francis Grose and then William Paterson. It was then that the officers' economic activity advanced fastest. The corps asserted itself in a different way by putting down the 1804 rebellion of Irish convicts (the Castle Hill Rising). The officer in charge of this operation, Major George Johnston, was later among the leaders of the corps' 1808 Rum Rebellion against the administration of Governor William Bligh, the celebrated victim of the earlier *Bounty* mutiny. Relations had long been strained with Bligh, who had accused the corps of corruption and ineptitude. After deposing him on Jan. 26, 1808, the corps controlled the colony until the arrival of Governor Lachlan Macquarie at the end of 1809. In the course of 1809, the name of the corps was changed to the 102nd Regiment of the Line as a preliminary to its recall to England. In May 1810 half of the regiment accepted reassignment, while the rest chose to remain in Australia and joined either the 73rd Regiment or the Veteran Corps. The 102nd Regiment subsequently saw service in the War of 1812 against the United States, was renumbered the 100th Regiment, and was disbanded in 1818.

New Spain, Viceroyalty of, Spanish VIRREINATO DE NUEVA ESPAÑA, the first of the four viceroyalties that Spain created to govern its conquered lands in the New World. Established in 1535, it initially included all land north of the Isthmus of Panama under Spanish control. This later came to include upper and lower California, the area that is now the central and southwestern portion of the United States, and territory eastward along the Gulf of Mexico to Florida. The viceroyalty of New Spain was also charged with governing Spain's Caribbean possessions. Later, in 1565, the newly conquered Philippines were placed under the jurisdiction of New Spain.

Although technically superior in governing authority, the viceroy in New Spain was hampered in practice from exerting that authority by the considerable independence of governors and royal *audiencias* in many of the subordinate areas. His power was largely confined to central and southern Mexico—from San Luis Potosí, Zacatecas, and Culiacán in the north to the Isthmus of Tehuantepec in the south. Within this territory, the viceroys of New Spain succeeded in converting the native population to Christianity, developing an array of educational institutions, and overseeing an economy based almost entirely on mining and ranching. During the first 100 years of Spanish rule, the Indian population of New Spain declined from an estimated 25 million to 1 million as a result of maltreatment, disease, and disruption of their cultures.

The first viceroy in New Spain was Antonio de Mendoza, who ruled from 1535 to 1549, then served as viceroy of Peru, where he died after one year in office. In New Spain, he dispatched Francisco Coronado on his expedition northward while ameliorating some of the worst abuses of the conquistadores. He supported the church in its work with the native population.

After a period of decline in the late 17th and early 18th centuries, the Viceroyalty of New Spain took on new life when refreshed by two distinguished men: Antonio Maria de Bucareli (1771–79) and Juan Vicente de Güemes Pacheco de Padilla, 2nd Count de Revillagigedo (1789–94); the latter was the last able viceroy in New Spain.

The Viceroyalty of New Spain managed to survive the early attempts at Mexican independence led by Miguel Hidalgo and José María Morelos. But it succumbed to the coalition forged by Agustín de Iturbide in 1821. Central America, which had been loosely joined to Mexico in the Viceroyalty of New Spain, was briefly annexed by the newly independent Mexican nation. In 1823, however, the people of Central America went their own way upon the overthrow of Iturbide's empire.

Consult the INDEX *first*

New Statesman, political and literary weekly magazine published in London, probably England's best-known political weekly, and one of the world's leading journals of opinion. It was founded in 1913 by Sidney and Beatrice Webb. He was a Fabian Socialist and she his political and literary partner, and their journal reflected their views, becoming politically an independent socialist forum for serious intellectual discussion, political commentary, and criticism. The magazine is famous for its aggressive and often satirical analysis of the British and world political scenes. Its contributors are drawn from among the most distinguished writers in Britain; as a result, its political commentary, cultural articles and critical reviews of the arts, and also its "Letters to the Editor" page, are known for their elegance and wit.

New Stone Age: *see* Neolithic Period.

New Style calendar: *see* Gregorian calendar.

New Sweden, only Swedish colony in America, established by the New Sweden Company in March 1638 and captured by the Dutch in 1655. The first expedition, including both Swedes and Dutchmen, was commanded by Peter Minuit, who purchased land from the Indians and named the settlement Fort Christina (later Wilmington, Del.) in honour of Sweden's queen. Johan Printz, who became governor in 1643, established additional settlements during his 10-year rule and attempted to deal with the Dutch, who considered the Swedes competitors and interlopers. He was succeeded in 1654 by Johan Claesson Rising, who arrived with more colonists and forced the Dutch to surrender Fort Casimir. The next year a Dutch force under Peter Stuyvesant laid siege to Fort Christina and compelled New Sweden's surrender. The Swedish colonists were allowed, however, to keep their lands and possessions and continue their customs.

New Territories, part of Hong Kong (*q.v.*), a special administrative region of China. It comprises an area of 373 square miles (966 square km) north of Kowloon Peninsula from Mirs Bay on the east to Deep Bay, an inlet of the Pearl River estuary, on the west and includes Lantau (Lantao) and other islands. Although much of the terrain is mountainous, the valleys are among the colony's most productive farmland. Since the 1950s residential and industrial development has spread into the area north of Kowloon city. The New Territories were leased to Great Britain from China in 1898 for 99 years. Pop. (1981) 1,304,000.

New Testament, second, later, and smaller of the two major divisions of the Christian Bible, and the portion that is canonical (authoritative) only to Christianity.

A brief treatment of the New Testatment follows. For full treatment, *see* MACROPAEDIA: Biblical Literature and Its Critical Interpretation.

Christians see in the New Testament the fulfillment of the promise of the Old Testament. It relates and interprets the new covenant, represented in the life and death of Jesus, between God and the followers of the Christ. Like the Old Testament it contains a variety of kinds of writing. Among its 27 books are selected recollections of the life and acts and sayings of Jesus in the four Gospels; a historical narrative of the first years of the Christian Church in Acts of the Apostles; Epistles or letters of advice, instruction, admonition, and exhortation to local groups of Christians—14 attributed to Paul, one (Hebrews) probably in error, and seven by three other authors; and an apocalyptic description of the intervention of God in history, the Book of Revelation.

The books are not arranged chronologically in the New Testament. The Epistles of Paul, for example, which address the immediate problems of local churches shortly after Christ's death, are considered to be the earliest texts. The books are instead arranged in a more logical narrative order, the Gospels telling the life of Jesus and his teachings; the Acts detailing the work of Christ's followers in propagating the Christian faith; the Epistles teaching the meaning and implications of the faith; and Revelation prophesying future events and the culmination of the divine purpose.

The setting of the New Testament within the Christian community is one factor that makes a biography of Jesus or a history of the 1st-century church difficult or impossible. The books of the New Testament were composed not in order to satisfy historical curiosity about the events they recount but to bear witness to a faith in the action of God through these events. A history of the New Testament is made difficult by the relatively short time span covered by its books when compared with the millennium and more of history described by the Old Testament. There is less historical information in the New Testament than in the Old, and many historical facts about the church in the 1st century therefore must be arrived at by inference from statements in one of the Gospels or Epistles. *See also* Gospel, or individual books by title; *compare* Old Testament.

New Thought, a mind-healing movement that originated in the United States in the 19th century, based on religious and metaphysical (concerning the nature of ultimate reality) presuppositions. The diversity of views and styles of life represented in various New Thought groups are difficult to describe because of their variety, and the same reason makes it virtually impossible to determine either membership or adherents. The influence of the various New Thought groups has been spread by its leaders through lectures, journals, and books not only in the United States but also in the United Kingdom, Europe, Asia, Africa, and Australia. Many adherents of New Thought consider themselves to be Christian, though generalizations about their relations to Christianity have been questioned.

Origins. The origins of New Thought may be traced to a dissatisfaction on the part of many persons with scientific empiricism and their reaction to the religious skepticism of the 17th and 18th centuries. The romanticism and idealism of the 19th century also influenced the New Thought movement, of which Phineas P. Quimby (1802–66) is usually cited as the earliest proponent. A native of Portland, Maine, Quimby practiced mesmerism (hypnotism) and developed his concepts of mental and spiritual healing and health based on the view that illness is a matter of the mind. Quimby's influence may be seen in the writings of Mary Baker Eddy and in the development of Christian Science (which she founded), although Mrs. Eddy retracted acknowledgment of dependence on her teacher. Quimby's influence was readily acknowledged by others. Warren F. Evans (1817–89), a Methodist and then a Swedenborgian minister (leader of a theosophical movement based on the teachings of the 18th-century Swedish scientist and theologian Emanuel Swedenborg), published a number of works exploring and systematizing the ideas of Quimby. These included *Mental Cure* (1869), *Mental Medicine* (1872), and *Soul and Body* (1876).

Julius Dresser (1838–93) was a popular lecturer who emphasized the theories of Quimby, and his son Horatio (1866–1954) spread the elder Dresser's teachings and later edited *The Quimby Manuscripts* (1921).

New Thought teachings and practices. Elements of New Thought may be traced to Platonism, based on the Idealism of the 5th–4th-century-BC Greek philosopher Plato, who held that the realm of ideas is more real than that of matter; to Swedenborgianism, especially Swedenborg's view that the material realm is one of effects whose causes are spiritual and whose purpose is divine; to Hegelianism, based on the views of the 18th–19th-century German philosopher G.W.F. Hegel, especially those concerning the external world, mental phenomena, and the nervous organism as the meeting ground of the body and the mind; to Orientalism, involving spiritual teachings of Eastern religions (*e.g.,* Hinduism); and, particularly, to the Transcendentalism (a form of Idealism) of the 19th-century American philosopher and poet Ralph Waldo Emerson.

Though it is difficult to summarize New Thought beliefs, since they are so varied and to so large a degree individualistic, it is possible to summarize some of the more prevalent views. As far as Christian Science is concerned, New Thought adherents do not accept Mary Baker Eddy's teaching or any other formulation as the final revelation. Rather, truth is viewed as a matter of continuing revelation, and no one leader or institution can declare with finality what is the nature of truth.

Moreover, New Thought does not oppose medical science, as Mrs. Eddy did, and it is essentially positive and optimistic about life and its outcome.

In 1916 the International New Thought Alliance (formed 1914) agreed upon a purpose that embraces some central ideas of most groups:

> To teach the Infinitude of the Supreme One; the Divinity of Man and his Infinite Possibilities through the creative power of constructive thinking and obedience to the voice of the indwelling Presence which is our source of Inspiration, Power, Health and Prosperity.

In 1917, at the St. Louis (Missouri) Congress, the alliance adopted a "Declaration of Principles." It was modified in 1919 and was printed in *New Thought* until revised in the 1950s.

This purpose and these principles emphasized the immanence of God, the divine nature of man, the immediate availability of God's power to man, the spiritual character of the universe, and the fact that sin, human disorders, and human disease are basically matters of incorrect thinking. Moreover, according to New Thought, man can live in oneness with God in love, truth, peace, health, and plenty. Many New Thought groups emphasize Jesus as teacher and healer and proclaim his kingdom as being within a person. Reference to Jesus or the Christ is totally omitted in the principles, however, as revised in 1954. New Thought leaders—unlike Quimby, it should be noted—have increasingly stressed material prosperity as one result of New Thought.

New Thought implies a kind of monism, or view of the oneness of the world, but it also has strong Gnostic (*i.e.,* dualistic, matter being opposed to spirit) undertones; that is, though New Thought is open to all, spiritual healing and strength of mind and body are available only to those who have the insights and who have been initiated into the movement at some point. There are no established patterns of worship, although the services often involve explication of New Thought ideas, testimony to healing, and prayer for the sick.

New Tōkaidō Line, high-speed rail line between Tokyo and Osaka that comprises the first segment of the Shinkansen Line (*q.v.*).

new town, a form of urban planning designed to relocate populations away from large cities by grouping homes, hospitals, industry and cultural, recreational, and shopping centres to form entirely new, relatively autonomous communities. The first new towns were proposed in Great Britain in the New Towns Act of 1946; between 1947 and 1950, 12 were designated in England and Wales and 2 in Scotland, each with its own development corporation financed by the government. The new towns were located in relatively undeveloped sites. Each was to have an admixture of population so as to give it a balanced social life. Proposed ultimate population figures of this first group of new towns ranged from 29,000 to 140,000. After 1961, target population figures for proposed new towns rose to 70,000 to 250,000.

The idea of new towns found favour in many other countries, notably in the United States, various countries of western Europe, and Soviet Siberia.

The chief criticism of new towns has been that they may be too static in conception. In Sweden, for example, a master plan prepared in 1952 envisaged establishing around the periphery of Stockholm some 18 communities, each with its own residences, places of employment, and shopping and cultural facilities. What was not satisfactorily anticipated in the plans, however, was the dramatic increase in commuting and other forms of personal mobility that obviated the need for the new towns to be so self-contained. Of the 27,000 wage earners in the suburb of Vallingby, for instance, 25,000 were found to be commuting out, half of them to the centre of Stockholm; in fact, Vallingby's own industries were drawing in commuters from outside.

New Ulm, city, seat of Brown County, southern Minnesota, U.S., on the Minnesota River, near the mouth of the Cottonwood, 75 mi (121 km) south of Minneapolis. Founded in 1854 by German immigrants, it was named for Ulm in Württemberg. The town was almost destroyed in the Sioux uprising of 1862; the Defenders' Monument next to the courthouse square commemorates the event. Overlooking the city on a bluff is a 102-ft (31-m) bronze statue (*c.* 1898) honouring Hermann (Arminius), a German tribal leader who inflicted a major defeat on the Romans at the Teutoburg Forest in AD 9. Dr. Martin Luther College dates from 1884. New Ulm's economy is based on agriculture (food processing), augmented by light manufacturing (chiefly electronic equipment and plastics). Nearby is Flandrau State Park and Ft. Ridgely (1854).

Building in traditional Germanic style, New Ulm, Minn.

Milt and Joan Mann from CameraMann

Inc. village, 1857; city, 1876. Pop. (1992 est.) 13,446.

New Wave, French NOUVELLE VAGUE, the style of a number of highly individualistic French film directors of the late 1950s. Preeminent among New Wave directors were Louis Malle, Claude Chabrol, François Truffaut, Alain Resnais, and Jean-Luc Godard, most of whom were associated with the film magazine *Cahiers du Cinéma,* the publication that popularized the auteur theory in the 1950s. The theory held that certain directors so dominated their films that they were virtually the authors of the film.

Films by New Wave directors were often characterized by a fresh brilliance of technique that was thought to have overshadowed their subject matter. An example occurs in Godard's *Breathless* (1960), in which scenes change in rapid sequence ("jump cuts") to create a jerky and disconnected effect. Although it was never clearly defined as a movement, the New Wave stimulated discussion about the cinema and helped demonstrate that films could achieve commercial along with artistic success. *See also* auteur theory.

New Westminster, city, southwestern British Columbia, Canada, on the Fraser River estuary, in the southeastern part of Vancouver metropolitan area. Founded in 1859 on a site chosen by Colonel Richard C. Moody, it was called Queensborough until renamed at the suggestion of Queen Victoria. New Westminster was the capital of colonial British Columbia (1859–66) and the province's first (1860) incorporated city. It was the scene of a disastrous fire in 1898.

New Westminster is one of western Canada's busiest ports, a major rail junction, and one of the province's largest industrial and marketing centres. Known for the manufacture of forest products, New Westminster also has other industries, including food processing (fruit and vegetables), distilling, brewing, shipbuilding, and oil refining. Pop. (1991) 43,586.

New Windsor (England): *see* Windsor.

New Windsor, town ("township"), Orange county, southeastern New York, U.S., on the Hudson River, immediately south of Newburgh. The old village, New Windsor Center (named for Windsor, Eng.), was laid out in 1749, and the town was established in 1763. George Clinton, first governor of New York, and his nephew De Witt Clinton were born there, at Little Britain. The New Windsor Cantonment, great winter camp of the Continental Army, has been reconstructed as a state historic site. There, at Temple Hill, George Washington ended a conspiracy among his officers and also established the Badge of Military Merit (forerunner of the Purple Heart). Pop. (1992 est.) 23,100.

New World monkey, also called PLATYRRHINE, any of certain anthropoid primates of the New World, as distinguished from the Old World forms (catarrhines). The term, in use since about 1812, covers the members of the families Callitrichidae (marmosets and tamarins) and Cebidae (capuchins, spider monkeys, and others). Characteristics include large, broadly separated nostrils; three premolars in each half of each jaw; relatively unopposable thumbs; and long, sometimes prehensile, tails.

New Year festival, any of numerous religious, social, and cultural observances worldwide celebrating the commencement of the New Year. Such festivals, which are among the oldest and most universally observed, generally include rites and ceremonies expressive of mortification, purgation, invigoration, and jubilation over life's renewal. This renewal is the essence of the New Year. It is, to varying degrees of explicitness in world cultures, a remembrance or repetition of the creation of the cosmos on the symbolic anniversary of its creation, in order that the gods, the cosmos, and the community may be strengthened.

The earliest-known record of a New Year's festival dates from about 2000 BC in Mesopotamia, where the New Year (Akitu) commenced with the new moon nearest the spring equinox (mid-March; Babylonia) or nearest the autumn equinox (mid-September; Assyria). The year began for the Egyptians, Phoenicians, and Persians with the autumn equinox (September 21) and for the Greeks, until the 5th century BC, with the winter solstice (December 21). By the Roman republican calendar the year began on March 1; after 153 BC the official date was January 1, and this was confirmed by the Julian calendar (46 BC).

In the Jewish religious calendar the year begins with the first day of the month of Tishri (September 6–October 5; Rosh Hashana [*q.v.*]). In early medieval times most of Christian Europe regarded March 25 (Annunciation Day) as the beginning of the year, though for Anglo-Saxon England New Year's Day was December 25. William the Conqueror decreed that the year start on January 1, but, later, England began its year with the rest of Christendom on March 25. January 1 was restored as New Year's Day by the Gregorian calendar (1582), immediately adopted by Roman Catholic countries. Other countries slowly followed suit: Scotland, 1660; Germany and Denmark, about 1700; England, 1752; Sweden, 1753; and Russia, 1918. Observances of the secular New Year in the West vary regionally but typically entail the preparation of a customary meal (as "hoppin' John," a dish of peas and rice, in the U.S. South) and the making of personal resolutions for the coming year.

Most Eastern New Year festivals retain a distinctly religious character. In Dravidian southern India, the Tamil New Year is celebrated at winter solstice with the three-day Poṅgal festival, marked by religious pilgrimages and the ritual boiling of new rice. In Bangladesh the New Year is marked by the worship of the Ganges.

Pre-Buddhist indigenous and Hindu influences are prominent in Southeast Asian festivals. In Thailand, Trut, or New Year (March/April), is of a mixed character. Buddhist monks exorcise ghosts from the vicinity and are presented with gifts. Oblations are made to various gods of Hindu origin. As people meet, water is playfully thrown by one on the other. Gambling, usually frowned upon, is permitted for the three-day festival.

Chinese New Year is celebrated officially for a month beginning in late January or early February. It is preceded by an expulsion of demons and by theatrical performances. Offerings are made to gods of hearth and wealth and to ancestors. Tibetans observe the New Year in February with feasting, visiting, and a relaxation of monastic discipline.

The celebration of the New Year on January 1–3 is the most popular annual festival in Japan. In some rural districts it continues to be observed according to the lunar-solar calendar on dates varying between January 20 and February 19, and the traditions connected with the festival confirm its original connection with the coming of spring and a time of rebirth. The festival is called in Japanese Ganjitsu ("Original Day"), signifying the beginning of the new year, and also Shōgatsu ("Standard Month"), referring to the belief that the good or bad fortune met with during the first few days of the new year may be taken as representative of the fortune for the entire coming year.

The Japanese festival is customarily celebrated with ceremonial housecleaning, feasting, and exchanging visits and gifts. The house gateway or entrance is often hung with a *shimenawa* (a sacred rope made of rice straw) to keep out evil spirits and decorated with fern, bitter orange, and lobster, signifying good fortune, prosperity, and longevity. Foods special to the holidays are *mochi* (cakes of rice paste) and *zoni* (a soup of vegetables and *mochi*). Traditional amusements are shuttlecock and *utagaruta,* a card game that involves matching lines of 100 poems.

Other Japanese observances—once widespread but now diminished—included, early on the first day, visits to Shintō shrines of the tutelary deities or to Buddhist temples. On the second day, arts and crafts were ritually recommenced. On the seventh day, a rice gruel containing seven purifying herbs was traditionally served and the decorations removed.

new-year's gift (plant): *see* winter aconite.

New York, constituent state of the United States of America, one of the Middle Atlantic states, lying in the eastern United States, bounded on the north by Lake Ontario and the Canadian provinces of Ontario and Quebec, on the east by Vermont, Massachusetts, and Connecticut, on the extreme southeast by the Atlantic Ocean, on the south by New Jersey and Pennsylvania, and on the west by Pennsylvania, Lakes Erie and Ontario, and the Canadian province of Ontario. The state capital is Albany on the Hudson River.

A brief treatment of New York follows. For full treatment, *see* MACROPAEDIA: United States of America: *New York.*

Two major groupings of Indians originally inhabited New York: the Algonquian-speaking Mohegan and Munsee, and the Iroquois confederacy of the Mohawk, Oneida, Onondaga, Cayuga, and Seneca. These Iroquois tribes sided with the British during the French and Indian War (1756–63).

New York was first settled as a colony of the Netherlands following the explorations (1609) of Henry Hudson on the river that bears his name. The Dutch founded Fort Orange (present-day Albany) in 1624 and New Amsterdam in 1625. The British took control of New Amsterdam in 1664 and renamed it New York.

The French defeat in 1763 encouraged New Englanders to settle in New York, and by the time of the American Revolution, its population was 163,000. Many of the Revolution's battles were fought in New York, including the important battle at Saratoga. New York was the 11th state to ratify the U.S. Constitution. By 1810 New York had grown to be the most populous state and was already the manufacturing, trade, and transportation centre of the country.

New York is divided into a number of physiographic regions, the largest of which is the Appalachian Highlands, covering half of the state and extending westward from the Hudson River valley to the state's southern and western boundaries. Within this region can be found the Catskill Mountains, the Finger Lakes, and the Delaware River basin. The Hudson-Mohawk Lowland follows the Hudson River to Albany (north) and then the Mohawk River to the west. A plateaulike region known as the Erie-Ontario Lowlands lies to the north of the Appalachian Highlands and west of the Mohawk valley. It extends along the southern shores of the Great Lakes. East of it lie the Adirondack Mountains, an ancient upland structurally distinct from the Appalachian Highlands to its south.

The state generally has warm summers and cold winters. A tendency to cloudiness across the state results in few completely clear days. Rainfall and snow produce a range of precipitation from 32 to 45 inches (810 to 1,140 mm) a year. The Catskills receive the greatest amount of precipitation, while the Erie-Ontario Lowlands receive the least. The regions east of Buffalo and Watertown receive an unusually heavy amount of snowfall.

New York was the nation's most populous state until the early 1960s, when it was overtaken by California. Since the colonial period, much of New York's growth has resulted from immigration funneled through the port of New York City, and even in the late 20th century millions of New Yorkers were foreign-born. Blacks comprised more than one-sixth of the total population and Hispanic persons more than one-eighth. Of the state's significant Puerto Rican minority, most live in New York City. New York was one of the few states that lost population between 1970 and 1980, and during the same period New York City's population declined by more than 10 percent. Subsequently, the state's population again increased, however, and the density of population has remained high.

New York had the largest economic output of any state in the union until the later 20th century. Its great economic strength arose from several factors, among them the commercial supremacy of New York City and its busy harbour, the state's access to the shipping lanes of the Great Lakes, and its role as a vital transportation link between the Atlantic coast and the Midwest.

New York ranked first among the states in manufacturing from 1830 to 1970, when it was surpassed by California. The manufacturing sector has continued to shrink since then, but the state remains high nationwide for total value added by manufacture. Buffalo is strong in many heavy industries, Rochester in photographic and optical equipment, and Syracuse and Utica-Rome in machinery, electronic equipment, and primary metals.

The state's economy is now dominated by services, and these are concentrated in New York City, which remains the chief financial centre of the United States. New York City is home to many corporate headquarters and to the major American stock exchanges. Its economy also relies on wholesale and retail trade, printing and publishing, advertising, government, education, insurance, television production, and tourism. Livestock, poultry, and dairy products are the major components of New York state's farm income. The main crops are hay, corn (maize), apples, grapes, and potatoes. Important minerals are stone, sand and gravel, zinc, and salt.

The Hudson-Mohawk Lowland has always been a major transportation artery for the state. Those rivers were the basis of the Erie Canal and the later New York State Barge Canal System. Through their valleys ran the New York Central Railroad to Buffalo and Chicago, and the New York State Thruway was built on the same course. The interstate port of New York and New Jersey is the largest centre for shipping in the United States. The New York City metropolitan area, served by three international airports, is one of the country's main points of entry. The state has an extensive network of highways, roads, and streets and is well served by railways.

New York City is also the nation's chief cultural centre, and many trends in fashion, theatre, television, and music emanate from it. New York City has long been one of the most important world centres of the print and broadcast news media. It is the seat of the United Nations. Cultural and related activities are not confined to New York City, however. Buffalo and Rochester have well-known art museums and outstanding symphony orchestras. The Eastman School of Music at Rochester is internationally known. The National Baseball Hall of Fame and Museum is in Cooperstown. Educational opportunities are plentiful. The State University of New York (est. 1948) is one of the most comprehensive educational organizations in the world. Area 53,013 square miles (137,304 square km). Pop. (2000) 18,976,457.

New York, State University of (SUNY), state-supported system of higher education established in 1948 with about 66 campuses located throughout the state of New York. SUNY was officially organized more than 150 years after the state legislature, in its first session (1784) after the American Revolutionary War, proposed a state university modeled after the French system—*i.e.,* a multi-institutional system with central administrative control. A Board of Regents was named to administer King's College (later renamed Columbia University), then the state's only college, and to start new colleges. But the regents were unable to get the new system started, and in 1787 control of Columbia was given over to its own board of trustees.

Until after World War II, the regents supported higher education by dispensing state scholarship funds and working closely with private colleges to establish educational policy. After the war it became apparent that existing universities did not have enough places to accommodate veterans and minority groups, who pressured the state to establish a free state-university system. In 1948 the state legislature approved a system that incorporated some existing schools and called for the construction of new colleges in underserved areas. A board of trustees was established to administer the system, replacing the regents in this role.

The system now includes university centres at Albany, Binghamton, Buffalo (the main centre for graduate work), and Stony Brook, 13 university colleges, 4 health sciences centres, 4 specialized colleges, 5 statutory colleges on the campuses of private universities, 6 colleges of technology, and more than 30 community colleges. The university colleges, or colleges of arts and sciences, include Empire State College in Saratoga Springs and SUNY branch campuses at Brockport, Buffalo, Cortland, Fredonia, Geneseo, New Paltz, Old Westbury, Oneonta, Oswego, Plattsburgh, Potsdam, and Purchase. The medical, or health science, centres are at Brooklyn, Buffalo, Stony Brook, and Syracuse. Total enrollment in the state university system exceeds 400,000 students.

New York Botanical Garden, one of the leading centres of botanical research and floristics in the United States. The 250-acre (101-hectare) garden, located in Bronx Park, New York City, has a plant collection consisting of about 12,000 species from almost every part of the world. Many of the specimens are displayed throughout the year in a conservatory that covers nearly 1 acre (0.5 hectare). Outdoor exhibits include a pristine 40-acre woodland, a rock garden, and a garden of native plants, as well as special collections of conifers, lilacs, and magnolias. Also located at the garden is one of the largest botanical libraries in the country and an herbarium of 5,700,000 dried reference specimens. Varied educational programs, some involving the use of these facilities, are offered to the public.

The New York Botanical Garden was founded in 1891, largely through the efforts of Nathaniel Lord Britton, a professor of botany at Columbia University. It was opened to the public in 1900. As the garden's first director, Britton initiated a program of botanical exploration that continues today, with studies being conducted in South America, especially the rainforests of the Atlantic Coast of Brazil and of the foothills of the Andes Mountains, and occasionally in other continents. In 1971 the garden acquired a large tract of land 70 miles (110 km) north of the city, for the establishment of the Mary Flagler Cary Arboretum. At the turn of the 21st century, the garden invested millions of dollars to expand its facilities as a state-of-the-art research centre.

New York Central Railroad Company, one of the major American railroads that connected the East Coast with the interior. Founded in 1853, it was a consolidation of 10 small railroads that paralleled the Erie Canal between Albany and Buffalo; the earliest was the Mohawk and Hudson, New York state's first railway, which opened in 1831.

The New York Central's moving spirit was Erastus Corning (1794–1872), four times mayor of Albany, who for 20 years had been president of the Utica and Schenectady, one of the consolidated roads. He served as president of the New York Central until 1864. In 1867 Cornelius Vanderbilt won control, after beating down the Central's stock, and combined it with his New York and Hudson railroads running from Manhattan to Albany.

Vanderbilt joined it to the Lake Shore and Michigan Southern Railway in 1873, extending his system from Buffalo to Chicago. He added the Michigan Central in 1871. Under his son William, the Central acquired the New York, West Shore, and Buffalo Railroad on the west side of the Hudson River in 1885. The system grew until it had 10,000 miles (16,090 km) of track linking New York with Boston, Montreal, Chicago, and St. Louis.

After World War II the New York Central began to decline. Between 1946 and 1958 it dropped four of its six fast daily passenger runs between New York and Chicago. Efforts to merge with its chief competitor, the also ailing Pennsylvania Railroad Company, culminated in 1968 with the creation of the Penn Central Transportation Company—a merger that later included the New York, New Haven and Hartford Railroad, in 1969. The new colossus had 21,000 miles (33,790 km) of track. Its creators hoped to achieve a division of labour, sending freight to New York and New England north along the New York Central's water-level route while the Pennsylvania main tracks served the industrial needs of Philadelphia, Baltimore, and the Delaware and Schuylkill valleys. The merger failed, however, and the new road was forced into bankruptcy in June 1970. Passenger services were taken over by the federally established National Railroad Passenger Corporation (Amtrak) in 1971. The company's other railroad assets were merged with five other lines in Consolidated Rail Corporation (Conrail) in April 1976, although the New York–Washington route was later transferred to Amtrak.

New York City, city and port located at the mouth of the Hudson River, southeastern New York state, northeastern U.S. New York

City is the centre of the largest urban agglomeration in the United States. It occupies Manhattan and Staten islands, the western end of Long Island, a portion of the mainland, and various islands in New York Harbor and Long Island Sound. Its urban area extends into neighbouring parts of New York, New Jersey, and Connecticut.

A brief treatment of New York City follows. For full treatment, *see* MACROPAEDIA: New York City.

The city consists of five boroughs (Manhattan, Brooklyn, Queens, the Bronx, and Staten Island [formerly Richmond]), which correspond to five counties of New York state (New York, Kings, Queens, Bronx, and Richmond, respectively). All are located near the point where the Hudson River empties into Upper New York Bay of the Atlantic Ocean. The city's only land boundaries are Westchester county on the north and Nassau county on Long Island to the east. The city's waterfront is used for shipping and recreation.

New York City is an ethnic melting pot where the most dramatic cultural contrasts are commonplace. It is among the most geographically and demographically complex of world cities, its economy one of the most diverse, and its cultural scene among the richest and most variegated.

The city may be described as a collection of many neighbourhoods, each with its own character and life-style. Manhattan is the economic and cultural heart of the city and is often considered to be "the city." Administration and services, however, have become increasingly decentralized as community planning boards have assumed more power in areas such as education, health, housing, and public works. Manhattan, the magnet for tourists and businessmen, is at first glance a city of skyscrapers, glaring lights, and frenetic pace. The shopping promenade of Fifth Avenue, the financial institutions of Wall Street, the residential mansions of Park Avenue, or the bohemian sections of the East Village and SoHo give typical impressions. Of the other boroughs, only Brooklyn has a similar ethnic heterogeneity and a similar range of social life, with commercial and industrial districts and residential areas ranging from the wealth of Brooklyn Heights to the poverty of parts of Bedford-Stuyvesant. Queens is mainly residential and middle class, and Staten Island is partly suburban but still rural in some areas. In the Bronx luxurious residences and solid middle-class apartments prevail in some sections, but other areas, especially the South Bronx, were once the scene of severe urban blight.

Ethnic pockets abound throughout Manhattan, from black and Spanish Harlem in the north to the various enclaves of the Lower East Side such as Little Italy and Chinatown. New York City has large numbers of Italians, Irish, Puerto Ricans, Asians, and West Indians, as well as the largest Jewish population of any city in the world. This ethnic and racial mix is the result of the waves of immigration that the city has absorbed during its history. The Statue of Liberty, located on Liberty Island off Manhattan, has long stood as a symbol of refuge and opportunity.

New York City is a centre of world trade and finance, communications, art and entertainment, and fashion. The city is the financial capital of the United States and holds the headquarters of many of the world's largest corporations. Wall Street in Manhattan is home to the nation's largest stock exchange and is the headquarters of the country's largest brokerage firms. With the headquarters of the nation's television and radio networks and the main offices of the largest advertising agencies, New York City is the heart of the mass media in the United States. Printing and publishing are important, and most of the nation's major publishing houses are based in midtown Manhattan. The city's economic life also depends on the diversity of its numerous small businesses and manufacturing establishments.

Service industries account for the greatest share of employment. The main nonmanufacturing employers include wholesale and retail trades; finance, insurance, and real estate; transport and public utilities; government; and construction. Wearing apparel, symbolized by New York City's famous garment district, is its major manufacturing industry. Other manufactures include chemicals and chemical products, electronic equipment, processed food, textiles, and fabricated metal products.

In the 1990s, New York City's financial stability grew, owing largely to a sustained boom on Wall Street. The city itself showed signs of invigoration, as seen in the transformation of Times Square from a seedy, crime-ridden district to a cleaned-up corporate mecca for tourists. The city's reduced crime rates received widespread recognition, as did revitalization projects such as the restoration of Grand Central Station.

The artists of New York City exhibit in a wide variety of forms, ranging from traditional crafts to the most avant-garde work, flavoured by complex blends of ethnic and national influences. Theatrical arts and entertainment are also important: Broadway is the synonym for musicals; Carnegie Hall is one of the most famous concert halls in the world; and the Lincoln Center for the Performing Arts is the home of the Metropolitan Opera, the New York City Opera, the New York Philharmonic, and the New York City Ballet. Though the importance of Broadway has declined, theatre is very much alive in the more venturesome Off-Broadway and Off-Off-Broadway productions. The city has numerous motion-picture theatres, among which are many revival and foreign-film houses.

The New York Public Library is one of the best research libraries in the world. Most famous among the city's many museums are the Metropolitan Museum of Art, the Museum of Modern Art, the Solomon R. Guggenheim Museum, the Whitney Museum of American Art, and the American Museum of Natural History. Many smaller museums house special collections. Art galleries featuring the work of the world's top artists are spread throughout the city, with enclaves in SoHo and Chelsea. The city's extensive system of public parks includes Central Park in Manhattan.

New York City has an extensive public university system. Outstanding private colleges and universities include Columbia, New York, Rockefeller, and Fordham universities, many medical schools, the New School for Social Research, and the Juilliard School.

New York City's subway system carries some 3.5 million of the mass-transit passengers in the metropolitan area, with the balance served by buses and commuter rail lines. The once-famous docks of Hell's Kitchen along the Hudson River in Manhattan have disappeared, and considerable shipping has shifted to the New Jersey side of the harbour. Rail lines radiate in all directions. International and domestic air service is provided by Kennedy, La Guardia, and Newark (New Jersey) international airports.

In 2001 the city was rocked by the September 11 attacks (*q.v.*), which destroyed the World Trade Center and killed some 2,800 people. Area city, 304 square miles (787 square km); metropolitan area, 1,384 square miles (3,585 square km). Pop. (2000) city, 8,008,278; New York PMSA, 9,314,235; New York–Northern New Jersey–Long Island CMSA, 21,199,865.

New York City Ballet, resident ballet company of the New York State Theatre at the Lincoln Center for the Performing Arts. The company, first named Ballet Society, was founded in 1946 by the choreographer George Balanchine (artistic director) and Lincoln Kirstein (general director) as a private subscription organization to promote lyric theatre. It is a descendant of the American Ballet company. In 1948 Ballet Society gave its first public performance at the Center Theater of the New York City Center of Music and Drama and changed the company's name to the New York City Ballet. From 1950 its prestige grew with foreign tours. It was moved to its present home in 1964. The company performs during summer sessions at the Saratoga Performing Arts Center in Saratoga, N.Y.

In addition to ballets choreographed by Balanchine, the company performed works by the choreographers Jerome Robbins (ballet master 1969–90), William Dollar, Todd Bolender, Francisco Moncion, Lew Christensen, and Sir Frederick Ashton. Its principal dancers have included Maria Tallchief, Tanaquil LeClercq, Melissa Hayden, Patricia Wilde, Violette Verdy, Suzanne Farrell, Gelsey Kirkland, Patricia McBride, Helene Alexopoulos, André Eglevsky, Jacques d'Amboise, Edward Villella, and Peter Martins.

After the death of Balanchine in 1983, Robbins and Peter Martins shared the responsibilities of ballet master. Robbins retired in 1990, and Martins continued in his charge.

New York Daily News, morning daily tabloid newspaper published in New York City, often the newspaper with the largest circulation in the United States.

The *New York Daily News* was the first successful tabloid newspaper in the United States. It was founded in 1919 as the *Illustrated Daily News* by Joseph Medill Patterson and was a subsidiary of the Tribune Company of Chicago. After a few months the paper changed its name to the *Daily News.* The *Daily News* attracted readers with its sensational coverage of crime, scandal, and violence, its lurid photographs, and its entertainment features. By 1930 its circulation had risen to 1,520,000; it reached 2,000,000 in the next decade.

The *New York Daily News* found abundant subject matter in the United States of the 1920s. Like other popular dailies, it gave prominence to political scandals. The paper devoted much attention to its photography; it was an early user of the Associated Press wirephoto service in the 1930s and developed a large staff of skilled photographers. In spite of strikes, rising production costs, and an unsuccessful attempt at an afternoon edition, the *Daily News* has continued to have one of the highest circulation rates in the United States.

New York Herald, American daily newspaper published from 1835 to 1924 in New York City. It was one of the first papers created in the penny-press movement and is often cited as the beginning of American journalism.

The *Herald* was founded by James Gordon Bennett, who pioneered aggressive methods of gathering news: he developed the interview as a reporting technique, hired foreign correspondents, and used the telegraph and carrier pigeons to speed the delivery of information. The *Herald* covered subjects that had not previously been considered newsworthy or had been inadequately reported, such as finance, sports, foreign events, society affairs, and the theatre. Bennett had an instinct for what interested the public, and under his direction the *Herald* developed a style of reporting that was sensational, high-spirited, and often sardonic, cynical, or malicious. The *Herald* had a larger staff and published more news than any other paper in the city.

His son, James Gordon Bennett, Jr., became managing editor in 1866, and he took over as editor the following year. The younger Bennett, although he was also a gifted editor and promoter, dissipated much of the

Herald's resources with his lavish living in Paris and London, running the *Herald* largely in absentia. He founded a Paris edition and otherwise contributed much to the paper's strengths, but when he died in 1918 he had extracted tens of millions of dollars from its earnings for his own comfort, and the paper was losing money when Frank Munsey bought it from the estate.

Munsey's intent was to build up the *Herald* by merging the morning edition of the *New York Sun* and the *New York Tribune* into it. He proceeded with the *Sun* maneuver, but the proprietors of the *Tribune,* Ogden and Helen Rogers Reid, rejected his offers for years, and finally he sold the *Herald* to them. In 1924 the *Herald* thus disappeared into the *New York Herald-Tribune,* which was a voice of moderate Republicanism and competent journalism for the next four decades. The paper began to decline after Ogden Reid's death in 1947, however, and after a protracted period of financial difficulties, it was shut down in 1966. It was survived by the onetime *Paris Herald* as the *International Herald-Tribune*.

New York Island (Kiribati): *see* Teraina Atoll.

New York, New Haven and Hartford Railroad Company, American railroad operating in southern New England and New York. It was absorbed by the Penn Central Transportation Company in 1969.

It was built up from about 125 small railroads, the earliest of which began operation in 1834 as the Hartford and New Haven Railroad. In 1872 the New York and New Haven Railroad Company joined with the Hartford and New Haven to form the New York, New Haven and Hartford. Eventually it had 1,800 miles (2,900 km) of main track.

The company electrified its track between New York and New Haven between 1907 and 1914; this was the first electrification of a main rail line in the United States. The opening of the Connecticut Turnpike in 1959 cut heavily into its revenues, and in 1961 it entered bankruptcy proceedings.

In 1969 the railroad merged with the Penn Central Transportation Company, which had been formed the previous year by the merger of the New York Central Railroad Company and the Pennsylvania Railroad Company. The Penn Central entered bankruptcy only two years later, however. Its passenger services were taken over by the federally established National Railway Passenger Corporation (Amtrak) in 1971, and its other railroad assets were merged with five other lines in the Consolidated Rail Corporation (*q.v.;* Conrail) in 1976.

New York Public Library (NYPL), one of the great libraries of the world and the largest city public library in the United States. It was established in 1895 through the consolidation of the privately endowed Lenox and Astor libraries and the $2,000,000 Tilden Foundation trust. The library's central building at 42nd Street and Fifth Avenue in New York City opened to the public in 1911. The still privately funded Research Libraries, plus 83 branch libraries augmented by bookmobiles, constitute the library, which contains more than 10,000,000 books and more than 10,000,000 manuscripts, as well as large collections of pictures, maps, books for the blind, films, and microfilms. Among the NYPL's special holdings are the Berg Collection of English and American literature, rare books and manuscripts from the 15th to the 20th century; and the Manuscripts and Archives Division, which includes, among other things, the H.L. Mencken papers and George Washington's farewell address, in his own hand.

New York school, those painters who participated in the development of contemporary art from the early 1940s in or around New York City. During and after World War II, leadership in avant-garde art shifted from war-torn Europe to New York, and the New York school maintained a dominant position in world art into the 1980s. Abstract Expressionism, the most important art movement to emerge after World War II, Minimal art, Pop art, and new realist styles of the late 1960s, among others, all had their beginnings in New York. *See also* Abstract Expressionism; Action painting; minimalism; Pop art.

New York State Canal System, also called BARGE CANAL, 520-mile- (837-kilometre-) system of state-owned, state-operated waterways linking the Hudson River with Lake Erie, with extensions to Lakes Ontario, Champlain, Cayuga, and Seneca. It incorporates the Erie Canal (*q.v.*), from Troy via Rochester to Tonawanda, north of Buffalo; the Champlain Canal, which joins the Erie Canal at Waterford and extends north to Whitehall; the Oswego Canal, which connects the Erie Canal at Three River Point (just north of Syracuse) and enters Lake Ontario at Oswego; and the Cayuga and Seneca lakes, connecting these at Montezuma with the Erie Canal. It can accommodate barges 300 feet (91 m) long, 43.5 feet (13 m) wide, with a draft of 12 feet (3.6 m) and a cargo capacity of 2,200 tons (2,000 metric tons). Authorized in 1903, it was completed in 1918. By the 1980s commercial shipping had declined through competition from pipeline, rail, and road transport. The system's popularity grew as a recreational attraction, however, aided by a major restoration program begun in the 1990s.

An extension of the Barge Canal, near Rochester, N.Y.
Milt and Joan Mann from CameraMann

New York Stock Exchange (NYSE), world's largest marketplace for securities. The exchange evolved from a meeting of 24 men under a buttonwood tree in 1792 on what is now Wall Street in New York City. It was formally constituted as the New York Stock and Exchange Board in 1817. The present name was adopted in 1863. Membership, limited to 1,366 since 1953, is obtained by purchasing (since 1868) a seat from an existing member.

Greater commercial activity in the United States after the War of 1812 and speculation in railroad stocks in the 1830s increased demand for capital and stimulated trading at the exchange. After the Civil War, the exchange provided the capital for the accelerating industrialization of the United States.

After the Panic of 1837, when many investors suffered heavy losses, the exchange began to demand that companies disclose to the public information about their finances as a condition of offering stock. The Stock Market Crash of 1929, which signaled the start of the Great Depression, led to investigation by the federal government and regulation by the Securities and Exchange Commission.

To be listed on the NYSE, a corporation must have aggregate pretax earnings of $6,500,000 over the previous three years and at least 1,100,000 shares of stock outstanding, give common shareholders voting rights, and publish periodic financial statements. A shift from fractional to decimal pricing occurred in 2001.

New York Sun, daily newspaper published from 1833 to 1950 in New York City, long one of the most influential of American newspapers. The *Sun* was the first successful penny daily newspaper in the United States.

The *New York Sun* was founded by a New York City printer, Benjamin H. Day, as a four-page half-tabloid sheet. Its reports of police-court activities and its witty treatment of news made it a success, and only the *Sun* and the *New York Herald* survived from a crowd of 30 or more new penny papers. In 1868 Charles A. Dana purchased the *Sun* and became its editor, a post he retained until his death 29 years later. He introduced a clear style of journalism, carefully retained the humorous touch that was the paper's early hallmark, and occasionally used a sensational approach to scandalous news. Under his guidance the *Sun* became increasingly conservative in its editorial stance, but within eight years the paper's circulation had tripled, reaching 130,000.

In 1887 the *Sun* introduced an immediately successful evening edition. The morning *Sun* and the *Evening Sun* were sold to Frank A. Munsey in 1916, and the morning edition was merged with Munsey's *New York Press.* In 1920 Munsey closed the morning *Sun,* and the *Evening Sun* was renamed simply *The Sun*. Munsey bought the *New York Globe* and merged it into *The Sun* in order to give it a membership in the Associated Press. The *Sun* continued to publish until 1950, when it was sold to the Scripps-Howard group and was merged into the *New York World-Telegram*.

New York Times, The, morning daily newspaper published in New York City, long the newspaper of record in the United States and one of the world's great newspapers. Its strength is in its editorial excellence; it has never been the largest newspaper in terms of circulation.

The *Times* was established in 1851 as a penny paper that would avoid sensationalism and report the news in a restrained and objective fashion. It enjoyed early success as its editors set a pattern for the future by appealing to a cultured, intellectual readership instead of a mass audience. But its high moral tone was no asset in the heated competition of other papers for readers in New York City. Despite price increases, The *Times* was losing $1,000 a week when Adolph Simon Ochs bought it in 1896.

Ochs built the *Times* into an internationally respected daily. Aided by an editor he hired away from the *New York Sun,* Carr Van Anda, Ochs placed greater stress than ever on full reporting of the news of the day, maintained and emphasized existing good coverage of international news, eliminated fiction from the paper, added a Sunday magazine section, and reduced the paper's newsstand price back to a penny. The paper's imaginative and risky exploitation of all available resources to report every aspect of the sinking of the *Titanic* in April 1912 greatly enhanced its prestige. In its coverage of two world wars the *Times* continued to enhance its reputation for excellence in world news.

In 1971 the *Times* became the centre of controversy when it published a series of reports based on the "Pentagon Papers," a secret government study of U.S. involvement in the Vietnam War that had been covertly given to the *Times* by government officials. The U.S. Supreme Court found that the publication was protected by the freedom-of-the-press clause in the First Amendment of the U.S. Constitution. Later in the 1970s the paper, under Adolph Ochs's grandson, Arthur Ochs

Sulzberger, introduced sweeping changes in the organization of the newspaper and its staff and brought out a national edition transmitted by satellite to regional printing plants.

New York University, private institution of higher learning that includes 13 schools, colleges, and divisions at five major centres in the borough of Manhattan in New York City. It was founded in 1831 as the University of the City of New York. Its school of law was established in 1835 and the school of medicine in 1841. A graduate school of pedagogy was added in 1890, becoming an important centre for the teaching of education. The university's present name was adopted in 1894.

New York University now consists of an undergraduate college of arts and sciences and a graduate school of arts and sciences; a school of business offering both undergraduate and graduate programs; a graduate school of public service (administration); a school of education, including health, nursing, and the arts; a school of medicine; a postgraduate medical school; a college of dentistry; a law school; a school of social work; a school of the arts, with training in the performing and visual arts; and a school of continuing education. The university's Gallatin School of Individualized Study was organized in 1972 to provide opportunities for earning degrees through innovative study programs.

New York World, daily newspaper published in New York City from 1860 to 1931, a colourful and vocal influence in American journalism in its various manifestations under different owners.

It was established in 1860 as a penny paper with a basically religious orientation. It supported U.S. President Abraham Lincoln's prosecution of the American Civil War and his other policies, but it lost money, was sold to a consortium of New York City Democrats, and turned abruptly on Lincoln after the Emancipation Proclamation of Jan. 1, 1863. The paper was shut down by federal authorities for two days in 1864 for publishing a fabricated report indicating that the North would draft 400,000 more men for the Union armies. In 1868 the paper published a statistical and historical annual, the *World Almanac,* which long survived the *World* itself.

In 1883 the *World* was purchased by Joseph Pulitzer (1847–1911) and became increasingly flamboyant, particularly its Sunday edition under the editorship of Arthur Brisbane. The *World* played a major role in whipping up the jingoistic spirit that led the United States into the Spanish-American War. The paper's bombast was tempered somewhat after Brisbane moved on and Pulitzer died and was succeeded by his son Joseph Pulitzer II.

The *World* was known for its numerous outstanding reporters, columnists, editors, and cartoonists. By 1930 the paper's circulation had declined after a price increase, and heavy losses induced young Pulitzer to sell the paper to the Scripps-Howard chain. In 1931 the *World* was combined with the *New York Evening Telegram* (founded 1867) to become the *New York World-Telegram.* (The latter lasted until 1966; another merger creation, the *New York World-Journal-Tribune,* lasted less than a year, closing in 1967.)

New York Zoological Park: *see* Bronx Zoo.

New Yorker, The, American weekly magazine, famous for its varied literary fare and humour. The founder, Harold Ross, published the first issue on Feb. 21, 1925, and was the magazine's editor until his death in December 1951. *The New Yorker*'s initial focus was on New York City's amusements and social and cultural life, but the magazine gradually acquired a broader scope that encompassed literature, current affairs, and other topics. *The New Yorker* became renowned for its short fiction, essays, foreign reportage, and probing biographical studies, as well as its comic drawings and its detailed reviews of cinema, books, theatre, and other arts. The magazine offered a blend of reportage and commentary, short stories and poetry, reviews, and humour to a sophisticated, well-educated, liberal audience.

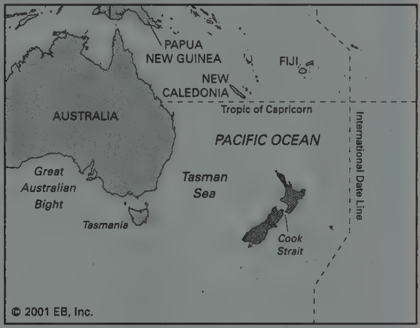
The New Yorker's contributors have included such well-known literary figures as S.J. Perelman, Robert Benchley, Ogden Nash, Wolcott Gibbs, E.B. White, John O'Hara, Edmund Wilson, J.D. Salinger, John Updike, Rebecca West, Dorothy Parker, and Pauline Kael. Among its great cartoonists have been Charles Addams, Helen Hokinson, George Price, James Thurber (a writer as well), Roz Chast, and Rea Irvin, who was the magazine's first art director and the creator of Eustace Tilley, the early American dandy who appeared on the cover of the first issue and on annual covers thereafter.

In 1985 *The New Yorker* was sold to the publisher Samuel I. Newhouse, Jr., this being the first time in its history that the magazine's ownership had changed hands. William Shawn was the magazine's editor in chief from 1952 to 1987, when he was succeeded by Robert Gottlieb, formerly a book editor and executive at Alfred A. Knopf publishers. In 1992 a Briton, Tina Brown, formerly editor of *Vanity Fair,* replaced Gottlieb, and she was succeeded, in 1998, by David Remnick, a staff writer at the magazine.

New Zealand, Maori AOTEAROA, an island nation in the South Pacific Ocean lying about 1,000 miles (1,600 km) southeast of Australia. New Zealand has two main islands—the North and South, separated by the 20-mile- (32-kilometre-) wide Cook Strait—and a number of small islands. The capital is Wellington. Area 104,454 square miles (270,534 square km). Pop. (2000 est.) 3,835,000.

A brief treatment of New Zealand follows. For full treatment, *see* MACROPAEDIA: New Zealand.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.



New Zealand

The land. North Island and South Island are both bisected by mountains in the south and by ranges of hills in the north. The North Island is about 18 percent mountainous, and the South Island is 70 percent mountainous. The Southern Alps, a 300-mile- (480-kilometre-) long chain of folded mountains in the western part of South Island, contain New Zealand's highest point, Mount Cook (12,349 feet [3,764 m]), and 22 other peaks are above 10,000 feet (3,000 m). Pastoral conditions created by the rain-shadow effect of the Southern Alps enable large-scale sheep ranches to produce much of New Zealand's fine wools, particularly from Merino sheep. The hills in the eastern part of South Island seldom exceed 6,000 feet (1,800 m) in elevation and descend to the Canterbury Plains; relief is also lower in the northern hill country. The North Island, much less precipitous than the South, has a central region consisting of the Volcanic Plateau and its surrounding hill country, where sheep and dairy farming are important activities. Parts of the plateau are forested, and there are some subtropical forests on the North Auckland Peninsula.

Most of New Zealand's rivers are short and swift-flowing and are important for hydroelectric-power production; the longest is the Waikato (264 miles [425 km]) in the North Island. The soils are mostly clays and are generally poor for agricultural use, though pockets of fertile alluvial soils are found in many valley bottoms. New Zealand is subject to frequent earthquakes and active volcanism.

Rainfall is fairly reliable and abundant, ranging generally from 25 to 60 inches (635 to 1,525 mm) annually. Mean annual temperatures at sea level vary from 59° F (15° C) in the far north to 48° F (9° C) in the far south. The average seasonal and diurnal temperature range is about 18° F (10° C).

New Zealand's forests, once covering some two-thirds of the country, have shrunk to less than one-third, although reforestation efforts have been undertaken. Lizards, frogs, and bats are the only indigenous land animals; red deer, Australian opossum, rabbits, and various domestic animals have been introduced by European settlers. There is a great variety of birdlife, including the flightless kiwi and weka. Many species of fish (tuna, snapper, cod, and flounder) are found off the coast.

Minerals are not of great economic importance in New Zealand, although coal, iron sands, and gold are found in commercial quantities. Renewable energy resources (hydroelectricity and geothermal power in particular) have played a major part in New Zealand's economic development.

The people. The principal ethnic element of New Zealand's population (about four-fifths) is of European origin (mostly British); Maori, the indigenous Polynesian inhabitants, constitute about one-seventh, while Pacific Islanders, Chinese, and Indians constitute the remainder. English and Maori are the official languages. Anglicans are the largest religious group, followed by Roman Catholics and Presbyterians, although more than one-fourth of the population does not claim any religious affiliation.

New Zealand's population is growing at a relatively low annual rate. Birth and death rates are moderate, health standards are excellent, and life expectancy is relatively high at 78 years for females and 75 for males. Five-sixths of the population lives in urban areas, and most migration within the country takes place between urban areas. Christchurch is the largest city on the South Island. On the more populous North Island, the largest cities include Manukau, Auckland, and Wellington.

The economy. New Zealand has a developed market economy largely based on agriculture, small-scale industries, and services. Economic growth has been kept low by dependence on imported fuels and capital and consumer goods. The gross national product (GNP) per capita is within the range of those of the developed countries of the world.

Agriculture accounts for approximately 5 percent of the gross domestic product (GDP) and employs less than 10 percent of the work force. Farming is highly scientific, and the marketing of butter, cheese, meat, wool, apples, pears, and certain other agricultural commodities is controlled by various boards. Agricultural commodities are New Zealand's chief exports. Pastures cover about half of the total land area, but arable land constitutes only about 2 percent.

Sheep raising dominates agriculture and is highly productive; the nation's sheep population (nearly 50 million) vastly exceeds the number of people. Cattle are also important. Meat, wool, butter, and cheese are largely exported.

The production of wheat meets domestic demand. Barley, corn (maize), peas, and potatoes are grown mainly for domestic consumption, while Chinese gooseberries (kiwi fruit), apples, and pears are produced for export. Forestry is an important source of foreign exchange, particularly the export of coniferous sawed logs, timber, and wood pulp.

There has been much growth in the fishing industry, spurred largely by increases in finfish exports. In 1978 New Zealand claimed an economic zone that extends up to 200 nautical miles (370 km) offshore.

Mining accounts for a tiny percentage of the GDP. Much of the natural gas produced by New Zealand is used by power stations to generate electricity. Crude oil is available from several fields in the Taranaki Peninsula. More than three million tons of coal are also mined annually, and small quantities are exported.

Manufacturing accounts for a shrinking one-fifth of the GDP and employs a slightly smaller proportion of the workforce. Industries tend to be small-scale and produce chiefly for the domestic market. Costs of production are usually much higher than those in other industrialized countries. Electricity is generated mainly by hydroelectric stations, but there are also several large geothermal plants, as well as conventional thermal generating stations.

Government and social conditions. New Zealand is an independent, democratic state within the Commonwealth. It has no formal written constitution. Ceremonial executive power is vested in the British monarch, who is represented in New Zealand by a governor-general. Legislative power is exercised by a unicameral House of Representatives (Parliament), the members of which are elected to terms of three years. The party holding the majority of seats forms the government. Executive power is vested in the policy-making cabinet headed by the prime minister, who is also the leader of the majority party. The governor-general is appointed to a five-year term. Among other ceremonial duties, the governor-general must give royal assent to bills passed by Parliament before they officially become law. The two major political parties are the National Party and the Labour Party, though there are several smaller parties. New Zealand's legal code includes certain statutes passed by the British Parliament before 1947 and usually follows the precedents of English law. The Court of Appeal is the highest appeal court in the country.

Social services account for more than one-third of the total government expenditures. New Zealand's comprehensive welfare system provides benefits for sickness, maternity, old age, disability, widowhood, orphanhood, unemployment, and emergencies. Hospitalization in public institutions is free. Health facilities are well staffed and accessible. Most of the country's housing has been built since 1955. State agencies provide limited financial assistance toward home purchases or subsidized rental accommodation for those with low incomes.

The country's literacy rate is nearly 100 percent. Education is compulsory between the ages of 6 and 16. Following six years of primary school, students attend secondary schools that offer a broad general academic education. Higher education is offered at state institutions.

Newspapers maintain high standards of reporting and comprehensive coverage. Television and radio are supervised by the state-supported Television New Zealand Ltd. and Radio New Zealand Ltd., respectively. A wide range of programming is offered, much of it produced locally.

Cultural life. The cultural milieu of New Zealand is predominantly European, although a revival of the Maori people's distinct artistic and cultural traditions is taking place; in addition, a number of immigrant Pacific Islanders continue their own traditional practices. Maori artistic expression, except for decorative design, was completely oral before the arrival of Europeans, and a great deal has been lost. New songs and chants are being written in Maori, however, as well as some poetry and prose.

New Zealand's artists and writers have evolved from explaining the unique history of the country, as exemplified by the work of Katherine Mansfield, to creating works of personal analysis and introspection. The works of Janet Frame are probably best known to world audiences. Government funding is necessary to support the opera and ballet companies; there is, however, a lively amateur dramatic tradition throughout the country. The national orchestra is completely supported by the government. The film industry has achieved modest international recognition. Sports are the main leisure-time occupation, with widespread participation in most major sports, particularly rugby football, track and field, and horse racing. New Zealand boats won the America's Cup yachting race in 1995 and 2000.

History. Polynesian occupation of New Zealand dates to at least AD 1000 and probably two or three centuries earlier. During the late Polynesian period of the 18th century, an estimated 100,000 to 200,000 Maori inhabited the main islands.

Prime ministers of New Zealand*

	party	term
Henry Sewell		1856
William Fox (*1st time*)		1856
Edward William Stafford (*1st time*)		1856–61
William Fox (*2nd time*)		1861–62
Alfred Domett		1862–63
Frederick Whitaker (*1st time*)		1863–64
Frederick Aloysius Weld		1864–65
Edward William Stafford (*2nd time*)		1865–69
William Fox (*3rd time*)		1869–72
Edward William Stafford (*3rd time*)		1872
George Marsden Waterhouse		1872–73
William Fox (*4th time*)		1873
Julius Vogel (from 1875, Sir Julius Vogel) (*1st time*)		1873–75
Daniel Pollen		1875–76
Sir Julius Vogel (*2nd time*)		1876
Harry Atkinson (*1st time*)		1876–77
Sir George Grey		1877–79
John Hall		1879–82
Frederick Whitaker (*2nd time*)		1882–83
Harry Atkinson (*2nd time*)		1883–84
Robert Stout (from 1886, Sir Robert Stout)		1884–87
Harry Atkinson (from 1888, Sir Harry Atkinson) (*3rd time*)		1887–90
John Ballance	Liberal	1890–93
Richard John Seddon	Liberal	1893–1906
Joseph Ward (from 1911, Sir Joseph Ward) (*1st time*)	Liberal	1906–12
William Ferguson Massey	Reform	1912–25
Joseph Gordon Coates	Reform	1925–28
Sir Joseph Ward (*2nd time*)	United	1928–30
George William Forbes	Reform–United	1930–35
Michael Joseph Savage	Labour	1935–40
Peter Fraser	Labour	1940–49
Sidney Holland	National	1949–57
Walter Nash	Labour	1957–60
Keith Jacka Holyoake	National	1960–72
John Marshall	National	1972
Norman E. Kirk	Labour	1972–74
Wallace Edward Rowling	Labour	1974–75
Robert Muldoon	National	1975–84
David Lange	Labour	1984–89
Geoffrey Palmer	Labour	1989–90
Mike Moore	Labour	1990
Jim Bolger	National	1990–97
Jennifer Shipley	National	1997–99
Helen Clark	Labour	1999–

*The titles premier and first minister were variously applied to each of the principal ministers until 1869, when premier became customary. Although the title prime minister was first used formally in the Schedule of the Civil List Act of 1873, no one used the title officially until Richard John Seddon, beginning in 1893.

Abel Janszoon Tasman, a Dutch sailor, commanded an expedition that sighted the coast of Westland in December 1642. His attempt to land on the South Island provoked a clash with the Maori, however. In 1769–70 Captain James Cook circumnavigated and charted the two main islands. Cook's initial contact with the Maori was also violent, but later voyages and contacts proved more harmonious.

Early European settlement of New Zealand was an offshoot of Australian enterprise in whaling and other activities: Australian companies set up small whaling settlements around the coasts of both islands. From 1839 to 1841 New Zealand was part of the colony of New South Wales. In 1840 the Maori ceded the sovereignty of New Zealand to Britain in exchange for protection and guaranteed possession of their lands. Intermittent fighting with the Maori went on, however, until the colonists finally subdued them in 1847. In 1852 the New Zealand Constitution Act divided the colony into six provinces and established its government.

Relations between settlers and the Maori deteriorated as the Maori became reluctant to sell prime land. In 1860 troops were used to dislodge Maori from land sold under questionable circumstances; war broke out and continued for most of the decade. Eventually British forces, militia, and Maori allied to the government defeated the tribes opposed to selling land.

The discovery of gold in the mid-19th century brought prosperity and more European settlers to the colony. Economic growth on the North Island was impeded, however, because of the Maori war. In the early 1880s the development of refrigerated ships made it possible for farmers to ship butter, cheese, and meat to Great Britain, thus inaugurating an agriculturally based economy.

From 1891 to 1912 the Liberal Party, for most of this period under Richard John Seddon as prime minister, introduced social security (1898), encouraged labour unions (1892–96), and introduced successful land policies. In 1912 the Liberals were unseated by the Reform Party led by William Ferguson Massey, who remained prime minister until 1925. During the 1920s the Reform administration set up a system of export-marketing agencies in which authority was shared by producer and state. These laid the foundations of a cooperative marketing structure for New Zealand's dairy and other products. New Zealand supported Great Britain in both world wars, supplying troops, wool, and food. The country's participation in World War I was a boon to its export trade but was costly in lives. New Zealand's entrance into World War II began with the sending of troops to the European theatre in 1939. After 1941, however, New Zealand was threatened directly by Japan and became involved in the war in the Pacific.

In 1907 New Zealand was given dominion status in the British Empire; it was granted autonomy in 1931 by the Statute of Westminster, but it did not formally accept the statute until 1947. The National Party has controlled New Zealand's government much of the time since independence, although the Labour Party has formed several governments. Since Great Britain joined the European Economic Community in the early 1970s, New Zealand has had to expand its export markets and diversify its economy. It has also become more independent in its foreign relations.

New Zealand, Church of the Province of, an independent Anglican church that developed from missionary work begun in the 19th century. The first missionaries arrived in New Zealand from Australia in 1814. The work flourished, and in 1841 George Augustus Selwyn (1809–78) was appointed the first bishop of New Zealand, where he served until 1867. The church grew as white settlers moved to the country, and it also gained converts among the native Maori population. In 1857 it adopted its own constitution and became an independent church.

Although other denominations also established missions in New Zealand, the Anglican church remained the largest church. It consists of one province divided into several dioceses. In June 1990 in Dunedin, N.Z., Penelope Jamieson became the first female Anglican bishop to head a diocese. The seat of the primate is in Christchurch.

New Zealand Company (1838–58), British joint-stock company responsible for much of the early settlement of New Zealand; it attempted to colonize in accordance with the theories of Edward Gibbon Wakefield (*q.v.*). Formed in the summer of 1838 after a parent New Zealand Association failed to receive a royal charter to proceed with the settlement of the still independent islands, the company sent a land purchase expedition to New Zealand in 1839. In 1840 it founded the settlements of Wellington and Nelson and, in 1841, through a subsidiary organization (the Plymouth Company), the settlement of New Plymouth.

While the advance group was buying land, Britain annexed New Zealand (May 1840) on terms that necessitated a review of the company's land purchases from the Maori (*see* Waitangi, Treaty of). From 1840 to 1845 many of its transactions were ruled invalid. Immigrants who had heeded the company's propaganda found that there was actually little land to be had when they arrived. While the company had finally received a royal charter to continue its work (1841), it was in serious financial difficulty. The massacre in 1843 of its officials and the 1844–47 Bay of Islands War exacerbated the company's plight. In 1858 it was dissolved.

New Zealand Labour Party, political party established in 1916 in a merger of various socialist and trades-union groups, including the Unified Labour Party (founded 1910) and the Social Democratic Party (founded in 1913). The party grew steadily so that by the 1930–35 term it had become the official parliamentary opposition; and in 1935 it gained 53 seats, a clear majority, and formed the first Labour government, with Michael Joseph Savage as prime minister. It remained in office continuously until 1949 (under Prime Minister Peter Fraser from 1940) and enacted various pieces of welfare legislation, including social security, price and trade regulations, compulsory unionism, Maori protection, and other reforms but embracing only very limited socialization (of banks and broadcasting). Ideologically the Labour Party's distance from its rival, the National Party, became narrow and vague. In the next 35 years Labour was in power in 1957–60, 1972–75, and 1984–90.

To make the best use of the Britannica, consult the INDEX *first*

New Zealand literature, the body of literatures, both oral and written, produced in New Zealand.

A brief treatment of the literature of New Zealand follows. For full treatment, *see* MACROPAEDIA: Australia and New Zealand, Literatures of.

Maori habitation of New Zealand began some 1,000 years before settlement by Europeans. Like other Polynesian peoples, the Maori had an oral tradition that included war chants, laments, love poems, prayers, and a well-developed mythology. The tribal meeting ground was (and continues to be) the site of much oratory, a Maori practice that combines text with aspects of performance. Maori legend also brought the past into the present, making the events described contemporary. When some New Zealand scholars began to fear that the Maori culture would eventually be lost, they attempted to record as much Maori legend as they could. Many types of songs and song-chants have been distinguished; they include laments, love songs, gossip songs, songs of courtship or praise, songs for children, and songs of greeting and farewell. There are also chants for a variety of occasions. Between the 1940s, when Maori writers began to publish works in English, and the 1970s, few writers knew much of the Maori language. Since that time, many writers who identify themselves with Maori culture have established a presence in New Zealand literary history.

The first permanent colony in New Zealand was established in 1840, but modern discussion of New Zealand literature has generally discounted works produced in the 19th century as the output of Britishers abroad. Much of the early writing was, understandably, derivative, and the most informative 19th-century writings are autobiographical narratives of pioneer experiences, such as Lady Mary Anne Barker's *Station Life in New Zealand* (1870) and Frederick Maning's *Old New Zealand* (1863).

The country's first writer of brilliance, Katherine Mansfield, though living and working abroad for most of her life, set many of her short stories—including those collected in *Bliss* (1920) and *The Garden Party* (1922)—in the idealized New Zealand of her childhood. Among her contemporaries and near-contemporaries, the novelists Jane Mander, William Satchell, John A. Lee, Robin Hyde, and John Mulgan should be noted.

The first outstanding New Zealand poet was Blanche Edith Baughan. She was followed in the 1930s by such poets as A.R.D. Fairburn, R.A.K. Mason, Allen Curnow, and Denis Glover. Frank Sargeson, noted for his three-volume autobiography and his novels, also began publishing stories in the 1930s.

In the 1950s a number of now internationally known writers including Janet Frame and Sylvia Ashton-Warner came to the fore. Other writers of note included the novelists Maurice Shadbolt, Maurice Gee, Bill Pearson, David Ballantyne, and Ronald Hugh Morrieson and the vigorous, eclectic poet James K. Baxter, who became something of a cult hero.

Literary styles of the late 20th century tended to reflect international trends, with poetry reflecting surrealist, modernist, and feminist strains. Theatre, in particular, flourished—with notable plays by Bruce Mason, Mervyn Thompson, Roger Hall, and poet Vincent O'Sullivan—and there was considerable crossing of genres among New Zealand writers.

New Zealand National Party, political party founded in 1936 in the merger of non-Labour groups, most notably the United Party and the Reform Party, two parties that had been in coalition since 1931.

The Reform Party, the full name of which was the New Zealand Political Reform League, was a conservative organization that held control of the national government from 1912 to 1928. The United Party, formed in 1927, was the successor to the Liberal Party, dating to the 1890s and formally established in 1905. The new United Party was surprisingly successful in the elections of 1928 and formed a government, under Joseph Ward. A United-Reform coalition government was established in 1931, only to lose disastrously to the New Zealand Labour Party in the 1935 elections. Leaders of the right-wing parties deemed that the only way to revive conservative hopes was to unite their various groups, which separately had been dissipating their strength. The New Zealand National Party was thus born in 1936. The road back was slow, and not until 1949 did it win back the government. For the next 35 years the New Zealand National Party governed continuously except for the periods 1957–60, 1972–75, and 1984–90.

New Zealand Political Reform League, byname REFORM PARTY, conservative political party formed from various local and sectional organizations that took power in 1912, following a general election in 1911, and held control of the government until 1928. The Reform Party first acted as a united group in 1905, but it was not formally constituted and organized along party lines until after the 1911 election.

Based primarily on urban business interests and the small farmers of the North Island dairy industry, the Reform Party won the 1911 election by a promise to transform agricultural leasehold property into freehold on terms that would enable farmers to reap a significant profit from the sale of their land. It also benefited from its opposition to growing labour union defiance of New Zealand's anti-strike Industrial Conciliation and Arbitration Act (1894).

Led by W.F. Massey, the party's leader and New Zealand's premier from 1912 until his death in 1925, the Reform Party dealt violently with the strikes of 1912–13. But it was mortally weakened during the depression of the late 1920s, when its business and agrarian wings turned against one another. The Reform Party returned to power in coalition with the United Party (1931–35) but was formally dissolved in 1936. Its remnant entered the new National Party.

New Zealand red pine: *see* rimu.

New Zealand short-tailed bat (*Mystacina tuberculata*), small bat that is the sole species in the family Mystacinidae. It is about 6.5 cm (2.5 inches) long and has a short 1.8-centimetre (0.7-inch) tail. Its fur is grayish brown and thicker than the fur of other bats. Close to the body the wing membranes are leathery, and the wings can be furled tightly within them. *M. tuberculata,* the most terrestrial bat, is very agile when on the ground. In its forest habitat it may roost in hollow trees, caves, or crevices, and it sometimes digs tunnels in rotten wood. The diet of this species includes fruit, nectar, pollen, and insects. The young are born with their eyes open.

Newar, people of mixed descent who comprise about half the population of the Kāthmāndu Valley in Nepal. They speak a language belonging to the Tibeto-Burman family, but their culture has been strongly influenced by Indian religious and social institutions. The Newar population of Nepal is estimated to be about 540,000.

Most of the Newar are Hindus, but some practice an Indian form of Buddhism. There are about 70 castes, Buddhist as well as Hindu, covering approximately the same spectrum as the caste system of India; they include the Brahman, Kshatriya, Vaisya, and Sudra *varṇa*s as well as numerous groups of untouchables.

The Newar have a wide range of occupations. Many are farmers; others are prominent in the retail trades; and some occupy high political and administrative posts. They have traditionally been noted as architects and artisans, the builders of the famous temples and shrines of Kāthmāndu. From the 10th to the 16th century painting and sculpture flourished among the Newar, along with crafts such as pottery making, papermaking, wood carving, and metallurgy. Each of the crafts has traditionally been the specialty of a particular caste.

Newark, city, New Castle county, northern Delaware, U.S. It lies just west-southwest of Wilmington. The community developed in the late 1680s around the New Worke Quaker meeting-house, which served as an early crossroads meeting place for travelers. Nearby Cooch's Bridge on Christina Creek was the scene (Sept. 3, 1777) of the only Revolutionary War battle fought in the state. An early industrial enterprise in the locality was a paper mill built before 1798 on White Clay Creek. Newark's industries now include the manufacture of vulcanized fibre, concrete products, processed foods, and the assembly of automobiles. Newark is the seat of the University of Delaware (founded 1743 in New London, Pa., and subsequently transferred to Newark in 1765). Inc. town, 1887; city, 1951. Pop. (2000) 28,547.

Newark, city and port of entry, northeastern New Jersey, U.S. It lies on the west bank of the Passaic River and Newark Bay, 8 miles (13 km) west of lower Manhattan. Puritans migrating from Connecticut founded Newark in 1666 on land purchased from local Indians. The settlement, first named Pesayak Towne and later New Milford, was probably renamed for the home of the Reverend Abraham Pierson, who went there from Newark-on-Trent, Eng. Another version holds that the name was of biblical significance (New Ark). Newark became the seat of Essex county (1682) and was chartered as a township in 1693.

After the Revolutionary War Newark became (*c.* 1790) noted for leather tanning and shoe manufacturing, which profited greatly by the inventiveness of Seth Boyden, who developed a process for making patent leather (1818) and who was also credited as the first producer of malleable cast iron (1826). Newark's other industrial pioneers included the Reverend Hannibal Goodwin, who patented a flexible film for motion pictures (1888), and Edward Weston, who invented electrical measuring instruments (1888).

The city's proximity to New York City places it within the nation's most highly industrialized and populous area. Newark is the largest city in the state and is a leading industrial centre. Its manufactures are highly diversified and include electronic equipment, leather goods, chemicals, textiles, industrial machinery, and foodstuffs. Printing, publishing, and the insurance business are also significant. Newark is a transportation centre and a major East Coast distributing point. Newark International Airport is one of the world's busiest, since it serves both Newark and the New York City area. The Port of Newark, started in 1914, is now leased and operated by the Port of New York Authority.

From the 1950s through the '70s there was an outward movement of population from Newark that fundamentally altered its racial composition, a change that accelerated after the city was wracked by black rioting in 1967. The movement of whites to the suburbs raised the proportion of blacks in the city from 17 percent in 1950 to more than 50 percent by the 1980s. In 1970 blacks obtained some political power when the city's first black mayor, Kenneth A. Gibson, was elected.

Located in Newark are the New Jersey Institute of Technology (1881), the Newark campus of Rutgers University, a branch of Seton Hall University (Roman Catholic, 1856), Essex County College (1968), and New Jersey College of Medicine and Dentistry. Near the city centre is Military Park, used as a drill ground in colonial times and now the site of a bronze group of figures, "The Wars of America," by Gutzon Borglum. Branch Brook, a county park, is noted for its Japanese cherry trees. In front of the county courthouse, designed by Cass Gilbert, is a seated statue of Abraham Lincoln, also by Borglum. Historic buildings include Trinity Cathedral (1743), used as a hospital during the Revolutionary War; House of Prayer, with its two-centuries-old stone rectory, Plume House (1710); and the old First Presbyterian Church (1791).

Notable Newark residents have included Mary Mapes Dodge, author of *Hans Brinker, or the Silver Skates* (1865), and Edmund Clarence Stedman, poet; Stephen Crane, author of *The Red Badge of Courage* (1895), was a native son, as was Aaron Burr. Adjacent to the Newark Museum, a general museum, is the Ballantine House, a restored Victorian mansion. Inc. city, 1836. Pop. (2000) city, 273,546; Newark PMSA, 2,032,989.

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Newark, city, seat (1808) of Licking county, central Ohio, U.S. It lies at the junctions of the North and South forks of the Licking River and of Raccoon Creek, 30 miles (48 km) east of Columbus. Indian earthworks in the local Mound Builders, Wright Earthworks, and Octagon state memorials date from pre-Columbian settlement in the locality. Laid out in 1802, the community was named for the New Jersey hometown of the first settlers, led by General William C. Schenck. Newark prospered as an agricultural trading centre, and development was spurred by its location near the Ohio and Erie Canal system begun (1825) at Licking Summit, 4 miles (6 km) south, and by the arrival of the first railroad (1852).

The modern city's economy is well diversified and is based on agriculture (dairying, livestock, grain, and fruit) and industry (including the manufacture of glass fibre and aluminum, truck axles and transmissions, lighting equipment, containers, and plastics). The Newark campus of Ohio State University opened in 1957, and Central Ohio Technical College in 1971. Points of historic interest include Buckingham House (1815), Licking County Museum, and the Museum of Ohio Indian Art. Nearby are Buckeye Lake State Park, Dawes Arboretum, the Flint Ridge State Memorial (a prehistoric Indian flint quarry), Dillon Dam and Reservoir, and the Ohio Canal Lock. Granville, 5 miles (8 km) west, is the seat of Denison University (1831). Inc. town, 1826; city, 1860. Pop. (2000) 46,279.

Newark and Sherwood, district, county of Nottinghamshire, central England. It occupies an area of 255 square miles (662 square km) in the east-central part of the county. Newark and Sherwood district extends from the sandy uplands (about 300 feet [90 m] in elevation) in the west to the fertile, wide valley of the River Trent, centred on the town of Newark-on-Trent in the east. The infertile uplands, an outcrop of the Pennines, support heath, limited agriculture, and what remains of the fabled Sherwood Forest; originally an oak forest, much of Sherwood Forest has been replanted in pine.

Coal production has great potential in the district. In the 1960s mining operations in the Nottinghamshire coalfield were extended eastward to Ollerton and Bilsthorpe, near Sherwood Forest. A vast coal reserve was discovered in the late 1970s in the Trent Valley north of Newark-on-Trent. Agriculture is the principle economic activity in the valley; wheat, barley, sugar beets, and dairy cattle are raised. Newark-on-Trent, a manufacturing centre of ball and roller bearings and other machinery, is the district seat.

The cathedral (1884) at Southwell, a parish (town) 10 miles (16 km) west of Newark-on-Trent, incorporates late Norman, Early English, and Decorated Gothic architectural styles. Pop. (2001) 106,287.

Newark-on-Trent, also called NEWARK, town, Newark district, county of Nottinghamshire, England. It lies along the River Trent, at the crossing of the Roman Fosse Way with the modern Great North Road (A1).

The earliest known occupation of the site was in Anglo-Saxon times. In 1055 the town was granted to the bishops of Lincoln, in whose hands it remained until 1549. Bishop Alexander built a castle and bridge over the Trent there (1123–35), the castle being replaced by a stone building about 1173. Much of the town was destroyed in the English Civil Wars of the mid-17th century. In the Middle Ages, Newark had a flourishing cloth industry. It is now a small engineering centre, with many agricultural industries.

The parish Church of St. Mary Magdalene, one of England's finest, has architecture dating from the Norman period. It has a tower and spire 246 feet (75 m) high. Kelham Hall houses the district headquarters. Pop. (1991) 35,129.

Newberg, city, Yamhill county, northwestern Oregon, U.S. It lies in the Willamette River valley, just southwest of Portland. Founded in 1869 as the first Quaker settlement in the Pacific Northwest, it was named by one of the settlers for his German birthplace. The city is now the trading, processing, and shipping centre for an area producing lumber, fruit, nuts, and paper and wood products. It is the seat of George Fox College, established in 1885 as Friends Pacific Academy; the future American president Herbert Hoover was in the first graduating class of 1888. Minthorn House, where Hoover lived with his uncle, has been restored. The Champoeg State Park, where settlers organized the first effective government (1843) in the future state, is nearby. Inc. 1893. Pop. (2000) 18,064.

Newbery Medal, annual award given to the author of the most distinguished American children's book of the previous year. It was established by Frederic G. Melcher, of the R.R. Bowker Publishing Company, and named for John Newbery, the 18th-century English publisher who was among the first to publish books exclusively for children. The first award was given in 1922. It is presented at the annual conference of the American Library Association along with the Caldecott Medal, an award to an artist for the best illustrations for a children's book.

Newbolt, Sir Henry (John) (b. June 6, 1862, Bilston, Staffordshire, Eng.—d. April 19, 1938, London), English poet, best-known for his patriotic and nautical verse.

Newbolt was educated at Clifton Theological College and at Corpus Christi College, Oxford. He was admitted to the bar at Lincoln's Inn in 1887 and practiced law until 1899. The appearance of his ballads, *Admirals All* (1897), which included the stirring "Drake's Drum," created his literary reputation. These were followed by other volumes collected in *Poems: New and Old* (1912; rev. ed. 1919). During World War I he was comptroller of wireless and cables and was later commissioned to complete Great Britain's official naval history of the war. He also edited various anthologies of verse, which reveal his catholic and progressive taste in poetry. He was knighted in 1915 and appointed a Companion of Honour in 1922.

Newburgh, city, Orange county, southeastern New York, U.S. It lies on the west bank of the Hudson River (opposite Beacon), 58 miles (93 km) north of New York City. First settled by Germans from the Palatinate in 1709, it became a parish in 1752 and was named for Newburgh, Scot. It served as General George Washington's final headquarters (1782–83) and was a key American command post in the strategic Hudson Valley during the Revolutionary War. It was there that Washington renounced the idea of a kingship and officially disbanded the Continental Army. Hasbrouck House, Washington's headquarters, is now a state historical site and museum. Nearby are the New Windsor Cantonment (a reconstructed winter camp of the Continental Army) and the preserved headquarters (1754) of General Henry Knox.

Jonathan Hasbrouck House, Newburgh, N.Y.

Milt and Joan Mann from CameraMann

Newburgh's early growth was influenced by its position as a river port; it shared in the 19th-century whaling boom and was a ferry point for coal shipped from Pennsylvania to New England. Its industries include shipbuilding and the manufacture of textiles, clothing, aluminum products, and machinery. The city serves as the trade-distribution centre for the surrounding dairy and fruit region, and nearby oil-tank farms contribute to the economy. Mount Saint Mary College was established (1930) in Newburgh. Inc. village, 1800; city, 1865. Pop. (2000) 28,259.

Newburn, industrial community, Newcastle upon Tyne district, metropolitan area of Tyne and Wear, England. It lies on the western boundary of the metropolitan complex of Newcastle upon Tyne. A residential and manufacturing district, it has a large industrial estate. The Anglo-Scottish Battle of Newburn was fought there in 1640. The Church of St. Michael and All Angels dates from 1190. Pop. (1991) 42,897.

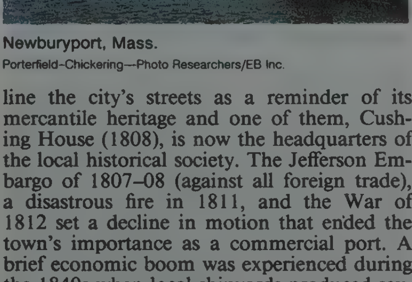
Newbury, town, Newbury district, county of Berkshire, England. The town lies along the River Kennet, on the Kennet and Avon Canal. Much evidence of Roman occupation has been found on the site.

During the English Civil Wars two important battles occurred at Newbury: on Sept. 20, 1643, 6,000 men fell in battle when the day was won by Parliamentary forces; on Oct. 27, 1644, the Royalists overcame their Parliamentary opponents and were able to relieve the local Donnington Castle. In 1795, Newbury's suburb of Speenhamland gave its name to a system of parish relief designed to supplement the wages of the poor.

Newbury was a centre of the textile trade prior to the English Civil Wars. Now, light engineering, flour milling, woodworking, and the manufacture of light aircraft are carried on there. One of the best racecourses in England lies east of the town. Pop. (1991) 33,273.

Newbury, district, county of Berkshire, England. The district occupies an area of 272 square miles (705 square km). It extends westward from the district of Reading along both sides of the River Kennet and edges into the Berkshire Downs on the north and the Hampshire Downs on the south; both downs are composed of chalk and rise to elevations of between 600 to 800 feet (185 to 245 m). The downs have occasional clumps of beech, and cereal grains (especially barley) are grown there. The Kennet River valley itself is devoted to pastureland upon which dairy cattle and the locally bred Berkshire pig are commonplace. Pop. (1998 est.) 144,200.

Newburyport, city, one of the seats of Essex county (with Salem and Lawrence), northeastern Massachusetts, U.S. It lies at the mouth of the Merrimack River, 35 miles (56 km) north-northeast of Boston. Settled in 1635 (as part of Newbury), its location attracted early fishing, shipbuilding, and craft industries and led to its incorporation as a separate town in 1764. Its sheltered harbour was home port for a large merchant fleet that brought wealth to the town in the years prior to the American Revolutionary War. Stately Federal-style houses (built by shipowners and sea captains) line the city's streets as a reminder of its mercantile heritage and one of them, Cushing House (1808), is now the headquarters of the local historical society. The Jefferson Embargo of 1807–08 (against all foreign trade), a disastrous fire in 1811, and the War of 1812 set a decline in motion that ended the town's importance as a commercial port. A brief economic boom was experienced during the 1840s when local shipyards produced several famous clipper ships under the direction of Donald McKay. After 1850 the city's production of textiles, shoes, silverware, and rum was significant. Tourism and the manufacture of electrical machinery, leather, and clothing are now the economic mainstays.



Newburyport, Mass.

Porterfield-Chickering—Photo Researchers/EB Inc.

A statue in Brown's Park honours the abolitionist William Lloyd Garrison, a native of Newburyport. Salisbury Beach State Reservation and Parker River National Wildlife Refuge are nearby. Inc. city, 1851. Pop. (2000) 17,189.

Newcastle, city and port, New South Wales, Australia. It lies at the mouth of the Hunter River, 104 miles (168 km) by rail northeast of Sydney.

Newcastle originated as the small Coal Harbour Penal Settlement in 1801 and developed as an outlet for coal (from the Newcastle-Cessnock field) and for farm produce of the fertile hinterland. The city's iron and steel industries, established in 1915 by the Broken Hill Proprietary Company, Ltd. (BHP), now rival its coal trade. Diversified industrialization followed, including metallurgy, engineering, shipbuilding, mineral sands mining (rutile and zircon), and major textiles. Proclaimed a municipality in 1859, Newcastle became a city in 1885. Its port facilities (based on North Harbour, the Basin, and Port Waratah) include a floating dock. The University of Newcastle (formerly Newcastle University College) was established in 1965. Newcastle's War Memorial Cultural Centre opened in 1958. The city was struck by a moderate-sized earthquake in 1989 that damaged some buildings. Pop. (2001 prelim.) 470,610.

The harbour with steelworks in the background, Newcastle, New South Wales

David Moore—Black Star/EB Inc.

Newcastle, town, seat (1786) of Northumberland county, New Brunswick, Canada. It lies 89 miles (143 km) northwest of Moncton. A port of entry opposite Chatham, near the mouth of the Miramichi River, it was founded in 1785 and was probably named for Thomas Pelham Holmes, Duke of Newcastle and British prime minister. The town developed with the lumber and allied trades, especially pulp and creosote. Newcastle's town hall, Old Manse Library, and The Enclosure (a park and historic site) were gifts from Lord Beaverbrook (William Maxwell Aitken), publisher and financier, who in the 1880s spent his boyhood in the town and chose his title to honour Beaver Brook Station, a settlement 9 miles (14 km) north. Inc. 1899. Pop. (2001) 1,228.

Newcastle, Irish AN CAISLEÁN NUA, town, Down district (established 1973), formerly in County Down, Northern Ireland. It lies along Dundrum Bay, at the foot of Slieve Donard (2,796 feet [852 m]), which is the highest peak in the Mourne Mountains. The town is a popular seaside resort and tourist centre for exploring the adjacent mountains. Nearby Tollymore Forest Park (1,200 acres [486 hectares]) is a government forestry estate and includes 135 species of trees. Light engineering products are made in the town. The new castle, from which the town takes its name, was a Magennis (MacGinnis) stronghold, built in 1588. Pop. (1991) 7,214.

Newcastle, town, northwestern KwaZulu/Natal province, South Africa. It lies at the foot of the Drakensberg mountains. The fourth British settlement in Natal, it was founded in 1864 as a regional trade centre. Fighting occurred in the vicinity during both the First Boer War (1881) and the South African War (1899–1902). Newcastle has long been known for its coal mining and steel production. The town is on the main road and rail lines between Durban and Johannesburg. Pop. (1991) town 38,767; urban agglom. 212,777.

Newcastle (-under-Lyme), Thomas Pelham-Holles, 1st Duke of, Duke of Newcastle-upon-Tyne, Marquess of Clare, Earl of Clare, Viscount Haughton, Baron Pelham of Laughton, Baron Pelham of Stanmer, original name Thomas Pelham (b. July 21, 1693—d. Nov. 17, 1768, London, Eng.), prime minister of Great Britain from 1754 to 1756 and from 1757 to 1762. Through his control of government patronage, he wielded enormous political influence during the reigns of the kings George I and George II.

Pelham-Holles inherited the barony of Pelham of Laughton from his father in 1712 (having assumed the name Pelham-Holles in 1711). By the time he came of age in 1714, he had become one of the wealthiest Whig landowners in England, with holdings in 12 counties and a rental income of nearly £40,000 a year. He helped bring about the succession of King George I (reigned 1714–27) and as a reward was given the title Duke of Newcastle-upon-Tyne in 1715. In 1724 Robert Walpole, the chief minister, made him secretary of state, a post he held for 30 years.

Newcastle gained even more power when his brother, Henry Pelham, became prime minister in 1743. On Pelham's death in March 1754, Newcastle was made prime minister, but England's setbacks early in the opening months of the Seven Years' War (1756–63) with France led to his resignation in October 1756. He was then created Duke of Newcastle-under-Lyme. Eight months later he again became prime minister in an uneasy coalition with his former enemy William Pitt (later 1st Earl of Chatham), who became secretary of state. While Newcastle procured parliamentary majorities in support of their ministry and handled matters of patronage, Pitt directed the war and turned initial defeat into a brilliant victory. In May 1762 Newcastle resigned and was replaced by John Stuart, 3rd Earl of Bute, favourite of young King George III. Newcastle died without issue, and the dukedom devolved on a nephew, Henry Finnes Clinton.

Newcastle was passionately devoted to the Hanoverian succession, to the cause of the Whigs, and to the game of politics for its own sake. Since party organizations hardly existed in the England of his time, the only means of giving a government cohesion and stability were the systematic management of elections and the distribution of patronage to secure parliamentary support for a particular ministry. Newcastle won a unique reputation for his skill and patience in securing a voting majority in the House of Commons by distributing posts, sinecures, and pensions. The key to his powers of patronage was his long and unbroken tenure of office, which put at his disposal the rich resources of the crown. He thus became an almost indispensable manager in all the ministries of his time.

Newcastle (-upon-Tyne), William Cavendish, 1st Duke of, also called (from 1620) Viscount Mansfield, Baron Ogle of Bothal, and (from 1628) Earl of Newcastle-on-Tyne, Baron Cavendish of Bolsover, and (from 1643) Marquess of Newcastle-on-Tyne (b. *c.* 1593—d. Dec. 25, 1676, Welbeck, Nottinghamshire, Eng.), Royalist commander during the English Civil Wars and a noted patron of poets, dramatists, and other writers.

The son of Sir Charles Cavendish, he attended St. John's College, Cambridge, and through inheritances and royal favour became wealthy. He was created Viscount Mansfield in 1620 and Earl of Newcastle-on-Tyne in 1628 and during his lifetime would become the patron of Ben Jonson, James Shirley, Sir William Davenant, John Dryden, Thomas Shadwell, and Richard Flecknoe, and of Thomas Hobbes, Pierre Gassendi, and René Descartes.

When Charles I declared open war in 1642, Newcastle was given the command of the four northern English counties; he advanced into Yorkshire in November, raised the siege of York, and compelled Lord Fairfax to retire. Subsequently his plans were checked by Sir Thomas Fairfax's recapture of Leeds in January 1643, and he retired to York. He escorted the queen, who returned from abroad in February, to York and thence to Oxford, and subsequently captured Wakefield, Rotherham, and Sheffield, but his successes were once more taken from him by the Fairfaxes, whom he subsequently defeated at Adwalton Moor on June 30, thereby obtaining possession of all Yorkshire except Hull and Wressel Castle. He then advanced into Lincolnshire to attack the eastern association, taking Gainsborough and Lincoln.

Newcastle returned to besiege Hull, and the force which he had left in Lincolnshire was defeated at Winceby by Oliver Cromwell on Oct. 11, 1643, which caused the loss of the whole county. On Oct. 27, 1643, he was created marquess. Next year his position was further threatened by the advance of the Scots. He retreated to York, where the three armies of the Scots, Lord Fairfax, and the Earl of Manchester surrounded him. The Royalist commander Prince Rupert raised the siege on July 1 but the next day threw away his success by engaging the three armies in battle, contrary to Newcastle's desire, at Marston Moor. After this disaster Newcastle announced his intention of abandoning the cause and quitting England. He resided at Hamburg from July 1644 to February 1645 and in April moved to Paris. He left in 1648 for Rotterdam to join Prince Charles in command of the navy, which had revolted, and finally settled at Antwerp. In April 1650 he was appointed a member of Charles II's privy council, and, in opposition to Edward Hyde, Earl of Clarendon, he advocated the agreement with the Scots.

At the Restoration, Newcastle returned to England and regained the greater part of his estates, though burdened with debts. He was reinstated in the offices he had filled under Charles I; was invested in 1661 with the Garter; and was advanced to a dukedom on March 16, 1665. He retired, however, from public life. He wrote various treatises and several comedies and with Sir John Dryden's assistance translated Molière's *L'Étourdi* as *Sir Martin Mar-All* (1688).

When his son Henry died in 1691, the title Duke of Newcastle became extinct.

Newcastle disease, also called Avian Pneumoencephalitis, a serious viral disease of birds caused by a paramyxovirus and marked by respiratory and nervous system problems. Some adult birds recover, although mortality rates are high in tropical and subtropical regions. Young chickens are especially susceptible and rarely survive. Symptoms are variable in turkeys and almost absent in ducks. There is no effective treatment. Vaccines are available and are given repeatedly for best protection. Humans can become infected by handling sick birds but usually develop only a temporary conjunctivitis (inflammation of the mucous membrane lining the inner surface of the eyelid).

Newcastle-under-Lyme, town and borough (district), administrative and historic county of Staffordshire, England. It borders the city of Stoke-on-Trent and occupies the northwestern corner of Staffordshire. Newcastle-under-Lyme takes its name from the new castle erected about 1145 by Ranulf de Gernons, the earl of Chester, in the proximity of the Lyme Forest. The castle became obsolete in Tudor times. The town received its first royal charter of incorporation in 1173. The borough, which is partly urban or suburban and partly rural, includes the towns of Chesterton, Clayton, Keele, Kidsgrove, Knutton, Silverdale, and Wolstanton. Local industries include brick and tile making, electronics, and engineering. The University College of North Staffordshire (1949) became the University of Keele in 1962. Area 81 square miles (211 square km). Pop. (1991) town, 73,731; (1998 est.) borough, 123,300.

Newcastle upon Tyne, city and metropolitan borough, metropolitan county of Tyne and Wear, historic county of Northumberland, northeastern England. It lies on the north bank of the River Tyne 8 miles (13 km) from the North Sea.

The settlement dates from the Roman period, when a fort was built on a site close to the present Tyne Bridge. The district and its name derive from a Norman castle built in 1080 by Robert II, the eldest son of William the Conqueror. In the 12th century the town became important as a fortress settlement because of its key position in the frontier defenses guarding the east coast route from Scotland. In 1172–77 Robert's castle was replaced by a massive stone keep (still standing) that was used to guard the bridge across the Tyne, and walls were built to enclose a small site northwest of the castle. The protection afforded by the fortress attracted religious and commercial bodies, and the resulting town rapidly expanded. The inhabitants gained municipal freedom and privileges granted in numerous charters, and the town became a thriving commercial centre. The wool trade was especially important, and in 1353 Newcastle became a staple (wool-manufacturing) town. By the late Middle Ages it had a thriving cloth industry.

In the following centuries Newcastle's growth continued steadily. In the 16th century locally mined coal, destined for the growing London market, surpassed wool as the town's principal export. (London's dependence on seaborne coal from Newcastle gave rise to the sarcastic phrase "carrying coals to Newcastle," which conveyed the essence of an unnecessary journey.) By 1800 Newcastle had become an important industrial and financial centre (the first banking houses dating from 1755), with expanding ironworking and glassmaking industries. The River Tyne became a major focus for shipbuilding, and Newcastle's shipyards were long among the largest ship-repairing centres in the world. Although the latter activity had declined by the late 20th century, the associated marine and heavy engineering industries remain important to Newcastle, which plays an important role in servicing Britain's offshore oil and gas fields. By the late 20th century, however, coal mining had ceased in Newcastle. The present economy rests mainly on the city's function as a major service and financial centre. Newcastle is the commercial centre of the Tyne and Wear metropolitan area and of northeastern England.

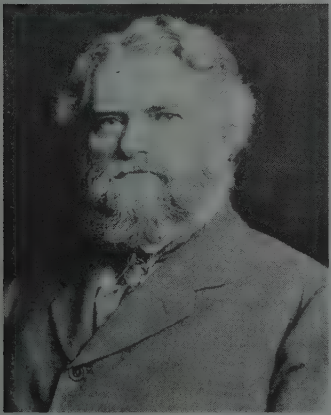
Municipal, commercial, and retail functions are located within the area of the medieval town, between the Tyne and the Town Moor. Outside the town walls, population increase since 1800 has resulted in the growth of many middle-class suburbs—Gosforth and Jesmond in the north, Walker and Heaton in the east, and Denton and Kenton in the west. The present city and metropolitan borough also embrace several former distinct towns. Six principal road and rail bridges link Newcastle with Gateshead on the south bank of the river—the most famous being the Tyne Bridge (1928), part of a major British road link. The rail link between London and Edinburgh also crosses the Tyne at Newcastle (the High Level Bridge, 1844–49). The electrically operated Swing Bridge (1865–76), one of the greatest engineering achievements of its time, is on the site of Roman and medieval bridges. The Cathedral Church of St. Nicholas dates from the 14th century, although another church occupied the site in 1123. The Guildhall (rebuilt 1655–58) stands on the Sandhill, the old city centre. The best-preserved portions of the old town walls lie between Westgate Road and Gallowgate, close to the ruins of the medieval Black Friars' priory.

Newcastle is an important education centre. The University of Newcastle upon Tyne was founded in 1937 as King's College by the merging of Armstrong College and the College of Medicine, both of which were attached to the University of Durham. The links with Durham remained until 1963, when King's College was granted a separate charter and became the present university. Further education is also provided by the Municipal College of Technology, Rutherford College of Technology, and a college of education. The Royal Grammar School, founded during the reign of Henry VIII (1509–47), was incorporated in 1600, and Dame Allan's School was endowed in 1705. Important Roman and other archaeological finds are housed by the Museum of Antiquities (belonging to the university) and the Society of Antiquities. The industrial history of the region is displayed in the Museum of Science and Technology. Collections of several natural history societies are preserved in the Hancock Museum. Both the Laing Art Gallery and Museum and the Hatton Gallery have permanent collections of paintings. Area 44 square miles (113 square km). Pop. (1998 est.) 276,100.

Newchwang (China): *see* Ying-k'ou.

Newcomb, Simon (b. March 12, 1835, Wallace, Nova Scotia—d. July 11, 1909, Washington, D.C.), Canadian-born American astronomer and mathematician who prepared ephemerides—tables of computed places of celestial bodies over a period of time—and tables of astronomical constants.

Life. Newcomb displayed his aptitude for working with figures at an early age. His father, an itinerant country schoolteacher, taught him to count at the age of four, and before he was five he was spending several hours a day making calculations in addition and multiplication; before he was seven he had finished the arithmetic book, including the extraction of cube roots.


Newcomb

By courtesy of the University of Chicago; photograph, Yerkes Observatory, Williams Bay, Wis.

Newcomb had little or no formal education. At the age of 16 he was apprenticed to a quack herb doctor in Salisbury, N.B. After two or three years he ran away to join his widowed father who had settled in the United States, in Maryland. In the libraries at Washington, D.C., Simon found the first full opportunity to indulge his intellectual curiosity. After avidly exploring many technical fields he concluded that his principal talent lay in mathematics. He was especially attracted to the *American Ephemeris and Nautical Almanac,* an annual handbook for astronomers, containing predicted positions in the sky of the principal celestial objects and other astronomical phenomena. He thereupon applied for employment in the American Nautical Almanac Office, then at Cambridge, Mass., and became a computer there in 1857. He also enrolled in the Lawrence Scientific School of Harvard University, receiving a degree in 1858. In 1861 he applied for and received a commission in the corps of professors of mathematics in the United States Navy and was assigned to the United States Naval Observatory at Washington, where he worked for more than 10 years determining the positions of celestial objects with the meridian instruments and for two years with a then new 26-inch refractor telescope.

In 1877 Newcomb was put in charge of the American Nautical Almanac Office, then in Washington, where almost at once he commenced the great work that he had had in his mind for some years and that was to occupy the greater part of the rest of his life: the calculation of the motions of the bodies in the solar system. Reaching the compulsory retirement age for captains in 1897, he later received the then unusual distinction of retirement with the rank of rear admiral.

In 1884 Newcomb had obtained the additional appointment of professor of mathematics and astronomy, which he held until 1893, at Johns Hopkins University, Baltimore, continuing, however, to live in Washington. For many years he was editor of the *American Journal of Mathematics.* He was one of the founders of the American Astronomical Society and was its first president (1899–1905). Newcomb received numerous honorary degrees and was awarded the highest scientific prizes of his day. He was elected a member of the National Academy of Sciences in 1869, serving as home secretary, 1881–83; vice president, 1883–89; and foreign secretary, 1903 until his death.

Accomplishments. Newcomb's most important work appeared in the *Astronomical Papers Prepared for the Use of the American Ephemeris and Nautical Almanac,* a series of memoirs that he founded in 1879 with the object of giving "a systematic determination of the constants of astronomy from the best existing data, a reinvestigation of the theories of the celestial motions, and the preparation of tables, formulae, and precepts for the construction of ephemerides, and for other applications of the same results." Of 36 articles filling approximately 4,500 quarto pages in the first nine volumes, he was the sole or principal author of 25. Among them were his tables of the Sun, Mercury, Venus, Mars, Uranus, and Neptune, along with tables of Jupiter and Saturn that were devised by George W. Hill, another American astronomer. These tables were used throughout most of the world for calculating daily positions of the objects from 1901 to 1959, and even afterward for the Sun, Mercury, Venus, and Mars. This series of *Papers* is remarkable for its sustained high quality. Hardly anything in them has proved to be incorrect, and at mid-20th century they were still worthy of the attention of any student of celestial motions.

Possibly Newcomb's most far-reaching contribution was his inauguration, jointly with A.M.W. Downing, then superintendent of the British Nautical Almanac Office, of a worldwide unified system of astronomical constants, which was later to lead to the outstandingly successful scheme of international collaboration among the principal almanac makers of the world that survived two World Wars with increasing vigour. Newcomb and Downing were impressed by the "confusion which pervaded the whole system of exact astronomy, arising from the diversity of the fundamental data made use of by the astronomers of foreign countries and various institutions in their work." A conference of the directors of the national ephemerides of the United States, Great Britain, France, and Germany, was held in Paris in May 1896. It resolved that beginning with 1901 a certain set of constants, substantially Newcomb's, should be used by all the ephemerides. The decision even included some work of Newcomb's that was not to be finished for several years. A similar conference, held at Paris in 1950, decided unanimously that the system of constants adopted in 1896 was still preferable to any other for practical use. (G.M.Ce.)

BIBLIOGRAPHY. Newcomb's major astronomical works include *Popular Astronomy* (1878, reissued 1910), *The Stars* (1901), *Astronomy for Everybody: A Popular Exposition of the Wonders of the Heavens* (1902, reissued 1942), and *A Compendium of Spherical Astronomy . . .* (1906, reprinted 1960). An autobiography, *The Reminiscences of an Astronomer,* was published in 1903. Raymond Clare Archibald, "Simon Newcomb, 1835–1909: Bibliography of His Life and Work," *Memoirs of the National Academy of Sciences,* 17:19–69 (1924), includes more than 500 titles.

Newcomen, Thomas (b. 1663, Dartmouth, Devon, Eng.—d. Aug. 5, 1729, London), British engineer and inventor of the atmospheric steam engine, a precursor of James Watt's engine.

As an ironmonger at Dartmouth, Newcomen became aware of the high cost of using the power of horses to pump water out of the Cornish tin mines. With his assistant John Calley (or Cawley), a plumber, he experimented for more than 10 years with a steam pump. It was superior to the crude pump of Thomas Savery. In Newcomen's engine the intensity of pressure was not limited by the pressure of the steam. Instead, atmospheric pressure pushed the piston down after the condensation of steam had created a vacuum in the cylinder.

As Savery had obtained a broad patent for his pump in 1698, Newcomen could not patent his engine. Therefore, he entered into partnership with Savery. The first recorded Newcomen engine was erected near Dudley Castle, Staffordshire, in 1712.

Newcomen invented the internal-condensing jet for obtaining a vacuum in the cylinder and an automatic valve gear. By using steam at atmospheric pressure, he kept within the working limits of his materials. For a number of years Newcomen's engine was used in the draining of mines and in raising water to power waterwheels.

newel, also called NEWEL-POST, upright post rising at the foot of a stairway, at its landings, or at its top. These posts usually serve as anchors for handrails. Often the stringboards, which cover and connect the ends of the steps, are framed into the newels. Made of the same substance as the stairway itself—wood, stone, or metal—the newel may be simple and functional, as in most contemporary examples, or highly ornamental, as in the Elizabethan or Jacobean styles.

Originally, a newel was the central post of a winding or circular stairway. If such a stairway has no central post, it is said to be of hollow-newel construction. In Gothic architecture a post used to support a vaulted-arch roof was sometimes called a newel.

Newfoundland, breed of working dog developed on the island of Newfoundland, possibly from crosses between native dogs and the Great Pyrenees dogs taken to North America by Basque fishermen in the 17th century.

Newfoundland
Sally Anne Thompson—EB Inc.

Noted for rescuing persons from the sea, the Newfoundland is a huge, characteristically gentle and patient dog standing 26 to 28 inches (66 to 71 cm) and weighing 110 to 150 pounds (50 to 68 kg). Powerful hindquarters, a large lung capacity, large webbed feet, and a heavy, oily coat contribute to the dog's ability to swim and to withstand cold waters. In addition to rescue work, the Newfoundland has served as a watchdog and companion and as a draft animal. The typical Newfoundland is solid black; the Landseer Newfoundland, named after Sir Edwin Landseer, the artist who painted it, is usually black and white.

Newfoundland and Labrador, one of the four Atlantic Provinces of Canada, extending into the North Atlantic Ocean and constituting the easternmost portion of the North American continent. The Strait of Belle Isle separates the island of Newfoundland to the south from mainland Labrador, which is bounded by Quebec to the west and south and constitutes nearly three-quarters of the province's total area. Newfoundland has more than 10,000 miles (16,000 km) of wildly jagged coastline with some of the world's finest and most extensive fishing grounds, the Grand Banks. The position of Newfoundland gives it strategic importance in transportation and communication between North America and Europe. The capital is St. John's. Area: island of Newfoundland, 43,008 square miles (111,390 square km); province, 156,649 square miles (405,720 square km). Pop. (2001) 512,930.

A brief treatment of Newfoundland and Labrador follows. For full treatment, *see* Canada: Newfoundland and Labrador.

The original inhabitants were Indians and Inuit. Archaeological excavation in the northern part of the island of Newfoundland has revealed Viking ruins dating from about AD 1000, demonstrating that the Vikings were the earliest Europeans to reach the area. The island's official discovery by Europeans, however, was in 1497 by the Italian explorer John Cabot, who claimed it for England.

Traditionally, the British regarded Newfoundland's fisheries as a preserve of the mother country and discouraged colonial settlement of the island. Thus, Newfoundland developed separately from the rest of Canada, and it was not until 1824 that a settled colony with a resident governor and council was finally acknowledged by Great Britain. In 1832 local agitation led to a popularly elected assembly. By the end of the 19th century a working class composed mainly of Irish Roman Catholics and a middle class of Protestant merchants and fishermen had developed in Newfoundland. New radical social policies in the colony were heralded by the formation of the People's Party by Edward Morris in 1907 and the Fishermen's Protective Union by William Coaker in 1908.

In 1927 Labrador became part of the colony after lengthy negotiations with Canada. In the 1930s Newfoundland's already struggling economy was overwhelmed by the Great Depression, and a commission appointed by the United Kingdom took over the government in order to straighten out the financial situation. In 1949 Newfoundland entered the Canadian union as a province. It was renamed Newfoundland and Labrador in 2001.

Newfoundland island and Labrador are separate physiographic regions. The island is geologically part of the Appalachian chain of North America, while Labrador is part of the Canadian Shield. In general, the province has cold but not severe winters (with the exception of northern Labrador, which is subarctic) and warm to cool summers. It is hit by numerous midlatitude storms, however, that move across Canada and up the Atlantic seaboard, and there are frequent, dense fogs over the Grand Banks and along the south and southeastern portion of the coast.

Much of the province is forested, with the exceptions of the tundra region of northern Labrador, the barren reaches at higher elevations, and some coastal regions. The principal trees are such conifers as balsam fir and black spruce. In most parts of the province, but particularly on the island, the conifers are mixed with deciduous species such as paper and yellow birches and with a wide variety of hardwood shrubs. The best stands of forest occur in areas of deep and well-drained soils such as the eastern slope of the Long Range Mountains in Labrador. Large mammals include moose, caribou, black bears, polar bears, and several species of seal. In the northern coniferous forests and in the tundra region, there are numerous small fur-bearing animals, and large seabird colonies inhabit the islands and coastal areas. Whales, now protected, are commonly seen in the summer.

Newfoundland and Labrador's people are an extremely homogeneous group. Virtually all of them are of British and Irish origin, and most of the remainder are of French extraction. The three largest religious denominations are Roman Catholic, Anglican, and the United Church of Canada.

Fishing in the Grand Banks, mainly for cod, was virtually the only economic activity in Newfoundland until the beginning of the 20th century. The exploitation of western Labrador's vast iron reserves has made mining the major industry. Forestry also arose beginning in the late 19th century. Newfoundland's fisheries, although surpassed by mining and forestry as sources of provincial wealth, remain the largest employers and continue to constitute the main economic base for the coastal villages and towns. Traditionally, fishing was inshore, and the fish were prepared for the market by small, family-run facilities. Today the catch is taken in offshore waters by modern trawlers and is fresh-frozen in large plants located along the coast. By the late 20th century, however, stocks of northern cod stock had become so depleted that the province's economy was severely affected.

A narrow-gauge railway was built during the 1880s from St. John's to Channel-Port aux Basques, but that railway has been abandoned. The province now has a single rail line that carries freight from Labrador to the Gulf of St. Lawrence. Newfoundland is well connected by roads, but most of Labrador is still without them. The island is linked to mainland Canada by car and passenger ferries. Several airlines serve the province.

The enormous hydroelectric-power resources of the province have been of great importance to its industrial development. Churchill Falls (Labrador) is the site of one of the world's greatest hydroelectric developments, supplying power to Quebec and indirectly to the northeastern United States.

The constitution of Newfoundland and Labrador is based on the British North America Act of 1867. It provides for a lieutenant governor, appointed by Canada's governor-general and representing the crown, and a unicameral assembly elected by universal adult suffrage; the leader of the majority party becomes premier and selects the executive council from the assembly. Local government has been slow to evolve. St. John's first municipal government was elected in 1888, and the next town council was not created until 1938.

Newfoundland and Labrador's isolation helped perpetuate sectarianism in its schools. In 1969 the Canadian federal government consolidated and integrated the province's school districts. Compulsory primary and secondary education is free in the public schools to grade 11. Nondenominational vocational, technical, and trade schools are also operated by the provincial government. The Memorial University of Newfoundland in St. John's, founded 1925, has become one of Canada's larger institutions of higher education.

As a result of the province's comparative isolation, 17th-century West Country speech and other British dialects are still preserved there. An immense body of folk music and folk tales also exists that has been preserved by storytellers and bards.

Newhall, Nancy, *née* WYNNE (b. May 9, 1908, Lynn, Mass., U.S.—d. July 7, 1974, Jackson, Wyo.), American photography critic, conservationist, and editor who was an important contributor to the development of the photograph book as an art form.

She attended Smith College and was a member of the Art Students League of New York. Her career began in 1943, when she became acting curator of the photography department at the Museum of Modern Art, New York City, substituting for her husband, Beaumont Newhall, the photography historian and founder of the department, while he was in military service.

Among Newhall's 22 books are *Time in New England* (1950), with photographs by Paul Strand, and the biography *Ansel Adams* (1963). Her long collaboration with Adams produced the landmark classic of conservationism *This Is the American Earth,* published by the Sierra Club in 1961 in the "oversize" format that she helped to pioneer. It is considered her most important work.

Newham, outer borough of London. It is bordered to the east by the River Roding and Barking Creek, to the south by the River Thames, and to the west by the River Lea. The northern edge of the borough is formed, in part, by the Wanstead Flats. Nearly all of Newham lies within the historic county of Essex.

The area grew extensively as 19th-century industrial London expanded, resulting in poor social and housing conditions, especially in the southwestern section. Much of the older housing was replaced in the mid-20th century. The Royal Docks along the Thames, now closed to shipping, are retained as the centrepiece of a mixed-use development. Sugar-refining, chemical, and other bulk industries are located along the banks of the Thames. The Thames Barrier, a flood-control device, stretches across the river to Greenwich.

Newham is traversed by the North Circular Road and other major routes; a foot tunnel and ferry link it with Woolwich, south of the Thames. Area 14 square miles (36 square km). Pop. (2001) 243,737.

Newhaven, town ("parish"), Lewes district, county of East Sussex, England, at the mouth of the River Ouse. "New" haven developed after the great storm of 1570, when the course of the lower Ouse shifted westward from its former outlet at Seaford. The port is the English terminus of a cross-Channel ferry service to Dieppe, France. There is some light industry, boatbuilding, and tourist trade. Pop. (1981) 9,834.

Newhouse FAMILY, family that built the second largest publishing empire in the United States in the second half of the 20th century.

The family's fortunes began with Samuel Irving Newhouse (b. May 24, 1895, New York, N.Y., U.S.—d. Aug. 29, 1979, New York City), who was born Solomon Neuhaus and was later known as S.I. Newhouse. He was working as a clerk for Judge Herman Lazarus in Bayonne, N.J., when Lazarus took over a failing newspaper, the *Bayonne Times.* Lazarus asked Newhouse, then 17, to take care of the paper. Newhouse cut costs while working for more advertising and wider circulation, and within one year the newspaper was making a profit.

In the early 1920s he began purchasing floundering newspapers and using the same techniques to make them profitable that had worked on the *Bayonne Times*. He bought the *Staten Island Advance* in 1922, and in 1924 he incorporated the Staten Island Advance Company, which became the basis of his publishing empire. With the profits he made from the *Advance,* he bought other small, undistinguished, unprofitable newspapers in New York and New Jersey and turned them around. In 1949 he renamed his company Advance Publications Inc.

Newhouse became a major force in American newspaper publishing in the 1950s with his purchase of the *Portland Oregonian* (1950), the *St. Louis Globe-Democrat* (1955), and several papers in Southern cities. In 1959 he acquired Condé Nast Publications, which printed such magazines as *Vogue, Glamour,* and *House & Garden*. With his purchase (1962) of the Times-Picayune Publishing Company, which printed both of the major newspapers in New Orleans, Newhouse owned more papers than any other American publisher. In 1967 he bought the *Cleveland Plain Dealer* for $54,000,000, and in 1976 he paid the record-breaking sum of $305,000,000 for Booth Newspapers, which published eight Michigan newspapers and *Parade* magazine. Though he paid close attention to his newspapers' profitability, Newhouse did not impose any editorial policies on his papers; local editors were free to express their own political views.

By the time of his death in 1979, Newhouse owned the third largest newspaper chain in the United States, with a total circulation of more than 3,000,000. Besides 31 newspapers, he also owned 7 magazines, 5 radio stations, 6 television stations, and 15 cable television systems. His philanthropies included a $15,000,000 donation to Syracuse University to establish the Newhouse School of Public Communications.

Upon his death the business was managed by two sons, Samuel I. Newhouse, Jr. (b. 1928), and Donald E. Newhouse (b. 1930), who greatly expanded the family holdings. Under their leadership, Advance Publications purchased Random House (1980) and several other book publishers and became one of the largest American magazine publishers with such titles as *The New Yorker, Vanity Fair, Gentleman's Quarterly, Vogue, Mademoiselle, Glamour, Bride's, Self,* and *Gourmet.*

Newlands, John Alexander Reina (b. Nov. 26, 1837, London, Eng.—d. July 29, 1898, London), British chemist whose "law of octaves" noted a pattern in the atomic structure of elements with similar chemical properties and contributed in a significant way to the development of the periodic law.

Newlands studied at the Royal College of Chemistry, London, fought as a volunteer under Giuseppe Garibaldi for Italian unification (1860), and later worked as an industrial chemist. In 1864 he published his concept of the periodicity of the chemical elements, which he had arranged in order of atomic weight. He pointed out that every eighth element in this grouping shared a resemblance and suggested an analogy with the intervals of the musical scale. The "law of octaves," thus enunciated, was controversial at first but later was recognized as an important generalization in modern chemical theory. Newlands collected his various papers in *On the Discovery of the Periodic Law* (1884).

Newman, mining town, northwestern Western Australia. It lies near Mount Newman, the highest peak (3,455 feet [1,053 m]) in the Ophthalmia Range. Both the town and the mountain were named for Aubrey Woodward Newman, who died while exploring the region in 1896. Newman was constructed during 1967–69 by The Mount Newman Mining Company Proprietary Ltd. as the residential and service centre for the iron-ore-mining development at nearby Mount Whaleback, one of the largest such projects in the world. In 1979 an iron-ore-beneficiation plant was completed there, and by the 1980s about 20,000,000 tons of ore were being exported annually by rail through Port Hedland to the northwest. The state capital, Perth, lies about 735 miles (1,184 km) by road to the southwest. Pop. (1991) 5,627.

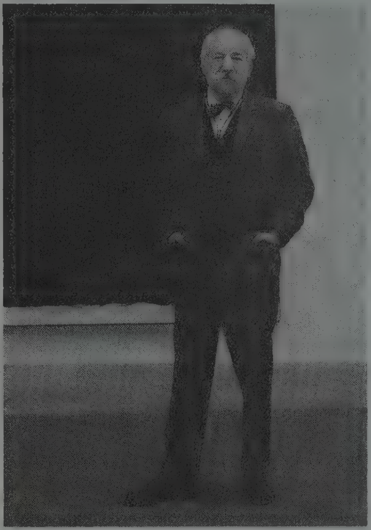
Newman, Arnold, in full ARNOLD ABNER NEWMAN (b. March 3, 1918, New York, N.Y., U.S.), American photographer who specialized in portraits of well-known people posed in settings associated with their work. This approach, known as "environmental portraiture," greatly influenced portrait photography in the 20th century.

Newman studied art at the the University of Miami, Fla., in 1936–38 and then took a job as an assistant in the photography studio of a Miami department store. He had become the manager of a portrait studio by 1939, and in 1941 he had his first major exhibition, a joint show (with his old friend and mentor Ben Rose) in New York City. In the early 1940s, during his visits to New York City, Newman began making portraits of well-known painters and other artists, usually posing them in their own studios. From 1946 he ran his own photography studio in New York City, and he gradually broadened his subject matter to include famous people of all types, including writers, composers, political leaders, scientists, and business magnates. Among his best-known portraits are those of Max Ernst, Alfred Stieglitz and Georgia O'Keefe, Igor Stravinsky, Alfried Krupp, Pablo Picasso, and Jean Cocteau.

The 76 photographic portraits of eminent Britons that Newman made for the National Portrait Gallery in London were published in the book *The Great British* (1979). Many other portraits are collected in the books *One Mind's Eye* (1974), *Faces USA* (1978), *Artists: Portraits from Four Decades* (1980), *Arnold Newman: Five Decades* (1986), and *Arnold Newman's Americans* (1992).

Newman, Barnett, original name BARUCH NEWMAN (b. Jan. 29, 1905, New York, N.Y., U.S.—d. July 3, 1970, New York City), American painter whose large, austerely reductionist canvases influenced the colour-field painters of the 1960s.

The son of Polish immigrants, Newman studied at New York City's Art Students League (1922–26) and at the City College of New York, from which he graduated in 1927. He worked in his father's clothing business in the 1930s and gradually began painting full-time. With the painters William Baziotes, Robert Motherwell, and Mark Rothko, he cofounded the school called "Subject of the Artist" (1948), which held open sessions and lectures for other artists.


Barnett Newman, 1969, with his painting "Prometheus Bound"
© 1970 Arnold Newman

Newman evolved a style of mystical abstraction in the 1940s and achieved a breakthrough with the canvas "Onement I" (1948), in which a single stripe of orange vertically bisects a field of dark red. This austerely geometric style became his trademark. His paintings, many of which are quite large, typically consist of grand, empty fields of saturated colour inflected with one or more vertical stripes of other colours. Newman's first one-man show, held in New York City in 1950, aroused hostility and incomprehension, but by the late 1950s and '60s his work had influenced Ad Reinhardt, Clyfford Still, and such younger artists as Frank Stella and Larry Poons. Newman's series of 14 paintings called "Stations of the Cross," exhibited at the Solomon R. Guggenheim Museum, New York City, in 1966, fully established his reputation.

Newman, John Henry (b. Feb. 21, 1801, London, Eng.—d. Aug. 11, 1890, Birmingham, Warwick), influential churchman and man of letters of the 19th century, who led the Oxford Movement in the Church of England and later became a cardinal-deacon in the Roman Catholic church. His eloquent books, notably *Parochial and Plain Sermons* (1834–42), *Lectures on the Prophetical Office of the Church* (1837), and *University Sermons* (1843), revived emphasis on the dogmatic authority of the church and urged reforms of the Church of England after the pattern of the original "catholic," or universal, church of the first five centuries AD. By 1845 he came to view the Roman Catholic church as the true modern development from the original body.

Early life and education. Newman was born in London in 1801. After pursuing his education in an evangelical home and at Trinity College, Oxford, he was made a fellow of Oriel College, Oxford, in 1822, vice principal of Alban Hall in 1825, and vicar of St. Mary's, Oxford, in 1828. Under the influence of the clergyman John Keble and Richard Hurrell Froude, Newman became a convinced high churchman (one of those who emphasized the Anglican church's continuation of the ancient Christian tradition, particularly as regards the episcopate, priesthood, and sacraments).

Association with the Oxford Movement. When the Oxford Movement began Newman was its effective organizer and intellectual leader, supplying the most acute thought produced by it. A High Church movement within the Church of England, the Oxford Movement was started at Oxford in 1833 with the object of stressing the Catholic elements in the English religious tradition and of reforming the Church of England. Newman's editing of the *Tracts for the Times* and his contributing of 24 tracts among them were less significant for the influence of the movement than his books, especially the *Lectures on the Prophetical Office of the Church* (1837), the classic statement of the Tractarian doctrine of authority; the *University Sermons* (1843), similarly classical for the theory of religious belief; and above all his *Parochial and Plain Sermons* (1834–42), which in their published form took the principles of the movement, in their best expression, into the country at large.

In 1838 and 1839 Newman was beginning to exercise far-reaching influence in the Church of England. His stress upon the dogmatic authority of the church was felt to be a much-needed reemphasis in a new liberal age. He seemed decisively to know what he stood for and where he was going, and in the quality of his personal devotion his followers found a man who practiced what he preached. Moreover, he had been endowed with the gift of writing sensitive and sometimes magical prose.

John Henry Newman, photograph by Herbert Barraud

Gernsheim Collection, Harry Ransom Humanities Research Center, The University of Texas at Austin

Newman was contending that the Church of England represented true catholicity and that the test of this catholicity (as against Rome upon the one side and what he termed "the popular Protestants" upon the other) lay in the teaching of the ancient and undivided church of the Fathers. From 1834 onward this middle way was beginning to be attacked on the ground that it undervalued the Reformation; and when in 1838–39 Newman and Keble published Froude's *Remains,* in which the Reformation was violently denounced, moderate men began to suspect their leader. Their worst fears were confirmed in 1841 by Newman's *Tract 90,* which, in reconciling the Thirty-nine Articles with the teaching of the ancient and undivided church, appeared to some to assert that the articles were not incompatible with the doctrines of the Council of Trent; and Newman's extreme disciple, W.G. Ward, claimed that this was indeed the consequence. Bishop Richard Bagot of Oxford requested that the tracts be suspended; and in the distress of the consequent denunciations Newman increasingly withdrew into isolation, his confidence in himself shattered and his belief in the catholicity of the English church weakening. He moved out of Oxford to his chapelry of Littlemore, where he gathered a few of his intimate disciples and established a quasi-monastery.

Conversion to Roman Catholicism. Newman resigned St. Mary's, Oxford, on Sept. 18, 1843, and preached his last Anglican sermon ("The Parting of Friends") in Littlemore Church a week later. He delayed long, because his intellectual integrity found an obstacle in the historical contrast between the early church and the modern Roman Catholic church. Meditating upon the idea of development, a word then much discussed in connection with biological evolution, he applied the law of historical development to Christian society and tried to show (to himself as much as to others) that the early and undivided church had developed rightly into the modern Roman Catholic church and that the Protestant churches represented a break in this development, both in doctrine and in devotion. These meditations removed the obstacle, and on Oct. 9, 1845, he was received at Littlemore into the Roman Catholic church, publishing a few weeks later his *Essay on the Development of Christian Doctrine.*

Newman went to Rome to be ordained to the priesthood and after some uncertainties founded the Oratory at Birmingham in 1848. He was suspect among the more rigorous Roman Catholic clergy because of the quasi-liberal spirit that he seemed to have brought with him; and therefore, though in fact he was no liberal in any normal sense of the word, his early career as a Roman Catholic priest was marked by a series of frustrations. In 1852–53 he was convicted of libeling the apostate former Dominican priest Achilli. He was summoned to Ireland to be the first rector of the new Catholic university in Dublin, but the task was, under the circumstances, impossible, and the only useful result was his lectures on the *Idea of a University* (1852). His role as editor of the Roman Catholic monthly, the *Rambler,* and in the efforts of Lord Acton to encourage critical scholarship among Catholics, rendered him further suspect and caused a breach with H.E. Manning, who was soon to be the new archbishop of Westminster. One of Newman's articles ("On Consulting the Faithful in Matters of Doctrine") was reported to Rome on suspicion of heresy. He attempted to found a Catholic hostel at Oxford but was thwarted by the opposition of Manning.

Apologia pro Vita Sua. From the sense of frustration engendered by these experiences Newman was delivered in 1864 by an unwarranted attack from Charles Kingsley upon his moral teaching. Kingsley in effect challenged him to justify the honesty of his life as an Anglican. And though he treated Kingsley more severely than some thought justified, the resulting history of his religious opinions, *Apologia pro Vita Sua* (1864; "A Defense of His Life"), was read and approved far beyond the limits of the Roman Catholic church, and by its fairness, candour, interest, and the beauty of some passages, it recaptured the almost national status that he had once held.

Though the *Apologia* was not liked by Manning and those who thought as he did because it seemed to show the quasi-liberal spirit that they feared, it assured Newman's stature in the Roman Catholic church. In 1870 he expressed opposition to a definition of papal infallibility, though himself a believer in the doctrine. In the same year, he published his most important book of theology since 1845, *An Essay in Aid of a Grammar of Assent* (commonly known as *The Grammar of Assent*), which contained a further consideration of the nature of faith and an attempt to show how faith can possess certainty when it rises out of evidence that can never be more than probable. In 1879 Pope Leo XIII made him cardinal-deacon of St. George in Velabro. He died at Birmingham in 1890 and is buried (with his closest friend, Ambrose St. John) at Rednal, the rest house of the Oratory.

Mind and character. Newman's portraits show a face of sensitivity and aesthetic delicacy. He was a poet—most famous are his contributions in the *Lyra Apostolica* of his Anglican days, including the hymn "Lead, kindly light," written in 1833 when he was becalmed in the strait between Sardinia and Corsica, and *The Dream of Gerontius* (1865), based upon the requiem offices and including such well-known hymns as "Praise to the holiest in the height" and "Firmly I believe and truly." He was always conscious of the limitations of prose and aware of the necessity for parable and analogy, and logical theologians sometimes found him elusive or thought him muddled.

But his was a mind of penetration and power, trained upon Aristotle, David Hume, Bishop Joseph Butler, and Richard Whately, and his superficial contempt for logic and dialectic blinded some readers into the error of thinking his mind illogical. His intellectual defect was rather that of oversubtlety; he enjoyed the niceties of argumentation, was inclined to be captivated by the twists of his own ingenuity, and had a habit of using the reductio ad absurdum in dangerous places. Newman's mind at its best is probably to be found in parts of the *Parochial and Plain Sermons* or the *University Sermons,* at its worst in the *Essay on Ecclesiastical Miracles* of 1843.

His sensitive nature, though it made him lovable to his few intimates, made him prickly and resentful of public criticism, and his distresses under the suspicions of his opponents, whether Anglicans defending the Reformation or ultramontanes (exponents of centralized papal power) attacking his Roman theology, weakened his confidence and prevented him from becoming the leader that he was otherwise so well equipped to be. Nevertheless, as the effective creator of the Oxford Movement, he helped to transform the Church of England; and as the upholder of a theory of doctrinal development he helped Catholic theology to become more reconciled to the findings of the new critical scholarship, while in England the *Apologia* was important in helping to break down the cruder prejudices of the English against Catholic priests. In both the Catholic church and the Church of England his influence has been momentous. (W.O.C.)

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Newman, Paul (b. Jan. 26, 1925, Cleveland, Ohio, U.S.), American film actor whose career has spanned more than four decades.

The son of a Catholic mother and Jewish father, Newman was a navy radio operator in World War II and enrolled at Ohio's Kenyon College upon his discharge (B.A., 1949).

Paul Newman, 1965
The Kobal Collection

He went to New York City in 1953 and soon began appearing in roles on Broadway. On the basis of his first play, *Picnic* (1953), Newman signed a film contract with Warner Bros. and in 1954 made a disastrous screen debut in the biblical epic *The Silver Chalice,* which Newman himself later described as "the worst picture of the decade." He fared better with two well-received performances in live television dramas (*Our Town* [1955] and *Bang the Drum Slowly* [1956]) and secured his future in films with his impressive portrayal of boxer Rocky Graziano in *Somebody Up There Likes Me* (1956). He captured his first Academy Award nomination for his performance in *Cat on a Hot Tin Roof* (1958).

In 1961 Newman essayed the role which perhaps best defines his screen persona, that of pool shark "Fast" Eddie Felson in *The Hustler.* Earning him another Oscar nomination, *The Hustler* was the first in a series of 1960s films, which included *Cool Hand Luke* (1967), in which Newman portrayed antiheroic protagonists.

Two popular films teamed Newman with costar Robert Redford and director George Roy Hill, both films featuring the Newman-Redford duo as a pair of charming outlaws. Newman's performance in the comic western *Butch Cassidy and the Sundance Kid* (1969) was hailed as his best work in comedy to date. In 1973 Newman and Redford portrayed Depression-era conmen in *The Sting,* a film that won that year's Oscar for best picture and matched *Butch Cassidy*'s box office success.

Newman's success afforded him the luxury of being eclectic in his choice of material, starring in some films that were box office failures but became cult favourites. Newman maintained his star status by appearing in such popular films as *The Towering Inferno* (1974), *Slap Shot* (1977), and two films for which he received Oscar nominations, *Absence of Malice* (1981) and *The Verdict* (1982).

After six Academy Award nominations and one career achievement Oscar, Newman finally won a best actor statuette for his work in director Martin Scorsese's *The Color of Money* (1986), the sequel to *The Hustler.* At the age of 70, he was nominated yet again for his depiction of an out-of-work construction worker in director Robert Benton's *Nobody's Fool* (1994). He also worked with Benton on the detective thriller *Twilight* (1998), proving his rank among the cinema's most enduring leading men.

Newmarket, town, Forest Heath district, administrative and historic county of Suffolk, England. It lies 70 miles (110 km) north of London. It is the home of the Jockey Club and has been celebrated for its horse races from the time of James I (reigned 1603–25); it is also known for the training of racehorses. Charles I instituted the first cup race there in 1634. Two of the five English classic races are held there in the spring—the Two Thousand Guineas and the One Thousand Guineas—and in the autumn two of the most popular handicap races, the Cesarewitch and the Cambridgeshire. Newmarket is the site of a great annual sale of bloodstock and possesses a unique Equine Research Centre. In 1967 the National Stud (a breeding centre for English horses) was opened there. There are two racecourses on Newmarket Heath: the Rowley Mile course, used in the spring and autumn, and the July course, used in the summer. The Rowley Mile intersects the Devil's Ditch, or Devil's Dyke, an earthwork thought to have been built by the East Anglians as a defense against the Mercians about the 6th century AD. The area is covered by chalk downland, with its unique flora and fauna. Northwest of Newmarket in Cambridgeshire is Wicken Fen, a nature reserve belonging to the National Trust, that is a surviving part of the now largely drained Fens. Pop. (1991) 16,498.

Newport, town, Isle of Wight unitary authority, historic county of Hampshire, England. It lies near the centre of the diamond-shaped island at the head of the River Medina's estuary, 5 miles (8 km) from its mouth at Cowes. Newport was probably the Roman settlement of Medina, but there is no trace of Saxon or Jute settlement. The first charter was granted between 1177 and 1184, and the borough was incorporated in 1608. Newport early superseded nearby Carisbrooke as the island's capital because of its facilities for trade. It remains the island's agricultural and administrative centre. Parkhurst, a major British maximum-security prison, stands on the outskirts. Pop. (1991) 20,574.

Newport, city, seat (1796; with Alexandria) of Campbell county, Kentucky, U.S. It adjoins Covington and lies opposite Cincinnati, Ohio, on the Ohio River near the mouth of the Licking River. The first settlement (about 1790) was named for Christopher Newport, commander of the first ship to reach Jamestown, Va., in 1607. An antislavery newspaper was published in Newport in the 1850s. The city experienced its greatest growth in the 1880s and '90s with an influx of German settlers and the completion of bridges to Cincinnati. Newport was the scene of a seven-year (1921–28) strike by steelworkers. Steel remains important, although services are now a major part of the economy. Other industries include printing and food processing. The Newport Aquarium opened in 1999. Inc. village, 1795; city, 1835. Pop. (2000) 17,048.

Newport, city, Newport county, southeastern Rhode Island, U.S. It occupies the southern end of Rhode (Aquidneck) Island in Narragansett Bay (there bridged to Jamestown). From the harbour on the west, the city rises up a gentle hillside to a low plateau.

Newport was founded in 1639 by a group of religious refugees from Massachusetts who had settled at the northern end of the island and founded the present town of Portsmouth. Following a schism in that settlement, a group led by William Coddington moved to the southern end of the island and established Newport, which, because of its excellent harbour, soon became one of the most flourishing seaports in colonial North America. Until the 20th century the two towns shared a government. Its early merchants prospered in the triangular trade of rum, molasses, and slaves between New England, Africa, and the West Indies. Printing in Rhode Island was begun at Newport in 1727 by James Franklin, an older brother of Benjamin. In 1758 James Franklin, Jr., established the *Newport Mercury,* which is still published as a weekly newspaper. The British occupation of Newport (1776–79) during the U.S. War of Independence resulted in the flight of merchants to the mainland.

After the American Civil War, largely because of a temperate climate and scenic location, Newport developed as an opulent summer resort with palatial summer mansions such as The Breakers, built (1895) in Italian Renaissance style for Cornelius Vanderbilt (grandson of the first Cornelius Vanderbilt).

Newport was one of Rhode Island's five original capital cities; Providence became sole capital in 1900. Many colonial buildings survive, including the Friends Meeting House (1699); the Old Colony House (1739); Trinity Church (1725–26); Touro Synagogue (1763), the oldest in America, founded by Spanish and Portuguese Jews; the Redwood Library and Athenaeum (1747); and the Artillery Company of Newport (chartered 1741) Military Museum. The old section of Newport, known as The Point, on the harbour front, has homes of colonial merchants, including Hunter House (1748), now restored as a museum. In Touro Park is the Old Stone Mill, a circular stone tower that is probably one of the oldest European-built edifices in the United States.

The International Tennis Hall of Fame and Museum (founded 1954) is in the Newport Casino (1880). Salve Regina University was established in 1947. Newport long has been known as a centre of yachting and has held many of the America's Cup yacht races. The Museum of Yachting is located in Fort Adams State Park. The city hosted the Newport Jazz Festival from 1954 until 1971, when it was moved to New York City. A festival of classical music is held annually in Newport in July, and a revived jazz festival occurs in August.

Newport was incorporated as a city in 1784 and resumed the town form of government in 1787, but in 1853 it was reincorporated as a city. Despite some closings in the 1970s, a major employer continues to be the U.S. Navy, with several facilities including the Naval Education and Training Center, Naval War College, Surface Warfare Officers School Command, Naval Justice School, and Naval Undersea Warfare Center. Services and tourism are also principal components of the city's economy. Pop. (2000) 26,475.

Newport, Welsh CASNEWYDD, town, industrial seaport, and county borough, historic county of Monmouthshire (Sir Fynwy), Wales.

The town is located at the mouth of the River Usk where it enters the River Severn estuary. A medieval borough with a castle (now in ruins) dating from about 1126, the town of Newport enjoyed commercial privileges conferred by various charters, such as that of 1385. Its present importance, however, dates from the 19th-century industrialization of the neighbouring coalfield. In 1839 Newport was the scene of some of the popular uprisings known as the Chartist riots, bullet marks from which are still visible in the pillars of the Westgate Hotel. The coal trade that brought considerable prosperity to the port up to 1913 has since ceased, and the town's industry has diversified to include steel and aluminum processing, papermaking, engineering, and chemicals. The port's imports include timber, tea, and automobiles. Newport is one of the most important metallurgical centres in Britain, with an immense steelworks at Llanwern, east of the town. Erected in 1906, a Transporter bridge

245 feet (75 metres) high spans the river near the docks, and a road bridge built in 1964 was the first cable cantilever bridge in Britain.

Newport county borough covers an area of industrial and residential development and open countryside around the town of Newport. Its main historical fame lies in the town of Caerleon ("City of the Legions"). From the 4th century BC to AD 75 the place was a stronghold of the Silures, the tribe that controlled what later became Monmouthshire. When the Romans conquered the Silures, Caerleon became the site of Isca Silurum, chief fortress of the Roman 2nd Augustan Legion. An amphitheatre built in the town in AD 80 later became known as King Arthur's Round Table. The present county borough has been dominated by the port of Newport since the 19th century, and that town continues to employ the bulk of the surrounding population. Agriculture remains a strong tradition to the east and west of the town, however, where a few small market villages remain. The county borough has excellent rail and motorway connections with London, southeastern England, the Midlands, and northern England, as well as with other parts of southern Wales. Area county borough, 74 square miles (191 square km). Pop. (1991) town, 115,522; (1998 est.) county borough, 139,200.

Newport Beach, city, Orange county, southern California, U.S. It lies along Newport Bay (Pacific inlet), south of Long Beach. Captain S.S. Dunnels sailed into the bay in 1865 looking for "new port" facilities; he developed Newport Landing, which in 1873 became a lumber terminal. Known as McFaddens Landing and Port Orange, it was laid out in 1892 as Newport. It developed around yachting, sport fishing, and beach activities and as a residential community for commuters to Los Angeles and Long Beach. There has been light industrial development, mainly aerospace electronics. Encompassing Lido Isle, Balboa Island and Peninsula, and Corona Del Mar, the city has extensive marina facilities. The University of California, Irvine, is immediately northeast. The Newport Harbor Art Museum displays modern American art. Inc. 1906. Pop. (2000) 70,032.

Newport News, independent city and port of entry, southeastern Virginia, U.S. It lies on the north side of Hampton Roads (harbour) and the mouth of the James River. With Portsmouth, Hampton, and Norfolk, it constitutes the Port of Hampton Roads (*q.v.*). The site was settled by Daniel Gookin (1621), who brought 50 colonists from Ireland. The origin of the place-name is obscure but is traditionally associated with Captain Christopher Newport, commander of five expeditions to Jamestown during 1606–12, and Sir William Newce, who arrived from Ireland in 1621.

Development began after 1870, when the site was chosen as a coal-shipping port for the Chesapeake and Ohio Railway. It was laid out in 1882, and by 1886 its prosperity was assured when the Newport News Shipbuilding and Dry Dock Company was founded there. One of the largest and most complete shipyards in the world, it has produced the luxury liners *America* and *United States,* the aircraft carriers *Forrestal* and *Enterprise,* and nuclear-powered submarines designed for firing guided missiles. Newport News was also an important supply and embarkation port in both world wars. In 1952 the city was made independent of Warwick county, in which it was located. That same year Warwick county was incorporated as the city of Warwick, and in 1958 Newport News and Warwick merged as the city of Newport News.

In addition to its port facilities, which can handle huge tonnages of coal, ore, bulk liquids, and general cargo, Newport News has diversified manufactures (textiles, paper, aeronautical and electronic equipment, and petroleum products). The city's Mariners' Museum (1930) has collections of ship models and a library. Also in Newport News are the Virginia War Museum, with exhibits from a Nazi concentration camp and the Berlin Wall; the Virginia Living Museum, with an aquarium and a planetarium; and Christopher Newport University (1960). Inc. 1896. Pop. (2000) city, 180,150; Norfolk–Virginia Beach–Newport News MSA, 1,569,541.

Newquay, town on the Atlantic coast, Restormel borough, administrative and historic county of Cornwall, England. The town is almost entirely a modern seaside resort, having grown since the mid-19th century from a small fishing village. It stands on cliffs overlooking sandy beaches and is sheltered from the Atlantic by Towan Head. The climate is equable, and tropical plants grow in the Trenance (valley). The small harbour is now used only by local fishing and pleasure boats. Newquay has become one of the most crowded tourist resorts on the Cornish coast. Pop. (1991) 17,390.

Beach at Newquay, Cornwall

Eric Carle—Shostal

Newry, Irish AN TLÚR, town and seat, Newry and Mourne district (established 1973), formerly in County Down, Northern Ireland. It lies along the River Clanrye and Newry Canal, near Carlingford Lough (inlet of the sea) and the Mourne Mountains. The town developed around a Cistercian abbey founded on the Clanrye by St. Malachy about 1144 and was granted a charter in 1157. The Irish name of the town, Iubhar Cinn Trágha, means "the yew tree at the head of the Strand," and it is alleged that the original yew, the symbol of immortality, was planted by St. Patrick. Because of its position in a gap of the hills, Newry was often attacked from the 13th to the 17th century; it was burned by the English king James II's forces in 1689. St. Patrick's Church, founded in Newry in 1578, was the first Protestant church to be built in Ireland. Newry is the seat of the Roman Catholic bishop of Dromore, and the Cathedral of Saints Patrick and Colman was completed in 1825. The town's industries include spinning and weaving of linen and cotton, the manufacture of waterproof clothing, food processing, and granite quarrying. Pop. (1991) 21,633.

Newry and Mourne, district, Northern Ireland. Formerly astride Counties Armagh and Down, Newry and Mourne was established as a district in 1973. It is bordered by the districts of Armagh and Banbridge to the north and Down to the northeast, by the Irish Sea to the east, and by the Irish Republic to the south and west. The Newry Canal, built in 1730–41 and the first major canal in the British Isles, flows between Lough (lake) Neagh and Carlingford Lough (inlet of the sea) and divides the district in two, with low mountains on the east and west.

Some potatoes, oats, and livestock are produced in the area, and, although limestone and granite are quarried in the Mourne Mountains, many of the wooded slopes have been preserved for recreation. Newry town is the administrative seat of the district and is connected to the Irish Sea at Carlingford Lough by the Newry Canal. Area 344 square miles (890 square km). Pop. (1991) 82,288.

news agency, also called PRESS AGENCY, PRESS ASSOCIATION, WIRE SERVICE, or NEWS SERVICE, organization that gathers, writes, and distributes news from around a nation or the world to newspapers, periodicals, radio and television broadcasters, government agencies, and other users. It does not publish news itself but supplies news to its subscribers, who, by sharing costs, obtain services they could not otherwise afford. All of the mass media depend upon the agencies for the bulk of the news, even including those few that have extensive news-gathering resources of their own.

The news agency has a variety of forms. In some large cities, newspapers and radio and television stations have joined forces to obtain routine coverage of news about the police, courts, government offices, and the like. National agencies have extended the area of such coverage by gathering and distributing stock-market quotations, sports results, and election reports. A few agencies have extended their service to include worldwide news. The service has grown to include news interpretation, special columns, news photographs, audiotape recordings for radio broadcast, and often videotape or motion-picture film for television news reports. Major agencies also are presences on the Internet. Many agencies are cooperatives. Under this form of organization, individual members provide news from their own circulation areas to an agency pool for general use. In major news centres the national and worldwide agencies have their own reporters to cover important events, and they maintain offices to facilitate distribution of their service.

The major press associations in the United States have expanded their service to include entertainment features, and some feature syndicates provide straight news coverage as a part of their service. The Newspaper Enterprise Association distributes both news and features in the United States.

Despite the plethora of news services, most news printed and broadcast throughout the world comes from only a few major agencies, such as the Associated Press in the United States, Reuters in Great Britain, and Agence France-Presse in France. Only these and a few others have the financial resources to station experienced reporters in all areas of the world where news develops regularly or to send them wherever news develops unexpectedly.

The world agencies have established a variety of relationships with other agencies and with individual news media. Most of them purchase the news services of national or local agencies to supplement news gathered by their own staff representatives at key points. Reuters, like the Agence France-Presse, supplies a worldwide news file to be distributed by some national agencies along with their domestic news reports. The American services more often contract to deliver their service directly to individual users abroad.

News agencies in communist countries had close ties to their national governments. Each major communist country had its own national news service, and each news service was officially controlled. Tass, the Soviet news agency, was the principal source of world news for the Soviet Union and its allies. China's Hsinhua, or New China News Agency, was the largest remaining news agency in a communist country by the late 20th century.

Most other countries have one or more national news agencies. Some depend on a common service, such as the Arab News Agency, which provides news for several states in the Middle East. Others are national newspaper cooperatives, such as the Ritzaus Bureau of Denmark, founded in 1866, which has a well-developed teleprinter network. A few, like the Agenzia Nazionale Stampa Associata of Italy, have expanded coverage abroad in limited degree to supplement their domestic service but still depend on Reuters and Agence France-Presse for much of their foreign news. Germany since 1949 has built Deutsche-Presse Agentur into one of the more important news agencies in Europe, including extensive exchange with other national services. In Canada the Canadian Press is a cooperative news agency with headquarters in Toronto. The oldest and largest news agency operating exclusively in Britain is the Press Association, founded by provincial newspapers on a cooperative basis in 1868. It began active work on Feb. 5, 1870, when the postal service took over the private telegraph companies that had previously supplied the provincial papers with news. It supplies news to all the London daily and Sunday newspapers, provincial papers, and trade journals and other periodicals.

The ability to transmit news rapidly has greatly increased during the 20th century. Radioteleprinters that make possible fast automatic transmission of news messages link all major areas. Picture transmission by radio and high-fidelity wires is well developed. From the major agencies, teletypesetter service, pioneered by the Associated Press in 1951, is available to newspapers wishing to have computerized typesetting done directly from news-service transmissions.

For brief coverage of the major world news agencies, *see* Agence France-Presse; Associated Press; Kyōdō; Press Trust of India; Reuters; Tass; United Press International. For treatment of newspaper feature syndicates, *see* newspaper syndicate.

newscast, radio or television summary of news events read by a newscaster or produced with a combination of reading and audio tape for radio or a combination of reading and film or video tape for television. It ranges from the one-minute dateline radio summary (usually a reading of five or six brief news items, each preceded by the city, state, or country in which it occurred) to the 15-minute newscast (usually divided into three groups: international, national, and local) to the 30-minute or one-hour newscast (generally longer items, integrating international, national, and local news and grouped according to related events) or even to an all-news format.

The newscast had a slow and difficult start in the U.S. in the 1920s in the form of infrequent readings of headlines and front-page stories from the late editions of newspapers. That start eventually led to a series of battles, beginning in 1933, between the radio stations on the one hand and, on the other, the major American newspapers and the three news-service agencies that sustained them—the Associated Press, the United Press, and the International News Service. The most significant outgrowth of the conflict, after two years, was the formation by the networks of their own news-gathering organizations. Public interest in news increased significantly with the events that led to World War II, and the networks' news organizations gave the first proof of their potential during that period.

The television newscast began in 1953 as a televised version of the radio form, with elements adopted from the theatre newsreel. In fact, the staffs of television's newscasts were drawn largely from newsreel organizations. The increasing frequency and popularity of newscasts led to controversies by the end of the 1960s involving their objectivity. The Federal Communications Commission code (1941) governing broadcasters reads, ". . . the broadcaster cannot be an advocate," and the code (1939) of the National Association of Broadcasters says, "Since the number of broadcasting channels is limited, news broadcasts shall not be editorial . . . ." Broadcasters were said by some to have violated these regulations, especially in newscasts.

Consult the INDEX *first*

Newsday, evening daily tabloid newspaper published in Long Island, N.Y., to serve residents of suburban Nassau and Suffolk counties, east of New York City.

It was established in 1940, as residential suburbs began to expand. Its founders were Harry Guggenheim and Alicia Patterson, daughter of publisher Joseph Medill Patterson. They set a liberal-independent policy for *Newsday,* which specialized in reporting serious local news, sometimes using teams of investigative reporters. The paper moved into new plants several times between 1947 and 1979, when it settled in Melville, Long Island, and began making the shift to computerized typesetting and other technological innovations.

In 1953 *Newsday* won a Pulitzer Prize for "disinterested and meritorious public service" and earned two more Pulitzer awards in later years. It is part of the Times Mirror Company group, which also publishes the *Los Angeles Times.*

newsletter, informal publication, often simple in format and crisp in style, that provides special information for a defined audience. Newsletters are ordinarily but not always issued regularly. They offer varieties of personal journalism and seldom carry advertising.

Forerunners of modern newsletters were the "corantos"—single-page collections of news items from foreign journals. They were circulated by the Dutch early in the 17th century, and English and French translations were published in Amsterdam. In the English American colonies, the *Boston News-letter*—credited also as the first American newspaper—appeared in 1704.

Roger W. Babson of Massachusetts introduced an investment advisory letter in 1904, and the *Whaley-Eaton Report* began in 1918. Circulation of modern newsletters varies from the modest numbers of free letters of small voluntary organizations to the hundreds of thousands achieved by subscription newsletters like *The Kiplinger Washington Letter*, begun in 1923 by Willard M. Kiplinger. Typical of many is the weekly *Latin American Reports*, started in London in 1967. Common topics covered in newsletters include business and the professions, energy, health, safety, and travel. Corporations often issue newsletters for internal communication; nonprofit organizations issue them for their members.

The wide availability of the typewriter, of cold type, and of fast and economical offset printing that reproduces camera-ready text and art contributed to the rapid growth of newsletters in the 20th century, especially in the 1960s and 1970s. The use of direct mail and the development of specialized mailing lists proved important for subscription letters. Word-processing systems and electronic delivery were applied to expedite production and improve timeliness.

By the late 20th century more than 100,000 different newsletters were issued in the United States. The Newsletter Association of America was founded in New York City in 1977; renamed the Newsletter Association in 1982, it organized a chapter in London in 1983.

Newsletters enjoy the economy of publishing for a limited and defined market. They often offer inside information, advice, and forecasts.

The Newsletter on Newsletters began in 1964. *Publishing Newsletters* (1982), by Howard Penn Hudson, illustrates a variety of designs and includes a glossary.

newspaper, publication usually issued daily, weekly, or at other regular times that provides news, views, features, and other information of public interest and that often carries advertising.

A brief treatment of newspapers follows. For full treatment, *see* MACROPAEDIA: Publishing.

Forerunners of the modern newspaper include the *Acta diurna* ("daily acts") of ancient Rome—posted announcements of political and social events—and manuscript newsletters circulated in the late Middle Ages by various international traders, among them the Fugger family of Augsburg.

In England the printed news book or news pamphlet usually related a single topical event such as a battle, disaster, or public celebration. The earliest known example is an eyewitness account of the English victory over the Scots at the Battle of Flodden (1513). Other forerunners include the town crier and ballads and broadsides.

In the first two decades of the 17th century, more or less regular papers printed from movable type appeared in Germany, Italy, and the Netherlands. The Dutch "corantos" ("currents of news"), which strung together items extracted from foreign journals, became the sources for English and French translations published in Amsterdam as early as 1620. Rudimentary newspapers appeared in many European countries in the 17th century, and broadsheets with social news were published in Japan in the Tokugawa period (1603–1867).

The first English corantos appeared in London in 1621. By the 1640s the news book had taken the form of a newspaper—the title page being dropped. The first English daily was *The Daily Courant* (1702–35). Not until 1771 did Parliament formally concede journalists the right to report its proceedings. *The Times,* which became a model for high quality and later led in mechanical innovation, was founded by John Walter in 1785, and *The Observer* was founded in 1791.

The Thirty Years' War (1618–48) set back incipient newspapers in Germany, and censorship in various forms was general throughout Europe. Sweden passed the first law guaranteeing freedom of the press in 1766.

In France the first daily, *Journal de Paris,* was started in 1771, and the *Journal des Débats* (1789), published until World War II, was founded as a daily to report on sessions of the National Assembly. Papers multiplied during the Revolution and decreased sharply after it.

The first newspaper in the United States, *Publick Occurrences Both Forreign and Domestick* (Boston, September 1690), was suppressed by the colonial governor after one issue. In 1704 the *Boston News-letter* began publication as a weekly issued by the postmaster. The *Boston Gazette* (1719) was printed by James Franklin, Benjamin Franklin's brother. Independent newspaper publishing in the English colonies is considered to have begun with James Franklin's *New-England Courant* (1721). Freedom of the press was advanced in a landmark case in 1735 when John Peter Zenger, a New York City newspaper publisher, was acquitted of libel on the defense that his political criticism was based on fact. Press freedom in the United States was further secured by the First Amendment to the U.S. Constitution (1791). Most of the press of the new republic proved fiercely partisan in the political struggles between the Federalists and Jeffersonian Republicans.

Circulation in the low thousands was common for papers at the beginning of the 19th century. Rising circulations were made possible by technological advances in mechanical typesetting, in high-speed printing (rotary press), in communications (telegraph and telephone), and in transport (railway). Led by papers in Great Britain and the United States, newspapers broadened their appeal and reduced prices. *The Times,* for example, increased circulation from 5,000 in 1815 (price seven pence) to 50,000 by the mid-19th century (five pence). In the United States, Benjamin Day established the *Sun* in New York City (1833) as the first successful penny paper. Two years later James Gordon Bennett began the *New York Herald.* He shaped many of the directions of modern journalism, including comprehensive coverage and an emphasis on entertainment. Horace Greeley, who crusaded for women's rights and against slavery, founded the independent *New York Tribune* (1841). Another independent, though less flamboyant, paper, *The New York Times,* appeared 10 years later. By the mid-19th century, there were 400 dailies and 3,000 weekly papers in the United States.

What became the Associated Press was organized (1848) by New York publishers as a cooperative news-gathering enterprise, and in London Paul J. Reuter began his foreign news service for the press (1858). Competition in New York City between Joseph Pulitzer, who owned the *World* from 1883, and William Randolph Hearst (*Journal,* 1895) led to excesses of lurid and sensationalized news, called yellow journalism (*q.v.*), and reactions against it in the late 1890s. In western Europe many papers became primarily organs of political and literary opinion.

In 1896 Alfred Harmsworth (Lord Northcliffe) launched the London *Daily Mail* as a national paper. Priced low to increase circulation, it was deliberately based on a plan for earning most of the revenues from advertising. He also introduced the first tabloid (*Daily Mirror,* 1903)—about half the size of a standard paper (15 × 23 inches [38 × 58 cm]). The first American tabloid was the *New York Daily News* (1919), started by Joseph Medill Patterson and devoted to sex and sensationalism. Early in the 20th century, the number of American papers reached a peak (more than 2,000 dailies and 14,000 weeklies). They declined in number thereafter, though total circulation rose. During the 1920s and '30s competition for circulation continued, and the wide use of syndicated columnists and ready-to-use features, comic strips, crossword puzzles, and other amusements developed.

A dozen large chains later came to control more than half of the American dailies. The first American chain was organized by Edward W. Scripps in the 1890s. A pattern of consolidation and merger was seen worldwide, especially in the second half of the 20th century.

Dissatisfaction with established papers, notably among younger readers, led to the rise in the second half of the 20th century of a diverse "underground," or alternative, press. The *Village Voice* in New York City began publishing in 1955. The alternative press, sometimes strident and irreverent, was forthright in seeking fresh approaches. Various special-interest groups, among them trade, ethnic, and religious interests, are also served by papers edited expressly for them.

Asia had more than 2,500 dailies in the late 20th century and Europe more than 2,600. There were some 2,200 in North America, South America had more than 760, and Africa fewer than 160.

Most of the news distributed internationally is provided by only four agencies, all in Western countries: Reuters, the Associated Press, United Press International, and Agence France-Presse.

newspaper syndicate, also called PRESS SYNDICATE, or FEATURE SYNDICATE, agency that sells to newspapers and other media special writing and artwork, often written by a noted journalist or eminent authority or drawn by a well-known cartoonist, that cannot be classified as spot coverage of the news. Its fundamental service is to spread the cost of expensive features among as many newspapers (subscribers) as possible. Press syndicates sell the exclusive rights to a feature to one subscriber in each territory, in contrast to the wire news services (*see* news agency), which offer their reports to all papers in a given area. Some syndicates specialize in such entertainment features as comic strips, cartoons, columns of oddities or humour, and serialized novels. Typical syndicated features are columns of advice on child rearing, health, running a household, gardening, and such games as bridge.

Syndicates came into being in the United States at the end of the Civil War. Individual features, however, had been syndicated as early as 1768 in the *Journal of Occurrences,* which was circulated by a group of "Boston patriots." The syndicate filled a need among rural or small-town weekly and daily papers for material that would help them compete with big-city papers. Three syndicates were in operation in 1865, supplying miscellaneous feature news items and short stories. In 1870 Tillotson & Son, publishers in Bolton, Eng., began to supply some British papers with serialized fiction. By 1881 Henry Villard, a reporter for the Associated Press (AP), had founded his own syndicate in Washington, D.C., and was soon sending material to the Cincinnati *Commercial,* the *Chicago Tribune,* and the *New York Herald.* About 1884, Charles A. Dana of the *New York Sun* formed a syndicate to sell short stories by Bret Harte and Henry James. Samuel S. McClure launched a similar venture in the same year. He first offered fiction and secured the rights to several stories by Rudyard Kipling. He also helped to introduce the stories of Sir Arthur Conan Doyle and others into the United States. The features offered at that time were mostly literary material and pictures. An important change came in 1896, however, when the big New York City Sunday newspapers began to produce and publish comic pages. In 1907 the comic strip was introduced in daily papers. This form of art gradually changed the whole character of the business and made it more profitable. The strips were shipped in matrix form to the subscribers for simultaneous publication. Originally, they were truly "comics" in that they were intended to make readers laugh, but later many became continued stories with no humour. When Bud Fisher's "Mutt and Jeff" was first bought and published in England in 1920, many British readers scoffed at the idea. It proved successful, and British editors later originated many strips in competition with the American products. By the late 1950s American comic strips were being translated into several languages and sold all over the world.

Many writers, photographers, and graphic artists syndicate their own materials. Some newspapers with especially strong resources syndicate their own coverage, including news, to papers outside their own communities. Examples include the *New York Times,* with major resources in every news department, and the defunct *Chicago Daily News,* which was known for its foreign coverage. Papers sometimes syndicate as a team with another newspaper—*e.g.,* the *Los Angeles Times–Washington Post* syndicate.

newsreel, short motion picture of current events introduced in England about 1897 by the Frenchman Charles Pathé. Newsreels were shown regularly, first in music halls between entertainment acts and later between the featured films in motion-picture theatres. Because spot news was expensive to shoot, newsreels covered expected events, such as parades, inaugurations, sport contests, bathing beauty contests, and residual news, such as floods.

Among the best-known early newsreel series were the *Pathé-Journal* (1908), shown first in England and France, and the *Pathé Weekly* (1912), produced for American audiences. *The March of Time* (1935), produced in the United States by Time, Inc., illustrated the influence of the documentary film by combining filmed news with interpretive interviews and dramatizations. With the rising popularity of television news reports, documentaries, and specials, the number of newsreels declined markedly. By the late 1950s the last of the American weeklies, Fox Movietone News, had gone out of business.

Newsweek, weekly newsmagazine published in New York City, one of the highly influential "big three" of American newsweeklies. It was founded in 1933 by Thomas J.C. Martyn, a former foreign-news editor of *Time,* as *News-Week.* It borrowed the general format of *Time* (founded 1923), as did Raymond Moley's *Today* magazine—with which *News-Week* merged in 1937, removing the hyphen from its name. The early *Newsweek* offered a rather drab survey of the week's news with signed columns of analysis. After World War II it grew livelier, and even more so after its purchase in 1961 by *Washington Post* publisher Philip L. Graham. It has a strong reputation for accurate, brisk, and vivid reporting of news events and for the care it exercises to report objectively. Like *Time,* it presents all the news in terse summary form, organized by departments and giving careful attention to the arts and sciences, business, religion, and sports.

newt, also called EFT, any of more than 40 species and 10 genera of salamanders constituting the widely distributed family Salamandridae of the order Caudata. They are called newts when aquatic and have moist skin, but are called efts when terrestrial and have rough skin. The name newt is derived from the expression "an eft," which became "a neft" and the letter "f" was transformed by popular usage to a "w."

The newt's body is long and slender, and its tail is flattened laterally (higher than wide). Different species of newts live either on land or in water, but all return to ponds or streams to breed, usually in spring. The fertilized eggs usually hatch in three to five weeks' time, and the aquatic larvae metamorphose into adults in late summer or early fall. Most young newts lead a completely terrestrial life, but when two to four years old they begin their annual or permanent return to the ponds. Newts eat earthworms, insects, snails, and other small animals.

In Great Britain newts are represented by

Warty newt (*Triturus cristatus*)

Toni Angermayer

three species of the genus *Triturus,* members of which are sometimes called tritons. The most common British newt is the smooth newt, *T. vulgaris,* a spotted form that also occurs widely throughout Europe. The largest European newt is the warty newt, *T. cristatus,* which grows to approximately 17 cm (7 inches). The California newt, *Taricha torosa,* found in humid regions of western North America, grows to about 15 cm in length. A common species of eastern North America is the red eft, *Notophthalmus viridescens.* The red eft lives on land for two or three years before becoming permanently aquatic. As it does so it turns from bright red to dull green with a row of red spots on the sides. The Japanese newt, *Cynops pyrrhogaster,* is frequently kept as a pet, surviving for several years in captivity. Newts are also found in the Middle East, Iran, and large areas in China and adjacent regions.

Newton, city, seat of Jasper county, central Iowa, U.S. It lies 30 miles (48 km) east of Des Moines. It was settled in 1846 as the county seat and was named for John Newton, Revolutionary War soldier. The railroad arrived in the 1860s and the community developed as a lumber-milling and agricultural trading centre. In 1898 the washing machine industry began there with the manufacture of ratchet-slat washers. Newton was where Frederick L. Maytag invented a "hand power" washing machine (1907) and his motor-driven washer (1911), which revolutionized the industry. The manufacture of automatic laundry appliances is now the economic mainstay, and the Jasper County Historical Museum exhibits the progress of the laundry industry. The city's other products include farm and road-building machinery, advertising specialties, and dairy foods (notably blue cheese). Inc. 1857. Pop. (1992 est.) 14,786.

Newton, city, seat (1872) of Harvey county, central Kansas, U.S. Founded in 1871 and named for Newton, Mass., it was a railhead for the Chisholm Trail cattle drives from 1871 to 1873. In the 1870s Russian Mennonite settlers began raising Turkey Red hard winter wheat brought from their homeland, and this variety became Kansas' principal agricultural product. Newton is now a trading and shipping centre for the surrounding wheat-growing area. There are railroad maintenance shops, food-processing and grain-milling plants, and factories making mobile homes. Bethel College (1887) in North Newton is the oldest Mennonite college in the nation; the Kauffman Museum on its campus features collections of antique automobiles and pioneer relics. Inc. 1872. Pop. (1992 est.) 16,613.

Newton, city, Middlesex county, eastern Massachusetts, U.S. It lies along the Charles River just west of Boston. Settled in 1639, it was part of Cambridge until separately incorporated as New Towne in 1688. Adopting its present name in 1691, it developed early milling and forge industries at the upper and lower falls of the Charles River. Suburban growth was stimulated by completion of the Boston and Worcester Railroad in 1834. Despite population increases, a sprawling, hilly setting has helped to sustain a semirural atmosphere (13 individual "villages," 8 of which have "Newton" in their names). Industry is limited by zoning laws.

The city is noted for its educational institutions, being the home of Andover Newton Theological School (1808) and several junior colleges (including Lasell [1851], Mount Ida [1899], and Aquinas [1961]). Chestnut Hill is the site of Boston College (1863) and Pine Manor College (1911). Inc. city, 1873. Pop. (1992 est.) 82,126.

newton, the absolute unit of force in the metre-kilogram-second (MKS) system of physical units. It is defined as that force necessary to provide a mass of one kilogram with an acceleration of one metre per second per second. One newton is equal to a force of 100,000 dynes in the centimetre-gram-second (CGS) system, or a force of about 0.2248 pound in the foot-pound-second (English, or customary) system. The newton was named for Sir Isaac Newton, whose second law of motion describes the changes that a force can produce in the motion of a body.

Newton, Alfred (b. June 11, 1829, Geneva, Switz.—d. June 7, 1907, Cambridge, Cambridgeshire, Eng.), British zoologist, one of the foremost ornithologists of his day.

Newton studied at Magdalene College, Cambridge, and from 1854 to 1863, as a holder of the Drury Travelling Fellowship, visited Lapland, Iceland, the West Indies, North America, and Spitsbergen, in the Arctic Ocean, on ornithological expeditions. In 1866 he became the first professor of zoology and comparative anatomy at the University of Cambridge, where few of the faculty or students were acquainted with zoology. Newton held the position for the remainder of his life, continually stimulating the growth of zoology as a distinct discipline. He was instrumental in securing passage of the first acts of Parliament for the protection of birds. He edited the ornithological journal *Ibis* (1865–70) and *The Zoological Record* (1870–72). Of his books, probably the most important is *A Dictionary of Birds* (1893–96), which grew from numerous articles on birds that he contributed to the 9th edition of *Encyclopædia Britannica.* His article "Ornithology" as amended in the 11th edition is still considered a valuable source of information on the history of ornithology and bird classification.

Newton, Sir Charles Thomas (b. Sept. 16, 1816, Bredwardine, Herefordshire, Eng.—d. Nov. 28, 1894, Margate, Kent), British archaeologist who excavated sites in southwestern Turkey and disinterred the remains of one of the seven wonders of the ancient world, the Mausoleum of Halicarnassus (at present-day Bodrum, Turkey). He also helped to establish systematic methods for archaeology and, as the first keeper (curator) of Greek and Roman antiquities at the British Museum, London, greatly enriched its collection by making outstanding acquisitions.

An assistant in the museum's Department of Antiquities (1840–52), Newton was sent to the Aegean as vice consul at Mytilene, on Lesbos, with the charge of looking after the museum's interests in Anatolia. In 1852 and 1855 he secured a series of inscriptions from the island of Calymnos. In 1856–57 he excavated the remains of the mausoleum and later unearthed the ground plan of Cnidus. Along with the chief remains from Halicarnassus, he brought to the museum the bronze Delphian serpent from Istanbul, a sculpture of the Greek goddess Demeter, the colossal lion from Cnidus, and statues from the road to Didyma (Branchidae). While serving as curator at the British Museum, he was also professor of archaeology at University College, London (1880–88), and did much to promote Hellenic studies in Britain. Knighted in 1887, he published, jointly with R.P. Pullan, his assistant at Cnidus, *A History of Discoveries at Halicarnassus, Cnidus, and Branchidae,* 2 vol. (1862–63).

Newton, Sir Isaac (b. Dec. 25, 1642 [Jan. 4, 1643, New Style], Woolsthorpe, Lincolnshire, Eng.—d. March 20 [March 31], 1727, London), English physicist and mathematician who invented the infinitesimal calculus, laid the foundations of modern physical optics, and formulated three laws of motion that became basic principles of modern physics and led to his theory of universal gravitation. He is regarded as one of the greatest scientists of all time.

A brief treatment of Sir Isaac Newton follows. For full treatment, *see* MACROPAEDIA: Newton.

Newton received a bachelor's degree at Trinity College, Cambridge, in 1665. During the next two years while the university was closed because of plague, Newton returned home, where he thought deeply about how certain natural phenomena might be explained and formulated the bases of his first major discoveries. He returned in 1667 as a fellow to Trinity College, where he became Lucasian professor of mathematics in 1669.

In 1666 Newton discovered the nature of white light by passing a beam of sunlight through a prism. He invented the calculus about 1669 but did not formally publish his ideas until 35 years later. He built the first reflecting telescope in 1668. Newton's most famous publication, *Philosophiae Naturalis Principia Mathematica* (1687; *Mathematical Principles of Natural Philosophy*), contains his work on the laws of motion, the theory of tides, and the theory of gravitation. His laws of motion laid the basis for classical mechanics, and the theory of gravity was particularly important in working out the motions of the planets. The *Principia* has been called one of the most important works of science ever written. In another book, *Opticks* (1704), Newton described his theory of light as well as the calculus and other mathematical researches.

Newton served as warden of the Royal Mint from 1696 and became president of the Royal Society in 1703, holding this office until his death. In 1705 he became the first British scientist ever to receive a knighthood for his researches.

Newton Abbot, town ("parish"), Teignbridge district, county of Devon, England. It lies near the head of the Teign Estuary. Bradley Manor (15th century) is now a National Trust property, while the Jacobean Forde House (1610) was visited by William, prince of Orange, the successful 17th-century contender for the English throne, who first read his famous declaration to the people of England at Newton Abbot market cross. The town is a busy service centre. Its industries include light engineering, food processing, and publishing. Pop. (1981) 20,979.

Newtonian transformations (physics): *see* Galilean transformations.

Newton's law of gravitation, statement that any particle of matter in the universe attracts any other with a force varying directly as the product of the masses and inversely as the square of the distance between them. In symbols, the magnitude of the attractive force F is equal to G (the gravitational constant, a number the size of which depends on the system of units used and which is a universal constant) multiplied by the product of the masses (m_1 and m_2) and divided by the square of the distance R: $F = G(m_1m_2)/R^2$. Isaac Newton put forward the law in 1687 and used it to explain the observed motions of the planets and their moons, which had been reduced to mathematical form by Johannes Kepler early in the 17th century.

Newton's laws of motion, relations between the forces acting on a body and the motion of the body, which, although formulated for the first time in usable form by Isaac Newton, had been discovered experimentally by Galileo about four years before Newton was born. The laws cover only the overall motion of a body; *i.e.,* the motion of its centre of mass. This concept is equivalent to assuming that the body is a particle with a definite mass but no size.

Strictly speaking, the laws are valid only for motions relative to a reference frame (coordinate system) attached to the fixed stars. Such a reference frame is known as a Newtonian, Galilean, or an inertial frame. Because the Earth rotates, a reference frame attached to the Earth is not inertial, and in some cases this rotation must be considered when applying Newton's laws. In most applications, however, the Earth's rotation can be neglected.

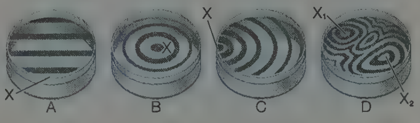
Newton's first law states that, if a body is at rest or moving at a constant speed in a straight line, it will remain at rest or keep moving in a straight line at constant speed unless it is acted upon by a force. This postulate is known as the law of inertia, and it is basically a description of one of the properties of a force: its ability to change rest into motion or motion into rest or one kind of motion into another kind. Before Galileo's time it was thought that bodies could move only as long as a force acted on them and that in the absence of forces they would remain at rest. Those who sought to find the forces that kept the planets moving failed to realize that no force was necessary to keep them moving at a practically uniform rate in their orbits; gravitational force, of which they had no conception, only changes the direction of motion.

Newton's second law is a quantitative description of the changes that a force can produce in the motion of a body. It states that the time rate of change of the velocity (directed speed), or acceleration, α, is directly proportional to the force F and inversely proportional to the mass m of the body; *i.e.,* $a = F/m$ or $F = ma$; the larger the force, the larger the acceleration (rate of change of velocity); the larger the mass, the smaller the acceleration. Both force and acceleration have direction as well as magnitude and are represented in calculations by vectors (arrows) having lengths proportional to their magnitudes. The acceleration produced by a force is in the same direction as the force; if several forces act on a body, it is their resultant (sum), obtained by adding the vectors tail-to-tip, that produces the acceleration.

The second law is the most important, and from it all of the basic equations of dynamics can be derived by procedures developed in the calculus. A simple case is a freely falling body. Neglecting air resistance, the only force acting on the body is its weight acting down, and it produces a downward acceleration equal to the acceleration of gravity, symbolized as g, which has an average value of 9.8 metres (32.2 feet) per second per second near the surface of the Earth.

Newton's third law states that the actions of two bodies upon each other are always equal and directly opposite; *i.e.,* reaction is always equal and opposite to action. The proposition seems obvious for two bodies in direct contact; the downward force of a book on a table is equal to the upward force of the table on the book. It is also true for gravitational forces; a flying airplane pulls up on the Earth with the same force that the Earth pulls down on the airplane. The third law is important in statics (bodies at rest) because it permits the separation of complex structures and machines into simple units that can be analyzed individually with the least number of unknown forces. At the connections between the units, the force in one member is equal and opposite to the force in the other member. The third law may not hold for electromagnetic forces when the bodies are far apart.

Newton's rings, in optics, a series of concentric light- and dark-coloured bands observed between two pieces of glass when one is convex and rests on its convex side on another piece having a flat surface. Thus, a layer of air exists between them. The phenomenon is caused by the interference of light waves; *i.e.,* the superimposing of trains of waves so that when their crests coincide, the light brightens; but when trough and crest meet, the light is destroyed. Light waves reflected from both top and bottom surfaces of the air film between the two pieces of glass interfere. The rings are named after the English 17th-century physicist Sir Isaac Newton, who first investigated them quantitatively.



Interference patterns formed with test surfaces

The principle is often used in testing the uniformity of a polished surface by studying the interference pattern the surface makes when placed in contact with a perfectly flat glass surface. The figure shows contour patterns formed by various surfaces under test. In the figure, A is produced by a flat surface with point of contact at X. In B and C the test surface is slightly convex, the points of contact indicated by X in each case. An irregular surface may give an interference pattern shown in D, with two points of contact X_1 and X_2.

Newtown, Welsh DRENEWYDD, "new town," Powys county, historic county of Montgomeryshire, Wales, located on the River Severn 15 miles (24 km) southwest of Welshpool. In 1967 Newtown was designated the second new town in Wales in an effort to create additional employment opportunities and check persisting rural depopulation. The town's original charter dates from 1280. To the southwest of town are the remains of a Norman motte-and-bailey castle, and the parliament hall of the medieval Welsh leader Owen Glendower was moved to Newtown in 1885. Gradual urban renewal during the 1970s resulted in a considerable mixture of old and new. The 16th-century town hall was torn down and replaced with a new Georgian-style hall. Other new structures include a county library headquarters, a police centre, and residential and industrial estates. A variety of light industries have been introduced to supplement the traditional textile mills and sawmills. Pop. (1991) 10,548.

Newtown Saint Boswells, village, Scottish Borders council area, historic county of Roxburghshire, Scotland, lying in the Tweed basin southeast of Edinburgh on the Edinburgh-Newcastle road. Before 1929 its population consisted mainly of railway employees. Since then its main function has changed to local governmental administration, and it has important livestock sales and a campus of Borders College. Nearby Dryburgh Abbey, founded in 1150 for the Premonstratensian order, has the tombs of Sir Walter Scott and Earl Haig (Field Marshal Douglas Haig). Pop. (1991) 1,108.

Newtownabbey, Irish BAILE NA MAINISTREACH, town and district (established 1973), formerly in County Antrim, Northern Ireland. The town of Newtownabbey was formed in 1958 by the amalgamation of seven villages, and it is a residential continuation of the city of Belfast on the shores of Belfast Lough (inlet of the sea). Newtownabbey is surrounded by modern industrial estates, manufacturing tires, telephones, textiles, and light engineering products, as well as new housing complexes.

Newtownabbey district has an area of 58 sq mi (150 sq km) and borders the districts of Larne and Carrickfergus to the east, Ballymena to the north, Antrim to the west, and Belfast to the south. The southern slopes of the Antrim Mountains extend into the northern and eastern parts of the district, but most of Newtownabbey consists of flat to undulating lowland. The district's light agricultural activity is centred around the administrative seat of Ballyclare, located in a wide valley 7 mi (11 km) north of Newtownabbey town. Pop. (1991) town, 57,103; (1998 est.) district, 79,600.

Newtownards, town and seat, Ards district (established 1973), formerly in County Down, Northern Ireland, at the northern end of Strangford Lough (inlet of the sea), just east of Belfast. It was founded by Sir Hugh Montgomery in 1608 at the site of a ruined Dominican friary (established 1244 by Walter de Burgh, earl of Ulster). It is now a manufacturing centre, with linen, hosiery, and engineering industries. Pop. (1991) 24,301.

Nexø, Martin Andersen (b. June 26, 1869, Copenhagen—d. June 1, 1954, Dresden, E. Ger.), writer who was the first Danish proletarian novelist championing social revolution, thus doing much to raise social consciousness in Denmark and throughout Europe.

Nexø came from an extremely poor family in the slums of Copenhagen but spent most of his childhood on the island of Bornholm, where he worked as a shepherd and later as a shoemaker's apprentice. He thus came to know the extreme deprivation suffered by the proletariat. With the help of a patron, he was later able to go to school; after finishing he worked as a teacher in a Grundtvigian folk school until 1901, when he was able to support himself by his writing.

Nexø's two major novels became known throughout the world. The first, *Pelle erobreren,* 4 vol. (1906–10; *Pelle the Conqueror,* 4 vol., 1913–16), tells of Pelle's development as the son of a farm labourer to become a worker in Copenhagen and a militant labour leader. The second novel, *Ditte mennskebarn,* 5 vol. (1917–21; *Ditte, Daughter of Man,* 3 vol., 1920–22) depicts the life of a poor, courageous, and loving girl and woman for whom there is no escape from oppression. A third novel, *Midt i en Jærntid* (1929; *In God's Land,* 1933), is critical of wealthy farmers during the period of agricultural inflation brought about by World War I. Nexø was a great admirer of the Soviet revolutionary experiment; he became a Communist after World War I and travelled to the Soviet Union a number of times. *Mod dagningen* (1923; "Toward the Dawn") gives his impressions of the Soviet Union. His memoirs appeared as *Erindringer,* 2 vol. (1932–39; first part: *Under the Open Sky,* 1938). In 1945 Nexø published a sequel to *Pelle, Morten hin Røde,* 2 vol. (1945; "Morten the Red"), in which Morten is the revolutionary and Pelle is shown as having turned bourgeois, like many of the labour leaders in the West. Nexø left Denmark in 1949, after the signing of the North Atlantic Pact, and settled in the German Democratic Republic, where he remained for the rest of his life.

nexum, in very early Roman law, a type of formal contract involving the loan of money under such oppressive conditions that it might result in the debtor's complete subjection to the creditor. The transaction was accomplished by means of a ritual employing scales and copper, the traditional symbols of transfer of property. The procedure was discontinued in the late 4th century BC, when the so-called Lex Poetelia released all those who were *nexi* (*i.e.,* insolvent debtors held in bondage by their creditors).

Ney, Michel, DUC (duke) D'ELCHINGEN, PRINCE DE LA MOSKOWA (b. Jan. 10, 1769, Sarrelouis, Fr.—d. Dec. 7, 1815, Paris), one of the best known of Napoleon's marshals (from 1804), who pledged his allegiance to the restored Bourbon monarchy when Napoleon abdicated in 1814. Upon Napoleon's return in 1815, Ney rejoined him and commanded the Old Guard at the Battle of Waterloo. Under

Ney, lithograph by François Le Villain, early 19th century, after a portrait by Maurin
H. Roger-Viollet

the monarchy, again restored, he was charged with treason, for which he was condemned and shot by a firing squad.

Military service. Ney was the son of a barrel cooper and blacksmith. Apprenticed to a local lawyer, he ran away in 1788 to join a hussar regiment. His opportunity came with the revolutionary wars, in which he fought from the early engagements at Valmy and Jemappes in 1792 to the final battle of the First Republic at Hohenlinden in 1800.

The early campaigns revealed two contrasting features of Ney's character: his great courage under fire and his strong aversion to promotion. Willing to hurl himself into battle at critical moments to inspire his troops by his personal example, he was unwilling to accept higher rank, and when his name was put forward he protested to his military and political superiors. In every instance he was overruled: it was as general of a division that he fought in Victor Moreau's Army of the Rhine at Hohenlinden.

A year before that battle, Napoleon, under whom Ney had never served, had emerged as master of France. In May 1801, Ney was summoned to be presented to the First Consul at the Tuileries, where Napoleon and Joséphine had surrounded themselves with the ceremony and splendour of a court. The Army of the Rhine had been disbanded, and Ney had bought a modest farm in Lorraine. His first encounter with Bonaparte was formal and unremarkable, for the First Consul, regarding Moreau as a military rival and political opponent, viewed the close associates of that general with suspicion. Joséphine, however, took him up and found him a wife, Aglaé Auguié, one of her maids of honour and daughter of a high civil servant. They were married in the chapel of the Auguié château near Versailles. Ney, with his influential new connections, became, at 33, part of the social and military world of the Consulate.

When peace with England broke down and Bonaparte was assembling armies along the Channel coast, Ney asked for employment and was given command of the VI Army Corps. Early in 1804, when police uncovered a plot by émigré Royalists to kidnap or murder Napoleon and restore the Bourbons to the throne, Ney's republican friend, General Moreau, was said to be involved, and with other alleged conspirators was put on public trial. Napoleon commuted Moreau's two-year sentence for banishment. On May 19, 1804, the day after Napoleon had had himself proclaimed hereditary emperor of the French, he revived the ancient military rank of marshal, and 14 generals, including Ney, were gazetted marshals of the empire.

When Napoleon led his armies in swift marches into the heart of the Continent, after a new European coalition of Russia, Austria, and England had been formed against France, the first victory was won by Ney at Elchingen in October 1805—for which he was created duke of Elchingen in 1808—and less than two months later Napoleon defeated the Russo-Austrian armies at Austerlitz. Ney was active in the defeat of Prussia at Jena in 1806 and of the Russians at Eylau and Friedland in 1807. When he was sent to Spain in 1808, his fame for personal bravery remained undimmed, but at the same time he was also known as a touchy and temperamental commander whom the general staff found difficult to fit into a tactical pattern. His impulsiveness sometimes verged on insubordination when his orders did not come from the Emperor himself. Since Napoleon directed the Spanish operations by remote control, Ney quarrelled with all those set above him, and, early in 1811, he was sent home in near disgrace.

The Russian campaign of 1812 reestablished his position. On the morning after the somewhat inconclusive battle at Borodino, Napoleon made him prince de la Moskowa. On the retreat from Moscow, Ney was in command of the rear guard, a position in which he was exposed to Russian artillery fire and to numerous Cossack attacks. He rose to heights of courage, resourcefulness, and inspired improvisation that seemed miraculous to the men he led. "He is the bravest of the brave," said Napoleon when Ney, for weeks given up as lost, joined the main body of the frozen and shrunken Grand Army.

In the European campaigns of 1813, Ney had to fight against former friends. Moreau had returned from exile in the U.S. to serve as Tsar Alexander I's military adviser and was killed by a French cannonball outside Dresden. Ney had the mortification of being defeated at Dennewitz by the crown prince of Sweden, Charles XIV John, who as Jean Bernadotte had served as a sergeant in the revolutionary armies, as had Ney. At Leipzig, Ney was wounded and had to be sent home. The defeated army fought its way back across Germany into France, where, deaf to all appeals for peace, Napoleon launched a new campaign. Ney, commanding in eastern France, organized the kind of partisan warfare he had learned in the revolutionary wars.

Ney's political shift. Napoleon concentrated his remaining forces at Fontainebleau to fight the allies in Paris, but Ney, speaking for himself and other marshals, told him that the army would not march. "The army will obey *me*," said Napoleon. "Sire," replied the Bravest of the Brave, "the army will obey its generals." Napoleon was forced to abdicate. Ney retained his rank and titles and took an oath of fidelity to the Bourbon dynasty.

On March 1, 1815, Napoleon reappeared in France. Ney, ordered to take command in the district of Besançon, told the King "that man deserves to be brought back to Paris in an iron cage." Ney, however, found that the population in his military district was intensely hostile to the Bourbons. Therefore, after receiving messages from Napoleon, he announced his decision to join the Emperor and was deliriously cheered by his soldiers and the populace. The King fled from Paris, and Napoleon reentered the Tuileries. Ney spent the period mostly in disgruntled retirement at his country estate. He saw little of Napoleon until three days before Waterloo, when he was summoned and asked to serve. He was put in charge of the left wing against the English, Napoleon taking the right wing against the Prussians, whom he defeated at Ligny. Ney fought the English in the drawn battle of Quatre-Bras. His conduct at Waterloo has remained a matter of controversy. When at nightfall the French fled from the field, Ney, his face blackened by smoke and holding a broken sword in his hand, shouted to a colleague: "If they catch us now, they'll hang us," a remark of prophetic accuracy.

Trial and death. After the second return of the Bourbons, Ney made a halfhearted attempt to flee the country, but was recognized and arrested in a remote corner of southwestern France. First put before a court-martial, he refused to recognize its competence and insisted on his right as a peer to be tried by the upper chamber. As he had expected, he was sentenced to death in one of the most divisive trials in French history. In December 1815, a firing squad in the Luxembourg Gardens ended what his soldiers had always regarded as a charmed life.

Ney was a soldier's soldier, wholly without political ambition or judgment. He was at his greatest in the campaigns for France's natural frontiers at the beginning and end of his career, but out of his depth in Napoleon's intricate strategy for the domination of Europe. He showed little interest in external distinctions or social success. The dignity with which he met his death effaced the memory of his political vagaries and made him, in an epic age, the most heroic figure of his time.

(Ha.K.)

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Neyagawa, city, Ōsaka Urban Prefecture (*fu*), Honshu, Japan, in the northern part of the Kōchi-gawa (Kōchi River) plain. Many ancient relics attest to prehistoric settlement in the area. With the construction of a railway line to Ōsaka in 1910, Neyagawa grew as a residential suburb. The few large-scale factories produce metal products, transportation equipment, and textiles. Pop. (1983 est.) 258,907.

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at the end of this volume

Neyman, Jerzy (b. April 16, 1894, Bendery, Russia—d. Aug. 5, 1981, Oakland, Calif., U.S.), Russian-U.S. mathematician and statistician who helped to establish the statistical theory of hypothesis testing. Neyman was a principal founder of modern theoretical statistics. In 1968 he was awarded the prestigious National Medal of Science.

After serving as a lecturer at the Institute of Technology, Kharkov, in the Ukraine, from 1917 to 1921, Neyman was appointed statistician of the Institute of Agriculture at Bydgoszcz, Pol. In 1923 he became a lecturer at the College of Agriculture, Warsaw, and joined the faculty of the University of Warsaw in 1928. He served on the staff of University College, London, from 1934 to 1938, and then emigrated to the United States, where he joined the faculty of the University of California at Berkeley, becoming chairman of a new department of statistics in 1955. There he built, with the help of a growing number of statisticians and mathematicians who studied under him, what became known as a leading world centre for mathematical statistics. A highly successful series of symposia on probability and statistics were carried out under his guidance.

Neyman's work in mathematical statistics, which includes theories of estimation and of testing hypotheses, has found wide application in genetics, medical diagnosis, astronomy, meteorology, and agricultural experimentation. He was noted especially for combining theory and its applications in his thinking.

Neyshābūr, also spelled NĪSHĀPŪR, town, northeastern Iran. Neyshābūr is situated 46 miles (74 km) west of Meshed. The town, which has shifted its position repeatedly in historical times, lies at an elevation of 3,980 feet (1,213 m) in a wide, well-watered, and fertile plain at the southern foot of the Bīnālūd Mountains. The surrounding area produces cereals and cotton, and the town's industries include agricultural marketing and the manufacture of carpets and pottery. Neyshābūr is linked by road and railway with Tehrān and Meshed.

Neyshābūr derived its name from its alleged founder, the Sāsānian king Shāpūr I (d. 272). It was once one of the four great cities of the region of Khorāsān and was important in the 5th century as the residence of the Sāsānian king Yazdegerd II (reigned 438–457). By the time the Arabs came to Khorāsān in the mid-7th century, however, it had become insignificant. Under the Ṭāhirid dynasty (821–873), the city flourished again, and it rose to importance under the Sāmānid dynasty (ended 999). Toghrïl Beg, the first Seljuq ruler, made Neyshābūr his residence in 1037, but it declined in the 12th century and in the 13th twice suffered earthquakes as well as the Mongol invasion.

A few miles east of the town is the Qadamgāh (1643), a fine domed mausoleum. American excavations in 1934–40 disclosed rich remains of both the Seljuq and pre-Seljuq periods in the locality. Near the mosque of the Imāmzādeh Maḥroq, 4 miles (6 km) southeast of Neyshābūr, is the tomb of the 12th-century astronomer-poet Omar Khayyam. The grave of the poet and mystic Farīd od-Dīn ʿAṭṭār also lies nearby. Pop. (1991) 135,681.

Nez Percé, Sahaptian-speaking North American Indian people centring on the lower Snake River and such tributaries as the Salmon and Clearwater rivers in what is now central Idaho and adjacent areas of Oregon and Washington. They were the largest, most powerful, and best known of the Sahaptin (*q.v.*) and were called by various names by other peoples; the French name, Nez Percé ("Pierced Nose"), referred to the wearing of nose pendants, though the fashion does not seem to have been widespread among them.

Their culture was primarily that of the Plateau culture area and more specifically that of the Sahaptin tribes. As one of the easternmost groups, however, they were influenced by the Plains Indians living just east of the Rockies. Typical of the Plateau, their domestic life traditionally centred on small villages located on streams having abundant salmon, which, dried, formed their main source of food. They also sought a variety of game, berries, and roots. Their dwellings were communal lodges, A-framed and mat-covered, varying in size but sometimes housing as many as 30 families.

After acquiring horses early in the 18th century, however, Nez Percé life began to change dramatically, at least among some groups. They were able to mount expeditions for bison hunts and to trade with peoples beyond the Rockies. Always somewhat warlike, they now became more so, adopting many war honours, war dances, and horse tactics imitative of the custom of the Plains; the Plains tepee was also used. The Nez Percé built up one of the largest horse herds on the continent and were almost unique among American Indians in learning selective breeding. As this enrichment and expansionism led to more tribal or intervillage consultation, they tended to dominate negotiations with other tribes.

The arrival of whites gradually changed their life. Just six years after the explorers Meriwether Lewis and William Clark visited the Nez Percé in 1805, fur traders and trappers began penetrating the area, followed later by missionaries. By the 1840s white settlers were moving through on the Oregon Trail, leading in 1855 to a treaty with the United States that created a large Nez Percé reservation, encompassing most of their traditional land. The discovery of gold on the Salmon and Clearwater rivers in 1860, however, and the influx of thousands of miners and then settlers, led U.S. commissioners in 1863 to force renegotiation of the treaty, fraudulently reducing the size of the reservation by three-fourths; subsequent invasions of homesteaders reduced the area even more. Many Nez Percé, perhaps a majority, had never accepted either the old treaty or the new, and hostile actions and raids by both whites and Indians finally evolved into the Nez Percé War of 1877. For five months a small band of 250 Nez Percé warriors, under the leadership of Chief Joseph, held off a U.S. force of 5,000 troops led by General O.O. Howard, who tracked them through Idaho, Yellowstone Park, and Montana before they surrendered to General Nelson A. Miles on October 5. In the campaign, Chief Joseph lost 239 persons, including women and children, and the United States lost 266. The tribe was then assigned to malarial country in Oklahoma rather than being returned to the Northwest as promised. (*See also* Joseph, Chief.)

Looking Glass, Nez Percé chief who fought under Chief Joseph in the Nez Percé War of 1877

Smithsonian Institution, National Anthropological Archives Photo No. 2963-A

In the late 20th century some 1,500 Nez Percé still remained on the Nez Percé Reservation in Idaho, but most had left to join the general U.S. population, largely as small landowners or labourers.

Nezahualcóyotl, also spelled NETZAHUALCÓYOTL, municipality northeast of Mexico City, México *estado* ("state"), central Mexico. Situated at the northeastern end of the Valle de México just outside of Mexico City, Nezahualcóyotl has become Mexico's third largest locality (after the Federal District and Guadalajara). Settlement began shortly after 1900, when Lake Texcoco was reduced in size and large areas of land were uncovered along the southern shore. Although the marshy land was initially inhospitable because of periodic flooding in the summer and strong winds in the winter and spring, it became more attractive to potential colonists after the creation of new population divisions was prohibited within the Federal District, in 1946. In that same year the government built Xochiaca Dam to the north to provide flood protection in the Lake Texcoco Zone and authorized the sale of parcels of land there at very low prices. Thousands of people were attracted, but problems soon arose, as the lots were sold without provision for public services and private efforts to contract for needed services were not satisfactory. In 1958, as the population of the new colonies nearby grew rapidly and conflicts between buyers and sellers intensified, the government passed legislation requiring that any new land sales must include service arrangements. A municipal administration was solidified in 1963, when the localities of Chimalhuacan, La Pas, Texcoco, Ecatepec, and Atenco were agglomerated into the municipality of Nezahualcóyotl, with its headquarters in Ciudad de Nezahualcóyotl. The municipality is connected by highway to Mexico City, sharing several urban and suburban bus lines, and its economy is heavily dependent on the city. Pop. (1990) 1,255,456.

Neẓāmī, in full ELYĀS YŪSOF NEẒĀMĪ GANJAVĪ, NEẒĀMĪ also spelled NIẒĀMĪ (b. *c.* 1141, Ganja, Seljuq empire [now Gyandzha, Azerbaijan]—d. 1209, Ganja), greatest romantic epic poet in Persian literature, who brought a colloquial and realistic style to the Persian epic.

Little is known of Neẓāmī's life. Orphaned at a young age, he spent his entire life in Ganja, leaving only once to meet the ruling prince. Although he enjoyed the patronage of a number of rulers and princes, he was distinguished by his simple life and straightforward character.

Only a handful of his *qaṣīdah*s ("odes") and *ghazal*s ("lyrics") have survived; his reputation rests on his great *Khamseh* ("The Quintuplet"), a pentalogy of poems written in *mas̄navī* verse form (rhymed couplets) and totaling 30,000 couplets. Drawing inspiration from the Persian epic poets Ferdowsī and Sanāʾī, he proved himself the first great dramatic poet of Persian literature. The first poem in the pentology is the didactic poem *Makhzan al-asrār* (*The Treasury of Mysteries*), the second the romantic epic *Khosrow o-Shīrīn* ("Khosrow and Shīrīn"). The third is his rendition of a well-known story in Islāmic folklore, *Leyli o-Mejnūn* (*The Story of Leyla and Majnun*). The fourth poem, *Haft paykar* (*The Seven Beauties*), is considered his masterwork. The final poem in the pentalogy is the *Sikandar* or *Eskandar-nāmeh* ("Book of Alexander the Great"; Eng. trans. of part I, *The Sikander Nama*), a philosophical portrait of Alexander.

Neẓāmī is admired in Persian-speaking lands for his originality and clarity of style, though his love of language for its own sake and of philosophical and scientific learning makes his work difficult for the average reader.

Nezhin (city, Ukraine): *see* Nizhyn.

Nezib, Battle of (1839): *see* Nizip, Battle of.

Neziqin (Hebrew: "Damages"), the fourth of the six major divisions, or orders (*sedarim*), of the Mishna (codification of Jewish oral laws), which was given its final form early in the 3rd century AD by Judah ha-Nasi. *Neziqin* deals principally with legally adjudicated damages and financial questions. The 10 tractates (treatises) of *Neziqin* are: *Bava qamma* ("First Gate"), *Bava metziʿa* ("Middle Gate"), *Bava batra* ("Last Gate"), *Sanhedrin* (the supreme executive and legislative body), *Makkot* ("Stripes"), *Shevuʿot* ("Oaths"), *ʿEduyyot* ("Testimonies"), *ʿAvoda zara* ("Idolatry"), *Avot* ("Fathers"), and *Horayot* ("Decisions"). Both the Palestinian and the Babylonian Talmud have Gemara (critical commentaries) on all the tractates, with the exception of *Avot* and *ʿEduyyot*.

NFL: *see* National Football League.

Ngada, also called ROKKA, or ROKANESE, tribe inhabiting the south coast of Flores, one of the Lesser Sunda Islands, in Indonesia. They live around the Inerie volcano and inland on the Badjava plateau. Primarily of Proto-Malay stock, they speak a Malayo-Polynesian language of the Ambon-Timor group, and numbered 35,000–40,000 in 1954. Claiming they migrated from Java, the Ngada were formerly hunters. Today they practice both wet (learned from the Dutch) and dry cultivation of rice and also grow corn (maize), millet, and vegetables. Ngada villages are composed of wooden pile houses, organized according to clan territories; land is portioned out to clan members. Descent is patrilineal and matrilineal; the oldest child receives the family inheritance. Marriage is strictly clan endogamous, and although sibling marriage is forbidden, marriage between cousins is encouraged. After marriage, the husband belongs to his wife's clan until full bridewealth is paid. Identified by a common ancestor and a geographic location, clans traditionally acted also as political units until the Dutch instituted the office of *radja.* Originally the Ngada recognized a high god (Déva) and his female component (Nitu), but since 1920 missionaries have worked among the Ngada, and today many Ngada are Roman Catholics.

Ngami, Lake, shallow lake at the southwest corner of the 4,000-square-mile (10,400-square-kilometre) Okavango Swamp in northwestern Botswana. The swamp and the lake are fed by the Okavango River, which loses most of its flow through evaporation in the marshes. Lake Ngami is 3,057 feet (932 m) above sea level. When the explorer David Livingstone first sighted it in 1849, he estimated it to be more than 170 miles (275 km) in circumference, but by 1950 it had become a sea of grass, and during a severe drought in 1965–66 it dried up completely. Because thousands of cattle belonging to the local inhabitants were dependent on the lake for water, the drought caused much hardship. Abundant rains since then have again filled the lake, although it is much smaller than it was when Livingstone first saw it. It is rich in birdlife and contains barbel fish, which are able to survive in mud for months while the lake is dry. Lake Ngami has no natural outlet; if it became filled, the Kunyere and Nghabe valleys would be submerged, and any excess water would be deflected into the Boteti (Botletle) River.

Ngaoundéré, also spelled N'GAOUNDÉRÉ, or N'GAUNDÉRÉ, town, north-central Cameroon, on the Adamawa Plateau. It is the northern terminus of the Trans-Cameroon Railway to Yaoundé and Douala and lies on the major north-south road from Garoua to Bertoua and Yaoundé; by these routes it exports livestock and peanuts (groundnuts) to southern Cameroon. Local development projects focus on animal husbandry. The town's industries include dairying, slaughtering, preparation of hides and skins, perfume manufacture, and cotton ginning. Major bauxite deposits are exploited to the south. Tourism is significant, encouraged by large game reserves to the northeast and northwest. A hospital, an airport, and customs and meteorological stations serve the town.

Ngaoundéré is important as a traditional Fulani capital. It was founded in the first half of the 19th century as a part of the kingdom of Adamawa by the Fulani emir Modibbo Adama. Pop. (1987) 78,210.

Ngasaunggyan, Battle of (1277), Mongol defeat of Burmese troops that led to the demise of the Pagan dynasty of Myanmar (Burma). After unifying China, the Mongol ruler Kublai Khan sent envoys to neighbouring kingdoms, obliging them to accept Mongol vassalage. The Pagan king Narathihapate (reigned 1254–87) shunned the first Mongol embassy and massacred the members of the second. Confident of victory because of recent Burmese conquests of the territory up to Nanchao, Narathihapate advanced boldly into Yunnan in 1277, accompanied by scores of elephants and soldiers. He met the Mongol troops at Ngasaunggyan, where he was decisively defeated. Thereafter Burmese opposition disintegrated. The border fortresses near Bhamo fell in 1283, thus opening the Irrawaddy River valley to invasion. Narathihapate fled southward to Bassein, where he decided to submit to Mongol vassalage, but he was assassinated by his son in 1287. The Mongols, in full control as far south as Pagan, installed a puppet in Myanmar in 1289, thus extinguishing the power of the Pagan dynasty.

Ngata, Sir Apirana Turupa (b. July 3, 1874, Kawaka, N.Z.—d. July 14, 1950, Waiomatatini), political and cultural leader of the Maori community in New Zealand. He was a major force behind the improvement of government policy toward the Maori in the early 20th century.

Earning his law degree in 1897, Ngata became the first Maori graduate of a New Zealand university and worked briefly as a lawyer before becoming active in the nationalist Young Maori Party. In 1905 he began his 39-year term of office in Parliament, representing the eastern Maori constituency. He was knighted in 1927, and he served as minister of native affairs from 1928 to 1934.

In 1931 Ngata inaugurated his Maori land-development plan, which improved the quality of his people's agriculture and expanded the amount of Maori land under cultivation. His efforts to improve educational opportunities for the Maori included the founding of the Maori Purposes Fund to finance school construction.

Deeply committed to the preservation of the Maori culture, Ngata helped to found the Maori Board of Ethnological Research and served as its chairman from 1928 to 1934. His contributions to Polynesian anthropology included a nine-year term as president of the Polynesian society and his *Nga Moteatea* (1929), largely a collection of songs and chants of the various Maori tribes.

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Ngbandi, also spelled GBANDI, also called MOGWANDI, a people of the upper Ubangi (Oubangui) River in southern Central African Republic and northern Zaire. Ngbandi speak a language of the Adamawa-Eastern subgroup of the Niger-Congo family that is related to that of neighbouring Banda and Baya. "Ngbandi" is a term preferred by Belgian ethnographers, while the French include these people with such "Ubangian" peoples as the Banziri, Nzakara, Sango, and Yakoma. The Ngbandi came from what are now the southern regions of The Sudan, converging upon and assimilating a number of small groups in their present lands. Ngbandi of the Bandia clan conquered Azande areas in the 18th century, creating a series of states; they assimilated Azande culture and language and are now indistinguishable from that group.

Rural Ngbandi grow corn (maize), cassava, peanuts (groundnuts), sweet potatoes, lima beans, peppers, pineapples, papayas, and tobacco. Traditionally, men have hunted, fished, and cleared land for cultivation, while women have gathered wild foods and done the hoeing, planting, and harvesting. Rural-urban migration of able-bodied men and women in search of work has been steadily increasing with the growth of the money economy.

The Ngbandi traditionally lived in compact villages consisting of a single row of dwellings. They have been mainly patrilineal, though there have been circumstances in which a man might reside with his maternal uncle. Ngbandi chiefs have acted as arbiters and priests of the ancestral cult central to traditional social life. Polygamy is practiced but has been on the decline for many years.

The Ngbandi were once renowned warriors, and their craftsmen produced lances and knives of high quality that were traded with many neighbouring groups; these are now prized by collectors of African art. Ngbandi also produced elegant curved-neck harps reminiscent of those of their ancestral peoples living in Chad and the southern part of The Sudan.

Ngbanya (people): *see* Guang.

NGC, abbreviation of *New General Catalogue of Nebulae and Clusters of Stars* (*q.v.*).

Ngelengwa (African ruler): *see* Msiri.

Ngengi, Kamau (president of Kenya): *see* Kenyatta, Jomo.

Ngo Dinh Diem (b. Jan. 3, 1901, Quang Binh province, northern Vietnam—d. Nov. 2, 1963, Cho Lon, South Vietnam), Vietnamese political leader who served as president, with dictatorial powers, of South Vietnam from 1955 until his assassination.

Diem was born into one of Vietnam's noble families. His ancestors in the 17th century had been among the first Vietnamese converts to Roman Catholicism. He was on friendly terms with the Vietnamese imperial family in his youth, and in 1933 he served as the emperor Bao Dai's minister of the interior, but he resigned that same year in frustration at French unwillingness to countenance his legislative reforms. Relinquishing his titles and decorations, he spent the next 12 years living quietly in Hue. In 1945 Diem was captured by the forces of the Communist leader Ho Chi Minh, who invited him to join his independent government in the North, hoping that Diem's presence would win Catholic support. But Diem rejected the proposal and went into self-imposed exile, living abroad for most of the next decade.

In 1954 Diem returned at Bao Dai's request to serve as prime minister of a U.S.-backed government in South Vietnam. After defeating Bao Dai in a government-controlled referendum in October 1955, he ousted the emperor and made himself president of the newly declared Republic of Vietnam (South Vietnam). Diem refused to carry out the Geneva Accords, which had called for free elections to be held throughout Vietnam in 1956 in order to establish a national government. With the south torn by dissident groups and political factions, Diem established an autocratic regime that was staffed at the highest levels by members of his own family. With U.S. military and economic aid, he was able to resettle hundreds of thousands of refugees from North Vietnam in the south, but his own Catholicism and the preference he showed for fellow Roman Catholics made him unacceptable to Buddhists, who were an overwhelming majority in South Vietnam. Diem never fulfilled his promise of land reforms, and during his rule, Communist influence and appeal grew among southerners as the Communist-inspired National Liberation Front, or Viet Cong, launched an increasingly intense guerrilla war against his government. The military tactics Diem used against the insurgency were heavy-handed and ineffective and only served to deepen his government's unpopularity and isolation.

Diem's imprisoning and killing of hundreds of Buddhists, who he alleged were abetting Communist insurgents, finally persuaded the United States to withdraw its support from him. Diem's generals assassinated him during a coup d'état.

Ngo Quyen (b. 897?—d. 944), Vietnamese liberator, known for his military tactics, who founded the first enduring Vietnamese dynasty and laid the foundation for an independent Vietnamese kingdom, which he called Nam Viet.

Ngo Quyen was prefect, under Chinese domination, of Giao Chau province in the valley of the Red River in what is now northern Vietnam. In 938–939 he defeated the Chinese at the Bach Dang River north of modern Haiphong and declared an autonomous kingdom. He established his capital on the Red River at Co Loa, believed to have been the capital of Vietnam's legendary Au Lac dynasty. Ngo Quyen could maintain only a tenuous control over his domain because feudal lords, known as *su quan,* refused to cooperate with his centralized authority. They tried to wrest power from Ngo Quyen, who barely managed to save the throne for his successors.

Ngo Quyen's military tactics, used to expel the Chinese in 939, were imitated by later generals in the course of Vietnamese history. His reign marked a turning point for Vietnam. Although China attacked repeatedly in the centuries to come, the kingdom of Nam Viet remained autonomous until the French seized control in the 19th century.

Ngo Quyen's immediate heirs proved unable to maintain a unified state. After his death in 944, Duong-Binh Vuong Tam-Kha usurped the throne for a brief time—until Ngo Quyen's two sons, Ngo Nam-Tan Vuong Xuong-Van and Ngo Thien-Sach Vuong Xuong-Ngap, finally established a joint rule, which lasted until the collapse of the Ngo dynasty in 954.

Ngo Van Chieu, also called NGO MINH CHIEU (b. 1878, Binh Tay, Vietnam—d. 1926?, Tay Ninh), founder of the Vietnamese religious sect Cao Dai (*q.v.*).

Ngo Van Chieu graduated from a provincial college in My Tho and entered the French colonial immigration service, where he served until 1902. In 1919, during a séance, he received what he conceived to be a revelation calling him to a religious mission. After a period of study and meditation, he announced the formation of Cao Dai (literally meaning "High Tower," a Taoist epithet for the supreme deity). Cao Dai was formally established in 1926 by Le Van Trung, a former government official, who became its leader, or "pope." Cao Dai contains elements of Confucianism, Taoism, Buddhism, and Roman Catholicism.

Ngoko River (Cameroon): *see* Dja River.

Ngonde (people): *see* Nyakyusa.

Ngoni, also called ANGONI, ABANGONI, MANGONI, and WANGONI, approximately 12 groups of people of the Nguni (*q.v.*) branch of Bantu-speaking peoples that are scattered throughout eastern Africa. Their dispersal was due to the rise of the Zulu empire early in the 19th century, during which many refugee bands moved away from Zululand. One Ngoni chief, Zwangendaba, led his party to Lake Tanganyika; the descendants of his group, the Ngoni cluster proper, are located in northern Malaŵi, in Zambia, and in southern Tanzania. Another group found its way to Mozambique.

Each Ngoni group formed a small independent state with a central administration based on patrilineal succession. It raided its weaker neighbours, and when the fertility of its own cultivated area was exhausted, the group moved elsewhere.

The superior Ngoni military organization, based, like that of the Zulu, on universal conscription into age-set regiments, enabled them to capture many of the people whose lands they seized or pillaged. Some captives were sold as slaves to Arabs, but many were assimilated into the tribe, some achieving high rank in the army and administration. Despite losses from warfare, the population increased greatly, leading eventually to splits in the state and the dispersal of rival segments.

Internally, each state, at least among Zwangendaba's people, was divided into several such segments, many of which were under the nominal leadership of queens.

The settlement pattern was characterized by large, compact villages surrounding a central cattle pen. Villages were built quite close to one another and might contain 2,000 or 3,000 inhabitants. A belt of empty land surrounded the settled area, separating it from the territories of the tribes raided by the Ngoni.

At the end of the 19th century, Portuguese, British, and German forces invaded the areas in which the Ngoni had been unchallenged for 50 years, and by 1910 all Ngoni had come under colonial control.

Ngorongoro Crater, extinct volcanic crater (caldera) in the Great Rift Valley, northern Tanzania. It lies 75 miles (120 km) west of the town of Arusha. The crater measures between 10 and 12 miles (16 and 19 km) across and has an area of 102 square miles (265 square km). Its rim rises to 7,500 feet (2,286 m), while its floor is 2,000 feet (600 m) below the rim. The crater is thought to have formed about 2,500,000 years ago from a large active volcano whose cone collapsed inward after a major eruption, leaving the present extremely large caldera as its chief remnant. The crater is home to a great array of African wildlife, including elephant, rhinoceros, lion, buffalo, zebra, reedbuck, and Thomson's gazelle. Flamingos frequent shallow Lake Magadi, a soda lake on the crater's floor. The local Masai people also graze their livestock in the crater.

Valley floor of the Ngorongoro Crater

Lynn McLaren—Photo Researchers, Inc.

The Ngorongoro Crater became part of Serengeti National Park in 1951 but was made a separate conservation area in 1959. It is the focus of one of Africa's major wildlife conservation areas and has an overwhelming "crater-of-the-Moon" appearance.

Ngoy, former kingdom on the Atlantic coast of Central Africa, just north of the Congo (Zaire) River, in an area that is now part of southern Cabinda (an exclave of Angola) and western Zaire. It was founded by Bantu-speaking people about the 15th century. The domestic and foreign slave trade rapidly became a major feature of the economy, with the port of Cabinda serving as the locus of foreign trade. When the Portuguese built a fort in Cabinda in 1783, Ngoy allied with neighbouring Kakongo and with the French to destroy it. Exporting slaves gradually brought wealth and power to the Ngoy nobility at the expense of the king, who was rendered ineffectual. The kingdom finally disintegrated into petty principalities after the nobles failed to elect a new king in the 1830s.

Ngozi, town, north-central Burundi. It is a market centre located at an elevation of about 5,740 feet (1,750 m). The surrounding area supports cattle raising and the growing of coffee, bananas, cassava, sweet potatoes, beans, and corn (maize). Other important activities in the region include the mining of cassiterite (a tin ore) and the processing of tea. There is a government hospital in Ngozi, as well as places of worship for Roman Catholics, Protestants, and Muslims. A road to the south links Ngozi with Gitega town, Burundi's second-largest town and a centre of trade and important services. Pop. (1990) town, 14,511.

Ngubane, Jordan Kush, Kush also spelled KHUSH (b. Nov. 15, 1917, Ladysmith, Natal [now KwaZulu/Natal], S.Af.—d. 1985), Zulu novelist, scholar, and editor for the South African publications *Ilanga lase Natal* ("The Natal Sun," Durban), *Bantu World* (Johannesburg), and *Inkundla ya Bantu* ("Bantu Forum," Verulam).

Ngubane took his degree at Adams College, near Durban. Because of increasing pressures, he moved his family in 1962 to Swaziland, where he farmed a modest property and did occasional writing. In 1969 he went to the United States on a Ford Foundation grant to teach at Howard University, Washington, D.C. He returned in the spring of 1980 to his Zulu homeland to accept a cabinet post as minister of information.

Ngubane worked closely with the Zulu chief Albert Lutuli during the latter's busiest period, from 1940 until he was awarded the Nobel Prize for Peace (1960).

Ngubane's one Zulu-language novel, *Uvalo Lwezinhlonzi* (1957; "His Frowns Struck Terror"), was popular when it appeared and was even a required school text before being banned from 1962 to 1967. His nonfictional works include *An African Explains Apartheid* (1963) and *Conflict of Minds* (1979). In 1979 he published a long study analyzing similarities and differences between the racial problems in the United States and in South Africa. He also published some poetry and short fiction. In 1974 Ngubane published his only English-language novel, *Ushaba: The Hurtle to Blood River;* he referred to the book as a "Zulu

Umlando," which he defined as "a story of ideas in action." "The narrator or *umlandi* is a witness of history," he wrote, and "as a rule, his authority rests on the fact that he was present at the critical moment when history took a new turn.... He deals with idea-forms, the subjective-moulds in which events are first cast."

Consult the INDEX *first*

Ngugi wa Thiong'o, original name JAMES THIONG'O NGUGI (b. Jan. 5, 1938, Limuru, Kenya), East Africa's leading novelist, whose popular *Weep Not, Child* (1964) was the first major novel in English by an East African. As he became sensitized to the effects of colonialism in Africa, he adopted his traditional name and wrote in the Bantu language of Kenya's Kikuyu people.

Ngugi received bachelor's degrees from Makerere University, Kampala, Uganda, in 1963 and from Leeds University, Yorkshire, Eng., in 1964. After doing graduate work at Leeds, he served as a lecturer in English at University College, Nairobi, Kenya, and as a visiting professor of English at Northwestern University, Evanston, Ill., U.S. From 1972 to 1977 he was senior lecturer and chairman of the department of literature at the University of Nairobi.

The prizewinning *Weep Not, Child* is the story of a Kikuyu family drawn into the struggle for Kenyan independence during the state of emergency and the Mau Mau rebellion. *A Grain of Wheat* (1967), generally held to be artistically more mature, focuses on the many social, moral, and racial issues of the struggle for independence and its aftermath. A third novel, *The River Between* (1965), which was actually written before the others, tells of lovers kept apart by the conflict between Christianity and traditional ways and beliefs and suggests that efforts to reunite a culturally divided community by means of Western education are doomed to failure. *Petals of Blood* (1977) deals with social and economic problems in East Africa after independence, particularly the continued exploitation of peasants and workers by foreign business interests and a greedy indigenous bourgeoisie. In a novel written in Kikuyu and English versions, *Caitaani Mutharaba-ini* (1980; *Devil on the Cross*), Ngugi presents these ideas in an allegorical form. Written in a manner meant to recall traditional ballad singers, the novel is a partly realistic, partly fantastical account of a meeting between the Devil and various villains who exploit the poor.

The Black Hermit (1968; produced 1962) was the first of several plays, of which *The Trial of Dedan Kimathi* (1976; produced 1974), cowritten with Micere Githae Mugo, is considered by some critics to be his best. He was also coauthor, with Ngugi wa Mirii, of a play first written in Kikuyu, *Ngaahika Ndeenda* (1977; *I Will Marry When I Want*), the performance of which led to his detention for a year without trial by the Kenyan government. (His book *Detained: A Writer's Prison Diary*, which was published in 1981, describes his ordeal.) The play attacks capitalism, religious hypocrisy, and corruption among the new economic elite of Kenya. *Matigari ma Njiruungi* (1986; *Matigari*) is a novel in the same vein.

Ngugi presented his ideas on literature, culture, and politics in numerous essays and lectures, which were collected in *Homecoming* (1972), *Writers in Politics* (1981), *Barrel of a Pen* (1983), and *Moving the Centre* (1993). In *Decolonising the Mind: The Politics of Language in African Literature* (1986), Ngugi argued for African-language literature as the only authentic voice for Africans and stated his own intention of writing only in Kikuyu or Kiswahili from that point on. Such works earned him a reputation as one of Africa's most articulate social critics.

Nguni, cluster of related Bantu-speaking ethnic groups living in South Africa, Swaziland, and Zimbabwe, whose ancestors inhabited a broad band of upland territory extending from the Great Fish River, in what is now Eastern Cape province, northward to Kosi Bay, near the border of KwaZulu/Natal and Mozambique, that paralleled the Indian Ocean. Although the people of this zone originally spoke a Bantu language in common, with only subtle and gradual linguistic variations, distinct (and mostly mutually unintelligible) Bantu languages developed during the late 19th and early 20th centuries—*e.g.,* Xhosa, Zulu, and Swazi. The Nguni languages are unique among Bantu languages in that they have imploded "clicking" phonemes. These sounds were absorbed into the language through the Ngunis' intermarriage with the area's earlier Khoisan-speaking peoples, whose languages were characterized by such click sounds.

At the start of the 19th century the Nguni were divided into a number of political entities. Each had its own chief, who was drawn from any of a number of recognized chiefly lineages that had both political and ritual powers. These groups included the Ndlambe, Gcaleka, Thembu, Mpondo, Mpondomise, Bhaca, Hlubi, Mtethwa, and Zulu. The people dwelling in these polities cultivated millet and kept a large number of cattle, which had both a subsistence role and a social role in Nguni society. There was a distinct division of labour: women were associated with hoe cultivation and men with cattle husbandry. The Nguni followed patterns of patrilineal descent and virilocal residence and practiced exogamous marriage, with wives obtained legally through the transfer of cattle as bridewealth (*lobola*).

The Nguni way of life changed greatly during the 19th century. One of the major factors was the Mfecane ("The "Crushing"), a period of wars and resettlement begun in the 1820s by Shaka, king of the Zulu. Shaka created an expansive Zulu state that waged war on neighbouring peoples, causing them to be incorporated into the Zulu state or to flee as refugees. These refugees, copying the new military discipline and the strategy developed by Shaka, were able to conquer other African peoples and to establish new states throughout southern and central Africa. These included the Ndebele state in southwestern Zimbabwe, under Mzilikazi; the Gaza state in southern Mozambique, under Soshangane; the Swazi state in Swaziland, under the Dlhamini family; and a cluster of Ngoni states in Tanzania, Zambia, and Malaŵi, under the successors of the Ngoni leader Zwangendaba.

Another major event, less cataclysmic yet more far-reaching in its impact, was the gradual undermining of Nguni society by expanding European power. A series of wars were fought between the southern Nguni peoples and the Europeans in the Cape of Good Hope. In piecemeal fashion the southern Nguni were conquered, their lands occupied, and their cattle seized, thus forcing large numbers of Nguni men to become migrant labourers throughout southern Africa. This process, gradual at first, accelerated sharply in the period after 1886, when large gold deposits were discovered in the Witwatersrand.

The process of industrialization sparked by the gold mines has continued throughout the 20th century, requiring large numbers of workers. In this capacity, the Nguni speakers have become one of the main underpinnings of the economy and are found as urban people throughout South Africa, rather than exclusively in the areas from which they had originally derived.

Despite the urbanization of the Nguni, the South African government, through much of the 20th century, attempted to maintain "traditional" Nguni cultural institutions and chiefs in rural areas under its system of apartheid and separate black states. Many contemporary Nguni-speaking peoples, however, were born in urban areas and have little connection with the rural areas of their ancestors. In consequence of this development, Nguni may best be considered as a linguistic term, with its cultural associations largely eroded.

Nguru, town, northwestern Yobe state, northern Nigeria, near the Hadejia River, a seasonal tributary of the Komadugu Yobe River, which flows into Lake Chad. Precisely when the town was founded is unknown, but by the early 16th century it had been incorporated into the Bornu kingdom (*see* Kanem-Bornu) of the Kanuri people and was the seat of the *galadima,* the Bornu governor of the western provinces. Nguru's location in the disputed area between the Hausa states and Bornu led it to be temporarily occupied by the forces of Muḥammad Kisoki, the Hausa king (1509–65) of Kano, 150 miles (240 km) west-southwest. Nguru was also the site about 1561 of the major victory by Kebbi, a Hausa state to the west, over Bornu; but Bornu succeeded in regaining the town shortly thereafter. Nguru once again became the seat of the *galadima* about 1808, when Fulani warriors almost destroyed the town in their victorious jihad, or holy war.

Since the arrival of the railroad in 1929, Nguru has become one of Nigeria's major collecting points for gum arabic, and it also ships peanuts (groundnuts), cotton, meat, hides, and skins by rail to Lagos. A modern abattoir and refrigeration plant was built there in the 1960s to process the cattle and goats pastured during the dry season in the Hadejia valley. The town serves as the chief trade centre (sorghum, millet, peanuts, cowpeas, cotton) for the nearby predominantly Muslim Kanuri, Bede (Bedde), and Manga peoples. Nguru is the northeastern terminus of the railway branch from Zaria and Kano. It is also served by a local highway that connects it with the main highway network at Damaturu, to the southeast. Pop. (1991 est.) 87,660.

Nguyen DYNASTY (1802–1945), the last Vietnamese dynasty, which was founded and dominated by the powerful Nguyen family. The Nguyen family emerged into prominence in the 16th century, when Vietnam was under the Le dynasty (*see* Later Le dynasty).

After Mac Dang Dung usurped the Vietnamese throne in 1527, Nguyen Kim fought to restore a Le emperor in 1533, leaving the Mac family in power in the northern section of the country. Members of the Nguyen family acted as mayors of the palace to the weak Le rulers, but by the mid-16th century this role passed to the Trinh family (*q.v.*), and Nguyen power became associated with the southernmost sections of the Vietnamese state. Longstanding rivalry between the Nguyen and the Trinh became open warfare in 1620, with hostilities continuing intermittently until 1673. By that date both families accepted a de facto division of the Vietnamese state.

Although never accorded royal status by the Chinese, the Nguyen ruled over southern Vietnam in an essentially independent fashion. During the 17th and 18th centuries the Nguyen encouraged Vietnamese settlement into lands formerly occupied by the Chams and the Cambodians. Much of the settlement of Cham and Cambodian lands, however, was done by Chinese refugees fleeing the collapse of the Ming dynasty. The Chinese were actively courted by the Nguyen, who were in desperate need of manpower in order to resist the encroachment of their northern rivals, the Trinh, and to expand their territorial base southward. Cho-lon, Bien Hoa, and many other towns in the Mekong River delta and along the southern coast were founded at this time on the sites of Chinese emporia (*phô*).

Nguyen power in southern Vietnam was challenged and nearly eclipsed by the revolt of the Tay Son brothers (*q.v.*) that broke out in 1771. A young prince, Nguyen Anh, survived to lead an eventual recovery of Nguyen territory and finally to become the emperor Gia Long (*q.v.*), who ruled over the whole of Vietnam from 1802 and was the founder of the Nguyen dynasty.

Modeling their administration after that of the Chinese Ch'ing dynasty (1644–1911), the Nguyen, particularly after Gia Long's death in 1820, followed a conservative policy that opposed foreign missionary activity in Vietnam. The French, partly as a result of this antimissionary policy, invaded Vietnam in 1858, initially landing at Tourane (Da Nang), and then establishing a base at Saigon. They forced the emperor Tu Duc (*q.v.*), then facing revolts elsewhere, to cede the three eastern provinces of southern Vietnam, called Cochinchina (*q.v.*) by the French, to France in 1862. Five years later the French gained control of all Cochinchina. French control over the whole of Vietnam was established following invasions in 1883–85, and Vietnam's ancient vassalage relationship with China was ended. The Nguyen dynasty was, however, retained in Hue with nominal control over central Vietnam, called Annam (*q.v.*) by the French, and over northern Vietnam, called Tonkin (*q.v.*). Cochinchina, in contrast, had the status of a colony. The French continued to dominate the throne until 1945, when the last emperor, Bao Dai (*q.v.*), abdicated, following the Vietnamese Nationalist forces' proclamation of independence. Bao Dai served as chief of state from 1949 until he was deposed by Ngo Dinh Diem in a national referendum in 1955.

Nguyen Ai Quoc (Vietnamese leader): *see* Ho Chi Minh.

Nguyen Anh, also called NGUYEN PHUC ANH (Vietnamese emperor): *see* Gia Long.

Nguyen Bun Dao (Vietnamese emperor): *see* Khai Dinh.

Nguyen Cao Ky (b. Sept. 8, 1930, Son Tay, northern Vietnam), South Vietnamese military and political leader known for his flamboyant manner and militant policies.

A member of the French forces that opposed the Vietnamese liberation movement, Ky joined the South Vietnamese Air Force after the nation was partitioned in 1954. He attracted much attention because of his vehement anticommunism, as well as his bravado, and was highly favoured by U.S. advisers in Vietnam. As a result he was named commander of South Vietnam's air force after the 1963 overthrow of the Ngo Dinh Diem government. With U.S. aid, Ky soon built up a fighting force of 10,000 men.

In June 1965 Ky, together with Major General Nguyen Van Thieu and General Duong Van Minh, led a military coup in unseating the government of Premier Phan Huy Quat. As the head of that triumvirate, Ky provoked widespread opposition to his authoritarian policies. In 1967 the top military leaders reached an agreement by which Thieu would run for president and Ky for vice president of a new regime. Unhappy with his new position, Ky became an outspoken critic of Thieu's administration. In 1971 he attempted to oppose Thieu for the presidency but was forced to remove himself as a candidate and returned to the air force. Upon the fall of South Vietnam in April 1975, Ky fled to the United States.

After coming to the United States Ky made tours, lecturing at several universities and promoting his book, *Twenty Years and Twenty Days,* published in 1976.

Nguyen Du, in full NGUYEN-DU THANH-HIEN, pseudonym TO NHU (b. 1765, Tien Dien, Vietnam—d. Aug. 10, 1820, Hue), best-loved poet of the Vietnamese and creator of the epic poem *Kim van Kieu,* written in *chu-nom* (southern characters). He is considered by some to be the father of Vietnamese literature.

Nguyen Du passed the mandarin examinations at the age of 19 and succeeded to a modest military post under the Le dynasty. He served the Le rulers, as his family had done for generations, until their dynasty fell in 1787. Nguyen Du was for a period associated with efforts to restore the Le to power, but, unable to achieve this goal, he withdrew to the mountains of Hong Linh near his native village. When in 1802 the new Nguyen ruler Gia Long succeeded in uniting the country and called Nguyen Du to court, he reluctantly obeyed and subsequently held many official posts.

While serving in Quang Binh in northern Vietnam in 1813, he attained the rank of Column of the Empire and was subsequently appointed head of a delegation to Peking. During this mission he translated a Chinese novel, dating from the Ming period, into Vietnamese poetry as *Kim van Kieu* (English translation by Huynh Sanh Thong, *The Tale of Kieu: The Classic Vietnamese Verse Novel*; 1973). As an exploration of the Buddhist doctrine of karmic retribution for individual sins, his poem expresses his personal suffering and deep humanism. He also wrote "Words of a Young Hat Seller," a shorter poem in a lighter vein; *Chieu hon* ("Address to the Dead"); and many other poems in Chinese rather than Vietnamese.

Nguyen Du was assigned to two other ambassadorial missions to Peking; before he was able to depart on the last one, however, he died of a long illness for which he stoically refused treatment.

Nguyen Hue (Vietnamese revolutionary leader): *see* Tay Son brothers.

Nguyen Huu Tho (b. July 10, 1910, Cho Lon, southern Vietnam—d. Dec. 24, 1996, Ho Chi Minh City, Vietnam), chairman of the National Liberation Front (NLF), the South Vietnamese political organization formed in 1960 in opposition to the U.S.-backed Saigon government.

The son of a rubber-plantation manager who was later killed during the First Indochina War (1946–54), Nguyen Huu Tho studied law in Paris in the 1930s. Returning to Saigon, he set up practice, remaining politically inactive until 1949, when he led student demonstrations against the French; he also organized protests in 1950 against the patrolling of the southern Vietnamese coast by U.S. warships. He was imprisoned and won popular acclaim for his prolonged hunger strike in protest of the war.

After the Geneva Agreements had divided Vietnam into northern and southern zones in 1954, Tho cooperated with the southern regime of Ngo Dinh Diem until he was arrested for advocating nationwide elections on reunification. Except for a short interval in 1958, Tho remained in prison from 1954 to 1961, when he escaped with the aid of some of his anti-Diem followers. These men, who had recently formed the National Liberation Front, made Tho, a noncommunist, provisional and then full-time chairman of the NLF.

Tho essentially served as a figurehead leader, while real power in the NLF was held by its military arm, the Viet Cong, and by veteran communists who reported directly to the North Vietnamese leadership. Tho helped attract a wide spectrum of South Vietnamese supporters to the NLF. In June 1969 the NLF established a Provisional Revolutionary Government (PRG) with Huynh Tan Phat as president and Nguyen Huu Tho as chairman of its advisory council. The PRG, in effect, became the government of South Vietnam in April 1975, when the Saigon government's troops surrendered to the North Vietnamese and PRG forces. Tho was made a vice president of Vietnam in 1976, a post he held until 1980, when he became acting president. In 1981 Tho was made vice president of the Council of State, as well as chairman of the Standing Committee of the National Assembly.

Nguyen Khanh (b. 1927), military and political leader who participated in a successful coup d'état against the South Vietnamese dictator, President Ngo Dinh Diem, in 1963 and served briefly as president of South Vietnam in 1964.

Khanh served in the French colonial army until 1954 and rose through the ranks of the Vietnamese army to become chief of staff to General Duong Van Minh. He joined Minh and other high military officials in assassinating Diem on Nov. 1, 1963, and led a countercoup against Minh in 1964. Khanh administered the government of South Vietnam in January–October 1964. His regime was undermined by several coups; he himself resigned once. After General Nguyen Cao Ky took control of the government in February 1965, Khanh was named roving ambassador but was, in effect, exiled to the United States.

Nguyen Lu (Vietnamese revolutionary leader): *see* Tay Son brothers.

Nguyen Nhac (Vietnamese revolutionary leader): *see* Tay Son brothers.

Nguyen Phuoc Chi Dam (Vietnamese emperor): *see* Minh Mang.

Nguyen Phuoc Hoang Nham (Vietnamese emperor): *see* Tu Duc.

Nguyen Phuoc Tan (Vietnamese ruler): *see* Hien Vuong.

Nguyen Tat Thanh (Vietnamese leader): *see* Ho Chi Minh.

Nguyen Tri Phuong (b. 1806, near Saigon [now Ho Chi Minh City], Vietnam—d. Nov. 20, 1873, Hanoi), general dedicated to protecting Vietnam from European influence and military conquest by France. He was a conservative and a close adviser to the emperor Tu Duc (reigned 1847–83).

The son of a provincial administrator, Nguyen Tri Phuong entered the military service and distinguished himself by repelling the Siamese invasion of Chau Doc, on the Cambodian border, and recapturing Ha Tien. At the death of General Truong Minh Giang in 1841, Nguyen Tri Phuong was named as his successor and became viceroy of lower Cochinchina (modern southern Vietnam).

Nguyen Tri Phuong linked himself to the monarchy by arranging the marriage of one of his daughters to Tu Duc, becoming one of the most powerful ministers at the court of Hue. Together, he and Tu Duc kept Vietnam closed to the West but, in refusing to adopt Western technology, left the country backward and vulnerable to conquest by the French.

Nguyen Tri Phuong delayed French conquest by his defense against Admiral Charles Rigault de Genouilly at Tourane (now Da Nang) in 1859, but he was decisively beaten in 1861 by Admiral Léonard Charner at Chi Hoa, near Saigon (now Ho Chi Minh City), and France was ceded several southern provinces. His final defeat in 1873 occurred in the defense of the Hanoi citadel. Taken prisoner, he availed himself of a traditional Vietnamese means of political and moral protest by tear-ing at his bandages and starving himself to death.

Nguyen Truong To (b. 1828, Nghe An province, Vietnam—d. 1871), an early advocate of modernization and political reform in Vietnam who was among the first Vietnamese to travel abroad and to realize the adjustments his country needed in order to survive.

A convert to Roman Catholicism, Nguyen Truong To traveled with French priests to Italy and France; upon his return to Vietnam in the 1860s, he was received by Emperor Tu Duc, to whom he advocated modernization. In 1866 Tu Duc sent him back to Europe as an official emissary to purchase equipment and to engage Western specialists for the introduction of modern technology into Vietnam. The project, however, was never realized because the French conquest of southern Vietnam in 1867 persuaded the emperor, on the advice of his mandarins, to pursue a policy of isolation from the West.

Nguyen Truong To advocated stringent political and economic reforms, fighting the conservative elements at court. He urged a reduction in the number of officials and an increase in their responsibilities and salaries in order to fight corruption. He also advocated political cooperation with all foreign powers on the basis of equality to prevent any single power from gaining ascendancy. His other suggestions included governmental, social, and educational reforms, the use of Western technological knowledge and scientific equipment in order to exploit the natural resources of the country, and the elimination of Chinese characters in Vietnamese writing. Nguyen Truong To's repeated demands brought severe reprisals from the court. Vietnam's leaders refused to listen to his reasoning and tried in vain to keep the modern world out of the country.

Nguyen Van Thieu (b. April 5, 1923, Tri Thuy, Ninh Thuan province, Vietnam), president of the Republic of Vietnam (South Vietnam) from 1967 until the republic fell to the forces of North Vietnam in 1975.

The son of a small landowner, Thieu joined the communist-oriented Viet Minh in 1945 but later fought for the French colonial regime against the Viet Minh. In 1954 he was put in charge of the Vietnamese National Military Academy and, after 1956, continued to serve under the regime of Ngo Dinh Diem in South Vietnam.

Thieu played an important part in a successful coup against Diem in 1963. In 1965 he became chief of state in a military government headed by Premier Nguyen Cao Ky. In 1967 he was elected president under a new constitution promulgated in that year. He was reelected without opposition in 1971.

Thieu's emergence coincided with the beginning of major U.S. intervention in the war against the Viet Cong insurgents and North Vietnam. Despite criticism of the authoritarian nature of his regime, he retained the support of the United States throughout the administrations of the U.S. presidents Lyndon B. Johnson and Richard M. Nixon. He continued to consolidate his power after the peace agreements of 1973 (in which his government was a somewhat reluctant participant) and the withdrawal of U.S. troops from South Vietnam.

Communist gains in South Vietnam's northern provinces early in 1975 prompted Thieu to recall troops to defend the capital city, Saigon (now Ho Chi Minh City). Badly managed, the retreat turned into a rout, allowing communist forces to surround the capital. After resisting for several days, Thieu was persuaded that his resignation might permit a negotiated settlement of the war. On April 21, 1975, in a speech denouncing the United States, he resigned in favour of his vice president, Tran Van Huong, and shortly afterward left the country. He went first to Taiwan and later to England, taking up residence in Surrey.

Nguyen Van Thinh (d. Nov. 10, 1946, Saigon [now Ho Chi Minh City], Vietnam), Vietnamese statesman who in 1946 served briefly as president of a French-controlled government of Cochinchina (southern Vietnam).

Thinh was a French citizen—a privilege granted to select Vietnamese nationals during the French rule of Vietnam. After World War II he helped plan an allegedly free Vietnamese republic created by the French in early 1946. Thinh's official title was president of the provisional government of the Republic of Cochinchina, but the republic was actually controlled by the French. Feeling dishonoured by his ineffectual role, Thinh committed suicide.

Nguyen Vinh Thuy (Vietnamese emperor): *see* Bao Dai.

Ngwenyama: *see* Sobhuza II.

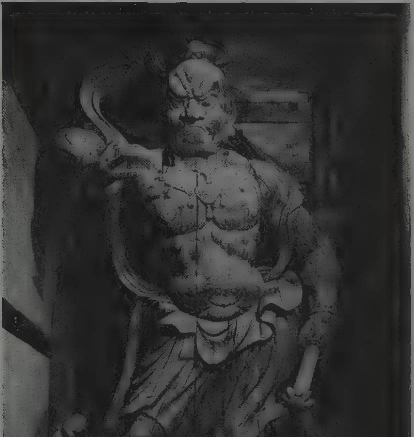
Nha Trang, port city, southeastern Vietnam. The city lies at the mouth of the Cai River, 256 miles (412 km) northeast of Ho Chi Minh City (formerly Saigon). Its history is known as far back as the 3rd century AD, when, as part of the independent land of Kauthara, a Champa kingdom, it acknowledged the suzerainty of Funan. In 1653 it was incorporated into the territory of the Nguyen lords of southern Vietnam and after 1802 into the kingdom of Vietnam. After 1862 Nha Trang was acquired by the French, who in 1895 established there the Pasteur Institute for research in tropical diseases. In 1912 the Saigon-Hanoi railway reached the town.

Nha Trang is a fishing port that has oil-storage facilities. It also has a fine, sandy beach, and under the French it became a seaside resort. On the north bank of the Cai River, opposite Nha Trang, is the village of Thon Cu Lao, behind which, on a granite knoll, sits Po Nagar ("Lady of the City"), a well-preserved cluster of four Cham shrines dedicated to Śiva and erected or rebuilt between the 7th and 12th century. Nha Trang is the site of the University of Fishery and Marine Products. Pop. (1989) 213,460.

NHK: *see* Nippon Hōsō Kyōkai.

NHL: *see* National Hockey League.

Ni-ō (Japanese: "Two Kings"), in Japanese Buddhist mythology, protector of the Buddhist faith, who makes a dual appearance as the guardian on either side of temple gateways. The guardian on the right side is called Kongō ("Thunderbolt"), or Kongō-rikishi; he holds a thunderbolt, with which he destroys evil, and is associated with the bodhisattva ("Buddha-to-be") Vajrapāṇi. The guardian on the left side of the gateway is called Misshaku, or Misshaku-rikishi. The two are depicted as gigantic figures, either heavily armoured or with naked chests and flowing scarves, as seen in the superbly spirited 13th-century guardians of the Tōdai Temple at Nara, Japan.



Ni-ō at the south gate of the Tōdai Temple, Nara, Japan; wood sculpture by Unkei, 1203

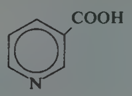
Asuka-en

Ni Tsan, Pinyin NI ZAN, original name NI YÜN-LIN (b. 1301, Wu-hsi, Kiangsu province, China—d. 1374), one of the group of Chinese painters later known as the Four Great Masters of the Yüan dynasty (1206–1368).

Although Ni Tsan was born to wealth, he declined to serve the foreign Mongol dynasty of the Yüan and instead lived a life of retirement and cultivated the scholarly arts (of poetry, painting, and calligraphy), collected artistic works of the past, and associated with those of a similar temperament. He was characterized by his contemporaries as particularly quiet and fastidious, and many of those qualities are found in his paintings. He was much imitated by later painters, and therefore originals by him are difficult to authenticate. Generally it may be said that his paintings, usually landscapes, are spare in elements and are in ink monochrome only and that great areas of the paper are left untouched. There is often a rustic hut, without any further suggestion of human presence, a few trees and other scant indications of plant life, and elemental landforms with a sombre quiet throughout.

The art of Ni Tsan and his peers in the Yüan dynasty was opposed to the preceding standards of the Southern Sung academy, whose art immediately appealed to the eyes through obvious displays of virtuoso brushwork and a convincing pictorial reality. Ni Tsan's new style demanded concentrated viewing before the larger and, in fact, more complex plays of ink could be perceived. Toward the end of his life Ni Tsan is said to have distributed all his possessions among his friends and adopted the life of a Taoist recluse, wandering and painting in his mature style. After the restoration of Chinese rule under the Ming dynasty in 1368, he returned to urban life.

niacin, also called NICOTINIC ACID, or VITAMIN B_3, water-soluble vitamin of the B complex; it is also called the pellagra-preventive vitamin, or vitamin PP, because an adequate amount in the diet prevents pellagra, a chronic disease characterized by skin lesions, gastrointestinal disturbance, and nervous symptoms. Niacin is interchangeable in metabolism with its amide, niacinamide (nicotinamide). Like vitamin B_1 (thiamine) and vitamin B_2 (riboflavin), it is a coenzyme involved in the metabolism of carbohydrates and acts to catalyze the oxidation of sugar derivatives and other substances.



Niacin

Niacin, which was identified as a pellagra preventive in 1937, is widely distributed among plants and animals. Lean meat is generally a good source. Approximately 10 to 20 milligrams per day (1 milligram = 0.001 gram) of nicotinic acid is required by humans. In the intestinal tract, the amino acid tryptophan can be converted to niacin by bacterial action and thus can serve as a source for part of the niacin required by the animal.

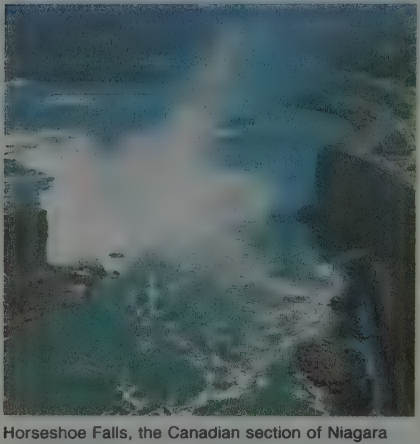
This explains scientists' early observation that the protein in such foods as eggs and milk, both poor sources of niacin, can nevertheless prevent or cure pellagra in humans.

Niacin is one of the most stable vitamins, resisting most cooking and preserving processes. It is prepared commercially from β-picoline or from quinoline, which are both obtainable from coal tar.

Niagara (Ontario, Canada): *see* Niagara-on-the-Lake.

Niagara Escarpment, also called LAKE RIDGE, ridge in North America that extends (with breaks) for more than 650 miles (1,050 km) from the Door Peninsula, in eastern Wisconsin, U.S., through the Manitoulin Islands, Ontario, Can., in northern Lake Huron, southward across the Bruce Peninsula, and then eastward around the southwestern end of Lake Ontario. It marks a portion of the shoreline (molded by glaciation and water erosion) of an ancient sea. The ridge crosses the Canadian–United States boundary at Niagara Falls and terminates just east of Rochester, N.Y. Its forested crest, sloping steeply toward the north, stands from 250 to 1,000 feet (75 to 300 m) above the surrounding lowlands. Several rivers, notably the Niagara, have cut gorges through the scarp, leaving recessed cataracts, including the famous Niagara Falls. Such cities as Rochester have grown up adjacent to cataracts (Genesee Falls), taking advantage of the cheap power supply. The escarpment also shelters the intensive Niagara fruit belt along the southern shore of Lake Ontario.

Niagara Falls, cataract on the Niagara River in northeastern North America, one of the continent's most famous spectacles. The falls lie on the border between Ontario, Can., and New York state, U.S. For many decades the falls were an attraction for honeymooners and for such stunts as walking over the falls on a tightrope or going over them in a barrel. Increasingly, however, the appeal of the site has become its beauty and uniqueness as a physical phenomenon.


Horseshoe Falls, the Canadian section of Niagara Falls, Ontario
ISTC

The falls are in two principal parts, separated by Goat Island. The larger division, adjoining the left, or Canadian, bank, is Horseshoe Falls; its height is 185 feet (56 m), and the length of its curving crest line is about 2,200 feet (670 m). The American Falls, adjoining the right bank, are 190 feet (58 m) high and 1,060 feet (320 m) across.

The shaping of the Niagara gorge downriver and the maintenance of the falls as a cataract depend upon peculiar geologic conditions. The rock strata from the Silurian Period (438 to 408 million years ago) in the Niagara gorge are nearly horizontal, dipping southward only about 20 feet per mile (almost 4 m per km). An upper layer of hard dolomite is underlain by softer layers of shale. Water exerts hydrostatic pressure and slowly dissolves the dolomite after infiltrating joints caused by glaciation and subsequent uplift. Dolomite blocks fall away as water from above also infiltrates and erodes the shale. The disposition of the rock strata provides the conditions for keeping the water constantly falling vertically from an overhanging ledge during a long period of recession (movement upstream).

The water flowing over the falls is free of sediment, and its clearness contributes to the beauty of the cataract. In recognition of the importance of the waterfall as a great natural spectacle, the province of Ontario and the state of New York retained or acquired title to the adjacent lands and converted them into public parks.

In recent years the very large diversion of water above the falls for power purposes has lessened the rate of erosion. Elaborate control works upstream from the falls have maintained an even distribution of flow across both the U.S. and Canadian cataracts, and the curtains of the waterfalls have been maintained. A large part of the great river above the falls is diverted and disappears into four great tunnels for use in the power plants downstream. Owing to concern over the possibility of major rockfalls, water was diverted from the American Falls in 1969, and some cementing of the bedrock was done; an extensive boring and sampling program was also carried out. River flow was returned to the American Falls in November of that year, and it was decided that safety measures for the viewing public should be implemented and that measures to stem natural processes were both too expensive and undesirable.

Excellent views of the falls are obtained from Queen Victoria Park on the Canadian side; from Prospect Point of the U.S. side at the edge of the American Falls; and from Rainbow Bridge, which spans the Niagara gorge about 1,000 feet (300 m) downstream from Prospect Point. Visitors may cross from the U.S. shore to Goat Island by footbridge and may take an elevator to the foot of the falls and visit the Cave of the Winds behind the curtain of falling water. The Horseshoe Falls, which carry about 90 percent of the river's discharge, receded upstream at an average rate of about 5.5 feet (1.7 m) per year in 1842–1905. Thereafter control works and diversion of water decreased the erosion.

Niagara Falls, city, regional municipality of Niagara, southeastern Ontario, Canada. It lies on the left bank of the Niagara River, opposite Niagara Falls, N.Y. Development of the city, which was named Elgin in 1853, began with the completion in 1855 of the first suspension bridge across the Niagara gorge. The city was renamed Clifton in 1856 and received its present name in 1881. In 1963 it merged with Stamford Township, increasing its area 12-fold. The city's importance is due largely to the cataract, which is a major source of electrical power for Ontario and is one of the nation's most popular tourist attractions. Now connected to Niagara Falls, N.Y., by three bridges, including the Rainbow and Whirlpool Rapids bridges, the city is also a customs port and industrial centre. Manufactures include electrochemicals, fertilizers, abrasives and refractories, silverware, cereals, machinery, sporting equipment, paper goods, and food products. Queen Victoria Park stretches along the bank of the river above and below the falls and includes the Oakes Garden Theatre. Inc. 1904. Pop. (1991) city, 75,399; St. Catherines–Niagara metropolitan area, 364,552.

Niagara Falls, city and port of entry, Niagara county, western New York, U.S. It lies at the great falls of the Niagara River, opposite the city of Niagara Falls, Ont. The British built Fort Schlosser there in 1761, and in 1805 Augustus Porter established a grist mill and a settlement called Manchester. Both the settlement and the fort were burned during the War of 1812, but development of the surrounding farmlands continued; the villages of Manchester, Suspension Bridge, and Clarksville (later to merge into Niagara Falls) grew up along the river. The Niagara River's hydroelectric potential began to be developed in 1881, and, with the formation of the Niagara Falls Power Company in 1886, the industrial future of the city was assured. Its hydroelectric plants supply power to much of New York state and to the city's electrochemical, electrometallurgical, and aerospace industries. Other economically important manufactures include paper, abrasives, flour, machinery, and electrical equipment.

The Niagara Reservation State Park (established 1885) includes Prospect Park (site of the Schoellkopf Geological Museum with exhibits on the history and formation of the falls) and areas along the river, including Luna, Goat, and other smaller islands. Tourism is a major economic factor, with millions of visitors coming to view the falls each year. Rainbow Bridge, which was completed in 1941 to replace the Falls View Bridge that collapsed in 1938, is one of several that cross the river downstream from the falls. Niagara County Community College was founded in the city in 1962, and Niagara University (1856) is situated just outside the city limits. Tuscarora Indian Reservation is 9 miles (14 km) northeast. Inc. city, 1892. Pop. (1990) city, 61,840; Niagara Falls PMSA, 220,756.

Niagara Frontier, recreation and heavy-industrial area in western New York, U.S., extending mainly along the Niagara River between Lakes Ontario and Erie and lying in the counties of Erie and Niagara and part of Cattaraugus. The recreational area sometimes includes the Canadian side of the river, while the industrial region includes metropolitan Buffalo, which encompasses Niagara Falls, Tonawanda–North Tonawanda, Lackawanna, and Lockport.

The focus of the recreation region is the Niagara Reservation State Park, established in 1885 at Niagara Falls. It is New York's oldest state park, and it includes an observation tower, elevators that descend into the gorge at the base of the American Falls, and boat trips into the turbulent waters at the base of the Horseshoe Falls. Fort Niagara State Park, at the mouth of the Niagara River on Lake Ontario, includes old Fort Niagara, built by the French in 1725–26 on the site of the Indian town Ongniaahra—whence Niagara. A few miles to the east lies the Four Mile Creek Annex to the park, devoted largely to camping. Whirlpool State Park is located at the Lower Rapids 3 miles (5 km) north of the falls; and Devil's Hole State Park at the Lower Gorge overlooks the end of the Lower Rapids. Buckhorn Island State Park is a wildlife sanctuary at the north end of Grand Island, south of the falls. Big Six Mile Creek Boat Basin is on the west side of the island, and Beaver Island State Park is a recreational area at its southern tip. Evangola State Park, near Farnham on the south shore of Lake Erie, has a broad sandy beach. Overlooking the river near Lewiston is the Earl W. Brydges Artpark (1974), dedicated to the performing arts. The whole area is overseen by the Niagara Frontier State Park and Recreation Commission (created in 1883 as the State Reservation at Niagara).

Robert Moses State Parkway, formerly Niagara Parkway, links the Grand Island parks with Niagara Falls, Fort Niagara, and Lake Ontario. The Grand Island South Parkway and West River Parkway combine to form a scenic route around the island and provide a connection with the New York State Thruway, Robert Moses State Parkway, Beaver Island and Buckhorn Island state parks, and Buffalo.

Niagara Movement (1905–10), organization of black intellectuals led by W.E.B. Du Bois and calling for full political, civil, and social rights for black Americans. This stance stood in notable contrast to the accommodation philosophy proposed by Booker T. Washington in the Atlanta Compromise of 1895. The Niagara Movement was the forerunner of the National Association for the Advancement of Colored People (NAACP). In the summer of 1905, 29 prominent blacks, including Du Bois, met secretly at Niagara Falls, Ont., and drew up a manifesto calling for full civil liberties, abolition of racial discrimination, and recognition of human brotherhood. Subsequent annual meetings were held in such symbolic locations as Harpers Ferry, W.Va., and Boston's Faneuil Hall.

Despite the establishment of 30 branches and the achievement of a few scattered civil-rights victories at the local level, the group suffered from organizational weakness and lack of funds as well as a permanent headquarters or staff, and it never was able to attract mass support. After the Springfield (Ill.) Race Riot of 1908, however, white liberals joined with the nucleus of Niagara "militants" and founded the NAACP the following year. The Niagara Movement disbanded in 1910, with the leadership of Du Bois forming the main continuity between the two organizations.

Niagara-on-the-Lake, also called NIAGARA, town, regional municipality of Niagara, southeastern Ontario, Canada. It lies on the southern shore of Lake Ontario, at the mouth of the Niagara River, 22 miles (35 km) below the falls. The town was established in 1792, when it was chosen as the first capital of Upper Canada and named Newark by Lieutenant Governor John G. Simcoe. Because of the town's location opposite a U.S. arsenal, the capital was moved to Toronto in 1796, and Newark's name was subsequently changed to Niagara-on-the-Lake. The town is a summer resort and a centre of a fruit-growing region. Industries include canning, yacht building, and basket weaving. Fort George, which was built in the late 1790s and played an important role in the War of 1812, and Navy Hall are popular tourist attractions. Pop. (1991) 12,945.

Niagara River, river that is the drainage outlet for the four upper Great Lakes (Superior, Michigan, Huron, and Erie), having an aggregate basin area of some 260,000 square miles (673,000 square km). Flowing in a northerly direction from Lake Erie to Lake Ontario, a distance of about 35 miles (56 km), the Niagara constitutes part of the boundary between the United States and Canada, separating New York state from the province of Ontario. The relatively high flow and steep descent (about 326 feet [99 m]) of the river combine to make it one of the best sources of hydroelectric power in North America. About halfway along the river's course lies Niagara Falls, one of the major scenic spectacles of the continent. U.S. and Canadian cities of the same name stand on either bank of the river.

From its head at Lake Erie, the river flows through a single channel for about 5 miles (8 km). It is then divided into two channels by Strawberry and Grand islands, the eastern, or U.S., channel running for about 15 miles (24 km), the western, or Canadian, for about 12 miles. At the foot of Grand Island the two merge again about 3 miles (5 km) above Niagara Falls. From Lake Erie to the upper rapids the river descends about 10 feet (3 m), whereas in the short rapids it falls 50 feet (15 m) before pouring over the falls.

Below the falls and extending for 7 miles (11 km) is the Niagara Gorge. The stretch of 2.25 miles (3.6 km) from Horseshoe Falls is known as the Maid of the Mist Pool. It has a descent of only 5 feet (1.5 m) and is navigable by excursion boats. Beyond this, the gorge descends another 93 feet (28 m), flowing northwestward first through the narrow Whirlpool Rapids for 1 mile (1.6 km) to the Whirlpool. There the gorge makes a 90° bend to the northeast for 2 miles (3 km) and turns north for another 1.5 miles (2.5 km) to the foot of the Niagara Escarpment at Lewiston, New York. In its final 7 miles, the river flows across a lake plain to Lake Ontario.

The river came into existence late in the Pleistocene Epoch, more than 10,000 years ago, when the margin of a great continental ice sheet melted back and exposed the escarpment of Niagaran dolomite rock, allowing the discharge from the Lake Erie Basin to pour over it. Recession of the falls created the Niagara Gorge, the age of which, when calculated by dividing its length by the average rate of recession of the falls in recent time, is about 7,000 years. Other considerations led some geologists to estimate an age as great as 25,000 years. Determinations of the age of the last glacial ice advance in the area suggest, however, that the Niagara River is about 12,000 years old.

The river is navigable from Lake Erie to the upper rapids. Waterborne traffic along the Niagara passes through the upper single channel and the U.S. channel and enters the New York State Barge Canal at Tonawanda, New York. That canal, with a minimum depth of 12 feet (4 m), connects with the Hudson River and has branches that connect with Lake Champlain and Lake Ontario. The Black Rock Canal, from Buffalo Harbor to a point a few miles down the Niagara River, extends the navigation period locally through a greater part of the winter, when the river itself becomes jammed with Lake Erie ice. The principal shipping between Lakes Erie and Ontario, however, passes through the Welland Canal, an important link in the Great Lakes-St. Lawrence Seaway.

Canada and the United States agreed, in a treaty signed in 1950, to reserve sufficient amounts of water for flow over Niagara Falls to preserve their scenic value. All water in excess of a certain amount, estimated to average about 130,000 cubic feet (3,600 cubic metres) per second, was made available for diversion for power generation, to be divided equally between the United States and Canada. This power is developed by public-authority power-plant installations on both sides of the gorge. Two large power plants situated at the end of the gorge, one near Lewiston, N.Y., and one at Queenston, Ont., receive water diverted from the river above the falls and carried to them by tunnels and canals. The electrical power is used by nearby electrochemical industries and is also sent to various cities for other uses.

Niagaran Series, second of the three major divisions of Silurian rocks and time (438 to 408 million years ago) in North America. It was named for exposures studied in Niagara county, N.Y. The characteristic exposures for the series are found in the gorge of the Niagara River below Niagara Falls; the gorge is rimmed by a resistant dolomite formation, the Lockport Dolomite, below which fossiliferous shales and thin limestones comprise the remainder of Niagaran rocks in the area. West of the Cincinnati Arch, Niagaran strata are largely calcareous, very widespread, and often attain a considerable thickness. In the Niagaran dolomites of Indiana, Illinois, and Wisconsin, fossil coral reefs are frequently encountered, some of which are about 10 km (6 miles) in diameter and attain a thickness of about 300 m (1,000 feet).

Niah Cave, site of significant archaeological evidence concerning prehistoric man's existence in Southeast Asia, located in Sarawak on the island of Borneo, East Malaysia, 10 miles (16 km) inland from the South China Sea. The Niah Cave provides examples of early Pleistocene man's habitat in Sarawak and was the site of almost continuous human dwelling until the 19th century. The cave was first described to Westerners in 1864 by Alfred Russel Wallace, the originator, along with Charles Darwin, of the theory of natural selection. Although a Sarawak civil servant visited the cave seven years later, only in the 20th century, following its purchase by the Sarawak Museum, was the importance of the site revealed.

The Niah Cave itself is massive, with five openings, or mouths. The main cave is called the painted cave because of red hematite wall and ceiling paintings. Its mouth is about 300 feet (90 m) high by 600 feet (180 m) wide. While other sections of the cave are dark, moist, and inhabited by millions of bats and swiftlets, the painted cave is dry, well lit, and favourable for human dwelling. The first archaeological digging, by Tom Harrisson in 1954, uncovered considerable evidence of past human habitations. The earliest flakes and chopper tools date from about 40,000 BC. The most important discovery at Niah was the remains of a skeleton of an adolescent male, about 38,000 BC, the earliest *Homo sapiens* remains found in the Far East to that time; these bones are of particular interest because this individual lived at the same time as Solo man of Java, the Rhodesioids of Africa, and the classic Neanderthals of Europe—all *Homo sapiens,* but of far less modern looking and gracile (slender) type. Other discoveries include the burial place "boats of the dead."

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nialamide, synthetic drug of the monoamine-oxidase inhibitor type, used to treat mental depression. Like other monoamine-oxidase inhibitor drugs, nialamide prevents the enzymatic breakdown of norepinephrine, the brain-neurotransmitter substance concerned with emotional stimulation. Nialamide is administered orally. The onset of action is delayed, the effects of the drug developing slowly over the first two weeks of therapy. As with other monoamine-oxidase inhibitor drugs, liver damage is a possible side effect.

Niam-Niam (people): *see* Azande.

Niamey, city, capital of Niger. Located along the Niger River in the southwest corner of the republic, it originated as an agricultural village of Maouri, Zerma, and Fulani people. It was established as the capital of Niger colony in 1926, and after World War II it grew rapidly. Today it is occupied by Yoruba and Hausa traders, merchants, officials, and craftsmen from Nigeria, Benin, and Togo, as well as from other parts of Niger. The city, which lies mainly on the left (north) bank of the river,

The National Assembly building in Niamey, Niger

Victor Englebert—De Wys Inc.

has expanded onto the right bank since the construction of the Kennedy Bridge in 1970.

There is some industry, but most people work in the service sector. Niamey is the site of the University of Niamey (1971; university status 1973), the National School of Administration (1963), the national museum, and research institutes for geology and minerals, human sciences, oral tradition, tropical forestry, tropical agriculture, and veterinary studies. There is an international airport, and roads link Niamey with Atlantic ports in Benin and Nigeria. Pop. (1994 est.) 420,000.

Niane, Djibril Tamsir (b. Jan. 9, 1932, Conakry, Guinea), African historian, playwright, and short-story writer.

After his secondary education in Dakar, Senegal, Niane graduated in history in 1959 from the University of Bordeaux in France. He taught in Conakry and at the Institut Polytechnique before joining the Basic Institute of Black Africa in Dakar.

Niane's first scholarly work, *Recherches sur l'empire du Mali* (1959; "Studies of the Empire of Mali"), was followed by *Histoire de l'Afrique occidentale* (1961; "History of Western Africa"), coauthored with Jean Suret-Canale. His novel *Soundjata ou l'épopée mandingue* (1960; *Sundiata: An Epic of Old Mali*) is a highly successful re-creation of the life and times of the illustrious 13th-century founder of the Mali empire, recounted in the voice of a tribal storyteller. His other works include a collection of short stories, *Mery* (1975), and two historical plays, *Sikasso* and *Chaka.*

Niani, village, northeastern Guinea. It lies on the left bank of the Sankarani River (a tributary of the Niger). A former administrative centre of Kangaba (a small state subservient to the old Ghana empire), it was named the capital of the new empire of Mali by its Mandingo (Malinke) founder, King Sundiata Keita (Mari Djata; reigned *c.* 1230–55). Niani remained the capital of the Muslim Mandingo empire for 300 years; it reached its zenith as Mali's political, commercial, and caravan centre (gold, salt, kola nuts, slaves) in the reign of Mansa Mūsā (1307–32). Raids by Songhai cavalrymen in the early 15th century marked the beginning of Niani's gradual decline. The site of the medieval Malian capital was not confirmed until excavations were made in the mid-1960s around present-day Niani, which lies in a valley irrigated for rice and occasionally mined for alluvial gold.

Niantic, Algonquian-speaking woodland Indians of southern New England. The Eastern Niantic lived on the western coast of what is now Rhode Island and on the neighbouring coast of Connecticut. The Western Niantic lived on the seacoast from Niantic Bay, just west of New London, to the Connecticut River. Once one tribe, they were apparently split by the migration of the Pequot into their area.

The Western Niantic were nearly destroyed by the Pequot War (1637), and remnants joined the Mohegans. The Eastern Niantic remained neutral during King Philip's War (1675–76), and at its close many of the defeated Narraganset Indians and their allies settled among them. Thereafter the combined tribes were called Narraganset (*q.v.*).

Niarchos, Stavros Spyros (b. July 3, 1909, Athens, Greece—d. April 15, 1996, Zürich, Switz.), Greek shipping magnate and art collector.

In 1929 Niarchos graduated from the University of Athens in law and began working in his uncle's flour mill. Recognizing the great transportation expense in importing Argentine wheat, Niarchos convinced his family that it would save money if it owned its own ships. Six freighters were bought for $120,000 during the Great Depression, and in 1939 Niarchos branched off to form his own firm, Niarchos Group, in which he owned two tankers and five other vessels.

While Niarchos served in the Greek navy during World War II, the Allied forces leased his ships, six of which were subsequently sunk in combat. Niarchos used the resulting $2,000,000 of insurance money as capital to expand his fleet and, in particular, to buy oil tankers. His philosophy was to buy and build big, and many of his supertankers set world records in size and carrying capacity. For many years he owned the largest private fleet in the world, some of his keenest competitors being his brother-in-law, Aristotle Onassis, and his father-in-law, Stavros Livanos. At its height his shipping company, Niarchos Ltd., operated more than 80 tankers, though Niarchos later sold off most of this fleet.

Niarchos also earned a reputation as an art investor and collector. In 1957 he purchased the French Impressionist art collection of the American actor Edward G. Robinson for more than $2,500,000. Although he owned homes in New York, London, Paris, and Athens, he spent much of his time on the Mediterranean Sea aboard his yacht *Creole.*

Niari River, tributary of the Kouilou River in southern Congo. Its headwaters rise in the Batéké Plateau northwest of Brazzaville. It runs south to Galobondo, west to Loudima, and northwest to Makabana, where it joins the Louessé River to form the Kouilou River. The Niari basin attracted extensive settlement after World War II, spurred by the construction of the Brazzaville–Pointe-Noire railway through the Niari valley. The basin is rich in copper, lead, and zinc deposits. It also has some of the most fertile soil in the Congo and has therefore been selected as the site for a number of agricultural research stations and experimental farms. The name Niari is sometimes extended to include the Kouilou River (*q.v.*) as well as the Niari proper.

Nias, Indonesian PULAU NIAS, island and *kabupaten* (regency), Sumatera Utara *provinsi* (province), Indonesia. It is the largest island in a chain paralleling the western coast of Sumatra. With an area of 1,842 square miles (4,772 square km), it has a topography much like that of western Sumatra but without volcanoes. The highest elevation is 2,907 feet (886 m). Nias' coasts are rocky or sandy and without any ports, and ships must anchor offshore of Guningsitoli on the eastern coast and Telukdalem on the south.

Most of the people are animists, belong to the early (Proto-) Malay stock, and speak dialects of a distinct branch of the Austronesian (Malayo-Polynesian) language family. Some are Christian and Muslim converts. Megalithic monuments and wooden sculptures honouring the dead or representing fertility are common throughout the island. In northern Nias, villages are small and located on hilltops, each enclosing a stone-paved rectangle. Larger villages in southern Nias may include a bathing pool. Houses are built on piles, the chief's house being particularly large with a high roof and massive carved pillars and beams. Pop. (1990) 567,318.

Niatross (foaled 1977), American harness racehorse (Standardbred), one of the greatest pacers in history, who in his two-year racing career set records for American career winnings ($2,019,212) and, in the second year, a record for one-year winnings for a horse of any breed ($1,414,313). Both records later were surpassed.

Sired by Albatross and foaled by Niagara Dream, Niatross was owned by Elsie Berger, Clint Galbraith, and Lou Guida and trained and driven by Galbraith.

As a two-year-old Niatross won all 13 starts, set a two-year-old winnings record of $604,900, and was named Horse of the Year, as he was again in 1980. As a three-year-old, Niatross won 24 of 26 races and captured the Pacing Triple Crown by winning the William H. Cane Futurity, the Messenger Stake, and the Little Brown Jug. In his career of 39 races, Niatross won 37. He set world marks for pacers in the mile (1:52$^{1}/_{5}$ sec), for harness racers in the mile (1:49$^{1}/_{5}$ sec), and for a three-year-old in the mile (1:49$^{1}/_{5}$ sec). He was syndicated for a record $8,000,000 in 1980 and put to stud in 1981.

Niaux, cave at Ariège, France, that is famous for its carefully drawn wall paintings in a black-outlined style typical of the classical Magdalenian period of Paleolithic art. This period is estimated to have lasted from approximately 15,000 to 10,000 BC. Niaux is one of a series of Pyrenean grottoes displaying the most stylistically homogenous cave painting known.

Like most caves, Niaux is divided into a number of distinct areas, among them the Salon Noir, which contains panels showing bison and horses drawn in outline. A few of the animals' features, such as a horse's jaw, are also indicated, and the figures are typically shaded in a cross-hatched manner. There are also depictions of fish, oxen, some variety of cat, and a beast tentatively identified as a rhinoceros. Other areas of the cave include the so-called Rotunda and the Reseau René Clastres, an inaccessible gallery discovered in 1970 that contains five paintings.

Nibelungenlied (German: "Song of the Nibelungs"), Middle High German epic poem written about 1200 by an unknown Austrian from the Danube region. It is preserved in three main 13th-century manuscripts, A (now in Munich), **B** (St. Gall), and C (Donaueschingen); modern scholarship regards **B** as the most trustworthy. An early Middle High German title of the work is *Der Nibelunge Not* ("The Nibelung Distress"), from the last line of the poem. The superscription on one of the manuscripts from the early 14th century is "The Book of Kriemhild."

The story has a long history and, as a result, contains a number of disparate elements. For example, the word Nibelung itself presents difficulties. In the first part of the poem, it appears as the name of Siegfried's lands and peoples and his treasure, but, throughout the second, it is an alternate name for the Burgundians.

The poem's content falls into two parts. It begins with two cantos (*aventiuren*) that introduce, respectively, Kriemhild, a Burgundian princess of Worms, and Siegfried, a prince from the lower Rhine. Siegfried is determined to woo Kriemhild despite his parents' warning. When he arrives in Worms, he is identified by Hagen, a henchman of Kriemhild's brother King Gunther. Hagen then recounts Siegfried's former heroic deeds, including the acquisition of a treasure. When war is declared by the Danes and Saxons, Siegfried offers to lead the Burgundians and distinguishes himself in battle. Upon his return, he meets Kriemhild for the first time, and their affections develop during his residence at court.

At this point a new element is introduced. News reaches the court that a queen of outstanding strength and beauty may be won only by a man capable of matching her athletic prowess. Gunther decides to woo Brunhild with the aid of Siegfried, to whom he promises the hand of Kriemhild if successful. Siegfried leads the expedition to Brunhild's abode, where he presents himself as Gunther's vassal. In the ensuing contests, Gunther goes through the motions of deeds actually performed by Siegfried in a cloak of invisibility. When Brunhild is defeated, she accepts Gunther as her husband. Siegfried and Kriemhild are then married as promised, but Brunhild remains suspicious and dissatisfied. Soon the two queens quarrel; Brunhild ridicules Kriemhild for marrying a vassal, and Kriemhild reveals Siegfried's and Gunther's deception.

Now Hagen becomes a prominent figure as he sides with Brunhild and takes the initiative in plotting vengeance. He wins Kriemhild's confidence and learns Siegfried's one vulnerable spot and then strikes the fatal blow.

During these events, Brunhild drops almost unnoticed out of the story, and the death of Siegfried does not appear to be so much vengeance on her part as an execution by Hagen, who is suspicious of Siegfried's growing power. Siegfried's funeral is conducted with great ceremony, and the grief-stricken Kriemhild remains at Worms, though for a long time estranged from Gunther and Hagen. Later they are reconciled in order to make use of Siegfried's treasure, which is brought to Worms. Kriemhild begins to distribute it, but Hagen, fearing that her influence will grow, sinks the treasure in the Rhine.

The second part of the poem is much simpler in structure and deals basically with the conflict between Hagen and Kriemhild and her vengeance against the Burgundians. Etzel (Attila), king of the Huns, asks the hand of Kriemhild, who accepts, seeing the possibilities of vengeance in such a union. After many years, she persuades Etzel to invite her brothers and Hagen to his court. Though Hagen is wary, they all go to Etzel's court, where general combat and complete carnage ensues. Kriemhild has Gunther killed and then, with Siegfried's sword, she slays the bound and defenseless Hagen, who to the last has refused to reveal where Siegfried's treasure is hidden. Kriemhild in turn is slain by a knight named Hildebrand, who is outraged at the atrocities that she has just committed.

In the *Nibelungenlied* some elements of great antiquity are discernible. The story of Brunhild appears in Old Norse literature. The brief references to the heroic deeds of Siegfried allude to several ancient stories, many of which are preserved in the Scandinavian *Poetic Edda* (*see* Edda), *Völsunga saga,* and *Thidriks saga,* in which Siegfried is called Sigurd. The entire second part of the story, the fall of the Burgundians, appears in an older Eddaic poem, *Atlakvida* ("Lay of Atli"; *see* Atli, Lay of). Yet the *Nibelungenlied* does not appear to be a mere joining of individual stories but, rather, an integration of component elements into a meaningful whole.

It is the second part of the poem that suggests the title "The Book of Kriemhild." The destruction of the Burgundians (Nibelungen) is her deliberate purpose. The climax of the first part, the death of her husband, Siegfried, prepares the ground for the story of her vengeance. Furthermore, Kriemhild is the first person introduced in the story, which ends with her death; and all through the story predominating attention is paid to Hagen. This concentration on Kriemhild and on the enmity between her and Hagen would seem to suggest that it was the poet's intention to stress the theme of Kriemhild's vengeance.

The *Nibelungenlied* was written at a time in medieval German literature when the current emphasis was on the "courtly" virtues of moderation and refinement of taste and behaviour. The *Nibelungenlied,* with its displays of violent emotion and its uncompromising emphasis on vengeance and honour, by contrast looks back to an earlier period and bears the mark of a different origin—the heroic literature of the Teutonic peoples at the time of their great migrations. The poem's basic subject matter also goes back to that period, for it is probable that the story of the destruction of the Burgundians was originally inspired by the overthrow of the Burgundian kingdom at Worms by the Huns in AD 437, and the story of Brunhild and Siegfried may have been inspired by events in the history of the Merovingian dynasty of the Franks in about AD 600. Much of the heroic quality of the original stories has remained in the poem, particularly in the author's conception of Hagen as the relentless protector of King Gunther's honour.

Probably no literary work has given more to Germanic arts than the *Nibelungenlied.* Many variations and adaptations appeared in later centuries. The most significant modern adaptation is Richard Wagner's famous opera cycle *Der Ring des Nibelungen* (1853–74).

Nicaea (Turkey): *see* İznik.

Nicaea, Council of (325), the first ecumenical council of the Christian church, meeting in ancient Nicaea (now İznik, Tur.). It was called by the emperor Constantine I, an unbaptized catechumen, or neophyte, who presided over the opening session and took part in the discussions. He hoped a general council of the church would solve the problem created in the Eastern church by Arianism, a heresy first proposed by Arius of Alexandria that affirmed that Christ is not divine but a created being. Pope Sylvester I did not attend the council but was represented by legates.

The council condemned Arius and, with reluctance on the part of some, incorporated the nonscriptural word *homoousios* ("of one substance") into a creed (the Nicene Creed) to signify the absolute equality of the Son with the Father. The emperor then exiled Arius, an act that, while manifesting a solidarity of church and state, underscored the importance of secular patronage in ecclesiastical affairs.

The council also attempted but failed to establish a uniform date for Easter. But it issued decrees on many other matters, including the proper method of consecrating bishops, a condemnation of lending money at interest by clerics, and a refusal to allow bishops, priests, and deacons to move from one church to another. Socrates Scholasticus, a 5th-century Byzantine historian, said that the council intended to make a canon enforcing celibacy of the clergy, but it failed to do so when some objected. It also confirmed the primacy of Alexandria and Jerusalem over other sees in their respective areas.

Nicaea, Council of (787), the seventh ecumenical council of the Christian church, meeting in Nicaea (now İznik, Tur.). It attempted to resolve the Iconoclastic Controversy, initiated in 726 when Emperor Leo III issued a decree against the worship of icons. The council declared that icons deserved reverence and veneration but not adoration. Convoked by the patriarch Tarasius, the council was attended by delegates of Pope Adrian I, and the pope confirmed the decrees of the council. Its authority was challenged in France as late as the 11th century, however, partly because certain doctrinal phrases had been incorrectly translated. But Rome's original verdict was eventually accepted, and the second Council of Nicaea was accepted as the seventh ecumenical council.

Nicaea, empire of, independent principality of the fragmented Byzantine Empire, founded in 1204 by Theodore I Lascaris (1208–22); it served as a political and cultural centre from which a restored Byzantium arose in the mid-13th century under Michael VIII Palaeologus.

Theodore fled to Anatolia with other Byzantine leaders after the Latin crusaders' conquest of Constantinople in 1204, establishing himself at Nicaea (now İznik, Tur.), 40 miles (64 km) to the southeast. Crowned emperor in 1208, Theodore gradually acquired control over much of western Anatolia. He and his successors sponsored a revival of Greek studies at their capital.

The next Nicaean emperor was John Vatatzes, who sought to retake Constantinople before his rivals Theodore Angelus, despot of Epirus, or John Asen II of Bulgaria (1218–41). He defeated Theodore at Klokotnitsa (in Bulgaria) in 1230. Between 1240 and 1250 he negotiated with the Western emperor Frederick II (1220–50) for help in reconquering Constantinople, but nothing came of the pact.

Theodore II Lascaris (1254–58) and John IV Lascaris (1258–61) maintained Nicaean strength against the invading Mongols during their brief reigns. In 1261 a Nicaean general, Michael Palaeologus, retook Constantinople and, as Michael VIII, founded the last dynasty of the Byzantine emperors.

Nicaragua, officially REPUBLIC OF NICARAGUA, Spanish REPÚBLICA DE NICARAGUA, largest country of Central America, covering an area of 50,464 square miles (130,700 square km). The capital is Managua. Nicaragua's maximum length from north to south is about 275 miles (440 km), and its maximum width from east to west is about 280 miles (450 km). It is bordered by Honduras on the north, the Caribbean Sea on the east, Costa Rica on the south, and the Pacific Ocean on the west. The population in 2002 was estimated to be 5,024,000.

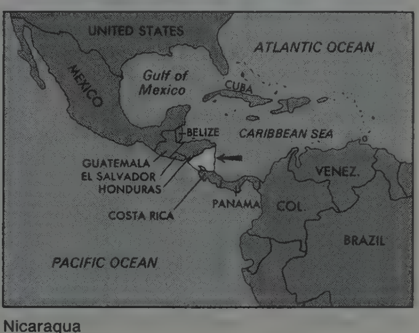
A brief treatment of Nicaragua follows. For full treatment, *see* MACROPAEDIA: Central America.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The western half of Nicaragua has highly dissected and thickly forested mountain ranges that alternate with basins and fertile valleys. To the west and south of this central mountain core there is a discontinuous belt of some 40 dormant and active volcanoes that stretches northwest-southeast, parallel to the Pacific coast. A basin region, including Lake Nicaragua (3,156 square miles [8,157 square km]) and the smaller Lake Managua (400 square miles [1,035 square km]), lies in the southwest interior of Nicaragua, east of the volcanic belt. The Pacific lowlands are to the west of the volcanic belt.

In the eastern half of the country the terrain gradually descends toward the Caribbean coast, where a fringe marshland area is called the Mosquito Coast. The Coco River (485 miles [780 km] long), with a drainage basin of 2,240 square miles (5,800 square km), forms most of the boundary with Honduras. The San Juan River links Lake Nicaragua to the Caribbean Sea and forms much of the southern boundary with Costa Rica. Seismic activity is frequent in Nicaragua, occasionally resulting in devastating earthquakes.

The climate of Nicaragua is tropical, with a dry (January–mid-May) and a wet (mid-May–December) season. It is slightly cooler and much wetter in the east than in the west. The Pacific side of the country has a mean annual temperature of 81° F (27° C), and annual precipitation is about 75 inches (1,900 mm); the corresponding figures for eastern Nicaragua are 79° F (26° C) and as much as 150 inches (3,800 mm) of rainfall. Tropical forests cover



Nicaragua

more than one-third of the total land area. The eastern lowlands are generally covered with savanna vegetation, except on the Mosquito Coast, where tropical rain forest prevails. The fauna includes puma, jaguar, various monkeys, anteater, crocodile, peccary, and various snakes and turtles.

The people. More than three-fourths of Nicaragua's people are mestizos, a product of the racial mixture of Europeans (mostly Spanish) and American Indians. Of the original American Indian population, the Sumo, Miskito (Mosquito), and Rama peoples occupy the basins of the northeastern rivers and other areas along the Caribbean Sea. The west coast has a small number of Monimbo and Subtiaba Indian peoples. Black Creoles live in the Caribbean lowland. Spanish is the official language, but there is widespread familiarity with English. Nearly nine-tenths of the population is Roman Catholic.

Nicaragua has a young population; almost half its people are under 15 years of age. The birth rate is one of the highest in Central America, while the death rate is only slightly above average and declining. Since the 1950s there has also been a considerable decline in the relatively high rate of infant mortality. The country has one of the highest estimated annual rates of population growth in Central and Latin America.

The economy. Nicaragua has a developing market economy based largely on agriculture, light industries, and trade. The gross national product (GNP) had a negative real growth rate from the mid-1970s largely because of political and economic instability. The GNP per capita is low by Central American standards.

Agriculture accounts for about one-fourth of the GNP but employs as much as two-fifths of the work force. Corn (maize), sorghum, and beans are the chief staples and are harvested twice a year. Coffee, cotton, bananas, and sugar are produced primarily for export. Nicaragua's known mineral resources include large reserves of gold, copper, and silver. Significant quantities of gold and silver are produced in eastern Nicaragua.

Industries—mostly processing domestic raw materials—account for one-fifth of the GNP and employ about one-tenth of the work force. Products include refined sugar, petroleum products, chemicals, cigarettes, leather goods, textiles, cement, and plastics. Nicaragua's electricity is generated principally from imported fuels; one-fourth also comes from hydroelectric sources and another one-fourth is generated by nuclear fuels.

Nicaragua's principal exports include coffee, cotton, beef, bananas, and gold. Imports consist of primary and intermediate goods for industry, mineral fuels, capital goods for industry, and transport equipment. Canada, Germany, the Soviet Union, Cuba, and Japan are its main trading partners.

Government and social conditions. Following the overthrow of the Somoza regime, Nicaragua was ruled from 1979 to 1985 by a junta drawn from the FSLN; Sandinista National Liberation Front (Frente Sandinista de Liberación Nacional). Executive and legislative authority was centred in the Government of National Reconstruction, which received legislative advice from a Council of State. Presidential and legislative elections were held in 1984, and a new administration, still largely dominated by the FSLN, replaced the junta government in 1985. The Sandinista administration lost the historic free election held in 1990, but Sandinistas retained enough seats in the National Assembly, which has 92 members, to prevent constitutional changes by the new administration.

Health services were vastly improved under the Sandinista government after decades of neglect. Diseases such as enteritis, tuberculosis, tetanus, and typhoid fever, however, are still common. There is a shortage of trained medical personnel, and health-care facilities are poorly equipped. Life expectancy is about 61 years for males and 63 years for females.

Education is free and compulsory between the ages of 6 and 13 years. About three-fourths of school-age children attend primary school, but only a small percentage of these advance to secondary school.

Nicaragua has several daily newspapers, including *La Prensa,* one of the largest. The government imposed censorship on the nation's news media throughout much of the 1980s. There are two major television stations and numerous radio stations.

History. Nicaragua's earliest Indian inhabitants migrated from South America and settled on the western coast at a remote but undetermined date. Waves of Indian migrants from Mexico and Mesoamerica began entering Nicaragua in the 10th century AD. The Spanish pacification of these peoples in the 16th century AD was relatively easy owing to the conversion to Christianity of one of the leading tribes.

Christopher Columbus landed in eastern Nicaragua in 1502. The first European settlements, Granada and León (both in the western interior), date from the early 1520s and were established by the Spanish explorer and soldier Hernández de Córdoba. During the colonial period an intense rivalry developed between these two cities. León, as the provincial capital, developed into a liberal intellectual centre, whereas Granada developed as an agricultural centre, with a conservative landed aristocracy. British buccaneers established settlements on the Caribbean coast in the 17th and 18th centuries. These settlements led to Britain's claim to the Mosquito Coast as a protectorate (1740–86). The cities of León and Granada continued to be hostile to each other during the area's struggle for independence from Spain in the early 1800s.

In 1826 Nicaragua became a state within the United Provinces of Central America, but it left the federation in 1838. The British seized the small Caribbean port of San Juan del Norte in 1848 and held it until 1860. During the 1850s, Cornelius Vanderbilt's steamship company transported prospectors bound for the California gold fields from the Atlantic to the Pacific by steamship on the San Juan River and Lake Nicaragua. William Walker, a filibuster from Tennessee, managed to establish himself as president of Nicaragua in 1856. He was routed a year later, however, by the efforts of the five Central American republics and Vanderbilt's steamship company.

For about a century after the nation reached independence in 1838, Nicaragua's politics were dominated by the competition for power between the Liberals, who were centred in the city of León, and the Conservatives, who were centred in that of Granada. These two sides shifted the capital back and forth between their respective cities until a compromise was reached in 1857 under which Managua, which lay equidistant between the rival cities, was made the capital.

Conservatives headed the government for most of the second half of the 19th century, but in 1893 the Liberals gained the presidency and proceeded to persecute the Conservatives just as the latter had previously persecuted them. The Liberals held power until 1909, at which time pressure from the United States led to the installation of a Conservative government. To back up its support of the new government, the United States sent a small detachment of marines into the country. The withdrawal of the marine detachment in 1925 was followed by the eruption of a new civil war between the Liberals and the Conservatives, and in response the United States sent several thousand marines in to suppress a Liberal-led insurrection in 1927. Two successive U.S.-supervised elections resulted in the election of Liberal presidents in 1928 and 1932, respectively. The marines withdrew from Nicaragua in 1933 after having carefully trained the Nicaraguan National Guard to keep order in the country.

In 1934 the head of the National Guard, Anastasio Somoza García, instigated the assassination of the preeminent remaining Liberal rebel leader, César Augusto Sandino, and in 1936 Somoza ran for the presidency without opposition. Somoza ruled Nicaragua with an iron hand for 20 years, and, though considerable economic development took place during that time, the benefits were inequitably distributed in favour of the Somoza family and its supporters. Somoza was assassinated in 1956 and was succeeded by one of his sons, Luis Somoza Debayle, who ruled until his own death in 1967. He was succeeded by his brother, Anastasio Somoza Debayle. Meanwhile, a guerrilla movement opposed to the rule of the Somozas and known as Sandinistas (after César Augusto Sandino) had been founded in 1962.

An earthquake devastated Managua in 1972, killing 6,000 people and leaving another 300,000 homeless. Opposition to the Somoza regime intensified after the government diverted international aid from the earthquake's victims to enrich the Somoza family instead. The Sandinistas then joined forces with liberal and middle-class opponents of the government, and a widespread popular insurrection overwhelmed the National Guard and overthrew Somoza in 1979.

The Sandinista-dominated government expropriated the vast property holdings of the Somoza family; nationalized banks, insurance companies, and mineral and forest resources; and generally instituted greater government participation in the economy. It also curtailed civil liberties and cultivated closer ties with the Soviet Union and Cuba.

The United States suspended foreign aid to Nicaragua in 1981 and in 1982 began to actively attempt to destabilize Nicaragua's economy by funding antigovernment rebels and initiating various covert activities. These efforts were successful and, though Nicaragua had made considerable progress in improving social services by 1985, economic woes increased. The Sandinista government lost the national elections in February 1990; thereafter many economic activities such as export industries and mining were returned to private control, and public participation in the economy increased.

Nicaragua, Lake, Spanish LAGO DE NICARAGUA, the largest of several freshwater lakes in southwestern Nicaragua and the dominant physical feature of the country; it is also the largest lake in Central America. Its aboriginal name was Cocibolca, meaning "sweet sea"; the Spanish called it Mar Dulce; its present name is said to have been derived from that of Nicarao, an Indian chief whose people lived on the lake shores. Oval in shape, the lake has an area of 3,149 square miles (8,157 square km), is 110 miles (177 km) in length, and has an average width of 36 miles (58 km). About 60 feet (18 m) deep in the centre, its waters reach a depth of 200 feet (60 m) to the southeast of its largest island, Ometepe. Its surface is 95 feet (29 m) above sea level.

It is believed that Lake Nicaragua, together with Lake Managua to the northwest, originally formed part of an ocean bay that, as a result of volcanic eruption, became an inland basin containing the two lakes, which are linked by the Tipitapa River. The ocean fish thus trapped adapted themselves as the water gradually turned from saltwater to freshwater. Lake Nicaragua is the only freshwater lake containing oceanic animal life, including sharks, swordfish, and tarpon.

More than 40 rivers drain into the lake, the largest being the Tipitapa River. The San Juan River (Río San Juan) drains out of the lake, following a 112-mile course that runs from the southeastern shore of the lake through a densely forested region to empty into the Caribbean Sea. For part of its course, the San Juan forms the boundary between Nicaragua and Costa Rica. To the southwest, the lake is separated from the Pacific Ocean by a narrow land corridor—the Rivas Isthmus—which is 12 mi wide.

Contrary to popular belief, the lake is tideless, although there is a daily fluctuation in the water level caused by east winds blowing up the San Juan Valley. The water level also falls during the dry season, December to April, and rises during the rainy season, May to October. There are several currents in the lake; the principal one runs from southeast to northeast on the surface, while beneath it a deeper current flows in the opposite direction. Surface water temperature usually remains at 75° F (24° C), and bottom temperature at 60° F (16° C). Due to the chemical composition of the volcanic rocks forming parts of the lake's bed and shores, the lake waters contain high proportions of dissolved magnesium and potassium salts.

There are over 400 islands in the lake, of which 300 are within 5 mi of the city of Granada on the northwest lake shore. Most of the islands are covered with a rich growth of vegetation, which includes tropical fruit trees. Some of the islands are inhabited. Ometepe, which, as mentioned, is the largest island, is 16 mi long and 8 mi wide. It is formed of what originally were two separate volcanoes—Concepción, which is 5,282 ft high and last erupted in 1983, and Madera, which is 4,015 ft high. Lava from bygone eruptions forms a bridge between them, called the Tistian Isthmus. (A third volcano associated with the lake is Mombacho, 4,413 ft high, which stands on the western shore.) Ometepe Island is the preeminent site in Nicaragua for pre-Columbian examples of statuary, ceramics, and other archaeological remains, some of which, it is believed, represent vestiges of ancient South American, as well as North American, civilizations. Coffee, cacao, corn (maize), bananas, and fruit are grown on the island as well as a little cotton and tobacco.

The lake is a traditional means of communication between the cities of the west coast of Nicaragua and those in the south and east of the country. Steamships have operated on the lake since 1882. Lake steamers based at Granada visit small lakeside towns, such as San Jorge and La Virgen on the west shore; Cárdenas and San Carlos on the southern shore; San Ubaldo, Puerto Díaz, San Miguelito, and El Morrito on the eastern shore.

In previous centuries, piratical raids from the Caribbean were sometimes made on the lakeside towns, until the building of fortifications in the 17th century on the San Juan River blocked the pirates' ingress. From the time of the ending of Spanish rule in the 1820s, the possibility of constructing a transoceanic canal from the Atlantic to the Pacific, which would run up the San Juan River, cross the lake, and be completed by a channel dug through the Rivas Isthmus, has been mooted. After the discovery of gold in California in 1848, Cornelius Vanderbilt, the New York millionaire, developed the Vanderbilt Road—a route over which gold prospectors from New York were transported up the river and over the lake, completing the final few miles to the Pacific by stage coach in order to take ship for San Francisco in California. The arrangement revived interest—which lasted for many years—in the possibilities of a transoceanic canal. After the completion of the Panama Canal in 1914, interest in the project once more subsided. Since 1916, however, by the provisions of the Bryan-Chamorro Treaty concluded between Nicaragua and the United States, the United States has had the exclusive right to build such a canal.

Nicaro, city, Holguín province, eastern Cuba. It is situated on the Bahía (bay) de Levisa, a nearly landlocked arm of the Atlantic Ocean, at the base of the Lengua de Pájara peninsula. Nicaro is Cuba's major centre for the refining of nickel and cobalt from nickel oxide, which is mined nearby in the foothills of the Sierra del Cristal. Other economic activities include motor repairing and the processing of dairy products; the city is also the home port of a small fishing fleet. Nicaro is connected by road with other coastal cities, and there is an airport on the peninsula southeast of the city. The area was the scene of major fighting in 1958 during Fidel Castro's revolt against the regime of Fulgencio Batista. Pop. (latest est.) 9,506.

Niccoli, Niccolò (b. *c.* 1364, Florence—d. Feb. 3, 1437, Florence), wealthy Renaissance Humanist from Florence whose collections of ancient art objects and library of manuscripts of classical works helped to shape a taste for the antique in 15th-century Italy.

Niccoli was one of the chief figures in the company of learned men who gathered around Cosimo de' Medici, and his intellectual quarrels with other noted Humanists created a sensation in the learned world at the time. Niccoli's chief services to classical literature consisted in his copying and collating ancient manuscripts, correcting the texts, introducing divisions into chapters, and making tables of contents. Many of the most valuable manuscripts in the Laurentian Library in Florence are by his hand, among them those of Lucretius and of 12 comedies of Plautus. Niccoli's private library was the largest and best in Florence, and he also possessed a small but significant collection of ancient works of art, coins and medals. He was also an accomplished calligrapher whose slightly inclined *antica corsiva* script influenced the development of italic type.

niccolite, an ore mineral of nickel, nickel arsenide (NiAs). It is commonly found associated with other nickel arsenides and sulfides, as in the Natsume nickel deposits, Japan; Andreas-Berg, Ger.; Sudbury, Ont.; and Silver Cliff, Colo. Niccolite is classified in a group of sulfide minerals that exhibit a characteristic hexagonal structure. The name, a derivative of the German word *Kupfernickel,* is a reference to subterranean imps (*Nickel*) who teased miners. For detailed physical properties, *see* sulfide mineral (table).

Niccolò dell'Arca, also called Niccolo da Bari (fl. *c.* 1460–94), early Renaissance Italian sculptor famed for his expressionistic use of northern Gothic realism in combination with true compositional principles of Renaissance art. Niccolò takes his name from the tomb (*arca* in Italian) of St. Dominic in the church of S. Domenico, Bologna, where he made the canopy and most of the freestanding figures (1469–94). His masterpiece is the passionately dramatic lamentation over the dead Christ (six figures; 1463, S. Maria della Vita, Bologna). Another terra-cotta sculpture group of the Madonna and saints (1478) is above the main entrance of the Palazzo Comunale in Bologna.

Niccolo di Giovanni di Massio: *see* Gentile da Fabriano.

Nice, seaport city, Mediterranean tourist centre, and capital of Alpes-Maritimes *département,* Provence-Alpes-Côte-d'Azur region, southeastern France. The city is located on the Baie (bay) des Anges, 20 mi (32 km) from the Italian border. Sheltered by beautiful hills, Nice has a pleasant climate and is the leading resort city of the Côte d'Azur, or French Riviera.

Founded by the Phocaeans of Marseille (a colony of Greek mariners) around 350 BC, the city was probably named in honour of a victory (*nikē* in Greek) over a neighbouring colony. Conquered by the Romans during the 1st century AD, it became a busy trading station. The town was held by the counts of Provence during the 10th century, and in 1388 passed under the protection of the counts of Savoy, who held it until 1860, although it was captured and occupied several times by the French during the 17th and 18th centuries. Nice was ceded to France by the Treaty of Turin (1860), after which a referendum ratified the decision. The Paillon River, now partly built over, separates the new town to the west from the old town, the harbour, and the commercial district to the east. The old town, with narrow winding streets, stands at the western base of a granite hill known as Le Château, although the castle that used to crown it was destroyed in 1706. The harbour, begun in 1750 and extended after 1870, is used by commercial vessels (imports include cereals and vegetable oils), fishing craft, and pleasure boats. There is also a regular passenger service to Corsica. The most striking part of the new town is the famous Promenade des Anglais, which originated in 1822 as a path along the shore built by the English colony. It stretches 2.5 mi (4 km) along the waterfront, and consists of two wide carriageways separated by flower beds and palm trees.

The Musée Jules Chéret des Beaux-Arts and the Musée Masséna have collections of early Italian paintings and works by 19th-century and contemporary artists. A memorial to the painter Marc Chagall has been built to house a collection of biblical paintings donated by the artist in 1966. A mile northeast of the city centre is the ancient episcopal town of Cimiez, which contains the majestic ruins of a Roman amphitheatre. Nearby stands a 17th-century villa housing an archaeological museum and a collection of more than 40 paintings and drawings by the French artist Henri Matisse.

Tourism is the leading commercial activity of the town, both in summer and winter. Numerous festivities are organized every year, the most important being the Carnival of Nice, which was first held in 1873. Nice has excellent road, rail, and sea communications; the airport is one of the most important in France. Industries include food processing, olive oil works, distilleries, and manufacture of perfumes. Newer technologies recently established include electronics and precision machinery. A flower and fresh-fruit market was established in 1963. Nice is also a growing cultural centre. A university with faculties of law, science, and letters was established in 1965; the Centre Universitaire Méditerranéen (founded 1933; first director, the French poet Paul Valéry) holds conferences on contemporary problems and language studies; and an international art school was established in 1970. Pop. (1999) 343,123.

Consult the INDEX *first*

Niceforo, Alfredo (b. Jan. 23, 1876, Castiglione di Sicilia, Catania, Italy—d. March 2, 1960, Rome), Italian sociologist, criminologist, and statistician who posited the theory that every person has a "deep ego" of antisocial, subconscious impulses that represent a throwback to precivilized existence. Accompanying this ego, and attempting to keep its latent delinquency in check, according to his concept, is a "superior ego" formed by man's social interaction. This theory, which he published in 1902, bears some resemblance to the discoveries of psychoanalysis that were being made about the same time.

Niceforo taught criminology in Lausanne (Switzerland), Brussels, and elsewhere and statistics at the universities of Naples and Rome (from 1931). Initially he was influenced by the Italian criminologist Cesare Lombroso (1835–1909), who had theorized the existence of a criminal type, identifiable by certain physical features. Niceforo came to believe, however, that crime could be understood only through a thorough investigation—biological, psychological, and sociological—of the normal human being.

One of the first empirical social scientists in Italy, he applied statistics to the problem of finding regularities in social behaviour. Out of these studies came his theory that persons in all societies exhibit certain constant features, which he called residues, one of which was diversity among individuals. He also discerned in every society the stratification of people into social hierarchies and their collection into a mass, observable especially in religious and national ideological systems.

In elaborating his theory of man's dual ego, he maintained that the deep ego often successfully evades the attempts of the superior ego to control it. This view is detailed in his *L' "io" profondo e le sue maschere* (1949; "The Deep Ego and Its Masks").

Nicene Creed, also called NICENO-CONSTANTINOPOLITAN CREED, a Christian statement of faith that is the only ecumenical creed because it is accepted as authoritative by the Roman Catholic, Eastern Orthodox, Anglican, and major Protestant churches. The Apostles' and Athanasian creeds are accepted by some but not all of these churches.

Until the early 20th century, it was universally assumed that the Niceno-Constantinopolitan Creed (the more accurate term) was an enlarged version of the Creed of Nicaea, which was promulgated at the Council of Nicaea (325). It was further assumed that this enlargement had been carried out at the Council of Constantinople (381) with the object of bringing the Creed of Nicaea up to date in regard to heresies about the Incarnation and the Holy Spirit that had risen since the Council of Nicaea.

Additional discoveries of documents in the 20th century, however, indicated that the situation was more complex, and the actual development of the Niceno-Constantinopolitan Creed has been the subject of scholarly dispute. Most likely it was issued by the Council of Constantinople even though this fact was first explicitly stated at the Council of Chalcedon in 451. It was probably based on a baptismal creed already in existence, but it was an independent document and not an enlargement of the Creed of Nicaea.

The so-called *Filioque* clause (Latin *filioque,* "and from the son"), inserted after the words "the Holy Spirit . . . who proceedeth from the Father," was gradually introduced as part of the creed in the Western Church, beginning in the 6th century. It was probably finally accepted by the papacy in the 11th century. It has been retained by the Roman Catholic, Anglican, and Protestant churches. The Eastern churches have always rejected it because they consider it theological error and an unauthorized addition to a venerable document.

The Nicene Creed was originally written in Greek. Its principal liturgical use is in the Eucharist in the West and in both Baptism and the Eucharist in the East. A modern English version of the text is as follows:

We believe in one God,
the Father, the Almighty,
maker of heaven and earth,
of all that is seen and unseen.
We believe in one Lord, Jesus Christ,
the only Son of God,
eternally begotten of the Father,
God from God, Light from Light,
true God from true God,
begotten, not made, one in Being with the Father.
Through him all things were made.
For us men and for our salvation
he came down from heaven:
by the power of the Holy Spirit
he was born of the Virgin Mary, and became man.
For our sake he was crucified under Pontius Pilate;
he suffered, died, and was buried.
On the third day he rose again
in fulfillment of the Scriptures;
he ascended into heaven
and is seated on the right hand of the Father.
He will come again in glory
to judge the living and the dead,
and his kingdom will have no end.
We believe in the Holy Spirit, the Lord, the giver of life,
who proceeds from the Father and the Son.
With the Father and the Son he is worshipped and glorified.
He has spoken through the Prophets.
We believe in one holy catholic and apostolic Church.
We acknowledge one baptism for the forgiveness of sins.
We look for the resurrection of the dead,
and the life of the world to come. Amen.

Nicephorus, name of rulers grouped below by country and patriarchate and indicated by the symbol •.

BYZANTINE EMPIRE

•**Nicephorus I** (b. Seleucia—d. July 26, 811, Bulgaria), Byzantine emperor from 802 who late in his reign alienated his subjects with his extremely heavy taxation and frequent confiscations of property.

Nicephorus became a high financial official under the empress Irene, and, when a revolution deposed Irene in 802, he was proclaimed emperor. In the following year he crushed a rebellion by Bardanes Turcus, a rival candidate for the throne, and in 808 he put down a similar revolt led by Arsaber.

Nicephorus I, coin, 9th century; in the British Museum
Peter Clayton

When Nicephorus withheld the tribute that Irene had agreed to pay the Baghdad caliph Hārūn ar-Rashīd, war followed, and Arab forces defeated the Byzantine emperor at Crasus in Phrygia (805). In 806 Hārūn ar-Rashīd invaded Asia Minor with more than 135,000 men and captured Heraclea, Tyana, and other places. Nicephorus was forced to agree to pay a yearly tribute of 30,000 gold pieces.

Although Nicephorus' religious policy was Orthodox rather than Iconoclast (*e.g.,* he permitted the veneration of images), he exercised strong control over the church, even going so far as to sponsor the convocation of a synod (809) that declared the emperor exempt from ecclesiastical laws.

During Nicephorus' reign Venice, Istria, and the Dalmatian coast were in dispute between Byzantium and the empire of Charlemagne until 810. Then a tentative agreement was reached, under which the disputed areas were to be returned to Byzantium in exchange for Byzantine recognition of Charlemagne's title of emperor. The details were worked out two years later during the reign of Nicephorus' successor, his son-in-law Michael I.

In 807–809, Nicephorus I conducted campaigns against the Bulgars, who were harassing Byzantium's northern frontiers. In 811 he invaded Bulgaria, rejecting the Bulgar khan Krum's repeated offers for peace. The Bulgars, however, managed to trap the Byzantines in a mountain defile, where they killed Nicephorus together with most of his army. Krum had Nicephorus' skull lined with silver and used it as a drinking cup.

•**Nicephorus II** PHOCAS (b. 912, Cappadocia—d. Dec. 10/11, 969, Constantinople), Byzantine emperor (963–969), whose military achievements against the Muslim Arabs contributed to the resurgence of Byzantine power in the 10th century.

Nicephorus II Phocas, coin, 10th century; in the British Museum
By courtesy of the trustees of the British Museum; photograph, Peter Clayton

Early life. Nicephorus Phocas was the son of Bardas Phocas, an important Byzantine general in Anatolia, on the borders of the empire. He quickly embraced a military career of arms and as a young patrician distinguished himself at his father's side in a war against the Ḥamdānid Arabs in the East. In 954–955 the emperor Constantine VII Porphyrogenitus named him commander in chief of the armies of the East, to replace the aging Bardas. Nicephorus proceeded to restructure the army to reinforce discipline and improve recruiting. At this point he probably wrote the treatises on military tactics that are attributed to him, although proof is lacking.

The emperor Romanus II named him commander of a wartime expedition to liberate Crete (which had been controlled by the Arabs ever since 826), at great cost to Aegean populations and international commerce. This enterprise mobilized the entire Byzantine fleet and close to 24,000 men. Nicephorus gained the island with the capture of Chandax, now Iráklion, on March 7, 961. In a general massacre, the inhumanity of which revealed his fierce nature, he broke all Arab resistance. Aided by the monks, among whom was Athanasius, his spiritual director and founder of the Greek Orthodox monastery on Mt. Athos, Nicephorus achieved the reconsolidation of Christianity. He then returned to Constantinople with ‘Abd al-‘Azīz, the last *amīr* of Crete, as his captive. This exploit, sung by the poet Theodosius the

Deacon, realized the Byzantine dream (after dozens had failed to liberate Crete) of imperial mastery of the eastern Mediterranean. Later, as emperor, Nicephorus could state proudly that he controlled the seas. By that time, however, he had recovered Cilicia and the island of Cyprus and had captured other Muslim naval bases.

At the beginning of 962, Nicephorus attacked the Arabs of Cilicia and Syria, capturing more than 60 fortresses. After the death of Romanus II on March 15, 963, the situation in the capital changed. The Emperor's will had left a eunuch, Joseph Bringas, in charge of the affairs of state and the 20-year-old empress, Theophano, as acting regent for the legitimate emperors, Basil and Constantine, aged six and three, respectively. These circumstances do not seem to have tempted Nicephorus.

Rise to power. In spite of his great popularity, there was no indication that Nicephorus—whose physical appearance was reportedly not very agreeable and who seemed destined under the influence of Athanasius the Athonite to embrace the monastic life—would end up seducing and being seduced by the young and beautiful empress. If such a plan existed at the time (and there is reason to believe it did) it was probably the brainchild of the ambitious Theophano, who was unhappy with Bringas' government. The people of Constantinople, aroused by Basil the chamberlain, revolted against Bringas, and the imperial army, through the intermediation of John Tzimisces, Nicephorus' faithful lieutenant, "obliged" the soldier to accept the crown at Caesarea on July 3, 963, and to march against Constantinople. On Aug. 16, 963, Nicephorus was crowned in the Hagia Sophia by the patriarch Polyeuctus, and on September 20 he celebrated his marriage to Theophano.

Smitten with the young woman and influenced by his brother Leo Phocas, whose self-interested machinations (he was accused of speculating on the price of wheat) stirred up the discontent of the people of Constantinople, Nicephorus gradually became taciturn and suspicious even of his best advisers, who, one after another, were removed from office. As emperor, Nicephorus continued his exploits against the Arabs until finally, abandoned by all, he retired to the fortified palace of Boukoleion, which he had built for his personal safety. During a night in December 969, he was killed there by former friends, guided by Tzimisces and advised by Theophano.

The contradictions in Nicephorus' life and character also marked his domestic politics. His government evoked unanimous discontent: the hostility of the people to the new fiscal charges and coinage debasement required by military needs; the exasperation of ecclesiastical authorities over decisions against enrichment of the monasteries; the remonstrances of his spiritual director, Athanasius, against his private life; and the apprehensions of Theophano that her children would be ousted through the machinations of Leo Phocas. These all created a climate of intrigue, which resulted in Nicephorus' assassination and brought John Tzimisces to the throne.

Military achievements. The failure of Nicephorus' domestic policies did not cast a shadow on his military achievement, which made his reign one of the Byzantine Empire's most glorious. In the words of C. Schlumberger, his most exhaustive biographer, he inaugurated the Byzantine era in the East. In fact, though known primarily for his exploits against the infidel, Nicephorus also carried the imperial frontier beyond the Euphrates to Syria. Nor did he neglect the other imperial frontiers in the conception of Byzantine grandeur. To counteract the Bulgar menace he spurred Russian intervention in the Danubian area, a policy that was not without danger for Byzantium, especially after his death. Also, to stop expansionist plans of the Germanic sovereign Otto I, who was re-creating the Carolingian heritage, Nicephorus opposed Otto's title of emperor, while trying with more or less success to consolidate the Byzantine presence in Italy. Nicephorus II's policies, seen in their entirety, indicate that his purpose was to assure Byzantium of its place as international arbiter, which he accomplished through the use of arms.

Reputation. Phocas was indeed a Nicephorus (Bringer of Victory) for the empire. The Byzantines surnamed him Kallinikos, artisan of good victories; the Arabs called him Nikfour, the Saracen hammer. His death caused joy in the Muslim world and shook Christianity. His legend was quickly nourished with stories of his exploits and tragic death. Byzantine and even Bulgar poets were inspired by his exploits, and posterity has kept his memory alive: he is celebrated in the epic poetry of the frontier; the church beatified him (an *acolouthie* was composed in his honour); and the monks of Mt. Athos still venerate as their benefactor and founder Nicephorus, emperor and martyr. His life was summed up in the phrase inscribed on his sarcophagus: "You conquered all but a woman." (H.Ah.)

BIBLIOGRAPHY. C. Schlumberger, *Un Empereur byzantin au Xᵉ siècle: Nicéphore Phocas* (1890), is a comprehensive biography. The same author's *L'Épopée byzantine à la fin du Xᵉ siècle,* 3 vol. (1896–1905); and A.A. Vasiliev, *Byzance et les Arabes,* vol. 2, *La Dynastie macédonienne* (1968), are useful for Nicephorus Phocas' career in the East. Also of interest is H. Gregoire, "The Amorians and the Macedonians, 842–1025," in *The Cambridge Medieval History,* new ed., vol. 4, pt. 1, pp. 147–156 (1966).

•**Nicephorus III** BOTANEIATES (fl. late 11th century), Byzantine emperor (1078–81) whose use of Turkish support in acquiring and holding the throne tightened the grip of the Seljuq Turks on Anatolia.

Nicephorus, who belonged to the military aristocracy of Asia Minor and who was related to the powerful Phocas family, became commander of the Anatolian theme (administrative district). When discontent against the government of Michael VII Ducas led to rioting in Constantinople, Nicephorus was proclaimed emperor (Jan. 7, 1078) by his supporters there. With some support from Suleiman, the Seljuq ruler in Anatolia, Nicephorus was acclaimed emperor by his troops at Nicaea (in northwestern Anatolia) and entered Constantinople three months later. His imperial claim was ratified by the aristocracy and clergy, who had already deposed Michael VII. Nicephorus III defeated a rival claimant to the throne, Nicephorus Bryennius, the empire's commander in Albania; he also defeated a later pretender, Nicephorus Basilacius, who succeeded Bryennius in Albania.

Nicephorus III Botaneiates, detail of a manuscript; in the Bibliothèque Nationale, Paris (Ms. Coislin 79)
By courtesy of the Bibliotheque Nationale, Paris

After the death of Nicephorus' wife, he married Mary, the wife of the deposed but still living Michael VII, naming Michael's son Constantine as his successor but then later deciding on one of his own nephews instead. He relegated Constantine's fianceé, a daughter of the Norman leader Robert Guiscard, to a convent. Nicephorus' action provided an excuse for Guiscard's later successful attacks against the empire.

In 1080 another usurper, Nicephorus Melissenus, appeared in Asia Minor and also sought Turkish assistance. As a result of such constant internal strife, with one faction or another requesting aid from the Turks, most of Asia Minor was lost to Byzantium and became incorporated in the Seljuq Sultanate of Rūm, centred on Iconium (modern Konya, Tur.). Unable either to save the empire from disintegration or to maintain his own position as ruler, Nicephorus abdicated on April 4, 1081, and entered the Peribleptos monastery in Constantinople.

PATRIARCHATE

•**Nicephorus I,** SAINT, Greek NIKEPHOROS (b. *c.* 758, Constantinople—d. June 2, 829, near Chalcedon, Bithynia, Asia Minor; feast day March 13), Greek Orthodox theologian, historian, and patriarch of Constantinople (806–815) whose chronicles of Byzantine history and writings in defense of Byzantine veneration of icons provide data otherwise unavailable on early Christian thought and practice.

Although his conservatively Orthodox family had suffered at the hands of iconoclast (image-destroying) regimes during the Isaurian dynasty (717–820), Nicephorus succeeded to the imperial secretariat and represented the emperor Constantine VI as imperial commissioner to the second Council of Nicaea (787), which approved the use of liturgical icons. After having retired for a number of years into monastic seclusion, he was called to be director of Constantinople's refuge centre for the poor soon after the accession of the empress Irene (ruled 797–802).

Though still a layman, he was nominated patriarch of Constantinople in 806. That move stirred the opposition of zealous monks of the Stoudion monastery who attacked his unconventional succession to the patriarchate, his compromising stand on an adulterous marriage at court, and his generally conciliatory position on theology. Later, however, his repudiation of the iconoclastic policies of the Isaurian emperor Leo V the Armenian won the monks' respect.

Subsequently, in 815, an iconoclastic synod at Constantinople deposed and exiled Nicephorus to a monastic retreat near Chalcedon; thenceforth, he produced a series of influential anti-iconoclastic tracts and Byzantine chronicles. His theological arguments achieved a measure of toleration from the emperor Michael II (ruled 820–829). Chief among his theological works was his *Apologeticus major* (817, "Major Apology"), an exhaustive treatise on the legitimacy of icon veneration. Nicephorus succeeded in neutralizing his theological adversaries and contributed to the eventual vindication of the use of icons by the mid-9th century.

Two of his historical works became universally popular: *Breviarium Nicephori* ("Nicephorus' Short History"), which narrated events during Byzantine reigns from 602 to 769 and is significant for material on the founding of Bulgarian settlements; and chronological tables, which listed civil and ecclesiastical offices from the time of Adam to the year 829. Both works circulated in the West through the Roman Anastasius the Librarian's late 9th-century Latin compilation of the *Chronologia tripartita* ("Tripartite Chronicle").

Nicephorus Bryennius: *see* Bryennius, Nicephorus.

Nicephorus Callistus Xanthopoulos (b. *c.* 1256—d. *c.* 1335), Byzantine historian and litterateur whose stylistic prose and poetry exemplify the developing Byzantine Humanism of the 13th and 14th centuries, and whose 23-volume *Ecclesiasticae historiae* ("Church History") constitutes a significant documentary source for material on primitive Christianity, its doctrinal controversies and Christological heresies, and for hagiographical, liturgical, and legendary texts from Byzantine culture.

One of the clerics attached to Constantinople's basilica of Hagia Sophia (Greek: Holy Wisdom), Nicephorus was trained in the florid, rhetorical style of Renaissance Byzantine historiography; he taught rhetoric and theology and in his later years became a monk. Using the basilica's manuscript library, he compiled his major work, an 18-volume "Church History," from the origins of Christianity to the execution of the emperor-tyrant Phocas in 610; an appendix of 5 volumes continued the chronicle, summarizing events until the death of Emperor Leo VI the Wise (912). Taking as a point of departure several celebrated ecclesiastical histories, including those of the 6th-century Byzantine Evagrius Scholasticus and the 4th-century Eusebius of Caesarea, integrated with accounts of an anonymous 10th-century text, Nicephorus paraphrased a chronicle the value of which must be determined by the quality of the individual sources used. In the manner of Byzantine Humanism, the "History," written in an affected style that often impedes textual clarity, was dedicated to the emperor Andronicus II Palaeologus (1282–1328) and contributed to that monarch's nationalist movement exalting Greek culture and Orthodoxy above Latin Christianity. The 16th-century Latin translation, however, served to support the argument for the use of religious images in controversies involving certain Protestant iconoclasts.

Among Nicephorus' other works are commentaries on the writings of the outstanding patristic Greek theologian, Gregory of Nazianzus; treatises on the annual cycle of Byzantine worship, with annotations on Lenten and Easter hymnody; original liturgical orations in prose and poetry; rigid Byzantine verse forms cataloging emperors, patriarchs, and other dignitaries; and, as an exception, secular themes in verse and rhetorical forms.

Nicetas OF REMESIANA (fl. early 5th century), Greek bishop, theologian, and composer of liturgical verse, whose missionary activity and writings effected the Christianization of the Serbian Slavic regions and cultivated a Latin culture among the barbarians in the lower Danube Valley.

After becoming bishop of Remesiana (later the Serbian village of Bela Palanka, near the town of Niš) *c.* 366, Nicetas twice visited Paulinus, who was bishop of Nola, in Campania (near Naples), a fellow missionary, the foremost Latin literary figure of his age, and the primary source for knowledge of Nicetas' life and pastoral activity. Scholarship, having laboriously reconstructed substantial portions of Nicetas' theological tracts, has furnished sufficient evidence to identify his principal doctrinal work, the *Competentibus ad baptismum instructionis libelli sex* ("Six Books of Instructions for Baptismal Candidates"). The lengthy excerpts from this catechetical series, particularly "On the Meaning of Faith," "On the Power of the Holy Spirit," and the "Commentary on the Apostolic-Nicene Creed," indicate that Nicetas stressed the orthodox position in Trinitarian doctrine consonant with the leading 4th-century theologian Cyril of Jerusalem. Accordingly, Nicetas opposed any attribution of a created nature—either to the Son, contrary to the Arians, or to the Holy Spirit, as against the Macedonians. Moreover, these documents contain, apparently for the first time in early Christian literature, the term communion of saints, in reference to the belief in a mystical bond uniting both the living and the dead in a confirmed hope and love. This expression henceforth played a central role in formulations of the Christian creed.

Other patristic writers, including the 5th-century church historian Gennadius of Marseilles, credit Nicetas with promoting Latin sacred music among his newly converted primitive Serbians for use during their eucharistic worship with its vigil from Saturday evening to Sunday morning. He wrote a rationale for such practice and reputedly composed a number of liturgical hymns, among which some 20th-century scholars identify the major Latin Christian acclamation chant of thanksgiving, the "Te Deum laudamus" (Latin: "God, We Praise You").

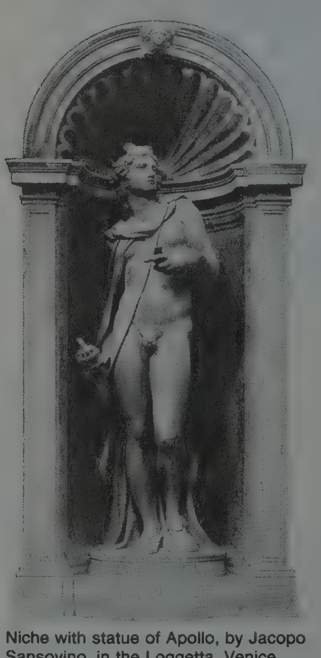
Nicetas STETHATOS (b. *c.* 1000—d. *c.* 1080), Byzantine mystic, theologian, and outspoken polemist who played the principal theoretical role in the 11th-century Greek Orthodox–Latin church controversy concluding in the definitive schism of 1054.

A monk of the Stoudion monastery in Constantinople (now Istanbul), Nicetas allied himself *c.* 1020 with his spiritual tutor, Symeon the New Theologian, whose biographer and apologist he became when Symeon was attacked for his system of contemplative prayer. In his biography of Symeon, Nicetas integrated his own views on the inner experience of beatifying illumination that derived from a monastic prayer discipline involving both body and spirit, known as Hesychasm (*q.v.*). Furthering this tradition he wrote a treatise and several commentaries on ascetical practices.

In the 11th-century conflict between the Greek and Latin churches, Nicetas served as theologian-polemist to Constantinople's patriarch Michael Cerularius, who, during 1053–54, disputed sharply with the papal legate Cardinal Humbert of Silva Candida. Nicetas criticized Western doctrine on the manner of relating the Holy Spirit to the divinity, on the claims of papal supremacy, on mandatory clerical celibacy, and on the use of unleavened bread in Roman eucharistic worship.

niche, in architecture, decorative recess set into a wall for the purpose of displaying a statue, vase, font, or other object. Niches were used extensively in both interior and exterior walls by the architects of ancient Rome. A fine extant example of such use is found at the Roman Temple of Diana at Nîmes, Fr.

Gothic examples of the decorative recess are ubiquitous, including niches in such medieval structures as the English cathedrals of Wells and Peterborough. Later architects, especially those of the Italian Renaissance and the classic revival of 17th- and 18th-century Europe, all made use of the niche. Semicircular niches are often featured, many having shell-like fluting at the apex.


Niche with statue of Apollo, by Jacopo Sansovino, in the Loggetta, Venice, 1540
Alinari—Art Resource/EB Inc.

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niche, in ecology, the smallest unit of a habitat that is occupied by an organism. Habitat niche refers to the physical space occupied by the organism; ecological niche refers to the role it plays in the community of organisms found in the habitat. The activities of an organism and its relationships to other organisms are determined by its particular structure, physiology, and behaviour. Two organisms that occupy similar niches but that are native to different geographical areas are termed ecological equivalents.

Nichinan, city, Miyazaki Prefecture (*ken*), Kyushu, Japan, facing the Pacific Ocean. Japanese (Obi) cedar has been cultivated in the area since the early 19th century and forms the basis of the city's shipbuilding, timber, paper, and pulp industries. Nichinan's two ports—Aburatsu and Oodotsu—are the main centres for coastal fishing (bonito, yellowtail, tuna) in southern Kyushu. Agricultural products include sweet potatoes, barley, and tobacco. The city is bordered (north) by low, rounded hills, and its picturesque seacoast is part of Nichinan-kaigan Quasi-national Park. Pop. (1995) 47,596.

Tropical vegetation in Nichinan-kaigan Quasi-national Park, Japan
Tokyo Photo—FPG/EB Inc.

Nichiren, original name ZENNICHI, also called ZENSHŌBŌ RENCHŌ, posthumous name RISSHŌ DAISHI (b. March 30, 1222, Kominato, Japan—d. Nov. 14, 1282, Ikegami), militant Japanese Buddhist prophet who contributed significantly to the adaptation of Buddhism to the Japanese mentality and who remains one of the most controversial and influential figures in Japanese Buddhist history. After an exhaustive study of the various forms of Buddhism, he concluded (in 1253) that the *Lotus Sūtra* teaching was the only true doctrine suitable for his age and predicted calamity for Japan if all other sects were not banished. He wrote his systematic work, *Kaimokushō* (1272), while in exile for his radical teachings.

Early years and spiritual quest. Nichiren, the son of a fisherman, was born in the village of Kominato, on the Pacific coast of the present Bōsō Peninsula in eastern Japan. When he was 11 years old, he entered the Buddhist monastery of Kiyosumi-dera, near Kominato, and after four years of novitiate received the Buddhist orders. Buddhism in Japan had become more and more doctrinally confused, and the identity of the various sects was based more on institutional aspects than on doctrinal tenets. Though the monastery of Kiyosumi-dera officially belonged to the Tendai sect (which was centred on the *Lotus Sūtra* text and realization of the universal Buddha-nature), the doctrine practiced there was a mixture of different Buddhist schools; it had a strong emphasis on Shingon, an esoteric school that emphasized an elaborate symbolic ritual as a means of arousing an immediate sense of the all-pervading presence of the Buddha.

The young monk was too intense and too sincere in his quest for the true doctrine of the Buddha to be satisfied with such prevailing confusion of doctrine. Soon his central spiritual problem was to find, through the maze of scriptures and doctrines, the authentic teaching the historical Buddha, Gautama (Śākyamuni), had preached for the salvation of mankind. So he undertook a thorough study of all the major Buddhist schools existing in Japan.

In 1233 he went to Kamakura, where he studied Amidism—a pietistic school that stressed salvation through the invocation of Amida (Amitābha), the Buddha of infinite compassion—under the guidance of a renowned master. After having persuaded himself that Amidism was not the true Buddhist doctrine, he passed to the study of Zen Buddhism, which had become popular in Kamakura and Kyōto. He then went to Mount Hiei, the cradle of Japanese Tendai Buddhism, where he found the original purity of the Tendai doctrine corrupted by the introduction and acceptance of other doctrines, especially Amidism and esoteric Buddhism. To eliminate any possible doubts, Nichiren decided to spend some time at Mount Kōya, the centre of esoteric Buddhism, and also in Nara, Japan's ancient capital, where he studied the Ritsu sect, which emphasized strict monastic discipline and ordination.

By 1253, 20 years after his quest had begun, Nichiren had reached his final conclusion: the true Buddhism was to be found in the *Lotus Sūtra,* and all other Buddhist doctrines were only temporary and provisional steps used by the historical Buddha as a pedagogical method to lead men to the full and final doctrine contained in the *Lotus Sūtra.* Moreover, the Buddha himself had decreed that this doctrine was to be preached to men during the age of *mappō* (the "latter law")—the last, degenerate period after his death, the present age—and that a teacher would then appear to preach this true and final doctrine.

Nichiren's doctrine. In the spring of 1253, Nichiren returned to Kiyosumi-dera, where he proclaimed his faith before his old master and his fellow monks, adding that all other forms of Buddhism were to be banished, for they were false and were misleading the people. Neither the monks of Kiyosumi-dera nor the feudal lord of the region accepted his doctrine, and their angry reaction was such that he had to escape to save his life.

Expelled from his monastery, Nichiren lived in a little hut in Kamakura and spent his days preaching his doctrine at the busiest crossroads of the city. His constant attacks against all other sects of Buddhism attracted an ever-increasing hostility and finally open persecution from Buddhist institutions and from the authorities. The country was at the time afflicted by epidemics, earthquakes, and internal strife. Reflecting on this sad situation, Nichiren is said to have read once again all the Buddhist scriptures and in 1260 published a short tract, *Risshō ankoku ron* ("The Establishment of Righteousness and the Pacification of the Country"), in which he stated that the deplorable state of the country was due to the people's refusal to follow true Buddhism and their support of false sects. The only salvation was for the authorities and the people of Japan to accept Nichiren's doctrine as the national faith and banish all the other sects. If this was not done, Nichiren claimed, the state of the country would become even worse, and Japan would be invaded by a foreign power. The military government in Kamakura reacted to this prophetic admonition by exiling the monk to a deserted place in the Izu-hantō, in the present Shizuoka prefecture, in June 1261. He was pardoned in 1263, but upon his return to Kamakura Nichiren renewed his attacks.

In 1268 an embassy from the Mongols—who had conquered China—arrived in Japan with the demand that the Japanese become a tributary nation to the new Mongol dynasty. Nichiren saw in this event the fulfillment of his prophecy of 1260. Once again he sent copies of his *Risshō ankoku ron* to the authorities and the heads of the major Buddhist institutions, insisting again that if his doctrine was not accepted as the true Buddhism and if the other sects were not banished, Japan would be visited with all manner of calamities.

Exile. Again the authorities and the older Buddhist sects were enraged by the extraordinary audacity of this troublesome monk, and in 1271 Nichiren was arrested and condemned to death. The death penalty was commuted at the last moment, and instead of being executed Nichiren was exiled to the island of Sado, in the Sea of Japan, where in 1272 he wrote his systematic work *Kaimokushō* ("The Opening of the Eyes").

According to Nichiren's account and the belief of his adherents, he was saved from execution by a miraculous intervention that struck the sword from the executioner's hand. While the fiery monk was in exile, a second and a third Mongol embassy arrived, threatening an invasion if Japan persisted in its refusal to become a vassal nation. Nichiren's prophecy and the pressure of his influential friends in Kamakura moved the government, and an edict of pardon was issued in the spring of 1274. In May Nichiren arrived in Kamakura, where he met with high government officials and reiterated his stern requests. Though this time the authorities treated him with deference and respect, they still refused to comply with his demands.

Full of indignation, Nichiren left Kamakura in June and with a small number of disciples retired to a solitary place on Mount Minobu, in the present Yamanashi prefecture. There he spent his last years instructing his followers and writing. Among the main works of this period are the "Selection of the Time," a synthetic exposition of his philosophy of history, and "In Recompense of Indebtedness," in which a good life is seen as one of practical gratitude toward one's parents, all creatures, one's sovereign, and the Buddha.

The hardships and persecutions endured for so many years began to take their toll, and Nichiren's state of health grew worse and worse. His final illness was probably a cancer of the intestinal tract. In the fall of 1282 he left his hermitage at Minobu and took residence in the mansion of one of his disciples in the district of Ikegami (in what is now Tokyo), where he died.

Assessment. Nichiren is perhaps the most controversial figure in the history of Japanese Buddhism. Incapable of accepting any compromise, he described himself as a most intractable character. Yet letters he wrote to his disciples and friends reveal how loving, understanding, and even delicate he could be. He dearly loved Japan and wanted it to fulfill its mission of being the chosen country of Buddhism, from which Buddha's salvation was to spread to the entire world. His Buddhism was typically Japanese in the sense that it could not be confined to mere speculation or even to individual salvation but had to be concerned with the salvation of society and temporal institutions—hence, the importance he gave to the right understanding of history and human affairs. The continuing vitality of the religious system he founded in the 13th century is attested by the fact that many of the modern Buddhist sects now flourishing in Japan are, in various degrees, based on Nichiren's doctrines. (P.P. del C.)

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Nichiren Buddhism, school of Japanese Buddhism named after its founder, the 13th-century militant prophet and saint Nichiren. It is one of the largest schools of Japanese Buddhism; in 1977 the total membership of its numerous subsects was reported to be approximately 30,600,000.

Nichiren believed that the quintessence of the Buddha's teachings was contained in the *Lotus Sūtra* (Sanskrit: *Saddharmapuṇḍarīka-sūtra;* "The Scripture of the Lotus of the Good Law"). According to him, the other sects then existing in Japan misunderstood the truth, and he vehemently denounced them and the government that supported them. He blamed the social unrest of the period on the erroneous religious beliefs of the nation and proclaimed that the salvation of the Japanese nation depended on devotion to the truth contained in the *Lotus Sūtra.* He came to conceive of himself as the bodhisattva ("buddha-to-be") Jōgyō, who was destined to suffer for proclaiming the truth in an era of darkness, an identification apparently verified by the severe persecution he suffered.

Nichiren taught that the historical Buddha Śākyamuni was identical with the original, eternal Buddha and that, inasmuch as all men partake of the Buddha-nature, all men are manifestations of the eternal. He devised three ways of expressing this concept, known as the *sandai-hihō* ("three great secret laws [or mysteries]"). The first, the *honzon,* is the chief object of worship in Nichiren temples and is a ritual drawing showing the name of the *Lotus Sūtra* surrounded by the names of divinities mentioned in the sutra (words of the Buddha). The second great mystery is the *daimoku,* the "title" of the sutra; and Nichiren instituted the devotional practice of chanting the phrase *namu Myōhō renge-kyō* ("salutation to the *Lotus Sūtra*"). The third mystery relates to the *kaidan,* or place of ordination, which is sacred and belongs to the "Lotus of the Good Law."

After Nichiren's death the school split into various subsects, most notably Nichiren-shū (Nichiren Sect) and Nichiren-shō-shū (True Nichiren Sect). The former, which still controls the main temple, the Kuon-ji, founded by Nichiren at Mount Minobu (Yamanashi prefecture), maintained a dominant position among Nichiren Buddhists until the years following World War II, when it was eclipsed by the Nichiren-shō-shū, whose phenomenal growth stemmed from its lay organization, the Sōka-gakkai.

Nichiren-shō-shū traces its line of succession back to one of Nichiren's six disciples, Nikkō, who, according to documents held by the sect, was the prophet's chosen successor. The temple he established in 1290 at the foot of Mount Fuji, Daiseki-ji, is still the sect's headquarters. Nichiren-shō-shū differs from the other Nichiren sects in its elevation of the founder, Nichiren, to a rank higher even than that of the historical Buddha.

Among its rival Nichiren sects, Nichiren-shō-shū had only minor influence until the emergence of the Sōka-gakkai lay organization brought it into its present dominant position in Japanese politics. The sect has established branches outside Japan. In the United States the lay organization equivalent to the Sōka-gakkai is called Nichiren-shō-shū of America.

Nicholas, name of rulers grouped below by country, papacy, or patriarchate and indicated by the symbol ●.

Foreign-language equivalents:

Greek	Nicolaos, or Nikolaos
Latin	Nicolaus
Montenegrin	Nikola
Russian	Nikolay, or Nikolai

Montenegro

●**Nicholas I,** Montenegrin in full NIKOLA PETROVIĆ (b. Oct. 7 [Sept. 25, old style], 1841, Njegoš, Montenegro—d. March 2, 1921, Antibes, Fr.), prince (1860–1910) and then king (1910–18) of Montenegro, who transformed his small principality into a sovereign European nation.

Heir presumptive to his uncle Danilo II, who was childless, Nicholas came to the throne in August 1860 after Danilo's assassination. Educated abroad in Paris and Trieste, he was throughout his reign faced with the difficult task of popularizing Western ways. A strong prince and an outstanding leader, he fought the Turks in 1862 and again in 1876, when he conducted a brilliant campaign. At the Congress of Berlin (1878), Montenegro was doubled in size, with an outlet to the Adriatic, and recognized as a sovereign state. Alexander II of Russia, whose friendship with Nicholas dated back to a state visit to St. Petersburg in 1868, supplied him regularly with money and arms and at one point favoured his candidacy for the Serbian throne. A clever diplomat, Nicholas strengthened his dynastic connections through the marriages of his daughters: Elena married (1896) the future king of Italy, Victor Emmanuel III; Zorka married Peter Karageorgević (1883) but died before he became king of Serbia; two other daughters married Russian grand dukes. In Balkan politics Nicholas conspired, sometimes with, and sometimes against, Serbian rulers, to create a South Slav state.

Styling himself "Royal Highness" (December 1900), Nicholas became more despotic until he was forced to grant a constitution in 1905. Political dissension, nevertheless, continued, culminating in the Cetinje bomb plot against him (1907). On Aug. 28, 1910, Nicholas declared himself king. Hoping to gain prestige through the addition of new territories, he joined in the Balkan War of 1912–13 against Turkey; but his territorial acquisitions were disappointing. In World War I he supported Serbia against Austria-Hungary. Defeated, he concluded a separate peace in January 1916 and then went into exile in Italy. When the victorious Serbs entered Montenegro after the defeat of Austria-Hungary, Nicholas and his dynasty were formally deposed by a national assembly (Nov. 26, 1918), and Montenegro was joined to Serbia, later to become part of the Kingdom of the Serbs, Croats, and Slovenes (Yugoslavia).

Papacy

●**Nicholas I,** SAINT, byname NICHOLAS THE GREAT (b. *c.* 819–822, Rome—d. Nov. 13, 867, Rome; feast day November 13), pope from 858 to 867, master theorist of papal power, considered to have been the most forceful of the early medieval pontiffs, whose pontificate was the most important of the Carolingian period and prepared the way for the 11th-century reform popes.

He had served in the Curia for almost 15 years before his election in April 858 as Pope Benedict III's successor. His reign was marked by three historically significant contests.

Nicholas supported the patriarch St. Ignatius of Constantinople, who was uncanonically replaced by the scholar Photius after the Byzantine emperor Michael III had unjustly humiliated and deposed him. To investigate this state of affairs, Nicholas dispatched legates to Constantinople, but when they confirmed judgment against Ignatius in 861, he disavowed them. After receiving word from the exiled Ignatius in 862, Nicholas, having studied the case, favoured Ignatius and excommunicated Photius (863), who counterdeposed the Pope in 867. Nicholas did not live to learn of this act or of its extreme culmination: the Photian Schism, a split between the Eastern and Western churches.

Nicholas' second great struggle was with King Lothair of Lorraine, who wanted to divorce his wife, Theutberga, on false charges of incest. Theutberga appealed to Nicholas, while a synod at Aachen in April 862 gave Lothair permission to remarry. At a synod at Metz, in 863, Lothair obtained confirmation of the Aachen decision, probably through bribery, from Nicholas' legates, archbishops Günther of Cologne and Theutgaud of Trier (Trèves). When these legates arrived in Rome with the libellous decree of Metz, Nicholas, treating Lothair as his ecclesiastical subject, quashed the whole proceedings against Theutberga and, creating a precedent, deposed the archbishops.

The third great ecclesiastical affair of Nicholas' pontificate involved the deposition in 862 of Bishop Rothad II of Soissons by Archbishop Hincmar of Reims, a classic example of the right of bishops to appeal to Rome against their metropolitans. Nicholas, a strict upholder of Rome's primacy of jurisdiction, ordered an examination that led to Rothad's restoration in 865 by using, probably for the first time, the False Decretals, a 9th-century collection of revolutionary but partially forged documents that, in part, maintained bishops' independence against the encroachments of archbishops who were attempting to extend their power.

For Nicholas, the Roman see, having power by divine commission, was the head and the epitome of the Catholic Church. Consistently urging the supremacy of Rome, he fully endorsed the papal inheritance of sacerdotal and royal functions as conferred by Christ on St. Peter and the delegation of temporal power to the emperor for the protection of the church. He reacted against Carolingian domination in ecclesiastical matters and claimed the right to legislate for the whole of Christendom. Thus, his teaching contained the rudiments of papal theocracy and helped to found Roman supremacy over the Western sees by declaring that what the pope decides, all must observe. M. Maitland's English translation of J. Roy's *St. Nicholas I* was published in 1901, followed by E. Perels' *Papst Nikolaus I und Anastasius Bibliothekarius* in 1920.

●**Nicholas II,** original name GERARD OF BURGUNDY, French GÉRARD DE BOURGOGNE (b. Lorraine—d. Aug. 27, 1061, Florence), pope from 1058 to 1061, a major figure in the Gregorian reform.

He was bishop of Florence when he was elected, *c.* December 1058 at Siena, Italy, to succeed Pope Stephen X (IX), in opposition to Antipope Benedict X, who had been chosen by the anti-reformist Roman aristocracy. In January 1059 Benedict was expelled from the papacy.

At the Lateran Council of April 1059, a milestone in papal history, Nicholas promulgated his famous bull on papal elections (April 13); he did so in reaction to the disorders that interrupted his own election. He assigned the leading part in elections to the seven cardinal bishops (*i.e.,* those who had the predominant position among the higher clergy), who were to choose a suitable candidate and then summon the other cardinals. The remaining clergy and the people were to acclaim the choice, and the imperial role was dismissed. Nicholas' legate, sent to notify the German court of the election decree, was refused an audience, and an imperialist version of the decree was circulated. At a synod of 1061, the German bishops declared Nicholas' decree void and quashed all his acts, signifying the ruptured alliance between Germany and Rome and launching the contest between empire and papacy.

Nicholas' relations with the Normans, firmly entrenched in southern Italy, were friendly, however. By the Treaty of Melfi (Aug. 23, 1059) he invested Robert Guiscard as duke of Apulia, Calabria, and Sicily (with papal suzerainty over these lands) and Richard of Aversa as prince of Capua, in return for allegiance. A. Clavel's *Pape Nicholas II: son oeuvre disciplinaire* ("Pope Nicholas II: His Disciplinarian Work") was published in 1906.

●**Nicholas III,** original name GIOVANNI GAETANO ORSINI (b. *c.* 1225, Rome—d. Aug. 22, 1280, Soriano nel Cimino, near Viterbo, Papal States), pope from 1277 to 1280.

Of noble birth, he was made cardinal in 1244 by Pope Innocent IV and protector of the Franciscans in 1261 by Pope Urban IV. After a colourful and celebrated service in the Curia, he was elected pope on Nov. 25, 1277, and initiated an administrative reform of the Papal States.

In matters of the church, Nicholas issued the important bull of 1279, temporarily settling the Franciscan struggle over the interpretation of perfect poverty that had split the order into two factions, the Conventuals and the Spirituals. His bull revoked the concessions concerning the use of money made by Pope Innocent IV and clarified Innocent's ruling that all possessions of the order, except those reserved by the donors, belonged to the papacy.

Nicholas successfully continued Pope Gregory X's policy of restraining the ambitious Sicilian king Charles I of Anjou and did not renew Charles's positions as imperial vicar of Tuscany and senator of Rome, an office Nicholas prevented from ever again being filled by a foreign ruler. He induced the German king Rudolf I to acknowledge that the Italian province of the Romagna (though it was not incorporated until much later) belonged to the church. Anxious to maintain a balance of power between Rudolf and Charles, who had invaded Italy and who was supported by the ruling Florentine party, Nicholas sent his nephew Cardinal Malebranca to Florence in 1279 on a mission that resulted in a reorganization of that government.

In May 1280 he arranged a treaty to terminate the claims of the sovereign dynasties—the Habsburgs and the Angevins—for the possession of Sicily. His early death ruined his plans to reorganize the Holy Roman Empire and led to a renewal of Angevin-French influence on the papacy under his successor, Pope Martin IV. Nicholas was a political realist; he accepted the idea that every cardinal was the agent of a political interest, and he exalted his own family, the Orsini, who acquired increasing influence in church policy and administration.

●**Nicholas IV,** original name GIROLAMO MASCI (b. Sept. 30, 1227, near Ascoli Piceno, Papal States—d. April 4, 1292, Rome), pope from 1288 to 1292, the first Franciscan pontiff.

He joined the Franciscans when young and became their minister for Dalmatia. In 1272

Pope Gregory X sent him to Constantinople, where he took part in effecting a brief reunion with the Greeks. From 1274 to 1279 he was minister general of the Franciscans, and in 1281 Pope Martin IV made him cardinal bishop of Palestrina, Italy. He was elected on Feb. 22, 1288, to succeed Pope Honorius IV, after the papacy had been vacant for almost 11 months.

Nicholas IV relied heavily on a powerful Italian family, the Colonna, and increased the number of Colonna cardinals. In a bull of 1289 he granted half of the church's revenues and a share in its administration to the College of Cardinals, thereby increasing their importance in church and Papal States affairs. In 1290 he issued a new bull against the Apostolici, various Christian sects that sought to reestablish the life and discipline of the primitive church by a literal observance of continence and poverty.

Like his predecessors popes Nicholas III, Martin IV, and Honorius IV, Nicholas IV strove to keep the balance between the sovereign dynasties of the Habsburgs (the German king Rudolf I) and the Anjous (the Sicilian king Charles I). As feudal overlord of Sicily, Nicholas tried vainly to force the royal house of Aragon to restore Sicily to the Anjous, and in 1291 he ended the conflict between France and the Kingdom of Aragon.

Nicholas was unable to revive the Crusades, and in 1291 the last Christian crusader state, the Palestinian fortress of Acre, fell to the Mamlūk sultan of Egypt. Nicholas' wish to ally the Western powers with the Mongols against the Muslims was given hope through the Il-Khan Arghun of Persia, who sent urgent requests for joint action to Nicholas and kings Philip IV of France and Edward I of England. Although the plan did not materialize, Nicholas sent the celebrated Franciscan missionary Giovanni da Montecorvino to Kublai Khan's court, which led to establishment of the first Roman Catholic Church in China. He also sent missionaries, mostly Franciscans, to the Balkans and the Near East. He did much for Roman architecture and art, especially in restoring the basilicas of S. Giovanni in Laterano and Sta. Maria Maggiore.

•**Nicholas (V),** original name PIETRO RAINALDUCCI, or RAINALLUCCI (b. Corvaro, Rieti, Papal States—d. Oct. 16, 1333, Avignon, Provence), last imperial antipope, whose reign (May 1328 to August 1330) in Rome rivalled the pontificate of Pope John XXII at Avignon.

An assembly of priests and laymen in Rome under the influence of the Holy Roman emperor Louis IV the Bavarian, whom John had excommunicated, elected the Franciscan monk Pietro Rainalducci as the antipope Nicholas V. Having little support, Nicholas' cause proved fruitless. After John excommunicated him in April 1329, Nicholas, having been assured a pardon, renounced at Avignon his illegal claim to the papacy on Aug. 25, 1330. He remained in honourable imprisonment in the papal palace until his death.

•**Nicholas V,** original name TOMMASO PARENTUCELLI (b. Nov. 15, 1397, Sarzana, Republic of Genoa—d. 1455, Rome), influential Renaissance pope (reigned 1447–55) and founder of the Vatican Library. Soon after his election, he brought to an end the schism caused by rivalries between popes and councils. By 1455 he had restored peace to the Papal States and to Italy. He began a program for the rebuilding of many of Rome's architectural wonders, including St. Peter's Church, and became the patron of many artists and scholars. His failure to promote real religious reform, however, helped to bring about the Reformation of the 16th century.

Early life. Parentucelli was born in 1397. His father died when he was nine. Later he studied at Bologna, but for lack of funds had to interrupt his studies there. Then, to earn money, he acted as tutor for two years in two wealthy, cultured Florentine families, and this contact with the early Renaissance coloured all his life. After returning to the university and completing his studies, at the age of 22 he entered the household of Niccolò Albergati, the cardinal-archbishop of Bologna, whom he served devotedly for 20 years, accompanying him on his many diplomatic missions throughout Europe.

Pope Eugenius IV recognized Parentucelli's merit and experience and, on Albergati's death, made him bishop of Bologna (1444), but he was prevented from entering the city by its rebellious inhabitants, who sought independence from papal rule. At the Council of Ferrara–Florence (1438–45), he led the discussions with the Armenians, Copts, and Jacobites that attempted to end their doctrinal differences with the Latin Church, and he later journeyed on missions for the Pope. After his diplomatic success in pacifying the German Electors at the Diet of Frankfurt in 1446, he was created cardinal and only three months later, on March 6, 1447, was elected pope. Thenceforward, his chief aims were, in his words, "without using arms other than those which Christ has given me for my defence, that is to say, His Cross," to work for ecclesiastical and political peace, to reform the church, and to make Rome architecturally and artistically the worthy centre of Christianity.

Diplomacy and church reform. When Nicholas became pope, the remnant of the rebellious Council of Basel (1431–37)—which advocated control of the church through councils rather than through the pope—and its antipope Felix V still challenged Rome. Nicholas, by demanding little and yielding much, brought the schism to an end. He restored peace in the papal states, not by mercenary armies, which he disbanded, but by strategically situated castles entrusted to carefully chosen governors. In Rome he was conciliatory with the nobility and granted concessions to the restive citizens. He allowed the town of Palestrina, destroyed by his predecessor, to be rebuilt; pacified Bologna by granting it virtual independence; won the allegiance of Poland by concessions; and, by promising coronation as Holy Roman emperor to Frederick III, gained the support of Austria. In order to give peace to Italy by preserving the status quo and to organize a crusade against the Turks, he initiated the Peace of Lodi among Venice, Milan, Florence, and Naples and solemnly ratified it on Feb. 25, 1455.

Nicholas helped the church by furthering legislation against the old abuses of simony (buying and selling of church offices) and clerical concubinage and by encouraging bishops to govern their dioceses wisely. In Germany Cardinal Nicholas of Cusa (1401–64), a notable scholar and thinker, and the Franciscan theologian and preacher, Saint John of Capistrano (1386–1456), laboured hard at reform with much success. A wider measure to stimulate piety and restore the papal reputation was the proclamation of the 1450 Jubilee Year. Vast numbers of pilgrims visited Rome, and the project did much good, though it was marred by an outbreak of the plague and a tragedy when 172 people died in a panic-crush on the Ponte Sant'Angelo.

Architectural and Humanistic achievement. Pope Nicholas is best remembered for his influence on the Renaissance in Rome. "Of all Renaissance popes," says Eugène Müntz, a famous curator and art historian, "Nicholas is the one who ventilated the greatest number of architectural ideas: his successors only executed one or another element of his programme." He had plans for building a new St. Peter's Church but was able only to rebuild what was crumbling, to reconstruct the Vatican Palace, and to surround the whole with a wall. The restoration and embellishment of many Roman architectural treasures, such as the senatorial palace on the Capitoline Hill, are credited to him, but he pillaged ancient monuments to quarry materials for his new constructions. At his initiative, Rome became a centre for goldsmiths and silversmiths; he employed French, Belgian, and German tapestry makers; and he commissioned artists of note, among them the great Florentine painter Fra Angelico (1387–1455), to beautify his constructions.

He had the Humanist's passion for books. On his diplomatic missions he sought them out, and as pope he spent vast sums on buying them; he also founded the Vatican Library. His court became a centre for Humanists, some of them more pagan in outlook than Christian; they were employed in copying and translating ancient texts, among them the works of Homer, Herodotus, Thucydides, and many Greek Church Fathers.

His last years were saddened by a plot against his life. Twice he dealt mercifully with the ringleader; the third time, in 1453, he had him and his accomplices executed. Also in 1453, Constantinople, the seat of Eastern Christianity, was captured by the Turkish sultan. Nicholas had ordered a fleet to aid the beleaguered city, but it arrived too late. This was a military reverse of great religious and cultural significance.

Nicholas was a man of gentle character who achieved more by wise concession than others did by force. Of him Vespasiano da Bisticci (1421–98), the biographer of 15th-century luminaries, wrote: "He did not know what avarice was: indeed, if he retained anything of his own, it was simply because no one had asked him for it." His diplomatic efforts on behalf of peace in Italy and elsewhere and his patronage of the arts, especially of literature, restored to the church much of the ancient prestige it had lately lost. His failure to promote sufficiently religious reform, however, was destined to result in the Reformation in the 16th century. (J.Gi.)

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PATRIARCHATE

•**Nicholas I,** byname NICHOLAS THE MYSTIC (b. 852, Constantinople—d. May 15, 925), Byzantine patriarch of Constantinople (901–907; 912–925), who contributed measurably to the attempted reunion of the Greek and Roman churches and who fomented the tetragamy controversy, or the question of a fourth marriage for the Eastern Orthodox.

A close associate of the controversial patriarch Photius of Constantinople, Nicholas began his career in the Byzantine civil service but became a monk when Photius was deposed in 886. Named a secretary counsellor (Mysticus) by the emperor Leo VI (886–912), Nicholas was appointed patriarch of Constantinople in 901. Having refused on grounds of religious legality and propriety to grant the Emperor's request for a dispensation to contract a fourth marriage after the death of his third wife, and declining to consult Pope Sergius III in the matter, Nicholas was banished to a monastery outside Constantinople. Recalled either by Leo in the last year of his reign, or by Emperor Alexander (912–913), Nicholas was invited to act as regent for Prince Constantine VII.

Because of his harsh retaliation against patriarch Euthymius, his successor during exile, Nicholas alienated many of the clergy and people, among them Leo's family, creating a rivalry between their respective supporters. During the rule of the emperor Romanus I Lecapenus (920–944), Nicholas was reconciled with Patriarch Euthymius, thus ending the bitter internal struggle within the Eastern Orthodox Church. Nicholas' negotiations with Pope John X (914–928) concerning cooperative union between Eastern and Western Christendom and an agreement over the ecclesiastical law of marriage for the Eastern Church inaugurated a rare period of harmony. In a synod (920) Nicholas issued a decree of union settling the tetragamy question by ordinarily limiting Greek Christians to three marriages but validating the fourth marriage of Leo VI for the good of the state in order to settle the imperial line of succession by a legitimate heir.

Nicholas also engaged in various diplomatic affairs, as is evidenced by his letters on Byzantine–Bulgarian relations and concerning questions of Greek estates in Italy. He is revered as a saint by the Eastern Orthodox Church.

Articles are alphabetized word by word, not letter by letter

• **Nicholas III** (fl. late 11th century), Eastern Orthodox patriarch of Constantinople (1084–1111), theologian and liturgical scholar noted for combatting doctrinal heresy and composing sacramental prayer texts for the Byzantine liturgy. Among Nicholas' liturgical compositions are prayers and responses in the service rituals for baptism, marriage, confession, fasting, and communion.

As emperor Alexis I Comnenus was negotiating with Pope Urban II the possibility of Western help against the Turks, Nicholas was consulted about the state of ecclesiastical relations between Rome and Constantinople. He expressed himself in favour of Church union, provided that the Pope send him an Orthodox confession of faith. He rejected any departure from Greek Orthodox doctrine and practice, including universal papal authority, the Latin concept of the Holy Spirit (*Filioque* question), and the use of unleavened bread in the Communion service. Frequently intervening in monastic affairs, Nicholas strengthened discipline in the community of Mt. Athos (Greece) and probably wrote a monastic Rule (*Typikon*) adapted from the original text of the early Palestinian monastic founder St. Sabas.

In a final theological judgment, Nicholas condemned as heretical the Bogomil leader Basil the Physician and his adherents, an exclusive sect originating in Bulgaria and teaching a form of religious dualism that attributed two sons to the Creator, Christ and Satan. In 1118 the emperor Alexius had Basil burned at the stake.

Russia

• **Nicholas I,** Russian in full NIKOLAY PAVLOVICH (b. July 6 [June 25, old style], 1796, Tsarskoye Selo, near St. Petersburg, Russia—d. March 2 [Feb. 18, O.S.], 1855, St. Petersburg), Russian emperor (1825–55), often considered the personification of classic autocracy; for his reactionary policies, he has been called the emperor who froze Russia for 30 years.

Early life. Nicholas was the son of Grand Duke Paul and Grand Duchess Maria. Some three and a half months after his birth, following the death of Catherine II the Great, Nicholas' father became Emperor Paul I of Russia. Nicholas had three brothers, two of whom, the future emperor Alexander I and Constantine, were 19 and 17 years older than he. It was the third, Michael, his junior by two years, and a sister, Anne, who became his childhood companions and intimate lifelong friends.

Nicholas I, detail of a watercolour by Christina Robertson, 1840; in the collection of Mrs. Merriweather Post, Hillwood, Washington, D.C.

By courtesy of Hillwood, Washington, D.C.

Paul was extremely neurotic, overbearing, and despotic. Yet it is believed that he showed kindness and consideration to his younger children and that, in fact, he loved and cherished them tenderly. He was killed in a palace revolution of 1801, which made Alexander emperor when Nicholas was not quite five years old. Maria, on the contrary, remained formal and cold in her relationship to the children, very much in keeping with her general character. She belonged, apparently, among those human beings who combine numerous conventional virtues with a certain rigidity and lack of warmth. In the words of a competent observer: "The only failing of this extraordinary woman was her being excessively, one may say, exacting of her children and of the people dependent on her."

Education. The future emperor's first guardian and instructor was a Scottish nurse, Jane Lyon, who was appointed by Catherine II to care for the infant and who stayed with Nicholas constantly during the first seven years of his life. From Lyon the young grand duke learned even such things as the Russian alphabet, his first Russian prayers, and his hatred of the Poles (at least he liked later to trace the origin of his bitter antipathy toward that people to the stories told by his nurse about her painful experience in Warsaw in the turbulent year of 1794).

In 1802–03 men replaced women in Nicholas' entourage, and his regular education began. As directed by Gen. Matthew Lamsdorff, it emphasized severe discipline and formalism. The growing grand duke studied French and German as well as Russian, world history, and general geography in French, together with the history and geography of Russia. Religion, drawing, arithmetic, geometry, algebra, and physics were added to the curriculum. Nicholas received instruction also in dancing, music, singing, and horseback riding and was introduced at an early age to the theatre, costume balls, and other court entertainment.

A more advanced curriculum went into effect in 1809, with courses ranging from political economy, logic, moral philosophy, and natural law to strategy. English, Latin, and Greek were added to the language program. Though, on the whole, a belief that Nicholas had not been trained for his role of Russian sovereign is wrong, he did profit little from the instruction, which he found rigid and tedious. He loved only military science, becoming a fine army engineer and expert in several other areas of military knowledge. Moreover, he always remained in his heart a dedicated junior officer.

Circumstances also favoured militarism. Nicholas' education, as well as that of his younger brother, was interrupted and largely terminated by the great struggles against Napoleon in 1812–15. The grand dukes were allowed to join the army in 1814, and, although they saw no actual fighting, they lived through the heady emotions of those momentous years and also enjoyed the opportunities to stay in Paris and other places in western and central Europe. On Nov. 4, 1815, at a state dinner in Berlin, Alexander I and King Frederick William III rose to announce the engagement of Nicholas and Princess Charlotte of Prussia (Alexandra, after she became Orthodox).

The solemn wedding followed some 20 months later, on July 13, 1817. The match represented a dynastic and political arrangement sought by both reigning houses, which had stood together in the decisive years against Napoleon and after that at the Congress of Vienna—the peace settlement following the Napoleonic Wars—and it proved singularly successful. Not only was Nicholas in love with his wife, but he became very closely attached to his father-in-law as well as to his royal brothers, one of whom was later to be his fellow ruler as King Frederick William IV. Beyond that, Nicholas was powerfully attracted by the Prussian court and even more so by the Prussian Army. He felt remarkably happy and at home in his adopted family and country, which for many years he tried to visit as often as he could.

To complete his training, Grand Duke Nicholas was sent on two educational voyages—an extensive tour of Russia that lasted from May to September in 1816 and a journey to England, where the future emperor spent four months late that same year and early in 1817. The Russian trip covered much ground at great speed and was quite superficial, but it has interest for the historian because of the notes that Nicholas, following the instructions of his mother, took on everything seen and heard. The grand duke's observations deal, typically, with appearances rather than with causes and reflect a number of his prejudices, including his bitter dislike of Poles and Jews. Such quick inspection tours later became almost an obsession of the Emperor.

In England, Nicholas stayed mostly in London, although he travelled to a score of other places. While he did attend the opening of the houses of Parliament and in general obtained some knowledge of English politics, his only recorded comments on that score were unfavourable. The future emperor found it much more congenial to examine military and naval centres. His favourite English companion was the Duke of Wellington. Less than a year after his return to Russia and a few months after his marriage, Nicholas was appointed inspector general of the army corps of engineers. In subsequent years he held several other military positions but of secondary significance.

Ascension to the throne. Alexander I's unexpected death in southern Russia on Dec. 1, 1825, led to a dynastic crisis. Because Alexander I had no direct male successor, Constantine was next in line for the throne. But the heir presumptive had married a Polish woman not of royal blood in 1820 and renounced his rights to the crown. Nicholas was thus to become the next ruler of Russia, the entire matter being stated, in 1822, in a manifesto confirmed with Alexander I's signature. But the manifesto remained unpublished, and

Nicholas questioned the legal handling of the whole issue and the reaction in the country, which expected Constantine to succeed Alexander. In any case, Constantine and the Polish kingdom of which he was commander in chief swore allegiance to Nicholas, but Nicholas, the Russian capital, and the Russian Army swore allegiance to Constantine.

It was only after Constantine's unyielding reaffirmation of his position and the resulting lapse of time that Nicholas decided to publish Alexander's manifesto and become emperor of Russia. On Dec. 26, 1825 (Dec. 14, O.S.), when the guard regiments in St. Petersburg were to swear allegiance for the second time in rapid succession, this time to Nicholas, liberal conspirators staged what came to be known as the Decembrist Rebellion. Utilizing their influence in the army, in which many of them were officers, they started a mutiny in several units, which they entreated to defend the rightful interests of Constantine against his usurping brother. Altogether some 3,000 misled rebels marched in military formation to the Senate Square—now the Decembrist Square—in the heart of the capital. Although the rebellion had failed by nightfall, it meant that Nicholas I ascended the throne over the bodies of some of his subjects and in actual combat with the dreaded revolution.

Personality. Nicholas I has come down in history as the classic autocrat, in appearance and manner as much as in behaviour and policy. To quote Andrew Dickson White, a United States diplomat:

> With his height of more than six feet, his head always held high, a slightly aquiline nose, a firm and well-formed mouth under a light moustache, a square chin, an imposing, domineering, set face, noble rather than tender, monumental rather than human, he had something of Apollo and of Jupiter . . . Nicholas was unquestionably the most handsome man in Europe.

Or to refer to Adolphe, marquis de Custine, whose lasting literary fame rests on his denunciation of the Russia of Nicholas I: "Virgil's Neptune . . . one could not be more emperor than he." In short, Nicholas I came to represent autocracy personified: infinitely majestic, determined and powerful, hard as stone, and relentless as fate. Yet, on closer acquaintance, the other side of the Emperor emerged. The detachment and the superior calm of an autocrat, which Nicholas I tried so often and so hard to display, were essentially a false front. The sovereign's insistence on firmness and stern action was based on fear, not on confidence; his determination concealed a state approaching panic, and his courage fed on something akin to despair. Nicholas' violent hatred could concentrate apparently with equal ease on an individual, such as the French king Louis-Philippe; a group, such as the Decembrists; a people, such as the Poles; or a concept, such as revolution. His impulse was always to strike and keep striking until the object of his wrath was destroyed.

Aggressiveness, however, was not the Emperor's only method of coping with the problems of life. He also used regimentation, orderliness, neatness, and precision, an enormous effort to have everything at all times in its proper place. Nicholas I was by nature a drill master and an inspector general; the army remained his love, almost an obsession, from childhood to the end of his life. But, in every other sphere of activity and existence too, the Emperor insisted on minute and precise regulation, with nothing to be left to chance. Position, circumstances, and his own character placed an almost intolerable burden on his shoulders. Still, he managed to carry it for three decades, sustained by his overwhelming sense of duty and devotion to hard work, by his sincere religious convictions, and by his family. His outlook, however, became ever more pessimistic and fatalistic, until in the disaster of the Crimean War the autocrat declared simply: "I shall carry my cross until all my strength is gone." "Thy will be done."

Ideology. Nicholas' views fitted his personality to perfection. In contrast to Alexander I, he had been brought up at the time of wars against Napoleon and of reaction, which he accepted wholeheartedly as his own cause. Eventually the Russian wing of European reaction, represented by Nicholas I and his government, found its ideological expression in the doctrine of so-called Official Nationality.

Formally proclaimed in 1833 by Count Sergey Uvarov, the Emperor's minister of educaton, Official Nationality rested on three principles: Orthodoxy, autocracy, and nationality. Autocracy meant the affirmation and maintenance of the absolute power of the sovereign, which was considered the indispensable foundation of the Russian state; in foreign relations it was transformed into legitimism and a defense of the Vienna settlement. Orthodoxy referred to the official church and its important role in Russia and also to the ultimate source of ethics and ideals that gave meaning to human life and society. Nationality (*narodnost*) described the particular nature of the Russian people, considered as a mighty and dedicated supporter of its dynasty and government. Whereas Alexander I had never quite abandoned dreams of change, Nicholas I was determined to defend the existing order in his motherland, especially autocracy.

Reign. Nicholas I's rule reflected in a striking manner both his character and his principles. The new regime became preeminently one of militarism and bureaucracy. The Emperor surrounded himself with military men, to the extent that late in his reign there were almost no civilians among his immediate assistants. Also, he relied heavily on special emissaries, most of them generals of his suite, who were sent all over Russia on particular assignments to execute immediately the will of the sovereign. Operating outside the regular administrative system, they represented an extension, so to speak, of the monarch's own person. In fact, the entire machinery of government came to be permeated by the military spirit of direct orders, absolute obedience, and precision, at least as far as official reports and appearances were concerned. Corruption and confusion, however, lay immediately behind this facade of discipline and smooth functioning.

In his conduct of state affairs, Nicholas I often bypassed regular channels and generally resented formal deliberation, consultation, or other procedural delay. The importance of the Committee of Ministers, the State Council, and the Senate decreased in the course of his reign. Instead of making full use of them, the Emperor depended more and more on special bureaucratic devices meant to carry out his intentions promptly while remaining under his immediate and complete control. As one favourite method, Nicholas I made extensive use of ad hoc committees that stood outside the usual state machinery. The committees were typically composed of a handful of the most trusted assistants of the Emperor; because these were few in number, the same men in different combinations formed these committees throughout Nicholas' reign. As a rule, the committees carried on their work in secret, adding further complication and confusion to the already cumbersome administration of the empire. The failure of one committee to perform its task merely led to the formation of another. For example, some nine committees tried to deal with the issue of serfdom during Nicholas' reign.

The propensities of the autocrat found expression also in the development and the new role of His Majesty's Own Chancery. Organized originally as a bureau to deal with matters that demanded the sovereign's personal participation and to supervise the execution of the Emperor's orders, it acquired five new departments: in 1826 the Second and the Third, to deal with the codification of law and the newly created corps of gendarmes, respectively; in 1828 the Fourth, to manage the charitable and educational institutions under the jurisdiction of the empress dowager Maria; in 1836 the Fifth, to reform the condition of the state peasants (soon replaced by the new Ministry of State Domains); in 1843 the Sixth, to draw an administrative plan for Transcaucasia.

The departments of the Chancery served Nicholas I as a major means of conducting a personal policy that bypassed the regular state channels. Its Third Department, the political police, acted as the autocrat's main weapon against subversion and revolution and as his principal agency for controlling the behaviour of his subjects and for distributing punishments and rewards among them. Its assigned fields of activity ranged from "all orders and all reports in every case belonging to the higher police" to "reports about all occurrences without exception!" The two successive heads of the Third Department—Count Aleksandr Benckendorff and Prince Aleksey Orlov—probably spent more time with Nicholas than did any of his other assistants; they accompanied him, for instance, on his repeated trips of inspection throughout Russia. During his entire reign the Emperor strove to follow the principle of autocracy—to be a true father of his people concerned with their daily lives, hopes, and fears.

Yet Nicholas I could do little for them beyond the minutiae. Determined to preserve autocracy, afraid to abolish serfdom, and suspicious of all independent initiative and popular participation, the Emperor and his government could not introduce in their country the much-needed basic reforms. In practice as well as in theory they looked backward. Important developments took place only in a few areas in which change would not threaten the fundamental structure of the Russian Empire. Thus Count Mikhail Speransky codified law, and Count Pavel Kiselev changed and improved the lot of the state peasants; but even limited reforms became impossible after 1848.

Final years. Frightened by European revolutions, Nicholas I became completely reactionary. During the last years of the reign the Emperor's once successful foreign policy collapsed, leading to isolation and to the tragedy of the Crimean War. A dauntless champion of legitimism and a virtual hegemony of eastern and central Europe following the revolutions of 1848–49, Nicholas—in part because of his own miscalculations, rigidity, and bluntness—found himself alone fighting the Crescent (the Ottoman Empire), supported by such countries of the Cross as France, Great Britain, and Sardinia.

Although it is unlikely that Nicholas committed suicide, as several historians have claimed, death did come as liberation to the weary and harassed Russian emperor. An ordinary cold picked up in late February 1855 turned into pneumonia, which the once mighty, but now apparently exhausted, organism refused to fight. To the end the autocrat retained lucidity and dignity. His last words to his heir and his family were: "Now I shall ascend to pray for Russia and for you. After Russia, I loved you above everything else in the world. Serve Russia." Nicholas I was survived by his wife, Empress Alexandra, and their six children: Emperor Alexander II, the grand dukes Constantine, Nicholas, and Michael, and the grand duchesses Maria and Olga. Another daughter, Grand Duchess Alexandra, had died in 1844. (N.V.R.)

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Nicholas II, Russian in full NIKOLAY ALEKSANDROVICH (b. May 6 [May 18 New Style], 1868, Tsarskoye Selo [now Pushkin], near St. Petersburg, Russia—d. July 16/17, 1918, Yekaterinburg), the last Russian emperor (1895–1917), who, with his wife, Alexandra, and their children, was killed by the Bolsheviks after the October Revolution.

Nicholas II, watercolour; in the collection of Mrs. Merriweather Post, Hillwood, Washington, D.C.

By courtesy of Hillwood, Washington, D.C.

Early life and reign. Nikolay Aleksandrovich was the eldest son (*tsesarevich*) of the *tsarevich* Aleksandr Aleksandrovich (emperor as Alexander III from 1881) and his consort Maria Fyodorovna (Dagmar of Denmark). Succeeding his father on Nov. 1, 1894, he was crowned in Moscow on May 26, 1896.

Neither by upbringing nor by temperament was Nicholas fitted for the complex tasks that awaited him as autocratic ruler of a vast empire. He had received a military education from his tutor, and his tastes and interests were those of the average young Russian officers of his day. He had few intellectual pretensions but delighted in physical exercise and the trappings of army life: uniforms, insignia, parades. Yet on formal occasions he felt ill at ease. Though he possessed great personal charm, he was timid and shunned close contact with his subjects, preferring the privacy of his family circle. His domestic life was serene. To his wife, Alexandra, whom he had married on Nov. 26, 1894, Nicholas was passionately devoted. She had the strength of character that he lacked, and he fell completely under her sway. Under her influence he sought the advice of spiritualists and faith healers, most notably Rasputin, who eventually acquired great power over the imperial couple.

Nicholas also had other irresponsible favourites, often men of dubious probity who provided him with a distorted picture of Russian life, but one that he found more comforting than that contained in official reports. He distrusted his ministers, mainly because he felt them to be intellectually superior to himself and feared they sought to usurp his sovereign prerogatives. His view of his role as autocrat was childishly simple: he derived his authority from God, to whom alone he was responsible, and it was his sacred duty to preserve his absolute power intact. He lacked, however, the strength of will necessary in one who had such an exalted conception of his task. Nicholas had to wage a continual struggle against himself, suppressing his natural indecisiveness and assuming a mask of self-confident resolution. His dedication to the dogma of autocracy was an inadequate substitute for a constructive policy, which alone could have prolonged the imperial regime.

Soon after his accession Nicholas proclaimed his uncompromising views to liberal deputies from the *Zemstva,* the self-governing local assemblies, in which he dismissed as "senseless dreams" their aspirations to share in the work of government. He met the rising groundswell of popular unrest with intensified police repression. In foreign policy, his naïveté and lighthearted attitude toward international obligations sometimes embarrassed his professional diplomats; for example, he concluded an alliance with the German emperor William II during their meeting at Björkö in July 1905, although Russia was already allied with France, Germany's traditional enemy.

He was the first Russian sovereign to show personal interest in Asia, visiting in 1891, while still *tsesarevich,* India, China, and Japan; later he nominally supervised the construction of the Trans-Siberian Railway. His attempt to maintain and strengthen Russian influence in Korea, where Japan also had a foothold, was partly responsible for the Russo-Japanese War (1904–05). Russia's defeat not only frustrated Nicholas' grandiose dreams of making Russia a great Eurasian power, with China, Tibet, and Persia under its control, but also caused problems at home, where discontent grew into the revolutionary movement of 1905.

Nicholas considered all who opposed him, regardless of their views, as malicious conspirators. Disregarding the advice of his future prime minister Sergey Yulyevich Witte, he refused to make concessions to the constitutionalists until events forced him to yield more than might have been necessary had he been more flexible. On March 3, 1905, he reluctantly agreed to create a national representative assembly, or Duma, with consultative powers, and by the manifesto of October 30 he promised a constitutional regime under which no law was to take effect without the Duma's consent, as well as a democratic franchise and civil liberties. Nicholas, however, cared little for keeping promises extracted from him under duress. He strove to regain his former powers and ensured that in the new "fundamental laws" (May 1906) he was still designated an autocrat. He furthermore patronized an extremist right-wing organization, the Union of the Russian People, which sanctioned terrorist methods and disseminated anti-Semitic propaganda. Witte, whom he blamed for the October manifesto, was soon dismissed, and the first two Dumas were prematurely dissolved as "insubordinate."

Pyotr Arkadyevich Stolypin, who replaced Witte and carried out the coup of June 16, 1907, dissolving the second Duma, was loyal to the dynasty and a capable statesman. But the emperor distrusted him and allowed his position to be undermined by intrigue. Stolypin was one of those who dared to speak out about Rasputin's influence and thereby incurred the displeasure of the empress. In such cases Nicholas generally hesitated but ultimately yielded to Alexandra's pressure. To prevent exposure of the scandalous hold Rasputin had on the imperial family, Nicholas interfered arbitrarily in matters properly within the competence of the Holy Synod, backing reactionary elements against those concerned about the Orthodox Church's prestige.

World War I. After its ambitions in the Far East were checked by Japan, Russia turned its attention to the Balkans. Nicholas sympathized with the national aspirations of the Slavs and was anxious to win control of the Turkish straits but tempered his expansionist inclinations with a sincere desire to preserve peace among the great powers. After the assassination of the Austrian archduke Francis Ferdinand at Sarajevo, he tried hard to avert the impending war by diplomatic action and resisted, until July 30, 1914, the pressure of the military for general, rather than partial, mobilization.

The outbreak of World War I temporarily strengthened the monarchy, but Nicholas did little to maintain his people's confidence. The Duma was slighted, and voluntary patriotic organizations were hampered in their efforts; the gulf between the ruling group and public opinion grew steadily wider. Alexandra turned Nicholas' mind against the popular commander in chief, his father's cousin the grand duke Nicholas, and on Sept. 5, 1915, he dismissed him, assuming supreme command himself. Since he had no experience of war, almost all his ministers protested against this step as likely to impair the army's morale. They were overruled, however, and soon dismissed.

Nicholas II did not, in fact, interfere unduly in operational decisions, but his departure for headquarters had serious political consequences. In his absence, supreme power in effect passed, with his approval and encouragement, to the empress. A grotesque situation resulted: in the midst of a desperate struggle for national survival, competent ministers and officials were dismissed and replaced by worthless nominees of Rasputin. The court was widely suspected of treachery, and antidynastic feeling grew apace. Conservatives plotted Nicholas' deposition in the hope of saving the monarchy. Even the murder of Rasputin failed to dispel Nicholas' illusions: he blindly disregarded this ominous warning, as he did those by other highly placed personages, including members of his own family. His isolation was virtually complete.

Abdication and death. When riots broke out in Petrograd (St. Petersburg) on March 8, 1917, Nicholas instructed the city commandant to take firm measures and sent troops to help restore order. It was too late. The government resigned, and the Duma, supported by the army, called on the emperor to abdicate. At Pskov, on March 15, with fatalistic composure, Nicholas renounced the throne—not, as he had originally intended, in favour of his son, Alexis, but in favour of his brother Michael, who, however, refused the crown.

Nicholas was detained at Tsarskoye Selo by Prince Lvov's provisional government. It was proposed that he and his family be sent to England; but instead, mainly because of the opposition of the Petrograd Soviet, the revolutionary Workers' and Soldiers' Council, they were moved to Tobolsk, in Western Siberia. This step sealed their doom. In April 1918 they were taken to Yekaterinburg in the Urals.

When anti-Bolshevik "White" Russian forces approached the area, the local authorities were ordered to prevent a rescue; and in the night of July 16/17 the prisoners were all slaughtered in the cellar of the house where they had been confined. The bodies were burned, cast into an abandoned mine shaft, and hastily buried elsewhere. A team of Russian scientists located the remains in 1976 but kept the discovery secret until after the collapse of the Soviet Union. By 1994 genetic analyses had positively identified the remains as those of Nicholas, Alexandra, three of their daughters, and four servants. The skeletons of another daughter (probably Maria) and of Alexis were not found. The remains were given a state funeral on July 17, 1998, and reburied in Saint Petersburg in the crypt of the Cathedral of St. Peter and St. Paul. On Aug. 14, 2000, the Russian Orthodox Church canonized the emperor and his family, designating them "passion bearers" (the lowest rank of sainthood) because of the piety they had shown during their final days. (J.L.H.K.)

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Nicholas, Russian in full NIKOLAY NIKOLAYEVICH (b. Nov. 18 [Nov. 6, Old Style], 1856, St. Petersburg, Russia—d. Jan. 5, 1929, Antibes, Fr.), Russian grand duke and army officer who served as commander in chief against the Germans and Austro-Hungarians in the first year of World War I and was subsequently (until March 1917) Emperor Nicholas II's viceroy in the Caucasus and commander in chief against the Turks.

The son of the emperor Alexander II's brother, the grand duke Nikolay Nikolayevich "the Elder," Nicholas was educated at the general staff college and commissioned in 1872. He served in the Russo-Turkish War of 1877–78 and as inspector general of cavalry (1895–1905), introducing major reforms in training and equipment. He was made commander of the St. Petersburg military district in 1905 and also was appointed first president of the short-lived imperial committee of national defense.

When World War I began, Emperor Nicholas II abandoned his intention to lead the Russian armies himself and appointed the grand duke Nicholas commander in chief. Despite their early successes, the Russians were outgeneralled by the German chief of staff Erich Ludendorff and eventually were immobilized by munitions shortages. The grand duke is considered to have done as well as possible with the general staff's plans he was obliged to follow.

On Sept. 5 (Aug. 23, Old Style), 1915, the emperor assumed the supreme command. He sent the grand duke to the Caucasus, where he remained until the overthrow of the monarchy in 1917. The emperor's last official act was to appoint the grand duke commander in chief once more; but his appointment was canceled almost immediately by Prince Georgy Y. Lvov, head of the provisional government. Two years later Grand Duke Nicholas sailed from Russia in a British warship. He lived in France until his death, heading an organization that sought to unite all anticommunist Russian émigrés.

Nicholas, SAINT, also called NICHOLAS OF BARI, NICHOLAS OF MYRA, SANTA CLAUS (fl. 4th century, Myra, Lycia, Asia Minor [near modern Finike, Tur.]; feast day December 6), one of the most popular minor saints commemorated in the Eastern and Western churches, and now traditionally associated with the festival of Christmas.

Nicholas' existence is not attested by any historical document, so nothing certain is known of his life except that he was probably bishop of Myra in the 4th century. According to tradition, he was born in the ancient Lycian seaport city of Patara, and, when young, he traveled to Palestine and Egypt. He became bishop of Myra soon after returning to Lycia. He was imprisoned during the Roman emperor Diocletian's persecution of Christians but was released under the rule of Emperor Constantine the Great and attended the first Council (325) of Nicaea. After his death he was buried in his church at Myra, and by the 6th century his shrine there had become well known. In 1087 Italian sailors or merchants stole his alleged remains from Myra and took them to Bari, Italy; this removal greatly increased the saint's popularity in Europe, and Bari became one of the most crowded of all pilgrimage centres. Nicholas' relics remain enshrined in the 11th-century basilica of San Nicola, Bari.

Nicholas' reputation for generosity and kindness gave rise to legends of miracles he performed for the poor and unhappy. He was reputed to have given marriage dowries of gold to three girls whom poverty would otherwise have forced into lives of prostitution, and he restored to life three children who had been chopped up by a butcher and put in a brine tub. In the Middle Ages, devotion to Nicholas extended to all parts of Europe. He became the patron saint of Russia and Greece; of charitable fraternities and guilds; of children, sailors, unmarried girls, merchants, and pawnbrokers; and of such cities as Fribourg, Switz., and Moscow. Thousands of European churches were dedicated to him, one as early as the 6th century, built by the Roman emperor Justinian I, at Constantinople (now Istanbul). Nicholas' miracles were a favourite subject for medieval artists and liturgical plays, and his traditional feast day was the occasion for the ceremonies of the Boy Bishop, a widespread European custom in which a boy was elected bishop and reigned until Holy Innocents' Day (December 28).

After the Reformation, Nicholas' cult disappeared in all the Protestant countries of Europe except Holland, where his legend persisted as Sinterklaas (a Dutch variant of the name Saint Nicholas). Dutch colonists took this tradition with them to New Amsterdam (now New York City) in the American colonies in the 17th century. Sinterklaas was adopted by the country's English-speaking majority under the name Santa Claus, and his legend of a kindly old man was united with old Nordic folktales of a magician who punished naughty children and rewarded good children with presents. The resulting image of Santa Claus in the United States crystallized in the 19th century, and he has ever since remained the patron of the gift-giving festival of Christmas.

Under various guises Saint Nicholas was transformed into a similar benevolent, gift-giving figure in The Netherlands, Belgium, and other northern European countries. In the United Kingdom Santa Claus is known as Father Christmas.

Nicholas OF AUTRECOURT, French NICOLAS D'AUTRECOURT (b. *c.* 1300, Autrecourt, near Verdun, Fr.—d. after 1350, Metz, Lorrain), French philosopher and theologian known principally for developing medieval Skepticism to its extreme logical conclusions, which were condemned as heretical.

Nicholas was an advanced student in liberal arts and philosophy at the Sorbonne faculty of the University of Paris from 1320 to 1327. He became one of the most notable adherents of nominalism, a school of thought holding that only individual objects are real and that universal concepts simply express things as names. Nicholas' chief writings are commentaries on the 12th-century *Sentences* of Peter Lombard, the basic medieval compendium of philosophical theology, and on the *Politics* of Aristotle; nine letters to the Franciscan monk-philosopher Bernard of Arezzo; and an important treatise usually designated by the opening words *Exigit ordo executionis* ("The order of completion requires"). This last contains the 60 theses controverted at Nicholas' heresy trial, convened by Pope Benedict XII at Avignon, in 1340.

Nicholas rejected the traditional Aristotelian objectivism, with its allusions to a single intellect for all men, and proposed that there are only two bases for intellectual certitude: the logical principle of identity, with its correlative principle of contradiction, which states that a thing cannot simultaneously be itself and another; and the immediate evidence of sense data. Consistent with his nominalist doctrine, he denied that any causal relation could be known experientially and taught that the very principle of causality could be reduced to the empirical declaration of the succession of two facts. The consequence of such a concept of causality, he averred, was to reject the possibility of any rational proof for the existence of God and to deny any divine cause in creation. Indeed, he held as more probable that the world had existed from eternity.

Nicholas' nominalism precluded the possibility of knowing anything as a permanent concept and allowed only the conscious experience of an object's sensible qualities. Rejecting Scholastic–Aristotelian philosophy and physics, Nicholas believed that the physical and mental universe is ultimately composed of simple, indivisible particles or atoms. He maintained, however, that his innovative thought did not affect his fidelity to Christian religious tradition, including the moral commandments and belief in a future life. Faith and reason, he taught, operate independently from each other, and one could assent to a religious doctrine that reason might contradict. Because of the fallibility of the senses and the human inclination—even in Aristotle—toward erroneous judgment, evidence and truth are not always identical, and philosophy at best is simply the prevalence of the more probable over the less probable.

The ecclesiastical judges at Nicholas' heresy trial labeled his avowals of Christian belief as mere subterfuge and denounced him. Condemned in 1346 by Pope Clement VI, Nicholas finally was ordered in 1347 to resign his professorship, recant his error, and publicly burn his writings. That he took refuge with Emperor Louis IV the Bavarian is a legend created to form a parallel with the life of William of Ockham, his nominalist precursor. Nicholas became dean of the cathedral at Metz in 1350, after which nothing more is heard of him. His *Exigit* manuscript was discovered by A. Birkenmayer at the Bodleian Library, Oxford, and was published in 1939 by J.R. O'Donnell in *Medieval Studies.*

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Nicholas OF CLÉMANGES, original name NICOLAS POILLEVILAIN (b. *c.* 1363, Clémanges, Fr.—d. 1437, Paris), theologian, humanist, and educator who denounced the corruption of institutional Christianity, advocated general ecclesiastical reform, and attempted to mediate the Western Schism (rival claimants to the papacy) during the establishment of the papal residence in Avignon, Fr.

Named rector of the University of Paris in 1393 after acquiring repute as a liberal humanist, Nicholas attempted to resolve the papal schism at the suggestion of his colleagues. In 1397 on the strength of his fame as a Latinist, he became secretary to the antipope Benedict XIII at Avignon, while Pope Boniface IX resided in Rome. Frustrated by the continuation of the schism, Nicholas withdrew his allegiance to Benedict in 1408, when the antipope lost the support of the French. After retiring to a Carthusian monastery near Avignon, he addressed a communication to the Council of Constance in 1414, supporting the theory of conciliarism, or the subordination of the pope to a general council. At the Council of Chartres in 1421, he defended the freedom of the Gallican church, and in 1432 he returned to his teaching career at the College of Navarre.

Reflecting an attitude of sober humanism, transcending the partisan church politics of his day, Nicholas preferred the equanimity of intellectual and moral suasion rather than combative means to influence the contending factions dividing Christendom. He aimed at expressing disputed philosophical and religious questions in pre-Christian classical literary form. His works *De fructu rerum adversarum* ("On the Fruit of Adversities") and *De fructu eremi* ("On the Fruit of Seclusion"), written at the height of the papal crisis in 1408, proposed criteria for settling the schism. In addition to several biblical commentaries he composed the tract *De studio theologico* ("On Theological Study"), in which he criticized the abstractions of medieval scholastic philosophy and urged theologians to a more direct exposition of biblical doctrine.

In his treatise *De lapsu et reparatione justitiae* ("On the Failure and Renewal of Justice") and in companion works (*c.* 1415) discussing the decline of the church and the ravages of simoniacal practices (the selling of religious offices) by ecclesiastical authorities, Nicholas deplored clerical avarice and the abuse of power. The essay *De corrupto ecclesiae statu* ("On the Corrupt State of the Church"), formerly attributed to him, is of dubious authenticity, according to more recent scholarship. His works, including the collection of stylistic letters on controversial issues and several pieces of poetry, were edited by J.M. Lydius (2 vol., 1613) and by A. Coville (1936).

Nicholas OF CUSA, German NIKOLAUS VON CUSA, Latin NICOLAUS CUSANUS (b. 1401, Kues, Trier—d. Aug. 11, 1464, Todi, Papal States), cardinal, mathematician, scholar, experimental scientist, and influential philosopher who stressed the incomplete nature of man's knowledge of God and of the universe.

At the Council of Basel in 1432, he gained recognition for his opposition to the candidate put forward by Pope Eugenius IV for the archbishopric of Trier. To his colleagues at the council he dedicated *De concordantia catholica* (1433; "On Catholic Concordance"), in which he expressed support for the supremacy of the general councils of the church over the authority of the papacy. In the same work he discussed the harmony of the church, drawing a pattern for priestly concord from his knowledge of the order of the heavens. By 1437, however, finding the council unsuccessful in preserving church unity and enacting needed reforms, Nicholas reversed his position and became one of Eugenius' most ardent followers. Ordained a priest about 1440, Cusa was made a cardinal in Brixen (Bressanone), Italy, by Pope Nicholas V and in 1450 was elevated to bishop there. For two years Cusa served as Nicholas' legate to Germany, after which he began to serve full-time as bishop of Brixen.

A model of the "Renaissance man" because of his disciplined and varied learning, Cusa was skilled in theology, mathematics, philosophy, science, and the arts. In *De docta ignorantia* (1440; "On Learned Ignorance") he described the learned man as one who is aware of his own ignorance. In this and other works he typically borrowed symbols from geometry to demonstrate his points, as in his comparison of man's search for truth to the task of converting a square into a circle.

Among Cusa's other interests were diagnostic medicine and applied science. He emphasized knowledge through experimentation and anticipated the work of the astronomer Copernicus by discerning a movement in the universe that did not centre in the Earth, although the Earth contributed to that movement. Cusa's study of plant growth, from which he concluded that plants absorb nourishment from the air, was the first modern formal experiment in biology and the first proof that air has weight. Numerous other developments, including a map of Europe, can also be traced to Cusa. A manuscript collector who recovered a dozen lost comedies by the Roman writer Plautus, he left an extensive library that remains a centre of scholarly activity in the hospital he founded and completed at his birthplace in 1458.

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Nicholas OF DAMASCUS (fl. 1st century BC), Greek historian and philosopher whose works included a universal history from the time of the Assyrian empire to his own days.

Nicholas instructed Herod the Great in rhetoric and philosophy, and attracted the notice of Augustus when he accompanied his patron on a visit to Rome. Later, when Herod's conduct aroused the suspicions of Augustus, Nicholas was sent on a mission to bring about a reconciliation. He survived Herod and it was through his influence that the succession was secured for Herod Archelaus. Fragments of his universal history, his autobiography, and his life of Augustus have been preserved, chiefly in the extracts of Constantine Porphyrogenitus.

Nicholas OF FLÜE, SAINT, byname BROTHER KLAUS, German SANKT NIKLAUS VON FLÜE, or BRUDER KLAUS (b. March 21?, 1417, Flüeli, near Sachseln, Obwalden, Switz.—d. March 21, 1487, Ranft; canonized 1947; feast day in Switzerland September 25, elsewhere March 21), hermit, popular saint, and Swiss folk hero. His intervention in a conflict between cantonal factions over the admission of Fribourg and Solothurn to the Swiss Confederation led to the agreement of Stans (Dec. 22, 1481), which forestalled civil war and strengthened the federative bond of the member cantons.

After serving with his cantonal contingent in the war against Zürich (1436–50), Flüe was elected judge and councillor for upper Unterwalden (1448), but in 1467 he left his wife and family and his civil functions to become a hermit. The nature of his intervention at Stans is still disputed; but by his admonitions to moderation, he entered popular Swiss tradition as one of the earliest champions of arbitration as a method for resolving disputes.

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Nicholas OF HEREFORD (d. *c.* 1420, Coventry, Warwickshire, Eng.), theological scholar and advocate of the English reform movement within the Roman Church who later recanted his unorthodox views and participated in the repression of other reformers. He collaborated with John Wycliffe on the first complete English translation of the Bible.

Nicholas was ordained in 1370 and later received a doctorate in theology (1382) from Oxford. While at Oxford he was influenced by Wycliffe, founder of an evangelical Christian group called Lollards. Developing the reform theology of Lollardism further through his own preaching, Nicholas denounced clerical luxury and affirmed the right of every Christian to establish his personal belief through meditation on the Scriptures. He and Wycliffe, along with other Lollards, were condemned for their views and called to appear before the Archbishop of Canterbury's court in 1382; when they refused to appear, they were excommunicated.

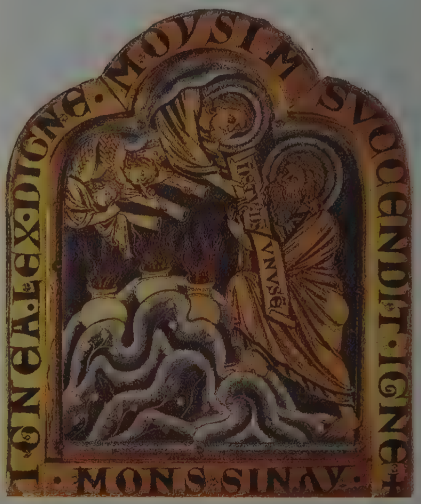
Nicholas immediately appealed his case to Pope Urban VI and went to Rome to plead, but he was again condemned and was sentenced to imprisonment for life. He escaped during a popular uprising against the Pope in June 1385 but was jailed by the Archbishop of Canterbury on his return to England. He was subjected to harsh treatment at Saltwood Castle, Kent (1388–89), and his writings were seized by order of King Richard II. By 1391 he recanted his beliefs, was granted royal protection, and was appointed theological inquisitor of suspected heretics. Chroniclers of the time report that he vigorously disputed his former Lollard colleagues. He was appointed chancellor of Hereford Cathedral (1391), and in 1395 he became chancellor of St. Paul's, London. From 1397 to 1417 he was treasurer at Hereford; shortly before his death he resigned the post and entered a Carthusian monastery.

The most important of Nicholas' literary works—and the only one extant—is the Wycliffe Bible. Nicholas is believed to have been entrusted with the translation of the Old Testament, the major part of which was completed by 1382. His other writings were destroyed by Richard II during Nicholas' captivity at Saltwood Castle, although documents of the period preserve his *Confession of 1382* and other public statements of his beliefs.

Nicholas OF LYRA, Latin NICOLAUS LYRANUS (b. *c.* 1270, Vieille-Lyre, Normandy—d. Oct. 16/23, 1349, Paris), author of the first printed commentary on the Bible and one of the foremost Franciscan theologians and influential exegetes (biblical interpreters) of the Middle Ages.

Becoming a Franciscan *c.* 1300, by 1309 Nicholas was a professor at the Sorbonne, where he taught for many years. From 1319 he headed the Franciscans in France and in 1325 founded the College of Burgundy, Paris. Nicholas' chief work is his monumental 50-volume *Postillae perpetuae in universam S. Scripturam* ("Commentary Notes to the Universal Holy Scripture"), a commentary on the whole Bible that became a leading manual of exegesis. The importance of the *Postillae* lies in its emphasis on a literal, rather than a mystical or an allegorical, interpretation of Scriptures. Some scholars claim that the work had an important influence on Martin Luther.

Nicholas OF VERDUN (fl. *c.* 1150–1210, Flanders), the greatest enamellist and goldsmith of his day and an important figure in the transition from late Romanesque to early Gothic style. He was an itinerant craftsman who travelled to the site of his commission; therefore most of what is known of his life is inferred from his works.



"Moses on Mt. Sinai," champlevé enamel plaque by Nicholas of Verdun, completed 1181; from the Klosterneuburg Altar in the Abbey Church of Klosterneuburg, near Vienna
Erwin Meyer

The altarpiece (1181) of the Abbey Church of Klosterneuburg, Austria, is his best known work and reveals his absolute mastery of metalworking and the technique of champlevé enamelling, in which compartments hollowed out from a metal base are filled with vitreous enamel. The program of scenes on the altar is the most ambitious of its kind in the 12th century and is often considered the most important surviving medieval enamel work. The earlier scenes are done in a mature Romanesque style, but later scenes become progressively more bold and classical.

The reliquary (1205) of SS. Piatus and Nicasius in the Cathedral of Tournai, Belgium, subordinates enamel work to beaten metalwork. Though much-damaged by restoration, it remains a masterful work of early Gothic sculpture, with its slender figures and supple drapery.

The Shrine of the Three Kings in the treasury of Cologne Cathedral is the most important of the Cologne reliquaries attributed to Nicholas. Much of the reliquary is the work of assistants, but the general design and the figures of the prophets are by Nicholas. Powerful and expressive, the prophets have been called the most important metal sculptures of the late 12th century. Two reliquaries attributed to Nicholas, the shrines of St. Anne in Siegburg and of St. Albanus in Saint-Pantaleon, Cologne, have suffered so much by restoration that they no longer reveal the hand of Nicholas except in the overall design.

Nicholls, Gwyn, in full ERITH GWYN NICHOLLS (b. June 1874, Westbury-on-Severn, Gloucester, Eng.—d. March 1939, Wales), one of the greatest rugby players of all time.

Nicholls was captain of Cardiff four times, a club record, beginning in 1892 and was the only Welsh representative on the British team that toured Australia in 1899. Nicholls was also captain of Wales 10 times, leading the team to victory in the legendary match against the New Zealand All Blacks in 1905, and won 24 caps for Wales. After he retired in 1925, Nicholls served on several Cardiff athletic committees and was a selector for the Welsh Rugby Union.

Nichols, John (b. Feb. 2, 1745, London, Eng.—d. Nov. 26, 1826, London), writer, printer, and antiquary who, through numerous volumes of literary anecdotes, made an invaluable contribution to posterity's knowledge of the lives and works of 18th-century men of letters in England.

John Nichols, engraving by Charles Heath after a portrait by J. Jackson
BBC Hulton Picture Library

Apprenticed in 1757 to William Bowyer the younger (known as "the learned printer"), who took him into partnership in 1766, Nichols undertook his first literary work as editor of the works of Jonathan Swift (1775–79). In 1778 Nichols became part manager of the *Gentleman's Magazine* and in 1792 sole managing editor. Of his original work, *Bibliotheca Topographica Britannica* (1780–90) and *The History and Antiquities of the County of Leicester* (1795–1815) are especially valuable. They are the fruit of his own meticulous observation and research. A friend of most of the leading literary figures of his age, he published Samuel Johnson's *Lives of the English Poets,* exercising much editorial influence and supplying a good deal of basic information. His own work as a biographer of the age began with his memoir of Bowyer, expanded into *Biographical and Literary Anecdotes of William Bowyer* (1782). This formed the basis of *Literary Anecdotes of the Eighteenth Century,* 9 vol. (1812–15; completed by his son, John Bowyer Nichols).

Nichols, Mike, original name MICHAEL IGOR PESCHKOWSKY (b. Nov. 6, 1931, Berlin, Ger.), American motion-picture and stage director whose productions focus on the absurdities and horrors of modern life as revealed in personal relationships.

Nichols immigrated with his family to the United States at the age of seven. He attended the University of Chicago (1950–53), studied acting under Lee Strasberg in New York City, and then returned to Chicago, where, with Elaine May, Alan Arkin, Barbara Harris, and Paul Sills, he formed the comic improvisational group The Second City. Nichols and May then traveled nationwide with their social-satire routines, and from 1960 to 1961 they performed on Broadway in *An Evening with Mike Nichols and Elaine May.*

Nichols made his Broadway directorial debut with the highly praised *Barefoot in the Park* (1963) and went on to direct a series of commercially and critically successful Broadway plays, many written by Neil Simon. He won Tony awards for *Barefoot in the Park, Luv* (1964), *The Odd Couple* (1965), *Plaza Suite* (1968), *The Prisoner of 2nd Avenue* (1971), and Tom Stoppard's *The Real Thing* (1984). He also directed *The Gin Game* (1977).

His first film was *Who's Afraid of Virginia Woolf?* (1966), a powerful rendering of the Edward Albee play. This was followed by *The Graduate* (1967), a landmark film about the conflicts of the generation of the 1960s for which he received an Academy Award for best director. Other notable films include *Catch-22* (1970), a macabre look at warfare; *Carnal Knowledge* (1971); *Silkwood* (1983), an examination of the practices of the nuclear power industry; *Postcards from the Edge* (1990); and *Wolf* (1994). His films typically are marked by his cynical commentary on contemporary life, often underlined by humour.

Nicholson, Ben (b. April 10, 1894, Denham, Buckinghamshire, Eng.—d. Feb. 6, 1982, London), English artist whose austere geometric paintings and reliefs were among the most influential abstract works in British art.

The son of the painter Sir William Nicholson, he was largely self-taught and only briefly attended the Slade School of Fine Art (1910–11), London. He traveled extensively in Europe between 1911 and 1914 and in 1917 visited California, keeping a detailed record in sketches of architecture and landscape.

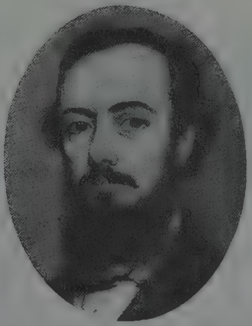
During the 1920s, along with the sculptors Barbara Hepworth (who became his second wife) and Henry Moore, Nicholson was instrumental in introducing continental modernism into England. His first semiabstract still lifes reflected his exposure to Synthetic Cubism in Paris. In 1933 he met the Dutch painter Piet Mondrian, under whose influence his work took on a cooler geometry; typical of this period are his low reliefs of whitewashed circles and rectangles (*e.g.,* "White Relief," 1937–38). He was coeditor with Naum Gabo and J.L. Martin of *Circle,* a manifesto published in 1937 to promote Constructivism in England. His later work showed an increasing concern with texture and with simple, isolated representation through silhouette.

Nicholson, Jack (b. April 22, 1937, Neptune, N.J., U.S.), American motion-picture actor noted for his versatile portrayals of unconventional outsiders.

Nicholson played a string of undistinguished roles in low-budget horror and motorcycle-gang films in the late 1950s and '60s before his performance as the easygoing Southern lawyer companion of the two main characters in *Easy Rider* (1969) brought him nationwide acclaim. He then went on to leading roles in a number of highly successful motion pictures, including *Five Easy Pieces* (1970), *Carnal Knowledge* (1971), *The Last Detail* (1973), *Chinatown* (1974), and *One Flew Over the Cuckoo's Nest* (1975), the last film winning him an Academy Award for best actor.

After a hiatus of several years, he resumed his career. Notable films include *The Shining* (1980), *The Postman Always Rings Twice* (1981), *Prizzi's Honor* (1985), *The Witches of Eastwick* (1987), *Batman* (1989), and *Wolf* (1994). He won an Academy Award for best supporting actor for his performance in *Terms of Endearment* (1983). Nicholson himself directed *Drive, He Said* (1971) and directed and starred in *Goin' South* (1978) and *The Two Jakes* (1990).

Nicholson, John (b. Dec. 11, 1821, Dublin, Ire.—d. Sept. 23, 1857, Delhi [India]), British soldier and administrator who brought relief to Delhi during the Indian Mutiny of 1857.


John Nicholson, detail of a chalk drawing by William Carpenter, 1854; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Nicholson became a cadet in the Bengal Army at the age of 17 and fought at Ghaznī during the First Afghan War (1839–42). Subsequently, he held political posts in Kashmir and the Punjab and took part in the Second Sikh War (1848–49).

During the rebellion of 1857 Nicholson was promoted to brigadier general after pacifying the Punjab and led a swift advance on Delhi, which had been seized by rebel forces in May. His arrival in Delhi early in August and his victory at Najafgarh inspired the besieged British troops outside the city; on September 14 he led an attacking column against the Kashmir Gate. The gate was taken, but he was wounded in battle and died shortly thereafter.

Nicholson, Reynold Alleyne (b. Aug. 18, 1868, Keighley, Yorkshire, Eng.—d. Aug. 27, 1945, Chester, Cheshire), English orientalist who exercised a lasting influence on Islāmic studies.

Educated at Aberdeen University and the University of Cambridge, Nicholson was lecturer in Persian (1902–26) and Sir Thomas Adams professor of Arabic (1926–33) at Cambridge. He was a leading scholar in Islāmic literature and mysticism. His *Literary History of the Arabs* (1907) remains a standard work on that subject in English; while his many text editions and translations of Ṣūfī writings, culminating in his eight-volume *Mathnawi of Jalalu'ddin Rumi* (1925–40), eminently advanced the study of Muslim mystics. He combined exact scholarship with notable literary gifts; some of his versions of Arabic and Persian poetry entitle him to be considered a poet in his own right. His profound understanding of Islām and of the Muslim peoples was the more remarkable in that he never traveled outside Europe. A shy and retiring man, he proved himself an inspiring teacher and an original thinker.

Nicholson, Seth Barnes (b. Nov. 12, 1891, Springfield, Ill., U.S.—d. July 2, 1963, Los Angeles, Calif.), American astronomer best known for discovering four satellites of Jupiter: the 9th in 1914 (at Lick Observatory, Mount Hamilton, California), the 10th and 11th in 1938, and the 12th in 1951 (all at Mount Wilson Observatory, Calif.).

Educated at Drake University, Des Moines, Iowa, and at the University of California (Ph.D., 1915), Nicholson was on the Mount Wilson Observatory staff from 1915 to 1957. Of greater astrophysical significance than his satellite discoveries was his investigation of sunspots, especially their magnetic properties and terrestrial effects. With the American astronomer Edison Pettit, he made many thermocouple measurements of stellar and planetary radiation.

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Nicholson, William (b. 1753, London, Eng.—d. May 21, 1815, Bloomsbury, London), English chemist, discoverer of the electrolysis of water, which has become a basic process in both chemical research and industry.

Nicholson was at various times a hydraulic engineer, inventor, translator, and scientific publicist. He invented a hydrometer (an instrument for measuring the density of liquids) in 1790. In 1800, after he heard of the invention of the electric battery by the Italian physicist Alessandro Volta, he built one of his own. He then discovered that when leads from the battery are placed in water, the water breaks up into hydrogen and oxygen, which collect separately to form bubbles at the submerged ends of the wires. With this discovery Nicholson became the first man to produce a chemical reaction by electricity.

In 1797 Nicholson founded the *Journal of Natural Philosophy, Chemistry and the Arts,* which was the first independent scientific journal. The success of this periodical inspired the creation of several rival scientific journals in England that eventually drove Nicholson's periodical out of business. Nicholson's *Introduction to Natural Philosophy* (1781) was the most successful of his published works.

Nicias (d. 413 BC, Sicily [now in Italy]), Athenian politician and general during the Peloponnesian War (431–404 BC) between Sparta and Athens. He was in charge of the Athenian forces engaged in the siege of Syracuse, Sicily, and the failure of the siege contributed greatly to the ultimate defeat of Athens.

In the first 10 years of the conflict, Nicias proved his ability as a leader of offensive expeditions and in 421 negotiated the Peace of Nicias and an alliance with Sparta. The hostility of Sparta's allies and the opposition of the Athenian general Alcibiades, however, foiled Nicias' efforts to uphold the peace. Warfare was renewed, and in 415 Nicias reluctantly allowed himself to be appointed, with Alcibiades and Lamachus, leader of the Sicilian expedition.

The recall of Alcibiades and the death of Lamachus left Nicias, although ill, in sole charge of the siege of Syracuse. The wall his forces attempted to build around Syracuse was not completed owing to the defenders' efforts. Nicias asked to be relieved of his command, but instead reinforcements under Demosthenes arrived early in 413. When these failed to reverse the situation, Demosthenes favoured the withdrawal of the Athenian army, but an eclipse of the Moon occurred on Aug. 27, 413, and the superstitious Nicias accepted his soothsayers' advice to delay setting out. The Syracusans soon afterward forced the surrender of the Athenian forces, including Nicias, whom they executed.

Nicias (fl. 4th century BC), Athenian painter who was noted for his skill in chiaroscuro (the depiction of form by means of light and shadow).

Nicias was famous for his ability to make his figures stand out by means of chiaroscuro. He seems to have excelled in the depiction of female figures in dramatic situations. He was a younger contemporary of the sculptor Praxiteles and apparently painted in the details on some of the latter's statues. The Roman author Pliny the Elder relates that when Praxiteles was asked which of his works in marble he admired most, he replied, "Those which had been touched by the hands of Nicias." Pliny also reports that King Ptolemy I of Egypt once offered Nicias a large sum of money for his painting of "Odysseus Questioning the Dead in the Underworld," but that Nicias chose instead to make the painting a present to his native Athens. None of Nicias' original paintings still exists. Among those listed by Pliny are "Portrait of Alexander," "Io," and "Perseus and Andromeda."

nickel (Ni), chemical element, ferromagnetic metal of Group VIII of the periodic table, markedly resistant to oxidation and corrosion.

Properties, occurrence, and uses. Silvery-white, tough, and harder than iron, nickel is widely familiar because of its use in coinage but is more important either as the pure metal or in the form of alloys for its many domestic and industrial applications. Elemental nickel very sparingly occurs together with iron in terrestrial and meteoric deposits. The metal was isolated (1751) by a Swedish chemist and mineralogist, Baron Axel Fredrik Cronstedt, who prepared an impure sample from an ore containing niccolite (nickel arsenide). Earlier, an ore of this same type was called *Kupfernickel* after "Old Nick" and his mischievous gnomes because, though it resembled copper ore, it yielded a brittle, unfamiliar metal. Twice as abundant as copper, nickel constitutes about 0.007 percent of the Earth's crust; it is a fairly common constituent of igneous rocks, though singularly few deposits qualify in concentration, size, and accessibility for commercial interest. The most important sources are pentlandite, found with nickel-bearing pyrrhotite and chalcopyrite, and nickel-bearing laterites, such as garnierite.

For information about the mining, refining, and production of nickel, *see* MACROPAEDIA: Industries, Extraction and Processing.

Nickel (atomic number 28) resembles iron (atomic number 26) in strength and toughness but is more like copper (atomic number 29) in resistance to oxidation and corrosion, a combination accounting for many of its applications. More than half the nickel produced is used in alloys with iron (particularly in stainless steels), and most of the rest is used in corrosion-resistant alloys with copper (including Monel) and in heat-resistant alloys with chromium. Nickel is also used in electrically resistive, magnetic, and many other kinds of alloys, such as nickel silver (with copper and zinc but no silver). The unalloyed metal is utilized to form protective coatings on other metals, especially by electroplating. Finely divided nickel is employed to catalyze the hydrogenation of unsaturated organic compounds (*e.g.,* fats and oils).

Natural nickel consists of five stable isotopes: nickel-58 (68.27 percent), nickel-60 (26.10 percent), nickel-61 (1.13 percent), nickel-62 (3.59 percent), and nickel-64 (0.91 percent). It has a face-centred-cubic crystal structure. Nickel is ferromagnetic up to 358° C, or 676° F (its Curie point). The metal is uniquely resistant to the action of alkalies and is frequently used for containers for concentrated solutions of sodium hydroxide. Nickel reacts slowly with strong acids under ordinary conditions to liberate hydrogen and form Ni^{2+} ions.

Compounds. In its compounds nickel exhibits oxidation states of −1, 0, +1, +2, +3, and +4, though nickel(II) is by far the most common. Divalent nickel forms a large number of complexes, encompassing coordination numbers 4, 5, and 6 and all of the main structural types—*e.g.,* octahedral, trigonal bipyramidal, tetrahedral, and square.

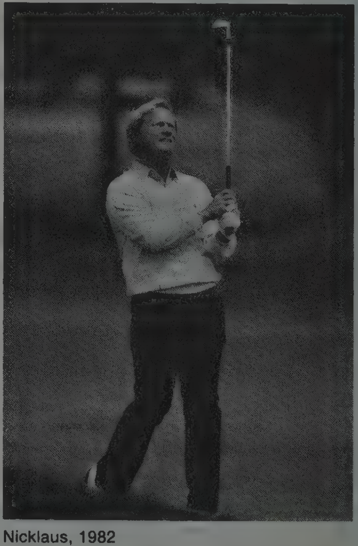
Nickel(II) compounds have a variety of industrial applications. For example, nickel chloride, $NiCl_2$, nickel nitrate, $Ni(NO_3)_2 \cdot 6H_2O$, and nickel sulfamate, $Ni(SO_3NH_2)_2 \cdot 4H_2O$, are employed chiefly in nickel electroplating baths. Nickel sulfate, $NiSO_4$, is also used in nickel plating as well as in the preparation of catalysts, ground-coat enamels, and mordants (fixatives) for dyeing and textile printing. Nickel oxide, NiO, and nickel peroxide, Ni_2O_3, are prepared for use in fuel cells and storage batteries, respectively. Nickel ferrites are utilized as magnetic cores for various types of electrical equipment such as antennas and transformers.

Among other important commercial compounds are nickel carbonyl, or tetracarbonylnickel, $Ni(CO)_4$. This zerovalent nickel compound is used primarily as a carrier of carbon monoxide in the synthesis of acrylates (compounds utilized in the manufacture of plastics) from acetylene and alcohols. It was the first of a class of compounds called metal carbonyls to be discovered (1890). The colourless, volatile liquid is formed by the action of carbon monoxide on finely divided nickel and is characterized by an electronic configuration in which the nickel atom is surrounded by 36 electrons. This type of configuration is quite comparable to that of the noble-gas atoms.

atomic number	28
atomic weight	58.69
melting point	1,453° C (2,647° F)
boiling point	2,732° C (4,950° F)
density	8.902 (25° C)
valence	0,1,2,3
electronic config.	2-8-16-2 or $(Ar)3d^84s^2$

Nicklaus, Jack (William) (b. Jan. 21, 1940, Columbus, Ohio, U.S.), American professional golfer, a dominating figure in world golf from the 1960s to the 1980s.

While a student at Ohio State University, Nicklaus won the U.S. Amateur championship in 1959 and again in 1961. Also in 1961



Nicklaus, 1982
Focus on Sports Inc.

Nicklaus set a record 282 for an amateur in the United States Open. After he turned professional in 1962, Nicklaus won the Masters Tournament (1963, 1965, 1966, 1972, 1975, 1986), the United States Open (1962, 1967, 1972, 1980), the PGA (Professional Golfers' Association of America) championship (1963, 1971, 1973, 1975, 1980), and the British Open (1966, 1970, 1978). His victories overseas included six Australian Open titles. Nicklaus was a member of the winning U.S. World Cup team six times (1963, 1964, 1966, 1967, 1971, 1973) and was a record three-time individual World Cup winner (1963, 1964, 1971). By 1986 he had played in 100 major championships, finishing in the top three 45 times. Nicklaus was named PGA Player of the Year five times (1967, 1972, 1973, 1975, 1976), and he was elected to the World Golf Hall of Fame in 1974. He joined the U.S. Senior Tour in 1990.

In addition to great natural ability and power, Nicklaus showed remarkable composure under the severest competitive pressure. He designed several golf courses, including Muirfield Village Golf Course in Ohio. He also wrote several books on golf.

Nicobar Islands, island group, Andaman and Nicobar Islands union territory, India. The islands lie in the Bay of Bengal and have a land area of 711 square miles (1,841 square km). With the nearby Andaman Islands, they constitute a union territory of India (*see* Andaman and Nicobar Islands). The Nicobar group includes the islands of Car Nicobar (north), Camorta (Kamorta) and Nancowry (central group), and Great Nicobar (south).

Though very little is known about the islands' earliest history, the Thanjāvūr inscription (1050) of the Cōḷa dynasty describes the land as Nakkavaram ("Land of the Naked"). Danish missionaries visited the islands in 1756. In 1869–88 they were claimed by the British, who established a penal colony there. The islands were occupied by the Japanese during World War II.

Car Nicobar is flat with rich, fertile soils; Nancowry, Camorta, and Great Nicobar are hilly. The highest peak is Mount Thullier, rising to 2,106 feet (642 m) on Great Nicobar. The islands are densely forested with coconut, betel nut, pandanus, mango, margosa, and casuarina. The population consists mostly of two ethnic groups, the Nicobarese and the Shompens. Agriculture is the principal occupation; crops include rice, corn (maize), fruits, vegetables, coconuts, and betel nuts. Copra making and oil pressing are the chief industries. The only important town is on Car Nicobar. Pop. (1991 prelim.) 39,022.

Nicobarese languages, Austroasiatic languages spoken on the Nicobar Islands and once considered to form a distinct family within the Austroasiatic stock. More recent data on these hitherto poorly known languages suggest that they form a distinct branch of the Mon-Khmer family, itself a part of the Austroasiatic stock. The Nicobarese languages are usually classified into four groups: North Nicobar, including the Car, Chowra, Teressa, and Bompaka languages; Central Nicobar, including the Camorta, Nancowry, Trinkat, and Katchall languages; South Nicobar, including the Coastal Great Nicobar and the Little Nicobar languages; and Inland Great Nicobar, including the Shompe language.

Nicodemus THE HAGIORITE, SAINT, also called SAINT NICODEMUS OF THE HOLY MOUNTAIN (b. 1748, Naxos Island, Ottoman Empire [now in Greece]—d. July 14, 1809, Mount Athos; canonized May 31, 1955), Greek Orthodox monk and author of ascetic prayer literature. He was influential in reviving the practice of Hesychasm, a Byzantine method of contemplative prayer.

Forced to flee Turkish persecution in the midst of his studies at Smyrna (now İzmir, Turkey), Nicodemus entered a monastery on Mount Athos. He was inspired to theological scholarship by a contemporary, Macarius of Corinth, whose collection of old Eastern prayer texts Nicodemus edited and published as *Philokalia* in 1782. After this book had occasioned a renewed interest in Hesychasm throughout the Orthodox churches, Nicodemus edited Macarius' essays on liturgical prayer, emphasizing the Eucharist, or the Lord's Supper. This work was at first criticized for erroneous doctrine, but its orthodoxy was vindicated by the Synod of Constantinople in 1819.

Nicodemus' outstanding work, the *Pedalion,* or *Rudder of the Ship of Knowledge,* is a commentary on Greek church law. Its bias against the Latin church, although partly attributable to interpolations by another editor, reflects the author's negative feelings toward the institutions of Western Christianity. Nicodemus did not hesitate, however, to use the treatises of Latin theologians on asceticism and contemplative prayer. His *Enchiridion of Counsels* (1801), a handbook on the religious life, continues to guide modern Greek spirituality. He was proclaimed a saint by the Greek Orthodox church in 1955.

Nicol, Davidson, in full DAVIDSON SYLVESTER HECTOR WILLOUGHBY NICOL, also called ABIOSEH NICOL (b. Sept. 14, 1924, Freetown, Sierra Leone—d. Sept. 20, 1994, Cambridge, Eng.), Sierra Leonean diplomat, physician, medical researcher, and writer.

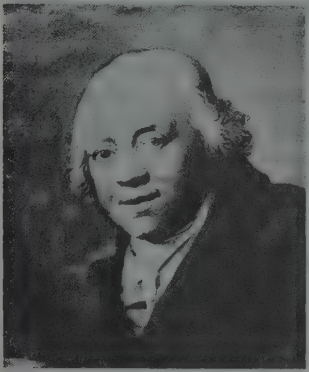
Nicol was educated in medicine and natural sciences in Sierra Leone, Nigeria, and England, and he subsequently served in various medical posts in those countries. He became known for his research into the structure of insulin, and he lectured and wrote widely on medical topics. He was principal of Fourah Bay College, Freetown (1960–68), vice chancellor of the University of Sierra Leone (1966–68), and his country's ambassador to the United Nations (1969–71). Nicol was president of the UN Security Council in 1970, and from 1972 to 1982 he served as executive director of the United Nations Institute for Training and Research (UNITAR). He was president of the World Federation of UN Associations from 1983 to 1987.

Nicol's short stories were published in *Two African Tales* (1965) and *The Truly Married Woman, and Other Stories* (1965), under the name Abioseh Nicol. They centre upon life in the government service and upon the interaction of Africans with colonial administrators in preindependent Sierra Leone. His short stories and poems appeared in anthologies and journals. He also wrote *Africa, A Subjective View* (1964) and edited several other nonfiction works.

Nicola DI **LORENZO**: *see* Cola di Rienzo.

Nicolai, Friedrich, in full CHRISTOPH FRIEDRICH NICOLAI (b. March 18, 1733, Berlin, Prussia [Germany]—d. Jan. 8, 1811, Berlin), writer and bookseller who, with Gotthold Ephraim Lessing and Moses Mendelssohn, was a leader of the German Enlightenment (*Aufklärung*) and who, as editor of the reformist journal *Allgemeine deutsche Bibliothek* ("German General Library"), was critical of such younger writers as Johann Wolfgang von Goethe and Friedrich von Schiller.

Nicolai went to Frankfurt an der Oder, where he learned his father's bookselling business and became acquainted with English literature. On his return to Berlin (1752), he took part in a literary controversy over John Milton by defending the English poet against the grammarian Johann Christoph Gottsched. Nicolai's *Briefe über den jetzigen Zustand der schönen Wissenschaften in Deutschland* (1755; "Letters on the Current State of the Fine Arts in Germany"), published anonymously, was directed against both Gottsched and Gottsched's Swiss opponents, the critics Johann Jakob Bodmer and Johann Breitinger. Nicolai's enthusiasm for English literature gained him the friendship of Lessing and Mendelssohn. He cofounded, with Mendelssohn, the periodical *Bibliothek der schönen Wissenschaften* (1757–60; "Library of Fine Arts") and, with both Lessing and Mendelssohn, *Briefe, die neueste Litteratur betreffend* (1761–66; "Letters on the Modern Literary Question"). He also edited the *Allgemeine deutsche Bibliothek* (1765–92), the organ of the "popular philosophers" who fought against authority in religion and what they conceived to be extravagance in literature. Nicolai showed a complete incomprehension of the new movement of ideas represented by Goethe, Schiller, Johann Gottfried von Herder, and Johann Gottlieb Fichte.



Friedrich Nicolai, oil painting by A. Graff
Historia-Photo

Nicolai wrote many independent works. His *Charakterischen Anekdoten von Friedrich II* (1788–92), an account of events in the court of Frederick II the Great, has some historical value. His romances are forgotten, although they were well known in their time. *Die Beschreibung einer Reise durch Deutschland und die Schweiz,* 12 vol. (1788–96; "The Description of a Journey Through Germany and Switzerland"), a record of his reflections on man and the state of science, religion, industry, and morals, was widely read by 1796 and reflects the rather narrow conservativism of his later views.

Nicolai, Otto, in full CARL OTTO EHRENFRIED NICOLAI (b. June 9, 1810, Königsberg, Prussia [now Kaliningrad, Russia]—d. May 11, 1849, Berlin, Prussia [Germany]), German composer known for his comic opera *Die lustigen Weiber von Windsor* (*The Merry Wives of Windsor*), based on William Shakespeare's comedy.

In his youth Nicolai was exploited as a musical prodigy by his father. He studied in Berlin in 1827 and later under Giuseppe Baini in Rome. From 1838 onward he produced successful operas in Italy and Vienna. In 1841 he became court conductor in Vienna, and he founded the Philharmonic Society there in 1842. In 1847 he became conductor of the Berlin Opera, where he produced *Die lustigen Weiber von Windsor* in 1849. It remains one of the most popular comic operas of the 19th century.

Nicolas-Favre disease: *see* lymphogranuloma venereum.

Nicolaus (Latin personal name): *see under* Nicholas.

Nicole, Pierre (b. Oct. 19, 1625, Chartres, France—d. Nov. 16, 1695, Paris), French theologian whose writings, chiefly polemical, supported the Roman Catholic reform movement known as Jansenism.

Educated in Paris, Nicole taught literature and philosophy at Port-Royal des Champs, a Cistercian abbey that was a stronghold of Jansenism. With the Jansenist leader Antoine Arnauld and others, he wrote several textbooks, among them *La Logique, ou L'art de Penser* (1662; *Logic; or, The Art of Thinking*). Nicole was an influential spokesman from 1655 to 1668 through his writing or editing of most of the Jansenist pamphlets. He was probably the source of the celebrated distinction between the two "questions of fact," an adroit device allowing him to separate into two parts the charge of heresy often made against the Jansenists. The two questions were: Are Jansenist doctrines rightly called heretical? And did Jansen in fact teach these doctrines? By answering the first question affirmatively and the second negatively, Nicole enabled the Jansenists to pursue their program of criticism and reform without openly breaking with the Roman Catholic church.

Nicole, detail of an engraving by Cornelius Vermeulen after a painting by Élisabeth Chéron
J.E. Bulloz

From 1669 on, Nicole used his talents to defend Catholic dogma against Protestant criticism. A friend of the French philosopher Blaise Pascal, he used one of his numerous pseudonyms to translate into Latin Pascal's *Provinciales* ("Provincial Letters"). Nicole's best-known work is the *Essais de morale,* 4 vol. (1671; "Essays on Morality"), eventually enlarged to 14 volumes, in which he discussed the problems raised for ethics by human nature, which he found seldom capable of virtue.

Nicolet, Jean (b. 1598, Cherbourg, France—d. Nov. 1, 1642, Sillery, Que., Can.), French North American explorer who was the first known European to discover Lake Michigan and what is now the state of Wisconsin.

The son of a dispatch carrier, Nicolet was 20 years old when he traveled to New France (Canada) at the request of Samuel de Champlain. He lived with a friendly Indian tribe on Allumette Island in the Ottawa River, learned the Algonquian language and culture, and participated in negotiations with the Iroquois. He returned to Quebec in 1620 and was then sent to live among the distant Nipissing tribe. In 1624 he became their interpreter. Nine years later he returned to the Three Rivers settlement in New France and became the colony's official interpreter.

In early 1634 Nicolet joined an expedition that journeyed westward into the Huron territory. There he obtained a large canoe and with seven Huron braves proceeded from Lake Huron through the Straits of Mackinac to discover Lake Michigan. The lake was not the Northwest Passage to the Pacific Ocean that Nicolet anticipated, but he sailed on to Green Bay and there concluded a friendship treaty with the Winnebago tribe.

He explored the region of present-day Wisconsin for a short time before he returned to Quebec during the autumn of 1634. He resumed his duties as colony interpreter and earned considerable respect from both French settlers and local Indian tribes. Nicolet was drowned when his boat capsized during a sudden storm on the St. Lawrence River.

Nicolle, Charles-Jules-Henri (b. Sept. 21, 1866, Rouen, France—d. Feb. 28, 1936, Tunis, Tunisia), French bacteriologist who received the 1928 Nobel Prize for Physiology or Medicine for his discovery (1909) that typhus is transmitted by the body louse.

After practicing and engaging in bacteriological research in Rouen, Nicolle became director of the Pasteur Institute in Tunis (1902–32). There he founded the Archives de l'Institut Pasteur de Tunis, which during his tenure became a distinguished centre for bacteriological research and for the production of serums and vaccines to combat infectious diseases. He extended his work on typhus to distinguish between the classical louse-borne form of the disease and murine typhus, which is conveyed to humans by the rat flea. Nicolle also made valuable contributions to the knowledge of rinderpest, brucellosis, measles, diphtheria, and tuberculosis.

Nicollet, Joseph Nicolas, also called JEAN-NICOLAS NICOLLET (b. July 24, 1786, Cluses, Savoy, France—d. Sept. 11, 1843, Washington, D.C., U.S.), mathematician and explorer.

Nicollet showed promise in mathematics and astronomy early; he became a teacher of mathematics at the age of 19. In 1817 he began working with the scientist Pierre-Simon Laplace at the Paris Observatory, and in the 1820s he became a professor of mathematics at the Collège Louis-le-Grand in Paris.

In 1832 Nicollet emigrated to the United States after financial reverses in France. With support from the wealthy Chouteau family of St. Louis, Nicollet in 1836–37 led an expedition that surveyed the sources of the Mississippi River. In 1838 he accepted a position with the U.S. Army Corps of Topographical Engineers, and in 1838–39 he led a government surveying expedition to map the region between the upper Mississippi and Missouri rivers, assisted by John C. Frémont. Nicollet later prepared a detailed map of the region and wrote a report on the expedition; these were published in 1843, after his death.

Nicolls, Richard (b. 1624, Ampthill, Bedfordshire, Eng.—d. May 28, 1672, in the North Sea, off Suffolk, Eng.), the first English governor of the province of New York.

The son of a barrister, Nicolls was a stalwart Royalist who served in the army during the English Civil Wars and followed the Stuarts into exile, where he entered the service of James, Duke of York. Upon the Restoration of Charles II, Nicolls was appointed gentleman of the bedchamber to the duke. In 1664 Charles II decided to seize the Dutch colony of New Netherland (now New York state) and confer some of its lands on his brother, the Duke of York. Nicolls was appointed by the Duke of York to be the governor of this prospective territory. Accordingly, in May of that year Nicolls sailed with a squadron of four vessels and a force of troops and blockaded the chief city of New Netherland, New Amsterdam (now New York City). In September 1664 the Dutch officials in New Amsterdam surrendered peacefully to the generous terms Nicolls had set, and he began organizing an English administration of the province. Nicolls renamed both the province and its chief city New York in honour of his patron, the duke, and he also gave the present-day city of Albany its name. Nicolls achieved the transition from Dutch to English rule tactfully and gradually, and his subsequent government of New York was so efficient and fair that he earned the general esteem of both its Dutch and English colonists. In 1665 he issued "the Duke's Laws," which served as the first legal code of New York and remained in force until 1683.

Nicolls resigned the governorship in 1668 and returned to England, where he resumed his post as gentleman of the bedchamber to the Duke of York. Upon the outbreak of the Dutch War (or Third Anglo-Dutch War) in 1672, Nicolls volunteered to fight and was killed in the naval battle of Solebay.

Nicolson, Sir Harold, in full HAROLD GEORGE NICHOLSON (b. Nov. 21, 1886, Tehrān, Iran—d. May 1, 1968, Sissinghurst Castle, Kent, Eng.), British diplomat and author of more than 125 books, including political essays, travel accounts, and mystery novels. His three-volume *Diaries and Letters* (1966–68) is a valuable document of British social and political life from 1930 to 1964.

Nicolson was born in Iran, where his father, Sir Arthur Nicolson (later 1st Baron Carnock of Carnock), was chargé d'affaires. Throughout his youth, his family moved about from diplomatic post to post, in central Europe, Turkey, Madrid, and Russia. He studied at Balliol College, Oxford. He entered the Foreign Office in 1909, with which he remained for 20 years, serving at such overseas posts as Madrid, Tehrān, and Berlin.

In 1929 Nicolson decided to abandon his diplomatic career. He had already published several biographies: *Paul Verlaine* (1921), *Tennyson* (1923), *Byron, the Last Journey* (1924), *Swinburne* (1926), and *Some People* (1927), as well as a novel and other pieces. On Jan. 1, 1930, he became a columnist for Lord Beaverbrook's *London Evening Standard* and also, on that day, began a diary, in which he made daily entries until Oct. 4, 1964. (Three volumes were edited and published by his son Nigel Nicolson in the late 1960s.)

Along with his newspaper work, Nicolson also wrote book reviews and gave radio talks. From 1935 to 1945 he was a member of Parliament. He was knighted in 1953. Some of his later books were *Curzon, the Last Phase* (1934), *Politics in the Train* (1936), *Helen's Tower* (1938), *Diplomacy* (1939), *The Congress of Vienna* (1946), *King George V* (1952), and *Journey to Java* (1957).

In 1913 Nicolson married the poet and novelist Victoria Sackville-West. Although both proved to have homosexual proclivities, their marriage of deep friendship lasted until her death in 1962.

BIBLIOGRAPHY. James Lees-Milne, *Harold Nicolson,* 2 vol. (1980–81), examines his diplomatic career, his writings, and his marriage.

Nicomachus (fl. 4th century BC, Thebes, Boeotia [Greece]), Greek painter.

Nicomachus' work was overshadowed by that of his great contemporaries; the Roman connoisseur Vitruvius said that if his fame was less than that of others, it was the fault of fortune rather than of demerit. Pliny the Elder gave a list of his works, including "Rape of Persephone," "Victory in a Quadriga," a group of Apollo and Artemis, and the "Mother of the Gods Seated on a Lion." Pliny also said that he was a rapid worker and used only four colours.

Nicomachus OF GERASA (fl. *c.* AD 100, Gerasa, Roman Syria [now Jarash, Jordan]), Neo-Pythagorean philosopher and mathematician who wrote *Arithmētikē eisagōgē* (*Introduction to Arithmetic*), an influential treatise on number theory. Considered a standard authority for 1,000 years, the book sets out the elementary theory and properties of numbers and contains the earliest-known Greek multiplication table. In his *Arithmētikē* Nicomachus, unlike Euclid, gave no abstract proofs of his theorems. Instead he merely enunciated the theorems and illustrated them with specific numerical examples. A Latin translation of the *Arithmētikē* by Apuleius of Madaurus (*c.* AD 125) is lost, but Boethius' version survived and was used as a schoolbook up to the Renaissance. Nicomachus' *Encheiridion Harmonikēs* ("Handbook of Harmony") is on the Pythagorean theory of music. He also wrote *Theologoumena arithmetikēs*, 2 vol. ("The Theology of Numbers"), on the mystic properties of numbers, but only fragments of this work have survived.

Nicopolis, Battle of (Sept. 25, 1396), military engagement that resulted in a Turkish victory over an army of European crusaders. It brought an end to massive international efforts to halt Turkish expansion into the Balkans and central Europe.

When the Ottoman sultan Bayezid I (ruled 1389–1402) laid siege to Constantinople (now Istanbul) in 1395, the Byzantine emperor Manuel II Palaeologus appealed to the Christian rulers of Europe for aid. King Sigismund of Hungary responded by organizing a crusade. In July 1396 knights from France, Burgundy, England, Germany, and the Netherlands joined Sigismund at Buda and set out first to evict the Turks from the Balkans and then to march through Anatolia and Syria to Jerusalem.

Having entered Turkish territory (August) and conquered the garrisons at Vidin and Rahova, the crusaders laid siege to Nicopolis, the main Turkish stronghold on the Danube River. While they waited for the well-stocked, well-fortified town to submit, Bayezid marched from Constantinople and established his army on a hill several miles from Nicopolis. Although Sigismund urged his allies to maintain a defensive position, the knights charged up the hill, scattering the first lines of the Turkish cavalry and infantry. Bayezid awaited them, however, with another cavalry contingent reinforced by a Serbian army, and by that time the heavily armoured Western knights were too exhausted to fight effectively. Sigismund, whose army had not participated in the initial attack, tried to rescue the knights, but his Walachian and Transylvanian contingents deserted and his Hungarian force was insufficient. The Turks slaughtered most of the crusaders and pushed the remainder back to the Danube. Although a small portion of the allied army, including Sigismund, escaped, most survivors were captured and executed by Bayezid.

By their victory at Nicopolis, the Turks discouraged the formation of future European coalitions against them. They maintained their pressure on Constantinople, tightened their control over the Balkans, and became a greater menace to central Europe.

Nicopolis Actia, Modern Greek NIKÓPOLIS, formerly PALAIOPRÉVEZA, city about 4 miles (6 km) north of Préveza, northwestern Greece. It was founded in 31 BC by Octavian (who in 27 BC was to become the Roman emperor Augustus) in commemoration of his victory over Antony and Cleopatra at Actium. Nicopolis Actia became the capital of the coastal region, encompassing Acarnania and southern Epirus (now Ípiros).

Nicosia, Greek LEVKOSÍA, Turkish LEFKOŞA, city and capital of the Republic of Cyprus. It lies along the Pedieos River, in the centre of the Mesaoria Plain between the Kyrenia Mountains (north) and the Troodos range (south). The city is also the archiepiscopal seat of the autocephalous (having the right to elect its own archbishop and bishops) Church of Cyprus.

Nicosia came successively under the control of the Byzantines (330–1191), the Lusignan kings (1192–1489), the Venetians (1489–1571), the Turks (1571–1878), and the British (1878–1960), and thus reflects the vicissitudes of Cypriot history and both Eastern and Western influences. Nicosia, known in antiquity as Ledra, is a medieval corruption of the Byzantine name Lefkosia. The city was a kingdom in the 7th century BC and has been a bishopric from the 4th century AD. It has been the seat of government of Cyprus since the 10th century. The city's walled fortifications, originally erected by the Lusignan kings and later rebuilt by the Venetians to encompass a smaller area (3 miles [5 km] round), did not prevent invasions by the Genoese in 1373, the Mamlūks in 1426, and the Turks in 1570. Standing in mute testimony to the religious and political changes of the city is the Cathedral of St. Sophia. Begun in 1209, completed in 1325, and pillaged by invaders, it was converted into the chief mosque of Cyprus in 1571. In 1954 its name was changed to the Selimiye Mosque in honour of the Ottoman sultan Selim II, under whose reign Cyprus was conquered.

During the 20th century the city boundaries were extended beyond the existing circular Venetian walls, and the old town within them was rebuilt. As a result of the Turkish intervention in 1974, part of the northern section of Nicosia, including the former international airport, has remained within the United Nations Forces in Cyprus operational boundary separating the Republic of Cyprus (south) from the Turkish Cypriot administered areas (north). The city also experienced an influx of an estimated 35,000 Greek Cypriot refugees from the north in the mid-1970s.

Nicosia's light industries, mainly serving the local market, include the manufacture and processing of cotton yarns and textiles, cigarettes, flour, confectionery, soft drinks, footwear, and clothing. Nicosia is connected by good roads with the other major towns of the island; a new international airport was established in 1974 at Larnaca, about 21 miles (34 km) southeast of Nicosia. The Cyprus Museum in the city houses many archaeological treasures. Most of the population in the surrounding area is engaged in agriculture, and crops produced include wheat, barley, vegetables, and fruits; goats and sheep are also raised. Pop. (1999 est.) 195,000.

Modern housing in Nicosia, Cyprus

Georg Gerster from Rapho/Photo Researchers—EB Inc.

nicotine, an organic compound that is the principal alkaloid of tobacco. (An alkaloid is one of a group of nitrogenous organic compounds that have marked physiological effects on humans.) Nicotine occurs throughout the tobacco plant and especially in the leaves. The compound constitutes about 5 percent of the plant by weight. Both the tobacco plant (*Nicotiana tabacum*) and the compound are named for Jean Nicot, a French ambassador to Portugal, who sent tobacco seeds to Paris in 1550.

Crude nicotine was known by 1571, and the compound was obtained in purified form in 1828; the correct molecular formula was established in 1843, and the first laboratory synthesis was reported in 1904. Nicotine is one of the few liquid alkaloids. In its pure state it is a colourless, odourless liquid with an oily consistency, but when exposed to light or air, it acquires a brown colour and gives off a strong odour of tobacco. Nicotine's chemical formula is $C_{10}H_{14}N_2$.

Nicotine is the chief addictive ingredient in the tobacco used in cigarettes, cigars, and snuff. In its psychoactive effects, nicotine is a unique substance with a biphasic effect; when inhaled in short puffs it has a stimulant effect, but when smoked in deep drags it can have a tranquilizing effect. This is why smoking can feel invigorating at some times and can seem to block stressful stimuli at others. Nicotine is also an addictive drug, though, and smokers characteristically display a strong tendency to relapse after having successfully stopped smoking for a time. When ingested in larger doses, nicotine is a highly toxic poison that causes vomiting and nausea, headaches, stomach pains, and, in severe cases, convulsions, paralysis, and death.

Nicotine is commercially obtained from tobacco scraps and is used as an insecticide and as a veterinary vermifuge. Nitric acid or other oxidizing agents convert it to nicotinic acid, or niacin, which is used as a food supplement.

nicotinic acid: *see* niacin.

Nicoya, Gulf of, Spanish GOLFO DE NICOYA, inlet that indents the west-central part of the Pacific coast of Costa Rica. The inlet extends northward and northwestward from Cape Blanco and Judas Point for about 50 miles (80 km). Cape Blanco, on the Nicoya Peninsula, and Judas Point, on the mainland, are about 25 miles (40 km) apart, but the gulf narrows to a width of approximately 15 miles (24 km) farther northward. The Tempisque, Abangares, and Tárcoles rivers empty into the gulf. It has several islands, most notably Chira, the largest, and San Lucas. The largest town and port of the many settlements on the shores of the gulf is Puntarenas, on the east.

Nicoya Peninsula, Spanish PENÍNSULA DE NICOYA, peninsula in western Costa Rica that is bounded on the west and south by the Pacific Ocean, on the northeast by the Cordillera de Guanacaste, and on the southeast by the Gulf of Nicoya. Costa Rica's largest peninsula, Nicoya measures about 85 miles (140 km) northwest–southeast and 40 to 60 miles (65 to 96 km) southwest–northeast. The base of the peninsula lies in the arid Guanacaste lowlands, but in the central and southern parts a range of mountains rises abruptly to over 3,000 feet (900 m). Descendants of the pre-Columbian Chorotega-Mangues Indians are still found in villages on the peninsula, but their original Mexican language has been totally replaced by Spanish. There is some mining of gold in the north. Nicoya, the principal town—as well as the other main villages on the peninsula—is linked by highway to Liberia, capital of Guanacaste province.

Niderviller ware, French faience (tin-glazed earthenware) and porcelain produced in the 18th and 19th centuries by a factory at Niderviller, in Lorraine. Production of the faience falls into three periods. In 1755–70, under the ownership of Baron de Beyerlé and the artistic directorship of his wife, the decoration was polychrome and made up of naturalistically rendered flowers, birds, and landscapes. In 1770–90, under Count de Custine, the decoration was inspired by the painter Nicolas Lancret. The Lanfrey period, 1790–1827, was the most original, producing trompe l'oeil wares.

Niderviller faience figures, c. 1775; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

The secret of the porcelain was introduced by a workman from Saxony, but when the town became part of France in 1766, its manufacture was forbidden because of royal edicts in favour of the Sèvres factory. The Count de Custine ignored the interdiction and resumed production in 1770. The decoration of Niderviller porcelain is, on the whole, the same as that of its faience.

Nidularium, genus of about 25 South American plants of the pineapple family (Bromeliaceae) that grow upon the branches of trees. Several species are cultivated indoors as decorative plants for their handsome foliage and colourful red, purplish, or white flowers.

The best-known *Nidularium* is the blushing bromeliad (*N. fulgens*), not to be confused with *Neoregelia carolinae,* which is also commonly known as blushing bromeliad. Both it and *Nidularium innocenti* have white flowers surrounded by bright red bracts.

Nidwalden, *demi-canton* ("half canton"), central Switzerland, formerly part of the canton of Unterwalden. Drained by the Engelberger Aa (river), it occupies the eastern part of former Unterwalden canton. Nidwalden means "below the forest" and refers to the great forest of Kerns that divided the two *demi-cantons* in the Middle Ages. Nidwalden was the first of the two *demi-cantons* to ally with Uri and Schwyz in the Everlasting League in 1291, the nucleus of the Swiss Confederation. It acted independently of Obwalden in its revolt against the Helvetic Republic in 1798 and in its refusal to accept the federal constitution of 1815. The latter action resulted in its loss of the abbey lands of Engelberg to Obwalden. A sovereign *demi-canton* since 1803, with its capital at Stans (*q.v.*), it is administratively independent of Obwalden. Nidwalden offers winter sports and tourist facilities along Lake Lucerne (Vierwaldstätter See). Most of the population is German speaking and Roman Catholic. Area 107 square miles (276 square km). Pop. (1994 est.) 35,393.

Niebuhr, Barthold Georg (b. Aug. 27, 1776, Copenhagen, Denmark—d. Jan. 31, 1831, Bonn, Prussia [Germany]), German historian who started a new era in historical studies by his method of source criticism; all subsequent historians are in some sense indebted to him.

Barthold Georg Niebuhr, detail from an engraving

Bavaria-Verlag

Niebuhr was the only son of the Danish explorer Carsten Niebuhr. Up to his matriculation at the University of Kiel he had a solitary education that perhaps intensified his leaning toward a life of scholarship. But on his father's advice he spent over a year in England and Scotland and then embarked on a career in state service, becoming private secretary to Count Schimmelmann, the Danish minister of finance, and in 1804 director of the national bank. In 1806, at the request of Baron von Stein, the Prussian chief minister, he took up a similar post in Prussia. Two years after Stein's fall (1808), however, disapproving of Prince von Hardenberg's policy, he resigned and became state historiographer. At the same time he became a member of the Berlin Academy of Sciences and was thereby empowered to lecture at the newly founded University of Berlin. In 1810 he began the series of lectures on Roman history that were the basis of his great book. In 1816 he went as Prussian ambassador to the Vatican, retiring to Bonn in 1823.

Niebuhr's *Römische Geschichte,* 3 vol. (1811–32; *History of Rome*) marked an era in the study of its special subject and had a momentous influence on the general conception of history. Although Niebuhr made particular contributions of value to learning (*e.g.,* his study of social and agrarian problems), some of his theories were extravagant and his conclusions mistaken. His permanent contribution to scholarship was his method. The failings of classical sources were already recognized, but it was Niebuhr who evolved what Johann Wolfgang von Goethe called *tätige Skepsis*—the "constructive skepticism" which is the root of a scientific method of criticism. It was Niebuhr who showed how to analyze the strata in a source, particularly poetical and mythical tradition, and how to discard the worthless and thereby lay bare the material from which the historical facts could be reconstructed. He thus laid the foundation for the great period of German historical scholarship.

Niebuhr, Carsten (b. March 17, 1733, Lüdingworth, Hanover [Germany]—d. April 26, 1815, Meldorf, Holstein), German traveler who was the sole survivor of the first scientific expedition to Arabia and the compiler of its results.

He learned surveying and in 1760 was invited to join the Arabian expedition being sent out by Frederick V of Denmark. The party visited the Nile, Mount Sinai, Suez, and Jidda, the port of Mecca, and then went overland to Mocha (al-Mukhā) in southwestern Arabia. The death of the expedition's philologist (May 1763) was followed by that of the naturalist in July. The remaining party members visited Ṣanʿāʾ, the capital of Yemen, and returned to Mocha. The group then sailed for Bombay, where the artist and the surgeon of the expedition died, leaving Niebuhr alone. He stayed 14 months in India and then turned homeward by way of Muscat (in southeastern Arabia), Persia, Mesopotamia, Cyprus, and Asia Minor, reaching Copenhagen in November 1767. He wrote *Beschreibung von Arabien* (1772; "Description of Arabia") and *Reisebeschreibung nach Arabien und andern umliegenden Ländern* (1774; *Travels Through Arabia*).

Niebuhr, Helmut Richard (b. Sept. 3, 1894, Wright City, Mo., U.S.—d. July 5, 1962, Greenfield, Mass.), American Protestant theologian and educator who was considered a leading authority on ethics and U.S. church history. He was a foremost advocate of theological existentialism.

The younger brother of the theologian Reinhold Niebuhr, Helmut was educated at Elmhurst (Ill.) College, Eden Theological Seminary (St. Louis, Mo.), Washington University, Yale Divinity School, and Yale University, where he was one of the first students to receive a Ph.D. in religion (1924). Ordained a pastor of the Evangelical and Reformed Church in 1916, he taught at Eden Theological Seminary (1919–22; 1927–31) and also served as president of Elmhurst College (1924–27). From 1931 he taught theology and Christian ethics at Yale Divinity School.

Influenced by Karl Barth, Søren Kierkegaard, and Ernst Troelsch, Niebuhr advocated historical criticism of religious beliefs, urging that church teachings be interpreted in a way to make them meaningful in contemporary culture. His views on theological existentialism allowed for relative interpretations of revelation and values within the framework of a monotheistic faith. Niebuhr argued that there is a correlation between religious belief and secular culture and that churches must account for the social context of their existence.

Among the most important works published by Niebuhr are *The Social Sources of Denominationalism* (1929), *The Kingdom of God in America* (1937), *The Meaning of Revelation* (1941), *The Purpose of the Church and Its Ministry* (1954), *Radical Monotheism and Western Culture* (1960), and *The Responsible Self* (1963).

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Niebuhr, Reinhold (b. June 21, 1892, Wright City, Mo., U.S.—d. June 1, 1971, Stockbridge, Mass.), American theologian who had extensive influence on political thought and whose criticism of the prevailing theological liberalism of the 1920s significantly affected the intellectual climate within American Protestantism. His exposure, as a pastor in Detroit, to the problems of American industrialism led him to join the Socialist Party for a time. A former pacifist, he actively persuaded Christians to support the war against Hitler and after World War II had considerable influence in the U.S. State Department. His most

Reinhold Niebuhr, 1963

By courtesy of the Rare Book Department, Union Theological Seminary Library, New York City

prominent theological work was *The Nature and Destiny of Man,* which was planned as a synthesis of the theology of the Reformation with the insights of the Renaissance.

Early life. Niebuhr was the son of Gustav and Lydia Niebuhr, who had emigrated to the United States at an early age from Germany. Gustav Niebuhr was a minister of the Evangelical Synod of North America, a denomination with a Lutheran and Reformed German background that merged into the Evangelical and Reformed Church in 1934 and is now a part of the United Church of Christ. At an early age Reinhold Niebuhr decided to emulate his father and become a minister. He graduated from his denomination's Elmhurst College, Illinois (1910), and Eden Theological Seminary, St. Louis, Mo. (1913), and completed his theological education at Yale University, receiving a bachelor of divinity degree (1914) and a master of arts (1915). He was ordained to the ministry of the Evangelical Synod in 1915.

Pastor and theologian. Niebuhr served as pastor of Bethel Evangelical Church in Detroit from 1915 to 1928. His earliest writings exhibit the religious liberalism and social idealism that pervaded the theological atmosphere of the time. But his experience in Detroit—and especially his exposure to the American automobile industry before labour was protected by unions and by social legislation—caused him to become a radical critic of capitalism and an advocate of socialism. His *Leaves from the Notebook of a Tamed Cynic* (1929) is an account of his years in Detroit. Niebuhr left the pastoral ministry in 1928 to teach at Union Theological Seminary in New York City, where he served as professor of applied Christianity (from 1930) and was a great intellectual and personal force until his retirement in 1960.

As a theologian Niebuhr is best known for his "Christian Realism," which emphasized the persistent roots of evil in human life. In his *Moral Man and Immoral Society* (1932) he stressed the egoism and the pride and hypocrisy of nations and classes. Later he saw these as ultimately the fruit of the insecurity and anxious overdefensiveness of man in his finiteness; here he located "original sin." He emphasized the tendency for sin—in the form of destructive pride—to appear on every level of human achievement, especially where claims to perfection were made, either in religious or political terms. His powerful polemics against liberal beliefs in assured progress and radical utopian hopes have caused a neglect of his more hopeful teaching concerning the image of God in all men that is never completely destroyed by sin and concerning "common grace" that is not dependent on recognized Christian redemption in personal or collective life. Also, he was himself a hopeful political activist and emphasized the good that could be achieved if pretentions were overcome. His outlook is well expressed in his statement that "the saints are tempted to continue to see that grace may abound, while sinners toil and sweat to make human relations a little more tolerable and slightly more just." He always had faith in what he called "indeterminate possibilities" for humanity in history as long as men did not deceive themselves into thinking that absolute solutions of historical problems were in their control. Though he did much to encourage the revival of the theology of the Reformation, with its emphasis on sin and grace—so-called Neo-orthodoxy—his salient theological work, *The Nature and Destiny of Man,* 2 vol. (1941–43), was planned by him as a synthesis both of the insights of the Reformation and of the Renaissance, with its hopefulness about cultural achievements.

His distance from the strongly Christocentric forms of Protestant Neo-orthodoxy can be seen in his unusual attitude toward the Jewish community. He was perhaps the first Christian theologian with ecumenical influence who developed a view of the relations between Christianity and Judaism that made it inappropriate for Christians to seek to convert Jews to their faith.

Political activist. His early political activities were influenced by his socialist convictions (he was a founder of the Fellowship of Socialist Christians), and he ran for office several times on the Socialist ticket. In the 1930s he broke with the Socialist Party over its pacifist or noninterventionist attitude in foreign policy, and in the 1940s he became a left-wing, anti-Communist Democrat. He was a founder and for a time chairman of the Americans for Democratic Action and he was vice chairman of the Liberal Party in the state of New York. In the 1930s he was much influenced by Marxist theory, but he rejected Marxist absolutism and both the tactics of Communists in the United States and Stalinism in the Soviet Union.

He did much to persuade Christians influenced by pacifism to support the war against Hitler. He himself had been a pacifist as a result of his revulsion against World War I, but during the 1930s he became the strongest theological opponent of any form of pacifism that claimed to have universally applicable nonviolent solutions of political problems. Identifying himself with the resistance to Hitler within Germany, he opposed a vindictive peace after World War II, and he had considerable influence with the policy planners in the U.S. State Department. He was a strong supporter of the United States' resistance to Soviet political expansion in Europe during the postwar years. His political activity ended during the early stage of the Cold War, but his later thought showed his capacity to transcend the outlook of that period. His book *The Irony of American History* (1952), while justifying American anti-Communist policies, gave much attention to criticism of American messianism and the American tendency to engage in self-righteous crusades. He always attacked American claims to special virtue. Early he favoured the recognition by the United States of Communist China, and he was an early opponent of American participation in the Vietnam War. He regarded as an error attempts to impose U.S. solutions on the new countries that emerged out of the colonial empires after World War II.

In addition to the works mentioned above, Niebuhr's writings include *Faith and History: A Comparison of Christian and Modern Views of History* (1949), a theological orientation; *The Self and the Dramas of History* (1955), probably his profoundest philosophical work; and *The Structure of Nations and Empires* (1959), his chief systematic discussion of international relations. Four volumes of essays, some of which are essential for understanding Niebuhr's thought and his influence on events, are *Christianity and Power Politics* (1940); *Christian Realism and Political Problems* (1953); *Pious and Secular America* (1958); and *Faith and Politics: A Commentary on Religious, Social, and Political Thought in a Technological Age,* ed. by Ronald H. Stone (1968). *Love and Justice,* ed. by D.B. Robertson (1957), is a collection of shorter writings showing Niebuhr's response to events; *Children of Light and Children of Darkness: A Vindication of Democracy and a Critique of Its Traditional Defence* (1944), a brief but comprehensive discussion of social ethics.

Niebuhr was an editor of *The World Tomorrow,* a religious pacifist and socialist journal; *Christianity and Crisis,* a biweekly with wide-ranging social and religious concerns; and a quarterly, now discontinued, first named *Radical Religion* and later *Christianity and Society.* He married Ursula M. Keppel-Compton in 1931. His wife was herself a teacher of religion at Barnard College in New York City, and they worked closely together. After 1952 Niebuhr's public activities were seriously limited as the result of a stroke, but he was able to continue much of his teaching and writing.

Assessment. Niebuhr's enormous influence on political thought, both inside and outside the church, caused Hans J. Morgenthau, an eminent political scientist, to say that Niebuhr was "the greatest living political philosopher of America." He was probably the most popular preacher in university chapels from the early 1920s to the early 1950s. Many contemporary Christians trace their conviction that Christianity makes sense to the influence of his preaching. He was not a specialized scholar in any field, including theology, but his broad learning and his original and incisive thought made him the subject of many theses and other scholarly writings, and he exercised a seminal influence on scholarship and thought in a variety of fields. (J.C.Be.)

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Articles are alphabetized word by word, not letter by letter

Niederbayern, English LOWER BAVARIA, *Regierungsbezirk* (administrative district), east-central Bavaria *Land* (state), southeastern Germany. Niederbayern is bordered by the Czech Republic to the northeast, Austria to the southeast, and the *Regierungsbezirke* of Oberbayern (Upper Bavaria) to the southwest and west and Oberpfalz (Upper Palatinate) to the north. Together with Oberbayern and Oberpfalz, the district comprises most of the historic region of Bavaria (*q.v.*). Its name is derived from that of the Baiuvarii, or Baiuwarii, a mixture of Germanic people who moved westward from Bohemia between AD 488 and 520, establishing their original settlement in the Danube River valley between modern Regensburg and Vilshofen. In 1180 when Otto of Wittelsbach gained control of the Bavarian lands, the duchy was bounded by the Bohemian Forest, the Alps, and the Inn and Lech rivers. The first division of the duchy into southwestern lands, afterward known as Upper Bavaria, and northeastern lands, or Lower Bavaria, was made in 1255 between the sons of Duke Otto II. Frequent changes of territorial boundaries followed, and in 1392 a threefold division of Bavaria took place, creating separate duchies centred at Ingolstadt, Landshut, and Munich. Landshut, which is located on the Isar River, rose to major importance as the residence of the dukes of Lower Bavaria, and today that city serves as the administrative seat of Niederbayern *Regierungsbezirk*.

Hops growing near Mainburg, in the Hallertau district, Niederbayern, Germany

Ulrich Hofmann—© Silvestris

The Danube River flows across central Niederbayern from the northwest border southeast to Passau, which is an important economic, cultural, and transportation centre situated at the confluence of the Danube, Inn, and Ilz rivers. The Inn River, joining the Danube from the southwest, forms the district's southeastern border with Austria. Along the southern bank of the Danube the Gäuboden plain, a fertile farm basin known as the granary of Bavaria, extends nearly 19 miles (30 km) in width. Here villages lie close to one another amid fields of sugar beets, wheat, barley, rye, and cabbage. Straubing serves as the major market centre for the region's agricultural goods and produces electrical equipment and beer.

Rising to the south of the Danube basin are the Lower Bavarian Uplands, a region comprising long ridges of hills broken by the Isar, Vils, and Rott rivers. Many small villages lie along the rivers, as well as the growing industrial cities of Landshut and Dingolfing. Electrical and mechanical engineering and the manufacture of automobiles and textiles are among the leading industries. The rural population of the uplands live in small hamlets or on individual farms scattered about the countryside. Wheat is the chief crop, and animal husbandry, particularly horse breeding, is also important. Immediately northwest of Landshut is the Hallertau district, Germany's largest hop-growing region.

North of the Danube River, the Bavarian Forest rises to merge with the Bohemian Forest along the district's eastern frontier with the Czech Republic. The landscape consists mainly of granite and gneiss hills covered with mixed woodland of spruce, silver fir, and beech. A number of larger mountain peaks rise above the hills, including the Grosser Arber with an elevation of 4,777 feet (1,456 m). Poor economic conditions have caused decades of depopulation in the forest region. Given its harsh climate and thin soils, small farms confined to the upland valleys produce only modest yields of rye, oats, and potatoes. In addition, the region's traditional stone, timber, ceramics, and glass industries have suffered from a loss of traditional market centres in central Europe since World War II. The tourist trade, however, is growing along the beautiful Bavarian Eastern Marches Highway and near such scenic attractions as the Bavarian Forest National Park, where more than 98 percent of the park's 51-square-mile (131-square-kilometre) area is tree-covered and many species of birds and small animals thrive.

The people of Niederbayern speak Bavarian, one of three principal German dialects in Bavaria. More than three-quarters of the population are Roman Catholics. Higher education in the *Regierungsbezirk* is centred at Passau University, which was founded in 1972. Bavaria's second largest popular folk festival, the Gäubodenfest, is celebrated during the month of August in Straubing. Area 3,989 square miles (10,331 square km). Pop. (1991 est.) 1,078,110.

Niedere Tauern, English LOWER TAUERN, range of the Eastern Alps in central Austria; lying between the Enns and Mur rivers, it extends 75 miles (120 km) westward to the headstreams of the two rivers. The scenic, well-forested mountains rise to their highest elevation at Hochgolling (9,393 feet [2,863 m]), and a road crosses the range at the Radstädter Tauern (pass; 5,705 feet). The range is divided into the Radstädter Tauern, Schladminger Tauern, and Rottenmanner Tauern. Summer resorts and winter-sports centres lie in the mountains, which are also noted for their cattle-grazing meadows.

Niederösterreich, English LOWER AUSTRIA, *Bundesland* (federal state), northeastern Austria. It is bordered by the Czech Republic on the north, Slovakia on the east, and by *Bundesländer* Burgenland on the southeast, Steiermark (Styria) on the south, and Oberösterreich (Upper Austria) on the west. Niederösterreich *Bundesland* surrounds but does not include Austria's largest city and national capital, Vienna, which is a separate administrative entity.

The *Bundesland* is roughly bisected by the Danube River, which flows from west to east through it. The borders of the state are demarcated by the mouths of the Enns River on the west and the March River on the east as they join the Danube River. Niederösterreich has an area of 7,403 square miles (19,174 square km).

The Waldviertel ("forest quarter") in the northwest, with deeply incised rivers, is part of the granite plateau called the Mühlviertel ("Mühl District") and extends southward to cross the Danube. The Weinviertel ("Wine District") in the northeast is low, hilly country with extensive loess soil cover and a favourable climate. The Vienna Basin, a lowland area lying immediately east of Vienna, contains Austria's richest and most productive farmland. Vienna itself is bordered on the west by the well-known Vienna Woods (Wienerwald). The southern part of the *Bundesland* includes parts of the Central Alps with heights exceeding 6,500 feet (1,980 m). Along the Danube and in the southeastern part of the state is a small but economically important Alpine foreland, a hilly, well-watered region with a productive agriculture.

There were prehistoric settlements in the Danube Gorge (Wachau), in the southeast, and in the Vienna Basin. Later, the area was part of the Roman province of Noricum and of Charlemagne's empire. The region was granted to the Bavarian Babenberg margraves in 976; the name Ostarichi (Eastern Region) dates from that period. A permanent administrative division between Upper and Lower Austria was made about 1450. Although the province's official name until 1918 was Österreich unter der Enns ("Austria Below the Enns"), it was popularly called Niederösterreich. An area near Gmünd was ceded to Czechoslovakia after World War I. Niederösterreich became a *Bundesland* in 1918, and in 1920 it lost Vienna, except as the seat of its administration. It was part of the Reichsgau Niederdonau (Lower Danube Reich District) during the *Anschluss,* or incorporation into Germany (1938–45). In 1938 Niederösterreich yielded land to Vienna; it regained *Bundesland* status in 1945 and recovered most of the lost area

Dürnstein, on the Danube River in the Danube Gorge, Niederösterreich, Austria; ruins of a 12th-century castle stand above the town

Eberhard Spaeth—© Silvestris

(309 square miles [800 square km]) in 1954 under a district reorganization law.

Most of the people are Roman Catholic, but there are small Protestant communities. Approximately half of all Austria's towns are located in Niederösterreich, the principal ones being Sankt Pölten, Wiener Neustadt, Klosterneuburg, Baden, Krems, Mödling, Schwechat, Amstetten, and Stockerau. Rural settlement in the state is characterized principally by villages and small farms of less than 12 acres (5 hectares).

Agriculture and forestry, once the mainstay of the state's economy, now support only about one-eighth of the working population; more than half of the land surface is used for farming, and more than one-third is forested. Wheat, rye, corn (maize), barley, potatoes, sugar beets, and fodder beets are grown in the Vienna Basin and in the Alpine foreland. There is extensive viticulture in the Weinviertel and the Danube Gorge, along the southern bank of the Danube east of Vienna, and on the slopes of the Vienna Basin; and fruit is grown in these areas and in the Alpine foreland. Livestock raising is widespread, with market gardening around Vienna.

Oil and natural gas are found in the northern Vienna Basin, and there are hydroelectric power stations at Ybbs-Persenbeug on the Danube and Sankt Pantaleon on the Enns. Gypsum is mined near Grünbach and graphite in the Wachau; limestone is quarried for a cement plant near Mannersdorf. Metal and textile industries, food processing, sugar refining, brewing, sawmilling, and paper, cellulose, and chemical factories are important. There are large rubber plants at Traiskirchen and Wimpassing.

The tourist trade is significant in the Alps, in various thermal spas in the state, and along the Danube River's gorge. The 18-mile- (30-kilometre-) long stretch of the Danube River valley between Melk and Krems, in the western portion of Niederösterreich, is particularly well known. Known as the Wachau, it is one of the most beautiful sections of the Danube's entire valley. Picturesque villages stand along the riverbank in the midst of terraced vineyards and orchards, while the ruins of fortified castles crown the crests of the gorge. The small town of Dürnstein, known as the "pearl of the Wachau," possesses perfectly preserved medieval and Baroque buildings and the ruins of a fortified castle that once held Richard I of England as a prisoner (1192–93).

River (Danube), rail, and road transport make the state a commercial throughway, and Vienna's airport at Schwechat is the largest in Austria. Pop. (1993 est.) 1,505,236.

Niedersachsen (state, Germany): *see* Lower Saxony.

Niel, Adolphe (b. Oct. 4, 1802, Muret, France—d. Aug. 13, 1869, Paris), French army officer and marshal who, as minister of war, made an unsuccessful attempt to reorganize the French army in 1868.

Niel was trained as an engineer and spent most of his life in military service after receiving his commission in 1825. In 1849 he distinguished himself in the French forces' capture of Rome from the republicans. Appointed a general of division in 1853, he twice commanded the engineers during the Crimean War. The next year he became an aide-de-camp to Napoleon III, and in 1857 he was made a senator. He went to Turin in January 1859 to help conclude the alliance between France and Sardinia-Piedmont, and in the ensuing war against Austria he played a decisive role in the Battle of Solferino, for which he was made a marshal the next day (June 25, 1859). After Niel was appointed minister of war on Jan. 18, 1867, he planned a radical reorganization of the French army, but he met with obstruction and did not live long enough to put his program into effect.

niello, black metallic alloy of sulfur with silver, copper, or lead that is used to fill designs that have been engraved on the surface of a metal (usually silver) object. Niello is made by fusing together silver, copper, and lead and then mixing the molten alloy with sulfur. The resulting black-coloured sulfides are powdered, and after the engraved metal, usually silver, has been moistened with a flux, some of the powder is spread on it and the metal strongly heated; the niello melts and runs into the engraved channels. The excess niello is then removed by scraping until the filled channels are clearly visible, and finally the surface is polished. The contrast of the black niello against the bright silver surface produces an attractive decorative effect.

"Coronation of the Virgin," sulfur cast of an engraving for niello, Italian, *c.* 1459–64; in the British Museum

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Objects decorated with niello, called nielli, are usually small in scale. During the Renaissance, at the height of its popularity, the technique was widely used for the embellishment of liturgical objects and for the decoration of such utilitarian objects as cups, boxes, knife handles, and belt buckles. Before filling in the incised design with niello, Renaissance metalsmiths commonly made a record of the design by making a sulfur cast of the engraved metal plate or by taking its impression on paper.

Nielli were produced by the ancient Romans, and the ring of King Aethelwulf (839–858) in the British Museum demonstrates that the technique was well established in England at an early date. The art of niello reached its peak in 15th-century Italy in the workshop of the Florentine goldsmith Maso Finiguerra. Russian goldsmiths working in Tula in the late 18th century revived the craft, and niello work came to be known in Russia as Tula work. Fine quality niello is still being produced in India and the Balkans.

nielsbohrium: *see* unnilpentium.

Nielsen, A.C., in full ARTHUR CHARLES NIELSEN (b. Sept. 5, 1897, Chicago, Ill., U.S.—d. June 1, 1980, Chicago), American market-research engineer and business executive, best known for the "Nielsen ratings," which offer a national rating of television viewing.

Nielsen's parents were both accountants, and he acquired mathematical interests at an early age. In 1918 he graduated from the University of Wisconsin and then worked briefly as an engineer. In 1923, with the financial backing of his fraternity brothers, he founded A.C. Nielsen Co., which eventually became the largest market-research concern in the world. In the early years the company had difficulties, almost going bankrupt twice, but it finally established a business foothold by analyzing retail food and drug sales, which thereafter remained the company's largest and most profitable operation. A.C. Nielsen Co. entered the radio program rating field in 1942 but became best known to the general public for its television rating service, which from 1950 gauged the popularity of television shows.

The rating system was based on a sampling of more than 1,000 television homes scattered around the United States. Each member of the sample had a small box, called an Audimeter, attached to the set, which recorded when the set was on and what channel was tuned in. These data were relayed to a computer centre, which also collected data from viewing diaries kept by a smaller sampling of households. Based on such information, the Nielsen raters projected a total audience for each program, as well as the age and sex of the viewers. A Nielsen rating of 20 denotes that 20 percent of all American households equipped with a television tuned in to a program. A "share," by contrast, denotes what percentage of all the viewers watching television at a particular time tuned in to a particular program; a 30 share means that 30 percent of the viewing audience watched that program.

Nielsen, Carl, in full CARL AUGUST NIELSEN (b. June 9, 1865, Sortelung, near Norre Lyndelse, Den.—d. Oct. 3, 1931, Copenhagen), violinist, conductor, and Denmark's foremost composer, particularly admired as a symphonist.

Nielsen studied at the Royal Conservatory in Copenhagen from 1884 to 1886. He was a violinist in the court orchestra at Copenhagen intermittently from 1886 to 1905. He subsequently served as Kapellmeister at the Royal Theatre (1908–14) and conductor of the Copenhagen Musical Society (1915–27), and from 1915 he taught at the Royal Conservatory, where he became director in 1931, shortly before his death.

Romanticism influenced Nielsen's early music, but his later style is a powerful fusion of chromatic and often dissonant harmony, solid contrapuntal structure, concentrated motivic treatment, and bold extensions of tonality with frequent polytonal passages. His six symphonies, written between 1890 and 1925, are forceful works that feature decisively articulated tonal progressions. The best known of these symphonies are the second, called *The Four Temperaments* (1902), the third, called *Sinfonia Espansiva* (1911), and the fourth, *The Inextinguishable* (1916). He also wrote three concertos—for violin, for flute, and for clarinet; the operas *Saul og David* (1902) and *Maskarade* (1906); four string quartets, two quintets, and choral and keyboard works. His songs based on Danish folk traditions are particularly highly regarded.

Nielsen, Morten (b. Jan. 3, 1922, Ålborg, Den.—d. Aug. 29, 1944, Copenhagen), Danish poet who became the symbol of his generation's desire for freedom and who was killed as a result of his participation in the organized Danish resistance to the German occupation during World War II.

Nielsen was only 22 when he was killed, but the role he played in Denmark was that not of a martyr or agitator but of a poet. He had been able to express, in well-formed verse, matters that were engaging the minds of his generation and his fellow countrymen. In contrast to most of the poetry of the occupation, Nielsen's verse is still read in Denmark.

A large edition of the collected poems was published 10 years after his death.

Niemann-Pick disease, inherited metabolic disorder in which a deficiency of the enzyme sphingomyelinase impairs the breakdown of the phospholipids lecithin and sphingomyelin, causing them to accumulate in various body tissues. Symptoms consist of extreme liver and spleen enlargement, mental retardation, and a brownish-yellow skin discoloration; foamy cells containing phospholipids are found in several organs.

There are five distinct varieties of the disease, the most common of which is the acute infantile form (type A). Affected infants are retarded in growth; they lose weight and undergo a decline in mental and neurologic functions, usually dying by age four. In the chronic visceral form (type B), development is normal for several years until poor muscle coordination and liver enlargement become apparent; there are no mental or other neurologic symptoms. Type C, which appears in adolescence, is similar to the acute infantile form, as is type D, which is found among a small group of people whose common ancestry is traced to Nova Scotia. The rare adult form (type E) resembles chronic visceral disease, but symptoms leading to diagnosis do not become apparent until adulthood.

Niembsch, Nikolaus Franz: *see* Lenau, Nikolaus.

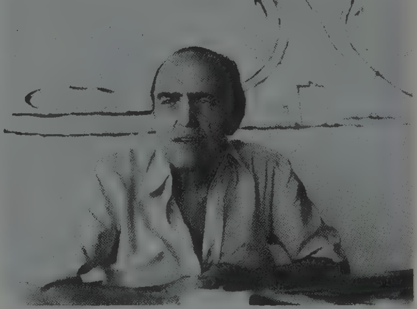
Niemcewicz, lithograph by François le Villain after a portrait by Fabian Sarnecki

By courtesy of the Muzeum Narodowe, Krakow, Pol.

Niemcewicz, Julian Ursyn (b. Feb. 6, 1757/58, Skoki, Pol.—d. May 21, 1841, Paris), Polish playwright, poet, novelist, and translator whose writings, inspired by patriotism and concern for social and governmental reform, reflect the turbulent political events of his day. He was the first Polish writer to know English literature thoroughly; he translated works of such authors as John Dryden, John Milton, Alexander Pope, and Samuel Johnson during a period of imprisonment in 1794–96 and introduced the historical novel to Poland, his *Jan z Tęczyna,* 3 vol. (1825; "Jan of Tęczyn") being influenced by the Scottish novelist Sir Walter Scott.

Educated in the Warsaw cadet corps between 1770 and 1777, Niemcewicz spent most of the period 1783–88 in western Europe and in 1788 was elected deputy to the Sejm (parliament) of Poland. In 1790 he wrote *Powrót Posła* ("The Deputy's Return"), a political comedy very popular in its day. After participating in the unsuccessful insurrection of 1794, he was captured at Maciejowice and imprisoned in St. Petersburg for two years. Upon his release, he travelled to England and then to the United States, where he married and remained until 1807, when he returned to Poland. Until 1831 he devoted himself to literary work, publishing *Śpiewy historyczne* (1816; "Historical Songs"), a series of simple song poems that became very popular, and *Lebje i Sïora* (1821; "Leybe and Syora"), the first Polish novel to discuss the Jewish problem. In 1831 Niemcewicz journeyed to England to attempt to persuade the western European powers to intervene on behalf of the Polish insurrection against the Russians. He failed to do so, however, and spent the last years of his life in Paris, campaigning for Polish freedom. His memoirs appeared in 1848.

Niemeyer (Soares Filho), Oscar (b. Dec. 15, 1907, Rio de Janeiro), Brazilian architect and early exponent of modern architecture in Latin America, particularly noted for his work on Brasília, the new capital of Brazil.



Niemeyer, 1972

Claus C. Meyer—Black Star/EB Inc.

Niemeyer studied architecture at the National School of Fine Arts, Rio de Janeiro. Shortly before his graduation in 1934, he entered the office of Lúcio Costa, a leader of the modern movement in Brazilian architecture. He worked with Costa from 1937 to 1943 on the design for the Ministry of Education and Health building, considered by many to be the first modern architectural masterpiece in Brazil. Le Corbusier, the Swiss-born French architect, was a consultant on the building, which shows his influence. Niemeyer also worked with Costa on the designs for the Brazilian Pavilion for the New York World's Fair of 1939–40. The plan for Pampulha, a new suburb of Belo Horizonte, was Niemeyer's first major project on his own. The project, commissioned in 1941 by Juscelino Kubitschek de Oliveira, then mayor of Belo Horizonte, is notable for the free-flowing forms used in many of its buildings. Other commissions followed, and in 1947 Niemeyer represented Brazil in the planning of the United Nations buildings in New York City.

Following his election to the presidency of Brazil in 1956, Kubitschek asked Niemeyer to design the new capital city of Brasília. Niemeyer agreed to design the government buildings but suggested a national competition for the master plan, a competition subsequently won by his mentor, Lúcio Costa. Niemeyer served as chief architect for NOVACAP, the government building authority in Brasília, from 1956 to 1961. Among the Brasília buildings designed by Niemeyer are the President's Palace, the Brasília Palace Hotel, the presidential chapel, and the cathedral. In 1961 Niemeyer returned to private practice and lived in Paris and Israel. In 1966 he designed an urban area in Grasse, near Nice, Fr., and a building for the French Communist Party in Paris. From 1968 he lectured at the University of Rio de Janeiro.

Niemeyer's other architectural projects included the Ministry of Defense building in Brasília in 1968 and the National Party Headquarters in Algiers in 1976. He was the recipient of many international architectural awards and received the Lenin Peace Prize in 1963.

Niemöller, (Friedrich Gustav Emil) Martin (b. Jan. 14, 1892, Lippstadt, Ger.—d. March 6, 1984, Wiesbaden, W.Ger.), prominent German anti-Nazi theologian and pastor, founder of the Bekennende Kirche (Confessing Church) and a president of the World Council of Churches.

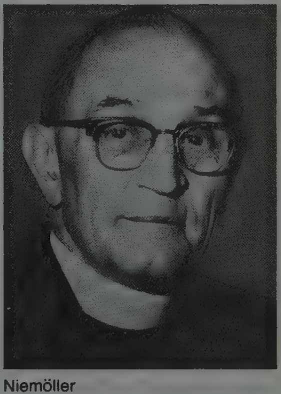
The son of a pastor, Niemöller was a naval officer and commander of a German U-boat in World War I before beginning theological studies at Münster.

In 1931 Niemöller became a pastor in Dahlem, a fashionable suburb of Berlin. Two years later, as a protest against interference in church affairs by the National Socialists (Nazi Party), Niemöller founded the Pfarrernotbund (Pastors' Emergency League). The group, among its other activities, helped combat rising discrimination against Christians of Jewish background. As founder and a leading member of the Confessing Church, within the larger Evangelical Church (Lutheran and Reformed) of Germany, Niemöller was influential in building opposition to Adolf Hitler's efforts to bring the German churches under control of the Nazis and the "Deutschen Christen" ("German Christians"). The resistance of the Confessing Church was openly declared and solidified at its Synod of Barmen in 1934. Niemöller continued to preach throughout Germany and in 1937 was arrested by Hitler's police, the Gestapo. Eventually sent to Sachsenhausen and then to Dachau concentration camps, he was moved in 1945 to the Tirol, where Allied forces freed him at the end of World War II. He helped rebuild the Evangelical Church, in 1945 becoming head of its foreign-relations office, in 1948 becoming a member of the Council of the Church, and from 1947 until 1964 serving as president of the Hesse-Nassau regional church.

Because of his experiences in the Hitler era, Niemöller became convinced of the collective guilt of the Germans and was responsible to a large extent for the Evangelical Church's declaration of such in 1945 with the "Stuttgarter Schuldbekenntnis" ("Stuttgart Confession of Guilt"). In 1961 he was elected one of the six presidents of the World Council of Churches, a position that he held until 1968.

Increasingly disillusioned with the prospects for demilitarization, both in his own country and in the world, Niemöller became a controversial pacifist. Lecturing widely, he spoke freely in favour of international reconciliation and against armaments. He stood up against the Western orientation of the Federal Republic of Germany, fought against the nuclear arms race, and sought contact with Eastern bloc countries. He travelled in 1952 to Moscow and in 1967 to North Vietnam. His writings include several volumes of sermons and an autobiography, *Vom U-Boot zur Kanzel* (1934; *From U-Boat to Pulpit*). His life is recorded in D. Schmidt's *Pastor Niemöller* (Eng. trans., 1959), and in C. Start-Davidson's *God's Man* (1959).

In recognition of his struggle in the interest of world peace, Niemöller received the Lenin Peace Prize in 1967 and the Grand Cross



Niemöller

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of Merit, West Germany's highest honour, in 1971.

Nien-ch'ing-t'ang-ku-la Mountains, Wade–Giles romanization NIEN-CH'ING-T'ANG-KU-LA SHAN, Pinyin NIANCHINGTANGGULA SHAN, mountain range forming the eastern section of a mountain system in the southern part of the Tibet Autonomous Region, China. In the west the system comprises a northern range, the A-ling Mountains, and a southern range, the Kailas Range, which is much more rugged and heavily glaciated, though its highest peak, at 22,031 feet (6,715 m), is lower than peaks of the A-ling Mountains. East of about longitude 88° E the two chains unite in the Nien-ch'ing-t'ang-kula Mountains proper, often called the Trans-Himalaya, which form a high watershed between the Ya-lu-tsang-pu River valley of southern Tibet and the area of inland drainage and salt lakes on the high plateau.

Southern slopes of the range are very rugged; many sections are above 20,000 feet (6,100 m), with some individual peaks well above 23,000 feet (7,000 m) in the area northwest of Lhasa, the capital of the Tibet Autonomous Region. The southern slopes also are comparatively well watered, and the natural environment is clearly divided into vertical zones, rich in grasses and shrubs affording good mountain pastures. The slopes drain into the Ya-lu-tsang-pu (Tsangpo) River, the Chinese name for the Brahmaputra. In the west, the northern slopes of the range form part of the interior drainage of the southeastern area of the Ch'iang-t'ang basin and are generally dry and covered with hardy grasses; at the eastern end of the range the northern slopes drain into the upper headwaters of the Salween River and have a much richer cover of alpine grasses. The main route across the range crosses the Shang-shung Pass between Yang-pa-ching and Hei-ho. This carries the main road from Lhasa north to the Tsaidam Basin and to the Sinkiang Uighur Autonomous Region.

nien-hao, English REIGN NAME, or ERA NAME, system of dating that was adopted by the Chinese in 163 BC. The *nien-hao* system was introduced by Emperor Wen-ti (reigned 180/179–157/156 BC) of the Western Han, and every emperor thereafter gave his reign a *nien-hao* at the beginning of his accession (sometimes a new *nien-hao* was assigned on the basis of signs of a particularly auspicious or ominous nature or on special occasions). The *nien-hao* system persisted until and informally for some years after the establishment of the republic in 1911, which was considered year one of a new period in the *nien-hao* manner. In 1949, upon the founding of the People's Republic of China, the Gregorian calendar was adopted.

Nien Rebellion (*c.* 1852–68), major revolt in the North China provinces of Shantung, Honan, Kiangsu, and Anhwei; it occurred when the Ch'ing dynasty was preoccupied with the great Taiping Rebellion (1850–64) in South and central China. An offshoot of the Buddhist-inspired White Lotus secret societies, the Nien were motley bands of peasants, army deserters, and salt smugglers who had fomented sporadic outbreaks since the first decade of the 19th century. Oppressed by famine resulting from flooding during the 1850s and stimulated by government preoccupation with the Taiping, several Nien bands formed a coalition under the leadership of Chang Lo-hsing in 1852–53 and began to expand rapidly.

Numbering from 30,000 to 50,000 soldiers and organized into five armies, they began to conduct raids into adjacent regions. In 1863 they received a setback when their citadel, Chih-ho, was captured and Chang Lo-hsing was killed. But they soon reorganized, and in 1864 they were joined by those Taiping soldiers not defeated in the fall of the Taiping capital at Nanking that same year. They began to adopt guerrilla hit-and-run tactics, using mobile mounted units to strike at the weak points of the Ch'ing armies and then retreating into strategic hamlets.

But, with the government free from problems with the Taiping, it began to concentrate on the Nien and adopted a strategy of blockade. The rebels were gradually trapped and defeated.

Nienhuys, Jacobus (b. July 15, 1836, Rhenen, Neth.—d. July 27, 1927, Bloemendaal), Dutch businessman and planter, who was responsible for establishing the tobacco industry in Sumatra (now part of Indonesia).

Nienhuys went to Sumatra in 1863 in hopes of purchasing tobacco as a middleman but found production there insufficient for commercial exploitation. To increase the output he imported Chinese labour from Singapore and began cultivating tobacco around what is now the Medan area. The leaves produced there were of exceptionally high quality and were normally used as wrappers for cigars. Originally only a single crop of tobacco was raised on a piece of ground, in the belief that it permanently sapped the fertility of the soil. Later it was discovered that eight fallow years were sufficient to restore soil fertility, and plots of land began to be reused.

Nienhuys in 1869 established the Deli Company, dealing in tropical produce, and returned to The Netherlands the following year for reasons of health. From 1880 until his death he was commissioner for the company.

Niepce, (Joseph-)Nicéphore (b. March 7, 1765, Chalon-sur-Saône, Fr.—d. July 5, 1833, Chalon-sur-Saône), French inventor who was the first to make a permanent photographic image.

The son of a wealthy family suspected of royalist sympathies, Niepce fled the French Revolution but returned to serve in the French army under Napoleon Bonaparte. Dismissed because of ill health, he settled near his native town of Chalon-sur-Saône, where he remained engaged in research for the rest of his life.

In 1807 he and his brother Claude invented an internal-combustion engine, which they called the Pyréolophore, explaining that the word was derived from a combination of the Greek words for "fire," "wind," and "I produce." Working on a piston-and-cylinder system similar to 20th-century gasoline-powered engines, the Pyréolophore initially used lycopodium powder for fuel, and Niepce claimed to have used it to power a boat.

When lithography became a fashionable hobby in France in 1813, Niepce began to experiment with the then-novel printing technique. Unskilled in drawing, and unable to obtain proper lithographic stone locally, he sought a way to provide images automatically. He coated pewter with various light-sensitive substances in an effort to copy superimposed engravings in sunlight. From this he progressed in April 1816 to attempts at photography, which he called heliography (sundrawing), with a camera. He recorded a view from his workroom window on paper sensitized with silver chloride but was only partially able to fix the image. Next he tried various types of supports for the light-sensitive material bitumen of Judea, a kind of asphalt, which hardens on exposure to light. Using this material he succeeded in 1822 in obtaining a photographic copy of an engraving superimposed on glass. In 1826/27, using a camera, he made a view from his workroom on a pewter plate, this being the first permanently fixed image from nature. Metal had the advantage of being unbreakable and was better suited to the subsequent etching process to produce a printing plate, which was Niepce's final aim. This photograph is now in the Gernsheim Collection, University of Texas, Austin. In 1826, he had produced another heliograph, a reproduction of an engraved portrait, which was etched by the Parisian engraver Augustin-François Lemaître, who pulled two prints. Thus Niepce not only solved the problem of reproducing nature by light, but he invented the first photomechanical reproduction process.

While on a visit to England in 1827, he addressed a memorandum on his invention to the Royal Society, London, but his insistence on keeping the method secret prevented the matter from being investigated.

Unable to reduce the very long exposure times by either chemical or optical means, Niepce in 1829 finally gave in to the repeated overtures of Louis-Jacques-Mandé Daguerre, a Parisian painter, for a partnership to perfect and exploit heliography. Niepce died without seeing any further advance, but, building on his knowledge, and working with his materials, Daguerre eventually succeeded in greatly reducing the exposure time through his discovery of a chemical process for development of (making visible) the latent (invisible) image formed upon brief exposure.

Nietzsche, Friedrich (b. Oct. 15, 1844, Röcken, Saxony, Prussia [now in East Germany]—d. Aug. 25, 1900, Weimar, Thuringian States), German classical scholar, philosopher, and critic of culture, an impassioned critic of the ethos of his time, especially of Christianity, conformism, and nationalism.

A brief account of Friedrich Nietzsche follows. For full treatment, *see* MACROPAEDIA: Nietzsche.

Nietzsche studied classical philology at Bonn and Leipzig (1864–68) and became a Swiss subject and a professor of classics at Basel, Switz. (1869). He served as a medical orderly for a brief time during the Franco-German War, but his health was so bad that he soon returned to Basel. There he wrote *The Birth of Tragedy* (1872), which contains his well-known Apollonian-Dionysian dichotomy. He resigned from the university permanently in 1879.

During the 10 years following his retirement, Nietzsche turned out such important works as *Thus Spake Zarathustra* (first three parts published 1883–84), *Beyond Good and Evil* (1886), and *On the Genealogy of Morals* (1887). When living in Switzerland, Nietzsche had been a friend and admirer of the composer Richard Wagner. With the passing of time, however, their philosophies diverged, and a formal break was made in 1878. Nietzsche published *The Case of Wagner* in 1888, the same year that Georg Brandes began lecturing on Nietzsche at the University of Copenhagen. Brandes' lectures were the first significant public notice of Nietzsche's works and thought. In 1889 Nietzsche suffered a breakdown and spent about a year in an asylum; he was thereafter attended by his mother and later his sister.

After his death, his sister Elisabeth secured the rights to his literary remains and edited them for publication without scruple or understanding. While she gained a wide audience for her misinterpretations, she withheld his own self-interpretation, *Ecce Homo,* until 1908.

Nieuw Nickerie, port, northwestern Suriname. It lies on the Nickerie River, near the mouth of the Courantyne (Dutch Corantijn) River, 3 miles (5 km) from the Atlantic coast. Rice is the principal crop grown in the area, and cocoa, baboen lumber, and balata, used in making golf balls, are other exports. Small oceangoing vessels can reach the port, and there is regular service to Paramaribo, the capital of Suriname, about 150 miles (240 km) to the east, to which Nieuw Nickerie is also linked by road. Pop. (1980 prelim.) 6,078.

Nieuwland, Julius Arthur (b. Feb. 14, 1878, Hansbeke, Belg.—d. June 11, 1936, Washington, D.C., U.S.), Belgian-born American chemist whose studies of acetylene culminated in the discovery of lewisite, a chemical-warfare agent, and neoprene, the first commercially successful synthetic rubber.

Nieuwland, emigrating with his parents to the United States in 1880, graduated in 1899 from the University of Notre Dame, Ind. Ordained a Roman Catholic priest in 1903, he studied botany and chemistry at the Catholic University of America, Washington, D.C., receiving a Ph.D. in 1904. Returning to Notre Dame, he was professor of botany from 1904 to 1918 and professor of organic chemistry from 1918 to 1936. His doctoral research concerned the chemistry of acetylene, a lifelong interest. Early in his studies he discovered dichloro(2-chlorovinyl)arsine, but, because of its highly poisonous properties, he suspended all research on it. Later known as lewisite, this compound was developed as a chemical weapon but was never used.

In 1920 Nieuwland discovered that acetylene could be polymerized (its molecules combined to form giant molecules) to produce divinylacetylene, a substance similar to rubber. Eleven years later, a group of chemists working under Wallace H. Carothers at E.I. du Pont de Nemours & Company succeeded in modifying Nieuwland's polymerization procedure to produce neoprene.

Nieuwpoort (Flemish), French NIEUPORT, municipality, West Flanders province, western Belgium, on the Yser (IJzer) River. Established in the 12th century as a new port for Ypres (replacing Lombardsijde), it was besieged 10 times after it was first fortified in 1163. The scene of a Dutch victory over the Spanish in 1600, it was the key to the defense of the Ypres salient in World War I. Its six sluices flooded the entire area, halting the German advance and completely destroying the town, which was rebuilt after 1918. An important port for fishing and oyster culture, it is in a coastal resort region. The North Sea resort of Nieuwpoort-Bad is 2 miles (3 km) northwest. Pop. (1992 est.) mun., 9,718.

Nièvre, *département,* Bourgogne *région,* central France, created from the historic province of Nivernais and a small part of Orléanais. Its area includes the mountainous, forested Morvan in the east, the hilly, wooded Nivernais plateau in the centre, and the valley of the Loire River in the west. The terrain attains elevations of more than 2,600 feet (800 m) in the Morvan and 1,400 feet (430 m) in the centre. The lowest parts, 460 feet (140 m), are in the Sologne region in the northwest between the Loire and the Vrille, which form the western boundary. The Loire River enters in the south, passes through the ancient town of Decize, where it is joined by the Aron, and through Nevers, the capital, where it receives the Nièvre, a small tributary for which the *département* is named. Southwest of Nevers, the Loire is joined by the Allier and flows north before entering Loiret *département.*

In the Morvan the climate is variable, with early winters and hot summers, while on the Nivernais plateau it is continental and in the Loire valley mild. The *département* is predominantly agricultural—cattle, sheep, cereals, and forestry. Some industry, including metallurgical and chemical works, is found in the Nevers region and in Clamecy and Decize. The white wines of Pouilly-sur-Loire have good standing in France.

The view across the Loire of the town of La Charité, with its Romanesque abbey church, its 16th-century stone bridge, and its ramparts, is one of the most delightful in central France. The old towns of Château-Chinon and Clamecy, in the Morvan mountains on the Yonne River, are popular tourist attractions. The *département* is divided into the *arrondissements* of Nevers, Château-Chinon, Clamecy, and Cosne-Cours-sur-Loire. It is in the educational division of Dijon. Area 2,632 square miles (6,817 square km). Pop. (1993 est.) 230,800.

Niffer (ancient Mesopotamian city): *see* Nippur.

Niflheim, Old Norse NIFLHEIMR, in Norse mythology, the cold, dark, misty world of the dead, ruled by the goddess Hel. In some accounts it was the last of nine worlds, a place into which evil men passed after reaching the region of death (Hel). Situated below one of the roots of the world tree, Yggdrasill, Niflheim contained a well, Hvergelmir, from which many rivers flowed. In the Norse creation story, Niflheim was the misty region north of the void (Ginnungagap) in which the world was created.

Nifo, Agostino, Latin AUGUSTINUS NIPHUS, or NIPHUS SUESSANUS, Niphus also spelled NYPHUS (b. *c.* 1473, Sessa, Kingdom of Naples [Italy]—d. after 1538, possibly Salerno), Renaissance philosopher noted for his development from an anti-Christian interpreter of Aristotelian philosophy into an influential Christian apologist for the immortality of the individual soul.

While attending the University of Padua about 1490, Nifo studied the Averroist Aristotelianism of Nicoletto Vernia and Siger of Brabant. This philosophical school interpreted Aristotle according to the principles of the 12th-century Arab philosopher and physician Averroës and that emphasized the eternity of the world and an immortal, universal intellect subsuming the souls of all individuals at death. Nifo expressed such teaching in his *De intellectu et daemonibus* (1492; "On the Intellect and Demons"). Later, however, he made a critical edition of Averroës' commentaries on Aristotle with conclusions more open to Christian doctrine, in the manner of Siger of Brabant.

After succeeding the strict Averroist Pietro Pomponazzi in the chair of philosophy at Padua in 1496, Nifo resigned when Pomponazzi returned. He then assumed teaching posts successively at Naples, Rome, and Salerno. Through the Neoplatonic influence of the Florentine school, he adapted his Aristotelianism to the 13th-century Christian synthesis of St. Thomas Aquinas. Consequently, at the request of Pope Leo X, he wrote *Tractatus de immortalitate animae contra Pomponatium* (1518; "Treatise on the Immortality of the Soul Against Pomponazzi") as a refutation of Pomponazzi's view that the human soul is essentially a material organism dissolving at death. Nifo argued, in a polemic that amounted to a personal attack, that Pomponazzi had neglected to consider the intrinsic relation between the nonmaterial idea and the intellectual power able to communicate it, thus making the soul something more than a bodily organism. The success of this work earned Nifo in 1520 the title of count.

Named as professor at the University of Pisa, Nifo by 1523 had published a plagiarized version of Niccolò Machiavelli's treatise on the ethics of ruling, *Il principe* (1513; "The Prince"), under the title *De regnandi peritia* ("On Skill in Governing"). This action has prompted some commentators to judge that by this time Nifo had exchanged his intellectual interests for those of a time-serving courtier.

Niğde, city, south-central Turkey; it lies at an elevation of 4,100 feet (1,250 m) below a hill crowned by a ruined 11th-century Seljuq fortress on the road between Kayseri and the Cilician Gates, north-northwest of Adana. The city is thought by some historians to be on the site of Nakida, mentioned in Hittite texts. After the decline of ancient Tyana (10th century), Niğde and nearby Bor emerged as the towns controlling the mountain pass, a vital link on the northern trade route from Cilicia to inner Anatolia and Sinope (modern Sinop) on the Black Sea coast. A prosperous and important city of the Seljuq Sultanate of Rūm, Niğde by 1333 was, nevertheless, in ruins (probably because of the wars between the Mongols and Karaman, a Turkmen principality that succeeded the Sultanate of Rūm) when the North African traveler Ibn Baṭṭūṭah visited there. Thereafter it changed hands among the Turkmen principalities of Eretna, Karaman, and Burhanettin before its absorption into the Ottoman Empire in the second half of the 15th century.

Niğde, Tur.

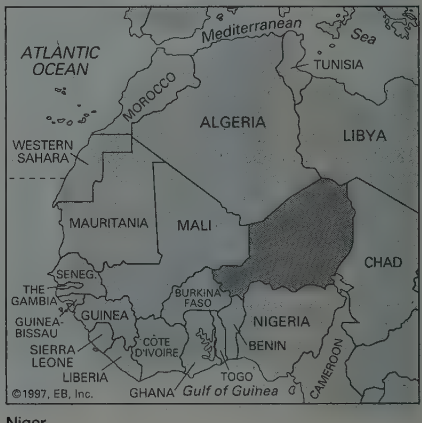
Farrell Grehan—Photo Researchers

Niğde has many medieval (Seljuq as well as Ottoman) buildings, including the Alâeddin Mosque (13th century); Sungur Bey Mosque (14th century), built by the Mongol chief; and Diş Mosque (16th century). The octagonal Hudavend Mausoleum dates from 1312. The Ak Madrasah (1409), a former religious school, now houses the regional museum of antiquities.

Industries include flour milling and wine making and the manufacture of cement, textiles, and tools. The city is linked by rail with the principal urban centres of Turkey.

The surrounding region is semiarid steppe country bounded on the south by the high ranges of the Taurus Mountains and on the northwest by the massive volcanic Melendiz Mountain. Soils are fertile when irrigated, producing potatoes, onions, rye, fruits, and raisins. Stock raising is important. Angora goats are raised for mohair. The region's mineral deposits include lignite and antimony. Pop. (1990 prelim.) 54,822.

Niger, officially REPUBLIC OF NIGER, French RÉPUBLIQUE DU NIGER, landlocked country of western Africa, covering an area of 458,075 square miles (1,186,408 square km). The cap-



Niger

ital is Niamey. Lying on the southern edge of the Sahara (desert), Niger is bounded on the northwest by Algeria, on the northeast by Libya, on the east by Chad, on the south by Nigeria and Benin, and on the west by Burkina Faso (formerly Upper Volta) and Mali. Pop. (1993 est.) 8,516,000.

A brief treatment of Niger follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Niger is dominated by arid highlands in the north and by the Aïr Massif, a highland rising to about 5,900 feet (1,800 m). The massif consists of a range trending north-south in the centre of the country. The highest point in the country is Mount Gréboun, which reaches an elevation of 6,379 feet (1,944 m). To the northeast is a series of high plateaus that form a bridge between the Ahaggar Mountains of Algeria and the Tibesti Mountains of Chad. The sandy regions of the Nigerian Sahara extend to either side of the Aïr Massif. The lower plateaus of the south, along the Niger River and eastward along the southern border with Nigeria, comprise (west to east) the Djerma region, the central Adar Hill and Majia areas, and to the east the Damagarim, Mounio, and Koutous regions. The Lake Chad basin lies in the extreme southeast.

The Niger River basin, lying in the westernmost region of Niger, occupies more than two-fifths of the country's total land area. About one-fourth of the Niger River basin and about one-fifth of the Lake Chad basin lie within the national territory of Niger. Soils are infertile in the Saharan region in the north, except in a few oases. To the south the soils are thin and white, covered with salty deposits that form an infertile crust. In the Niger River basin area, soils are rich and fertile.

The southern part of the country has a single rainy season, between June and October. Temperatures rise from February to May (the hottest month), when they average more than 100° F (38° C) in the afternoon at most stations. They drop during the rainy season but rise again afterward. Lowest monthly averages occur in January, when afternoon temperatures are still in the 90s Fahrenheit (mid-30s Celsius) at most stations. On January nights, however, temperatures may drop to the freezing level in desert locations. In the south, rainfall averages some 22 inches (560 mm) annually. The northern two-thirds of Niger is desert, and the remainder in the south is savanna. The vegetation of the desert zone clusters around oases and includes the date palm and cultivated corn (maize). The savanna zone includes a vast variety of herbaceous vegetation with mahogany, kapok, and baobab trees. Wildlife in southern Niger, which has declined in numbers, includes lion, buffalo, elephant, and various antelopes. In the Niger River, crocodile, hippopotamus, and sometimes manatee are found.

Only some 3 percent of Niger's area is considered arable, and about 7 percent of its area is used for grazing cattle. Niger is, however, among the top uranium-producing countries in the world. Reserves of phosphate, iron ore (containing about 50 percent iron), and coal are also substantial.

The people. Niger's population is distributed very unevenly. A majority lives in the south, occupying about one-fourth of the national territory. Three groups of sedentary peoples are found there: the Hausa, Songhai-Zerma, and Kanuri. The Hausa, who constitute more than one-half of the population of Niger, occupy the centre of southern Niger. The second largest group, the Songhai-Zerma (about one-fifth of the total population), live in the southwest along the Niger River. The Kanuri, together with the Manga people, live near Lake Chad in the east of the country. The Fulani, or Peul, people are scattered through all of these regions. Except for a few oases, northern Niger is virtually empty of human life. The Tibesti region in the extreme northeast is the land of the nomadic Teda, and elsewhere northern Niger remains the domain of the nomadic Tuareg. Nomadic populations still constitute about one-sixth of the country's total, but there is a trend among the nomads to settle down. Urban population is about one-sixth and is concentrated mainly in four cities: Niamey, Zinder, Maradi, and Tahoua.

Niger does not suffer from demographic pressure on the land, but its population growth rate is one of the highest in western Africa. Nearly one-half the population is less than 15 years of age. Immigration is insignificant, but emigration (of seasonal agricultural workers and industrial job seekers) to Ghana, Togo, Cameroon, Nigeria, and Chad is important. Some 500,000 nationals of Niger are thought to be living abroad.

Though French is the official language, at least five principal indigenous languages are spoken. A majority understands Hausa, which has an abundant literature; the second most important language is Songhai; the language of the Fulani is Fulfulde; and Tamashek is the language of the Tuareg. Many of the people of Niger speak Arabic.

Christianity is principally a religion of the towns; Islām is the religion of the rural majority of the peoples of Niger. Many black Africans, however, continue to adhere to traditional animist religions.

Economy. Niger has a developing economy based largely on agriculture and uranium mining. Rapid economic growth caused by uranium development slowed in the 1980s when the world price for uranium declined sharply. The gross national product (GNP) declined through the 1980s, while the population continued to grow rapidly; the GNP per capita is among the lowest in the world.

Agriculture accounts for two-fifths of the gross domestic product (GDP) and employs about four-fifths of the workforce. Millet and sorghum are the main food crops; others include cassava, green beans, and rice. Expanding food production has generally matched population growth except during drought years, and Niger is largely self-sufficient in food grains. Expanding livestock (cattle, sheep, and goat) production, severely retarded by the Sahel droughts of the mid-1970s and early '80s, has subsequently generated significant export earnings. The most important export crop is cowpeas; peanuts (groundnuts) and cotton are also widely grown.

The industrial sector, accounting for about one-eighth of the GDP, is largely dominated by uranium mining. The processing plant at the Arlit mine is largely under French control. A second mine, opened in the late 1970s, is operated by a consortium comprising the government of Niger, French and Spanish companies, and Japanese interests. A third mine, also largely French-controlled, opened in 1987. Manufacturing is limited to the processing of agricultural commodities and the production of import substitution goods. Electricity consumption is rising rapidly, and domestic generation covers only part of the demand, with the gap being met by supplies from Nigeria. A coal-operated power station began operation at Arlit in the early 1980s.

Services (including transportation, trade, finance, and public administration) account for about two-fifths of the GDP. Despite considerable foreign aid for road development, the transportation system remains inadequate. Road access to the harbour at Lomé (Togo) and access to other seaports is being improved. Major airports are located at Niamey and Agadez.

Niger's imports generally exceed exports, with higher import spending reflecting higher petroleum prices and larger investments in capital equipment for mining. The country receives substantial development aid, primarily from France. Other donors include a variety of multilateral agencies and noncommunist countries. France, Nigeria, Côte d'Ivoire, Spain, and Germany are Niger's principal trading partners.

Government and social conditions. Under the constitution approved in 1992, Niger is a unitary, multiparty republic. The head of state is the president, who is elected to a five-year term, renewable once. The president appoints the prime minister, who is responsible to the unicameral National Assembly. The members of this body also serve a five-year term. Elections are by direct, universal adult suffrage. The constitution also provides for an independent judiciary.

Niger's social-welfare system provides benefits to employed persons for old age, disability, sickness, maternity, and work injury. A family-allowance law also offers benefits to employees with one or more children younger than 14 years of age.

Health conditions are relatively poor. There are major hospitals in Niamey and Zinder, with a smaller hospital in Dosso, but the rural population has only limited access to medical treatment. Vaccination programs have reduced deaths due to measles and eliminated those due to smallpox, but malaria and trachoma remain serious health problems. Life expectancy is very low at 46 years, and the country has a very high infant mortality rate.

Niger has one of the lowest literacy rates in western Africa, but teaching facilities are being expanded with aid from France and the United Nations Educational, Scientific and Cultural Organization. Approximately one-fourth of primary-school–age children attend school, but less than 10 percent of those aged 12 to 17 attend secondary schools. The country's major institution of higher education is the University at Niamey, which was established in 1973. The Islāmic University of Niger was founded in 1987 in Say.

All the nation's news media are owned and operated by the government.

Cultural life. Although the influence of Islām is predominant in Niger, pre-Islāmic cultural traditions are also strong. Since independence, greater interest has been shown in the country's cultural heritage, particularly with respect to traditional architecture, handicrafts, dances, and music. There is a regional centre of oral traditions, as well as a national museum in Niamey. A major cultural celebration is National Youth Week, held annually in December.

History. There are carved stones from the Acheulian industry (the earliest stage of Paleolithic stone-tool–working industries) in the Bilma region and later Neolithic remains, both of which give evidence of the Tuareg's early existence in the Sahara region. The Tuareg established themselves in the Aïr Massif about the 11th century, and the Tuareg sultanate of Agadès arose about the 15th century. The Zerma, speaking Songhai, established an empire on the Niger River in the 17th century. The Hausa, who probably entered the region from the northeast, formed from the 14th century onward a number of kingdoms, of which one, the Gobir, expanded vastly in the 18th century and displaced the Tuareg. The Fulani had long been infiltrating into the Hausa land, and in 1804 Sheikh Usman dan Fodio proclaimed himself commander of the faithful and preached jihad ("holy war") against the Hausa. He defeated them and established in the former Hausa states the empire of Sokoto.

Friederich Hornemann, Mungo Park, and other Europeans explored the region in the 18th–19th century. In the latter part of the 19th century, Niger became part of the French sphere of influence. In 1904 it was formally constituted a French West African territory. It became an autonomous republic within the French Community in 1958.

Niger proclaimed its independence in 1960, withdrew from the French Community, and joined the United Nations. Hamani Diori was the first elected president. In 1974 a military coup removed Diori and put Lieutenant Colonel Seyni Kountché into power. Kountché released Diori, who had been detained after the 1974 coup, in 1980. General Ali Saibou became chief of state and president in 1987 following the death of Kountché. In August 1991 a national conference voted to suspend the constitution. Saibou remained as interim head of state, but his powers were largely ceremonial. A new constitution was approved by national referendum in December 1992, and after multiparty elections were held, Mahamane Ousmane became president in April 1993. A military coup in 1996 brought to power Colonel Ibrahim Baré Maïnassara. Widespread political unrest followed, as students and members of the civil service protested and military units mutinied. Following Baré's assassination in 1999 the country returned to democratic government under President Tandja Mamadou.

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Niger, state, west-central Nigeria. It consists mostly of wooded savannas and includes the floodplains of the Kaduna River. The state is bounded on the south by the Niger River. It is also bounded by the states of Kebbi and Sokoto on the north, Kaduna on the north and northeast, Kogi on the southeast, and Kwara on the south. The Abuja Federal Capital Territory is on Niger state's eastern border, and the Republic of Benin is its western border. Niger province was created by the British in 1908 and called Nupe province from 1918 to 1926; it included the Abuja, Agaie, Bida, Kontagora, and Lapai emirates, the Gwari (Gbari), Kamuku, and Wushishi chiefdoms, and the Zuru federation. In 1967 Niger province became the southern part of North-Western state, and in 1976 it became Niger state (excluding the newly created Abuja Federal Capital Territory). In 1991 part of northwestern Kwara state, lying between the Niger River and the Republic of Benin, was added to Niger state.

Niger state is populated mainly by the Nupe people in the south, the Gwari in the east, the Busa in the west, and Kamberi (Kambari), Hausa, Fulani, Kamuku, and Dakarki (Dakarawa) in the north. Islām is the predominant religion. Most of the inhabitants are engaged in farming. Cotton, shea nuts, yams, and peanuts (groundnuts) are cultivated both for export and for domestic consumption. Sorghum, millet, cowpeas, corn (maize), tobacco, palm oil and kernels, kola nuts, sugarcane, and fish are also important in local trade. Paddy rice is widely grown as a cash crop in the floodplains of the Niger and Kaduna rivers, especially in the area around Bida. Cattle, goats, sheep, chickens, and guinea fowl are raised for meat. Pigs are raised around Minna for sale to southern Nigeria.

Gold, tin, iron, and quartz (used by the glass artisans in Bida) are mined mainly for local craftsmen. Pottery, brasswork, glass manufactures, raffia articles, and locally dyed cloth are significant exports. Marble is quarried at Kwakuti, near Minna, the state capital; and Minna has a brickmaking factory. Niger state has a share in all three dams of the Niger Dams Project, including one at Shiroro Gorge on the Kaduna River and one at Jebba (in Kwara state), the reservoir of which lies partly in Niger state. The Kainji Dam (1969) and part of its reservoir, Kainji Lake, also lie in the state. Besides generating hydroelectric power, these dams sustain irrigation projects, and fishing has developed as an industry on their reservoirs.

Minna and Bida are the state's chief towns and also the main education centres, with teacher-training colleges, a polytechnic institute in Bida, and a federal university of technology in Minna. A railway from Lagos traverses Niger state. The main highway system runs north of the railway and serves the market towns of Mokwa, Kontagora, Tegina, Kagara, and Kusheriki. The state's other large towns are served by networks of local roads. Area 29,484 square miles (76,363 square km). Pop. (1995 est.) 2,775,526.

Niger, Pescennius, original name GAIUS PESCENNIUS NIGER JUSTUS (d. 194), rival Roman emperor from 193 to 194.

An equestrian army officer from Italy, Niger was promoted to senatorial rank about 180. Most of his earlier service had been in the eastern provinces, but in 185–186 he commanded an expeditionary force against deserters who had seized control of a number of cities in southern Gaul. After serving a term as consul (*c.* 189), he was appointed legate of Syria. By the end of the emperor Commodus' reign in 192, Niger had won great popularity, both in the east and among the urban populace of Rome. When Commodus' successor, Pertinax, was murdered in the spring of 193, Niger was proclaimed emperor by his legions and was accepted as ruler in all the Asiatic provinces. Septimius Severus, who was proclaimed emperor by the troops of Pannonia Superior, marched east and decisively defeated Niger in the Battle of Issus (in southeast Anatolia) in the autumn of 194. Niger fled but was overtaken and killed.

Niger-Congo languages, family of some 1,400 languages (and thousands of dialects) spoken across a broad region of Africa. The area in which these languages are spoken stretches from Dakar, Senegal, at the westernmost tip of the continent, east to Mombasa in Kenya and south to Cape Town, South Africa. Excluding northern Africa (Mauritania to Egypt and The Sudan) and the Horn of Africa (Ethiopia to Somalia), some 85 percent of the population of Africa—at least 600 million people—speak a Niger-Congo language.

A brief treatment of the Niger-Congo languages follows. For full treatment, *see* MACROPAEDIA: Languages of the World: *Niger-Congo languages.*

All indigenous peoples of sub-Saharan Africa west of the Nile River are speakers of Niger-Congo languages, with the exception of a few to the extreme south (who speak languages of the Khoisan family) and a more substantial number along the northern rim of the area (who speak Chadic languages of the Afro-Asiatic family or Nilo-Saharan languages). In only two countries of this region—Niger and Chad—do speakers of Niger-Congo languages constitute a minority.

Linguists sometimes divide the Niger-Congo family into six branches: West Atlantic (Atlantic), Mande, Voltaic (Gur), Kwa, Benue-Congo, and Adamawa-Eastern (Adamawa-Ubangi). The Benue-Congo branch alone, which includes the enormous Bantu subgroup, contains more than than 550 languages.

Many languages in the Niger-Congo family have more than 1 million speakers and at least 12 Bantu languages have more than 5 million speakers. Several Bantu languages, including Xhosa and Zulu, have incorporated all or some of the click sounds typical of the Khoisan languages (*q.v.*).

Niger River, principal river of western Africa and the third longest in Africa.

A brief treatment of the Niger River follows. For full treatment, *see* MACROPAEDIA: Africa.

The river rises in Guinea on the eastern side of the Fouta Djallon highlands and flows in a great arc northeast to Taoussa in Mali, then southeast through western Niger, continuing to Lokoja, Nigeria, where it turns south to flow into the Gulf of Guinea, of the Atlantic Ocean, west of Port Harcourt. The Niger drainage system is bounded in the south by such highlands as the Fouta Djallon, the Banfora Cliffs, the Plateau of Yorubaland, and the Cameroon highlands. The northern edge of the Niger basin is less clearly defined. The river's upper-course tributaries include the Mafou, Niandan, Milo, Sankarani, and Tinkisso; its major middle-course tributary is the Bani; and its major lower-course tributaries are the Kaduna and the Benue, the latter approximately doubling the volume of the Niger's annual discharge. At the confluence of the Niger and Benue at Lokoja, the rivers form a lakelike stretch of water about 2 miles (3 km) wide that is dotted with islands and sandbanks. In the Niger River delta, extending over an area of 14,000 square miles (36,000 square km), the river breaks up into an intricate network of channels called rivers, which include the Nun, the Forcados, the Brass, the Sambreiro, and the Bonny.

Within the Niger basin, climate shows great variability; mean annual rainfall decreases northward from more than 160 inches (4,060 mm) annually in the delta to less than 10 inches (255 mm) in Timbuktu. Because of climatic variations, the annual river flood does not occur at the same time in all parts of the basin. Along its course the Niger traverses virtually all of the vegetational zones of western Africa, including sedge vegetation, savanna grassland, thorny shrub and acacia wood, rain forest, and mangrove swamps. Many varieties of fish are found in the Niger and its tributaries; catfish, carp, and Nile perch supply an important economic activity along the length of the river system. Other Niger fauna include hippopotamus, crocodile, lizards, and a rich collection of birds.

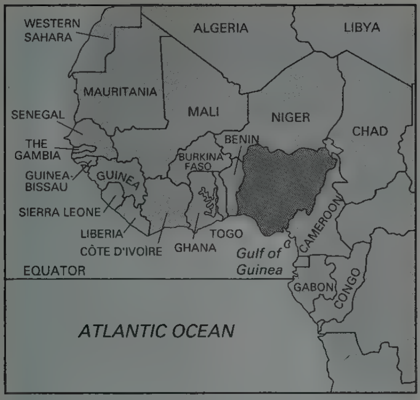
The Niger River valley is sparsely settled, with the exception of population concentrations in the lake region of central Mali and in the Nupe area in Nigeria. The ethnic pattern along the course of the river includes such peoples as the Bambara, the Malinke, the Songhai, and the Zerma (Djerma). The Niger provides a tremendous source for irrigation and hydroelectric development. Most of the river is used by commercial shipping, and rail and road routes cross it at many points. Length 2,600 miles (4,200 km); drainage basin 730,000 square miles (1,890,600 square km); mean annual discharge 212,000 cubic feet (6,000 cubic m) per second.

Nigeria, officially FEDERAL REPUBLIC OF NIGERIA, country situated on the southern coast of western Africa, extending about 650 miles (1,050 km) from north to south and 700 miles (1,130 km) east to west. Nigeria is the most populous African nation. Facing the Bight of Benin (southwest) and the Bight of Biafra (southeast), both of the Gulf of Guinea, Nigeria is bordered by Niger on the north, Lake Chad on the northeast, Cameroon on the east, and Benin on the west. The national capital is the new town of Abuja, located in the Federal Capital Territory. Area 356,669 square miles (923,768 square km). Pop. (2000 est.) 123,338,000.

A brief treatment of Nigeria follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Nigeria's topography consists of several eroded surfaces occurring as high plateaus at elevations between 2,000 and 4,000 feet (600 and 1,200 m) and the lowlands be-



Nigeria

tween them, which are mainly basins of the country's major rivers. The coastal areas along the Gulf of Guinea form gently undulating plains. The characteristic landforms in the western and north-central parts of the country are high plains with broad, shallow valleys studded with numerous dome-shaped isolated hills and elongated ridges. Other prominent relief forms include the central Jos Plateau and the northeastern Biu Plateau, both consisting of extensive lava surfaces dotted with many extinct volcanoes. The Niger-Benue River basin occupies three-fifths of Nigeria's land area and dominates the hydrology of the country. About one-tenth of the Lake Chad basin lies within the national territory of Nigeria. The Niger River and the Benue, its largest tributary, are the principal rivers. Others include the Sokoto, Kaduna, and Gongola. Low fertility because of excessive leaching is a problem on most of the country's soils, especially in the south, where rainfall is heaviest.

Near the coast in the south, temperatures rarely exceed 90° F (32° C), but the humidity is very high, and the wet season is nearly yearlong. Inland, the wet season lasts from April to October and the dry season from November to March, with summer temperatures often exceeding 100° F (38° C). The dry season of the northern part of Nigeria is nearly eight months long and is dominated by a hot, dusty Sahara wind called the harmattan. Average rainfall varies from 70 to more than 120 inches (1,800 to more than 3,000 mm) along the coast to only about 20 inches (500 mm) in the far north.

Nigeria's zones of natural vegetation progress south to north from swampland to rain forest and finally to tree-studded savanna. The animal life includes chimpanzee, gorilla, African wild dog, leopard, elephant, giraffe, lion, crocodile, and snakes of many species. About one-third of Nigeria's land area is considered arable, and another two-fifths is available as pasture. Nigeria's estimated petroleum reserves in the late 20th century represented nearly one-third of Africa's total reserves. Nigeria's estimated reserves of natural gas were also about one-third of the continent's total. There are also abundant deposits of iron ore.

The people. The great diversity of peoples and cultures in Nigeria is largely the result of the country's location at the meeting point of transcontinental migration routes. There are more than 250 ethnic groups in the country, each with its own customs, traditions, and language. Ten groups—the Hausa, Yoruba, Igbo (or Ibo), Fulani, Ibibio, Kanuri, Edo, Tiv, Ijo, and Nupe—account for approximately nine-tenths of the country's population. The Hausa of the far north have become integrated with the minority Fulani who conquered them in the 19th century, and together they are mostly Muslim. Another important ethnic group consists of the Yoruba-speaking peoples of southwestern Nigeria. The Igbo-speaking peoples of the southeastern region are the third-largest group. Less numerous groups include the Ibibio, who live near the Igbo, and the Edo people of Benin City. In central Nigeria, where the greatest concentration of different ethnic groups occurs, the Tiv and the Nupe are the largest groups.

Almost half of Nigeria's people are Muslims; the others are either animists or Christians.

Hausa is by far the most widely spoken language in Nigeria, and the continued political domination of the country by the Hausa-Fulani group has contributed to its spread. English is the official language of Nigeria but is used mostly in the cities. Urban life has a long history in Nigeria, with such centres as Kano, Katsina, and Zaria dating from the 11th century AD and Benin City dating from the late 16th century.

The main concentrations of people are in the south-central rain-forest belt, in the coastal lowland between Lagos and Port Harcourt, and in the northwestern part of the country. Vast areas of the middle belt, the Lake Chad basin, and the eastern Cross River basin are virtually uninhabited.

Demographic trends in Nigeria are similar to those in other developing nations. High birth and death rates are characteristic, although since the 1950s there has been a considerable decline in the relatively high rate of infant mortality. The country's natural rate of population increase is among the highest in the world, and in sub-Saharan Africa it is exceeded by only a few other countries. Considerable migration takes place within the country, mostly from the north to the more urbanized south.

The economy. Nigeria has a developing, mixed economy based largely on petroleum production and agriculture. Rapidly expanding economic growth was interrupted in the early 1980s when prices for Nigerian crude oil fell significantly. The government then introduced a variety of severe austerity measures and a program to expand non-oil exports, especially in agriculture and industry. Many state-owned enterprises were privatized in the early 1990s. The gross national product (GNP) began to grow again in the mid-1980s but not as rapidly as the population. The GNP per capita remains lower than those of most other western African countries.

Agriculture accounts for two-fifths of the gross domestic product (GDP) and employs close to half the workforce. Agricultural production declined drastically since the 1960s as a result of drought, government-set low market prices for crops, and the competition for skills and labour arising from other sectors of the economy. Nigeria is largely self-sufficient in meat products, but its production of staple food crops (corn [maize], sorghum, taro, yams, cassava, and rice) has not kept pace with the growing population, and food imports have continued to be high. Cacao and rubber are the only significant export crops. About one-eighth of the country's area is forested, and there is potential for exploitation, but illegal deforestation is a major problem, and most of the wood cut is used for fuel.

Industry and mining, accounting for about one-fifth of the GDP and employing only a small percentage of the workforce, are dominated by petroleum production. Exploration and production is carried out mainly in the southern part of the country and in the offshore area of the Gulf of Guinea. The Nigerian National Petroleum Corporation has a stake in all large oil firms. Tin ore and limestone are mined in significant quantities, and the production of natural gas is being developed.

Despite growth, manufacturing remains primarily small-scale and underdeveloped. Textiles are the major manufacture, but the industry suffers from competition with smuggled imports. Some four-fifths of Nigeria's installed electrical generating capacity is thermal, and hydroelectric sources account for the remainder. Demand for electricity continues to outstrip capacity.

Services, trade, and transportation account for one-third of the GDP and employ more than two-fifths of the workforce. Nigeria has a fairly extensive road network (almost half of which is paved), the principal ports have been expanded and modernized in recent years, and airports at Lagos and Kano have both national and international flights.

Nigeria's budget depends largely on income from petroleum exports. In years of high oil prices, the balance of trade is positive, but when oil prices are low, exports fall below imports. Major imports include machinery and transport equipment, chemicals, manufactured goods, and food. Nigeria's chief trading partners include the United States, Germany, the United Kingdom, France, and Spain.

Government and social conditions. Nigeria is a federal republic of 30 states. The constitution, drawn up in 1988 while the country was under military rule, allocated power between the federal and state governments and retained a presidential form of government. Executive authority rested with the president and the Armed Forces Ruling Council. Legislative power was vested in a bicameral national assembly.

Nigerian politics has been characterized by the tendency of political parties to proliferate along ethnic, sectional, or religious lines. To alleviate this problem, the military government of President Ibrahim Babangida in the late 1980s created two new parties, the centre-right National Republican Convention and the centre-left Social Democratic Party, and banned all previously existing parties. His government sponsored a gradual return to civilian democratic rule, with local elections held in 1991 and national legislative elections held in 1992. Presidential elections were held in June 1993 despite allegations of unfair practices, but, shortly thereafter, the results were voided by the ruling council. In August of that year Babangida ceded power to a mostly civilian transitional government. In November 1993 the military seized power and dissolved the institutions set up under Babangida; the transitional government was replaced by the Provisional Ruling Council.

Health conditions are relatively poor in Nigeria. Medical and health services, which are the responsibility of state governments, remain largely inadequate. Many hospitals are understaffed, and drugs are chronically scarce. Significant numbers of people die from malaria, water-borne gastrointestinal diseases, tuberculosis, cerebrospinal meningitis, and other preventable diseases. In the late 20th century, life expectancy was relatively low at 51 years for men and 54 years for women.

Six years of primary schooling are officially compulsory. The enrollment ratio for primary schools increased greatly between 1970 and 1980, when educational development was undertaken with the Universal Primary Education (UPE) program as one of its central features. The enrollment ratio for secondary schools remains low, however, as the secondary sector has not expanded sufficiently to absorb the pupils completing the UPE program. Several universities and colleges were founded during the 1970s and '80s, and high priority was given to training technical workers and teachers.

Most Nigerian newspapers are wholly or partially owned by the federal government or the states, and the few private newspapers are either personal or party organs. Press freedom, however, is an established tradition; despite instances of government censorship, there is generally free expression of opinions. Television and radio broadcasting are also government-owned.

History. The earliest identified culture in Nigeria is that of the Nok people, who flourished between about 500 BC and about AD 200 in the area north of the confluence of the Niger and Benue rivers on the Jos Plateau. The Kanuri peoples of Bornu and the Hausa and Fulani peoples subsequently migrated into the northern regions. By the end of the 11th century the empire of Kanem, of which Bornu (now in extreme eastern Nigeria) was a province, extended east and west of Lake Chad and included the greater part of the Hausa lands. In the 13th century Islām was introduced into the northern area and influenced the social as well as the religious life of the inhabitants. Toward the end of the 14th century the power of Kanem waned and the empire shrank, leaving only Bornu province. Meanwhile, to the west of Bornu, the fortunes of the Hausa states rose and fell. These states, the most important of which were Kano, Zaria, Daura, and Katsina, had existed from an early date and had often fought for supremacy with each other or joined in a loose confederacy for mutual defense. They were conquered in turn by Kanem, by the Songhai kingdom of the Sudan, and by Bornu and then Kebbi, but they retained their identities and continued to engage in internecine wars. Meanwhile, a people known as the Fulani had long been migrating into the Hausa lands; most of the Fulani were nomadic, but some settled in towns and mingled with the Hausa population. In the early 19th century, Fulani emirs were appointed rulers of several Hausa states, and the Fulani empire emerged, extending from Gandu in the west to Adamawa in the east (excluding Bornu). To the south of Bornu and the Hausa lands were the Yoruba and Benin kingdoms, which occupied what later became the Western region of Nigeria, and the Igbo, in what later became the Eastern region.

The first Europeans to reach the Nigerian coast were the Portuguese in the 15th century. They began acquiring slaves from the Benin peoples, and by the 17th century British slave ships were visiting the coast of Nigeria. Much of the trade was with various tribes and minor chiefs in the Niger River delta and on the banks of other rivers. The slaves were usually obtained from the interior. Throughout the duration of the slave trade no European nation attempted to bring any part of Nigeria under its control.

The slave trade was abolished by the British in 1807, but the trade continued as ships of other nations carried cargoes of slaves across the Atlantic. A British naval squadron was then stationed on the coast of western Africa to intercept the slavers, and British merchant ships began to trade in palm oil and other products. At that time little was known of the hinterland, but eventually several European explorers penetrated the interior.

Official British control of the area began with the annexation of Lagos in 1861. Nigeria was established as a separate British colony in 1886, and in 1914 the region became the Colony and Protectorate of Nigeria. In 1960 Nigeria achieved independence within the Commonwealth and joined the United Nations. Nigeria became a republic in 1963, and the regions were replaced by 12 states (subdivided in 1996 into 36 states). In 1966 clashes between the Hausa and Igbo peoples resulted in the killing of thousands of Igbo in the former Northern region, and many Igbo fled to their tribal homelands in the former Eastern region. A military government was formed, and a year later, civil war broke out when the Igbos of the former Eastern region declared it the independent Republic of Biafra. By 1969 federal troops had captured much of Biafra, and in 1970 the Biafrans surrendered. Military governments have since alternated with briefer periods of ineffective and corrupt civilian rule in Nigeria. Apart from political instability and underlying ethnic and religious rivalries, Nigeria's chief problems remained its rapidly growing population (by far the largest of any nation in Africa), chronic governmental corruption, and a large foreign debt representing squandered oil revenues. The return to a democratically elected government in 1999 signaled a more hopeful future, with pledges to repair the deteriorated infrastructure, return assets looted by the military regime, more equitably distribute oil revenues, and purge corrupt officials.

Nigerian theatre, variety of folk opera of the Yoruba people of southwestern Nigeria that emerged in the early 1940s. It combined a brilliant sense of mime, colourful costumes, and traditional drumming, music, and folklore. Directed toward a local audience, it uses Nigerian themes, ranging from modern-day satire to historical tragedy. Although the plays are performed entirely in the Yoruba language, they may be understood and appreciated by speakers of other languages with the aid of a translated synopsis.

Three types of themes are explored: the fantastic folktale, the farcical social satire, and the historical or mythological account derived from oral tradition. Generally speaking, both text and music evolved from a synthesis of liturgies from different religious sects.

Although there are more than a dozen traveling theatre companies, three professional troupes are particularly notable: those of Hubert Ogunde (author of *Yoruba Ronu* ["Yorubas, Think!"] and *Journey to Heaven*); Kola Ogunmola (*The Palmwine Drinkard* and *Love of Money*); and Duro Ladipo (*Oba Koso* ["The King Did Not Hang"] and *Eda* ["Everyman"]). Each of these troupes has created a distinctive style shaped by the tastes of its founder, who generally writes or adapts and produces the plays, arranges the music, and performs the leading roles.

This contemporary dramatic form grew out of biblical episodes in Christmas and Passion plays presented by separatist African churches in the 1930s and '40s. Some of these plays have been performed abroad, notably, *Oba Koso* and *The Palmwine Drinkard.*

In 1945 Ogunde was the first to establish a professional touring company. Some of his plays are satires on Yoruba types: the jealous husband, the stingy father, the reckless son. Others deal with topical political events.

In 1947 Ogunmola organized some of his pupils into an acting troupe, forming his own Theatre Party. Ogunmola's operas reveal a Christian influence in the use of biblical material for the basic plots. Ogunmola employs folklore by incorporating praise poetry, proverbs, and incantations into the dialogue, as evidenced in his celebrated production of Amos Tutuola's novel *The Palm-Wine Drinkard.*

In the early 1960s Ladipo, a composer of church music who wished to preserve the traditional arts, wrote cultural plays based on historical material. While he was no doubt influenced by his predecessors, Ladipo employed ceremonial drumming, chanting, and singing as well as traditional costume appropriate to specific historical or religious groups represented in his productions. Some of Ladipo's actors had performed in religious rituals before joining the theatre company; thus, their ceremonial material was incorporated within a contemporary mold.

Nigg, village, Highland council area, historic county of Ross-shire, historic region of Ross and Cromarty, northeast coast of Scotland. It is closely associated with and heavily dependent on the offshore petroleum industry. Construction of a huge dry dock began at Nigg in 1972, utilizing a sheltered 200-acre (80-hectare) site close to deep tidal water for the production of large drilling platforms for the North Sea oil fields. A pipeline brings oil from the sea onshore at the Nigg oil terminal. Nigg Old Church, rebuilt in 1626, houses an elaborately carved 8th-century Pictish stone. Pop. (latest est.) 380.

Niggli, Paul (b. June 26, 1888, Zofingen, Switz.—d. Jan. 13, 1953, Zürich), Swiss mineralogist who originated the idea of a systematic deduction of the space group (one of 230 possible three-dimensional patterns) of crystals by means of X-ray data and supplied a complete outline of methods that have since been used to determine the space groups.

Niggli studied at the Federal Polytechnic School in Zürich and the University of Zürich, where his thesis research, a field study of schistose rocks, was a pioneering application of physicochemical principles to the study of stress metamorphism. After postgraduate work, he moved in 1915 to a chair at the University of Leipzig, and in 1918 to Tübingen. He succeeded to the chair of mineralogy and petrology at the University of Zürich in 1920.

Niggli's synthesis of mathematical crystallography and experimental X-ray techniques forms the foundation of crystal-structure analysis. His *Lehrbuch der Mineralogie und Kristallchemie* (1920; "Textbook of Mineralogy and Crystal Chemistry") set a new standard of achievement and provided a new vista of the content of modern mineralogy.

Night and Fog Decree, German NACHT-UND-NEBEL-ERLASS, secret order issued by Adolf Hitler on Dec. 7, 1941, under which "persons endangering German security" in the German-occupied territories of western Europe were to be arrested and either shot or spirited away under cover of "night and fog" (that is, clandestinely). The decree was issued in response to the increased activity of the Resistance in France. Some 7,000 people are known to have been sent to concentration camps as a result of this decree.

night blindness, also called NYCTALOPIA, failure of the eye to adapt promptly from light to darkness and reduced ability to see in dim light or at night. It occurs as a symptom of numerous diseases that cause degeneration of the rods of the retina (the sensory cells responsible for vision in dim light); as an inherited deficiency in visual purple, or rhodopsin, which is the pigment of the rods; or as a result of vitamin A deficiency.

Congenital night blindness with or without myopia (nearsightedness) occurs as either a dominant, a recessive, or a sex-linked hereditary trait and usually remains stable throughout life. Night blindness developing during childhood or adolescence may be an early sign of retinitis pigmentosa, in which continued deterioration of vision often leads to blindness. Vitamin A deficiency causes night blindness that is usually not severe, and vision recovers when adequate levels of the vitamin are administered. Night blindness also occurs in the light-sensitive condition known as xerophthalmia but is treatable with vitamin A.

night-blooming cereus, also called MOON CACTUS (genus *Selenicereus*), any member of a group of about 20 species of cacti in the family Cactaceae. The plants are native to tropical and subtropical America, including the West Indies. They are widely grown in suitable American climates and have escaped from cultivation. The genus is known for its large, usually fragrant, night-blooming white flowers, which are among the largest in the cactus family. Some species clamber along the ground; others cling with aerial roots to trees and other objects. The queen-of-the-night (*S. grandiflorus*), the popular night-blooming cereus, is often grown indoors.

Stems are ribbed, angled, or flattened. *S.*

hamatus has backward-projecting lobes that aid clinging.

night fighter, in military aviation, a fighter aircraft (*q.v.*) with special sighting, sensing, and navigating equipment enabling it to function at night.

night monkey (primate): *see* durukuli.

Night of Broken Glass (Germany): *see* Kristallnacht.

nightclub: *see* cabaret.

nightglow, weak, steady light emanating from the whole night sky. *See* airglow.

nighthawk, any of several species of birds comprising the subfamily Chordeilinae of the family Caprimulgidae (*q.v.*). Unrelated to true hawks, they are classified with the nightjars, frogmouths, and allies in the order Caprimulgiformes. They are buffy, rufous (reddish), or grayish brown, usually with light spots or patches, and range in length from about 15 to 35 centimetres (6 to 14 inches). They fly about at night, especially at evening and dawn, catching flying insects in their mouths.

The common nighthawk (*Chordeiles minor*), or bullbat, inhabits most of North America, migrating to South America in winter. It is about 20 to 30 centimetres (8 to 12 inches) long, grayish brown, with a white throat and wing patches. It has a sharp nasal call. During courtship it dives swiftly, creating audible whirring sounds.

Common nighthawk (*Chordeiles minor*)

Kenneth W. Fink—Root Resources

Related species are found in the Southwestern U.S. and Central and South America. *See also* nightjar.

nightingale, any of several small Old World thrushes, belonging to the family Turdidae (order Passeriformes), renowned for their song. The name refers in particular to the Eurasian nightingale (*Erithacus,* or *Luscinia, megarhynchos*), a brown bird, 16 centimetres (6½ inches) long, with a rufous tail. Its strong and varied song, in which crescendo effects are prominent, is uttered by day or night from perches in shrubbery.

Eurasian nightingale (*Erithacus megarhynchos*)

H. Reinhard—Bruce Coleman Inc.

The thrush nightingale, or sprosser (*E. luscinia*), is a closely related, somewhat more northerly species with slightly darker plumage. Its song lacks the crescendo.

The term nightingale is also applied to other birds with rich songs, such as members of the neotropical nightingale thrush (*q.v.*) group, the Chinese nightingale (*see* Leiothrix), and, in the West Indies, the mockingbird (*q.v.*).

Nightingale, Florence, byname LADY OF THE LAMP (b. May 12, 1820, Florence—d. Aug. 13, 1910, London), English nurse and the founder of trained nursing as a profession for women.

In 1854–56, during the Crimean War, she was in charge of nursing in the military hospitals at Scutari, in Turkey, where she coped with conditions of crowding, inadequate sanitation, and shortage of basic necessities. In 1860 she established in London the Nightingale School for Nurses, the first such in the world.

Florence Nightingale, *c.* 1885

By courtesy of the Gernsheim Collection, the University of Texas, Austin

The second daughter of William Edward Nightingale and Frances (Fanny) Smith, Florence Nightingale was born in Florence where her well-to-do parents were temporarily resident. She grew up in Derbyshire, Hampshire, and London, where her family maintained comfortable homes. She was educated largely by her father, who taught her Greek, Latin, French, German, Italian, history, philosophy, and mathematics. Throughout her life she read widely in many languages. Social life was generally unsatisfying for Nightingale. On Feb. 7, 1837, she believed that she had heard the voice of God informing her that she had a mission, but it was not until nine years later that she realized what that mission was. Meanwhile, she strove to escape to a life of her own. Her proposal to study nursing at a hospital was scotched. She was then persuaded to study parliamentary reports, and in three years she was regarded by influential friends as an expert on public health and hospitals.

In 1846 a friend sent Nightingale the Year Book of the Institution of Protestant Deaconesses at Kaiserswerth, Ger., which trained country girls of good character to nurse the sick. Four years later she entered the institution and went through the full course of training as a nurse. In 1853 she was appointed superintendent of the Institution for the Care of Sick Gentlewomen, in London. The changes that she made and her administration were very successful. But she yearned for a wider field; by January 1854 she was referring to the institution as "this little molehill."

The Crimean War broke out in March 1854, and the allied British and French armies landed on the Crimea in September. Almost at once the British conscience was dismayed by published graphic reports of the disgraceful conditions suffered by sick and wounded British soldiers. Women were urged to serve as nurses like the French Sisters of Charity. Nightingale volunteered at once to leave in three days for Constantinople, taking three nurses with her. Meanwhile, she was officially approached by her old friend, the then secretary of state at war, Sidney Herbert (later Lord Herbert of Lea), to take out a much larger party of nurses. She was to have complete charge of the nursing in the military hospitals in Turkey (*i.e.,* at Scutari). The party left England on Oct. 21, 1854, and entered the Barrack Hospital at Scutari on November 5.

On her party's arrival she found that they had no decent facilities whatever. Their quarters were infested with rats and fleas, and the water allowance was one pint per head per day for all purposes. She had to use the provisions brought with her. The doctors were hostile, and at first the nurses were not allowed in the wards. After the Battle of Inkerman (fought on the very day of her arrival) the hospital was soon grossly overcrowded with sick and wounded. Furniture, clothing, and bedding were deficient, and in the corridors men lay on straw palliasses amidst filth caused by inadequate sanitation. Nightingale was then asked to help, and one of her first requisitions was for 200 scrubbing brushes. She next arranged for the patients' filthy clothes to be washed outside the hospital.

All supplies had completely broken down, but Nightingale had authority to purchase outside the hospital; she had brought £30,000 with her. By the end of the year she was purveying the hospital. She was harassed by the cares of administration, a vast correspondence, and the writing of numerous official and private reports, as well as by the insubordination of her nurses, some of whom had to be sent home because of drunkenness or immorality. She spent many hours a day in the wards, and there was scarcely a man whom she had not personally attended. After 8:00 PM she would allow no woman in the wards except herself. The night nursing—such as it was—was done by convalescent orderlies. Each night, however, she made her rounds, giving comfort and advice and establishing the wounded soldiers' conception of "The Lady with the Lamp."

By May 1855 nursing the sick had become her secondary interest, and her prime concern now was the welfare of the British Army. She now transferred herself and some of her nurses to the Crimea, and on landing at Balaklava she was very ill with Crimean fever. Then her opponent, the inspector general of hospitals, contended that she had authority only at Scutari and none in the Crimea. It was not until March 16, 1856, that her position as general superintendent of the Female Nursing Establishment of the Military Hospitals of the Army was confirmed in general orders.

Shortly after the last patient left the Barrack Hospital, Nightingale sailed for England, where she had long been a national hero. But she refused official transport home and every kind of public reception. Nightingale returned home determined to destroy her popular image and to inaugurate official action to improve the health, living conditions, and food of the British soldier. In the first she succeeded extraordinarily well. In the second she encountered difficulties, as the important men regarded her scheme tolerantly but without enthusiasm. In October 1856, however, she had a long interview with Queen Victoria, the Prince Consort, and Lord Panmure, Herbert's successor. She later had a private interview with the Queen, and Panmure promised a royal commission.

The Royal Commission on the Health of the Army was appointed in May 1857. Nightingale gave extensive evidence and compiled an immense confidential report, covering the whole field of army medical and hospital administration, which was later privately printed as her *Notes on Matters Affecting the Health, Efficiency and Hospital Administration of the British Army* (1858). One consequence of the commission's activities was the foundation of the Army Medical School in 1857. The Indian Mutiny in the same year turned Nightingale's interest to the health of the army in India, and for that purpose another royal commission was appointed in 1859. This resulted in 1868 in the establishment of a Sanitary Department in the India Office with supreme authority in India.

Meanwhile, Nightingale had been engaged in other pioneering activities. In 1860 she used the Nightingale Fund of £45,000, subscribed by the public to commemorate her Crimean work, to establish at St. Thomas's Hospital the Nightingale School for Nurses—the first of its kind in the world. Within a few years she was largely instrumental in inaugurating training for midwives and for nurses in workhouse infirmaries, and she played a part in the reform of workhouses. All these works were accomplished by a woman generally supposed to have died. From 1857 Nightingale had lived, mainly in London, as an invalid. Her correspondence was enormous. Lying on her couch year after year, she received innumerable visitors, from the highest to the humblest, and few came who did not give information or receive it. Although she had never been to India, she was an acknowledged master of most things Indian, and successive viceroys consulted her before assuming their offices. She drove her influential friends to obtain for her those things that she felt her cause needed. When Sidney Herbert, a dying man, was forced to discontinue his active cooperation in their work, she sent him a very cruel letter.

It has never been shown that Florence Nightingale had any organic illness; her invalidism may have been partly neurotic and partly intentional. By this apparent stratagem she was able to devote herself night and day to the task at hand. Her sight gradually failed, until in 1901 she became completely blind. In 1907 the king conferred on her the Order of Merit—the first woman ever to receive it. Florence Nightingale died in 1910. The offer of a national funeral and burial in Westminster Abbey was, by her wish, declined.

(E.A.U.)

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nightingale thrush, any of 11 species of thrushes of the New World genus *Catharus* (family Turdidae). They are of slender build and have rather drab plumage and rich songs—qualities reminiscent of the European nightingale. In some tropical species, the eye rims, bill, and legs are orange, and the underparts are unspotted; an example is the slaty-backed nightingale thrush (*C. fuscater*), 16 cm (6.5 inches) long, of mountain forests from Costa Rica to Bolivia. In more northerly species, sometimes placed in the genus *Hylocichla,* the eye rims are whitish, the bill is dark, and the underparts are spotted. An example is the hermit thrush (*C. guttatus*), 18 cm (7 inches) long, a famous singer that is found in Canadian and U.S. coniferous woodlands. Common in eastern broadleaf forests of the United States is a spotted, rusty-headed form, the wood thrush (*Hylocichla mustelina*), 20 cm (8 inches) long.

Orange-billed nightingale thrush (*Catharus aurantiirostris*)
Peter L. Ames—EB Inc.

nightjar, any of about 60 to 70 species of birds that make up the subfamily Caprimulginae of the family Caprimulgidae and sometimes extended to include the nighthawks, subfamily Chordeilinae (*see* nighthawk). The name nightjar is sometimes applied to the entire order Caprimulgiformes. (*See* caprimulgiform.)

True nightjars occur almost worldwide in temperate to tropical regions, except for New Zealand and some islands of Oceania. They have protective colouring of gray, brown, or reddish brown. They feed on flying insects that they catch on the wing at night.

The common nightjar (*Caprimulgus europaeus*) is representative of some 35 similar species making up the largest genus in the order Caprimulgiformes. It is characterized by its flat head, wide mouth fringed with bristles, large eyes, and soft plumage that results in noiseless flight. About 30 cm (12 inches) long, it breeds throughout Europe and in western Asia, wintering in Africa.

The lyre-tailed nightjar (*Uropsalis lyra*) inhabits northwestern South America. Its outermost tail feathers may measure 60 cm (24 inches) or more, accounting for 80 to 90 percent of the bird's total length.

Male common nightjar (*Caprimulgus europaeus*) landing
Frank V. Blackburn

The pennant-winged nightjar (*Semeiophorus vexillarius*) of Africa gets its name from its boldly patterned black and white wing, which has greatly lengthened innermost primary flight feathers (50 to 70 cm [20 to 28 inches]).

The North American relatives of nightjars are chuck-will's-widow, pauraque, poorwill, and whippoorwill (*qq.v.*).

nightshade, any plant of the genus *Solanum* (family Solanaceae; *q.v.*), which has about 2,300 species, and certain other plants of the same family and other families. The species usually called nightshade in North America and England is *Solanum dulcamara,* also called bittersweet and woody nightshade. Its foliage and egg-shaped red berries are poisonous, the active principle being solanine, which can cause convulsions and death if taken in large doses. The black nightshade (*S. nigrum*) is also generally considered poisonous, but its fully ripened fruit and foliage are cooked and eaten in some areas.

Nightshade (*Solanum dulcamara*)
Kitty Kohout from Root Resources—EB Inc.

The aptly named deadly nightshade, or dwale, is the belladonna (*q.v.; Atropa belladonna*), a tall, bushy herb of the same family and the source of several alkaloid drugs. Enchanter's nightshade is a name applied to plants of the genus *Circaea* (family Onagraceae). Malabar nightshade refers to twining herbaceous vines of the genus *Basella* (family Basellaceae).

nigun, wordless song sung by Ḥasidic Jews as a means of elevating the soul to God. Because they lacked words, the *nigunim* were felt to move the singer beyond the sensual and rational toward the mystic. Such songs were spontaneously extemporized by a rabbi or one of his disciples, the entire group of men then repeating the song in unison. Melodically, the songs are strongly influenced by Slavic folk song, but they are freer in rhythm.

In the 18th century, when persecutions caused many eastern European Jews to migrate to western Europe, the *nigunim* were often appropriated by cantors who sought to combine them with western European musical styles; only rarely were such combinations truly successful. A number of *nigunim* have been preserved in musical notation.

nihilism (from Latin *nihil,* "nothing"), a philosophy of skepticism that originated in 19th-century Russia during the early years of the reign of Alexander II. The term is an old one, applied to certain heretics in the Middle Ages. In Russian literature nihilism was probably first used by N.I. Nadezhdin in an article in the *Messenger of Europe,* applying it to Aleksandr Pushkin. Nadezhdin, as did V. Bervi later in 1858, equated nihilism with skepticism. Mikhail N. Katkov, a well-known conservative journalist mainly responsible for interpreting nihilism as synonymous with revolution, presented nihilism as constituting a social menace by its negation of all moral principles.

It was Ivan Turgenev in his celebrated novel *Fathers and Sons* (1862) who popularized the term through the figure of Bazarov the nihilist. Eventually the nihilists of the 1860s and '70s came to be regarded as disheveled, untidy, unruly, ragged men who rebelled against tradition and social order. The philosophy of nihilism then began to be associated erroneously with the regicide of Alexander II (1881) and the political terror that was employed by those active at the time in clandestine organizations against absolutism.

If to the conservative elements the nihilists were the curse of the time, to the liberals such as N.G. Chernyshevsky they represented a mere transitory factor in the development of national thought, a stage in the struggle for individual freedom, a true spirit of the rebellious young generation. In his novel *What Is to Be Done?* (1863) Chernyshevsky endeavoured to detect positive aspects in the nihilist philosophy. Similarly, in his *Memoirs,* Prince Peter Kropotkin, the leading Russian anarchist, defined nihilism as the symbol of struggle against all forms of tyranny, hypocrisy, and artificiality, and for individual freedom.

Fundamentally, nihilism represented a philosophy of negation of all forms of aestheticism; it advocated utilitarianism and scientific rationalism. The social sciences and classical philosophical systems were rejected entirely. Nihilism represented a crude form of positivism and materialism, a revolt against the established social order; it negated all authority exercised by the state, by the church, or by the family. It based its belief on nothing but scientific truth; science became the cure-all for social problems. All evils, nihilists believed, derived from a single source—ignorance—which science alone would overcome.

The thinking of nihilists was profoundly influenced by such men as Ludwig Feuerbach, Charles Darwin, Henry Buckle, and Herbert Spencer. Since nihilists denied the duality of man as a combination of body and soul, of spiritual and material substance, they came into violent conflict with ecclesiastical authorities. Since nihilists questioned the doctrine of divine right, they came into similar conflict with secular authorities. Since they scorned all social bonds and family authority, the conflict between fathers and sons became equally immanent, and it is this theme that is best reflected in Turgenev's novel. A comparison between Turgenev's hero, Bazarov, and the hero of Leonid Andreyev's drama, Savva, written during the early 20th century, reveals the deterioration of nihilist philosophy, which changed from a faith in science into a justification of terror and destruction as a means to attain the set goals.

Nihon: *see* Japan.

Nihon keizai shimbun (Japanese: "Japanese Economic Newspaper"), Nihon also spelled NIPPON, Japan's most widely respected daily business-oriented newspaper. It deals principally with news of commerce, industry, finance, government regulation of business, world trade, and economic news in general.

The newspaper has as its roots the *Chūgai bukka shimpō* ("Domestic and Foreign Prices News"), established in 1876 to report on Meiji Japan's massive economic development; in 1889 the name was changed to *Chūgai shōgyō shimpō* ("Domestic and Foreign Commercial News"). The newspaper acquired its present name in 1946.

Nihon keizai shimbun is actually two newspapers. Its national edition is published mornings and evenings in Ōsaka, Sapporo, Seibu, and Tokyo and has a combined circulation of some 2,800,000. *Nihon keizai shimbun* has offices in major world capitals.

Nihon shoki, also called NIHON-GI (Japanese: "Chronicles of Japan"), text that, together with the *Kojiki* (*q.v.*), comprises the oldest official history of Japan, covering the period from its mythical origins to AD 697.

The *Nihon shoki,* written in Chinese, reflects the influence of Chinese civilization on Japan. It was compiled in 720 by order of the imperial court to give the newly Sinicized court a history that could be compared with the annals of the Chinese. It was the first of six officially compiled chronicles that were continued to 887 by imperial command.

The *Nihon shoki* consists of 30 chapters. The first part deals with many myths and legends of ancient Japan and is an important source for Shintō thought. The later chapters, for the period from about the 5th century on, are historically more accurate and contain records of several of the politically powerful clans as well as of the imperial family. Among the events described are the introduction of Buddhism and the Taika reforms of the 7th century.

Niigata, *ken* (prefecture), north-central Honshu, Japan. It lies along the Sea of Japan and includes the offshore islands of Sado and Awa. Silt deposited by the Shinano and Ara rivers in the central part of the long coastline has created the lowland called the Echigo Plain, which contains the majority of the population. The rest of the prefecture is mountainous except for small southern coastal plains and lowlands along other river courses. Niigata is one of Japan's largest rice producers, providing major surpluses for shipment to city markets. Plentiful hydroelectric power generated in the interior mountains has stimulated industrial growth (chemicals, metals, machinery) in such cities as Niigata, Kashiwazaki, Naoetsu, Sanjō, and Takada. The prefecture also produces petroleum (Nagaoka, Kashiwazaki) and natural gas. Niigata is the prefectural capital and largest city. Area 4,857 square miles (12,579 square km). Pop. (1993 est.) 2,478,000.

Mouth of the Shinano River at Niigata in Niigata prefecture, Japan

Kokunai Jigyo Kouku

Niigata, capital of Niigata *ken* (prefecture), north-central Honshu, Japan. Niigata lies on the coastal edge of the Echigo Plain at the mouth of the Shinano River. It was an important rice port in feudal times and has continued as the country's leading port along the Sea of Japan, carrying on trade with South Korea and Russia. Coal and raw material imports predominate. Niigata is also an industrial city that produces chemicals, cotton textiles, metals, machinery, paper, and ships. Local deposits of natural gas and available hydroelectricity have attracted many large factories. A severe earthquake struck the city and surrounding area in June 1964, causing extensive loss of life and property damage. Pop. (1993 est.) 490,237.

Niihama, city, Ehime *ken* (prefecture), Shikoku, Japan. It lies on the Inland Sea coast. Originally a small fishing village, it grew after 1691 as a transit port for copper from an inland copper mine to Ōsaka. The foundation of modern smelting works (1883) and a hydroelectric company (1913) laid the basis of present industrialization in the city. The port was enlarged for the importation of foreign copper ores, and in the 1970s Niihama was the core of the East Ehime New Industrial City Program, producing copper, aluminum, chemicals, and machinery. Pop. (1993 est.) 128,716.

Niihau, volcanic island, Kauai county, Hawaii, U.S. Niihau lies 17 miles (27 km) southwest of Kauai Island. It was sold in 1863 by King Kamehameha IV to Elizabeth Sinclair of Scotland. Her descendants, the Kamaaina (meaning "old-timer") Robinson family, continue to live at Makaweli and have attempted to preserve Hawaiian culture on Niihau. Residency on Niihau is restricted to Hawaiians, and tourism is prohibited; in 1959 it was the only island to vote against statehood. Although English is taught, residents prefer to speak the old Hawaiian language. Niihau has an area of 72 square miles (186 square km). The island is mostly arid lowland that supports sheep and cattle ranching. The chief village, Puuwai, is on the west coast. Pop. (1990) 230.

Niitsu, city, Niigata *ken* (prefecture), Honshu, Japan. It lies on the Uetsu Line (railway), 150 miles (240 km) north-northwest of Tokyo. Oil was discovered southeast of Niitsu in the 17th century, and exploitation began in 1898. Three railway lines were subsequently opened through the city. Although the output of the oil fields has decreased significantly, Niitsu continues to be an important

Tulip plantation, Niitsu, Japan

Shiro Shirahata—Bon

transport and commercial centre, producing tulip and hyacinth bulbs for export to the United States. In the late 1960s it developed as a residential suburb of Niigata city. Pop. (1995) 65,572.

Nijhoff, Martinus (b. April 20, 1894, The Hague—d. Jan. 26, 1953, The Hague), greatest Dutch poet of his generation, who achieved not only an intensely original imagery but also an astounding command of poetic technique.

In his first volume, *De wandelaar* (1916; "The Wanderer"), his negative feelings of isolation and noninvolvement are symbolized in wildly grotesque figures, and the image of the dance of death is prevalent. The only solution to this spiritual frustration is suicide, as enacted in the short verse drama *Pierrot aan de lantaarn* (1918; "Pierrot at the Lamppost"). The demonic element is again apparent in his second volume, *Vormen* (1924; "Forms"), which also reveals Nijhoff's realistic, direct approach to Christianity in, for example, "De soldaat die Jezus kruisigde" ("The Soldier Whom Jesus Crucified").

Nijhoff's best volume, *Nieuwe gedichten* (1934; "New Poems"), shows a spiritual rebirth, an affirmation of the richness of earthly existence, which is most apparent in the optimism of the magnificent "Awater." This tale of a mythical, biblical character set in a sober modern townscape combines a sensitive use of colloquialism with extreme virtuosity of form.

"Awater" and *Het uur U* (1942; "U-Hour"), the story of a stranger's shattering effect on a self-satisfied community, firmly establish Nijhoff as one of Europe's foremost 20th-century poets.

Nijinsky, Vaslav, Russian in full VATSLAV FOMICH NIZHINSKY (b. March 12 [Feb. 28, old style], 1890, Kiev—d. April 8, 1950, London), Russian-born ballet dancer of almost legendary fame, celebrated for his spectacular leaps and sensitive interpretations. After a brilliant school career, Nijinsky became a soloist at the Mariinsky Theatre, St. Petersburg, in 1907, appearing in such classical ballets as *Giselle, Swan Lake,* and *The Sleeping Beauty.* In 1909 he joined Sergey Diaghilev's Ballets Russes, and the company's choreographer Michel Fokine created *Le Spectre de la rose, Petrushka, Schéhérazade,* and other ballets expressly for him. Nijinsky's own works as a choreographer include *L'Après-midi d'un faune* and *Le Sacre du printemps.*

Nijinsky in *Spectre de la rose*

By courtesy of the Dance Collection, the New York Public Library at Lincoln Center, Roger Pryor Dodge Collection

Vaslav was the second son of Thomas Laurentiyevich Nijinsky and Eleonora Bereda; both his parents were celebrated dancers, and his father in particular was famous for his virtuosity and enormous leaps. The Nijinskys had their own dance company and performed throughout the Russian Empire. Nijinsky's childhood was mostly spent in the Caucasus, where he danced as a small child with his brother Stanislav and his little sister Bronisława. His father, noticing the child's great disposition for dancing, gave him his first lessons.

At the age of nine, at the end of August 1898, Nijinsky entered the Imperial School of Dancing in St. Petersburg, where his teachers, the foremost of the time, soon discovered his extraordinary talent. When he was 16 years old, they urged him to graduate and enter the Mariinsky Theatre. Nijinsky declined, preferring to fulfill the customary period of study. At the time he already had been heralded as the "eighth wonder of the world" and the "Vestris of the North" (in reference to Auguste Vestris, a famous French dancer of the 18th century). During his school years he appeared at the Mariinsky Theatre, first as a member of the corps de ballet, later in small parts. He danced in St. Petersburg before the Tsar at the Chinese Theatre of Tsarskoe Selo and the Hermitage Theatre of the Winter Palace.

Nijinsky was graduated in the spring of 1907 and on July 14, 1907, joined the Mariinsky Theatre as a soloist. His first appearance was in the ballet *La Source* with the Russian ballerina Julia Sedova as his partner; the public and the ballet critics burst out immediately in wild enthusiasm. Among his Mariinsky partners were three great ballerinas, Mathilde Kschessinskaya, Anna Pavlovna Pavlova, and Tamara Platonovna Karsavina. As *danseur noble,* he danced the leading parts in many ballets, including *Ivanotschka, Giselle, Swan Lake, The Sleeping Beauty,* and *Chopiniana.* From 1907 to 1911 Nijinsky danced all of the leading parts at the Mariinsky Theatre and at the Bolshoi Theatre in Moscow, where he was a guest performer. His success was phenomenal.

In 1909 Sergey Diaghilev, former assistant to the administrator of the Imperial Theatres, was commissioned by the grand duke Vladimir to organize a ballet company of the members of the Mariinsky and Bolshoi theatres. Diaghilev decided to take the company to Paris in the spring and asked Nijinsky to join as principal dancer. Its first performance was on May 17, 1909, at the Théâtre du Châtelet. Nijinsky took Paris by storm. The expression and beauty of his body, his featherweight lightness and steel-like strength, his great elevation and incredible gift of rising and seeming to remain in the air, and his extraordinary virtuosity and dramatic acting made him a genius of the ballet. From 1907 to 1912 he worked with the company's choreographer, Michel Fokine. With his phenomenal talent for characterization, he created some of his most renowned roles in Fokine's *Le Carnaval, Les Sylphides* (a revision of *Chopiniana*), *Le Spectre de la rose, Schéhérazade, Petrushka, Le Dieu bleu, Daphnis et Chloé,* and *Narcisse.* His later ballets were *Mephisto Valse, Variations on the Music of Johann Sestian Bach, Les Papillons de nuit,* and *The Minstrel.* Until 1917 Nijinsky appeared all over Europe, in the United States, and in South America. He was called *le dieu de la danse.*

In 1912 he began his career as a choreographer. He created for Diaghilev's Ballets Russes the ballets *L'Après-midi d'un faune, Jeux,* and *Le Sacre du printemps. Till Eulenspiegel* was produced in the United States without Diaghilev's personal supervision. His work in the field of choreography was generally considered daringly original.

Nijinsky married Romola, countess de Pulszky-Lubocy-Cselfalva, in Buenos Aires on Sept. 10, 1913. During part of World War I and again in World War II, he was interned in Hungary as a Russian subject. In 1919, at the age of 29, he retired from the stage, owing to a nervous breakdown, which was diagnosed as schizophrenia. He lived from 1919 until 1950 in Switzerland, France, and England, and died in London in 1950. Nijinsky is buried next to Auguste Vestris in the cemetery of Montmartre in Paris. (R.Ni.)

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Nijlen, Jan van (b. Nov. 10, 1884, Antwerp—d. Aug. 14, 1965, Forest, Belg.), one of the most distinguished Flemish poets of his generation.

Of a retiring nature, van Nijlen, a high official with the Ministry of Justice in Brussels, usually published his verse in limited editions. Among his early volumes were *Het angezicht der aarde* (1923; "The Face of the Earth"), *De vogel phoenix* (1928; "The Phoenix Bird), and *Geheimschrift* (1934; "Secret Writing"). He gained a wider audience when in 1938 he at last published a one-volume selection from his poems, *Gedichten, 1904–1938.* Subsequent publications included *De Dauuwtrapper* (1947; "The Dew Trapper") and *Te laat voor deze wereld* (1957; "Too Late for This World").

Van Nijlen's characteristic tone is melancholic and elegiac, reflecting his disillusionment with the modern world. His verses recall the Romantics' longing to escape to a simpler and truer life; they are marked, however, by a classical clarity and finish. Van Nijlen also wrote studies of the French authors Charles Peguy (1919) and Francis Jammes (1918).

Nijmegen, German NIMWEGEN, *gemeente* (municipality), Gelderland *provincie* (province), eastern Netherlands, on the Waal River (southern arm of the Rhine). It originated as the Roman settlement of Noviomagus and is the oldest town in The Netherlands. Often an imperial residence in the Carolingian period, it became a free city and later joined the Hanseatic League. In 1579 it subscribed to the Union of Utrecht against Spain. It was taken by the French (1672) in the third of the Dutch Wars, and the treaties—between Louis XIV, the Netherlands, Spain, and the Holy Roman Empire—that ended the hostilities were signed there in 1678–79. Nijmegen was the capital of Gelderland until its capture in 1794 by the French, who moved the capital to Arnhem. It served as a frontier fortress until its defenses were dismantled in 1878. Occupied by the Germans during World War II, the town was badly damaged and was the scene of a U.S. airborne landing in 1944. Rebuilt, it is now an important industrial centre, a rail junction, and an inland shipping centre.

A scenic park, the Valkhof ("Falcon's Court"), contains ruins of Charlemagne's castle, which was destroyed by the Vikings but rebuilt by Frederick Barbarossa in 1155 before being demolished by French Revolutionary troops in 1796; a 16-sided baptistry (consecrated in 799) and the choir of its 12th-century church remain. The fine Renaissance Grote Kerk ("Great Church") of St. Stephen and the town hall (1554) both suffered war damage but have been restored. Other notable buildings include the Latin School (1544–45), the Weighhouse (1612), and the modern Church of St. Peter Canisius (1960). Nijmegen has the Catholic University of Nijmegen (1923), with an important medical faculty and hospital; a municipal museum; the G.M. Kam State Museum at Nijmegen (1922), with a notable collection of Roman antiquities; and a theatre and a concert hall. Pop. (1993 est.) 146,993; metropolitan area, 246,885.

Nijmegen, Treaties of, Nijmegen also spelled NIMWEGEN, peace treaties of 1678–79 that ended the Dutch War (*q.v.*), in which France had opposed Spain and the Dutch Republic (now The Netherlands). France gained advantages by arranging terms with each of its enemies separately.

Although negotiations had begun in 1676, the first treaty, between France and the Dutch Republic, was not concluded until Aug. 10, 1678. France agreed to return Maastricht and to suspend Jean-Baptiste Colbert's anti-Dutch tariff of 1667; these concessions represented a major victory for Dutch naval power and commerce. In the second treaty, concluded between France and Spain on Sept. 17, 1678, Spain was forced to make major concessions, indicating that its power had declined since the Peace of Westphalia in 1648. Spain gave up Franche-Comté, Artois, and 16 fortified towns in Flanders to France. France returned some of its enclaves in the Spanish Netherlands to Spain to round out the formerly arbitrary frontier line there. On the whole, France gained substantially by the possession of a more rational northeastern border and of border fortresses that secured the safety of Paris. Furthermore, with Franche-Comté finally in French hands, Spain had lost its "corridor" between Milan and the Spanish Netherlands.

The Holy Roman emperor Leopold I finally accepted French terms on Feb. 5, 1679, keeping Philippsburg but giving up Freiburg im Breisgau to France and granting free access through his territory to it from Breisach (French since 1648). France also continued to occupy Lorraine, since its duke, Charles V, refused the conditions imposed for his restoration. Two further treaties in 1679 terminated hostilities between France and Brandenburg (Peace of Saint-Germain-en-Laye) and between France and Denmark (Peace of Fontainebleau). Brandenburg and Denmark restored to France's ally, Sweden, territories taken by them.

Nijo Yoshimoto (b. 1320, Japan—d. 1388, Japan), Japanese government official and *renga* ("linked-verse") poet of the early Muromachi period (1338–1573) who is best known for refining the rules of *renga* composition.

Yoshimoto's father was *kampaku* (chief councillor) to the emperor Go-Daigo. Yoshimoto also served Go-Daigo, but after the mid-1330s he gave his allegiance to the emperors of the "northern" court. His first writings on linked-verse composition appeared in 1345 and were later put out in revised form as *Renri hishō* (roughly, "A Secret Selection of *Renga* Principles"). With the assistance of the poet Gusai (Kyūsei), Yoshimoto compiled *Tsukuba-shū* (1356), one of the first collections of *renga* (which were also called *tsukuba* at that time). In 1372 he and Gusai completed *Ōan shinshiki* ("New Rules of the Ōan Era"; also called *Renga shinshiki*), his most important work. Among his other treatises on *renga* composition is *Tsukuba mondō* (1372; "Questions and Answers on *Renga*").

Nika (people): *see* Nyika.

Nike, in Greek religion, the goddess of victory, daughter of the giant Pallas and of the infernal River Styx. Nike probably did not originally have a separate cult at Athens. As an attribute of both Athena, the goddess of wisdom, and the chief god, Zeus, Nike was represented in art as a small figure carried in the hand by those divinities. Athena Nike was always wingless; Nike alone was winged. She also appears carrying a palm branch, wreath, or Hermes staff as the messenger of victory. Nike is also portrayed erecting a trophy, or, frequently, hovering with outspread wings over the victor in a competition; for her functions referred to success not only in war but in all other undertakings. Indeed, Nike gradually came to be recognized as a sort of mediator of success between gods and men.

Nike, sculpture from a bronze vessel, probably made in a Greek city of southern Italy, *c.* 490 BC; in the British Museum

By courtesy of the trustees of the British Museum

At Rome, where Nike was called Victoria, she was worshiped from the earliest times. She came to be regarded as the protecting goddess of the Senate, and her statue in the Curia Julia (originally set up by Augustus in memory of the Battle of Actium) was the cause of the final combat between Christianity and paganism toward the end of the 4th century.

Among artistic representations of Nike are the sculpture by Paeonius (*c.* 424 BC) and the "Nike of Samothrace." The latter, discovered on Samothrace in 1863 and now in the Louvre Museum, Paris, was probably erected by Rhodians about 203 BC to commemorate a sea battle. Excavations have shown that the sculpture was placed alighting on a flagship, which was set in the ground in such a way that it appeared to float.

Nike missile, any of a group of U.S. surface-to-air missiles designed in the 1940s and '50s for defense against air attack. The first was Nike Ajax, a two-staged, liquid-fueled missile 6.4 m (21 feet) long. Guided by radar, it could intercept high-flying aircraft within a range of 40 km (21 miles) at more than twice the speed of sound. Beginning in 1953, Ajax missiles were installed in fixed launchers in cities and military sites throughout the United States. They were also distributed among U.S. allies in Europe and Asia.

In 1958 the larger Nike Hercules began to replace the Ajax. Its two-stage, solid-propellant engines could carry either a high-explosive or a nuclear warhead at over three times the speed of sound to targets as high as 45,000 m (150,000 feet) and more than 120 km (75 miles) away. A more sophisticated radar system enabled it to intercept short-range ballistic missiles as well as aircraft. Hercules missile sites in the United States were deactivated in 1974, after the signing of the Anti-Ballistic Missile Treaty with the U.S.S.R.; other Hercules missiles in Europe were replaced in the 1980s by the Patriot system.

Nike Zeus, the first missile designed to intercept intercontinental ballistic missiles, was developed between 1957 and 1963, but the program was abandoned in 1967.

Nikisch, Arthur (b. Oct. 12, 1855, Lébényi Szentmiklós, Hung.—d. Jan. 23, 1922, Leipzig, Ger.), one of the finest conductors of the late 19th century.

After study in Vienna, in 1878 Nikisch was appointed choral coach at the Leipzig Opera, becoming principal conductor in 1879. From 1889 to 1893 he was conductor of the Boston Symphony Orchestra, then conducted the Gewandhaus Orchestra at Leipzig from 1895 until his death. From 1897 he also led the Berlin Philharmonic Orchestra, with which he toured widely. He succeeded Hans von Bülow as conductor of the Philharmonic Concerts at Hamburg in 1897, toured the United States with the London Symphony Orchestra in 1912, and conducted Richard Wagner's *Ring* cycle of operas at Covent Garden in 1913. Although he excelled in performances of Wagner, he was a conductor of broad musical tastes. His style was marked by intensity of Romantic expression and his technique by precision and economy of gesture. As an accompanist at the piano, he appeared in recitals with his pupil Elena Gerhardt, a lieder singer.

Nikkatsu Motion Picture Company, Japan's oldest motion-picture company. Established as an independent company in 1912 with the title Japan Cinematograph Company, it had previously been a part of the Greater Japan Film Machinery Manufacturing Company, Ltd., an attempted monopoly of the industry modeled after the Motion Picture Patents Company in the United States. By 1915 Nikkatsu had captured two-thirds of the viewing market. It employed the first Japanese film star, Onoe Matsunosuke, and the first prominent Japanese director, Makino Shōzō. It was the first to successfully experiment with night photography, in *Ningenku* (1923; "Human Suffering"), and in the early 1930s it had the best sound system in Japan, the Western Electric sound process.

Poor management eventually led to financial difficulty, and in 1942 its production facilities were incorporated into the newly formed Daiei Company. Nikkatsu remained as a theatre-holding chain only until 1954, when it resumed production. Two years later the huge popularity of *Taiyo no Kisetsu* ("Season of the Sun") and *Kurutta Kajitsu* ("Crazed Fruit"), both based on novels by Ishihara Shintaro and dealt with revolt against tradition, gave Nikkatsu a place among the leading studios. The work of director Mizoguchi Kenji gave the company added prestige. Nikkatsu attracts a widely diversified audience and has expanded into television broadcasting.

Nikkō, city, Tochigi *ken* (prefecture), Honshu, Japan. The city lies along the Daiya River, north of Tokyo. One of the major pilgrimage and tourist centres in Japan, it is situated at the edge of Nikkō National Park. The name Nikkō means "sunlight." The splendour of the place is reflected in the Japanese proverb, "Do not say '*kekkō*' [magnificent] until you've seen Nikkō." A Shintō shrine may have existed at Nikkō as early as the 4th century AD, and in 766 a Buddhist temple was founded there. Since the 17th century, however, the city has been dominated by the great Tōshō Shrine, which contains the mausoleum of Tokugawa Ieyasu, the first Tokugawa shogun. Also important is the Daiyuin mausoleum, dedicated to Tokugawa Iemitsu, the third Tokugawa shogun, who died in 1651. The shrines and associated buildings are notable for their vibrant red colour (symbolizing blood), gilt ornamentation, and detail. Their picturesque setting, especially the grove of giant Japanese cedars in which they stand, considerably enhances the attractiveness of the city.

There are scores of hot mineral springs in the Mount Nasu area of Nikkō National Park. The park also contains the extinct volcano Mount Nantai, which is crowned by the Futarasan Shrine. Waterfalls such as the 325-foot (99-metre) Kegon Falls and the recreation centre and trout hatchery of Lake Chūzenji are also in the park. Pop. (1990) 20,128.

Torii (portal entrance) to the Futarasan Shrine in Nikkō, Japan

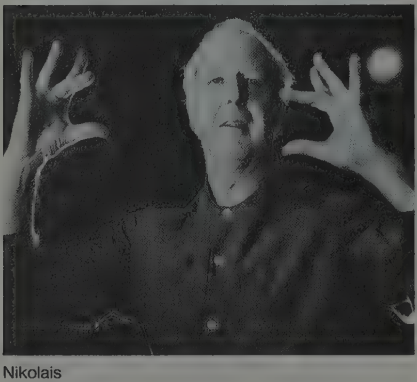
Bob and Ira Spring

Nikola (Serbo-Croatian, Montenegrin, etc., personal name): *see under* Nicholas.

Nikolaev (Ukraine): *see* Mykolayiv.

Nikolais, Alwin (b. Nov. 25, 1910/1912?, Southington, Conn., U.S.—d. May 8, 1993, New York, N.Y.), American choreographer, composer, and designer whose abstract dances combine motion with various technical effects and a complete freedom from technique and established patterns.

Initially a silent-film accompanist and puppeteer, Nikolais began his study of dance in about 1935 with Truda Kaschmann, a former student of modern dancer Mary Wigman, to understand Wigman's use of percussion accompaniment. In 1937 he founded a dance school and company in Hartford, Conn., and was director of the dance department of Hartt School of Music (now part of the University of Hartford) from 1940 to 1942 and from 1946 to 1949. After serving in World War II, Nikolais resumed dance studies with Hanya Holm and became her assistant. In 1948 he joined the Henry Street Settlement in New York City and founded its school of modern dance; the following year he became artistic director of its playhouse.



Nikolais

Martha Swope

The Nikolais Dance Theater (originally called the Playhouse Dance Company) was formed in 1951. In 1953 the company presented Nikolais' first major work, *Masks, Props, and Mobiles,* in which the dancers were wrapped in stretch fabric to create unusual, fanciful shapes.

In later works—such as *Kaleidoscope* (1956), *Allegory* (1959), *Totem* (1960), and *Imago* (1963)—he continued experiments in what he called the basic art of the theatre—an integration of motion, sound, shape, and colour, each given relatively equal emphasis. His later works include *Tent* (1968), *Scenarios* (1971), *Guignol* (1977), *Count Down* (1979), and *Talisman* (1981). Nikolais frequently composed electronic scores for these productions.

Although Nikolais' choreography was sometimes criticized as "dehumanizing," he maintained instead that it was liberating. He asserted that, in depersonalizing his dancers, they were relieved of their own forms and, hence, allowed to identify with whatever they portrayed. His term for this concept was "decentralization" (as opposed to egocentricity). These theories were developed under Hanya Holm and were displayed in such works as *Aviary, A Ceremony for Bird People* (1978).

During the 1970s the Nikolais group toured widely abroad. In 1978 the French Ministry of Culture, together with the French city of Angers, subsidized the new National Centre of Contemporary Dance at Angers, a Nikolais school and company that made its debut in Angers, France, in November 1979. Nikolais made films of his works, as well as broadcasts on American and British television.

Nikolaus (German personal name): *see under* Nicholas.

Nikolay (Russian personal name): *see under* Nicholas, except as below.

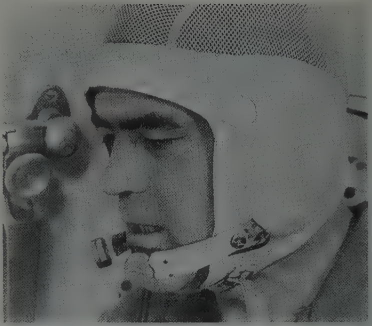
Nikolay Kasatkin, Saint, original name IVAN DMITROVICH KASATKIN, Kasatkin also spelled KASSATKIN (b. Aug. 13, 1836, Smolensk, Russia—d. Feb. 16, 1912, Tokyo, Japan), Russian Orthodox missionary and first Orthodox bishop of Japan.

Kasatkin, who adopted the name Nikolay when he took monastic vows, went to Japan in 1861 as chaplain to the Russian consulate in Hakodate. Because Christianity was a prohibited religion in Japan, he spent his first years in the Orient learning the Japanese language and culture, eventually celebrating Orthodox ceremonies in Japanese in the embassy chapel. By 1868 he had baptized his first three converts. As the number of converts grew, the Holy Synod created a regular mission for Japan in 1871. The laws against Christianity were lifted in 1873, and by 1874 the Orthodox community consisted of 400 Japanese converts. Kasatkin encouraged the autonomous aspects of the church, recruiting clergy from among the Japanese; in 1875 two of the original converts were ordained priests, and in 1880 Kasatkin was consecrated bishop.

Although the Russo-Japanese War (1904–05) strained relations between the Russian and Japanese Orthodox churches, the Japanese Orthodox church continued to grow and Nikolay remained loyal to it, becoming archbishop in 1906. At his death in 1912, the church was a self-supporting autonomous body numbering over 30,000 converts.

Nikolayev (city and *oblast,* Ukraine): *see* Mykolayiv.

Nikolayev, Andriyan Grigoryevich (b. Sept. 5, 1929, Shorshely, Chuvash A.S.S.R., U.S.S.R. [now Chuvashiya, Russia]), Soviet cosmonaut who piloted the Vostok 3 spacecraft, launched Aug. 11, 1962. When Vostok 4, piloted by Pavel R. Popovich, was launched a day later, there were, for the first time, two manned craft in space simultaneously. The two made radio and visual contact, but there was no attempt at docking. Both landed on August 15.



Nikolayev in a Soyuz 9 spaceship, 1970

Novosti Press Agency

The son of a worker on a collective farm, Nikolayev studied and worked in forestry until drafted into the Soviet army in 1950. An early interest in flying persisted, and he soon transferred to the air force; in 1954 he became a pilot. In 1957 he joined the Communist Party and in March 1960 entered cosmonaut training. From 1964 Nikolayev was the commander of the Soviet Astronauts' Detachment.

On Nov. 3, 1963, Nikolayev married Valentina Tereshkova, who in June 1963 had become the first woman to travel in space. They had one child and were subsequently divorced.

Nikolayev and Vitaly I. Sevastyanov manned the Soyuz 9 flight on June 1, 1970, and set a space endurance record of almost 18 days in orbit. The mission, primarily one of determining the effects of prolonged spaceflight, ended on June 19.

Nikolayevsk-na-Amure, also spelled NIKOLAJEVSK-NA-AMURE, English NIKOLAYEVSK-ON-AMUR, city, Khabarovsk *kray* (region), far eastern Russia. The city is situated at the head of the Amur River estuary. It was founded in 1850, but its importance as a Pacific port and naval base was overshadowed by the later development of Vladivostok and Sovetskaya Gavan, both with rail communications to the interior. It has ship repair yards and industries of local significance only, and a fishing fleet is based there. Pop. (1993 est.) 36,200.

Nikon, original name NIKITA MININ (b. 1605, Veldemanovo, Russia—d. Aug. 1 [Aug. 27, New Style], 1681, en route to Moscow), religious leader who unsuccessfully attempted to establish the primacy of the Orthodox Church over the state in Russia and whose reforms led to a schism in the church.

Nikon (Nikita) was born in the village of Veldemanovo, near Nizhny Novgorod,

Nikon, detail of a portrait by an unknown artist, 1687

Tass—Sovfoto

the son of a peasant of Finnic stock. After acquiring the rudiments of an education in a nearby monastery, Nikon married, entered the clergy, and settled in Moscow, until the death of all three of his children moved him to seek repentance and solitude. For the next 12 years, from 1634 to 1646, he lived as a monk, as a hermit, and finally as an abbot in several northern localities. In 1646 he went on monastic business to Moscow, where he made so favourable an impression on the young tsar Alexis and on Patriarch Joseph that they appointed him abbot of the Novospassky monastery in Moscow, the burial place of the Romanov family.

During his stay there, Nikon became closely associated with the circle led by the tsar's confessor, Stefan Vonifatyev, and the priests Ivan Neronov and Avvakum Petrovich (all, like him, natives of the Nizhny Novgorod region). This group of priests strove to revitalize the church by bringing about closer contact with the mass of the faithful, and they also sought to purify religious books and rituals from accidental errors and Roman Catholic influences. With their backing, Nikon became first metropolitan of Novgorod (1648) and then patriarch of Moscow and all Russia (1652).

Nikon accepted the highest post in the Russian Church only on condition that he be given full authority in matters of dogma and ritual. In 1654, when the tsar departed for the campaign against Poland, he asked Nikon to supervise the country's administration as well as watch over the safety of the tsar's family, and in 1657, with the outbreak of the new war with Poland, he invested Nikon with full sovereign powers. Enjoying the friendship of the tsar, the backing of the reformers, and the sympathy of the population of Moscow, Nikon stood at the pinnacle of his career.

It was not long, however, before Nikon alienated his friends and infuriated his opponents by his brutal treatment of all those who disagreed with him. On assuming the patriarchate, he consulted Greek scholars employed in Moscow as well as the books in the patriarchal library and concluded not only that many Russian books and practices were badly corrupted but also that the revisions of the circle of Vonifatyev had introduced new corruptions. He then undertook a thorough revision of Russian books and rituals in accord with their Greek models to bring them into line with the rest of the Orthodox Church. When his onetime friends questioned his reforms, Nikon had them exiled. Assisted by Greek and Kievan monks and supported by the Greek hierarchy, he next carried out several reforms of his own: he altered the form of bowing in the church, replaced a two-fingered manner of crossing oneself with a three-fingered one, and ordered that three alleluias be sung where Moscow tradition called for two. A council of the Russian clergy that he convened in 1654 authorized him to proceed with the revision of liturgical books. He next began to remove from churches and homes icons that he considered incorrectly rendered. To quell mounting opposition to these moves, he called in 1656 another council, which excommunicated those who failed to adopt the reforms.

Though all the changes introduced by Nikon affected only the outward forms of religion, some of which were not even very old, the population and much of the clergy resisted him from the beginning. The uneducated Muscovite clergy refused to relearn prayers and rituals, while the mass of the faithful was deeply troubled by Nikon's contempt for practices regarded as holy and essential to Russia's salvation. This was the origin of the Raskol, or great schism within the Russian Orthodox Church. Yet what really brought about Nikon's downfall was the hostility of the tsar's family and the powerful boyar (aristocratic) families, who resented the high-handed manner in which he exercised authority in the tsar's absence. They also objected to his claims that the church could interfere in affairs of state but was itself immune to state interference.

When Alexis returned to Moscow in 1658, relations between tsar and patriarch were no longer what they had been. Grown in self-confidence and incited by relatives and courtiers, Alexis ceased to consult the patriarch, though he avoided an open break with him. Nikon finally struck back after several boyars had insulted him with impunity and the tsar failed to appear at two consecutive services at which Nikon officiated. On July 20 (July 10, O.S.), 1658, in characteristically impetuous fashion, he announced his resignation to the congregation in the Assumption (Uspensky) Cathedral in the Kremlin, and shortly afterward he retired to the Voskresensky monastery.

Nikon had apparently hoped by this act to compel the tsar, whose piety was well-known, to recall him and to restore his previous influence. This did not happen. After several months in self-imposed exile, Nikon attempted a reconciliation, but the tsar either refused to answer his letters or urged him to formalize his resignation. Nikon refused to do so on the ground that he had resigned merely from the Moscow see, not from the patriarchate as such. For eight years, during which Russia was effectively without a patriarch, Nikon stubbornly held on to his post, while Alexis, troubled by lack of clear precedent and by the fear of damnation, could not decide on a formal deposition. Finally, in November 1666, Alexis convened a council attended by the patriarchs of Antioch and Alexandria to settle the dispute.

The charges against Nikon were presented by the tsar himself. They concerned largely his behaviour in the period of the tsar's absence from Moscow, including his alleged arrogation of the title of "grand sovereign." Many of the charges were entirely without foundation. The Greek hierarchy now turned against Nikon and decided in favour of the monarchy, whose favours it needed. A Greek adventurer, Paisios Ligaridis (now known to have been in collusion with Rome), was particularly active in bringing about Nikon's downfall. The council deprived Nikon of all his sacerdotal functions and on December 23 exiled him as a monk to Beloozero, about 350 miles (560 km) directly north of Moscow. It retained, however, the reforms he had introduced and anathematized those who opposed them and who were henceforth known as Old Ritualists (or Old Believers). In his last years, Nikon's relations with Alexis improved. The succeeding tsar, Fyodor III, recalled Nikon from exile, but he died while en route to Moscow.

Nikon was one of the outstanding leaders of the Russian Orthodox Church and an able administrator. His ultimate failure was due to two main factors: (1) his insistence on the hegemony of church over state had no precedent in Byzantine or Russian traditions and could not be enforced in any event; and (2) his uncontrollable temper and autocratic disposition alienated all who came in contact with him and enabled his opponents first to disgrace and then to defeat him. (R.E.Pi.)

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Nikopol, town, northern Bulgaria. It lies along the Danube River near its confluence with the Osŭm (Ossăm) and opposite Turnu Măgurele, Rom. Nikopol was an important Danubian stronghold—ruined fortresses still dominate the town—founded by the Byzantine emperor Heraclius I in AD 629. In 1396 the Ottoman sultan Bayezid I defeated a crusader army led by King Sigismund of Hungary at Nikopol, an event that contributed significantly to Turkish domination of the Balkans for five centuries. Occupied by the Turks in 1393–1877, Nikopol was again fortified and became an important administrative town. Its population grew to approximately 40,000 before it was destroyed by the Russians in 1810; thereupon the Turks moved the regional centre of government northwest to Vidin, and Nikopol consequently declined. The Russians liberated Nikopol from Turkish control in 1877. Farming, viticulture, and fishing are the main means of livelihood; as a port, it has been superseded by Somovit. Pop. (1988 est.) 16,897.

Nikopol, also spelled NIKOPOL', city, Dnepropetrovsk *oblast* (province), south-central Ukraine. It lies along the northern shore of the Kakhovka Reservoir on the Dnieper River and on the Zaporozhye–Krivoy Rog railway. Founded as Nikitin Rog in the 1630s at a strategic crossing of the river, it was renamed Nikopol in 1782. It is important as the centre of the world's largest deposit of manganese, first mined there in 1886. Reserves are estimated at approximately 500,000,000 tons, much of which has a high metal content. The city's metallurgical industry produces ferroalloys, steel tubes, cranes, and agricultural machinery; food processing and brewing are also significant. A dam protects the lower part of the city from inundation by the reservoir. Pop. (1991 est.) 159,000.

Nikópolis (Greece): *see* Nicopolis Actia.

Nikšić, town in Montenegro, Yugoslavia, in the valley of the Zeta River. The Romans built a castrum (camp) called Anagastum there, probably on an old tribal settlement site. By the 12th century the name had been transliterated to Onogošt, and the name Nikšić was used by the Montenegrins *c.* 1355. The town was held by the Turks from 1455 to 1877.

Nikšić is an important industrial centre with a major steelworks, ironworks, a brewery, a malt factory, sawmills, woodworking factories, and a hydroelectric station. Bauxite is obtained from one of the largest mines in Europe. The planned development of underdeveloped Montenegro after World War II brought new buildings, parks, and service projects to Nikšić. An ancient Roman bridge crosses the Zeta, and ruins of Anagastum and another settlement at nearby Zavrh remain. Around the old Church of St. Peter is a graveyard of the heretical Bogomil sect, which died out in the late Middle Ages. Pop. (1981) 50,399.

Niku (Egyptian rulers): *see under* Necho.

Nil Sorsky, SAINT, original name NIKOLAY MAYKOV (b. *c.* 1433—d. 1508; feast day May 7), first Russian mystic to write about the contemplative life and to formulate a guide for spiritual self-perfection.

After a trip to Constantinople and Mount Athos, he founded his own monastery beside the Sora River (whence the name Sorsky). At a council in Moscow (1503), Nil spoke against monastic ownership of property and thus came to be identified with the "non-possessor" party within the Russian Church. He was also opposed to the involvement of monks in social-welfare and political activity. The writings and monastic rule of this Russian saint influenced Russian monasticism for several centuries.

Nile, Battle of the, also called BATTLE OF ABOUKIR BAY, Aboukir also spelled ABUKIR (Aug. 1, 1798), battle that was one of the greatest victories of the British admiral Horatio

Nelson. It was fought between the British and French fleets in Abū Qīr Bay, near Alexandria, Egypt.

The French Revolutionary general Napoleon Bonaparte in 1798 made plans for an invasion of Egypt in order to constrict Britain's trade routes and threaten its possession of India. The British government heard that a large French naval expedition was to sail from a French Mediterranean port under the command of Napoleon, and in response it ordered the Earl of St. Vincent, the commander in chief of the British fleet, to detach ships under Rear Admiral Sir Horatio Nelson to reconnoitre off Toulon and to watch French naval movements there. But Nelson's own ship was dismasted in a storm, and his group of frigates, now dispersed, returned to the British base at Gibraltar. Meanwhile, St. Vincent sent Nelson more ships, which joined Nelson on June 7, bringing his strength up to 14 ships of the line.

The French expedition eluded the British warships and sailed first for Malta, which the French seized from the British early in June. After spending a week at Malta, Napoleon sailed with his fleet for his main objective, Egypt. Meanwhile, Nelson had found Toulon empty and had correctly guessed the French objective, but because he lacked frigates for reconnaissance, he missed the French fleet, reached Egypt first, found the port of Alexandria empty, and impetuously returned to Sicily, where his ships were resupplied. Determined to find the French fleet, he sailed to Egypt once more and on August 1 he sighted the main French fleet of 13 ships of the line and 4 frigates under Admiral François-Paul Brueys d'Aigailliers at anchor in Abū Qīr Bay.

Although there were but a few hours left until nightfall and Brueys' ships were in a strong defensive position, being securely ranged in a sandy bay that was flanked on one side by a shore battery on Abū Qīr Island, Nelson gave orders to attack at once. Several of the British warships were able to maneuver around the head of the French line of battle and thus got inside and behind their position. Fierce fighting ensued, during which Nelson himself was wounded in the head. The climax came at about 10:00 PM, when Brueys' 120-gun flagship, which was by far the largest ship in the bay, blew up with most of the ship's company, including the admiral. The fighting continued for the rest of the night, with the end result that the British warships destroyed or captured all but two of Brueys' ships of the line. The British suffered about 900 casualties, the French about 10 times as many.

The Battle of the Nile had several important effects. It isolated Napoleon's army in Egypt, thus ensuring its ultimate disintegration. It ensured that in due time Malta would be retaken from the French, and it both heightened British prestige and secured British control of the Mediterranean.

Nile perch (species *Lates niloticus*), large food and game fish of the family Latidae (order Perciformes), found in the Nile and other rivers and lakes of Africa. A large-mouthed fish, the Nile perch is greenish or brownish above and silvery below and grows to about 1.8 m (6 feet) and 140 kg (300 pounds). It has an elongated body, a protruding lower jaw, a rounded tail, and two dorsal fins.

The family Latidae includes several other species, some found in the river systems of Africa, the others in estuaries and along the coasts of Asia and Australia. The members of the family are sometimes classified with snooks and glassfishes in the family Centropomidae.

Nile River, Arabic BAḤR AN-NĪL, or NAHR AN-NĪL, river, the longest of Africa and of the world, rising in highlands south of the equator and flowing northward through northeastern Africa to drain into the Mediterranean Sea.

A brief treatment of the Nile River follows. For full treatment, *see* MACROPAEDIA: Africa.

The Nile River at Aswān, Egypt
Erika Stone—Photo Researchers

The Nile River basin covers about one-tenth of the area of the African continent and falls naturally into seven major regions: the Lake Plateau of East Africa, the Al-Jabal River (Mountain Nile), the White Nile (Al-Baḥr al-Abyaḍ), the Blue Nile (Al-Baḥr al-Azraq), the Atbara ('Aṭbarah) River, the Nile north of Khartoum, and the Nile delta. The Nile's remotest headstream rises as the Kagera River in the eastern African lakes region of Burundi and flows northward, passing through or forming part of the boundaries of Tanzania, Rwanda, and Uganda before entering Lake Victoria from the west. The Nile proper rises from that lake as the Victoria Nile, passes through Lakes Kyoga and Albert, and leaves the latter as the Albert Nile. Entering southern Sudan at Nimule, this river's main course is then called the Al-Jabal, until its confluence with the Al-Ghazāl and Sobat rivers near Malakāl. Before reaching Malakāl the Al-Jabal and Al-Ghazāl rivers pass through As-Sudd, a swampy lowland region crowded with tall papyrus and other aquatic plants. After the river's confluence with the Sobat River, the main stream becomes the White Nile until its confluence with the Blue Nile, which rises in the central Ethiopian Plateau and enters the White Nile on its eastern bank near Khartoum. Downriver and northeast of Khartoum the Nile proper receives its last major tributary, the Atbara River, again on its eastern bank. Below its confluence with the Atbara the Nile describes a broad S-curve toward the northwest and passes over three cataracts before entering Lake Nasser (Lake Nubia in The Sudan) near the Egypt-Sudan border. After the Aswān High Dam has impounded the lake, the river flows northward through Egypt to the head of the Nile delta near Cairo, where it divides into several distributaries before discharging into the eastern end of the Mediterranean Sea.

The principal feature of the Nile River's hydrological regime below the Aswān High Dam is the annual flood. In the northern Sudan, the river usually begins to rise in May, reaches its maximum level in August, and decreases thereafter, having a low level from January to May. Although the flood is a regular phenomenon, it varies in both its volume and in its date of onset. The flood is caused by the Blue Nile and Atbara rivers, whose waters come from heavy seasonal rainfall on the Ethiopian Plateau. The Ethiopian Plateau contributes more than 80 percent of the Nile's total water supply, while the remainder comes from the Lake Plateau of East Africa. The greatest part of the Nile's flow is contributed by the Blue Nile and the least by the Atbara, but, during the season when the river's water level is low, the White Nile becomes the most important stream.

There is hardly an area within the Nile basin that experiences a true equatorial type of climate. The greater part of the region falls under the influence of the trade winds, which account for the prevailing aridity of most of the basin. The main stream of the Nile, from Khartoum northward to Aswān, flows between deserts and has a narrow strip of vegetation on either side. Where the soil permits, the river's banks and the neighbouring flatlands are cultivated by use of irrigation, thus supporting a modest population. From Aswān northward to Cairo the river is bordered by a floodplain of rich alluvial soil that gradually increases to a width of about 12 miles (19 km), all of which is cultivated by use of irrigation. Beyond this on both sides is the desert.

The desert region outside the Nile valley extends from the Mediterranean southward to Atbarah, in the north-central Sudan. Much of this area is almost rainless and possesses no vegetation except in occasional oases. South of the Atbarah the country becomes dotted with small thorny shrubs, mostly acacias. These grow increasingly thick toward the south and merge into savanna country that supports grasses and small thorny trees. South of this is found true savanna country, consisting of open grassy plains and a few trees, and becoming swampy during the rainy season. Farther south, along the Blue Nile, are to be found savanna forests and areas of true rain forest.

Many varieties of fish are found in the Nile River system. Notable species include the perchlike *Tilapia,* which is an important food source for humans; the giant Nile perch (*Lates niloticus*), which may reach weights of 300 pounds (140 kg); and several types of catfish. Reptiles include the crocodile, soft-shelled turtles, monitor lizards, and a wide variety of snakes, including two types of cobras.

Nilot is the general term used to describe the people of the upper Nile basin. Much of southern Sudan is populated by Nilotic and Bantu-speaking peoples, central Sudan by pastoral Semitic people, and northern Sudan by Muslim Arabs and Nubians, as well as Hamitic people. Egyptians are primarily of Hamitic descent intermixed with European elements to the north and Nubian elements to the south.

The first use of the Nile for irrigation in Egypt began when seeds were sown in the mud left after the river's annual floodwaters had subsided. Henceforth, the Nile supported a continuous human settlement for at least 5,000 years. Perennial irrigation was made possible by the completion of several barrages and waterworks on the river before the end of the 19th century, and, by the beginning of the 20th century, the canal system had been remodeled and the first dam at Aswān had been completed (in 1902). The Aswān High Dam (*q.v.*), constructed between 1959 and 1970, is built at a place where the river is 1,800 feet (550 m) wide and has steep banks of granite. The High Dam completed human control over the Nile's annual flooding and in the process created Lake Nasser, a reservoir that stretches more than 300 miles (500 km) upstream of the dam and extends into the northern Sudan. The High Dam provides protection for both population and crops against unusually high floods, and it also generates enormous amounts of hydroelectric power. The Nile River also serves as a vital waterway for the transportation of people and goods. Length 4,132 miles (6,650 km); drainage basin 1,293,000 square miles (3,349,000 square km); mean annual discharge 109,475 cubic feet per second (3,100 cubic m/sec).

Niles, city, Berrien county, southwestern Michigan, U.S. It lies along the St. Joseph River, 10 miles (16 km) north of South Bend, Ind. It is the only locality in the state to have been under the control of France, Great Britain, Spain, and the United States. The site became a stagecoach stop between Chicago and Detroit and was permanently settled in 1828 and named for publisher Hezekiah Niles. It developed as a centre for the farm produce of the St. Joseph River valley. Inc. village, 1835; city, 1859. Pop. (2000) 12,204.

Niles, city, Trumbull county, northeastern Ohio, U.S. It lies along the Mahoning River, 7 miles (11 km) northwest of Youngstown, and is a part of the Mahoning industrial complex. Ruben Harmon, the first white settler (1797), and others discovered deposits of coal, iron ore, and limestone there. James Heaton built a foundry and organized the Township of Heaton's Furnace (1806), which was renamed Nilestown in 1834 (shortened in 1843) to honour Hezekiah Niles, the influential Baltimore editor of the *Niles' Weekly Register* (1811–36). Industrialization was fostered by the railroads, which first arrived in 1856. The city's manufactures now include building materials, steel, lathes, and tools and dies. U.S. president William McKinley was born (1843) in Niles; the McKinley Memorial stands in the city centre. Inc. village, 1865; city, 1895. Pop. (2000) 20,932.

The McKinley Memorial, Niles, Ohio

Milt and Joan Mann from CameraMann

Niles, Hezekiah (b. Oct. 10, 1777, Jefferis' Ford, Chester county, Penn., U.S.—d. April 2, 1839, Wilmington, Del.), editor and newspaper publisher who was one of the foremost figures in early American journalism.

The son of Quakers, Niles at age 17 was apprenticed to a printer in Philadelphia, and upon his release from his apprenticeship three years later he went to Wilmington, Del., and embarked on various ventures, including the publication of a short-lived literary magazine called *The Apollo*. In 1805 he went to Baltimore and became editor of the *Baltimore Evening Post*, continuing in that post until 1811. In the latter year he issued the prospectus for his *Weekly Register* (later to be called *Niles' Weekly Register*), which he edited and published until 1836 and which became one of the most influential papers in the United States. Niles favoured protective tariffs and the gradual abolition of slavery, and he ceaselessly propaganized for both these causes. His newspaper remains an extremely valuable source for the study of the political and economic controversies in the America of his day.

Niles, John Jacob (b. April 28, 1892, Louisville, Ky., U.S.—d. March 1, 1980, Boothill Farm, near Lexington, Ky.), American folksinger, folklorist, and composer of solo and choral songs.

Niles came from a musical family. His great-grandfather was a composer, organist, and cello manufacturer; his mother, Lula Sarah Niles, taught him music theory. He was attracted to folk songs while working as a surveyor in the Appalachians, and after he served in World War I he was educated at the music conservatories in Cincinnati, Ohio, and Lyon, Fr., and at the Schola Cantorum of Paris.

In 1921 in New York City, Niles became master of ceremonies at the Silver Slipper nightclub before teaming up with Marion Kerby, with whom he toured widely in the United States and Europe as a folksinger. He made his own lutes and Appalachian dulcimers and specialized in the songs of the Appalachian Mountain region. His ballad collections frequently included material that he composed, such as "I Wonder As I Wander" and "Black Is the Color of My True Love's Hair," or arranged, as well as ballads transcribed directly from oral sources. His published works include *Songs My Mother Never Taught Me* (1929; with Douglas Moore), *Songs of the Hill Folk* (1934), *The Shape Note Study Book* (1950), and *The Ballad Book of John Jacob Niles* (1961). His last work (1972) was the Niles-Merton song cycles, settings of poems of the Trappist monk Thomas Merton.

nilgai, also called BLUEBUCK (species *Boselaphus tragocamelus*), Indian antelope, family Bovidae (order Artiodactyla), that ranges alone or in small groups in open plains or light forests.

The name bluebuck derives from the bluish gray coat of the male; the female is reddish brown. The adult stands about 1.4 m (55 inches) at the shoulder. Both sexes have a short mane and have white on the underparts, ears, face, throat, and immediately above the hooves. The male has short, slightly curved horns and a tuft of black hair on the throat.

Nilgai (*Boselaphus tragocamelus*)

Kenneth W. Fink from Root Resources—EB Inc.

Nīlgiri Hills, mountainous region of Tamil Nādu state, southeastern India. The peaks of the Nīlgiri rise abruptly from the surrounding plains to an elevation of 6,000–8,000 feet (1,800–2,400 m); one of them, Doda Betta (8,652 feet [2,637 m]), is the highest point in Tamil Nādu. Part of the Western Ghāts, the hills are separated from the Karnātaka plateau (north) by the Noyar River and from the Anaimalai and Palni hills (south) by the Pālghāt Gap. They are considerably cooler and wetter than the surrounding plains, the upper hills forming undulating grassy downs. Tea, cinchona (trees and shrubs whose bark yields quinine), coffee, and vegetables are grown extensively.

Nilo-Saharan languages, large group of African languages thought by many scholars to compose a language family. This hypothetical language family includes Songhai, Fur, the Koma languages, the Maba languages, the Saharan languages, and the Chari-Nile languages. Nilo-Saharan languages are spoken in an area extending from Mali in the west to Ethiopia in the east and from Egypt in the north to Tanzania in the south.

Nilópolis, city and suburb of Rio de Janeiro city, Rio de Janeiro *estado* ("state"), southeastern Brazil. It lies in the Guandu-Mirim River valley, at 92 feet (28 m) above sea level. Situated 15 miles (24 km) northwest of Rio de Janeiro, Nilópolis experienced significant growth during the 1960s and '70s, when much of the state's industry became concentrated in the periphery of the Greater Rio de Janeiro metropolitan area. Important industries include metallurgical and meat-packing plants, as well as ones manufacturing pharmaceuticals and chemicals, soaps, perfumes, candles, plastics, and leather products. There are extensive orange groves in the agricultural hinterland. Railroads and highways link Nilópolis to Rio de Janeiro and to communities farther inland, while electric commuter rail service provides residents of Nilópolis with rapid access to downtown Rio de Janeiro. Pop. (2000 prelim.) 153,572.

Nilot, plural NILOTES, any member of several east-central African peoples living in southern Sudan, northern Uganda, and western Kenya. The name refers to their habitat, mostly the region of the Upper Nile and its tributaries, and to a linguistic unity that distinguishes them from their neighbours who have similar physical characteristics and culture. (*See* Nilotic languages.) The Nilotes numbered about 7,000,000 in the late 20th century.

Most Nilotes occupy savanna country that is alternately subject to flooding and drought. They pursue a mixed economy of pastoralism and hoe cultivation, supplemented by fishing, hunting, and a little food gathering. Although Nilotes may cultivate out of necessity, all except the Anuak of The Sudan are pastoralists with a great love of cattle. Milk, milk products, and grain are staple foods. Cattle are not slaughtered indiscriminately for meat; they are paid in compensation and bridewealth, and their ownership determines status and wealth. Nilotic peoples have a rich cattle vocabulary; they spend much time caring for the herds and erecting large stables, or kraals, for their protection. A man commonly trains and decorates the horns of his favourite ox, and in many cases he is addressed by the animal's name. Cattle assume ritual importance, being dedicated and sacrificed to ancestors or spirits.

Nomadic or transhumant movements are especially pronounced among the Nuer and Dinka peoples. In the wet season they live in permanent village settlements above flood level and cultivate crops and herd cattle in the vicinity of their well-built, circular houses. In the dry season they occupy temporary cattle camps near permanent water supplies and pastures, where they live in windbreaks and engage in herding and fishing. Other Nilotic tribes are more sedentary.

The Shilluk are the most highly organized, having a divine king who symbolizes the whole realm. Organized chieftainships, associated with rainmaking, court ceremonial, and royal emblems, are found also among the

Anuak, Acholi, and others. In contrast, the Nuer, Dinka, and Luo of Kenya are without rulers, their egalitarian society being based on a relationship between lineage segments coordinated with territorial segments. A dominant clan is associated with a tribal territory; dominant lineages of this clan are found in subdivisions of the society. The principal opposition between segments and their fusion in relation to larger segments is marked; descent is patrilineal.

Ritual experts are often rainmakers; among the Dinka and Nuer they act also as mediators and peacemakers in feuds between lineages and between territorial subdivisions. There are strong ancestor cults and belief in a supreme being. Totemism exists in some societies but is important only among the Dinka.

Nilotic languages, group of related languages spoken in Uganda, Kenya, southern Sudan, and northern Tanzania. These languages are usually classified as belonging to the Eastern Sudanic subbranch of the Chari-Nile branch of the Nilo-Saharan language family. The languages of this group were formerly divided, primarily on the basis of racial and cultural considerations, into two groups named Nilotic (which includes Shilluk, Dinka, and Nuer in southern Sudan; Acholi in northern Uganda; and Luo in western Kenya and in Tanzania) and Nilo-Hamitic (which includes Bari and Lotuho in southern Sudan; Karamojong, Nandi, and Suk in Uganda; Turkana in Kenya; and Masai, extending from southern Kenya into northern Tanzania). Recently, however, a number of scholars have produced a considerable amount of evidence showing that the two groups of languages are closely related and should be considered as one group; these linguists often divide the Nilotic languages into a western group, including Shilluk, Nuer, and Luo; an eastern group, including Masai and Turkana; and a southern group, including Nandi and Suk.

In Nilotic sentences, the subject of a principal clause usually precedes the verb. The languages are tone languages, often using tones to distinguish the singular of a noun from its plural or to indicate the syntactic role of a word in a particular sentence. Some of the languages also indicate plurals by means of suffixes.

Nilsson, (Märta) Birgit, *née* SVENNSSON (b. May 17, 1918, West Karup, Swed.), Swedish operatic soprano, celebrated as a Wagnerian interpreter and known for her powerful, rich voice.

On the advice of a local choirmaster, she went to study with Joseph Hislop in Stockholm, where she joined the Royal Opera and made her debut in 1946 as Agathe in Carl Maria von Weber's *Der Freischütz.* A year later she achieved a major success there as Giuseppi Verdi's Lady Macbeth. Other successes followed, particularly in Vienna and Bayreuth, where between 1954 and 1970 her Wagnerian roles included Isolde, Sieglinde, and Brünnhilde.

In 1957 Nilsson made her debut at Covent Garden, London, as Brünnhilde in the complete *Ring* cycle of Richard Wagner, and in 1958 she first appeared at La Scala, Milan, in the title role of Giacomo Puccini's *Turandot.* She made her debut at the Metropolitan Opera, New York City, as Isolde in 1959. Her other significant roles include Richard Strauss's Salome and Elektra, Ludwig van Beethoven's Leonore, and Carl Maria von Weber's Rieza.

In 1975 she appeared in the demanding role of the Dyer's Wife in the first performance in Stockholm of Strauss's *Die Frau ohne Schatten,* which she repeated in San Francisco in 1980 and New York City in 1981. In 1969 the Austrian government gave her the honorary title of Kammersängerin ("court singer"), and in 1981 the Swedish government issued a postage stamp in her honour.

Nilus OF ANCYRA, SAINT, also called NILUS THE ASCETIC (d. *c.* 430, Ancyra, Galatia; feast day November 12), Greek Byzantine abbot and author of extensive ascetical literature that influenced both Eastern and Western monasticism. He also participated in the prevalent theological controversies concerning the Trinity and the person and work of Christ.

A protégé of the staunchly orthodox and reform patriarch of Constantinople, St. John Chrysostom, Nilus consistently supported him during his conflicts with ecclesiastical rivals and the imperial court. Thus influenced, Nilus composed several letters to leaders of the Goths in which he strongly refuted Arianism, the heretical doctrine that teaches the created nature of the Son and Holy Spirit in the Christian Trinity. In the letters he contended that Christ is God and man in one individual person; his mother is therefore Theotokos (God-bearer).

After leaving Constantinople, Nilus became a monk and eventually abbot of a monastery near Ancyra and soon won a reputation as a wonder-worker and spiritual counselor. He wrote a number of tracts on moral and monastic subjects, including *De monastica exercitatione* ("On Monastic Practice") and *De voluntaria paupertate* ("On Voluntary Poverty"), which stress the essence of monastic obedience as the renunciation of the will and all resistance to the religious superior, whose duty is to guide the prayer life of the monk and put him on guard against the wiles of Satan. The greatest poverty, Nilus states, is the exclusive dedication to the service of God; consequently, the ascetic life is led more effectively in the wilderness than in the city because, among other reasons, it avoids vainglory.

Supplementing these longer studies, Nilus wrote approximately 1,000 letters, which survive in a mutilated collection, to varied recipients. His letters are written in a blunt, sometimes coarse style, which established his reputation as an early master of Christian spirituality, balancing religious insight with worldly astuteness. He seems to have coined the term "spiritual philosophy" to indicate his central theme of casting Christ as man's effective exemplar for controlling his impulses. The object of this discipline, initiated by a divine gift or grace, is union with God. Moreover, Nilus criticized exaggerated asceticism, particularly that of the Stylite monks, contemplative solitaries who sat atop rocks or pillars, whence they sometimes dispensed advice. Throughout his writings are frequent interpretations of biblical texts, commentaries following the literal or historical sense, as is characteristic of the Antiochian school, although he occasionally used allegory. In another essay he discussed the expression of religious art in mosaics.

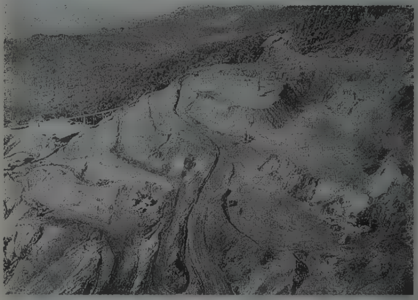
Certain works attributed to Nilus in the standard collection of early Greek Christian authors edited by J.-P. Migne, *Patrologia Graeca* (vol. 79, 1861; "Greek Patrology"), including treatises *De oratione* ("On Discourse"), a standard work on the subject, and *De malignis cogitationibus* ("On Evil Thoughts") are probably the work of the Greek theologian Evagrius Ponticus (346–399). Many authors suspected of heresy have hidden behind Nilus' reputation in the history of monasticism by affixing his name to their works. The sifting of the spurious from the genuine is still in process. The account, under Nilus' name, "Concerning the Capture of the Monks on Mount Sinai," depicting an invasion of the monastery by Saracens in 410, and the ransom of a certain Nilus of Sinai and his son Theodulus, refers to a legendary figure. This story has given rise to the "Nilus Question" in historical scholarship. The account, surprisingly for a Christian author, describes the cultic practice of animal sacrifice.

Nilus OF ROSSANO, SAINT, also called NILUS THE YOUNGER (b. *c.* 905, Rossaro, Calabria, Kingdom of Naples [Italy]—d. Dec. 29, 1005, Abbey of Santa Agata, near Rome; feast day September 26), abbot and promoter of Greek monasticism in Italy, who founded several communities of monks in the region of Calabria following the Greek rule of St. Basil of Caesarea. A supporter of the regular successors to the papal crown in their controversies with antipopes, he also helped establish (1004) the noted abbey of Grottaferrata, near Rome, that remains today the centre of Greek monasticism and liturgy in Italy.

Nīmach, also spelled NEEMUCH, town, western Madhya Pradesh state, central India, located on a barren ridge. Handloom weaving is the major industry. Formerly a large British cantonment of Gwalior princely state, the town in 1822 became the headquarters of the combined Rājputāna–Mālwa political agency and of the Mālwa Agency in 1895. It is a road junction and distribution centre for agricultural products and building stone. There is a college affiliated with Vikram University. The surrounding country was once famous as a tiger-hunting area. Pop. (1981) town, 65,860; metropolitan area, 68,853.

Nimba Range, mountain chain extending in a southwest–northeast direction along the Guinea–Côte d'Ivoire–Liberia border. It reaches its highest elevation at Mount Nimba (5,748 feet [1,752 m]) in Guinea. Surrounded by lowland rain forest to the south and savanna to the north, the mountains are the source of the Nuon (Nipoué, Cestos) and Cavalla rivers, which form the Liberia–Côte d'Ivoire boundary. All three countries have set aside nature and forest reserves on the mountain slopes.

The range has considerable mineral wealth; extensive iron-ore deposits were mined by the Liberian American-Swedish Minerals Company (Lamco) after 1963 and exported via the 168-mile (270-kilometre) company railroad to the port of Buchanan. A mining concession was granted to Consafrique, a European consortium, to mine the Guinean section of the range after an agreement had been reached with Liberia to use the Lamco railway.


Iron-ore mine in the Nimba Range of West Africa
Jacques Jangoux

Nimbārka, also called NIMBĀDITYA, OR NIYAMĀNANDA (fl. 12th or 13th century?, South India), Telugu-speaking Brahman, yogi, minor philosopher, and prominent astronomer who founded the devotional sect called Nimbārkas, Nimandi, or Nimāvats, who worshiped the deity Krishna (Kṛṣṇa) and his consort, Rādhā.

Nimbārka has been identified with Bhāskara, a 9th- or 10th-century philosopher and celebrated commentator on the *Brahma-sūtra* (*Vedānta-sūtra*). Most historians of Hindu mysticism, however, hold that Nimbārka probably lived in the 12th or 13th century because of the similarities between his philosophical and devotional attitudes and those of Rāmānuja (traditionally dated 1017–1137). Both adhered to *dvaitādvaita* (Sanskrit: "dualistic non-dualism"), the belief that the creator-god and the souls he created were distinct but shared in the same substance, and both stressed devotion to Krishna as a means of liberation from the cycle of rebirth.

The Nimanda sect flourished in the 13th and 14th centuries in eastern India. Its philosophy held that men were trapped in physical bodies constricted by *prakṛti* (matter) and that only by surrender to Rādhā-Krishna (not through their own efforts) could they attain the grace necessary for liberation from rebirth; then, at death, the physical body would drop away. Thus Nimbārka stressed *bhakti* yoga, the yoga of devotion and faith. Many books were written about this once-popular cult, but most sources were destroyed by Muslims during the reign of the Mughal emperor Aurangzeb (1659–1707), and thus little information has survived about Nimbārka and his followers.

nimbus (in art): *see* halo.

Nimeiri, Gaafar Mohamed el-, also spelled JAʿFAR MUḤAMMAD AN-NUMAYRĪ, Nimeiri also spelled NIMEIRY, NEMERY, or NUMEYRI (b. Jan. 1, 1930, Wad Nubawi, Omdurman, Sudan), major general, commander of the armed forces, and president of The Sudan (1971–85).

After graduating from the Sudan Military College in 1952, Nimeiri acted as commander of the Khartoum garrison and led campaigns against rebels in Southern Sudan. He also joined in a number of attempts to overthrow the Sudanese government. In 1966 he graduated from the U.S. Army Command College at Fort Leavenworth, Kan. Three years later he overthrew the civilian regime of Ismāʿīl al-Azharī and was promoted to major general. He became prime minister and chairman of the Revolutionary Command Council (RCC). He put down a right-wing revolt led by Ṣādik al-Mahdī in March 1970 but was briefly overthrown by a Communist coup in July 1971. In September 1971 he was elected president in a plebiscite with 98.6 percent of the vote.

Upon his election as president, Nimeiri dissolved the RCC and established in 1972 the Sudanese Socialist Union, of which he also became president. He was credited with bringing about negotiations that led to a settlement of a 10-year conflict in the Southern Sudan region, which he granted autonomy in 1972.

When Nimeiri assumed power, he first pursued a socialist economic policy but soon shifted course in favour of capitalist agriculture, designed to make The Sudan a major food producer. In March 1981 he inaugurated the Kinānah sugar project, one of the largest sugar refineries in the world. His efforts were hampered, however, by a succession of economic crises brought on in part by overly ambitious development plans, and his reign was punctuated by many attempted coups. Nimeiri became the first Muslim leader to back the Egyptian president Anwar el-Sadāt's efforts to establish peace with Israel. As president of the Organization of African Unity (OAU) in 1978, Nimeiri reasserted his position that Africa should keep free from entanglements of "alignment" with external powers. His attempts to promulgate measures of Islāmic law in The Sudan alienated many in the predominantly Christian Southern Region.

In April 1985, while he was abroad (in Egypt), he was overthrown by his defense minister in a bloodless coup. The new regime turned to closer relations with Libya, which Nimeiri had spurned.

Nîmes, city, capital of Gard *département,* Languedoc-Roussillon region, southern France, south-southwest of Lyon. Situated at the foot of some barren hills called the Monts Garrigues to the north and west of the city, Nîmes stands in a vine-planted plain extending south and east.

Named after Nemausus, the genie of a sacred fountain, Nîmes was the capital of a Gaulish tribe that submitted to Rome in 121 BC. The emperor Augustus founded a new city there and gave it privileges that rapidly brought it prosperity. In the 5th century Nîmes was plundered by the Vandals (a Germanic people) and the Visigoths (a westerly division of the Teutonic peoples known as the Goths). It was later occupied by the Saracens (Arabs), who were driven out in 737.

Tour Magne, a ruined Roman tower, Nîmes, Fr.
Art Resource—EB Inc.

In the 10th century the city passed to the counts of Toulouse, and it was joined to the French crown in 1229. At the time of the Reformation, it became largely Protestant and suffered from persecution after the revocation in 1685 of the Edict of Nantes, which had accorded a measure of religious liberty to Protestants in 1598. Damaged in 1815 during the fighting between royalists and Bonapartists, Nîmes became prosperous once more with the coming of the railways later in the 19th century.

In Roman times one of the richest towns of Gaul, the city is famous for its many Roman remains, which are mostly in an excellent state of preservation. The vast amphitheatre, probably built in the 1st century AD to seat 24,000, is an ellipse (440 by 330 ft [135 by 100 m]), standing 69 ft (21 m) high. From outside it presents the aspect of a double row of 60 arches surmounted by an attic. It was built of large stones from a nearby quarry, put together without mortar. Originally intended for gladiatorial shows, chariot races, and naval spectacles, it was used as a fortress in the 5th century by the Visigoths. In the Middle Ages, houses, and even a church, were built inside it. Cleared of buildings in 1809, it is now used for bullfights. Despite this checkered history, it is one of the best preserved Roman amphitheatres in existence. The famous Maison Carée (1st century AD), a rectangular temple 82 ft (25 m) long by 40 ft (12 m) wide, dedicated to Gaius and Lucius Caesar, adopted sons of the first Roman emperor Augustus, is one of the most beautiful monuments built by the Romans in Gaul, and certainly the best preserved. Like the amphitheatre, the building has had varied uses (town hall, private house, stable, and church) through the ages. It now houses a collection of Roman sculptures. The Tour Magne, atop a hill just outside the city, is the oldest Roman building, 92 ft high, but probably originally higher. Its original function is not known, but it was incorporated into the Roman wall in 16 BC.

Near the Tour Magne is a reservoir from which the water carried by the great Roman aqueduct, the Pont du Gard, was distributed throughout the town. The pleasant Jardin de la Fontaine, situated on the edge of the city, was designed in 1745. The fountain and the canals that flow through it are partly Roman. The Archeological Museum, which is housed in a former Jesuit college, has a fine collection of Roman objects, as well as some Iron Age artifacts.

The city's population grew considerably after 1960, from both rural immigration and immigrants from North Africa, especially Algeria. The traditional manufacture of textiles and clothing still flourishes. New industries include shoe manufacturing, food processing (canned fruit, brandy), and the manufacturing of electrical and agricultural equipment. Nîmes is also an important market town, notably for wine. The city is an important crossroads for rail transportation, particularly of commercial traffic such as meats. Pop. (1982) 120,515.

Nimitz, Chester W(illiam) (b. Feb. 24, 1885, Fredericksburg, Texas, U.S.—d. Feb. 20, 1966, near San Francisco), commander of the U.S. Pacific Fleet during World War II. One of the navy's foremost administrators and strategists, he commanded all land and sea forces in the Pacific area.

A graduate (1905) of the U.S. Naval Academy at Annapolis, Nimitz served in World War I as chief of staff to the commander of the U.S. Atlantic submarine force, a tour of duty that convinced him of the effectiveness of submarine warfare. He held a variety of posts at sea and on shore until 1939, when he was appointed chief of the Bureau of Navigation of the U.S. Navy.

Nimitz, 1941
By courtesy of the U.S. Navy

After the Japanese attack on Pearl Harbor (December 1941), Nimitz was elevated to commander in chief of the Pacific Fleet, a command that brought both land and sea forces under his authority. By June 1942 he had proudly announced the decisive victory at the Battle of Midway and the Coral Sea, where enemy losses were 10 times greater than those of the United States at Pearl Harbor. In succeeding years, the historic battles of the Solomon Islands (1942–43), the Gilbert Islands (1943), the Marshalls, Marianas, Palaus, and Philippines (1944), and Iwo Jima and Okinawa (1945) were fought under his direction.

The Japanese capitulation was signed aboard his flagship, the USS "Missouri," in Tokyo Bay on Sept. 2, 1945. In December 1944 Nimitz had been promoted to the Navy's newest and highest rank—that of fleet admiral.

After the war, Nimitz served as chief of naval operations (1945–47). In 1947, in answer to interrogatories by the German Adm. Karl Dönitz, on trial for war crimes, Nimitz gave his justification for the unrestricted nature of U.S. submarine warfare in the Pacific during World War II. With E.B. Potter he edited *Sea Power, a Naval History* (1960).

Nimrod, also spelled NEMROD, legendary biblical figure, described in Gen. 10:8–12 as "the first on earth to be a mighty man. He was a mighty hunter before the Lord." The only other references to Nimrod in the Old Testament are Mic. 5:6, where Assyria is called the land of Nimrod, and I Chron. 1:10. The beginning of his kingdom is said in Genesis to be Babel, Erech, and Akkad in the land of Shinar. Nimrod is said to have built Nineveh, Calah (modern Nimrūd), Rehoboth-Ir, and Resen. There is some consensus among biblical scholars that the mention of Nimrod in Genesis is a reference not to an individual but to an ancient people in Mesopotamia.

The description of Nimrod as a "mighty hunter before the Lord" is an intrusion in this context, but probably, like the historical notices, derived from some old Babylonian saga; however, no equivalent of the name has yet been found in the Babylonian or other cuneiform records. In character there is a certain resemblance between Nimrod and the Mesopotamian epic hero Gilgamesh.

Nimrūd (ancient Assyrian city): *see* Calah.

Nimwegen (The Netherlands): *see* Nijmegen.

Nimzowitsch, Aron (b. Nov. 7, 1886, Riga Latvia, Russian Empire—d. March 16, 1935, Denmark), Latvian-born chess master and theoretician, renowned for his book *My System* (1925) but who failed to win a world championship, despite many attempts.

Nimzowitsch learned to play chess from his father, a wholesale merchant, when he was eight years old, but only after he entered the University of Berlin in 1904 did he concentrate on the game. *My System,* which advocates what came to be called the hypermodern school of chess, remains a classic.

Nimzowitsch is best-remembered for having created a new vocabulary for chess that made the strategy of the masters more intelligible. He also developed several theories of play, including the Nimzowitsch-Indian defense.

Nin, Anaïs (b. Feb. 21, 1903, Neuilly, Fr.—d. Jan. 14, 1977, Los Angeles), French-born author of novels and short stories whose literary reputation rests on the eight published volumes of her personal diaries. Her writing shows the influence of the Surrealist movement and her study of psychoanalysis under Otto Rank.

Brought to New York City by her mother in 1914, Nin was educated there but later returned to Europe. She launched her literary career with the publication of *D.H. Lawrence: An Unprofessional Study* (1932); the book led to a lifelong friendship with the American author Henry Miller.

At the beginning of World War II Nin returned to New York City. There she continued—at her own expense—to print and publish her novels and short stories, and although no critical acclaim was forthcoming, her works were admired by many leading literary figures of the time. Not until 1966, with the appearance of the first volume of her diaries, did she win recognition as a writer of significance. The success of the diary provoked interest in her earlier work entitled *Cities of the Interior* (1959), a five-volume *roman fleuve,* or continuous novel, which consisted of *Ladders to Fire* (1946); *Children of the Albatross* (1947); *The Four-Chambered Heart* (1950); *A Spy in the House of Love* (1954); and *Solar Barque* (1958).

Nin's literary contribution was a subject of controversy in her lifetime and has remained so since her death. Many critics admire her unique expression of femininity, her lyrical style, and her psychological insight. Some dismiss her concern with her own fulfillment as self-indulgent and narcissistic. Opinion was further divided by the posthumous *Delta of Venus: Erotica* (1977) consisting of previously unpublished erotic stories written on commission during the financially lean years of the early 1940s. Her other works of fiction include a collection of short stories, *Under a Glass Bell* (1944); the novels *House of Incest* (1936), *Seduction of the Minotaur* (1961), and *Collages* (1964); and three novelettes collected in *Winter of Artifice* (1939).

Ninazu, in Mesopotamian religion, Sumerian deity, the city god of Enegir, which was located on the Euphrates River between Larsa and Ur in the southern orchard region. Ninazu was also the city god of Eshnunna (modern Tall al-Asmar in eastern Iraq). Ninazu, whose name means "water knower," was primarily an underworld deity, although the exact nature of his character or functions is not clear. In Enegir he was considered the son of Ereshkigal, goddess of the netherworld; according to another tradition, however, he was the son of Enlil (Akkadian Bel) and Ninlil (Belit). His spouse was Ningirda, a daughter of Enki (Ea).

9/11 attacks: *see* September 11 attacks.

Nine Men's Morris, also called MORRIS, MORELLES, MERELLES, MERELS, MILL, or THE MILL, board game of great antiquity, most popular in Europe during the 14th century and played throughout the world in various forms.

The board is made up of three concentric squares and several transversals, making 24 points of intersection. In modern play the diagonal lines of the board are usually omitted. Two players, each provided with nine counters of a single colour, lay pieces alternately upon the points, the object being to get three in a row (a mill) upon any line. On doing so, the player is entitled to remove from the board (capture) one adverse counter, but not one that is in a mill. Having placed all their counters, the players continue moving alternately, with the same object. A mill may be opened by moving one piece off the line; returning the same piece to its original position counts as a new mill. The player who captures all but two of the adverse pieces wins. A move is normally from one point to the next in either direction along a line, but the rule is sometimes made that, when a player has only three pieces left, he may move them from any point to any point regardless of the lines.

ninepins, bowling game that probably originated in continental Europe during the Middle Ages. Many regional variations of the game developed. Early German ninepins lanes were made of clay or cinders; later a single long plank about one foot wide was added, on which the ball was rolled. The pins were set up in a square formation with one corner toward the bowler. These features are retained in the modern games asphalt, bohle, and schere, which are recognized for international competition by the Fédération Internationale des Quilleurs (International Federation of Bowlers). Skittles (*q.v.*), a British variation of ninepins, is also still played. The game of ninepins was brought to America by early Dutch colonists, but it was supplanted there in the mid-19th century by the tenpin game.

1927, Generation of, Spanish GENERACIÓN DEL 1927, in Spain, a group of poets and other writers who rose to prominence in the late 1920s and who derived their collective name from the year in which several of them produced important commemorative editions of the poetry of Luis de Góngora y Argote on the tercentenary of his death. In contrast to the earlier Generation of '98, most of whom were prose writers, the members of the Generation of 1927 were almost without exception poets. Chief among them were Federico García Lorca, Rafael Alberti, Jorge Guillén, Vicente Aleixandre, Luis Cernuda, Pedro Salinas, Gerardo Diego, and Dámaso Alonso. Generally speaking, these poets were influenced by such wider European movements as Symbolism, Futurism, and Surrealism, and they helped introduce the tenets of these movements into Spanish literature. They rejected the use of traditional metre and rhyme and discarded anecdotal treatment and strictly logical descriptions in their poems. Instead, they made a constant and audacious use of metaphor, coined new words, and introduced highly symbolic or suggestive images into their poems in an effort to convey aspects of inner personal experience. They also drew on ballads, traditional songs and lyrics, and on Góngora's poetry itself for subject matter.

The poets of the Generation of 1927 differed in their individual styles and concerns but collectively formed the dominant trend in Spanish poetry during the 1920s, '30s, and early '40s. The Spanish Civil War (1936–39) and its aftermath blunted the type of experimentation practiced by these poets, however, and subsequent Spanish poetry turned away from their cultivated and abstruse aestheticism.

1932, Revolution of (Thailand): *see* Promoters Revolution.

'98, Generation of, also called GENERATION OF 1898, Spanish GENERACIÓN DEL '98, or GENERACIÓN DEL 1898, in Spain, the novelists, poets, essayists, and thinkers active at the time of the Spanish–American War (1898), who reinvigorated Spanish letters and restored Spain to a position of intellectual and literary prominence that it had not held for centuries.

The shock of Spain's defeat in the war, which left it stripped of the last vestiges of its empire and its international prestige, provided an impetus for many writers and thinkers to embark on a period of self-searching and an analysis of Spain's problems and its destiny.

The term Generation of '98 was used loosely at the turn of the century but was elaborated by the literary critic Azorín (*q.v.*) in critical essays that appeared in various periodicals and were collected in his *Clásicos y modernos* (1913). It was soon generally applied to the writers who concerned themselves with Spain's heritage and its position in the modern world. Never an organized movement or school, the Generation of '98 worked in diverse fields and styles and rarely agreed on approaches or solutions to Spain's problems, but all had in common a desire to shake the Spanish people out of what they saw as apathy and to restore a sense of national pride.

Joaquín Costa, Ángel Ganivet, and Miguel de Unamuno are generally considered precursors of the Generation of '98, but many literary historians consider Ganivet and, usually, Unamuno as members of the group proper. Other outstanding figures were Azorín himself, the philosopher and critic José Ortega y Gasset, the novelists Pío Baroja, Vicente Blasco Ibáñez, and Ramón María del Valle-Inclán, and the poets Antonio Machado y Ruiz and Manuel Machado y Ruiz (*qq.v.*). In their revitalization of Spanish letters, they brought a new seriousness of purpose to the Spanish novel and elevated the essay—critical, psychological, philosophical—to a position of literary importance. At the same time, they brought to Spain an awareness of trends in foreign literature and thought that enabled the Spanish people to reassess their own values in the context of the modern world, thus awakening a national consciousness that paved the way for subsequent cultural development.

Ninety-five Theses, propositions for debate concerned with the question of indulgences, written (in Latin) and posted, according to legend, by Martin Luther on the door of the Schlosskirche (Castle Church), Wittenberg, on Oct. 31, 1517. This event is often seen as the beginning of the Protestant Reformation.

Luther was simply following current practice, when he nailed the theses to the church door, of inviting debate and discussion. Ordinarily, Luther's theses would have been of interest only to professional theologians, but various political and religious situations of the time, and the fact that printing had been invented, combined to make the theses known throughout Germany within a few weeks. Luther did not give them to the people, although he did send copies to the Archbishop of Mainz and to the Bishop of Brandenburg. Others, however, translated them into German and had them printed and circulated. Thus, they became a manifesto that turned a protest about an indulgence scandal into the greatest crisis in the history of the Western Christian Church.

The doctrine concerning indulgences (*q.v.*) was uncertain in the Roman Catholic Church prior to the Council of Trent (1545–63), which defined the doctrine and eliminated abuses. Indulgences were the commutation for money of part of the temporal penalty due for sin—*i.e.,* the practical satisfaction that was a part of the sacrament of penance. They were granted on papal authority and made available through accredited agents. Not at any time did they imply that divine forgiveness could be bought or sold or that they availed for those who were impenitent or unconfessed. But during the Middle Ages, as papal financial difficulties grew more complicated, they were resorted to very often, and abuses grew common. Further misunderstanding developed after Pope Sixtus IV extended indulgences to souls in purgatory. The often outrageous statements of indulgence sellers were a matter of protest among theologians.

The immediate cause of scandal in Germany in 1517 was the issue of an indulgence that was to pay for the rebuilding of St. Peter's in Rome. But by secret agreement of which most Germans, probably including Luther, were unaware, half the proceeds of the German sales were to be diverted to meet the huge debt owed to the financial house of Fugger by the archbishop and elector Albert of Mainz, who had incurred the debt in order to pay the Pope for appointing him to high offices. Such a prince could not afford to be squeamish about the methods and language used by his agents, and the agent in Germany, the Dominican Johann Tetzel, made extravagant claims for the indulgence he was selling. The sale of this indulgence was forbidden in Wittenberg by the elector Frederick III the Wise, who preferred that the faithful should make their offerings at his own great collection of relics, exhibited in the Church of All Saints. Nevertheless, Wittenberg church members went to Tetzel, who was preaching nearby, and they showed the pardons for their sins received from him to Luther. Outraged at what he considered grave theological error, Luther wrote the Ninety-five Theses.

The theses were tentative opinions, about some of which Luther had not decided. In the theses the papal prerogative in this matter was not denied, though by implication papal policy was criticized. The spiritual, inward character of the Christian faith was stressed. The fact was emphasized that money was being collected from poor people and sent to the rich papacy in Rome, a point popular with the Germans, who had long resented the money they were forced to contribute to Rome.

Subsequently, the Archbishop of Mainz, alarmed and annoyed, forwarded the documents to Rome in December 1517, with the request that Luther be inhibited. A counterthesis was prepared by a Dominican theologian and defended before a Dominican audience at Frankfurt in January 1518. When Luther realized the extensive interest his tentative theses had aroused, he prepared a long Latin manuscript with explanations of his Ninety-five Theses, published in the autumn of 1518.

The practice of dating the beginning of the Reformation from the date that the Ninety-five Theses were posted did not develop until after the mid-17th century.

Ninety Mile Beach, western coast of Aupori Peninsula, the northernmost extension of North Auckland Peninsula, North Island, New Zealand. It stretches for 55 mi (88 km) from Scott Point (northwest) to Ahipara Bay (southwest) and is bordered by scrubland and sand dunes.

In 1643 the Dutch navigator Abel Tasman referred to the beach as "a desert coast." Now a resort area, it offers fishing (especially for toheroa, a shellfish delicacy) and automobile racing on the hard-packed strand.

Nineveh, the oldest and most populous city of the ancient Assyrian Empire, situated on the east bank of the Tigris opposite modern Mosul (in Iraq). From time immemorial, roads from the foothills of Kurdistan debouched there, and a tributary of the Tigris, the Khawṣar River, added to the value of the fertile agricultural and pastoral lands in the district.

The first person to survey and map Nineveh was the archaeologist Claudius J. Rich in 1820, a work later completed by Felix Jones and published by him in 1854. Excavations have been undertaken intermittently since that period by many persons. A.H. (later Sir Henry) Layard during 1845–51 discovered the palace of Sennacherib and took back to England an unrivalled collection of stone bas-reliefs together with thousands of tablets inscribed in cuneiform from the great library of Ashurbanipal. Hormuzd Rassam continued the work in 1852. During 1929–32 R. Campbell Thompson excavated the temple of Nabu (Nebo) on behalf of the British Museum and discovered the site of the palace of Ashurnasirpal II. In 1931–32, together with M.E.L. (later Sir Max) Mallowan, Thompson for the first time dug a shaft from the top of the Quyunjik (Acropolis), 90 feet (30 metres) above the level of the plain, down through strata of accumulated debris of earlier cultures to virgin soil. It was then proved that more than four-fifths of this great accumulation is prehistoric.

History. The first settlement, a small Neolithic hamlet, was probably founded not later than the 7th millennium BC. Hassuna-Sāmarrā' and Tall Ḥalaf painted pottery of the subsequent Early Chalcolithic phases, characteristic of the north, was succeeded by gray wares such as occur westward in the Jabal Sinjār. Farmers during the 4th millennium used clay sickles of [illegible] type found in the Ubaid Period, and these imply contact with the south.

One of the most remarkable discoveries that Mallowan and Thompson made in the prehistoric strata consisted of roughly made, bevelled bowls, overturned in the soil and filled with vegetable matter. These may have been intended as magical offerings to expel evil spirits from houses. Their typology conforms exactly with that of Uruk (Erech) pottery, widespread throughout the Tigris–Euphrates Valley in the late 4th millennium. In these levels also large metal vases occur, again characteristic of southern Babylonia, and technologically this district of the Tigris had much in common with the cities of the lower Euphrates Valley at this period. This similarity is of particular interest because it indicates that some time before 3000 BC a period of economic prosperity had united the commercial interests of north and south; later these two civilizations diverged widely.

A little before and after 3000 BC, unpainted Ninevite pottery was similar to that used at Sumerian sites; to approximately the same period belongs a series of attractively painted and incised ware known as Ninevite V, which is a home product distinct from that of the south. Beads found in these strata may be dated *c.* 2900 BC.

The most remarkable object of the 3rd millennium BC is a realistic bronze head—life-size, cast, and chased—of a bearded monarch. This, the finest piece of metal sculpture ever recovered from Mesopotamia, may represent the famous king Sargon of Akkad (*c.* 2334–*c.* 2279 BC). This bronze head, however (now in the Iraq Museum, Baghdad), because of its brilliant technique and elaborately modelled features, is thought by some authorities to belong to a rather later stage of the Akkadian Period (*c.* 2334–*c.* 2154 BC); if so, the head might represent King Naram-Sin (*c.* 2254–*c.* 2218 BC). The hypothesis for the earlier period seems preferable, for metal work advanced more rapidly in style in Mesopotamia at that period than did stone sculpture, and it is known from inscriptions that Sargon's second son, Manishtusu, had built the temple of E-Mashmash at Nineveh by virtue of being the "son of Sargon"; thus a model of the founder of the dynasty would have been appropriately placed there.

Surprisingly, there is no large body of evidence to show that Assyrian monarchs built at all extensively in Nineveh during the 2nd millennium BC. Later monarchs whose inscriptions have appeared on the Acropolis include Shalmaneser I and Tiglath-pileser I, both of whom were active builders in Ashur; the former had founded Calah (Nimrūd). Nineveh had to wait for the neo-Assyrians, particularly from the time of Ashurnasirpal II (ruled 883–859 BC) onward, for a considerable architectural expansion. Thereafter successive monarchs kept in repair and founded new palaces, temples to Sin, Nergal, Nanna, Shamash, Ishtar, and Nabu (Nebo). Unfortunately, severe depredations have left few remains of these edifices.

It was Sennacherib who made Nineveh a truly magnificent city (*c.* 700 BC). He laid out fresh streets and squares and built within it the famous "palace without a rival," the plan of which has been mostly recovered and has overall dimensions of about 600 by 630 feet. It comprised at least 80 rooms, of which many were lined with sculpture. A large part of the famous "K" collection of tablets was found there (see below); some of the principal doorways were flanked by human-headed bulls. At this time the total area of Nineveh comprised about 1,800 acres (700 hectares), and 15 great gates penetrated its walls. An elaborate system of 18 canals brought water from the hills to Nineveh, and several sections of a magnificently constructed aqueduct erected by the same monarch were discovered at Jerwan, about 25 miles (40 kilometres) distant.

His successor Esarhaddon built an arsenal in the Nabī Yūnus mound, south of Quyunjik, and either he or his successor set up statues of the pharaoh Taharqa (Tarku) at its entrance as trophies to celebrate the conquest of Egypt. These were discovered by Fuad Safar and Muhammad 'Alī Muṣṭafā on behalf of the Iraqi Department of Antiquities in 1954.

Ashurbanipal later in the 7th century BC constructed a new palace at the northwest end of the Acropolis. He also founded the great library and ordered his scribes to collect and copy ancient texts throughout the country. The "K" collection included more than 20,000 tablets or fragments of tablets and incorporated the ancient lore of Mesopotamia. The subjects are literary, religious, and administrative, and a great many tablets are in the form of letters. Branches of learning represented include mathematics, botany, chemistry, and lexicology. The library contains a mass of information about the ancient world and will exercise scholars for generations to come.

Fourteen years after the death of Ashurbanipal, however, Nineveh suffered a defeat from which it never recovered. Extensive traces of ash, representing the sack of the city by Babylonians, Scythians, and Medes in 612 BC, have been found in many parts of the Acropolis. After 612 BC the city ceased to be important, although there are some Seleucid and Greek remains. Xenophon in the *Anabasis* recorded the name of the city as Mespila. In the 13th century AD the city seems to have enjoyed some prosperity under the atabegs of Mosul. Subsequently, houses continued to be inhabited at least as late as the 16th century AD. In these later levels imitations of Chinese wares have been found.

Outline of the city. From the ruins it has been established that the perimeter of the great Assyrian city wall was about 7.5 miles (12 km) long and in places up to 148 feet (45 m) wide; there was also a great unfinished outer rampart, protected by a moat, and the Khawṣar River flowed through the centre of the city to join the Tigris on the western side of it.

The 15 great gates that intersected the Acropolis walls were built partly of mud brick and partly of stone. The long eastern sector, about 3 miles (5 km), contained six gates; the southern sector, 2,624 feet (800 m), contained only one, the Ashur Gate; the western sector, about 2.5 miles (4 km), had five gates; the northern sector, about 1.2 miles (1.9 km), three gates, Adad, Nergal, and Sin. Several of these entrances are known to have been faced with stone colossi (lamassu). In the Nergal Gate two winged stone bulls, attributable to Sennacherib, have been reinstalled: a site museum has been erected adjacent to it by the Iraqi Department of Antiquities. The Adad Gate contained many inscribed tiles, and what may prove to be the Sin Gate contained a corridor that led through an arched doorway into a ramp or stairwell giving access to the battlements.

Most impressive was the Shamash Gate, which has been thoroughly excavated by Tariq Madhloum on behalf of the Iraqi Department of Antiquities. It was found to have been approached across two moats and a watercourse by a series of bridges in which the arches were cut out of the natural conglomerate. The wall was faced with limestone and surmounted by a crenellated parapet, behind which ran a defense causeway. The structure was constructed of mud as well as burnt bricks, which bore the stamp of Sennacherib. There was an entrance 14.8 feet (4.5 m) wide in the centre of a long, projecting bastion, which was further strengthened by six towers. Crudely incised stone slabs on the inner side of the gateway depicted the burning of a tower; it is possible that these carvings represented the fall of Nineveh and are post-Assyrian. The internal plan of the gate includes six great chambers lined with uncarved orthostats (upright slabs), which were discovered by Layard and Rassam.

Archaeologists also have been active within the Quyunjik (Acropolis). Since 1966 restoration has proceeded on the throne room of Sennacherib's palace and some of the adjoining chambers. All the entrances to the two main chambers were found flanked by winged bull colossi, and a series of orthostats not recorded by any of the 19th-century excavators has been recovered. One such slab illustrates a foreign city, heavily defended by towers, surrendering to the Assyrian army. Adjoining the throne room is a stone-paved bathroom, and the great antehall contained no fewer than 40 carved orthostats. The subjects represented include Sennacherib's campaigns against mountain-dwelling peoples, besieged cities, and units of the Assyrian army.

(M.Mn.)

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Ning-po, also called YIN-HSIEN, Pinyin NINGBO, or YINXIAN, city in the coastal plain of northeastern Chekiang *sheng* (province), China. Ning-po ("Calm Waves") is situated on the Yung River, some 16 miles (25 km) upstream from its mouth, at the junction with its chief western tributary, the Yu-yao. Ning-po was from an early period itself a port, although the mouth of the river was masked by a mud bar. It has an outport on the western bank of the estuary, called Chen-hai, which originally had been a fishing port.

After Kou-chang *hsien* (county), a few miles to the east, was transferred to what is now Ning-po in 625, it became the seat of an independent *chou* (prefecture), Ming, in 738. In 908 the county seat's name, Mao-hsien since 625, was changed to Yin-hsien, which it has since retained. Under the Southern Sung (1126–1279), Ming *chou* was promoted in 1198 to a *fu* (superior prefecture), Ch'ing-yuan. It kept this name through the Yüan (Mongol) period (1206–1368). In 1368 it became Ning-po *fu,* which name it kept until 1912, when it was demoted to county status, taking the formal name of Yin-hsien.

Ning-po first rose to importance during the latter part of the 5th century, when Korean shipping found it the most convenient port for contacts with the southern capital at Nanking (Nan-ching; then called Chien-k'ang). Under the T'ang (618–907) this traffic continued. Although official relations lapsed after 838, private trade continued on a large scale. In the 11th century Ning-po became a centre of the coastal trade. Its importance grew with the establishment of the Southern Sung capital at Hang-chou in 1127, when overseas trade to and from the capital flowed through Ning-po. It grew rapidly during the Sung (960–1279) and Yüan periods.

The early period of the Ming dynasty (1368–1644) brought a setback to Ning-po's development. Overseas trade was deliberately curtailed by the government and the building of oceangoing ships prohibited, and even coastal trade was severely restricted. Ning-po was attacked by Japanese pirates, and it became a defensive base of some importance. Its growth seems to have stagnated, however, until the last quarter of the 15th century, when the rural prosperity of its hinterland began to recover.

This recovery was assisted when the Portuguese began trading in Ning-po in 1545, at first illicitly, but later (after 1567) legally. Still later, Dutch and British merchants arrived, and the Ning-po merchants began to trade with the China coast from Manchuria to Canton, as well as with the Philippines and Taiwan. Ning-po was the commercial centre of the coastal plain to the east of Shao-hsing and an outport for the Yangtze River Delta area, to which it was linked by the Che-tung Canal leading to Shao-hsing and the Ch'ien-t'ang River. As a result, in the 17th and 18th centuries the Ning-po merchants became important in China's internal commerce and began to play a national role as bankers in the early 19th century. In 1843 Ning-po was opened to foreign trade as a treaty port, but trade declined, and its place was taken by Shanghai.

Modern Ning-po is a local commercial centre and a busy port for northeastern Chekiang. Steamships of 3,000 tons can use the port, and there are regular steamer services to Shanghai. A large passenger terminal was built in 1979. A separate new port, Pei-lun, nearby was designed to be one of China's largest transfer docks and a centre for the import of Australian iron ore. There is a rail link with Shanghai via Hang-chou, and Ning-po is also the centre of a transportation network of coastal junk traffic, canals, and roads. It is a collection centre for cotton and other agricultural produce of the plain, for the marine products of the local fishing industry, and for timber from the mountains in the hinterland and is a major distribution centre for coal, oil, textiles, and consumer goods. In 1984 Ning-po was designated one of China's "open" cities in the new open-door policy inviting foreign investment.

Cotton-spinning mills, flour mills, textile plants, and tobacco factories were established before World War II, and from 1949 industrialization continued. The textile industry has expanded with new textile plants, knitting factories, dyeing plants, and yarn-spinning mills. Food processing—flour milling, rice polishing, oil extraction, wine making, and particularly the canning of foodstuffs—has become a large-scale industry. In addition, Ning-po supports a number of manufacturing concerns. A large shipbuilding industry constructs fishing vessels. Factories produce diesel engines, agricultural and other machinery, generators, machine tools, and petrochemicals.

The oldest library building in China, T'ien-i Ko, is in the western part of the city. Its collection of rare books and documents goes back to the 11th century and includes many unique local chronicles of the Ming dynasty. Pop. (1985 est.) city centre, 422,000; city, 615,600; city and administratively attached counties, 4,841,900.

Ning Tsung, Pinyin NING ZONG (temple name), personal name CHAO K'UO (b. 1168, Hangchow, Chekiang Province, China—d. 1224, Hangchow), 13th emperor of the Sung dynasty, whose reign (1194/95–1224/25) is noted as a period of intellectual and cultural achievement; Chu Hsi, the great Neo-Confucian philosopher, wrote some of his most famous works during this time. The government, however, was plagued by rising inflation, and the emperor came under the domination of the minister Han T'o-chou, who attempted to recover the Sung territory in North China that had been lost to the Juchen several generations earlier. The war was disastrous, and more territory was lost to the Juchen, who demanded a huge annual indemnity. During the negotiations with the Juchen, Han was assassinated, and a peace treaty was finally signed in 1208.

Ning Zong (Chinese emperor): *see* Ning Tsung.

Ningirsu (Mesopotamian god): *see* Ninurta.

Ningishzida, in Mesopotamian religion, Sumerian deity, city god of Gishbanda, near Ur in the southern orchard region. Although Ningishzida was a power of the netherworld, where he held the office of throne bearer, he seems to have originally been a tree god, for his name apparently means "Lord Productive Tree." In particular, he probably was god of the winding tree roots, since he originally was represented in serpent shape. When pictured in human form, two serpent heads grow from his shoulders in addition to the human head, and he rides on a dragon. He was a son of Ninazu and Ningirda and was the husband of Ninazimua ("Lady Flawlessly Grown Branch").

Ningre-Tongo (creole language): *see* Sranantonga.

Ningsia, in full HUI AUTONOMOUS REGION OF NINGSIA, Chinese (Wade–Giles romanization) NING-HSIA-HUI-TSU TZU-CHIH-CH'Ü, Pinyin NINGXIA HUIZU ZIZHIQU, autonomous region of the People's Republic of China, located in northern China and bounded on the west by Kansu, on the north by the Inner Mongolia Autonomous Region, and on the east by Shansi *sheng* (province) and otherwise surrounded by Kansu *sheng*. Ningsia is nearly coextensive with the ancient kingdom of the Tangut people.

A brief treatment of the Hui Autonomous Region of Ningsia follows. For full treatment, *see* MACROPAEDIA: China.

Irrigation canals on the Ningsia plains of the Huang Ho (river) dating from about 220 BC provide evidence that the area has long been inhabited. In the 11th century AD it became part of the kingdom of Tangut in western China. Yin-ch'uan, its chief city, was captured by Genghis Khan early in the 13th century and remained a tributary to China. After this conquest it was named Ningsia ("Peaceful Hsia"). In 1914 the area became a part of the province of Kansu, and in 1928 it was constituted as the province of Ningsia. In 1954 it again merged with Kansu; in 1956 that part of Ningsia largely occupied by Mongolians became a part of the Inner Mongolia Autonomous Region. In 1958 the rest of the former province became the Hui Autonomous Region of Ningsia. The capital is Yin-ch'uan.

Most of the region is desert, but the vast plain of the Huang Ho in the north has been irrigated for centuries. Over the years many canals have been built. The network of willow-lined canals and paddy fields gives the landscape a look resembling that of southern China. The river enters from a plateau in Kansu and flows east and then north into Inner Mongolia. West of the plain are the Ho-lan Mountains, which serve as a shelter against the sandstorms from the Ala Shan, a desert to the west. The plain is extremely arid, receiving only 8 inches (200 mm) of rainfall per year. The climate is continental.

The ethnic composition of Ningsia includes the Han (Chinese-speaking Chinese), Hui (Chinese Muslims), Mongolians, and Manchu. The people speak Mandarin Chinese, Tibetan, and Mongolian. Most of the population live in rural areas and farm the land. Ningsia is one of China's more sparsely settled regions. In the widely scattered cities, most workers are engaged in handicrafts, although mining and manufacturing, recently developed, offer employment opportunities.

Abundant wheat and high-quality rice are produced on the Ningsia plain. Cash crops include sesame and sugar beet. Other crops are millet, cotton, melons, and apricots. Sheep are raised. The Manchu particularly, are well known for raising and breeding pigs. The province's mineral resources are limited to coking-coal reserves in the P'ing-lo area, near the Inner Mongolian border.

Industry and agriculture in Ningsia have been aided in their development by the Pao-t'ou–Lan'chou railway, an extension of the main Peking–Pao-t'ou railway. Area 23,000 square miles (60,000 square km). Pop. (1985 est.) 4,060,000.

Ningsia carpet, floor covering woven in Hui Autonomous Region of Ningsia, China, characterized by a stylized pictorial design and subtle use of blue, red, and beige. Geometrical patterns are sometimes used. The heavy wool pile of the Ningsia is cut so that the design is in relief. The foundation weave is cotton.

Ninhar, also called NINGUBLA, in Mesopotamian religion, Sumerian deity, city god of Kiabrig, near Ur in the southern herding region. Ninhar was god of the thunder and rainstorms that made the desert green with pasturage in the spring; as such he was represented in the form of a roaring bull. He was the son of Nanna (Akkadian Sin) and Ningal and the husband of Ninigara ("Lady of Butter and Cream"), goddess of the dairy.

Ninhursag, also spelled NINHURSAGA (Sumerian), Akkadian BELIT-ILI, in Mesopotamian religion, city goddess of Adab and of Kish in the northern herding regions; she was the goddess of the stony, rocky ground, the *hursag*. In particular, she had the power in the foothills and desert to produce wildlife. Especially prominent among her offspring were the onagers (wild asses) of the western desert. As the sorrowing mother animal she appears in a lament for her son, a young colt, but as goddess of birth she is not only the goddess of animal birth but the Mother of All Children, a mother-goddess figure. Her other names include: Dingirmakh ("Exalted Deity"), Ninmakh ("Exalted Lady"), Aruru ("Dropper," *i.e.*, the one who "loosens" the scion in birth), and Nintur ("Lady Birth Giver"). Her husband is the god Shulpae, and among their children were the sons Mululil and Ashshirgi and the daughter Egime. Mululil seems to have been a dying god, like Dumuzi, whose death was lamented in yearly rites.

Ninian, SAINT, also called NYNIA, NINIAS, RIGNA, TRIGNAN, NINNIDH, RINGAN, NINUS, or DINAN (b. *c.* 360, Britain—d. *c.* 432, Britain; feast day September 16), bishop generally credited as the first Christian missionary to Scotland, responsible for widespread conversions among the Celts.

The two primary historical sources about Ninian's life and work are of dubious reliability. According to one, a 12th-century life by abbot Aelred (Ethelred) of Rievaulx, Ninian was the son of a Christian Briton chieftain. He made a pilgrimage to Rome, where he was consecrated as a bishop, and, in Aelred's narrative, traveled through Gaul on his return journey, along the way befriending St. Martin of Tours. An earlier source, the Venerable Bede's 8th-century *Ecclesiastical History of the English People,* implies that Ninian began the conversion of the Picts, a notion based on even earlier—and not entirely trustworthy—accounts of the period.

More certainly, Ninian was the first bishop of Galloway. That he established his see at Whithorn, Caledonia, is a supposition borne out by modern anthropology. There, in about 397, he built a whitewashed stone church (hence Whithorn, or White House, from the Anglo-Saxon *Huitaern;* Latin *Candida Casa*)—a notable departure from the customary wooden churches of the Britons. The monastery that he established at Whithorn was, by the 6th century, a leading Anglo-Saxon monastic centre.

Historically, there is little doubt that Ninian carried out his mission in Scotland, although there is some confusion about the areas that he visited. Modern scholars believe that, though his influence among the Picts may have been overestimated, his success with the Celts was evidently much greater. Indisputable evidence of his influence survived in the large number of churches dedicated to him throughout Scotland and in several locations in northern England, and it is generally agreed that his missionary work prepared the foundation for the later efforts of Saints Columba and Kentigern.

St. Ninian's shrine at Whithorn drew many pilgrims, among them King James IV of Scotland, who was a regular visitor. The Roman Catholic diocese of Galloway retains Candida Casa as its official name.

Ninigi, in full NINIGI NO MIKOTO, Japanese deity, grandson of the sun goddess Amaterasu. Ninigi's supposed descent to earth established the divine origin of the Yamato clan, the Imperial house of Japan. He is said to have been the great-grandfather of the first emperor, Jimmu.

Amaterasu delegated Ninigi to assume ownership and rule of the central land of the reed plains (Japan) and gave him three signs of his charge: a jewel (symbolizing benevolence), a mirror (purity), and Kusanagi, the "grass-mowing" sword (courage). The jewel, the mirror, and the sword are still the Japanese Imperial symbols. On his descent to earth Ninigi landed on Kyushu, the southernmost of the main islands. Ōkuninushi no Mikoto, who was already sovereign there, was reluctant to give up his own right to rule but submitted when he was permitted to retain control of "secret" (religious) affairs, with Ninigi supervising "public" (political) affairs. Today, Ōkuninushi remains an important folk deity, while Ninigi is no longer venerated.

Nininsina, also called NINKARRAK (Mesopotamian deity): *see* Bau.

Ninlil (Mesopotamian deity): *see* Belit.

Ninnidh, SAINT: *see* Ninian, Saint.

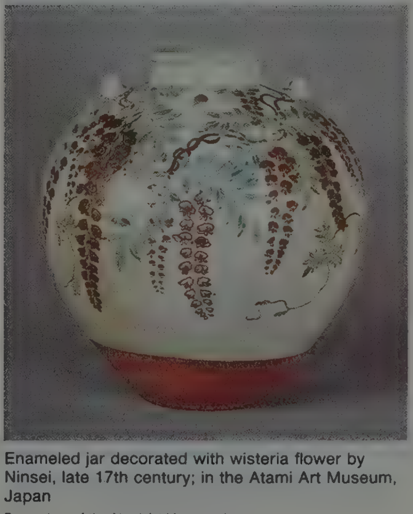
Niño, El (oceanic phenomenon): *see* El Niño.

Ninomiya Sontoku, also called NINOMIYA KINJIRŌ (b. Sept. 4, 1787, Kayama, Sagami Province, Japan—d. Nov. 17, 1856, Imaichi, Shimotsuke Province), Japanese agrarian reformer who helped improve agricultural techniques and whose writings exalting rural life earned him the affectionate title of the "Peasant Sage of Japan."

Born into a poor family, Ninomiya was completely self-educated. Through diligence and careful planning he was able to develop and increase his family's landholdings. His success came to the attention of local officials, and he was soon invited to join the government. There was nothing revolutionary in Ninomiya's system. He taught peasant families how to budget their expenses and plan their work, and he advocated mutual aid and cooperation in farm communities. Nevertheless, his methods achieved remarkable success in improving agriculture; his fame became widespread when the regions that he had developed suffered very little during the great national famine of 1836.

Ninomiya was also a moral leader who believed in the value of hard work and the dignity of manual labour and was able to instill in the peasants pride in their own occupations and the urge to follow his example of working to improve the general welfare. In the long run his ideas may have helped spur a desire for a more equalitarian social order.

Ninsei, pseudonym of NONOMURA SEISUKE, also called SEIEMON (fl. 17th century), Japanese



Enameled jar decorated with wisteria flower by Ninsei, late 17th century; in the Atami Art Museum, Japan

By courtesy of the Atami Art Museum, Japan potter active in Kyōto during the Edo period between the Meireki (1655–57) and the Genroku (1688–1703) eras. He learned the art of ceramics by working at the Awata-guchi kiln in Kyōto and the Seto kiln in Mino. His patron, the prince of the Ninna Temple at Omuro Katamachi, allowed him to build his kiln in front of the temple complex. He specialized in tea ceremony wares, notable for their delicate shapes and fine glaze and decorated in traditional motifs. Some of his finest works are his tea urns, or *cha-tsubo.*

Ninsun, in Mesopotamian religion, Sumerian deity, city goddess of Kullab in the southern herding region. As Ninsun's name, "Lady Wild Cow," indicates, she was originally represented in cow form and was considered the divine power behind, as well as the embodiment of, all the qualities the herdsman wished for in his cows: she was the "flawless cow" and a "mother of good offspring that loves the offspring." She was, however, also represented in human form and could give birth to human offspring. The Wild Bull Dumuzi (as distinct from Dumuzi the Shepherd) was traditionally her son, whom she lamented in the yearly ritual marking his death. In her role as a mother figure, her other Sumerian counterparts include Ninhursag (Akkadian: Belit-ili) and Ninlil (Belit). Ninsun's husband was the legendary hero Lugalbanda. *See also* Tammuz.

Ninth of Av (Judaism): *see* Tisha be-Av.

Ninurta, also called NINGIRSU, in Mesopotamian religion, city god of Girsu (Ṭal'ah, or Telloh) in the Lagash region. Ninurta was the farmer's version of the god of the thunder and rainstorms of the spring. He was also the power in the floods of spring and was god of the plow and of plowing. Ninurta's earliest name was Imdugud (now also read as Anzu), which means "rain cloud," and his earliest form was that of the thundercloud envisaged as an enormous black bird floating on outstretched wings roaring its thunder cry from a lion's head. With the growing tendency toward anthropomorphism, the old form and name were gradually disassociated from the god as merely his emblems; enmity toward the older inacceptable shape eventually made it evil, an ancient enemy of the god.

Ninurta was the son of Enlil (Akkadian: Bel) and Ninlil (Belit) and was married to Bau, in Nippur called Ninnibru, Queen of Nippur. A major festival of his, the Gudsisu Festival, marked in Nippur the beginning of the plowing season.

Ninus, in Greek mythology, king of Assyria and the eponymous founder of the city of Nineveh, which itself is sometimes called Ninus. He was said to have been the son of Belos, or Bel, and to have conquered in 17 years all of western Asia with the help of Ariaeus, king of Arabia. During the siege of Bactra he met Semiramis, the wife of one of his officers, Onnes; he then took her from Onnes and married her. The fruit of the marriage was Ninyas—*i.e.,* the Ninevite.

Ninus, SAINT: *see* Ninian, Saint.

Niobe, in Greek mythology, the daughter of Tantalus (king of Sipylus in Lydia) and wife of King Amphion of Thebes. She was the prototype of the bereaved mother, weeping for the loss of her children. According to Homer's *Iliad,* she had six sons and six daughters and boasted of her progenitive superiority to the Titan Leto, who had only two children, the twin deities Apollo and Artemis. As punishment for her pride, Apollo killed all Niobe's sons, and Artemis killed all her daughters. The bodies lay for nine days unburied because Zeus had turned all the Thebans to stone, but on the 10th day they were buried by the gods. Niobe went back to her Phrygian home, where she was turned into a rock on Mount Sipylus (Yamanlar Dağı, northeast of Izmir, Tur.), which continues to weep when the snow melts above it.

The story of Niobe illustrates the favourite Greek theme that the gods are quick to take vengeance (nemesis) on human pride and arrogance (hubris). Niobe is the subject of lost tragedies by both Aeschylus and Sophocles, and Ovid tells her story in his *Metamorphoses.* The number of her children, which varies with different authors, is generally given in post-Homeric literature as seven sons and seven daughters. The origin of the name Niobe is uncertain; it may have been of non-Greek origin and perhaps derived from Asia Minor, which seems also to have been the source of her story.

Apollo and Artemis killing the children of Niobe, red-figure calyx krater by the Niobid Painter, c. 455–450 BC; in the Louvre, Paris

Cliche Musees Nationaux, Paris

Niobid Painter (fl. *c.* 475–450 BC), painter of flower-shaped Greek vases, named for a calyx krater (mixing bowl) with a representation of the death of the children of Niobe, now at the Louvre Museum, Paris. The vessel is thought to reflect the innovative technique of the now lost mural paintings of Polygnotus, another Greek painter of the 5th century BC.

In the scene of the death of the children of Niobe and in the scene of Athena and Heracles on the other side of the krater, the Niobid Painter has arranged his figures so that they are set on different levels, suggesting different ground lines by means of a fine, painted white line. Landscape setting, too, is suggested: Athena and Heracles appear to be standing on a hilly terrain. Apparently, the Niobid Painter made a deliberate attempt to express space and depth.

niobium (Nb), chemical element, refractory metal of Group Vb of the periodic table, used in alloys, tools and dies, and superconductive magnets. Niobium is closely associated with tantalum in ores and in properties.

A brief treatment of niobium follows. For information on the mining, recovery, and applications of niobium, *see* MACROPAEDIA: Industries, Extraction and Processing.

Niobium was first discovered (1801) in a New England mineral by the English chemist Charles Hatchett, who called the element columbium; it was rediscovered and named (1844) by the German chemist Heinrich Rose. International agreement among chemists (about 1950) finally established the name niobium, though columbium persisted in the U.S. metallurgical industry.

Niobium, more plentiful than lead and less abundant than copper in the Earth's crust, occurs dispersed except for a relatively few minerals, of which columbite and pyrochlore are the principal commercial sources. Natural niobium occurs entirely as the stable isotope niobium-93. Separation from tantalum, when necessary, is effected by solvent extraction; the niobium is then precipitated and roasted to niobium pentoxide, which is reduced to niobium powder through metallothermic and hydriding processes. The powder is consolidated and purified further by electron-beam melting. Vacuum sintering of powder is also used for consolidation.

The pure metal is soft and ductile; it looks like steel or, when polished, like platinum. Although it has excellent corrosion resistance, niobium is susceptible to oxidation above about 400° C (750° F). Completely miscible with iron, it is added in the form of ferroniobium to some stainless steels to give stability on welding or heating. Niobium is used as a major alloying element in nickel-based superalloys and as a minor but important additive to high-strength, low-alloy steels. Because of its compatibility with uranium, resistance to corrosion by molten alkali-metal coolants, and low thermal-neutron cross section, it has been used alone or alloyed with zirconium in claddings for nuclear reactor cores. Cemented carbides used as hot-pressing dies and cutting tools are made harder and more resistant to shock and erosion by the presence of niobium. Niobium is useful in constructing cryogenic (low temperature) electronic devices of low power consumption. Niobium-tin (Nb_3Sn) is a superconductor below 18.45 Kelvins (K), and niobium metal itself, below 9.15 K.

Compounds of niobium are of relatively minor importance. Those found in nature are pentavalent, but compounds of lower valences (2–4) have been prepared. Tetravalent niobium, for example, in the form of the carbide, NbC, is used for making cemented carbides.

atomic number	41
atomic weight	92.906
melting point	2,468° C (4,474° F)
boiling point	4,927° C (8,901° F)
specific gravity	8.57 (20° C)
valence	2, 3, 4, 5
electronic config.	2-8-18-12-1 or $(Kr)4d^45s^1$

Niobrara Limestone, geologic division of rocks in the United States during the Late Cretaceous Period (97.5 to 66.4 million years ago). Named for exposures studied along the Missouri River near the mouth of the Niobrara River, Knox county, Neb., the Niobrara occurs over a wide area including Nebraska, Kansas, North and South Dakota, Minnesota, Montana, Wyoming, Colorado, and New Mexico. The Niobrara Limestone varies in thickness from about 60 m (200 feet) to more than 270 m and consists of chalks, shales, limestones, and many thin layers of bentonite (altered volcanic-ash deposits that appear like soapy clays).

The Niobrara marks the withdrawal of the Cretaceous seas from the region of the Rocky Mountain geosyncline. Aquatic reptiles such as the mosasaur *Clidastes,* which was about 4.5 m long, and flying reptiles such as *Pteranodon,* possessing a 7.5-metre wingspread, have been found in the Niobrara.

Articles are alphabetized word by word,
not letter by letter

Niobrara River, river rising near Lusk, Wyo., U.S., and flowing east across the High Plains, the northern edge of the sandhills, and the low eastern plains of Nebraska to join the Missouri at the village of Niobrara, Neb., at the South Dakota line. The name is of Indian origin and means "running, or spreading, water." Both are apt designations because the Niobrara has a more uniform flow than do most plains streams, due to steady groundwater contributions from tributaries in the sandhills, while in its lower course it is wide and shallow. The river is 447 miles (720 km) long and drains 12,000 square miles (31,080 square km). Box Butte Dam (1946) is on the river near Marsland, Neb.

Niort, town, capital of Deux-Sèvres *département,* Poitou-Charentes *région,* western France. The town lies on the slopes of two hills facing one another on the left bank of the Sèvre Niortaise River, above its silted estuary. It grew up in the shelter of a 12th–13th-century castle erected by Henry II of England and his son Richard I the Lion-Heart. The two square towers of the castle keep dominate the river. Niort became one of the centres of Protestantism in western France and suffered severely after the revocation of the Edict of Nantes in 1685. The 15th–16th-century Church of Notre-Dame stands south of the castle, and the 16th-century former town hall is on the opposite hill.

Niort is a major centre for the insurance industry and other commercial services. Besides its traditional production of chamois leather, the town specializes in the plywood industry and has electrical, chemical, and glove factories. Pop. (1990) 58,660.

Nipigon, Lake, lake, Thunder Bay district, west-central Ontario, Canada. Lake Nipigon lies 80 miles (130 km) northeast of Thunder Bay. It is about 70 miles (110 km) long and 50 miles (80 km) wide and has an area of 1,872 square miles (4,848 square km). The lake lies at an elevation of 1,050 feet (320 m) and has maximum depths of 540 feet (165 m). Its Indian name means "deep, clear water." The lake is studded with numerous islands, and promontories and large bays characterize its shoreline. The lake is drained southward into Lake Superior by the Nipigon River, which drops 250 feet (76 m) in its 30-mile (48-kilometre) course to Nipigon Bay. A hydroelectric development provides power for mining and for the entire lakehead region.

Nipissing, Lake, lake, southeastern Ontario, Canada. Lake Nipissing lies midway between the Ottawa River and Georgian Bay. It is 321 square miles (832 square km) in area and has a maximum length of 50 miles (80 km) and a maximum width of 30 miles (48 km). A remnant of glacial Lake Algonquin, which emptied eastward via the Ottawa River, Lake Nipissing ("little water") is now drained by the French River westward to Georgian Bay. It was discovered by a French explorer, Étienne Brûlé, about 1610 and later served as a fur-trading route linking the Ottawa River with the upper Great Lakes.

Nipkow, Paul Gottlieb (b. Aug. 22, 1860, Lauenburg, Pomerania [Germany]—d. Aug. 24, 1940, Berlin, Ger.), German engineer who discovered television's scanning principle, in which the light intensities of small portions of an image are successively analyzed and transmitted. Nipkow's invention in 1884 of a rotating disk (Nipkow disk) with one or more spirals of apertures that passed successively across the picture made a mechanical television system possible. The Nipkow disk was supplanted in 1934 by electronic scanning devices.

Nippon (Japanese: "Japan," or "Japanese"): *see under* Nihon, except as below.

Nippon (country, Asia): *see* Japan.

Nippon Hōsō Kyōkai (NHK), English JAPAN BROADCASTING CORPORATION, public radio and television system of Japan. It operates two television and three radio networks and is notable for its innovations in high-definition television.

NHK was founded as a state public utility corporation controlled by Japan's Ministry of Communications. It began operations in 1926 with the merger of the radio stations in Tokyo, Ōsaka, and Nagoya. Beginning in 1930 NHK became a propaganda outlet for Japan's increasingly militaristic government. With a new broadcast law in 1950, NHK was dissolved and a new public broadcasting corporation, also named NHK, was formed; the law forbade government intervention in programming and also, for the first time, permitted competition by private broadcasting stations. NHK began television broadcasting in 1953.

NHK, which does not broadcast advertising, is supported entirely by fees paid by its audience. One of its television networks provides educational programming, and the other provides general programming, including news (for which it is especially noted), cultural programs, sports (especially sumo wrestling and baseball), and entertainment. Both networks can be seen throughout Japan's principal islands. The NHK laboratories developed a television system using 1,125 scanning lines, and some of its satellite programming uses this high-definition system daily.

Since 1951 the network has sponsored Japan's oldest and largest classical music ensemble, the NHK Symphony Orchestra.

Nippon Kōkan KK: *see* NKK Corporation.

Nippon Steel Corporation, Japanese SHIN NIPPON SEITETSU KK, Japanese corporation created by the 1970 merger of Yawata Iron & Steel Co., Ltd., and Fuji Iron & Steel Co., Ltd. It ranks among the world's largest steel corporations. Its headquarters are in Tokyo, and it has several offices overseas.

In 1896 the Japanese government established a steelmaking bureau, and five years later the Imperial Japanese Government Steel Works began operation at Yawata (now part of Kita-Kyūshū) in northern Kyushu. In the following three decades several private steelmakers were also founded. In 1934 the imperial Diet passed legislation creating the state-operated Japan Iron & Steel Co., Ltd., which incorporated the Yawata works and six private steelmakers (Wanishi, Kamaishi, Fuji, Kyushu, Toyo, and Mitsubishi). By the end of 1939 this giant trust had developed several large, modern, integrated steelworks. During World War II, however, bombings and loss of raw materials put most of the works out of operation. The disintegration was completed in 1950, when, under pressure from the Allied occupation authority, the trust was dissolved. Its assets were distributed among four new private companies, including Yawata and Fuji.

The Japanese economy prospered greatly following the outbreak of the Korean War in 1950, and world prosperity in the 1950s and '60s sparked an enormous demand for inexpensive steel. To meet this demand, Yawata and Fuji launched successive modernization programs that resulted in large-scale integrated mills, more efficient operations, and improvement of raw-material treatment technology. The merger of Yawata and Fuji in 1970, forming Nippon Steel Corporation, further strengthened their corporate resources. At its peak in the early 1970s, Nippon Steel had a steelmaking capacity of 47 million tons per year; it passed the United States Steel Corporation in 1975 to become the world's largest steelmaker. Declining worldwide demand for steel and other changes in the global economy forced the company to cut back its steelmaking capacity in the 1980s and to diversify its operations, however.

Nippon Telegraph and Telephone Corporation (NTT), Japanese NIHON DENSHIN DENWA KŌSHA, also called DENDEN KŌSHA, Japanese telecommunications company that almost monopolizes Japan's domestic electronic communications industry. It is Japan's largest company and one of the largest companies in the world.

NTT was established in 1952 as a public corporation and the sole telecommunications company in Japan. NTT oversaw the vast expansion of the nation's telephone network in the postwar period, with the number of telephone subscribers growing from 1.5 million in 1953 to 20 million by 1972. NTT was able to make telephone service available nationwide in 1977. Telephone service still provides almost 80 percent of the company's income.

In 1968 the corporation also became involved in data communications. Because of its demand for increasingly sophisticated electronics equipment and its ability to utilize vast financial resources in the support of technology research and development, NTT was a major factor in Japan's domination of the computer microchip industry. In the 1980s the company was developing non-telephone linkage systems for computer data systems and fibre-optic telecommunications systems. NTT was privatized in 1985, and from then on it was in competition with other telecommunications companies in Japan.

Nippur, modern NIFFER, or NUFFAR, ancient city of Mesopotamia, now in southeastern Iraq. It lies northeast of the town of Ad-Dīwānīyah. Although never a political capital, Nippur played a dominant role in the religious life of Mesopotamia.

In Sumerian mythology Nippur was the home of Enlil, the storm god and representation of force and the god who carried out the decrees of the assembly of gods that met at Nippur. Enlil, according to one account, created man at Nippur. Although a king's armies might subjugate the country, the transference to that king of Enlil's divine power to rule had to be sought and sanctioned. The necessity of this confirmation made the city and Enlil's sanctuary there especially sacred, regardless of which dynasty ruled Mesopotamia.

The first American archaeological expedition to Mesopotamia excavated at Nippur from 1889 to 1900; the work was resumed in 1948. The eastern section of the city has been called the scribal quarter because of the many thousands of Sumerian tablets found there; in fact, the excavations at Nippur have been the primary source of the literary writing of Sumer. Excavation in 1990 uncovered an Akkadian tomb and a large temple to Bau (Gula), the Mesopotamian goddess of healing.

Female figure, made of gypsum, with a gold mask that stood at a temple altar in Nippur, *c.* 2700 BC; in the Iraq Museum, Baghdad

By courtesy of the Iraq Museum, Baghdad; photograph, David Lees

Little is known about the prehistoric town, but by 2500 BC the city probably reached the extent of the present ruins and was fortified. Later, Ur-Nammu (reigned 2112–2095 BC), first king of the 3rd dynasty of Ur, laid out Enlil's sanctuary, the E-kur, in its present form. A ziggurat and a temple were built in an open courtyard surrounded by walls.

Parthian construction later buried Enlil's sanctuary and its enclosure walls, and in the 3rd century AD the city fell into decay. It was finally abandoned in the 12th or 13th century.

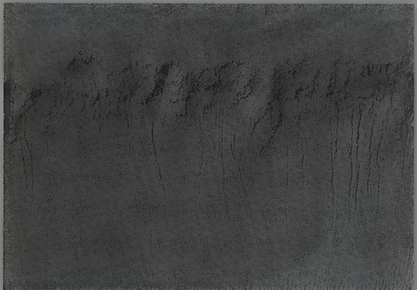
Niraṅkārī, religious reform movement within Sikhism. The Niraṅkārī movement was founded by Dayāl Dās (died 1855), who belonged to a half-Sikh, half-Hindu community in Peshāwar. He believed that God is formless, or *niraṅkār* (hence the name Niraṅkārī).

The chief contribution of the Niraṅkārī movement is its standardization of rituals connected with birth, marriage, and death based on the Sikh scriptures. Its members differ from the orthodox Sikhs in their disapproval of the militant brotherhood, the Khālsā, and in the homage they accord Dayāl Dās and his successors, to whom they accord the status of living Gurū. The headquarters of the sect is at Chandīgarh.

Nirenberg, Marshall Warren (b. April 10, 1927, New York City), U.S. biochemist and Nobel laureate who played a major role in deciphering the genetic code. He demonstrated that, with the exception of "nonsense codons," each possible triplet (called a codon) of four different kinds of nitrogen-containing bases found in deoxyribonucleic acid (DNA) and, in some viruses, in ribonucleic acid (RNA) ultimately causes the incorporation of a specific amino acid into a cell protein.

Nirenberg received his Ph.D. from the University of Michigan in 1957, and that year joined the staff of the National Institutes of Health in Bethesda, Md. His research earned him the National Medal of Science in 1965 and the Nobel Prize for Medicine or Physiology in 1968, which he shared with Robert W. Holley and Har Gobind Khorana.

Nirgal Vallis, sinuous, branching valley located on the planet Mars near 28° S, 42° W. It is roughly 400 km (250 miles) long and 5 km (3 miles) wide. First seen in Mariner 9 spacecraft images, the valley has several tributaries and appears to have been cut by running water. The source of the water, whether from rainfall, snowfall, or groundwater seepage, is controversial. Also contentious is the origin of gullies on the valley's steep walls photographed by the Mars Global Surveyor spacecraft. Some scientists have proposed that they are the result of recent groundwater seepage; others have suggested that they were created by flows of dry or gas-lubricated debris.



Gullies on a south-facing wall of Nirgal Vallis, image by Mars Global Surveyor, July 1999

Malin Space Science Systems/Jet Propulsion Laboratory/National Aeronautics and Space Administration

nirguṇa (Sanskrit: "distinctionless"), concept of primary importance in the orthodox Hindu philosophy of Vedānta, raising the question of whether the supreme being, Brahman, is to be characterized as without qualities (*nirguṇa*) or as possessing qualities (*saguṇa*).

The Advaita (Nondualist) school of Vedānta assumes on the basis of selected passages of the *Upaniṣad*s that Brahman is beyond all polarity and therefore cannot be characterized in the normal terms of human discursive thought. This being the case, Brahman cannot possess qualities that distinguish it from all other magnitudes, as Brahman is not a magnitude but is all.

The fundamental text of this tenet is the *Bṛhadāraṇyaka Upaniṣad* definition of Brahman as *neti-neti* ("not this! not that!" 2.3.6). The scriptural texts that ascribe qualities to Brahman, leading to the conception of a qualified Brahman (*saguṇa*) are, according to the Advaita school, merely preparatory aids to meditations. Others, notably the theistic schools of Vedānta (for example, Viśiṣṭādvaita), argue that God (Brahman) is possessed of all perfections and that the scriptural passages denying qualities deny only imperfect ones.

nirjarā, in Jaina religious belief of India, the destruction of *karman* (merit and demerit). For the soul to achieve *mokṣa*, or liberation from rebirths, the believer must rid himself of existing *karman* and prevent the accumulation of new *karman*. *Nirjarā* is accomplished by such physical and spiritual austerities as fasting, mortification of the body, confession and penance, reverence to superiors, service to others, meditation and study, and indifference to the body and its needs, the last practice in its extreme form leading to self-starvation. The prevention of new *karman* is called *saṃvara* and is accomplished by the observation of moral vows (*vrata*s); control of the activities of body, speech, and mind; care in walking and handling things; and the development of moral virtues and the patient endurance of troubles.

Nirmala, an ascetic order of the Sikhs, a religious group of India. Nirmalas ("those without blemish") at first wore only white garments but later adopted the ochre robes worn by Hindu ascetics and shared some other practices, such as birth and death rites, with Hindus. Like the Udāsī order of Sikh ascetics the Nirmalas carried on missionary activities for the Sikhs and served as *mahant*s (priests) of their temples.

Nirvāṇa (Sanskrit: Extinction, or Blowing Out), Pāli NIBBĀNA, in Indian religious thought, the supreme goal of the meditation disciplines. The concept is most characteristic of Buddhism, in which it signifies the transcendent state of freedom achieved by the extinction of desire and of individual consciousness. According to the Buddhist analysis of the human situation, delusions of egocentricity and their resultant desires bind man to a continuous round of rebirths and its consequent suffering (*dukkha*). It is release from these bonds that constitutes Enlightenment, or the experience of Nirvāṇa.

Liberation from rebirth does not imply immediate physical death; the death of an *arhat* (a perfected person) or a Buddha is usually called the *parinirvāṇa,* or complete Nirvāṇa. In the Mahāyāna Buddhist tradition, the realization of Nirvāṇa is deferred by the *bodhisattva* ("Buddha-to-be") while he continues, out of compassion (*karuṇā*), to work for the salvation of others.

Nirvāṇa is conceived somewhat differently within various schools of Buddhism. In the Theravāda tradition, it is tranquillity and peace. In the schools of the Mahāyāna tradition, Nirvāṇa is equated with *śūnyatā* (emptiness), with *dharma-kāya* (the real and unchanging essence of the Buddha), and with *dharma-dhātu* (ultimate reality).

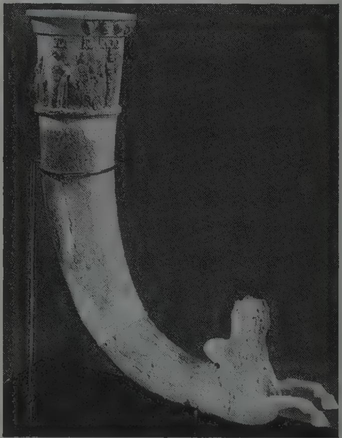
Niš, town in Serbia, Yugoslavia, on the Nišava River. The town is important for its command of the Morava–Vardar and the Nišava River corridors, the two principal routes from central Europe to the Aegean. The main rail line from Belgrade and the north divides at Niš for Thessaloníki, in Greece, and Sofia.

The ancient Roman city, Naissus, which probably succeeded a Celtic settlement, was cited in the 2nd century by Ptolemy, in his *Guide to Geography.* The old fortress on the right bank of the river is believed to have been built on this site. Under its walls, in AD 269, the emperor Claudius II defeated an army of the Goths. Niš is the birthplace of Constantine the Great (*c.* 280). During migrations of the Huns in the 5th century, the town was destroyed, and the Bulgarians conquered it in the 9th century but ceded it in the 11th century to the Hungarians, from whom the Byzantine emperor took it in 1173. Toward the end of the 12th century, the town came under the Serbian Nemanja dynasty, but in 1375 the Turks captured it from the Serbians.

Niš was recovered briefly several times, but Turkish domination lasted for 500 years, and the town became an important station on the route from Istanbul to Hungary. In the first Serbian uprising (1809), the Serbs fired their powder magazine and destroyed themselves and a large number of the enemy; in the ruins of the Turkish-built Ćele Kula (Tower of Skulls) are embedded the skulls of more than 900 of the Serbians who fell at the Battle of Čegar. The Serbs' army liberated Niš in 1877, and the town was ceded to them by the Treaty of Berlin (1878). In World War I, Niš was for a period the capital of Serbia. Heavy bomb damage from World War II and postwar construction erased much of the town's Turko-Byzantine style. Historical buildings include a 5th-century Byzantine crypt.

Industries include textiles, beer, tobacco products, locomotives, household appliances, and electronic materials. A university was opened in 1965; a modern centre for its faculty of medicine was opened in 1977 in the Niška Banje spa just east of Niš. The spa is a centre for the treatment of cardiovascular diseases. Pop. (2000 est.) 182,583.

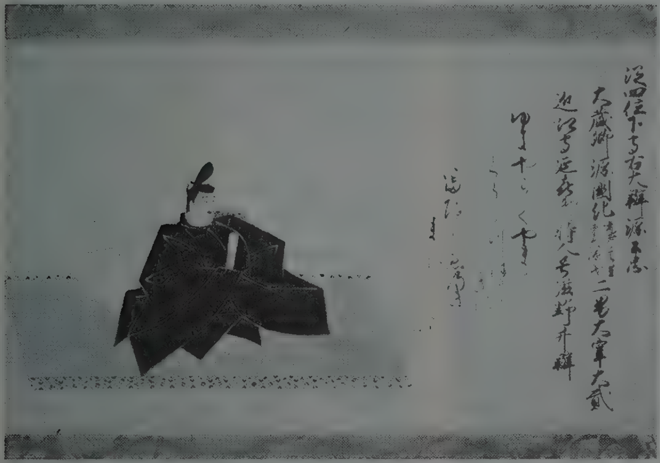
Nisa, also called PARTHAUNISA, first capital of the Parthians, located near modern Ashkhabad in Turkmenistan. Nisa was traditionally founded by Arsaces I (reigned *c.* 250–*c.* 211 BC), and it was reputedly the royal necropolis of the Parthian kings. Excavations at Nisa have revealed substantial buildings, many inscribed documents, and a looted treasury. Also many Hellenistic art works have been uncovered, as well as a large number of ivory rhytons, the outer rims decorated with Iranian subjects or classical mytholog-



Ivory rhyton from Nisa, 2nd–1st century BC; in the Hermitage, St. Petersburg

By courtesy of the State Hermitage Museum, St. Petersburg ical scenes. In fact, almost all the art and architecture at Nisa exhibits a great intermingling of Western and Iranian styles. Nisa was later renamed Mithradatkirt by Mithradates I (reigned 171–138 BC).

nise-e (Japanese: "likeness painting"), form of sketchy portraiture that became fashionable in the court circles of 12th- and 13th-century Japan. Realistic art was originally outside the tradition of Japanese portraiture, which, until the 12th century, was purely religious in character. Alongside the rise of scroll painting, which depicted incidents of real life, a parallel trend in the field of portraiture arose in the second half of the 12th century. The skill of *nise-e* consisted in catching a man's character in a few simple lines, although portraits expressed not so much a feeling for the individual and his characteristics as veneration for his accomplishments. The angular, geometric, almost abstract treatment of robes contrasts strikingly with the realistic treatment of the face.



Nise-e of Minamoto Kintada, one of the 36 poets, from a handscroll by Fujiwara Nobuzane, Kamakura period (1192–1333); in the Freer Gallery of Art, Washington, D.C.

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

Fujiwara Takanobu (1142–1205) initiated the trend, and his son, Fujiwara Nobuzane, a courtier and poet like his father, won a great reputation as a painter. His important successors included Shinkai, Tametsugu, Korenobu, Tamenobu, Tametada, and Gōshin.

Nisei (Japanese: "second-born"), second-generation Japanese in the United States. During World War II all persons of Japanese ancestry on the U.S. West Coast were forcibly evacuated from their homes and relocated in inland detention centres as a result of mass hysteria following the Japanese attack on Pearl Harbor (Dec. 7, 1941). The U.S. government claimed it was forced by public hysteria, agitation by the press and radio, and military pressure to establish the War Relocation Authority by executive order (March 18, 1942); this agency administered the mass evacuation.

Under the jurisdiction of the Western Defense Command, during the spring and summer of 1942 110,000 Japanese-Americans (including a number who were still aliens) were placed in 10 war relocation centres located in isolated areas from the Sierra Nevada to the Mississippi River. The sparsely furnished military barracks in these camps afforded meagre "work opportunities" for adults and a minimal education for children. By the time the evacuation was complete, U.S. forces were largely in command of the Pacific and all danger of a possible Japanese invasion had passed. After individual screening at the centres to prove their loyalty, 17,600 Nisei were accepted for service in the U.S. armed forces; many of their units were later cited for bravery.

Demands for redress for the losses and injury suffered by the evacuees during the war were met in 1988 when the U.S. government apologized for the internments and passed legislation providing partial monetary payments to the approximately 60,000 surviving Japanese-Americans who had been interned.

Nīshāpūr (Iran): *see* Neyshābūr.

Nishapur pottery, Islāmic ceramics produced at Nishapur (modern Neyshābūr, Iran) that were of bold style and showed links with Sāssānian and Central Asian work. The style originated in Transoxania, an ancient district of Iran, during the 9th century AD and showed such specific characteristics as black and ochre birds with dashes of white and green. A rougher type portraying human and animal figures against an ornamental background also existed.

Nishi Amane (b. March 7, 1829, Tsuwano, Iwami province, Japan—d. Jan. 30, 1897, Tokyo), philosopher, writer, and publisher who helped introduce Western philosophy, especially British empiricism, to Japan.

After study at the University of Leiden, The Netherlands, he became a professor at Kaieisho College in Tokyo. Together with Mori Arinori (1847–89), later minister of education, Nishi founded the famous Meirokusha publishing house. Its journal featured articles on a wide range of Western philosophers, including Jean-Jacques Rousseau, Montesquieu, Ernst Haeckel, John Stuart Mill, Herbert Spencer, and Henry Buckle. The publishing house also introduced other aspects of Western civilization to Japan.

Nishi not only translated J.S. Mill's *Utilitarianism* but also wrote many commentaries on Western philosophy. He is regarded as the first philosopher to create modern philosophical terminology in Japanese, which permitted Japanese philosophers to compare Oriental and Western thought.

Nishida Kitarō (b. June 17, 1870, near Kanazawa, Ishikawa prefecture, Japan—d. June 7, 1945, Kamakura), Japanese philosopher who exemplified the attempt by the Japanese to assimilate Western philosophy into the Oriental spiritual tradition.

Early life. Nishida's father, Nishida Yasunori, was for a time a teacher of an elementary school among whose few pupils was Kitarō. His mother, Tosa, was a pious devotee of the Jōdo, or True Pure Land, school of Buddhism. Although Nishida's family was descended from a former village landowner, Yasunori ruined his fortune when Kitarō was young, and the entire Nishida family had to move to Kanazawa in 1883. Kitarō entered primary course at Kanazawa Normal School in that year but had to leave on account of sickness in the following year. He was admitted in 1886 into the second class of the high school, and in 1888 he became a student of the Fourth Higher School (junior college).

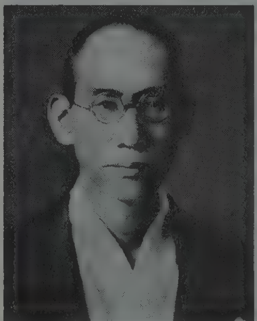
In his boyhood, Nishida took traditional lessons in Chinese from an excellent Confucian teacher, and in his higher school days he was taught by another scholar erudite in Chinese. Another important teacher of Nishida's was Hōjō Takiyoshi, a professor of mathematics of the Fourth Higher School, under whom Nishida had studied mathematics even before he entered high school. This exposure to Chinese culture enriched his life with a lasting Confucian quality and worldview. Later, when Western philosophy and Buddhism (especially Zen Buddhism) were merged in his mature mind, there remained deep within him an undercurrent of Confucian conviction with regard to "the ideal man," "the Way" to good and truth, sincerity, self-negation, and detachment. He and his contemporaries belonged to the last Japanese generation whose education in the Chinese Classics molded their personal character. From his boyhood days, he made several good friends in Kanazawa, among whom was D.T. Suzuki, later an eminent Buddhologist and the main interpreter of Zen Buddhism to the West. Nishida and Suzuki became classmates at higher school, and from that time their mutual spiritual influence continued until Nishida's death.

In his memoirs, entitled "A Certain Professor's Statement upon Retirement (from Kyōto Imperial University, December 1928)," he writes:

> My student days at the Fourth Higher School were the happiest of my life. I was filled with youthful zest. I did anything I wished, heedless of the consequences. As a result I had to leave school before my graduation. At the time I thought it was not necessarily true that one could not achieve anything by studying alone. In fact I thought it would be better to rid myself of the fetters of school and to read freely. But within one year I was prohibited to read any more by my doctor, since I was afflicted with an eye disease. I had to abandon my principle, and went to Tokyo to be a non-regular student of philosophy, in Tokyo University (1891–1894).

At that time in the Faculty of Letters and Law, there were several promising students who later became famous, some as men of letters and others as university professors. Together with them, Nishida appeared at the same lectures but could not form close friendships, as he had done in higher school.

Academic career. After graduation he became a teacher in a middle school near his home (1895). In the following year, he was appointed a lecturer in the Fourth Higher School at Kanazawa, and, after two years as a lecturer and later as a professor at the



Nishida Kitarō

By courtesy of the International Society for Educational Information Tokyo, Inc.

Yamaguchi Higher School in Yamaguchi, he was again appointed as a professor of the Fourth Higher School, teaching psychology, logic, ethics, and German (1899–1909). During his Yamaguchi and Kanazawa teaching periods, he was much engaged in the practice of Zen meditation. Remarks about Zen practice are overwhelmingly conspicuous in his diary of this period. From this effort and through his lectures at the higher school came Nishida's maiden work, *Zen no kenkyū* (1911; *A Study of Good,* 1960). At about this time parts of the book were published in Japanese philosophical journals, and his name as an original philosopher attracted attention in the Japanese philosophical world.

Nishida's philosophy of Nothingness. After one year as professor at Gakushūin University (Tokyo) in 1909, he was appointed associate professor of ethics at Kyōto Imperial University. In 1913 he was appointed professor of philosophy of religion and in 1914 professor of philosophy, a post he held until his retirement in 1928. About the end of his professorship in Kyōto Imperial University, Nishida's philosophy attained its maturity, which can be defined as "the philosophy of the *topos* (place) of Nothingness." In his latter years he delved most deeply into philosophical problems and endeavoured to explain more concrete facts by his logic. Thus his idea of the true reality that overcomes the dichotomy of subjectivity and objectivity (the mind and its objects) in the *topos* of Nothingness became significant, he emphasized, for "historical reality in the historical world." Nishida developed this implication of absolute Nothingness in his *Tetsugakuron bunshū* ("Philosophical Essays"; 7 vol.), which he wrote after his retirement. In his last days, as World War II was coming to an end, looking at the fires of the burning cities in the darkness of night, Nishida was much inspired by the words of the prophets of Israel in the Old Testament. He said that the result of this war might be something that neither the victors nor the vanquished could at that time foresee. He died in 1945 at Kamakura.

Nishida's philosophy was attacked by the nationalists and militarists during World War II because of the Western way of his philosophical thinking. Since then he has been criticized for his loyalty to his nation and for his alleged metaphysical obscurantism by Marxist philosophers and antimetaphysical Rationalist philosophers, but such criticism is decreasing for lack of solid grounds. More philosophically important are the criticisms by Takahashi Satomi and Tanabe Hajime. Takahashi was the first scholar to appreciate and evaluate the distinctively Japanese philosophy in Nishida's *Zen no kenkyū,* and later he contributed his critical investigation of Nishida's philosophy in its mature form. Tanabe, Nishida's disciple, who succeeded him in the chair of professor of philosophy at Kyōto Imperial University (1927–45), contributed valuable criticism from his own philosophical point of view.

The stages of Nishida's thought. Nishida says in his memoirs that he thought of his life in terms of a change of position with the blackboard as an axis; in the first half of his life he sat at a desk facing the blackboard, while in the latter half he sat with the blackboard behind him. Continuing this metaphor, it may be said that in the third stage, represented by his philosophy of the *topos* of Nothingness, he wished to relinquish both positions, whether in front of or behind the blackboard, so that he and his logic became chalk on the blackboard of the historical world. In Nishida's philosophy, each stage has its independent value. Like a series of vortexes floating on the stream when two (*i.e.,* Western and Eastern) rivers converge, each closes its own circle. The preceding system should not be replaced by the later, even if they flow successively.

In the first stage of his philosophy, Nishida derived his basic insights from his long, concentrated practice of Zen. He was also much inspired by William James's philosophy and psychology and tried to interpret his own basic insights philosophically with the use of psychological concepts borrowed from James. The opening page of Nishida's *Zen no kenkyū* indicates the general direction of his thought:

> To experience means to know events precisely as they are. It means to cast away completely one's attitude of discriminative reflection, and to know in accordance with the events. Since people include some reflection even when speaking of experience, the word "pure" is here used to signify a condition of true experience itself without the addition of the least thought or reflection. For example, it refers to that moment of seeing a color or hearing a sound which occurs not only before one has added the judgment that this seeing or hearing relates to something external or that one is feeling this sensation, but even before one has judged what color or what sound it is. Thus, *pure experience* is synonymous with *direct experience.* When one experiences directly one's conscious state there is as yet neither subject nor object, and knowledge and its object are completely united. This is the purest form of experience.

The concept of pure experience expounded here is the Western philosophical mold into which Nishida poured his own religious experience cultivated by his Zen training. As it is beyond the dichotomy of subject and object, so it is far removed from the difference of whole and part. The whole universe is, as it were, crystallized into one's own being. In the total activity of one's own pure and alert life, one's entire being becomes transparent, so that it reflects, as in a mirror, all things as they become and also participates in them. This is "to know in accordance with the events." The profoundness of reality, the directness of one's experience of reality, a dynamic system developing itself in the creative stream of consciousness—these are the characteristic motifs of Nishida's philosophy, all suggesting where his thinking was ultimately rooted.

According to Nishida, judgment is formed by analysis of the intuitive whole. For instance, the judgment that a horse runs is derived from the direct experience of a running horse. The truth of a judgment is grounded on the truth of the original intuitive whole from which the judgment is formed through the dichotomy of subject and predicate or that of subject and object. For the establishment of its truth a judgment is, through its dichotomy itself, referred back to intuition as its source, because intuition is here considered a self-developing whole, similar to Hegel's Notion (*Begriff*). As Hegel says, "All is Notion," or "All is judgment," so could Nishida say, "All (reality) is intuition," or "All reality is immediate consciousness." For this is practically the import of his dictum, "Consciousness is the Unique Reality."

Influence of Neo-Kantian thought. In the second stage of his philosophy, Nishida was under the influence of the philosophy of Henri Bergson, a French philosopher, which he tried to synthesize with a Neo-Kantian type of German thought that was then prevalent in Japanese philosophical circles. He thus entered the second stage of his thinking, the result of which was incorporated into a book entitled *Jikaku ni okeru chokkan to hansei* (1917; "Intuition and Reflection in Self-Consciousness"). His basic notion did not undergo any change, but he tried to express what he once called pure experience in a different way. Neo-Kantian influence led him to eliminate from his thought all psychological terms and to follow strictly the path of logical thinking to the end. Actually, however, he found himself standing at the end of a blind alley, where he came up against something that was impenetrable to his logic. "After a long struggle with the Unknowable my logic itself bade me surrender to the camp of mysticism," so he himself says in the preface. Thus the self as the unity of thought and intuition acquires a mystical background. It is pure activity but ultimately finds itself in the abyss of darkness, enveloping every light of self-consciousness. This darkness, however, is "dazzling obscurity" giving the self the unfathomable depth of meaning and being. The self is thus haloed with a luminous darkness.

The third stage of Nishida's philosophy was marked by a reversal of his whole procedure, as is shown in his *Hataraku mono kara miru mono e* (1927; "From the Acting to the Seeing Self"). Whereas he had always made the self the starting point for his philosophical thinking, he now parted definitely with Transcendental Idealism or, rather, broke through it to find behind it a realm of reality corresponding to his own mystical experience. This may be called the realm of Non-self, or Nothingness, which should not be confused with the non-self of Idealism as the realm of the objective over against that of the subjective, or with annihilating nothingness of Sartre's Existentialism. The "Non-self" of Nishida is the ultimate reality where all subject–object cleavage is overcome. In accordance with Buddhist tradition he called it "Nothingness" and sought to derive the individual reality of everything in the world, whether it be a thing or a self, from the supreme identity of Nothingness. The Idealist "pure self," as the universal consciousness or consciousness in general, is still abstract, while the "Non-self" of Nishida establishes itself as true individuality in the absolute Nothingness, which includes, not excludes, the individual reality of the thing-in-itself (the ultimate reality of things). Indeed, the problem of the individual now became Nishida's chief concern. In his quest for its solution he made an intensive study of Greek philosophy, especially Plato and Aristotle.

He found the thinking of these philosophers to be relatively free from the cleavage of subject and object, in comparison with modern Western philosophy, which always presupposes, consciously or unconsciously, the *cogito* (the thinking subject) as the starting point of thought. The ontology of Plato and Aristotle rather makes a logic of reality reveal itself, a logic that explains the world of reality as seen from within. Whether "explaining" or "seeing," such a logic is to be understood as an act taking place in the world of reality itself. Nishida seeks thus to clarify the significance of the individual and the universal from the viewpoint of the Absolute Nothingness. Thus he propounds that Nothingness or *mu* is the universal that is to be sought behind the predicate as the universal concept and, at the same time, is the abyss of Nothingness in which the self as the individual is crystalized. He developed the idea of the "*topos* of Nothingness," adopting the concept of *topos* from Plato's *Timaeus* and from this time on Nothingness is explained as the uniqueness of the *topos.*

In the fourth stage of the development of his thought, Nishida applied the idea of the *topos* of Nothingness to the explanation of his "historical world." (Y.T.)

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The following works of Nishida are available in English translation. *A Study of Good,* trans. by Valdo H. Viglielmo (1960), is Nishida's maiden work, which gives a well-balanced treatment of philosophical problems. *Intelligibility and the Philosophy of Nothingness,* trans. by Robert Schinzinger (1958), and *Fundamental Problems of Philosophy,* trans. by David A. Dilworth (1970), include introductory remarks on Nishida's life and work. See also "Nishida Kitarō: The Problem of Japanese Culture," trans. by Abe Masao in *Sources of the Japanese Tradition,* pp. 857–872 (1958); and Gino K. Piovesana, *Recent Japanese Philosophical Thought, 1862–1962* (1963).

Nishikawa Sukenobu, byname MAGOUEMON (b. 1671, Kyōto—d. Aug. 20, 1750, Kyōto), Japanese painter of the Ukiyo-e school of popular, colourful paintings and prints, who also was a book designer of the Kyōto–Ōsaka area. Nishikawa studied painting with masters of two schools, the Kanō (stressing Chinese subjects and techniques) and the Japanese-oriented Tosa. Eventually, however, he was influenced by Ukiyo-e painters, especially Hishikawa Moronobu (died 1694). In his time Edo (now Tokyo) was already considered the centre of Ukiyo-e, and that school's prints were often referred to as Edo-e or Edo paintings and prints.

"Kesho suru onna" ("Woman Making-up"), painting by Nishikawa Sukenobu; in the Atami Art Museum, Japan

By courtesy of the Atami Art Museum, Japan

Nishikawa established his own school of Ukiyo-e and gathered numerous pupils in the Kyōto area, where the classical tradition predominated. His style was graceful and sensuous, and it influenced many Edo artists, such as the late 18th-century painters Suzuki Harunobu and Ishikawa Toyonobu. He was a prolific artist, particularly known for his diverse kimono designs. The two-volume illustrated book *Hyakunin jorō shinasadame* ("One Hundred Types of Women") is one of his masterpieces.

nishiki-e, Japanese polychrome woodblock prints of the Ukiyo-e (*q.v.*) school that were first made in 1765. The invention of the technique is attributed to Kinroku, and its greatest early master was Suzuki Harunobu.

Nishinomiya, city, Hyōgo Prefecture (*ken*), Honshu, Japan, at the mouth of the Muko-gawa (Muko River) on the Inland Sea. It is part of the Hanshin Industrial Region. The city occupies a narrow lowland between Ōsaka-wan (Ōsaka Bay) and interior Rokkō-zan (Mt. Rokkō). Nishinomiya is famed for its fine sake (rice beer). Its coastal areas are assigned to industry (metals, machinery, chemicals, rubber goods, soap, cosmetics, and beer). The city has a professional baseball stadium and has excellent railway and road connections with adjacent urban areas. Pop. (1990) 426,919.

Nishio, city, Aichi Prefecture (*ken*), Honshu, Japan, on the lower reaches of the Yahagi-gawa (Yahagi River). Nishio was a castle town and commercial centre during the Tokugawa era (1603–1867). The opening of two railways through the city in 1911 and 1928 resulted in the establishment of industry, particularly the manufacture of textiles and metal castings. Tea is cultivated on Inari-yama (Mt. Inari) in the western part of the city. Pop. (1990) 95,198.

Nishiyama Sōin, original name NISHIYAMA TOYOICHI (b. 1605, Higo Province, Japan—d. May 5, 1682, Kyōto?), *renga* ("linked-verse") poet of the early Tokugawa period (1603–1867) who founded the Danrin school of haikai poetry. Sōin's haikai (comical *renga*) became the transition between the light and clever haikai of Matsunaga Teitoku and the more serious and aesthetic haiku of Matsuo Bashō.

In his youth Sōin was a samurai retainer for a daimyo in Kyushu, but his lord encouraged him to develop his literary talents. In 1622 Sōin went to Kyōto and by 1633 he was a professional *renga* poet. His interest in haikai was slow to develop, and it was not until 1673 that his first anthology of haikai, *Sōin senku* ("One Thousand Verses by Sōin") was published.

The poems in this volume, although written in the Teitoku style, demonstrated a higher degree of sophistication than the earlier haikai. Young students—including Ihara Saikaku and Okanishi Ichū—who were dissatisfied with the old school flocked to Sōin's Danrin school. His numerous volumes of poetry include *Sōin gohyakku* (1676; "Five Hundred Verses by Sōin") and *Baiō Sōin hokku shū* (1681; "The Collected Hokku [Haiku] of the Plum Old Gentleman Sōin").

Nisibin (Turkey): *see* Nusaybin.

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Nisibis, School of, intellectual centre of East Syrian Christianity (the Nestorian Church) from the 5th to the 7th century. The School of Nisibis (now Nusaybin, Tur.) originated soon after 471, when Narsai, a renowned teacher and administrator at the School of Edessa, and his companions were forced to leave Edessa (modern Urfa, Tur.) because of theological disputes. Under Narsai's directorship (471–496), a number of former teachers and students from the School of Edessa were enlisted in the new institution; they gave shape to Christianity according to the Nestorian creed, which so stressed the independence of the divine and human natures of Christ that the natures seemed in effect two persons loosely joined in a moral union.

The school experienced tremendous growth during Abraham de Bet Rabban's tenure (until *c.* 569) as director. Its teachers wrote in the fields of literature, history, philology, and theology, as well as translating from Greek into Syriac. The school gained renown in the West and became a major centre of education for members of the clergy and hierarchy. It was primarily through Syriac translations that the Arabs became acquainted with Greek thought.

The Nestorian theology of the school, however, was undermined by the administration of Ḥenānā (*c.* 570–*c.* 609), who preferred Origen (a Christian theologian who flourished in the early 3rd century) to Theodore of Mopsuestia, the recognized Nestorian authority. Ḥenānā's views led to a revolt by students, and the director required royal support to maintain his position.

The only outstanding figure after Ḥenānā was Surin, who held office for some time in the second quarter of the 7th century. His literary work must have created considerable attention, and its vitality sustained the school in its subsequent history of decline, especially in the areas of historiography and monastico-historical inquiry. The school was unable to retain its preeminence among other schools and was superseded by the school of Seleucia-Ctesiphon.

niṣprapañca (Sanskrit), in the Mādhyamika and Vijñānavāda schools of Buddhist philosophy, ultimate reality. *See* prajñapti.

Nissaba, in Mesopotamian religion, Sumerian deity, city goddess of Eresh on the ancient Euphrates River near Erech in the farming regions; she was goddess of the grasses in general, including the reeds and the cereals. As goddess of the reeds and provider of the reed stylus used by the scribes, she became the patroness of writing and the scribal arts, particularly of accounting.

Nissan Motor Co., Ltd., Japanese NISSAN JIDŌSHA KK, Japanese industrial corporation that manufactures automobiles, trucks, and buses under the names Nissan and Datsun. The company also designs and manufactures such products as communications satellites, pleasure boats, and machinery. Headquarters are in Tokyo.

The company originated in two earlier companies—Kwaishinsha Co. (founded in 1911 to produce Dat cars) and Jitsuyo Jidōsha Co. (founded in 1919)—which merged in 1925 to form Dat Jidōsha Seizō Co. In 1933 the assets of this company were taken over by new investors, who established the Jidōsha Seizō Co., Ltd., giving it its present name the following year. The new company was engaged in the production and sale of vehicles and parts under a new name, Datsun.

During the war years (from 1938) the company converted entirely to production of trucks and military vehicles. In 1945 the Allied occupation forces seized the main Nissan plants; though allowing production of Nissan and Datsun vehicles to resume at one plant, they did not restore all other facilities to Nissan until 1955. Thereafter, especially during the 1960s, when Nissan entered the world market, production and sales grew phenomenally. The company is engaged in joint ventures abroad, and Nissan has established assembly plants in several foreign countries, including Australia, Peru, Mexico, the United States, and Germany.

Nistrul River (Ukraine and Moldova): *see* Dniester River.

Nisus, in Greek mythology, a son of King Pandion of Megara. His name was given to the Megarian port of Nisaea. Nisus had a purple lock of hair with magic power: if preserved, it would guarantee him life and continued possession of his kingdom. When King Minos of Crete besieged Megara, Nisus' daughter Scylla fell in love with Minos (or, in some accounts, was bribed): she betrayed her city by cutting off her father's purple lock. Nisus was killed (or killed himself) and became transformed into a sea eagle. Scylla later drowned, possibly at the hand of Minos, and was changed into a sea bird (Greek *keiris,* Latin *ciris*), possibly a heron, constantly pursued by the sea eagle.

NIT (basketball): *see* National Invitation Tournament.

Niten (Japanese artist): *see* Miyamoto Musashi.

niter: *see* saltpetre.

Niterói, city, Rio de Janeiro *estado* ("state"), eastern Brazil. It lies on the eastern side of the entrance to Guanabara Bay. The city of Rio de Janeiro on the opposite side is connected to Niterói by ferry, railroad, and, since 1974, the President Costa e Silva Bridge, spanning Guanabara Bay; this is one of the longest bridges in Brazil. Both cities are located on low ground at the heads of inlets, many of which indent the shores, with various sections separated by steep rocky ridges extending into the bay.

Icarai Beach on Guanabara Bay, Niterói, Braz.

Walter Aguiar

Founded in 1671, the settlement became a village in 1819, with the name of Villa Real da Praia Grande. It was made the capital of Rio de Janeiro state in 1835, the year after the city of Rio de Janeiro and the Federal District were separated from Rio de Janeiro state. In 1836 it became a city and was renamed Niterói (or Nictheroy, from an Indian term meaning "hidden water"). It lost its capital status temporarily in 1894–1903 to Petrópolis and permanently from 1975 to the city of Rio de Janeiro.

Niterói is a residential suburb of the city of Rio de Janeiro and is well developed industrially. It is the site of Brazil's chief shipbuilding and ship-repair yards and has metal and machinery industries, pharmaceutical and food-processing plants, and textile mills. It is also the seat of the Fluminense Federal University (1960). Pop. (2000 prelim.) 458,465.

Nithard (b. 790?—d. June 14, 844), Frankish count and historian whose works, utilizing important sources and official documents, provide an invaluable firsthand account of contemporary events during the reign of the West Frankish king Charles II.

A son of Charlemagne's daughter Bertha and the renowned poet and imperial chancellor Angilbert, Nithard was reared at court. On the death of the emperor Louis I the Pious (840), he became counselor to the youngest of Louis's sons, Charles II the Bald. Failing to prevent a civil war, Nithard fought for Charles in the Battle of Fontenoy (841) against Lothair I, Charles's eldest half brother. In the same year Charles requested that Nithard write an account of recent events. The resulting four-volume *Historiae* or *De dissensionibus filiorum Ludovici pii* ("On the Dissensions of the Sons of Louis the Pious") deals with the discord between the sons of Louis during the years 840–843.

In 843 Charles made Nithard lay abbot of Saint-Riquier, a position he held for only a few months before he died in a battle against the forces of Pepin II of Aquitaine.

Nithsdale, valley of the River Nith, Dumfries and Galloway region, southwestern Scotland. It comprises the western part of the historic county of Dumfriesshire and a small portion of eastern Kirkcudbrightshire. The valley's upper end lies along the border with Ayrshire, where the Nith flows through a gap in the Southern Uplands. Nithsdale broadens southeastward toward the lowland along the Solway Firth. Sheep are bred in the hills and fattened in the lowland. Dumfries, on the Nith, is the region's largest town and commercial and administrative centre.

Nitra, German NEUTRA, Hungarian NYITRA, town, Západní Slovensko *kraj* (region), Slovakia. It lies along the Nitra River.

The centre of the Nitra principality in the beginning of the 9th century, it was later a stronghold and religious centre. The first Christian church in what is now Slovakia was established there in AD 830 and consecrated by Saints Cyril and Methodius. Town privileges were acquired in 1248. The town's dominant features are still the old fortification gate, above which the Zobor (a hill 1,929 feet [588 m] high) rises to the north, and the medieval castle enclosure, which includes the cathedral.

Nitra is an important road junction and a food-processing centre for the farming area to the south. Nitra's College of Agriculture was founded in 1946. Pop. (1998 est.) 87,548.

nitrate, any member of either of two classes of compounds derived from nitric acid. The salts of nitric acid are ionic compounds containing the nitrate ion, NO_3^-, and a positive ion, such as NH_4^+ in ammonium nitrate. Esters of nitric acid are covalent compounds having the structure $R—O—NO_2$, in which R represents an organic combining group, such as ethyl (C_2H_5) in ethyl nitrate. *See also* nitro compound.

nitrate and iodate minerals, small group of naturally occurring inorganic compounds that are practically confined to the Atacama Desert of northern Chile; the principal locality is Antofagasta. These minerals occur under the loose soil as beds of grayish caliche (a hard cemented mixture of nitrates, sulfates, halides, and sand) 2–3 m (7–10 feet) thick. The much rarer iodate minerals occur sporadically, intermixed with the nitrates, and are distinguished from the former by their yellow colour. The caliche has accumulated as a result of drainage. Because most of these compounds are soluble and unstable, they are practically confined to arid regions and soils, which possess a paucity of microorganisms.

Before World War I, Chile possessed a near monopoly on nitrates, with as many as 100 plants in operation. The introduction of practical methods for the fixation of nitrogen early in the 20th century resulted in a decline of the marketing of natural nitrates.

The nitrate and iodate minerals are structurally related to the carbonate minerals. The most important nitrates are soda nitre, nitre (saltpetre), darapskite, and humberstonite. Among the iodates are lautarite and dietzeite.

nitre: *see* saltpetre.

nitric acid (HNO_3), colourless, fuming, and highly corrosive liquid (freezing point −42° C [−44° F], boiling point 83° C [181° F]) that is a common laboratory reagent and an important industrial chemical for the manufacture of fertilizers and explosives. It is toxic and can cause severe burns.

The preparation and use of nitric acid were known to the early alchemists. A common laboratory process used for many years, ascribed to a German chemist, Johann Rudolf Glauber (1648), consisted of heating potassium nitrate with concentrated sulfuric acid. In 1776 Antoine-Laurent Lavoisier showed that it contained oxygen, and in 1816 Joseph-Louis Gay-Lussac and Claude-Louis Berthollet established its chemical composition.

The principal method of manufacture of nitric acid is the catalytic oxidation of ammonia. In the method developed by the German chemist Wilhelm Ostwald in 1901, ammonia gas is successively oxidized to nitric oxide and nitrogen dioxide by air or oxygen in the presence of a platinum gauze catalyst. The nitrogen dioxide is absorbed in water to form nitric acid. The resulting acid-in-water solution (about 50–70 percent by weight acid) can be dehydrated by distillation with sulfuric acid.

Nitric acid decomposes into water, nitrogen dioxide, and oxygen, forming a brownish yellow solution. It is a strong acid, completely ionized into hydrogen and nitrate ions in aqueous solution, and a powerful oxidizing agent (one that acts as electron acceptor in oxidation-reduction reactions). Among the many important reactions of nitric acid are: neutralization with ammonia to form ammonium nitrate, a major component of fertilizers; nitration of glycerol and toluene, forming the explosives nitroglycerin and trinitrotoluene, respectively; preparation of nitrocellulose; and oxidation of metals to the corresponding oxides or nitrates.

nitric oxide (NO), colourless, toxic gas, formed from nitrogen and oxygen by the action of electric sparks or high temperatures or, more conveniently, by the action of dilute nitric acid upon copper or mercury. It was first prepared about 1620 by the Belgian scientist Jan Baptist van Helmont, and it was first studied in 1772 by the English chemist Joseph Priestley, who called it "nitrous air."

Nitric oxide liquefies at −151.8° C (−241.2° F) and solidifies at −163.6° C (−262.5° F); both the liquid and the solid are blue in colour. The gas is almost insoluble in water, but it dissolves rapidly in a slightly alkaline solution of sodium sulfite, forming the compound sodium dinitrososulfite, $Na_2(NO)_2SO_3$. It reacts rapidly with oxygen to form nitrogen dioxide, NO_2. Nitric oxide is one of the few stable compounds containing an odd number of electrons; it can gain or lose one electron to form the ions NO^- or NO^+, which are present in the nitrosyls, compounds somewhat similar to the carbonyls formed from carbon monoxide and transition metals.

An industrial procedure for the manufacture of hydroxylamine is based on the reaction of nitric oxide with hydrogen in the presence of a catalyst. The formation of nitric oxide from nitric acid and mercury is applied in a volumetric method of analysis for nitric acid or its salts.

nitride, binary compound of nitrogen with a more electropositive element, such as boron, silicon, and most metals. Certain metal nitrides are unstable, and most react with water to form ammonia and the oxide or hydroxide of the metal; but the nitrides of boron, vanadium, silicon, titanium, and tantalum are very refractory, resistant to chemical attack, and hard—and thus are useful as abrasives and in making crucibles. Nitrides are formed during a process for hardening the surface of steel objects by heating them with ammonia at temperatures usually between 950° and 1,050° F (500° and 550° C) for 5 to 100 hours, depending on the depth of hardened case desired. *See also* surface hardening.

nitrifying bacterium, plural NITRIFYING BACTERIA, any of a small group of aerobic bacteria (family Nitrobacteraceae) that use inorganic chemicals as an energy source. They are microorganisms that are important in the nitrogen cycle as converters of soil ammonia to nitrates, compounds usable by plants. The nitrification process requires the mediation of two distinct groups:

bacteria that convert ammonia to nitrites (*Nitrosomonas, Nitrosospira, Nitrosococcus,* and *Nitrosolobus*) and bacteria that convert nitrites (toxic to plants) to nitrates (*Nitrobacter, Nitrospina,* and *Nitrococcus*). In agriculture, irrigation with dilute solutions of ammonia results in an increase in soil nitrates through the action of nitrifying bacteria.

See also nitrogen cycle.

nitrile, also called CYANO COMPOUND, any of a class of organic compounds having molecular structures in which a cyano group ($-C{\equiv}N$) is attached to a carbon atom (C). Nitriles are colourless solids or liquids with distinctive odours.

Acrylonitrile is produced in large quantities by a process called ammoxidation that depends on the oxidation of propylene in the presence of ammonia and a catalyst. Acrylonitrile constitutes an important component of several polymeric substances, including the acrylic textile fibres and synthetic rubbers and thermoplastic resins.

Some nitriles are manufactured by heating carboxylic acids with ammonia in the presence of catalysts. This process is used to make nitriles from natural fats and oils, the products being used as softening agents in synthetic rubbers, plastics, and textiles and for making amines. Nitriles are also formed by heating amides with phosphorous pentoxide. They can be reduced to primary amines through the action of lithium aluminum hydride or hydrolyzed to carboxylic acids in the presence of either an acid or a base.

nitrite, any member of either of two classes of compounds derived from nitrous acid. Salts of nitrous acid are ionic compounds containing the nitrite ion, NO_2^-, and a positive ion such as Na^+ in sodium nitrite ($NaNO_2$). Esters of nitrous acid are covalent compounds having the structure $R-O-N-O$, in which R represents a carbon-containing combining group such as ethyl (C_2H_5) in ethyl nitrite. These covalent nitrites are isomers of the nitro compounds—*e.g.,* nitroethane—which are considered to be derivatives of nitric acid rather than of nitrous acid.

Nitrites usually are prepared by absorption of nitric oxide and nitrogen dioxide in an alkaline solution. In an older method, sodium nitrate was fused with lead, and the resulting sodium nitrite was dissolved in water and separated from the by-product, lead oxide, by filtration. Nitrites are used as food preservatives and in medicine as vasodilators to relieve cardiac pain. *See also* nitroso compound.

nitro compound, any of a family of chemical compounds in which the nitro group ($-O-N{=}O$) forms part of the molecular structure. The most common examples are organic substances in which a carbon atom is linked by a covalent bond to the nitrogen atom of the nitro group. Nitro compounds are polar, and those with no other chemically reactive grouping are colourless or pale yellow liquids that are only slightly soluble in water. Many nitro compounds are commercially produced for use as explosives, solvents, or chemical intermediates (substances valued as raw materials in further chemical processing).

A nitro compound ordinarily is made by the reaction, called nitration, between nitric acid and an organic compound. Nitration of aromatic compounds, such as benzene or toluene, is commonly effected by treating them with a mixture of nitric and sulfuric acids at temperatures of 100° C or lower. These temperatures are not high enough for nitrating aliphatic compounds; propane, however, is commercially converted to a mixture of nitromethane, nitroethane, 1-nitropropane, and 2-nitropropane by allowing it to react with nitric acid vapours at temperatures of about 400° C. The mixture is then separated into its components by fractional distillation.

The most important reaction of aromatic nitro compounds is their reduction, which can be brought about by a wide variety of agents. Under acidic conditions, reduction almost always produces an amine. In neutral media, reduction may yield a hydroxylamine. In alkaline solution, compounds containing nitrogen-to-nitrogen bonds (azo, hydrazo, or azoxy compounds) are formed.

nitrobenzene, the simplest aromatic nitro compound, having the molecular formula $C_6H_5NO_2$. It is used in the manufacture of aniline, benzidine, and other organic chemicals. Nitrobenzene is a colourless to pale yellow, oily, highly toxic liquid with the odour of bitter almonds.

Nitrobenzene was first prepared in 1834 by the German chemist Eilhardt Mitscherlich, who treated benzene with fuming nitric acid. Commercially, both batch and continuous processes employing mixed nitric and sulfuric acids are used to make nitrobenzene.

Nitrobenzene undergoes nitration, halogenation, and sulfonation much more slowly than does benzene. It may be reduced to a variety of compounds, depending on the reaction conditions. Most nitrobenzene produced is reduced to aniline; smaller amounts are converted to azobenzene, hydrazobenzene (the intermediate for benzidine), and phenylhydroxylamine. Reduction of both the nitro group and the benzene ring affords cyclohexylamine. Nitrobenzene is used as a mild oxidizing agent in the syntheses of quinoline and fuchsin.

nitrocellulose, also called CELLULOSE NITRATE, a mixture of nitric esters of cellulose, and a highly flammable compound that is the main ingredient of modern gunpowder. Nitrocellulose is a fluffy white substance that retains some of the fibrous structure of untreated cellulose. It is not stable to heat, and even carefully prepared samples will ignite on brief heating to more than about 150° C (300° F). When nitrocellulose decomposes, it forms products that catalyze further decomposition; this reaction, if not stopped in time, results in an explosion.

In 1838 T.-J. Pelouze discovered that cotton could be made explosive by dipping it in concentrated nitric acid. C.F. Schönbein in 1845 improved the manufacturing method by dipping cotton in a mixture of nitric and sulfuric acids and then washing the substance to remove the excess acid. The form of nitrocellulose known as guncotton came into use as an ingredient of gunpowder in the 1860s. The early history of its use was punctuated by many disastrous explosions, however, and in 1868 Sir Frederick Augustus Abel showed that the methods then prevalent for washing nitrocellulose after nitration did not remove enough acid. Paul Vieille added special stabilizers to nitrocellulose to neutralize the catalytically active decomposition products; the first stable and reliable propellant, smokeless powder, resulted from his work and became the main form of gunpowder.

The manufacturing process uses either cotton linters or wood pulp as the source of cellulose. These materials are treated in a mixture of nitric and sulfuric acid at a ratio of one part cellulose to 30 parts acid. Most of the spent acid is removed by centrifuging the moist nitrocellulose, which is washed in a large quantity of water and is then subjected to boiling in acidified water to eliminate the remaining unstable by-products of nitration. The material is then pulped to disintegrate the cellulose fibres, and a subsequent washing removes the last traces of acid. Wood pulp is the preferred material for nitrocellulose used as a gun propellant.

If cotton is treated until almost all of the cellulose molecules' hydroxyl groups have been esterified but the molecules' structure has not yet been broken down, the result is guncotton. This form of nitrocellulose has more than 13 percent nitrogen and is soluble in acetone but not in ether and alcohol. It is used for propellants, either alone or combined with nitroglycerin.

Less completely nitrated celluloses are called collodion cotton or pyroxylin and are inferior to guncotton in explosive properties. Collodion with a nitrogen content of not more than 12 percent is used chiefly for lacquers and celluloid plastics. Materials with a nitrogen content of about 11.5 percent were once used as artificial silk but have been replaced by other materials such as viscose rayon. This same material was used for manufacturing photographic film until safety film made of cellulose acetate plastics became popular.

nitrogen (N), nonmetallic element of Group Va of the periodic table. It is a colourless, odourless, tasteless gas that is the most plentiful element in the Earth's atmosphere, and a constituent of all living matter.

A treatment of nitrogen follows. For additional treatment, *see* MACROPAEDIA: Chemical Elements.

Daniel Rutherford, a medical student in Edinburgh, is usually credited with the discovery of nitrogen (1772) because he was first to publish his findings; but in England the chemists Joseph Priestley and Henry Cavendish and in Sweden the chemist Carl Wilhelm Scheele also discovered it about the same time. The French chemist Antoine Lavoisier first recognized the gas as an element and named it azote because of its inability to support life (Greek *zōē,* "life"). The present name (from "nitre" plus the suffix "-gen," thus "nitre-forming") was coined in 1790 to indicate the presence of the element in nitre (ordinary saltpetre, or potassium nitrate, KNO_3).

Occurrence, properties, and uses. Among the elements, nitrogen ranks sixth in cosmic abundance. It occurs in the Earth's atmosphere to the extent of 78 percent by volume, or about 75 percent by weight. Free nitrogen also is found in many meteorites; in gases of volcanoes, mines, and some mineral springs; in the Sun; and in some stars and nebulae. In combination it is found in the minerals nitre and Chile saltpetre (sodium nitrate, $NaNO_3$); in the atmosphere, rain, soil, and guano as ammonia and ammonium salts; in seawater as ammonium (NH_4^+), nitrite (NO_2^-), and nitrate (NO_3^-) ions; and in living organisms as complex organic compounds such as proteins.

Animals obtain the nitrogen of their tissue proteins from vegetable or other animal proteins of food. Plants synthesize their proteins from inorganic nitrogen compounds from soil and to some extent from uncombined nitrogen in the air. A bacterium living in the roots of leguminous plants, such as peas, beans, clover, alfalfa, and peanuts, assimilates atmospheric nitrogen. Certain free-living anaerobic bacteria and blue-green algae also can extract nitrogen from the air. Other microorganisms in soils convert ammonium salts to nitrates. Lightning and sunlight cause a limited amount of nitrogen to combine with atmospheric oxygen, forming several oxides that are conveyed by rain in the form of nitric and nitrous acids to the soil, where they are neutralized, becoming nitrates and nitrites. The nitrogen content of cultivated soil is generally enriched and renewed artificially by fertilizers containing nitrates and ammonium salts. Excretion and decay of animals and plants return nitrogen compounds to the soil and air, and some bacteria in soil decompose nitrogen compounds and return the element to the air.

Inhaled nitrogen dissolves slightly in the blood and in other body fluids; under increased pressure, the amount dissolved is greater. The bends, or decompression sickness, is caused mainly by bubbles of nitrogen coming out of solution in the bloodstreams of persons such as divers, aviators, and those who work in deep caissons on whom the air pressure has been reduced too quickly.

Commercially, nitrogen is prepared almost entirely by the fractional distillation of liquid air. Nitrogen, which has a lower boiling point (−195.8° C, or −320.4° F) than oxygen (−183.0° C, or −297.4° F), tends to evaporate first. On a small scale, pure nitrogen is made from its compounds, for example, by heating ammonium nitrite, NH_4NO_2, or barium azide, $Ba(N_3)_2$.

Chemically, nitrogen gas is quite inert, especially at ordinary temperatures. Owing to its inertness, nitrogen gas is utilized in the chemical industry as a diluent or as a blanket to exclude oxygen and moisture. The low temperature (and inertness) of nitrogen in the liquid state make it suitable for freeze-drying food and as a refrigerant when transporting perishable commodities. Liquid nitrogen also has proved useful in cryogenic research.

Natural nitrogen on Earth consists of a mixture of two stable isotopes, nitrogen-14 (99.63 percent) and nitrogen-15 (0.37 percent). The first artificially induced nuclear transmutation was reported (1919) by a British physicist, Ernest Rutherford, who bombarded nitrogen-14 with alpha particles to form oxygen-17 nuclei and protons. Three other radioactive isotopes are known: nitrogen-12, nitrogen-13, and nitrogen-16.

Compounds. Most elemental nitrogen is consumed in the manufacture of nitrogen compounds.

Large quantities of nitrogen are used together with hydrogen to produce ammonia, NH_3, a colourless gas with a pungent, irritating odour. The chief commercial method of synthesizing ammonia is the Haber-Bosch process (*q.v.*). Ammonia is one of the two principal nitrogen compounds of commerce; it has numerous uses in the manufacture of other important nitrogen compounds. A large portion of commercially synthesized ammonia is converted into nitric acid (HNO_3) and nitrates, which are the salts and esters of nitric acid. Much ammonia is used in the ammonia-soda process (*q.v.*) to produce soda ash, Na_2CO_3. Ammonia is also utilized in the preparation of hydrazine, N_2H_4, a colourless liquid used as a rocket fuel and in many industrial processes.

Nitric acid is the other main commercial compound of nitrogen. A colourless, highly corrosive liquid, it is much used in the production of fertilizers, dyes, drugs, and explosives. Ammonium nitrate (NH_4NO_3), a salt of ammonia and nitric acid, is the most common nitrogenous component of artificial fertilizers.

With oxygen, nitrogen forms several oxides, including nitrous oxide, or nitrogen(I) oxide, N_2O; nitric oxide, or nitrogen(II) oxide, NO; and nitrogen dioxide, or nitrogen(IV) oxide, NO_2. Many of the nitrogen oxides are extremely volatile; they are prime sources of pollution in the atmosphere. Nitrous oxide, also known as laughing gas, is sometimes used as an anesthetic; when inhaled it produces mild hysteria. Nitric oxide reacts rapidly with oxygen to form nitrogen dioxide, an intermediate in the manufacture of nitric acid and a powerful oxidizing agent utilized in chemical processes and rocket fuels.

Also of some importance are certain nitrides, solids formed by direct combination of metals with nitrogen, usually at elevated temperatures. They include hardening agents produced when alloy steels are heated in an atmosphere of ammonia, a process called nitriding. Those of boron, titanium, zirconium, and tantalum have special applications. One allotrophic form of boron nitride (BN), for example, is nearly as hard as diamond and less easily oxidized and so is useful as a high-temperature abrasive.

The inorganic cyanides contain the group CN^-. Hydrogen cyanide, or formonitrile, HCN, is a highly volatile and extremely poisonous gas that is used in fumigation, ore concentration, and various other industrial processes. Cyanogen, or oxalonitrile, $(CN)_2$, is also used as a chemical intermediate and a fumigant.

Azides, which may be either inorganic or organic, are compounds that contain three nitrogen atoms as a group, represented as $(-N_3)$. Most azides are unstable and highly sensitive to shock. Some of them, such as lead azide $[Pb(N_3)_2]$, are used in detonators and percussion caps. The azides, like the halogen compounds, readily react with other substances by displacement of the so-called azide group and yield many kinds of compounds.

Nitrogen forms many thousands of organic compounds. Most of the known varieties may be regarded as derived from ammonia, hydrogen cyanide, cyanogen, and nitrous or nitric acid. The amines, amino acids, and amides, for example, are derived from or closely related to ammonia. Nitroglycerin and nitrocellulose are esters of nitric acid. Nitro compounds are obtained from the reaction (called nitration) between nitric acid and an organic compound. Nitrites are derived from nitrous acid (HNO_2). Nitroso compounds are obtained by the action of nitrous acid on an organic compound. Purines and alkaloids are heterocyclic compounds in which nitrogen replaces one or more carbon atoms.

atomic number	7
atomic weight	14.0067
melting point	−209.86°C (−345.8°F)
boiling point	−195.8°C (−320.4°F)
density (1 atm, 0° C)	1.2506 g/l
usual oxidation states	−3, +3, +5
electron config.	2-5 or $1s^2 2s^2 2p^3$

nitrogen cycle, circulation of nitrogen in various forms through nature. Nitrogen, a component of proteins and nucleic acids, is essential to life on Earth. Although 78 percent by volume of the atmosphere is nitrogen gas, this abundant reservoir exists in a form unusable by most organisms. Through a series of microbial transformations, however, nitrogen is made available to plants, which in turn ultimately sustain all animal life. The steps, which are not altogether sequential, fall into the following classifications: nitrogen fixation, nitrogen assimilation, ammonification, nitrification, and denitrification.

Nitrogen fixation, in which nitrogen gas is converted into inorganic nitrogen compounds, is mostly (90 percent) accomplished by certain bacteria and blue-green algae (*see* nitrogen fixation). A much smaller amount of free nitrogen is fixed by abiotic means (*e.g.,* lightning, ultraviolet radiation, electrical equipment) and by conversion to ammonia through the Haber-Bosch process (*q.v.*).

Nitrates and ammonia resulting from nitrogen fixation are assimilated into the specific tissue compounds of algae and higher plants. Animals then ingest these algae and plants, converting them into their own body compounds.

The remains of all living things—and their waste products—are decomposed by microorganisms in the process of ammonification, which yields ammonia. (Under anaerobic, or oxygen-free, conditions foul-smelling putrefactive products may appear, but they too are converted to ammonia in time.) Ammonia can leave the soil or be converted into other nitrogen compounds, depending in part on soil conditions.

Nitrification, a process carried out by nitrifying bacteria (*q.v.*), transforms soil ammonia into nitrates, which plants can incorporate into their own tissues.

Nitrates also are metabolized by denitrifying bacteria (*q.v.*), which are especially active in water-logged, anaerobic soils. The action of these bacteria tends to deplete soil nitrates, forming free atmospheric nitrogen.

nitrogen euphoria (medicine): *see* nitrogen narcosis.

nitrogen fixation, any natural or industrial process that causes free nitrogen, which is a relatively inert gas plentiful in air, to combine chemically with other elements to form more reactive nitrogen compounds such as ammonia, nitrates, or nitrites.

Under ordinary conditions nitrogen does not react with other elements. Yet nitrogenous compounds are found in all fertile soils, in all living things, in many foodstuffs, in coal, and in such naturally occurring chemicals as sodium nitrate (saltpetre) and ammonia. Nitrogen is also found in the nucleus of every living cell as one of the chemical components of DNA.

Nitrogen is fixed, or combined, in nature as nitric oxide by lightning and ultraviolet rays, but more significant amounts of nitrogen are fixed as ammonia, nitrites, and nitrates by soil microorganisms. More than 90 percent of all nitrogen fixation is effected by them. Two kinds of nitrogen-fixing microorganisms are recognized: free-living (non-symbiotic) bacteria, including the cyanobacteria (or blue-green algae) *Anabaena* and *Nostoc* and such genera as *Azotobacter, Beijerinckia,* and *Clostridium;* and mutualistic (symbiotic) bacteria such as *Rhizobium,* associated with leguminous plants, and *Spirillum lipoferum,* associated with cereal grasses.

The symbiotic nitrogen-fixing bacteria invade the root hairs of host plants, where they multiply and stimulate the formation of root nodules, enlargements of plant cells and bacteria in intimate association. Within the nodules the bacteria convert free nitrogen to nitrates, which the host plant utilizes for its development. To ensure sufficient nodule formation and optimum growth of legumes (*e.g.,* alfalfa, beans, clovers, peas, soybeans), seeds are usually inoculated with commercial cultures of appropriate *Rhizobium* species, especially in soils poor or lacking in the required bacterium. (*See also* nitrogen cycle.)

Nitrogenous materials had long been used in human agriculture as fertilizers, and in the course of the 19th century, fixed nitrogen's importance to growing plants was increasingly understood. Accordingly, ammonia released in making coke from coal was recovered and utilized as a fertilizer, as were deposits of sodium nitrate (saltpetre) from Chile. Wherever intensive agriculture was practiced, there arose a demand for nitrogen compounds to supplement the natural supply in the soil. At the same time, the increasing quantity of Chile saltpetre used to make gunpowder led to a worldwide search for natural deposits of this nitrogen compound. By the end of the 19th century it was clear that recoveries from the coal-carbonizing industry and the importation of Chilean nitrates could not meet future demands. Moreover, it was realized that in the event of a major war a nation cut off from the Chilean supply would soon be unable to manufacture munitions in adequate amounts.

During the first decade of the 20th century, intensive research efforts culminated in the development of several commercial nitrogen-fixation processes. The three most productive approaches were the direct combination of nitrogen with oxygen, the reaction of nitrogen with calcium carbide, and the direct combination of nitrogen with hydrogen. In the first approach, air or any other uncombined mixture of oxygen and nitrogen is heated to a very high temperature, and a small portion of the mixture reacts to form the gas nitric oxide. The nitric oxide is then chemically converted to nitrates for use as fertilizers. By 1902 electric generators were in use at Niagara Falls, N.Y., to combine nitrogen and oxygen in the high temperatures of an electric arc. This venture failed commercially, but in 1904 Christian Birkeland and Samuel Eyde of Norway used an arc method in a small plant that was the forerunner of several larger, commercially successful plants that were built in Norway and other countries. The arc process, however, was costly and inherently inefficient in its use of energy, and it was soon abandoned for better processes. One such method used the reaction of nitrogen with calcium carbide at high temperatures to form calcium cyanamide, which hydrolyzes to ammonia and urea. The cyanamide process was utilized on a large scale by several countries before and during World War I, but it too was energy-intensive, and by 1918 the Haber-Bosch process had rendered it obsolete.

The Haber-Bosch process (*q.v.*) directly synthesizes ammonia from nitrogen and hydrogen and is the most economical nitrogen-fixation process known. About 1909 the German chemist Fritz Haber ascertained that nitrogen from the air could be combined with hydrogen under extremely high pressures and moderately high temperatures in the presence of an active catalyst to yield an extremely high proportion of ammonia, which is the starting point for the production of a wide range of nitrogen compounds. This process, made commercially feasible by Karl Bosch, came to be called the Haber-Bosch process, or the synthetic ammonia process. Germany's successful reliance on this process during World War I led to a rapid expansion of the industry and the construction of similar plants in many other countries after the war. The Haber-Bosch method is now one of the largest and most basic processes of the chemical industry throughout the world.

nitrogen group element, any of the chemical elements that constitute Group Va of the periodic table. This group consists of nitrogen (N), phosphorus (P), arsenic (As), antimony (Sb), and bismuth (Bi).

A brief treatment of the nitrogen group elements follows. For full treatment, *see* MACROPAEDIA: Chemical Elements. *See also* MICROPAEDIA for entries on each member of this element family.

All of the elements of the nitrogen group occur in the Earth's crust. Moreover, nitrogen itself is the most abundant gas in the atmosphere and on the average constitutes about 16 percent by weight of the complex compounds called proteins that are present in all living organisms. Phosphorus is the 12th most abundant element in the terrestrial crust and one of the most widely distributed. Because of its high chemical reactivity, however, it does not occur uncombined. The other three members of the group are found in substantially smaller amounts. They exist both in the native state and in the form of compounds.

The nitrogen elements probably have the widest range in physical state of any group in the periodic table. Nitrogen, for example, is a gas that liquefies at roughly −210° C, whereas bismuth is a solid that melts at 271° C. Nitrogen and phosphorus are nonmetals; arsenic and antimony are metalloids; and bismuth is a typical metal. The elements of this group also exhibit considerable diversity in appearance. Nitrogen is colourless both as a gas and as a liquid. Phosphorus occurs in a variety of allotropic forms, including the familiar highly reactive white form, a much less reactive red form, and a black modification that appears to be the most stable of all. Arsenic exists ordinarily as a dull gray metallic solid. Antimony is a silver, metallic-appearing but somewhat brittle solid. Bismuth is a silver-white metal with a trace of pink in its lustre.

The nitrogen group elements are clearly differentiated from each other chemically, but they do manifest certain general similarities in chemical behaviour. These similarities reflect common features of the electronic structure of their atoms. Each element of the group has an outermost shell of five electrons. In every case, these electrons occupy an *s* orbital completely with two electrons and contribute one electron to each of three *p* orbitals. The arrangement of outer electrons in the atoms of nitrogen elements therefore provides three half-filled orbitals that can form three covalent bonds by interaction with half-filled orbitals of the atoms of other elements; an unshared, or lone, pair of electrons, remains after the three covalent bonds have been formed. With the exception of nitrogen, all other elements in this group can also form five covalent bonds.

nitrogen narcosis, also called NITROGEN EUPHORIA, or RAPTURES OF THE DEEP, effects produced by the gas nitrogen when it is breathed under increased pressure. Nitrogen, a major constituent of air, is quite inert and passes into the fluids and tissues of the body without undergoing chemical change. Even though it is not used to sustain the bodily functions, it, nevertheless, has certain effects upon the tissues when it is present in excess of the amounts breathed at atmospheric pressures.

As divers descend in the water, the pressure upon their bodies increases proportionally to the water depth; in order for them to breathe normally, they are supplied with air at a pressure equal to that of the water. A diver situated at 30 m (100 feet) under water is breathing air that is four times more dense than at sea level; the quantity of nitrogen is, likewise, four times greater.

Nitrogen is absorbed by the fatty tissue (lipids) much faster than by other tissues; the brain and the rest of the nervous system have a high lipid content. Consequently, when a high concentration of nitrogen is breathed, the nervous system becomes saturated with the inert gas, and normal functions are impaired. Each individual has his own threshold of susceptibility; some divers experience narcosis at 15 m, while others can go to 60 m without any apparent effects. Most often, nitrogen narcosis begins to be apparent at about 10 m of depth. As a diver goes deeper, the symptoms increase in severity. When the diver ascends, the symptoms terminate with essentially no aftereffects or permanent harm done.

Mild cases begin as an intoxicating feeling of light-headedness, euphoria, numbness, and carefreeness. The reasoning ability and manual dexterity may next be slowed down. Emotional instability and irrationality may then ensue. Persons severely affected lapse into convulsions and unconsciousness. Divers swimming in clear, warm water seem to experience pleasant sensations, while those in dark, cold water seem to encounter panic, fear, anxiety, and depression. Unless the narcosis is severe, the victim is capable of functioning physically and may not fully realize that his rationality is being impaired. Irrationality itself, however, can cause the diver to inflict bodily harm upon himself by rising too fast or by failing to realize that his air supply has been depleted.

Because helium dissolves less readily in body tissue than nitrogen, mixtures of helium and oxygen are used in place of the usual nitrogen-oxygen mixtures for deep dives.

See also decompression sickness.

nitroglycerin, also called GLYCERYL TRINITRATE, a powerful explosive and an important ingredient of most forms of dynamite (*q.v.*). It is also used with nitrocellulose in some propellants, especially for rockets and missiles, and it is employed as a vasodilator in the easing of cardiac pain.

Pure nitroglycerin is a colourless, oily, somewhat toxic liquid having a sweet, burning taste. It was first prepared in 1846 by the Italian chemist Ascanio Sobrero by adding glycerol to a mixture of concentrated nitric and sulfuric acids. The hazards involved in preparing large quantities of nitroglycerin have been greatly reduced by widespread adoption of continuous nitration processes.

Nitroglycerin, with the molecular formula $C_3H_5(ONO_2)_3$, has a high nitrogen content (18.5 percent) and contains sufficient oxygen atoms to oxidize the carbon and hydrogen atoms while nitrogen is being liberated, so that it is one of the most powerful explosives known. Detonation of nitroglycerin generates gases that would occupy more than 1,200 times the original volume at ordinary room temperature and pressure; moreover, the heat liberated raises the temperature to about 5,000° C (9,000° F). The overall effect is the instantaneous development of a pressure of 20,000 atmospheres; the resulting detonation wave moves at approximately 7,700 m per second (more than 17,000 miles/h). Nitroglycerin is extremely sensitive to shock and to rapid heating; it begins to decompose at 50°–60° C (122°–140° F) and explodes at 218° C (424° F).

The safe use of nitroglycerin as a blasting explosive became possible after the Swedish chemist Alfred B. Nobel developed dynamite in the 1860s by combining liquid nitroglycerin with an inert porous material such as charcoal or diatomaceous earth. Nitroglycerin plasticizes collodion (a form of nitrocellulose) to form blasting gelatin, a very powerful explosive. Nobel's discovery of this action led to the development of ballistite, the first double-base propellant and a precursor of cordite.

A serious problem in the use of nitroglycerin results from its high freezing point (13° C [55° F]) and the fact that the solid is even more shock-sensitive than the liquid. This disadvantage is overcome by using mixtures of nitroglycerin with other polynitrates; for example, a mixture of nitroglycerin and ethylene glycol dinitrate freezes at −29° C (−20° F).

nitromersol, disinfectant for application to the skin and mucous membranes and for sterilizing surgical instruments, sometimes marketed under the trade name Metaphen. It is an organic compound containing mercury and is related to merbromin (Mercurochrome) and thimerosal (Merthiolate). Nitromersol disinfects by the action of the mercury in the molecule, which precipitates the enzymes of microorganisms and disrupts their metabolism. Nitromersol occurs as a yellowish powder or granules, soluble in alkaline solutions. It is used as a 0.5-percent alcoholic tincture or as a 0.2-percent aqueous solution.

nitroso compound, any of a class of organic compounds having molecular structures in which the nitroso group ($-N{=}O$) is attached to a carbon or nitrogen atom. Substances in which this group is attached to an oxygen atom are called nitrites, that is, esters of nitrous acid; those in which the nitroso group is attached to a metal ion are called nitrosyls.

Nitroso compounds are usually prepared by the action of nitrous acid or a derivative of it upon a substance containing an easily replaced hydrogen atom. Certain members of the class are obtainable by oxidation of amines or by reduction of nitro compounds.

Examples of nitroso compounds are nitrosodimethylaniline and the nitrosophenols, used in the manufacture of dyes. The compounds are usually blue or green in colour. Nitroso derivatives of amides decompose upon heating with formation of nitrogen and can be used as foam-producing agents; if they are heated in the presence of alkalies, the decomposition takes a different course, yielding diazo compounds.

nitrous acid (HNO_2), an unstable, weakly acidic compound that has been prepared only in the form of cold, dilute solutions. It is useful in chemistry in converting amines into diazonium compounds, which are used in making azo dyes. It is usually prepared by acidifying a solution of one of its salts, the nitrites, which are more stable (*see* nitrite).

Nitrous acid decomposes into nitric oxide, NO, and nitric acid, HNO_3. It may react as either an oxidizing or a reducing agent; that is, its nitrogen atom may either gain or lose electrons in reactions with other substances. Nitrous acid, for example, oxidizes iodide ion to elemental iodine but reduces bromine to bromide ion.

nitrous oxide (N_2O), also called DINITROGEN MONOXIDE, or LAUGHING GAS, one of several oxides of nitrogen, a colourless gas with pleasant, sweetish odour and taste, which when inhaled produces insensibility to pain preceded by mild hysteria, sometimes laughter. Nitrous oxide was discovered by the English chemist Joseph Priestley in 1772; another English chemist, Humphry Davy, later named it nitrous oxide and showed its physiological effect. The principal use of nitrous oxide is as an anesthetic in surgical operations of short duration; prolonged inhalation causes death. The gas is also used as a propellant in food aerosols. It is prepared by the action of zinc on dilute nitric acid, by the action of hydroxylamine hydrochloride ($NH_2OH \cdot HCl$) on sodium nitrite ($NaNO_2$), and, most commonly, by the decomposition of ammonium nitrate (NH_4NO_3).

Nitta Yoshisada (b. 1301, Kōzuke province, Japan—d. Aug. 17, 1338, Echizen province), Japanese warrior whose support of the imperial restoration of the emperor Go-Daigo was crucial in destroying the Kamakura shogunate, the military dictatorship that governed Japan from 1192 until 1333. The ultimate defeat of Nitta resulted in the end of the imperial restoration and the rise to power of the Ashikaga family, which dominated Japan from 1338 to 1573.

When Go-Daigo first rebelled against the Kamakura shogunate in 1331, Nitta, as a Kamakura retainer, helped defeat the emperor's armies. The following year, however, Nitta switched allegiance and led the army that attacked and destroyed the Kamakura shogunate. He was one of the strongest men in the new court government, but he soon had a falling out with Ashikaga Takauji, another former Kamakura retainer who had also switched sides. Go-Daigo supported Nitta in the ensuing struggle, and in 1335 Takauji was driven from the capital, only to return a year later at the head of a large army and navy recruited from provincial warriors. The emperor's forces were crushed, and Nitta fled the capital, taking Go-Daigo with him.

Takauji established a new puppet emperor at Kyōto, while Nitta set up Go-Daigo at Yoshino-yama, in south-central Japan, thus establishing two rival imperial courts, a northern court at Kyōto and a southern court at Yoshino. Nitta regained power in 1338 but died a few months later when he was hit by a stray arrow in a surprise attack.

Nitti, Francesco Saverio (b. July 19, 1868, Melfi, Italy—d. Feb. 20, 1953, Rome), Italian statesman who was prime minister for a critical year after World War I.

After a career as a journalist and professor of economics, Nitti was elected deputy in 1904. A Left Liberal, he served as minister of agriculture, industry, and commerce in 1911–14 and as minister of the treasury in 1917–19. He succeeded Vittorio Emanuele Orlando, the wartime prime minister, in June 1919, in the midst of foreign and domestic crises involving Italian territorial claims disputed by other Allied countries and the economic and fiscal problems created by the war and demobilization. Nitti's adoption of the system of proportional representation (Aug. 15, 1919) resulted in large increases in the number of deputies elected by the Socialists (156) and the Christian Democrats, or Popolari (100), but he did not succeed in conciliating these parties, and an epidemic of strikes by industrial workers and disorders fomented by the new Fascist Party of Benito Mussolini undermined not only Nitti's government but the processes of democratic government itself. Nitti resigned on June 9, 1920. He was reelected to parliament in 1921 and served until 1924 but did not enter his name in the election of that year held by the new Fascist regime. For several years he remained in exile in France, devoting himself to writing.

Francesco Saverio Nitti
B. Pellegrini

During World War II Nitti was arrested by the Germans (August 1943) and interned in Austria but was freed by the Allied victory in 1945. He became a senator of Italy in June 1948.

Nitti, Frank, original name FRANCESCO RAFFELE NITTO, byname THE ENFORCER (b. 1896?, Naples, Italy—d. March 19, 1943, North Riverside, Ill., U.S.), American gangster in Chicago who was Al Capone's chief enforcer and inherited Capone's criminal empire when Capone went to prison in 1931.

Starting as a barber, Nitti became a fence for stolen goods and about 1920 joined Capone's gang. He was sent to prison for 18 months after pleading guilty in 1930 to income-tax evasion, but thereafter he nominally headed the syndicate that controlled Chicago's gambling, prostitution, and other rackets. In March 1943 he and eight others (including Paul "the Waiter" Ricca) were indicted for trying to extort $1,000,000 from four motion-picture companies (Loew's, Paramount, Twentieth Century–Fox, and Warner Brothers) under threat of "union trouble." Just hours before the New York federal grand jury handed down the indictment, Nitti shot himself as he wandered, drunken, along a railroad track in a Chicago suburb.

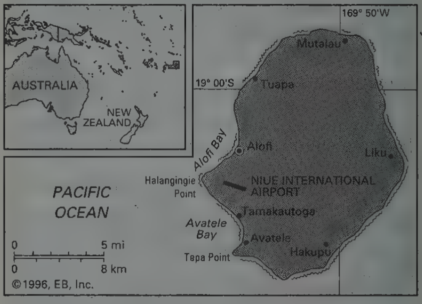
Niuafo'ou, northernmost island of Tonga, in the southwestern Pacific Ocean. The generally wooded land area of 19 square miles (49 square km) includes a volcanic peak 853 feet (260 m) high, a crater lake, and numerous hot springs. During a particularly violent eruption in 1946, the island's inhabitants were evacuated to 'Eua, several hundred miles to the south. They began returning to Niuafo'ou in 1958. Because of an unusual method of exchanging letters in cans with passing ships, Niuafo'ou gained the nickname "Tin Can Island." Pop. (1986) 763.

Niuatoputapu, also called KEPPEL ISLAND, one of the northernmost islands of Tonga, in the southwestern Pacific Ocean. Of volcanic origin, the island has an area of 7 square miles (19 square km) and rises to 350 feet (110 m). Although the island lacks an adequate anchorage, it serves as a regular port of call for interisland shipping between Tonga and Samoa. Copra and breadfruit are produced. Pop. (1986) 1,616.

Niue, internally self-governing island state in free association with New Zealand. It is the westernmost of the Cook Islands but is administratively separate from them. Niue lies 1,340 miles (2,156 km) northeast of Auckland and 240 miles (385 km) east of Vava'u, Tonga, in the south-central Pacific. The capital is Alofi. Area 100 square miles (260 square km). Pop. (1994 est.) 2,200.

Physical and human geography. Niue is a roughly oval, raised coral island that is about 40 miles (64 km) in circumference. The island has two distinct levels. The upper level, a central plateau 208 feet (63 m) high, slopes steeply down at its edges to the lower level, a coastal terrace about 0.3 miles (0.5 km) wide and 80–90 feet (25–27 m) high, which in turn slopes down to meet the sea in small cliffs. A fringing reef surrounds the island.

Rainfall on Niue averages 80 inches (2,000 mm) annually and falls mostly from December to April. The island's soil is extremely porous, so that water catchment from roofs is necessary to provide adequate water supply. The island's vegetation cover is scant but includes large trees, such as banyan and Tahiti chestnut; smaller species, such as coconut and fan palms and pandanus; shrubs, including hibiscus; and ferns and creepers.



Niue

The population is overwhelmingly Polynesian and speaks Niuean, a Polynesian dialect akin to Tongan and Samoan. English is also widely spoken. The inhabitants are predominantly Christian. Most of the population lives on the fertile coastal strip, which is intensively cultivated. The largest settlement on the island is Alofi.

Niue's economy is based mainly on agriculture. One-fourth of the land is arable and is held in traditional family patterns; Nieuans may not sell land to foreigners. Passion fruit, coconuts, pawpaw, and limes are cash crops. Subsistence crops include taro, yams, bananas, sugarcane, papaya, guava, and citrus fruits. Livestock includes pigs, chickens, and cattle, and fishing is conducted for domestic needs. About one-fifth of the land is forest. Manufacturing is centred on processing crops and includes lime juice, passion fruit, copra, honey, leather goods, and handicrafts for export. Some tourism has also developed. Alofi is the main port, and the island has a small airport as well. New Zealand is the major trading partner and source of financial aid.

Under the 1974 self-government constitution, Niueans remain New Zealand citizens. The British monarch is head of state, and the leader of the government is the premier, elected by the 20-member Legislative Assembly, itself elected by universal adult suffrage. The premier selects a four-member cabinet from the assembly.

History. Archaeological surveys in 1974 showed that Niue was settled approximately AD 900 by Samoans. Tradition recalls a second group, a war party from Tonga, that arrived sometime in the 16th century. Captain James Cook landed on Niue in 1774 and, because of hostility from the Niueans, named it Savage Island. London Missionary Society members began to arrive in the 1830s, and starting in 1852 the islanders were converted to Christianity.

In 1900 Great Britain annexed Niue as part of the Samoa partition. New Zealand annexed the island in 1901 as part of the Cook Islands, but in 1904 it was separated and given its own resident commissioner and island council. The first Niuean Legislative Assembly was elected in 1960, and in 1966 the resident commissioner's authority was partly delegated to the assembly and a Niuean leader of government was installed. In 1974 the people voted for a new constitution, choosing self-government in association with New Zealand, which agreed to provide defense and look after foreign affairs and to keep Niueans as New Zealand citizens.

Nivelle, Robert-Georges (b. Oct. 15, 1856, Tulle, France—d. March 23, 1924, Paris), commander in chief of the French armies on the Western Front for five months in World War I. His career was wrecked by the failure of his offensive in the spring of 1917.

Nivelle graduated from the École Polytechnique in 1878, served in Indochina, Algeria, and China as an artillery officer, and was made a general of brigade in October 1914 after World War I began. In 1915 he rose to command a division and then the 3rd Corps, which helped stem the German offensive at the Battle of Verdun early in 1916. In May 1916 he succeeded General Philippe Pétain as commander of the 2nd Army at Verdun. His use of creeping artillery barrages in two dazzlingly successful French counterattacks there (October, December 1916) enabled the French to retake nearly all the ground gained by the Germans over the previous six months.

That December, Nivelle was promoted over many senior officers to succeed General Joseph-Jacques Joffre as commander in chief of the French armies. He then proclaimed that his methods at Verdun could win the war. David Lloyd George, the British prime minister, heartily subscribed to Nivelle's advocacy of frontal assaults carried out in close coordination with massive artillery bombardments, and he placed the British armies in France under Nivelle's command for his great offensive. Nivelle, however, steadily lost the confidence of his own chief subordinates, and his final offensive on the Aisne front (April 1917) failed to break through German lines and cost France 120,000 casualties. The next month there were widespread mutinies in the French armies. On May 15, 1917, Nivelle was replaced by Pétain as commander in chief, and in December 1917 he was transferred to North Africa.

Niven, David, in full JAMES DAVID GRAHAM NIVEN (b. March 1, 1909, Kirriemuir, Angus, Scot.—d. July 29, 1983, Château-d'Oex, Switz.), British stage and motion-picture actor who personified dapper charm.

Born to a longtime military family, Niven attended Sandhurst Military Academy. He made his way to Hollywood in the mid-1930s and began performing as an extra. His first major roles were in *Dawn Patrol* (1938) and *Wuthering Heights* (1939). He rapidly became known as a steady, reliable actor who usually specialized in light comedy.

Niven served as an officer in the British army's commando unit during World War II, and following the war he returned to films. Though known for his sure touch with light comedy, he also proved to be a substantial dramatic actor, winning an Academy Award for his role in *Separate Tables* (1958). Among his best-known films are *The Moon Is Blue* (1953), *Around the World in 80 Days* (1956), *The Guns of Navarone* (1961), *The Pink Panther* (1964), and *Death on the Nile* (1978). He also appeared on stage and on two television series. He published a novel, *Go Slowly, Come Back Quickly* (1981), and two autobiographical volumes, *The Moon's a Balloon* (1971) and *Bring on the Empty Horses* (1975).

Niven performed in movies until the year of his death, even though he suffered in his later life from amyotrophic lateral sclerosis (also called Lou Gehrig's disease). His last film was *The Curse of the Pink Panther* (1983).

Nivernais, in France, the area administered from Nevers during the ancien régime, and until the French Revolution the last great fief still not reunited to the French crown. Bounded southwest by Bourbonnais, west by Berry, north by Orléanais, and east by Burgundy, Nivernais in 1790 became the *département* of Nièvre.

The *gouvernement* of Nivernais in 1789

Having formed part of the duchy of Burgundy, the county of Nevers (Nivernais) was given by Duke Henry I in 987 to his stepson, Otto William, who five years later handed it over to his son-in-law Landri. The first house of the hereditary counts of Nevers originated in this Landri and was brought to an end in 1192 by the death of Agnes, comtesse de Nevers. The county subsequently passed by successive marriages into the houses of Donzy, Châtillon, and Bourbon. Through marriages it passed to the duke of Burgundy and then the counts of Flanders and finally came to the house of Cleves (Kleve). The French king Francis I erected it into a duchy for Francis of Cleves in 1539. In 1565 Louis de Gonzaga (d. 1595), son of a duke of Mantua, married Henrietta of Cleves, duchesse de Nevers, and one of his descendants, Charles (d. 1665), sold the Nivernais to Cardinal Mazarin in 1659. The cardinal devised it to his nephew Philippe-Jules Mancini, whose descendants possessed it until the French Revolution. The last duc de Nivernais—Louis-Jules-Barbon Mancini-Mazarini—died in 1798.

Nivkh, formerly called GILYAK, east Siberian people who live in the region of the Amur River estuary and on nearby Sakhalin Island. They numbered about 4,600 in the late 20th century. Most speak Russian, though about 10 percent still speak Nivkh, a Paleo-Siberian language unaffiliated apparently with any other language. Their name for themselves, Nivkh, means "human."

The Nivkh economy was traditionally based on fishing (especially for salmon) and the hunting of sea lions and seals. Agriculture (the cultivation of potatoes) was started in the mid-19th century. Men's occupations included fishing, hunting, and making tools and means of transportation. Women processed animal skins, prepared birch bark for various uses, made clothing and utensils, gathered plants, did housework, and cared for the dogs. Until recently, when contact with the Evenk introduced the reindeer as a draft animal, dogs were the only domestic animals; they were used for pulling sleds and as a source of fur and meat. They were also a medium of exchange, an index of wealth, and an important part of religious rituals.

Villages generally included some 20 houses that were situated along the coast or near the mouths of rivers used by spawning salmon. The Nivkh were divided into exogamous clans. Clan members had mutual duties in payment of blood money, bride-price, and burial expenses; they observed a common cult that included the organization of a clan bear festival, usually held in honour of a dead clan kinsman.

Under Soviet administration economic activities were collectivized and small, scattered villages unified. Tillage, gardening, and cattle breeding were developed, and agriculture was introduced among the Sakhalin Nivkh.

Nivkh language, formerly called GILYAK LANGUAGE, isolated language with two main dialects spoken by some 400 Nivkh, roughly 10 percent of the ethnic group. The Nivkh live on Sakhalin Island and along the estuary of the Amur River in eastern Siberia. Nivkh is not known to be related to any other language, and it is usually included with the Luorawetlan languages and the Yeniseian languages in the catchall areal category of Paleo-Siberian languages.

Nixon, Richard M., in full RICHARD MILHOUS NIXON (b. Jan. 9, 1913, Yorba Linda, Calif., U.S.—d. April 22, 1994, New York, N.Y.), 37th president of the United States (1969–74), who, faced with almost certain impeachment, became the first U.S. president to resign from office. He also was vice president (1953–61) under President Dwight D. Eisenhower.

The son of a grocer, Nixon graduated from Whittier (Calif.) College in 1934 and from Duke University Law School, Durham, N.C., in 1937. He entered law practice in Whittier in 1937 and served briefly in the Office of Price Administration in Washington, D.C., soon after the outbreak of World War II. In August 1942 he joined the navy and served as an aviation ground officer in the Pacific. Following his return to civilian life in California, he was twice elected to the U.S. House of Representatives (1947, 1949). During this period, Nixon served on the House Un-American Activities Committee, taking a leading role in the investigation of Alger Hiss, a former State Department official who had been accused of spying for the Soviet Union.

In 1950 Nixon was elected to the U.S. Senate after a campaign in which he claimed his opponent had communist sympathies. Nixon's reputation as an anticommunist made him a desirable running mate for Eisenhower in the 1952 campaign, which emphasized that issue. Nixon served two terms as vice president under Eisenhower. He was narrowly defeated by the Democrat John F. Kennedy in the 1960 presidential election, and after losing the California gubernatorial election in 1962, Nixon announced his retirement from politics and moved to New York City to practice law.

Nixon reentered politics as a candidate in the 1968 presidential election. He initiated what came to be known as the "southern strategy," in which the Republican Party sought the support of conservative voters in southern and western states, often neglecting the interests of Americans—particularly blacks—in northern and northeastern cities. The campaign took place amid severe social and political turmoil; protests against U.S. participation in the Vietnam War were widespread. Nixon defeated the Democratic nominee, Hubert H. Humphrey, in a close vote.

Nixon, 1970
UPI

After his inauguration in January 1969, Nixon adjusted the U.S. strategy in Vietnam. A gradual withdrawal of U.S. forces was undertaken, and U.S. field commanders were ordered to minimize casualties. Under a policy known as "Vietnamization," the U.S. troops' combat role was progressively taken over by South Vietnamese troops, who nevertheless remained heavily dependent on American supplies and air support. This policy was part of the so-called Nixon Doctrine of reducing U.S. military forces abroad by assisting smaller nations to defend themselves through military and economic aid.

At the same time, Nixon escalated U.S. air attacks against North Vietnam. He also ordered secret bombing campaigns against North Vietnamese supply centres and staging areas in the neutral nations of Laos and Cambodia. In the spring of 1970, U.S. and South Vietnamese forces attacked North Vietnamese sanctuaries in Cambodia. This action caused widespread protest in the United States. In response, Nixon ordered government agencies to collect intelligence on prominent antiwar organizations and sought to discredit individuals who were critical of his Vietnam strategy.

Renominated in 1972, Nixon defeated his Democratic challenger, the liberal Senator George S. McGovern, in one of the largest landslide victories in U.S. presidential history. His second term began with the effective ending of U.S. participation in the Vietnam War in January 1973 after his national-security adviser, Henry Kissinger, had conducted intensive negotiations with the North Vietnamese. U.S. bombing raids on Cambodia continued, however, until August, and the administration was heavily criticized when the 1969–70 secret bombing of Laos and Cambodia was revealed and investigators discovered that the U.S. Air Force and the Department of Defense had falsified reports to conceal the bombing.

In domestic affairs, inflation was President Nixon's most persistent economic problem. Initially, he tried to cut federal expenditures; but the annual budget deficits of his administration grew to become the largest in history up to that time. In 1971 and 1973 the administration devalued the dollar in an attempt to achieve a balance of trade. Despite his well-known aversion to government controls, Nixon initiated (Aug. 15, 1971) his New Economic Policy, which included unprecedented peacetime controls on wages and prices. With the opportunity to appoint four Supreme Court justices, the president sought, with mixed success, to redirect the court toward the "strict constructionism" he espoused.

In foreign affairs, Nixon's most significant action may have been the reopening of direct communications with the People's Republic of China after a 21-year estrangement. In February 1972 he paid a state visit to China. This rapprochement in East Asia gave Nixon a stronger position during his visit to Moscow in May—the first by a U.S. president. At its conclusion the United States and the Soviet Union announced the SALT I nuclear arms limitation agreements as well as a bilateral-trade accord and plans for joint scientific and space ventures.

The president's second term, however, was dominated by the so-called Watergate Scandal (*q.v.*), which resulted from illegal activities by Nixon and his aides during the 1972 election campaign. On June 17, 1972, five men hired by the Republican Party's Committee to Re-elect the President had been arrested while burglarizing and wiretapping the national headquarters of the Democratic Party at the Watergate office complex in Washington, D.C. In the days following the break-in, Nixon had secretly directed the White House counsel, John Dean, to oversee a "cover-up" to conceal the administration's involvement. Nixon also obstructed the Federal Bureau of Investigation in its inquiry and authorized secret cash payments to the Watergate burglars in an effort to prevent them from implicating the administration.

Several major newspapers, led by *The Washington Post,* investigated the White House's possible involvement with the burglary, and in February 1973 a special Senate committee was established to investigate the affair. In televised public hearings, Dean accused the president of involvement in the cover-up, and others testified to illegal activity by the administration and the campaign staff. In July the committee learned that in 1969 Nixon had installed a recording system in the White House and that all of the president's conversations had been recorded; Nixon then began a long and ultimately futile effort to conceal these recordings from investigators.

By mid-1974, several of the president's closest aides, including two former Cabinet officers, had been indicted on criminal charges, and several had been convicted. The release during July 1974 of the audio tapes of Nixon's conversations—which demonstrated that Nixon had obstructed justice and had made false and misleading public statements after the break-in—resulted in a dissolving of support from his own party, both in Congress and throughout the country. In that month the Committee on the Judiciary of the House of Representatives voted three articles of impeachment against Nixon.

Nixon announced his resignation on the evening of August 8, effective August 9, and was succeeded by Vice President Gerald R. Ford. Nixon was not convicted for his alleged involvement in the Watergate scandal but was granted a pardon by President Ford in September 1974.

Nixon retired to the seclusion of his estate in San Clemente, Calif. He wrote *RN: The Memoirs of Richard Nixon* (1978) and several books on international affairs and U.S. foreign policy, claiming a modest role as an elder statesman and foreign-policy expert. Nixon spent his last years campaigning for American political support and financial aid for Russia and the other former Soviet republics.

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Niyamānanda (philosopher): *see* Nimbārka.

Niza, Marcos de, byname FRAY MARCOS (b. *c.* 1495, Nice, Savoy [now in France]—d. March 25, 1558, Mexico), Franciscan friar who claimed to have sighted the legendary "Seven Golden Cities of Cibola" in what is now western New Mexico.

Niza went to the Americas in 1531 and served in Peru, Guatemala, and Mexico. At Culiacán, Mex., he freed Indian slaves from regions to the north. Under orders from the viceroy Antonio de Mendoza, Niza and a Moor, Esteban, led an expedition across the desert to the cities of Cibola (1539). Esteban was killed; Niza claimed to have come within sight of large towns rich in precious stones, gold, and silver. The following year Francisco de Coronado found the "seven cities" to be small and poor Indian pueblos. Niza became provincial of his order for Mexico in 1541.

Niẓām al-Mulk (Arabic: "Order of the Kingdom"), original name ABŪ ʿALĪ ḤASAN IBN ʿALĪ (b. 1018/19, Ṭūs, Khorāsān, Iran—d. Oct. 14, 1092, near Nehāvand), Persian vizier of the Turkish Seljuq sultans (1063–92), best remembered for his large treatise on kingship, *Seyāsat-nāmeh* (*The Book of Government; or Rules for Kings*).

Early life. Niẓām al-Mulk was the son of a revenue official for the Ghaznavid dynasty. Through his father's position, he was born into the literate, cultured milieu of the Persian administrative class. In the years of confusion following the initial Seljuq Turk expansion, his father fled, eventually to Ghazna (now in Afghanistan), where Niẓām al-Mulk, too, in due course entered Ghaznavid service.

He soon returned to Khorāsān, however, and joined the service of Alp-Arslan, who was then the Seljuq governor of Khorāsān. When Alp-Arslan's vizier died, Niẓām al-Mulk was appointed to succeed him, and, when Alp-Arslan himself succeeded his father in 1059, Niẓām al-Mulk had the entire administration of Khorāsān in his hands. His abilities so pleased his master that, when Alp-Arslan became the supreme overlord of the Seljuq rulers in 1063, Niẓām al-Mulk was made vizier.

Influence in Seljuq policy. For the next 30 years, under two remarkable rulers, he occupied this position in an empire that stretched from the Oxus River (now Amu Darya) in the east to Khwārezm and the southern Caucasus and westward into central Anatolia. During these decades, the Seljuq empire was at its zenith; Niẓām al-Mulk's influence guided the sultan's decisions, sometimes even military ones, and his firm control of the central and provincial administration, through his numerous dependents and relatives, implemented those decisions. His aim, like that of other great Persian viziers, was to impress on his less-sophisticated Turkmen rulers, brought up in the rude tradition of the steppe, the superiority of Persian civilization and its political wisdom. His influence was especially felt in the rule of Sultan Malik-Shāh, who succeeded to the Seljuq throne when he was only 18. Such was Niẓām al-Mulk's reputation among contemporaries that he was compared to the Barmakids, viziers to the 8th-century caliph Hārūn al-Rashīd.

The Seyāsat-nāmeh. Shortly before his death and at Malik-Shāh's request, Niẓām al-Mulk wrote down his views on government in the *Seyāsat-nāmeh.* In this remarkable work, he barely refers to the organization of the dewan (administration) because he had been able, with the help of his well-chosen servants, to control and model it on traditional lines. But he never had the same power in the *dargāh* (court) and found much to criticize in the sultan's careless disregard for protocol, the lack of magnificence in his court, the decline in prestige of important officials, and the neglect of the intelligence service. The most severe criticisms in the *Seyāsat-nāmeh,* however, are of those with heterodox religious views, the Shīʿites in general and the Ismāʿīlītes in particular, to whom he devotes his last 11 chapters. His support of "right religion," Sunnī Islām, was not only for reasons of state but also a matter of passionate conviction.

Niẓām al-Mulk expressed his religious devotion in ways that contributed to the Sunnite revival. He founded Niẓāmīyah madrasahs (colleges of higher learning) in many major towns throughout the empire to combat Shīʿite propaganda, as well as to provide reliable, competent administrators, schooled in his own branch of Islāmic law. Less orthodox religious communities among the Ṣūfī orders also benefited from his generosity; hospices, pensions for the poor, and extensive public works related to the pilgrimage to Mecca and Medina were created or sustained by his patronage. Particularly in his last years, when the Ismāʿīlīte threat grew stronger and its partisans found a refuge in Alamūt, the castle of the Assassins, he set himself the task of combating their influence by every means possible.

On Alp-Arslan's death in 1073, Niẓām al-Mulk was left with wider powers, since the late sultan's successor, Malik-Shāh, was only a youth. By 1080, however, Malik-Shāh had become less acquiescent. Niẓām al-Mulk also antagonized the sultan's favourite courtier, Tāj al-Mulk, and he made an enemy of the sultan's wife Terkhen-Khatun by preferring the son of another wife for the succession.

Niẓām al-Mulk was assassinated in 1092, on the road from Eṣfahān to Baghdad, near Nehāvand. The murder was probably committed by an Ismāʿīlīte from Alamūt, possibly with the complicity of Tāj al-Mulk and Terkhen-Khatun, if not that of Malik-Shāh himself. Within a month, however, the sultan, too, was dead, and the disintegration of the great Seljuq empire had begun.

Assessment. As a great Iranian vizier, Niẓām al-Mulk conspicuously exemplifies the chief minister's role of mediator between a despot, in this instance an alien Turk, and his Persian subjects. Niẓām al-Mulk kept Turkmen immigrants, who had entered Iran with the Seljuqs, engaged in hostilities outside the country; and he tempered military harshness with lessons in judicious clemency and conciliation. He built up Seljuq power with the sultan as the keystone of an integrated administration, and he encouraged the recognition of local rulers as honourable vassals. Niẓām al-Mulk was, for contemporaries, as he has remained for successive generations who read his *Seyāsat-nāmeh,* the quintessential vizier—wise, prudent, resourceful and successful, and a devout Muslim.

The only complete English translation of Niẓām al-Mulk's *Seyāsat-nāmeh* is by Hubert Darke, *The Book of Government; or, Rules for Kings* (1960).

nizam-ı cedid (Turkish: "new order"), originally a program of westernizing reforms undertaken by the Ottoman sultan Selim III (reigned 1789–1807). Later the term came to denote exclusively the new, regular troops established under this program.

In 1792–93 Selim III, assisted by a committee, promulgated a series of reforms that included new regulations on provincial governorships and taxation, on land tenure, and on the control of grain trade. More significant, however, were military reforms. A new corps of regular infantry trained and drilled on Western lines was founded, and an attempt was made to introduce discipline into the decadent Janissary Corps (elite troops). New regulations were introduced into the artillery, bombardier, and miners corps; the fleet was reorganized; new military and naval schools provided training in gunnery, fortification, and navigation; and technical and scientific books were translated into Turkish from Western languages. To finance these projects a special treasury was established, collecting revenues from confiscated fiefs and taxes on liquor, tobacco, and coffee.

The reforms were inspired by Western models, and in their application Selim had to rely heavily on French assistance, particularly upon French instructors in the military schools. The growing French influence and the reforms, however, evoked a strong reaction from a conservative coalition of the Janissaries and the ulama (men of religious learning). In 1805 that coalition was joined by *aʿyān* (local notables) of the Balkan provinces to stop an attempt to organize *nizam-ı cedid* troops in Edirne. Finally in 1807 a mutiny of the *yamak*s (auxiliary levies) compelled Selim to abolish the *nizam-ı cedid* reforms and brought about his deposition.

Niẓām Shāhī DYNASTY, succession of rulers of the kingdom of Ahmadnagar in the Deccan of India from 1490 to 1633. The founder was Malik Aḥmad, who in 1490 fixed his capital on a new site called Ahmadnagar after himself. The kingdom lay in the northwestern Deccan, between the states of Gujarāt and Bijāpur. It secured the great fortress of Daulatābād in 1499 and added Berār in 1574.

The Niẓām Shāhī dynasty was engaged in constant warfare. Burhān Shāh (reigned 1509–53) allied with the Hindu state of Vijayanagar, but his successor Husain (reigned 1553–65) joined the alliance that overthrew it (1565). An attack by the Mughals from the north was gallantly resisted by Chānd Bībī, queen dowager of Bijāpur, but Berār was ceded (1596) and Ahmadnagar fell after the queen's death (1600). A part of the state of Ahmadnagar remained, and the dynasty survived until the fall of Daulatābād, in 1633.

Niẓām-ul-Mulk (Arabic: "Governor of the Kingdom"), title borne by various Indian Muslim princes. The term has also been translated as "Deputy for the Whole Empire." In 1713 it was conferred on Chīn Qilich Khān (Āṣaf Jāh) by the Mughal emperor Muḥammad Shāh and was held by his descendants, the rulers of the princely state of Hyderābād, until the mid-20th century. The head of a ruling family was commonly known as the Niẓām.

Nizāmābād, also called INDUR, city, northwestern Andhra Pradesh state, southern India. The city is located on the Hyderābād–Godāvari Valley line of the Central Railway, north-northwest of Hyderābād. Historical points of interest include a temple that now houses a water-supply tank and the fort of Indur. The city is also the site of several colleges affiliated with Osmania University in Hyderābād. Pop. (1991) city, 241,034.

Niẓāmī (Persian poet): *see* Neẓāmī.

Nizhegorod, formerly (1932–90) GORKY, *oblast* (province) in western Russia, in the middle of the Volga River basin. Nizhegorod *oblast* is bisected by the Volga River. The northern half of the *oblast* is a low plain, mostly in dense coniferous forest of spruce, pine, and fir, while lower parts are often swampy. Its soils are infertile. The southern half comprises rolling morainic hills, with deciduous trees, especially oaks, and open areas of forest-steppe. It has gray forest soils.

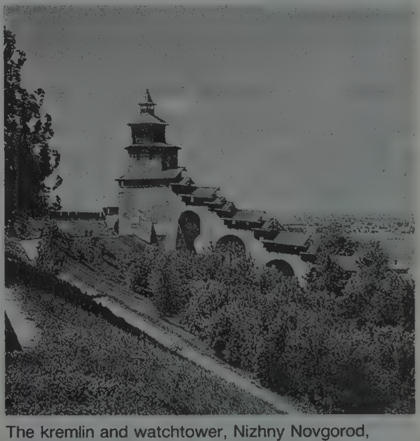
The highly industrialized area along the Volga and lower Oka rivers includes the metropolis of Nizhny Novgorod, the administrative headquarters, and its satellite towns, producing a great range of goods. Elsewhere there are only pockets of industry, *e.g.,* steel mills in Kulebaki and Vyksa. In the forested areas timber industries are highly developed. At Zavolzhye, above Nizhny Novgorod, is a hydroelectric station on the Volga. The main agricultural area lies south of the Volga; grains—rye, oats, spring wheat, and buckwheat—are dominant, though potatoes and flax are important as well. Area 28,900 square miles (74,800 square km). Pop. (1995 est.) 3,734,000.

Nizhnekamsk, city, Tatarstan, western Russia. It lies along the left bank of the Kama River, just southwest of Naberezhnye Chelny. It is an important petrochemical centre. Its synthetic-rubber plant, intended to become one of the world's largest, began operation in 1970. It also has a large tire plant and produces plastics. An oil refinery began operation there in 1979. Pop. (1995 est.) 209,500.

Nizhnevartovsk, city and port, Khanty-Mansi autonomous *okrug* (district), Tyumen *oblast* (province), west-central Russia. It lies along the right bank of the Ob River. The city grew rapidly, especially in the 1970s, as a result of the discovery of large oil fields nearby. Along with Surgut, Nizhnevartovsk is a major administrative centre of the middle Ob oil fields. It also has a gas-processing plant. Pop. (1995 est.) 237,900.

Nizhny Novgorod, formerly (1932–90) GORKY, city and administrative centre of Nizhegorod *oblast* (province), western Russia. The city lies at the confluence of the Volga and Oka rivers, 260 miles (420 km) east of Moscow.

Although some authorities give an earlier date, the city was founded, according to a major chronicle, in 1221 by Yury Vsevolodovich, prince of Vladimir, as Russian colonization was advancing to the Volga into lands formerly occupied by the Mordvinians. Nizhny Novgorod's strategic site on the great Volga route from the Baltic to Central Asia—with links via the navigable Oka River to the Vladimir-Moscow region and via the Kama River to the Ural Mountains and Siberia—ensured its importance. In 1392 the town was incorporated into the principality of Moscow and soon became a Russian stronghold against the Volga Tatars. From there, Ivan III the Great in 1469 and Ivan IV the Terrible in 1552 launched their expeditions against the Tatar capital of Kazan. The Russian conquest of the Volga in the mid-16th century brought about increased trade for Nizhny Novgorod. The annual fair that was established in that



The kremlin and watchtower, Nizhny Novgorod, Russia

Novosti Press Agency

city in 1817 became the largest and most important in Russia, attracting traders and goods from across Europe and Asia. The fair continued until the Russian Revolution of 1917. The well-known writer Maksim Gorky was born in Nizhny Novgorod in 1868, and in 1932 the town was renamed in his honour by the Soviet regime, although its original name was restored in 1990.

The great volume of trade passing through the city led to the early utilization of serf labour in manufacturing, causing an earlier onset of factory industrialization than in much of Russia, especially in heavy industry and engineering. The town's industrial importance grew steadily, stimulated in World Wars I and II by the destruction of plants to the west. Modern Nizhny Novgorod is one of the largest cities of Russia and the centre of a large metropolitan area strung out along the Volga and lower Oka rivers. The city itself produces motor vehicles, many types of ships and river craft, diesel engines, machinery and machine tools, and a wide range of chemical and consumer goods. Of its satellite towns, Bor, across the Volga, makes glass, notably safety glass for cars; Dzerzhinsk makes chemicals and fertilizers; Balakhna and Pravdinsk make paper; Bogorodsk produces leather goods and footwear; and Kstovo has a major oil refinery. Power for the metropolis comes from two thermal-electric plants in Nizhny Novgorod—the Balakhna peat-burning station and the hydroelectric station at Zavolzhye. Nizhny Novgorod is the focus of excellent communications by river, road, rail, and air. Railways connect it with Moscow, Kirov (on the Trans-Siberian line), and Arzamas, and electrified suburban lines serve the metropolitan area.

Nizhny Novgorod is the site of the N.I. Lobachevsky State University (founded 1918) and other institutions of higher education, including ones in agriculture, medicine, and engineering. There is also a state art museum and one of the oldest drama theatres in Russia (established 1798). The city's historic buildings include the 16th-century kremlin and the 17th-century Archangel Cathedral. Pop. (1995 est.) 1,382,500.

Nizhny Tagil, also spelled NIŽNIJ TAGIL, city, Sverdlovsk *oblast* (province), western Russia. Nizhny Tagil lies along the Tagil River. One of the oldest smelting centres of the Ural Mountains region, it was founded in 1725 in connection with the construction of a metallurgical factory that used the iron ore of Vysokaya Gora. It became a city in 1917 and is now an important iron and steel centre noted for metallurgy and engineering. The city's manufactures include machine tools, railway cars, and building materials. Teacher-training and mining colleges are located in the city, along with an applied-arts college and a regional museum. Pop. (1997 est.) 404,000.

Nizhnyaya Tunguska River, also spelled NIŽN'AJA TUNGUSKA, English LOWER TUNGUSKA RIVER, river in western Siberia that is a right-bank tributary of the Yenisey River, flowing through Irkutsk *oblast* (province) and Krasnoyarsk *kray* (region) of Russia. Its length is 1,857 miles (2,989 km), and the area of its basin is 187,900 square miles (471,300 square km). The river rises near the watershed between the Yenisey River basin and that of the Lena River and flows north and then west across the Central Siberian Plateau. In its upper course, the river has a broad valley with numerous sandbanks, but after turning west its valley narrows, and there are numerous gorges and rapids. In the river basin lies the extensive Tunguska coalfield.

Nizhyn, Russian NEZHIN, also spelled NEŽIN, city, Chernihiv *oblast* (province), north-central Ukraine. Nizhyn dates from the 11th century and was incorporated in 1781. It contains several buildings from the 17th and 18th centuries, including the cathedrals of St. Nicholas and of the Annunciation. A minor industrial centre before the 1917 Revolution, it now has engineering and food industries. The city's teacher-training institute is named for the novelist Nikolay Gogol, who studied in a Nizhyn lyceum. Pop. (1994 est.) 83,000.

Nizip, Battle of, Nizip also spelled NEZIB (June 24, 1839), battle between forces of the Ottoman Empire and those of Muḥammad ʿAlī, viceroy of Egypt, at Nizip (now in southeastern Turkey), in which the Ottomans were defeated. Their empire was spared only by the intervention of Great Britain, Austria, Russia, and Prussia.

The Convention of Kütahya (1833) that had awarded the Ottomans' Syrian provinces and Adana to Muḥammad ʿAlī was not satisfactory to either party, and a new war developed. The Ottoman army was decisively defeated at Nizip by Egyptian forces under Muḥammad ʿAlī's son Ibrāhīm, and the Ottoman fleet surrendered at Alexandria. The great powers, except France, intervened on behalf of the Ottomans, forcing the Egyptians to evacuate Syria in 1840. On Feb. 3, 1841, the Ottoman sultan Abdülmecid I signed a firman (official edict) appointing Muḥammad ʿAlī as hereditary governor of Egypt.

Njáls saga, also called NJÁLA, or BURNT NJÁLL, one of the longest and generally considered the finest of the 13th-century Icelanders' sagas. It presents the most comprehensive picture of Icelandic life in the heroic age and has a wide range of complex characters. The work has two heroes—Gunnar (Gunther) and Njáll. Gunnar is a brave, guileless, generous youth like Sigurd (Siegfried) of the heroic legends; Njáll is a wise and prudent man endowed with prophetic gifts. Both are men of peace, but in a society in which the ties of blood impose inescapable obligations and the memories of past injuries may always be rekindled, neither Gunnar's goodwill nor Njáll's wisdom can save them from their fate.

Gunnar meets death at the hands of his enemies when his wife, the beautiful but capricious Hallgerd, in retaliation for a blow he once gave her in anger, refuses him a strand of her hair to string his bow.

Njáll is drawn into a feud through the headstrong actions of his sons. He accepts the consequences stoically in a powerful scene in which he and his family are burned to death in their home by a reluctant "enemy," whose honour demands this vengeance. A third part of the saga deals with the vengeance of Njáll by his son-in-law Kári, the sole survivor of the family.

The characters of the *Njáls* saga are vividly drawn and range from comic to sinister. The high tide of Icelandic life is revealed in the meetings of the heroes at the Althing (Parliament) in times of peace and good fortune; but the high price for their unique style of life is always threatening in the background, and the overriding mood is one of tragic pessimism. The best English translation is by M. Magnusson and H. Pálsson, published in 1960.

Njemen River (Belarus and Lithuania): *see* Neman River.

Njǫrd, Old Norse NJǪROR, in Norse mythology, the god of the wind and of the sea and its riches. His aid was invoked in seafaring and in hunting, and he was considered the god of "wealth-bestowal," or prosperity. He was the father of Freyr and Freyja by his own sister. Traditionally, Njǫrd's native tribe, the Vanir, gave him as a hostage to the rival tribe of Aesir, the giantess Skadi choosing him to be her husband. The marriage failed because Njǫrd preferred to live in Nóatún, his home by the sea, while Skadi was happier in her father's mountain dwelling place. Several traditions hold that Njǫrd was a divine ruler of the Swedes, and his name appears in numerous Scandinavian place-names.

Nkayi, formerly JACOB, town (commune), southwestern Congo. It lies west of the capital, Brazzaville, and northeast of the port of Pointe-Noire, on the Brazzaville–Pointe-Noire railway; its airport has scheduled flights to both cities. Nkayi is the major sugar-producing centre in the Niari River valley agricultural region. It also has a flour mill, a sawmill, and plants that produce peanut (groundnut) oil and cattle feed. Pop. (1992 est.) 42,465.

NKK Corporation, formerly (until 1988) NIPPON KŌKAN KK, major Japanese industrial company and one of the country's largest steelmakers. Headquarters are in Tokyo.

Nippon Kōkan KK was founded in 1912 to make products using the steel from Japan's first steel mills. The company's innovative seamless steel pipe proved superior to conventional welded pipe, and Nippon Kōkan eventually also began producing raw steel from iron ore. Nippon Kōkan expanded greatly in the decades after World War II, with large steelmaking complexes at Fukuyama (in Hiroshima prefecture) and at Kawasaki and Yokohama (the Keihin Steel Works, near Tokyo). In the late 1970s the company expanded its Keihin complex by building an ultramodern steelworks on man-made Ōgi Island in Tokyo Bay.

The NKK Corporation is the second largest steelmaker in Japan (after the Nippon Steel Corporation). In addition to producing a great array of finished and semifinished steel products, the company designs and builds industrial plants, ships, and other large-scale steel structures; produces specialty metals, ceramics, plastics, and chemicals; and makes computer hardware and software.

Nkole, also spelled NKORE, ANKOLE, or ANKORE, also called NYANKOLE, or NYANKORE, a people of the Interlacustrine Bantu-speaking group who occupy the area of southwestern Uganda between Lakes Edward and George and the Tanzania border.

Numbering about 1,500,000 in the late 20th century, the Nkole were traditionally divided into two quite distinct social groups: the pastoral Hima, who made up about one-tenth of the population, and the agricultural Iru, who constituted the remainder. Both groups spoke a common Bantu language. Though marriage between Hima and Iru was traditionally prohibited, each borrowed extensively from the culture of the other. Both groups were traditionally divided into patrilineal clans and groups. Polygyny has been general.

The differing economic pursuits of Hima and Iru gave rise to different modes of life. The Hima lived traditionally in scattered kraals about a mile apart, each with a number of different families. They subsisted almost entirely on the products of their herds. The Iru were sedentary hoe cultivators, for whom the staple crop was millet. They lived in settlements of from 40 to 100 homesteads.

The Nkole maintained a despotic state, headed by the *mugabe* (king). Hima were bound to the *mugabe* by an oath of fealty. Iru headmen were appointed over communities of their fellows, and through them Hima chiefs collected tribute.

Nkomo, Joshua, in full JOSHUA MQABUKO NYONGOLO NKOMO (b. June 19, 1917, Semokwe Reserve, Matabeleland, Southern Rhodesia [now Zimbabwe]—d. July 1, 1999, Harare), black nationalist in Zimbabwe who, as leader of the Zimbabwe African People's Union (ZAPU), was Prime Minister Robert Mugabe's longtime rival.

Nkomo was the son of a cattle-owning teacher and lay preacher in Matabeleland. Although often regarded as of Ndebele (formerly called Matabele) descent, from the dominant ethnic group in the southern part of the country, he was in fact a member of the Karanga group of Shona peoples. After primary schooling in Rhodesia, he went to South Africa to complete his education in Natal and Johannesburg. Returning home in 1945, he worked for the Rhodesian Railways and by 1951 had become a leader in the trade union of the black Rhodesian railway workers. In 1951 he also obtained an external B.A. degree from the University of South Africa, Johannesburg.

Nkomo became increasingly political, and in 1957 he was elected president of the African National Congress (ANC), the leading black nationalist organization in Rhodesia. When the ANC was banned early in 1959, Nkomo went to England to escape imprisonment. He returned in 1960 and founded the National Democratic Party (NDP); in 1961, when the NDP was banned in turn, he founded ZAPU. The white-minority government of Rhodesia held Nkomo in detention from 1964 until 1974. After his release he traveled widely in Africa and Europe to promote ZAPU's goal of black majority rule in Rhodesia. Nkomo helped lead the guerrilla war that followed against white rule in Rhodesia, but his forces played a relatively minor role compared with those of Mugabe, who headed the Zimbabwe African National Union (ZANU). The two groups were joined in an uneasy alliance known as the Patriotic Front after 1976.

After white-ruled Rhodesia became black-ruled Zimbabwe in 1979–80, Nkomo and his Ndebele-supported ZAPU were increasingly eclipsed by Mugabe's ZANU, whose base of support was the majority Shona people. ZANU resoundingly defeated Nkomo's ZAPU in the 1980 parliamentary elections. Strain quickly arose between ZANU and ZAPU, and overt ethnic strife broke out between the Shona and the Ndebele peoples after Mugabe dismissed Nkomo from the Cabinet in 1982. After a complete breach between the two leaders for a few years, they agreed in 1987 to merge their respective parties in order to try to achieve ethnic unity in their country. In 1990 Nkomo became a vice president under Mugabe, who remained Zimbabwe's chief executive. An autobiography, *Nkomo, the Story of My Life,* was published in 1984.

Nkonde (people): *see* Nyakyusa.

Nkongsamba, also spelled N'KONGSAMBA, or NKONGSOMBA, town, western Cameroon. Nkongsamba lies at the foot of Mount Manengouba (7,861 feet [2,396 m]). It is the terminus of the railway from Douala and has road connections to Bamenda (north), Bafoussam (northeast), and Buea (southwest). Large palm-oil, banana, and coffee plantations in the area make Nkongsamba a commercial centre. Coffee and tobacco from the north are shipped by rail to Douala for export. The town has a sawmill, a food-processing plant, and a teacher-training school. Pop. (1987) 85,560.

Nkore (people): *see* Nkole.

Nkosi, Lewis (b. Dec. 5, 1936, Durban, Natal, S.Af.), South African author, critic, journalist, and broadcaster.

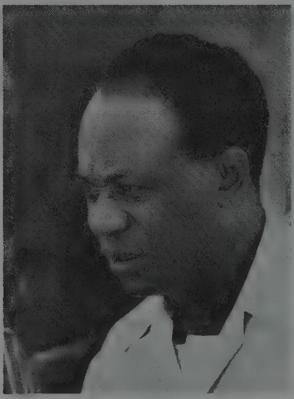
After attending a technical college in Durban for a year, Nkosi worked as a journalist, first in 1955 for the Zulu-English weekly paper *Ilanga lase Natal* ("Natal Sun") and then for the *Drum* magazine and as chief reporter for its Sunday newspaper, the *Golden City Post,* from 1956 to 1960.

In 1961 Nkosi accepted a fellowship to study journalism at Harvard University, and, consequently, he was exiled from South Africa. From that time Nkosi wrote for American, British, and African periodicals, including *The New Yorker*. Many of his critical essays were published in *Home and Exile* (1965), which became a standard source for students of African literature.

The Rhythm of Violence (1964), a drama set in Johannesburg in the early 1960s, handles the theme of race relations. Nkosi produced the British Broadcasting Corporation (BBC) radio series "Africa Abroad" from 1962 to 1965 and worked from 1965 to 1968 as literary editor of *The New African.*

Nkosi's later works included essays on South Africa in *The Transplanted Heart* (1975) and the collections *Tasks and Masks: Themes and Styles of African Literature* (1981) and *Home and Exile and Other Selections* (1983). His first novel, *Mating Birds* (1983), brought Nkosi to the attention of a wider audience for its subtle examination of an interracial affair.

Nkrumah, Kwame (b. September 1909, Nkroful, Gold Coast [now Ghana]—d. April 27, 1972, Bucharest, Romania), Ghanaian nationalist leader who led the Gold Coast's drive for independence from Britain and presided over its emergence as the new nation of Ghana. He headed the country from independence in 1957 until he was overthrown by a coup in 1966.



Nkrumah, 1962

Marc and Evelyne Bernheim—Woodfin Camp and Associates

Early years. Kwame Nkrumah's father was a goldsmith and his mother a retail trader. Baptized a Roman Catholic, Nkrumah spent nine years at the Roman Catholic elementary school in nearby Half Assini. After graduation from Achimota College in 1930, he started his career as a teacher at Roman Catholic junior schools in Elmina and Axim and at a seminary.

Increasingly drawn to politics, Nkrumah decided to pursue further studies in the United States. He entered Lincoln University in Pennsylvania in 1935 and, after graduating in 1939, obtained master's degrees from Lincoln and from the University of Pennsylvania. He studied the literature of socialism, notably Karl Marx and Vladimir I. Lenin, and of nationalism, especially Marcus Garvey, the black American leader of the 1920s. Eventually, Nkrumah came to describe himself as a "nondenominational Christian and a Marxist socialist." He also immersed himself in political work, reorganizing and becoming president of the African Students' Organization of the United States and Canada. He left the United States in May 1945 and went to England, where he organized the 5th Pan-African Congress in Manchester.

Meanwhile, in the Gold Coast, J.B. Danquah had formed the United Gold Coast Convention (UGCC) to work for self-government by constitutional means. Invited to serve as the UGCC's general secretary, Nkrumah returned home in late 1947. As general secretary, he addressed meetings throughout the Gold Coast and began to create a mass base for the new movement. When extensive riots occurred in February 1948, the British briefly arrested Nkrumah and other leaders of the UGCC.

When a split developed between the middle-class leaders of the UGCC and the more radical supporters of Nkrumah, he formed in June 1949 the new Convention Peoples' Party (CPP), a mass-based party that was committed to a program of immediate self-government. In January 1950, Nkrumah initiated a campaign of "positive action," involving nonviolent protests, strikes, and noncooperation with the British colonial authorities.

From prison to prime ministry. In the ensuing crisis, services throughout the country were disrupted, and Nkrumah was again arrested and sentenced to one year's imprisonment. But the Gold Coast's first general election (Feb. 8, 1951) demonstrated the support the CPP had already won. Elected to Parliament, Nkrumah was released from prison to become leader of government business and, in 1952, prime minister of the Gold Coast.

When the Gold Coast and the British Togoland trust territory became an independent state within the British Commonwealth—as Ghana—in March 1957, Nkrumah became the new nation's first prime minister. In 1958 Nkrumah's government legalized the imprisonment without trial of those it regarded as security risks. It soon became apparent that Nkrumah's style of government was to be authoritarian. Nkrumah's popularity in the country rose, however, as new roads, schools, and health facilities were built and as the policy of Africanization created better career opportunities for Ghanaians.

By a plebiscite of 1960 Ghana became a republic and Nkrumah became its president, with wide legislative and executive powers under a new constitution. Nkrumah then concentrated his attention on campaigning for the political unity of black Africa, and he began to lose touch with realities in Ghana. His administration became involved in magnificent but often ruinous development projects, so that a once-prosperous country became crippled with foreign debt. His government's Second Development Plan, announced in 1959, had to be abandoned in 1961 when the deficit in the balance of payments rose to more than $125 million. Contraction of the economy led to widespread labour unrest and to a general strike in September 1961. From that time Nkrumah began to evolve a much more rigorous apparatus of political control and to turn increasingly to the communist countries for support.

President of Ghana and afterward. The attempted assassination of Nkrumah at Kulugungu in August 1962—the first of several—led to his increasing seclusion from public life and to the growth of a personality cult, as well as to a massive buildup of the country's internal security forces. Early in 1964 Ghana was officially designated a one-party state, with Nkrumah as life president of both nation and party. While the administration of the country passed increasingly into the hands of self-serving and corrupt party officials, Nkrumah busied himself with the ideological education of a new generation of black African political activists. Meanwhile, the economic crisis in Ghana worsened and shortages of foodstuffs and other goods became chronic. On Feb. 24, 1966, while Nkrumah was visiting Peking, the army and police in Ghana seized power. Returning to West Africa, Nkrumah found asylum in Guinea, where he spent the remainder of his life. He died of cancer in Bucharest in 1972.

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NKVD, Soviet secret police agency, a forerunner of the KGB (*q.v.*).

NLF (Vietnam): *see* National Liberation Front.

NLRB: *see* National Labor Relations Board.

Nmai Hka, river in northern Myanmar (Burma). It rises in the Languela glacier and flows generally south, joining the Mali River to form the Irrawaddy River. The Nmai, which is virtually unnavigable because of the strong current, is about 300 miles (480 km) long.

NMR: *see* nuclear magnetic resonance.

nō theatre, nō also spelled NOH, traditional Japanese theatrical form and one of the oldest extant theatrical forms in the world.

Nō, meaning "talent" or "skill," is unlike Western narrative drama. Rather than being actors or "representers" in the Western sense, nō performers are simply storytellers who use their visual appearances and their movements to suggest the essence of their tale rather than to enact it. Little "happens" in a nō drama, and the total effect is less that of a present action than of a simile or metaphor made visual. The educated spectators know the story's plot very well, so that what they appreciate are the symbols and subtle allusions to Japanese cultural history contained in the words and movements.

Nō developed from ancient forms of dance drama and from various types of festival drama at shrines and temples that had emerged by the 12th or 13th century. Nō became a distinctive form in the 14th century and was continually refined up to the years of the Tokugawa period (1603–1867). It became a ceremonial drama performed on auspicious occasions by professional actors for the warrior class—as, in a sense, a prayer for peace, longevity, and the prosperity of the social elite. Outside the noble houses, however, there were performances that popular audiences could attend. The collapse of the feudal order with the Meiji Restoration (1868) threatened the existence of nō, though a few notable actors maintained its traditions. After World War II, however, the interest from a large number of educated youth led to a revival of the form.

There are five types of nō plays. The first type, the *kami* ("god") play, involves a sacred story of a Shintō shrine; the second, *shura mono* ("fighting play"), centres on warriors; the third, *katsura mono* ("wig play"), has a female protagonist; the fourth type, varied in content, includes the *gendai mono* ("present-day play")—in which the story is contemporary and "realistic" rather than legendary and supernatural—and the *kyōjo mono* ("mad-woman play")—in which the protagonist becomes insane through the loss of a lover or child; and the fifth type, the *kiri,* or *kichiku* ("final," or "demon"), play, in which devils, strange beasts, and supernatural beings are featured. A typical nō play is relatively short. Its dialogue is sparse, serving as a mere frame for the movement and music. A standard nō program consists of three plays selected from the five types so as to achieve both an artistic unity and the desired mood; invariably, a play of the fifth type is the concluding work. *Kyōgen,* humourous sketches, are performed as interludes between plays. A program may begin with an *okina,* which is essentially an invocation for peace and prosperity in dance form.

Three major nō roles exist, the principal actor, or *shite;* the subordinate actor, or *waki;* and the *kyōgen* actors, one of whom is often involved in nō plays as a narrator. Each is a specialty having several "schools" of performers, and each has its own "acting place" on the stage. Subsidiary roles include those of attendant (*tsure*), of a "boy" (*kokata*), and of nonspeaking "walk-on" (*tomo*).

Accompaniment is provided by an instrumental chorus (*hayashi*) of four musicians—who play a flute (*Nōkan*), small hand drum (*ko-tsuzumi*), a large hand drum (*ō-tsuzumi*), and large drum (*taiko*)—and by a chorus (*jiutai*) consisting of 8–10 singers. The recitation (*utai*) is one of the most important elements in the performance. Each portion of the written text carries a prescription of the mode of recitation—as well as of accompanying movement or dance—although application of this may be varied slightly. Each type of dialogue and song has its own name: the *sashi* is like a recitative; the *uta* are the songs proper; the *rongi,* or debate, is intoned between chorus and *shite;* and the *kiri* is the chorus with which the play ends.

About 2,000 nō texts survive in full, of which about 230 remain in the modern repertoire. Zeami Motokiyo (1363–1443) and his father, Kan'ami Kiyotsugu (1333–84), wrote many of the most beautiful and exemplary of nō texts, including *Matsukaze* ("Wind in the Pines") by Kan'ami and *Takasago* by Zeami. Zeami also formulated the principles of the nō theatre that guided its performers for many centuries. His *Kakyō* ("The Mirror of the Flower," 1424) detailed the composition, the recitation, the mime and dance of the performers, and the staging principles of nō. These constituted the first major principle of nō, which Zeami described as *monomane,* or the "imitation of things." He advised on the selection of properly classical characters to be portrayed, from legend or life, and on the proper integration of the visual, the melodic, and the verbal to open the eye and ear of the mind to the supreme beauty he crystallized in the second main principle, *yūgen.* Meaning literally "dark" or "obscure," *yūgen* suggested beauty only partially perceived—fully felt but barely glimpsed by the viewer.

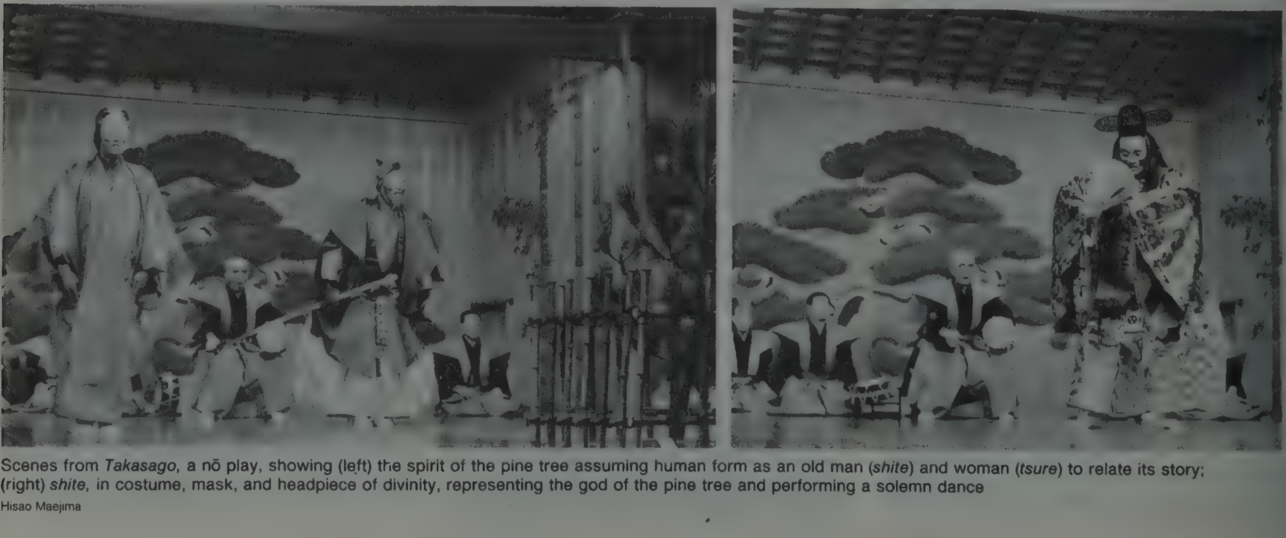
Two factors have allowed nō to be transmitted from generation to generation yet remain fairly close to earlier forms: first, the preservation of texts, containing detailed prescriptions of recitation, dance, mime, and music, and, second, the direct and fairly exact transmission of performing skills. On the other hand, nō was subject to changing preferences of new audiences, and new styles and patterns inevitably evolved. Further, there was constant refinement of received forms to express more clearly or intensely the objectives of nō, but these were always only minor deviations from traditional form. Even the differences between the five schools of *shite* performers represent only slight variations in the melodic line of the recitation or in the patterns of the *furi* or *mai* mime and dance.

In the 20th century some experimentation has taken place. Toki Zenmaro and Kita Minoru produced nō plays that had new content but adhered to traditional conventions in production. Mishima Yukio, on the other hand, took old plays and added new twists while retaining the old themes. Experiments to elaborate the humorous *kyōgen* interludes and the attempt to add (in the manner of Kabuki theatre) a long passage onto the stage through the audience and a strong spotlight on the *shite* received little public acceptance. Instead, nō has been sustained in the postwar period by theatregoers who have come to enjoy it not simply for its status as a "classic theatre" or because of innovations but as a perfected and refined contemporary stage art.

no-till agriculture: *see* till-less agriculture.

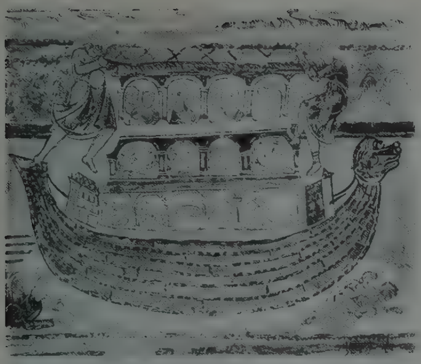
Noachian Laws (Judaism): *see* Noahide Laws.

Noah, also spelled NOE, the hero of the biblical Flood story in the Old Testament book of Genesis, the originator of vineyard cultivation, and, as the father of Shem, Ham, and



Scenes from *Takasago*, a nō play, showing (left) the spirit of the pine tree assuming human form as an old man (*shite*) and woman (*tsure*) to relate its story; (right) *shite*, in costume, mask, and headpiece of divinity, representing the god of the pine tree and performing a solemn dance

Hisao Maejima



Noah's ark, 12th-century fresco in the nave of the church at Saint-Savin-sur-Gartempe, Fr.
Jean Roubier

Japheth, the representative head of a Semitic genealogical line. A synthesis of at least three biblical source traditions, Noah is the image of the righteous man made party to a covenant with Yahweh, the God of Israel, in which nature's future protection against catastrophe is assured.

Noah appears in Gen. 5:29 as the son of Lamech and ninth in descent from Adam. In the story of the Deluge (Gen. 6:11–9:19), he is represented as the patriarch who, because of his blameless piety, was chosen by God to perpetuate the human race after his wicked contemporaries had perished in the Flood. A righteous man, Noah "found favour in the eyes of the Lord" (Gen. 6:8). Thus, when God beheld the corruption of the earth and determined to destroy it, he gave Noah divine warning of the impending disaster and made a covenant with him, promising to save him and his family. Noah was instructed to build an ark, and in accordance with God's instructions he took into the ark male and female specimens of all the world's species of animals, from which the stocks might be replenished. Consequently, according to this narrative, the entire surviving human race descended from Noah's three sons. Such a genealogy sets a universal frame within which the subsequent role of Abraham, as the father of Israel's faith, could assume its proper dimensions.

The story of the Flood has close affinities with Babylonian traditions of apocalyptic floods in which Utnapishtim plays the part corresponding to that of Noah. These mythologies are the source of such features of the biblical Flood story as the building and provisioning of the ark, its flotation, and the subsidence of the waters, as well as the part played by the human protagonist. Tablet XI of the Gilgamesh epic introduces Utnapishtim, who, like Noah, survived cosmic destruction by heeding divine instruction to build an ark.

The religious meaning of the Flood is conveyed after Noah's heroic survival. He then built an altar on which he offered burnt sacrifices to God, who then bound himself to a pact never again to curse the earth on man's account. God then set a rainbow in the sky as a visible guarantee of his promise in this covenant. God also renewed his commands given at creation but with two changes: man could now kill animals and eat meat, and the murder of a man would be punished by men.

Despite the tangible similarities of the Mesopotamian and biblical myths of the flood, the biblical story has a unique Hebraic perspective. In the Babylonian story the destruction of the flood was the result of a disagreement among the gods; in Genesis it resulted from the moral corruption of human history. The primitive polytheism of the Mesopotamian versions is transformed in the biblical story into an affirmation of the omnipotence and benevolence of the one righteous God. Again, following their survival, Utnapishtim and his wife are admitted to the circle of the immortal gods; but Noah and his family are commanded to undertake the renewal of history.

The narrative concerning Noah in Gen. 9:20–27 belongs to a different cycle, which seems to be unrelated to the Flood story. In the latter, Noah's sons are married and their wives accompany them in the ark; but in this narrative they would seem to be unmarried, nor does the shameless drunkenness of Noah accord well with the character of the pious hero of the Flood story. Three different themes may be traced in Gen. 9:20–27: first, the passage attributes the beginnings of agriculture, and in particular the cultivation of the vine, to Noah; second, it attempts to provide, in the persons of Noah's three sons, Shem, Ham, and Japheth, ancestors for three of the races of mankind and to account in some degree for their historic relations; and third, by its censure of Ham, it offers a veiled justification for the later Israelite conquest and subjugation of the Canaanites. Noah's drunkenness and the disrespect it provokes in his son Ham, (or Canaan) result in Noah's laying of a curse on Ham and his descendants. This incident may symbolize the ethnic and social division of Palestine: the Israelites (from the line of Shem) will separate from the pre-Israelite population of Canaan (which is depicted as licentious), who will live in subjection to the Hebrews.

The symbolic figure of Noah was known in ancient Israel, before the compilation of the Pentateuch. Ezekiel (14:14;20) speaks of him as a prototype of the righteous man who, alone among the Israelites, would be spared God's vengeance. In the New Testament, Noah is mentioned in the genealogy of the Gospel According to Luke (3:36) that delineates Jesus' descent from Adam. Jesus also uses the story of the Flood that came on a worldly generation of men "in the days of Noah" as an example of Baptism, and Noah is depicted as a preacher of repentance to the men of his time, itself a predominant theme in Jewish apocryphal and rabbinical writings.

Noahide Laws, also called NOACHIAN LAWS, a Jewish Talmudic designation for seven biblical laws given to Adam and to Noah before the revelation to Moses on Mt. Sinai and consequently binding on all mankind.

Beginning with Genesis 2:16, the Babylonian Talmud listed the first six commandments as prohibitions against idolatry, blasphemy, murder, adultery, and robbery and the positive command to establish courts of justice (with all that this implies). After the Flood a seventh commandment, given to Noah, forbade the eating of flesh cut from a living animal (Gen. 9:4). Though the number of laws was later increased to 30 with the addition of prohibitions against castration, sorcery, and other practices, the "seven laws," with minor variations, retained their original status as authoritative commandments and as the source of other laws. As basic statutes safeguarding monotheism and guaranteeing proper ethical conduct in society, these laws provided a legal framework for alien residents in Jewish territory. Maimonides thus regarded anyone who observed these laws as one "assured of a portion in the world to come." Throughout the ages scholars have viewed the Noahide Laws as a link between Judaism and Christianity, as universal norms of ethical conduct, as a basic concept in international law, or as a guarantee of fundamental human rights for all.

Noailles, DUKES AND VISCOUNTS OF, titled nobility of a great French family, the Noailles, tracing back to the 13th century, grouped below chronologically and indicated by the symbol •.

• Noailles, Anne, 1er duc de (1st duke of) (d. Feb. 15, 1678, Paris), count of Noailles (grandson of the first count, Antoine of Noailles) who was created the first duc de Noailles and a peer of France in 1663. He had played an important part in the Fronde and had become a protégé of Cardinal Mazarin. He was made premier captain of Louis XIV's bodyguard in 1648 and became captain general (governor) of the newly won province of Roussillon, to which his descendants were usually appointed thereafter.

• Noailles, Anne-Jules, 2^{e} duc de (2nd duke of) (b. Feb. 5, 1650, Paris—d. Oct. 2, 1708, Versailles, Fr.), duke of Noailles, marshal of France, son of Anne of Noailles, the first duke. He was made field marshal at the age of 23 and was named lieutenant general and commander in chief of Languedoc in 1682. By then he had become one of the greatest generals of France, and, after raising the regiment of Noailles in 1689, he commanded in Spain during the War of the Spanish Succession. In 1693 he was made marshal of France.

His wife, Marie-Françoise de Bournonville, bore him 21 children.

• Noailles, Adrien-Maurice, 3^{e} duc de (3rd duke of) (b. Sept. 29, 1678, Paris—d. June 24, 1766, Paris), the third duc de Noailles, son of Anne-Jules of Noailles; he served in all the most important wars of the reign of Louis XV in Italy and Germany and became a marshal in 1734. His last command was in the War of the Austrian Succession, when he was beaten by the English at the Battle of Dettingen in 1743. He married Françoise d'Aubigné, a niece of Mme de Maintenon, Louis XIV's mistress and later wife; and two of his sons also attained the rank of marshal of France.

• Noailles, Louis, 4^{e} duc de (4th duke of) (b. April 21, 1713—d. Aug. 22, 1793, Saint-Germain-en-Laye, Fr.), duc d'Ayen until the death of his father (Adrien-Maurice) in 1766, when he became the duc de Noailles. He served in most of the wars of the 18th century without particular distinction but was nevertheless made a marshal of France, as the marshal of Noailles, in 1775. He refused to emigrate during the Revolution but escaped the fate of most noblemen by dying in August 1793 before the Terror reached its height.

On the 4th Thermidor (July 22), 1793, his wife, the aged Duchesse de Noailles, was executed, along with her daughter-in-law, the Duchesse d'Ayen, and her granddaughter, the Vicomtesse de Noailles.

• Noailles, Jean-Paul-François, 5^{e} duc de (5th duke of) (b. Oct. 26, 1739, Paris—d. Oct. 20, 1824, Fontenay-Trésigny, Fr.), son of Louis of Noailles, lieutenant general, and member of the French Académie des Sciences. Though he served in the army, his tastes were scientific, and for his eminence as a chemist he was elected to the Académie des Sciences in 1777. He became duc d'Ayen in 1766 on his grandfather's death and duc de Noailles on his father's death in 1793. After emigrating in 1792 to escape the Revolution, he lived in Switzerland until the Restoration in 1814, when he took his seat as a peer of France.

• Noailles, Louis-Marie, vicomte de (viscount of) (b. April 17, 1756, Paris—d. Jan. 9, 1804, at sea near Cuba), second son of the Marshal of Mouchy and one of the most distinguished members of the Noailles family.

He served brilliantly under Lafayette in the U.S. War of Independence and was the officer who concluded the capitulation of Yorktown. He was elected to the States General in 1789. He began the "orgie," as Mirabeau called it, on August 4, when all privileges were abolished, and with d'Aiguillon he proposed the abolition of titles and liveries in June 1790. When the French Revolution became more pronounced, he emigrated to the United States and became a partner in Bingham's Bank at Philadelphia. He was very successful but left the bank to accept a command against the English in San Domingo, under Rochambeau. He made a brilliant defense of the Môle Saint-Nicolas and escaped with the garrison to Cuba; but in making for Havana his ship was attacked by an English frigate, and after a long engagement he was severely wounded and died of his injuries.

Noailles, Anna de, in full ANNA-ÉLISABETH DE NOAILLES, PRINCESS BRANCOVAN, COUNTESS (comtesse) MATHIEU (b. Nov. 15, 1876, Paris, France—d. April 30, 1933, Paris), poet, a leading literary figure in France in the pre-World War I period.

The daughter of a Romanian prince and granddaughter of a Turkish pasha, she adopted France and its language for her life and writings even before her marriage to a French count. Her friends included the novelists Marcel Proust and Colette and the poets Paul Valéry and Jean Cocteau. In her literary salon she kept most of the writers of her time under the spell of her artful conversation. Her volumes of poems, *Le Coeur innombrable* (1901; "The Numberless Heart"), *Les Éblouissements* (1907; "Resplendence"), and *L'Honneur de souffrir* (1927; "The Honour of Suffering"), are vibrant with a sensual love of nature. Her lyricism draws from the Romantic themes of the 19th-century poets Alfred de Vigny and Alphonse de Lamartine. Her later works reflect her fear of the thought of the inevitable collapse of her physical powers. She was made a commander of the Légion d'Honneur and elected to the Royal Academy of French Language and Literature of Belgium.

Noailles, Louis-Antoine de (b. May 27, 1651, Château de Tessières, near Aurillac, France—d. May 4, 1729, Paris), cardinal and archbishop of Paris, who, with his brother, the second duc de Noailles, made the name Noailles one of the most honoured in France.

Educated in Paris and receiving a doctorate in theology from the Sorbonne, he became successively bishop of Cahors (1679), bishop of Châlons (1680–95), and archbishop of Paris (from 1695); he was named cardinal in 1700.

He was involved in the controversies over Jansenism, mildly approving the Jansenism of Pasquier Quesnel's *Reflexions morales* and, by 1713, demonstrating intense opposition to the most resolute anti-Jansenists, the Jesuits. His opposition to Pope Clement XI's anti-Jansenist bull *Unigenitus* ended ambiguously in 1728, when he accepted it unconditionally after signing a preliminary protest against any such acceptance. He died the following year.

Noākhāli, port city, southern Bangladesh, on the Noākhāli Watercourse near the Meghna Estuary as it empties into the Bay of Bengal. The port is connected by road and rail with Comilla and by steamer with Barisāl. Industries include cotton weaving. Formerly called Sudhārām, the city was constituted a municipality in 1876 and contains several government colleges affiliated with the University of Dhākā.

Around Noākhāli on three sides is an alluvial plain that is annually inundated and fertilized by silt deposits from the Meghna Estuary; the area is broken only by a hilly tract in the northeast known as Bāraiyādhāla. Rice, jute, oilseeds, pulses, betel nuts, chilies, and sugarcane are the chief local crops. Pop. (1991 prelim.) city, 73,766.

Nōami, original name NAKAO SHINNŌ (b. 1397, Japan—d. 1494), Japanese poet, painter, and art critic, the first nonpriest who painted in the *suiboku* ("water-ink"), or Chinese, style.

Nōami was in charge of the art collection of Ashikaga Yoshimitsu, the military dictator who ruled Japan from 1368 to 1394, and was perhaps the first great art expert in Japan. His catalog of Yoshimitsu's collection, *Kundaikan sayū chōki* (1476; "A Treatise on the Scrolls in the Lord's Watchtower"), is invaluable as an early Japanese appraisal of Chinese artists.

Many of Nōami's paintings have been preserved. Among the best known are "The Pines of Miho," a landscape executed on a screen in the soft ink-wash technique associated with Mu-ch'i Fa-ch'ang, the 13th-century Chinese priest-painter whose work Nōami admired, and "The White-Robed Kannon," a portrait in ink of the Buddhist goddess of mercy painted for his child's memorial service. Nōami's son, Geiami (d. 1485), and grandson, Sōami, also served the Ashikaga court as painters and art advisers; together they are known as the San Ami (Three Amis).

Noatak National Preserve, formerly NOATAK NATIONAL MONUMENT, national preserve in Alaska, U.S., adjoining Gates of the Arctic National Park to the east and Kobuk Valley National Park to the south. Proclaimed a national monument in 1978, the area underwent boundary and name changes in 1980. The entire area is located north of the Arctic Circle and contains the largest untouched river basin in the United States. Landforms of scientific interest include the Grand Canyon of the Noatak (65 miles [105 km] long), a transition zone and migration route for flora and fauna between subarctic and Arctic environments. The preserve has hundreds of archaeological sites, and wildlife includes caribou, grizzly bears, Dall sheep, moose, and wolves, and waterfowl, raptors, and other bird species. The total area is 10,273 square miles (26,607 square km).

Nobel, Alfred Bernhard (b. Oct. 21, 1833, Stockholm, Sweden—d. Dec. 10, 1896, San Remo, Italy), Swedish chemist, engineer, and industrialist who invented dynamite and other, more powerful, explosives and founded the Nobel Prizes.

Through his mother he was descended from the Swedish naturalist Olof Rudbeck, noted for his description of the lymphatic vessels (*c.* 1653). From his father, Immanuel Nobel, he learned the fundamentals of engineering, and, like his father, he had a talent for invention. The Nobel family left Stockholm in 1842 to join the father in St. Petersburg. Educated mainly by tutors, young Nobel was a competent chemist at 16 and was fluent in English, French, German, Russian, and Swedish. He left Russia in 1850 to spend a year in Paris studying chemistry and four years in the United States working under the direction of John Ericsson, builder of the ironclad warship *Monitor*. Upon his return to St. Petersburg, Nobel worked in his father's factory until it went bankrupt in 1859.

Alfred Nobel, detail of a portrait (from a photograph) by Emil Österman, 1915; in the Nobel Foundation, Stockholm

By courtesy of the Svenska Portrattarkivet

Returning to Sweden, Nobel began the manufacture of the liquid explosive nitroglycerin. Shortly after production was under way in 1864, the factory blew up, causing the death of his youngest brother, Emil, and four other persons. Forbidden by the Swedish government to rebuild the factory, Nobel, who had become stereotyped as a "mad scientist," began experimenting on a barge to find a way to minimize the danger of handling nitroglycerin. A chance discovery that nitroglycerin was absorbed to dryness by kieselguhr, a siliceous packing material, and that the mixture could be handled safely led him to perfect dynamite and a detonating cap. Granted patents for dynamite in Britain (1867) and the United States (1868), he further experimented and developed a more powerful form of dynamite, blasting gelatin, patented in 1876. About a decade later, he produced ballistite, one of the first nitroglycerin smokeless powders and a precursor of cordite. Nobel's claim that his patent covered the latter was the occasion of vigorously contested lawsuits between him and the British government in 1894 and 1895, which he eventually lost. An accomplishment of importance equal to that of his explosives was his construction and perfection of detonators for such explosives as could not be made to explode by simple firing.

His worldwide interests in explosives, in addition to large holdings in the Baku oil fields of Russia, brought him an immense fortune but required him to travel almost constantly. He had the inclinations of a recluse, however, and he never married. Though he was essentially a pacifist and hoped that the destructive powers of his inventions would help bring an end to wars, his view of mankind and nations was pessimistic. He had an abiding interest in literature, and in his youth he had written poetry in English. The beginnings of a novel were found among his papers.

Generous in humanitarian and scientific philanthropies, he left the bulk of his fortune in trust to establish what came to be the most highly regarded of international awards, the Nobel Prize.

Nobel Prize, any of the prizes (five in number until 1969, when a sixth was added) that are awarded annually by four institutions (three Swedish and one Norwegian) from a fund established under the will of Alfred Bernhard Nobel. Distribution was begun on Dec. 10, 1901, the fifth anniversary of the death of the founder, whose will specified that the awards should annually be made "to those who, during the preceding year, shall have conferred the greatest benefit on mankind." The five prizes established by his will are: the Nobel Prize for Physics (Nobelpriset i Fysik); the Nobel Prize for Chemistry (Nobelpriset i Kemi); the Nobel Prize for Physiology or Medicine (Nobelpriset i Fysiologi eller Medicin); the Nobel Prize for Literature (Nobelpriset i Litteratur); and the Nobel Prize for Peace (Nobels Fredspris). An additional award, the Prize for Economic Sciences in Memory of Alfred Nobel (Priset i Ekonomisk Vetenskap till Alfred Nobels Minne), was set up in 1968 by the Bank of Sweden, and the first award was given in 1969.

The institutions cited as prize awarders by Alfred Nobel in his will are the Royal Swedish Academy of Sciences (physics and chemistry), the Royal Caroline Medico-Chirurgical Institute (physiology or medicine), and the Swedish Academy (literature)—all in Stockholm—and the Norwegian Nobel Committee (peace), located in Oslo and appointed by the Norwegian Storting (parliament). The Academy of Sciences also supervises the economics award. The Nobel Foundation, established in pursuance of the provisions of the will, is the legal owner and functional administrator of the funds and serves as the joint administrative body of the prize awarders, but it is not concerned with the prize deliberations or decisions, which rest exclusively with the four institutions. Each award consists of a gold medal, a diploma bearing a citation, and a sum of money; the amount depending on the income of the foundation.

The selection of the prizewinners starts in the early autumn of the year preceding the awards, with the prize-awarding institutions sending out invitations to nominate candidates to those competent under the Nobel statutes to do so. The basis of selection is professional competence and international range; self-nomination automatically disqualifies a person. Prize proposals must reach the proper committee in writing before February 1 of the year of the prize decision.

On February 1, six Nobel committees—one for each prize group—start their work on the nominations received. If necessary, the committees may call in experts, irrespective of nationality. During September and early October the committees submit recommendations to their respective prize-awarding bodies—only in rare cases has the question been left open. The final decision by the awarders must be made by November 15. A committee recommendation is usually but not invariably followed. The deliberation and the voting are secret at all stages. Prizes may be given only to individuals, except the Peace Prize, which may also be given to an institution. An individual may not be nominated posthumously, but a prize duly proposed may be so awarded, as with Dag Hammarskjöld (for peace; 1961) and Erik A. Karlfeldt (for literature; 1931). The awards may not be appealed against. Official support, diplomatic or political, for a certain candidate has no bearing on an award because the prize awarders, as such, are independent of the state.

A prize is either given entire to one person, divided equally between at most two works, or shared jointly by two or three persons. Sometimes a prize is withheld until the following year; if not then awarded it is paid back into the funds, which happens also when a prize is neither awarded nor reserved. Two prizes in the same field can thus be awarded in one year—*i.e.,* the prize withheld from the previous year and the current year's prize. If a prize is declined or not accepted before a set date, the prize money goes back to the funds. Prizes have been declined, and in some instances governments have forbidden their nationals to accept Nobel Prizes. Those who win a prize are nevertheless entered into the list of Nobel laureates with the remark "declined the prize." Motives for nonacceptance may vary, but the real reason has mostly been external pressure; *e.g.,* Hitler's decree of 1937 forbade Germans to accept Nobel Prizes because the Peace Prize to Carl von Ossietzky in 1935 was taken as an affront. In some cases, the refuser has later explained his situation and on application received the Nobel gold medal and the diploma—but not the money, which had reverted to the funds.

Prizes are withheld or not awarded when no worthy candidate in the meaning of Nobel's will can be found or when the world situation prevents the gathering of information required to reach a decision, as happened during World Wars I and II. The prizes are open to all, irrespective of nationality, race, creed, or ideology. They can be awarded more than once to the same recipient. The ceremonial presentations for physics, chemistry, physiology or medicine, literature, and economics take place in Stockholm; and that for peace takes place in Oslo, on December 10, the anniversary of Nobel's death. The laureates usually receive their prizes in person; each presents a lecture in connection with the award ceremonies.

The general principles governing awards were laid down by Alfred Nobel in his will. In 1900 supplementary rules of interpretation and administration were agreed upon between the executors, representatives of the prize awarders, and the Nobel family and were confirmed by the king in council. These statutory rules have on the whole remained unchanged but have been somewhat modified in application; *e.g.,* the will's ambiguous words "idealistic tendency," as qualification for the prize for literature, were in the beginning interpreted strictly but have gradually been interpreted more flexibly, as the list of laureates shows. The basis for the economics award was scientific—*i.e.,* mathematical or statistical, rather than political or social. The first two laureates, economist Ragnar Frisch (Norway) and Jan Tinbergen (The Netherlands), were given the prize for their work in econometrics, the analysis of economic activity by means of mathematical expression.

The scientific and medical prizes have proved to be the least controversial, while those for literature and peace by their very nature have been the most exposed to critical differences. The Peace Prize has been most frequently reserved. For Nobel Prize winners, *see* Table, pages 740–747.

nobelium (No), synthetic chemical element of the actinide series in Group IIIb of the periodic table, atomic number 102. Not occurring in nature, nobelium (as the isotope nobelium-254) was discovered (April 1958) by Albert Ghiorso, T. Sikkeland, J.R. Walton, and Glenn T. Seaborg at the University of California, Berkeley, as a product of the bombardment of curium (atomic number 96) with carbon ions (atomic number 6) accelerated in a heavy-ion linear accelerator. An international team of scientists working at the Nobel Institute of Physics in Stockholm had claimed less than a year before that they had synthesized the same element, which they named nobelium (for Alfred Nobel); but experiments performed in the Soviet Union (at the I.V. Kurchatov Institute of Atomic Energy, Moscow, and at the Joint Institute for Nuclear Research in Dubna) and in the United States (University of California, Berkeley) failed to confirm the discovery. The Berkeley and Dubna teams have subsequently produced more than a half dozen isotopes of nobelium; nobelium-255 (three-minute half-life) is the stablest. Using traces of this isotope, radiochemists have shown nobelium to exist in aqueous solution in both the +2 and +3 oxidation states. The +2 state is very stable, an effect more pronounced than was anticipated in comparison with the homologous lanthanide element ytterbium (atomic number 70).

atomic number	102
stablest isotope	255
valence	2,3
electronic config.	2-8-18-32-32-8-2 or (Rn)$5f^{14}7s^2$

Nobeoka, city, Miyazaki *ken* (prefecture), Kyushu, Japan, on the delta of the Gokase River (Gokase-gawa). It developed as a castle town in the 12th century and has been a fishing port since the mid-18th century. Nobeoka is now the largest industrial city of the prefecture. Several large chemical plants produce fertilizer, medicines, and fibres. Pearls are cultivated along the coast, and sweet potatoes, cereals, and tobacco are grown. Pop. (1983 est.) 136,255.

Nobile, Umberto (b. Jan. 21, 1885, Lauro, near Salerno, Italy—d. July 30, 1978, Rome), Italian aeronautical engineer and pioneer in Arctic aviation who in 1926, with the Norwegian explorer Roald Amundsen and Lincoln Ellsworth of the United States flew over the North Pole in the dirigible *Norge,* from Spitsbergen (now Svalbard), north of Norway, to Alaska.

As a general in the Italian air force and a professor of aeronautical engineering at the University of Naples in 1928, Nobile began a new series of flights over unexplored Arctic regions with a craft similar to the *Norge.* On the third flight the airship crashed on the ice north-northeast of Spitsbergen. Though Nobile and 7 companions were rescued, 17 lives were lost. When an Italian commission of inquiry found him responsible for the disaster, he resigned his commission. In 1931 he took part in a Soviet voyage to the Arctic. After World War II the commission's report was discredited, and he was reinstated in the air force. He resumed teaching at Naples and was a deputy in the Italian Constituent Assembly (1946). Nobile's own account of his Arctic adventures is given in *Gli italiani al Polo Nord* (1959; *My Polar Flights*).

Nobility, Charter to the (Russian history): *see* Gentry, Charter to the.

Noble, Sir Andrew, 1ST BARONET (b. Sept. 13, 1831, Greenock, Renfrew, Scot.—d. Oct. 22, 1915, Argyll), Scottish physicist and gunnery expert, considered a founder of the science of ballistics. His pioneering research on fired gunpowder, often in conjunction with the British chemist Frederick Abel, contributed greatly to the progress of gunnery.

Noble was educated at Edinburgh Academy and the Royal Military Academy, Woolwich, London, and then entered the Royal Artillery in 1849. During the 1850s, in a study of the relative merits of smoothbore and rifled cannon, he devised a method of comparing their accuracy of fire. He became assistant inspector of artillery in 1859 but later left the service to join the engineering and ordnance firm of Sir William (later Lord) Armstrong, of which he became chairman in 1900.

About 1862 he applied his invention, the chronoscope, a device for measuring very small time intervals, to determine the velocity of shot in gun barrels. His experiments helped establish the science of ballistics and also led to new types of gunpowder, the redesigning of guns, and new methods of loading. Noble was elected a fellow of the Royal Society (1870), knighted (1893), and created a baronet (1902).

noble gas, any of the six chemical elements that make up Group O of the periodic table. The elements are helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), and radon (Rn).

A brief treatment of the noble gases follows. For full treatment, *see* MACROPAEDIA: Chemical Elements. *See also* MICROPAEDIA for entries on each of the individual noble gases.

All of the noble gases are present in the Earth's atmosphere. With the exception of hydrogen, helium is the most plentiful element in the universe, comprising almost 25 percent of its total mass. Under ordinary conditions, the noble gases are colourless, odourless, and nonflammable. Their atoms have stable electron configurations; thus they do not easily gain or lose electrons and rarely share them with other elements. The term "noble" alludes to the extraordinarily limited reactivity of the gases. They also are sometimes called inert gases for the same reason. It was, however, discovered in 1962 that the heavier noble gases—krypton, xenon, and radon—can form chemical compounds with fluorine, the strongest electron attracting of all elements. The outer electrons of the atoms of these three gases, screened from the nucleus by intervening electrons, are held less firmly and can be removed more readily from the atoms than can the electrons of helium, neon, and argon.

Nobel Prize winners[1]

	physics			chemistry			literature	
1901	Wilhelm Röntgen	Ger.	discovery of X rays	Jacobus van't Hoff	Neth.	laws of chemical dynamics and osmotic pressure	Sully Prudhomme; poet	Fr.
1902	Hendrik Antoon Lorentz Pieter Zeeman	Neth. Neth.	investigation of the influence of magnetism on radiation	Emil Fischer	Ger.	work on sugar and purine syntheses	Theodor Mommsen; historian	Ger.
1903	Henri Becquerel Pierre Curie Marie Curie[2]	Fr. Fr. Fr.[3]	discovery of spontaneous radioactivity investigations of radiation phenomena discovered by H. Becquerel	Svante Arrhenius	Swed.	theory of electrolytic dissociation	Bjørnstjerne Bjørnson; novelist, poet, dramatist	Nor.
1904	Lord Rayleigh	U.K.	discovery of argon	Sir William Ramsay	U.K.	discovery of inert gas elements and their places in the periodic system	Frédéric Mistral; poet José Echegaray y Eizaguirre; dramatist	Fr. Spain
1905	Philipp Lenard	Ger.	research on cathode rays	Adolf von Baeyer	Ger.	work on organic dyes, hydroaromatic compounds	Henryk Sienkiewicz; novelist	Pol.
1906	J.J. Thomson	U.K.	researches into electrical conductivity of gases	Henri Moissan	Fr.	isolation of fluorine; introduction of Moissan furnace	Giosuè Carducci; poet	Italy
1907	A.A. Michelson	U.S.[3]	spectroscopic and metrological investigations	Eduard Buchner	Ger.	discovery of noncellular fermentation	Rudyard Kipling; poet, novelist	U.K.
1908	Gabriel Lippmann	Fr.	photographic reproduction of colours	Ernest Rutherford	U.K.	investigations into the disintegration of elements and the chemistry of radioactive substances	Rudolf Eucken; philosopher	Ger.
1909	Guglielmo Marconi Ferdinand Braun	Italy Ger.	development of wireless telegraphy	Wilhelm Ostwald	Ger.	pioneer work on catalysis, chemical equilibrium, and reaction velocities	Selma Lagerlöf; novelist	Swed.
1910	Johannes van der Waals	Neth.	research concerning the equation of state of gases and liquids	Otto Wallach	Ger.	pioneer work in alicyclic combinations	Paul von Heyse; poet, novelist, dramatist	Ger.
1911	Wilhelm Wien	Ger.	discoveries regarding laws governing heat radiation	Marie Curie[2]	Fr.[3]	discovery of radium and polonium; isolation of radium	Maurice Maeterlinck; dramatist	Belg.
1912	Nils Gustaf Dalén	Swed.	invention of automatic regulators for lighting coastal beacons and light buoys	Victor Grignard Paul Sabatier	Fr. Fr.	discovery of the Grignard reagents method of hydrogenating organic compounds	Gerhart Hauptmann; dramatist	Ger.
1913	Heike Kamerlingh Onnes	Neth.	investigation into the properties of matter at low temperatures; production of liquid helium	Alfred Werner	Switz.[3]	work on the linkage of atoms in molecules	Rabindranath Tagore; poet	India
1914	Max von Laue	Ger.	discovery of diffraction of X rays by crystals	Theodore Richards	U.S.	accurate determination of the atomic weights of numerous elements	(no award)	—
1915	William Bragg Lawrence Bragg	U.K. U.K.	analysis of crystal structure by means of X rays	Richard Willstätter	Ger.	pioneer researches in plant pigments, especially chlorophyll	Romain Rolland; novelist	Fr.
1916	(no award)	—	—	(no award)	—	—	Verner von Heidenstam; poet	Swed.
1917	Charles Barkla	U.K.	discovery of characteristic X-radiation of elements	(no award)	—	—	Karl Gjellerup; novelist Henrik Pontoppidan; novelist	Den. Den.
1918	Max Planck	Ger.	discovery of the elemental quanta	Fritz Haber	Ger.	synthesis of ammonia	Erik Axel Karlfeldt (declined)	Swed.
1919	Johannes Stark	Ger.	discovery of Doppler effect in positive ion rays and division of spectral lines in electric field	(no award)	—	—	Carl Spitteler; poet, novelist	Switz.
1920	Charles Guillaume	Switz.	discovery of anomalies in alloys	Walther Nernst	Ger.	work in thermochemistry	Knut Hamsun; novelist	Nor.
1921	Albert Einstein	Switz.[3]	work in theoretical physics	Frederick Soddy	U.K.	chemistry of radioactive substances; occurrence and nature of isotopes	Anatole France; novelist	Fr.
1922	Niels Bohr	Den.	investigation of atomic structure and radiation	Francis Aston	U.K.	work with mass spectrograph; whole-number rule	Jacinto Benavente y Martínez; dramatist	Spain
1923	Robert Millikan	U.S.	work on elementary electric charge and the photoelectric effect	Fritz Pregl	Austria	method of microanalysis of organic substances	William Butler Yeats; poet	Ire.
1924	Manne Siegbahn	Swed.	work in X-ray spectroscopy	(no award)	—	—	Władysław Reymont; novelist	Pol.
1925	James Franck Gustav Hertz	Ger. Ger.	discovery of the laws governing the impact of an electron upon an atom	Richard Zsigmondy	Austria	elucidation of the heterogeneous nature of colloidal solutions	George Bernard Shaw; dramatist	Ire.
1926	Jean Perrin	Fr.	work on discontinuous structure of matter	The Svedberg	Swed.	work on disperse systems	Grazia Deledda; novelist	Italy
1927	Arthur Holly Compton C.T.R. Wilson	U.S. U.K.	discovery of wavelength change in diffused X rays method of making visible the paths of electrically charged particles	Heinrich Wieland	Ger.	researches into the constitution of bile acids	Henri Bergson; philosopher	Fr.[3]
1928	Owen Richardson	U.K.	work on electron emission by hot metals	Adolf Windaus	Ger.	constitution of sterols and their connection with vitamins	Sigrid Undset; novelist	Nor.

Nobel Prize winners[1] (continued)

	physiology or medicine			peace		economic science
1901	Emil von Behring	Ger.	work on serum therapy	Jean-Henri Dunant Frédéric Passy	Switz. Fr.	prize not awarded until 1969
1902	Ronald Ross	U.K.	discovery of how malaria enters an organism	Élie Ducommun Charles-Albert Gobat	Switz. Switz.	
1903	Niels R. Finsen	Den.	treatment of skin diseases with light	Randal Cremer	U.K.	
1904	Ivan Pavlov	Russia	work on the physiology of digestion	Institute of International Law	(founded 1873)	
1905	Robert Koch	Ger.	tuberculosis research	Bertha von Suttner	Austria	
1906	Camillo Golgi Santiago Ramón y Cajal	Italy Spain	work on the structure of the nervous system	Theodore Roosevelt	U.S.	
1907	Alphonse Laveran	Fr.	discovery of the role of protozoa in diseases	Ernesto Teodoro Moneta Louis Renault	Italy Fr.	
1908	Paul Ehrlich Élie Metchnikoff	Ger. Russia	work on immunity	Klas Pontus Arnoldson Fredrik Bajer	Swed. Den.	
1909	Emil Kocher	Switz.	physiology, pathology, and surgery of thyroid gland	Baron d'Estournelles de Constant Auguste Beernaert	Fr. Belg.	
1910	Albrecht Kossel	Ger.	researches in cellular chemistry	International Peace Bureau	(founded 1891)	
1911	Allvar Gullstrand	Swed.	work on dioptrics of the eye	Tobias Asser Alfred Fried	Neth. Austria	
1912	Alexis Carrel	Fr.	work on vascular suture; transplantation of organs	Elihu Root	U.S.	
1913	Charles Richet	Fr.	work on anaphylaxis	Henri-Marie Lafontaine	Belg.	
1914	Robert Bárány	Austria	work on vestibular apparatus	(no award)	—	
1915	(no award)	—	—	(no award)	—	
1916	(no award)	—	—	(no award)	—	
1917	(no award)	—	—	International Red Cross Committee[4]	(founded 1863)	
1918	(no award)	—	—	(no award)	—	
1919	Jules Bordet	Belg.	work on immunity factors in blood serum	Woodrow Wilson	U.S.	
1920	August Krogh	Den.	discovery of capillary motor-regulating mechanism	Léon Bourgeois	Fr.	
1921	(no award)	—	—	Karl Branting Christian Lous Lange	Swed. Nor.	
1922	A.V. Hill	U.K.	discoveries concerning heat production in muscles	Fridtjof Nansen	Nor.	
	Otto Meyerhof	Ger.	work on metabolism of lactic acid in muscles			
1923	F.G. Banting J.J.R. Macleod	Can. U.K.	discovery of insulin	(no award)	—	
1924	Willem Einthoven	Neth.	discovery of electrocardiogram mechanism	(no award)	—	
1925	(no award)	—	—	Sir Austen Chamberlain Charles G. Dawes	U.K. U.S.	
1926	Johannes Fibiger	Den.	contributions to cancer research	Aristide Briand Gustav Stresemann	Fr. Ger.	
1927	Julius Wagner-Jauregg	Austria	work on malaria inoculation in dementia paralytica	Ferdinand Buisson Ludwig Quidde	Fr. Ger.	
1928	Charles Nicolle	Fr.	work on typhus	(no award)	—	

Nobel Prize winners[1] (continued)

	physics			chemistry			literature	
1929	Louis-Victor de Broglie	Fr.	discovery of the wave nature of electrons	Arthur Harden Hans von Euler-Chelpin	U.K. Swed.[3]	investigations in the fermentation of sugars and the enzyme action involved	Thomas Mann; novelist	Ger.
1930	Sir Chandrasekhara Raman	India	work on light diffusion; discovery of Raman effect	Hans Fischer	Ger.	hemin, chlorophyll research; synthesis of hemin	Sinclair Lewis; novelist	U.S.
1931	(no award)	—	—	Carl Bosch Friedrich Bergius	Ger. Ger.	invention and development of chemical high-pressure methods	Erik Axel Karlfeldt; poet (posthumous award)	Swed.
1932	Werner Heisenberg	Ger.	creation of quantum mechanics	Irving Langmuir	U.S.	discoveries and investigations in surface chemistry	John Galsworthy; novelist	U.K.
1933	P.A.M. Dirac Erwin Schrödinger	U.K. Austria	introduction of wave-equations in quantum mechanics	(no award)	—	—	Ivan Bunin; poet, novelist	U.S.S.R.
1934	(no award)	—	—	Harold Urey	U.S.	discovery of heavy hydrogen	Luigi Pirandello; dramatist	Italy
1935	James Chadwick	U.K.	discovery of the neutron	Frédéric Joliot-Curie Irène Joliot-Curie	Fr. Fr.	synthesis of new radioactive elements	(no award)	—
1936	Victor Hess Carl Anderson	Austria U.S.	discovery of cosmic radiation discovery of the positron	Peter Debye	Neth.	work on dipole moments and diffraction of X rays and electrons in gases	Eugene O'Neill; dramatist	U.S.
1937	Clinton Davisson George Paget Thomson	U.S. U.K.	experimental demonstration of the interference phenomenon in crystals irradiated by electrons	Norman Haworth Paul Karrer	U.K. Switz.	research on carbohydrates and vitamin C research on carotenoids, flavins, and vitamins	Roger Martin du Gard; novelist	Fr.
1938	Enrico Fermi	Italy	disclosure of artificial radioactive elements produced by neutron irradiation	Richard Kuhn (declined)[5]	Ger.	carotenoid and vitamin research	Pearl Buck; novelist	U.S.
1939	Ernest Lawrence	U.S.	invention of the cyclotron	Adolf Butenandt (declined)[5] Leopold Ružička	Ger. Switz.[3]	work on sexual hormones work on polymethylenes and higher terpenes	Frans Eemil Sillanpää; novelist	Fin.
1943[6]	Otto Stern	U.S.[3]	discovery of the magnetic moment of the proton	George de Hevesy	Hung.	use of isotopes as tracers in chemical research	(no award)	—
1944	Isidor Rabi	U.S.[3]	resonance method for registration of various properties of atomic nuclei	Otto Hahn	Ger.	discovery of the fission of heavy nuclei	Johannes V. Jensen; novelist	Den.
1945	Wolfgang Pauli	Austria	discovery of the exclusion principle of electrons	Artturi Virtanen	Fin.	invention of fodder preservation method	Gabriela Mistral; poet	Chile
1946	P.W. Bridgman	U.S.	discoveries in the domain of high-pressure physics	James Sumner John Northrop Wendell Stanley	U.S. U.S. U.S.	discovery of enzyme crystallization preparation of enzymes and virus proteins in pure form	Hermann Hesse; novelist	Switz.[3]
1947	Sir Edward Appleton	U.K.	discovery of Appleton layer in upper atmosphere	Sir Robert Robinson	U.K.	investigation of alkaloids and other plant products	André Gide; novelist, essayist	Fr.
1948	Patrick Blackett	U.K.	discoveries in the domain of nuclear physics and cosmic radiation	Arne Tiselius	Swed.	researches in electrophoresis and adsorption analysis; serum proteins	T.S. Eliot; poet, critic	U.K.[3]
1949	Yukawa Hideki	Japan	prediction of the existence of mesons	William Giauque	U.S.	behaviour of substances at extremely low temperatures	William Faulkner; novelist	U.S.
1950	Cecil Powell	U.K.	photographic method of studying nuclear processes; discoveries concerning mesons	Otto Diels Kurt Alder	Ger. Ger.	discovery and development of diene synthesis	Bertrand Russell; philosopher	U.K.
1951	Sir John Cockcroft E.T.S. Walton	U.K. Ire.	work on transmutation of atomic nuclei by accelerated particles	Edwin McMillan Glenn Seaborg	U.S. U.S.	discovery of and research on transuranium elements	Pär Lagerkvist; novelist	Swed.
1952	Felix Bloch E.M. Purcell	U.S.[3] U.S.	discovery of nuclear magnetic resonance in solids	A.J.P. Martin R.L.M. Synge	U.K. U.K.	development of partition chromatography	François Mauriac; poet, novelist, dramatist	Fr.
1953	Frits Zernike	Neth.	method of phase-contrast microscopy	Hermann Staudinger	Ger.	work on macromolecules	Sir Winston Churchill; historian, orator	U.K.
1954	Max Born Walther Bothe	U.K.[3] Ger.	statistical studies of atomic wave functions invention of coincidence method	Linus Pauling[7]	U.S.	study of the nature of the chemical bond	Ernest Hemingway; novelist	U.S.
1955	Willis Lamb, Jr. Polykarp Kusch	U.S. U.S.[3]	discoveries in the hydrogen spectrum measurement of magnetic moment of electron	Vincent Du Vigneaud	U.S.	first synthesis of a polypeptide hormone	Halldór Laxness; novelist	Ice.
1956	William Shockley John Bardeen[9] Walter H. Brattain	U.S. U.S. U.S.	investigations on semiconductors and invention of the transistor	Nikolay Semyonov Sir Cyril Hinshelwood	U.S.S.R. U.K.	work on the kinetics of chemical reactions	Juan Ramón Jiménez; poet	Spain
1957	Tsung-Dao Lee Chen Ning Yang	China China	discovery of violations of the principle of parity	Sir Alexander Todd	U.K.	work on nucleotides and nucleotide coenzymes	Albert Camus; novelist, dramatist	Fr.
1958	Pavel A. Cherenkov Ilya M. Frank Igor Y. Tamm	U.S.S.R. U.S.S.R. U.S.S.R.	discovery and interpretation of the Cherenkov effect	Frederick Sanger[10]	U.K.	determination of the structure of the insulin molecule	Boris Pasternak; novelist, poet (declined)	U.S.S.R.

Nobel Prize winners[1] (continued)

	physiology or medicine			peace		economic science
1929	Christiaan Eijkman Sir Frederick Hopkins	Neth. U.K.	discovery of antineuritic vitamin discovery of growth-stimulating vitamins	Frank B. Kellogg	U.S.	
1930	Karl Landsteiner	U.S.[3]	grouping of human blood	Nathan Söderblom	Swed.	
1931	Otto Warburg	Ger.	discovery of nature and action of respiratory enzyme	Jane Addams Nicholas Murray Butler	U.S. U.S.	
1932	Edgar D. Adrian Sir Charles Sherrington	U.K. U.K.	discoveries regarding function of neurons	(no award)	—	
1933	Thomas Hunt Morgan	U.S.	heredity transmission functions of chromosomes	Sir Norman Angell	U.K.	
1934	George R. Minot William P. Murphy George H. Whipple	U.S. U.S. U.S.	discoveries concerning liver treatment for anemia	Arthur Henderson	U.K.	
1935	Hans Spemann	Ger.	organizer effect in embryo	Carl von Ossietzky	Ger.	
1936	Sir Henry Dale Otto Loewi	U.K. Ger.	work on chemical transmission of nerve impulses	Carlos Saavedra Lamas	Arg.	
1937	Albert Szent-Györgyi	Hung.	work on biological combustion	Viscount Cecil of Chelwood	U.K.	
1938	Corneille Heymans	Belg.	discovery of role of sinus and aortic mechanisms in respiration regulation	Nansen International Office for Refugees	(founded 1931)	
1939	Gerhard Domagk (declined)[5]	Ger.	antibacterial effect of prontosil	(no award)	—	
1943[6]	Henrik Dam Edward A. Doisy	Den. U.S.	discovery of vitamin K discovery of chemical nature of vitamin K	(no award)	—	
1944	Joseph Erlanger Herbert S. Gasser	U.S. U.S.	researches on differentiated functions of nerve fibres	International Red Cross Committee[4]	(founded 1863)	
1945	Sir A. Fleming Ernst Boris Chain Sir Howard Florey	U.K. U.K.[3] Austl.	discovery of penicillin and its curative value	Cordell Hull	U.S.	
1946	Hermann J. Muller	U.S.	production of mutations by X-ray irradiation	Emily Greene Balch John R. Mott	U.S. U.S.	
1947	Carl F. Cori Gerty T. Cori Bernardo Houssay	U.S.[3] U.S.[3] Arg.	discovery of how glycogen is catalytically converted pituitary hormone function in sugar metabolism	American Friends Service Committee Friends Service Council	U.S. U.K.	
1948	Paul Müller	Switz.	properties of DDT	(no award)	—	
1949	Walter Rudolf Hess António Egas Moniz	Switz. Port.	discovery of function of interbrain therapeutic value of leucotomy in psychoses	Lord Boyd-Orr	U.K.	
1950	Philip S. Hench Edward C. Kendall Tadeus Reichstein	U.S. U.S. Switz.[3]	research on adrenal cortex hormones, their structure and biological effects	Ralph Bunche	U.S.	
1951	Max Theiler	S.Af.	yellow fever discoveries	Léon Jouhaux	Fr.	
1952	Selman A. Waksman	U.S.[3]	discovery of streptomycin	Albert Schweitzer	Alsace	
1953	Fritz A. Lipmann Hans A. Krebs	U.S.[3] U.K.[3]	discovery of coenzyme A citric acid cycle in metabolism of carbohydrates	George C. Marshall	U.S.	
1954	John F. Enders Thomas H. Weller Frederick Robbins	U.S. U.S. U.S.	cultivation of the poliomyelitis virus in tissue cultures	Office of the United Nations High Commissioner for Refugees[8]	(founded 1951)	
1955	Axel Hugo Theorell	Swed.	nature and mode of action of oxidation enzymes	(no award)	—	
1956	Werner Forssmann Dickinson Richards André F. Cournand	Ger. U.S. U.S.[3]	discoveries concerning heart catheterization and circulatory changes	(no award)	—	
1957	Daniel Bovet	Italy[3]	production of synthetic curare	Lester B. Pearson	Can.	
1958	George W. Beadle Edward L. Tatum Joshua Lederberg	U.S. U.S. U.S.	genetic regulation of chemical processes genetic recombination	Dominique Georges Pire	Belg.	

Nobel Prize winners[1] (continued)

	physics			chemistry			literature	
1959	Emilio Segrè Owen Chamberlain	U.S.[3] U.S.	confirmation of the existence of the antiproton	Jaroslav Heyrovský	Czech.	discovery and development of polarography	Salvatore Quasimodo; poet	Italy
1960	Donald Glaser	U.S.	development of the bubble chamber	Willard Libby	U.S.	development of radiocarbon dating	Saint-John Perse; poet	Fr.
1961	Robert Hofstadter Rudolf Mössbauer	U.S. Ger.	determination of shape and size of atomic nucleons discovery of the Mössbauer effect	Melvin Calvin	U.S.	study of chemical steps that take place during photosynthesis	Ivo Andrić; novelist	Yugos.
1962	Lev D. Landau	U.S.S.R.	contributions to the understanding of condensed states of matter	John C. Kendrew Max F. Perutz	U.K. U.K.[3]	determination of the structure of hemoproteins	John Steinbeck; novelist	U.S.
1963	J. Hans D. Jensen Maria Goeppert Mayer Eugene Paul Wigner	Ger. U.S.[3] U.S.[3]	development of shell model theory of the structure of atomic nuclei principles governing interaction of protons and neutrons in the nucleus	Giulio Natta Karl Ziegler	Italy Ger.	structure and synthesis of polymers in the field of plastics	George Seferis; poet	Greece
1964	Charles H. Townes Nikolay G. Basov Aleksandr M. Prokhorov	U.S. U.S.S.R. U.S.S.R.	work in quantum electronics leading to construction of instruments based on maser-laser principles	Dorothy M.C. Hodgkin	U.K.	determining the structure of biochemical compounds essential in combating pernicious anemia	Jean-Paul Sartre; philosopher, dramatist (declined)	Fr.
1965	Julian S. Schwinger Richard P. Feynman Tomonaga Shin'ichirō	U.S. U.S. Japan	basic principles of quantum electrodynamics	R.B. Woodward	U.S.	synthesis of sterols, chlorophyll, and other substances	Mikhail Sholokhov; novelist	U.S.S.R.
1966	Alfred Kastler	Fr.	discovery of optical methods for studying Hertzian resonances in atoms	Robert S. Mulliken	U.S.	work concerning chemical bonds and the electronic structure of molecules	Shmuel Yosef Agnon; novelist Nelly Sachs; poet	Israel[3] Swed.[3]
1967	Hans A. Bethe	U.S.[3]	discoveries concerning the energy production of stars	Manfred Eigen Ronald G.W. Norrish George Porter	Ger. U.K. U.K.	studies of extremely fast chemical reactions	Miguel Ángel Asturias; novelist	Guat.
1968	Luis W. Alvarez	U.S.	work with elementary particles, discovery of resonance states	Lars Onsager	U.S.[3]	work on theory of thermodynamics of irreversible processes	Kawabata Yasunari; novelist	Japan
1969	Murray Gell-Mann	U.S.	classification of elementary particles and their interactions	Derek H.R. Barton Odd Hassel	U.K. Nor.	work in determining actual three-dimensional shape of molecules	Samuel Beckett; novelist, dramatist	Ire.
1970	Hannes Alfvén Louis Néel	Swed. Fr.	work in magnetohydrodynamics and in antiferromagnetism and ferrimagnetism	Luis F. Leloir	Arg.[3]	discovery of sugar nucleotides and their role in the biosynthesis of carbohydrates	Aleksandr Solzhenitsyn; novelist	U.S.S.R.
1971	Dennis Gabor	U.K.[3]	invention of holography	Gerhard Herzberg	Can.[3]	research in the structure of molecules	Pablo Neruda; poet	Chile
1972	John Bardeen[9] Leon N. Cooper John R. Schrieffer	U.S. U.S. U.S.	development of the theory of superconductivity	Christian B. Anfinsen Stanford Moore William H. Stein	U.S. U.S. U.S.	fundamental contributions to enzyme chemistry	Heinrich Böll; novelist	Ger.
1973	Leo Esaki Ivar Giaever Brian D. Josephson	Japan U.S.[3] U.K.	tunneling in semiconductors and superconductors	Ernst Fischer Geoffrey Wilkinson	Ger. U.K.	organometallic chemistry	Patrick White; novelist	Austl.
1974	Sir Martin Ryle Antony Hewish	U.K. U.K.	work in radio astronomy	Paul J. Flory	U.S.	studies of long-chain molecules	Eyvind Johnson; novelist Harry Martinson; novelist, poet	Swed. Swed.
1975	Aage N. Bohr Ben R. Mottelson L. James Rainwater	Den. Den.[3] U.S.	work on the atomic nucleus that paved the way for nuclear fusion	John W. Cornforth Vladimir Prelog	U.K. Switz.	work in stereochemistry	Eugenio Montale; poet	Italy
1976	Burton Richter Samuel C.C. Ting	U.S. U.S.	discovery of new class of elementary particles (psi, or J)	William N. Lipscomb	U.S.	structure of boranes	Saul Bellow; novelist	U.S.[3]
1977	Philip W. Anderson Sir Nevill F. Mott John H. Van Vleck	U.S. U.K. U.S.	contributions to understanding of the behaviour of electrons in magnetic, noncrystalline solids	Ilya Prigogine	Belg.	widening the scope of thermodynamics	Vicente Aleixandre; poet	Spain
1978	Pyotr L. Kapitsa Arno A. Penzias Robert W. Wilson	U.S.S.R. U.S.[3] U.S.	invention and application of helium liquefier discovery of cosmic microwave background radiation, providing support for the big-bang theory	Peter D. Mitchell	U.K.	formulation of a theory of energy transfer processes in biological systems	Isaac Bashevis Singer; novelist	U.S.[3]
1979	Sheldon Glashow Abdus Salam Steven Weinberg	U.S. Pak. U.S.	establishment of analogy between electromagnetism and the "weak" interactions of subatomic particles	Herbert C. Brown Georg Wittig	U.S.[3] W.Ger.	introduction of compounds of boron and phosphorus in the synthesis of organic substances	Odysseus Elytis; poet	Greece
1980	James W. Cronin Val Logsdon Fitch	U.S. U.S.	demonstration of simultaneous violation of both charge-conjugation and parity-inversion symmetries	Paul Berg Walter Gilbert Frederick Sanger[10]	U.S. U.S. U.K.	first preparation of a hybrid DNA development of chemical and biological analyses of DNA structure	Czesław Miłosz; poet	U.S.[3]

Nobel Prize winners[1] (continued)

	physiology or medicine			peace		economic science		
1959	Severo Ochoa Arthur Kornberg	U.S.[3] U.S.	work on producing nucleic acids artificially	Philip Noel-Baker	U.K.			
1960	Sir Macfarlane Burnet Peter B. Medawar	Austl. U.K.	acquired immunity to tissue transplants	Albert Lutuli	S.Af.			
1961	Georg von Békésy	U.S.[3]	functions of the inner ear	Dag Hammarskjöld	Swed.			
1962	Francis H.C. Crick James D. Watson Maurice Wilkins	U.K. U.S. U.K.	discoveries concerning the molecular structure of deoxyribonucleic acid	Linus Pauling[7]	U.S.			
1963	Sir John Eccles Alan Lloyd Hodgkin Andrew Huxley	Austl. U.K. U.K.	study of the transmission of impulses along a nerve fibre	International Red Cross Committee[4] League of Red Cross Societies	(headquarters of both in Geneva)			
1964	Konrad Bloch Feodor Lynen	U.S.[3] Ger.	discoveries concerning cholesterol and fatty-acid metabolism	Martin Luther King, Jr.	U.S.			
1965	François Jacob Jacques Monod André Lwoff	Fr. Fr. Fr.	discoveries concerning regulatory activities of the body cells	United Nations Children's Fund (UNICEF)	(founded 1946)			
1966	Charles B. Huggins Francis Peyton Rous	U.S.[3] U.S.	research on causes and treatment of cancer	(no award)	—			
1967	Haldan Keffer Hartline George Wald Ragnar A. Granit	U.S. U.S. Swed.	discoveries about chemical and physiological visual processes in the eye	(no award)	—			
1968	Robert W. Holley Har Gobind Khorana Marshall W. Nirenberg	U.S. U.S.[3] U.S.	deciphering of the genetic code	René Cassin	Fr.			
1969	Max Delbrück A.D. Hershey Salvador E. Luria	U.S.[3] U.S. U.S.[3]	research and discoveries concerning viruses and viral diseases	International Labour Organisation	(founded 1919)	Ragnar Frisch Jan Tinbergen	Nor. Neth.	work in econometrics
1970	Julius Axelrod Sir Bernard Katz Ulf von Euler	U.S. U.K.[3] Swed.	discoveries concerning the chemistry of nerve transmission	Norman E. Borlaug	U.S.	Paul A. Samuelson	U.S.	work in scientific analysis of economic theory
1971	Earl W. Sutherland, Jr.	U.S.	action of hormones	Willy Brandt	Ger.	Simon Kuznets	U.S.[3]	extensive research on the economic growth of nations
1972	Gerald M. Edelman Rodney Porter	U.S. U.K.	research on the chemical structure of antibodies	(no award)	—	Sir John Hicks Kenneth J. Arrow	U.K. U.S.	contributions to general economic equilibrium theory and welfare theory
1973	Karl von Frisch Konrad Lorenz Nikolaas Tinbergen	Austria Austria U.K.[3]	discoveries in animal behaviour patterns	Henry Kissinger Le Duc Tho (declined)	U.S. North Vietnam	Wassily Leontief	U.S.[3]	input-output analysis
1974	Albert Claude Christian R. de Duve George E. Palade	U.S.[3] Belg. U.S.[3]	research on structural and functional organization of cells	Satō Eisaku Seán MacBride	Japan Ire.	Gunnar Myrdal Friedrich von Hayek	Swed. U.K.	pioneering analysis of the interdependence of economic, social, and institutional phenomena
1975	Renato Dulbecco Howard M. Temin David Baltimore	U.S.[3] U.S. U.S.	interaction between tumour viruses and the genetic material of the cell	Andrey D. Sakharov	U.S.S.R.	Leonid V. Kantorovich Tjalling C. Koopmans	U.S.S.R. U.S.[3]	contributions to the theory of optimum allocation of resources
1976	Baruch S. Blumberg D. Carleton Gajdusek	U.S. U.S.	studies of origin and spread of infectious diseases	Mairead Corrigan[11] Betty Williams[11]	N.Ire. N.Ire.	Milton Friedman	U.S.	consumption analysis, monetary theory, and economic stabilization
1977	Rosalyn S. Yalow	U.S.	development of radioimmunoassay	Amnesty International	(founded 1961)	Bertil Ohlin James Meade	Swed. U.K.	contributions to theory of international trade
	Roger Guillemin Andrew Schally	U.S. U.S.	research on pituitary hormones					
1978	Werner Arber Daniel Nathans Hamilton O. Smith	Switz. U.S. U.S.	discovery and application of enzymes that fragment deoxyribonucleic acids	Menachem Begin Anwar el-Sādāt	Israel Egypt	Herbert A. Simon	U.S.	decision-making processes in economic organizations
1979	Allan M. Cormack Godfrey N. Hounsfield	U.S.[3] U.K.	development of the CAT (computerized axial tomography) scan, a radiographic diagnostic technique	Mother Teresa of Calcutta	India[3]	Sir W. Arthur Lewis Theodore W. Schultz	U.K. U.S.	analyses of economic processes in developing nations
1980	Baruj Benacerraf George D. Snell Jean Dausset	U.S.[3] U.S. Fr.	investigations of genetic control of the response of the immunological system to foreign substances	Adolfo Pérez Esquivel	Arg.	Lawrence R. Klein	U.S.	development and analysis of empirical models of business fluctuations

Nobel Prize winners[1] (continued)

	physics			chemistry			literature	
1981	Kai M. Siegbahn	Swed.	electron spectroscopy for chemical analysis	Fukui Kenichi Roald Hoffmann	Japan U.S.[3]	orbital symmetry interpretation of chemical reactions	Elias Canetti; novelist and essayist	Bulg.
	Nicolaas Bloembergen Arthur L. Schawlow	U.S.[3] U.S.	applications of lasers in spectroscopy					
1982	Kenneth G. Wilson	U.S.	analysis of continuous phase transitions	Aaron Klug	U.K.[3]	determination of structure of biological substances	Gabriel García Márquez; novelist, journalist, social critic	Colom.
1983	Subrahmanyan Chandrasekhar William A. Fowler	U.S. U.S.	contributions to understanding of the evolution and devolution of stars	Henry Taube	U.S.	study of electron transfer reactions	William Golding; novelist	U.K.
1984	Carlo Rubbia Simon van der Meer	Italy Neth.	discovery of subatomic particles *W* and *Z*, which supports the electroweak theory	Bruce Merrifield	U.S.	development of a method of polypeptide synthesis	Jaroslav Seifert; poet	Czech.
1985	Klaus von Klitzing	W.Ger.	discovery of the quantized Hall effect, permitting exact measurements of electrical resistance	Herbert A. Hauptman Jerome Karle	U.S. U.S.	development of a way to map the chemical structures of small molecules	Claude Simon; novelist	Fr.
1986	Ernst Ruska Gerd Binnig Heinrich Rohrer	W.Ger. W.Ger. Switz.	development of special electron microscopes	Dudley R. Herschbach Yuan T. Lee John C. Polanyi	U.S. U.S. Can.	development of methods for analyzing basic chemical reactions	Wole Soyinka; playwright and poet	Nigeria
1987	J. Georg Bednorz K. Alex Müller	W.Ger. Switz.	discovery of new superconducting materials	Donald J. Cram Charles J. Pedersen Jean-Marie Lehn	U.S. U.S. Fr.	development of molecules that can link with other molecules	Joseph Brodsky; poet and essayist	U.S.[3]
1988	Leon M. Lederman Melvin Schwartz Jack Steinberger	U.S. U.S. U.S.	research in subatomic particles	Johann Deisenhofer Robert Huber Hartmut Michel	W.Ger. W.Ger. W.Ger.	discovery of structure of proteins needed in photosynthesis	Naguib Mahfouz; novelist	Egypt
1989	Norman F. Ramsey	U.S.	development of the atomic clock	Sidney Altman Thomas R. Cech	U.S. U.S.	discovery of certain basic properties of RNA	Camilo José Cela; novelist	Spain
	Hans G. Dehmelt Wolfgang Paul	U.S. W.Ger.	development of methods to isolate atoms and subatomic particles for study					
1990	Jerome I. Friedman Henry W. Kendall Richard E. Taylor	U.S. U.S. Can.	discovery of atomic quarks	Elias James Corey	U.S.	development of "retrosynthetic analysis" for synthesis of complex molecules	Octavio Paz; poet and essayist	Mex.
1991	Pierre-Gilles de Gennes	Fr.	discovery of general rules for behaviour of molecules	Richard R. Ernst	Switz.	improvements in nuclear magnetic resonance spectroscopy	Nadine Gordimer; novelist	S.Af.
1992	Georges Charpak	Fr.	inventor of detector that traces subatomic particles	Rudolph A. Marcus	U.S.[3]	explanation of how electrons transfer between molecules	Derek Walcott; poet	St. Lucia
1993	Russell A. Hulse Joseph H. Taylor, Jr.	U.S. U.S.	identifying binary pulsars	Kary B. Mullis Michael Smith	U.S. Can.	invention of techniques for gene study and manipulation	Toni Morrison; novelist	U.S.
1994	Bertram N. Brockhouse Clifford G. Shull	Can. U.S.	development of neutron-scattering techniques	George A. Olah	U.S.[3]	development of techniques to study hydrocarbon molecules	Ōe Kenzaburō; novelist	Japan
1995	Martin L. Perl Frederick Reines	U.S. U.S.	discovery of subatomic particles tau and neutrino, respectively	Paul Crutzen Mario Molina F. Sherwood Rowland	Neth. U.S.[3] U.S.	explanation of processes that deplete Earth's ozone layer	Seamus Heaney; poet	Ire.
1996	David M. Lee Douglas D. Osheroff Robert C. Richardson	U.S. U.S. U.S.	discovery of superfluidity in helium-3	Robert F. Curl, Jr. Sir Harold W. Kroto Richard E. Smalley	U.S. U.K. U.S.	discovery of fullerenes, a form of carbon	Wisława Szymborska; poet	Pol.
1997	Steven Chu Claude Cohen-Tannoudji William D. Phillips	U.S. Fr. U.S.	development of methods that use laser light to chill air and trap atoms for study	Paul D. Boyer John E. Walker Jens C. Skou	U.S. U.K. Den.	discoveries about the enzyme that makes adenosine triphosphate, the energy carrier in living cells	Dario Fo; playwright	Italy
1998	Robert B. Laughlin Horst L. Störmer Daniel C. Tsui[3]	U.S. Ger. U.S.	discovery that electrons in a strong magnetic field form a type of quantum fluid with a fractional electron charge	Walter Kohn[3] John A. Pople	U.S. U.K.	development of computational methods to study the properties of interactions of molecules	José Saramago; novelist	Port.
1999	Gerardus 't Hooft Martinus J.G. Veltman	Neth. Neth.	demonstration of the way particle physics theory can be used for precise calculations of physical quantities	Ahmed H. Zewail	Egypt-U.S.	development of technique allowing study of chemical reactions in "slow motion"	Günter Grass; novelist, poet, playwright	Ger.
2000	Zhores I. Alferov Herbert Kroemer	Russia Ger.	development of fast semiconductors for use in microelectronics	Alan J. Heeger Alan J. MacDiarmid Hideki Shirakawa	U.S. U.S. Japan	discovery of plastics that conduct electricity	Gao Xingjian; novelist and playwright	Fr.[3]
	Jack S. Kilby	U.S.	development of the integrated circuit (microchip)					
2001	Eric A. Cornell Wolfgang Ketterle Carl E. Wieman	U.S. Ger. U.S.	achievement of Bose-Einstein condensation in dilute gases of alkali atoms; early fundamental studies of the properties of the condensates	William S. Knowles Noyori Ryōji	U.S. Japan	work on chirally catalyzed hydrogenation reactions	Sir V.S. Naipaul; novelist	Trinidad
				K. Barry Sharpless	U.S.	work on chirally catalyzed oxidation reactions		
2002	Raymond Davis, Jr. Koshiba Masatoshi	U.S. Japan	detection of neutrinos and cosmic sources	John B. Fenn Tanaka Koichi	U.S. Japan	development of mass-spectrometry methods for analyzing biological macromolecules	Imre Kertész	Hung.
	Riccardo Giacconi	U.S.	contributions leading to the discovery of cosmic X-ray sources	Kurt Wüthrich	Switz.	application of nuclear magnetic resonance spectroscopy to the structural determination of biological macromolecules		

Nobel Prize winners[1] (continued)

	physiology or medicine			peace		economic science		
1981	Roger W. Sperry Torsten N. Wiesel David H. Hubel	U.S. Swed. U.S.[3]	functions of the cerebral hemispheres processing of visual information by the brain	Office of the United Nations High Commissioner for Refugees[8]	(founded 1951)	James Tobin	U.S.	portfolio selection theory of investment
1982	Sune K. Bergström Bengt I. Samuelsson John R. Vane	Swed. Swed. U.K.	biochemistry and physiology of prostaglandins	Alva Myrdal Alfonso García Robles	Swed. Mex.	George Stigler	U.S.	economic effects of governmental regulation
1983	Barbara McClintock	U.S.	discovery of mobile plant genes which affect heredity	Lech Wałęsa	Pol.	Gerard Debreu	U.S.	mathematical proof of supply and demand theory
1984	Niels K. Jerne Georges J.F. Köhler César Milstein	U.K.-Den. W.Ger. Arg.	theory and development of ■ technique for producing monoclonal antibodies	Desmond Tutu	S.Af.	Sir Richard Stone	U.K.	development of national income accounting system
1985	Michael S. Brown Joseph L. Goldstein	U.S. U.S.	discovery of cell receptors relating to cholesterol metabolism	International Physicians for the Prevention of Nuclear War	(founded 1980)	Franco Modigliani	U.S.	analyses of household savings and of financial markets
1986	Stanley Cohen Rita Levi-Montalcini	U.S. Italy	discovery of chemical agents that help regulate the growth of cells	Elie Wiesel	U.S.[3]	James M. Buchanan	U.S.	public-choice theory bridging economics and political science
1987	Tonegawa Susumu	Japan	study of genetic aspects of antibodies	Oscar Arias Sánchez	Costa Rica	Robert M. Solow	U.S.	contributions to the theory of economic growth
1988	Sir James W. Black Gertrude B. Elion George H. Hitchings	U.K. U.S. U.S.	development of new classes of drugs for combating disease	United Nations peacekeeping forces		Maurice Allais	Fr.	contributions to the theory of markets and efficient use of resources
1989	J. Michael Bishop Harold E. Varmus	U.S. U.S.	study of cancer-causing genes called oncogenes	Dalai Lama	Tibet	Trygve Haavelmo	Nor.	development of statistical techniques for economic forecasting
1990	Joseph E. Murray E. Donnall Thomas	U.S. U.S.	development of kidney and bone-marrow transplants	Mikhail Sergeyevich Gorbachev	U.S.S.R.	Harry M. Markowitz Merton H. Miller William F. Sharpe	U.S. U.S. U.S.	study of financial markets and investment decision making
1991	Erwin Neher Bert Sakmann	Ger. Ger.	discovery of how cells communicate, as related to diseases	Aung San Suu Kyi	Myanmar	Ronald H. Coase	U.S.	application of economic principles to the study of law
1992	Edmond H. Fischer Edwin G. Krebs	U.S. U.S.	discovery of class of enzymes called protein kinases	Rigoberta Menchú	Guat.	Gary S. Becker	U.S.	application of economic theory to social sciences
1993	Richard J. Roberts Phillip A. Sharp	U.K. U.S.	discovery of "split," or interrupted, genetic structure	F.W. de Klerk Nelson Mandela	S.Af. S.Af.	Robert W. Fogel Douglass C. North	U.S. U.S.	contributions to economic history
1994	Alfred G. Gilman Martin Rodbell	U.S. U.S.	discovery of cell signalers called G-proteins	Yāsir ʿArafāt Shimon Peres Yitzhak Rabin	Palestine Israel Israel	John C. Harsanyi John F. Nash Reinhard Selten	U.S.[3] U.S. Ger.	development of game theory
1995	Edward B. Lewis Christiane Nüsslein-Volhard Eric F. Wieschaus	U.S. Ger. U.S.	identification of genes that control the body's early structural development	Joseph Rotblat Pugwash Conferences on Science and World Affairs	U.K.[3] (founded 1957)	Robert E. Lucas, Jr.	U.S.	incorporation of rational expectations in macroeconomic theory
1996	Peter C. Doherty Rolf M. Zinkernagel	Austl. Switz.	discovery of how the immune system recognizes virus-infected cells	Carlos Filipe Ximenes Belo José Ramos-Horta	East Timor East Timor	James A. Mirrlees William Vickrey	U.K. U.S.	analysis of economic incentives in situations with incomplete information
1997	Stanley B. Prusiner	U.S.	discovery of the prion, a type of disease-causing protein	International Campaign to Ban Landmines (ICBL) Jody Williams	(founded 1992) U.S.	Robert C. Merton Myron S. Scholes[3]	U.S. U.S.	development of method of assessing value of stock options
1998	Robert F. Furchgott Louis J. Ignarro Ferid Murad	U.S. U.S. U.S.	discovery that nitric oxide acts as a signaling molecule in the cardiovascular system	John Hume David Trimble	N.Ire. N.Ire.	Amartya Sen	India	contributions to welfare economics
1999	Günter Blobel	U.S.	discovery of intrinsic signals in proteins that direct them to their proper place in the cell	Médecins sans Frontières (Doctors Without Borders)	(founded 1971)	Robert A. Mundell	Can.	analysis of monetary dynamics and optimum currency areas
2000	Arvid Carlsson Paul Greengard Eric R. Kandel[3]	Swed. U.S. U.S.	discoveries about how signals are transmitted between nerve cells in the brain	Kim Dae Jung	S.Kor.	James J. Heckman Daniel L. McFadden	U.S. U.S.	development of methods of statistical analysis of individual and household behaviour
2001	LeLand H. Hartwell R. Timothy Hunt Sir Paul M. Nurse	U.S. U.K. U.K.	discovery of key regulators of the cell cycle	United Nations Kofi Annan	(founded 1945) Ghana	George A. Akerlof A. Michael Spence Joseph E. Stiglitz	U.S. U.S. U.S.	analysis of markets with asymmetric information
2002	Sydney Brenner H. Robert Horvitz John E. Sulston	U.K. U.S. U.K.	discoveries about how genes regulate organ growth and development and the process of programmed cell death	Jimmy Carter	U.S.	Daniel Kahneman Vernon L. Smith	U.S.-Israel U.S.	integration of psychological research into economic science establishment of laboratory experiments as ■ tool in empirical economic analysis

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[1] Nationality given is the citizenship of recipient at the time award was made. [2] Awarded two Nobel Prizes: physics (1903); chemistry (1911). [3] Naturalized citizen. [4] Awarded three Nobel Prizes for peace (1917, 1944, and 1963). [5] Adolf Hitler forbade Germans to accept Nobel Prizes (January 1937). [6] No awards made, 1940–42. [7] Awarded two Nobel Prizes: chemistry (1954); peace (1962). [8] Awarded two Nobel Prizes for peace (1954 and 1981). [9] Shared two Nobel Prizes for physics (1956 and 1972). [10] Awarded two Nobel Prizes for chemistry (1958 and 1980). [11] Award announced a year late, in 1977.

The noble gases absorb and give off electromagnetic radiation in a much less complex manner than do other substances. This absorption and emission behaviour is exploited in the use of the gases (with the exception of highly radioactive radon) in fluorescent lighting devices and discharge lamps. If any of the noble gases is confined at low pressure in a glass tube and an electrical charge is passed through it, the gas glows. The noble gases also have very low boiling points and melting points, which make them useful as refrigerants in the study of matter at extremely low temperatures.

noble metal, any of several metallic chemical elements that have outstanding resistance to oxidation, even at high temperatures; the grouping is not strictly defined but usually is considered to include rhenium, ruthenium, rhodium, palladium, silver, osmium, iridium, platinum, and gold; *i.e.,* the metals of groups VIIb, VIII, and Ib of the second and third transition series of the periodic table.

Silver and gold, which with copper are often called the coinage metals, and platinum, iridium, and palladium comprise the so-called precious metals, which are used in jewelry.

noble savage, in literature, an idealized concept of uncivilized man, who symbolizes the innate goodness of one not exposed to the corrupting influences of civilization.

The glorification of the noble savage is a dominant theme in the Romantic writings of the 18th and 19th centuries, especially in the works of Jean-Jacques Rousseau. For example, *Émile, ou, De l'education,* 4 vol. (1762), is a long treatise on the corrupting influence of traditional education; the autobiographical *Confessions* (written 1765–70) reaffirms the basic tenet of man's innate goodness; and *Dreams of a Solitary Walker* (1776–78) contains descriptions of nature and man's natural response to it. The concept of the noble savage, however, can be traced to ancient Greece, where Homer, Pliny, and Xenophon idealized the Arcadians and other primitive groups, both real and imagined. Later Roman writers such as Horace, Virgil, and Ovid gave comparable treatment to the Scythians. From the 15th to the 19th centuries, the noble savage figured prominently in popular travel accounts and appeared occasionally in English plays such as John Dryden's *Conquest of Granada* (1672), in which the term noble savage was first used, and in *Oroonoko* (1696) by Thomas Southerne, based on Aphra Behn's novel about a dignified African prince enslaved in the British colony of Surinam.

François-René de Chateaubriand sentimentalized the North American Indian in *Atala* (1801), *René* (1802), and *Les Natchez* (1826), as did James Fenimore Cooper in the Leatherstocking Tales (1823–41), which feature the noble chief Chingachgook and his son Uncas. The three harpooners of the ship *Pequod* in Melville's *Moby Dick* (1851), Queequeg, Daggoo, and Tashtego, are other examples.

noblesse de robe (French: "Nobility of the Robe"), in 17th- and 18th-century France, a class of hereditary nobles who acquired their rank through holding a high state office. Their name was derived from the robes worn by officials. The class was already in existence by the end of the 16th century, but it was only in the 17th century that its members acquired the right to transmit noble status to their heirs. The period of the 1640s and '50s was pivotal in the development of the *noblesse de robe.* In an attempt to bargain for political support during the troubled minority of Louis XIV, the crown granted detailed charters of nobility to judicial officials. At the summit of this newly created privileged class were the officers of such sovereign courts as the Parlement of Paris.

Because of their bourgeois background, the families of the *noblesse de robe* were at first disdained by nobles who derived their rank from military service (*noblesse d'épée*) and from long-standing possession (*noblesse de race*). The distinction between the old and the new aristocracies, between the sword and robe, gradually blurred during the 18th century as both groups worked to defend privilege against attempts at reform by the king. In fact, it was the *noblesse de robe* that, because of its wealth, its rising social status, and its control of official positions, took the lead in opposition to reform.

Noboribetsu, city, Hokkaido, Japan, on the Pacific coast of southwestern Hokkaido, northeast of Muroran. Since the discovery of hot springs during the late Tokugawa era (1603–1867), the city has been one of the most visited hot-spring resorts in Japan. After World War II, industries replaced agriculture as the major economic activity, influenced by the urbanization and expansion of Muroran's suburbs in the west. Products include cement, pottery, chemicals, and processed foods. The city is a tourist base for the Shikotsu-Tōya National Park. Pop. (1990) 55,575.

Nobre, António (b. Aug. 16, 1867, Porto, Port.—d. March 18, 1900, Foz do Douro), Portuguese poet whose verse marked a departure from objective realism and social commitment to subjective lyricism and an aesthetic point of view.

Nobre was a member of a wealthy family. He studied law unsuccessfully at Coimbra and, from 1890 to 1895, studied political science in Paris, where he was influenced by the French Symbolist poets. There he wrote the greater part of the only book he published in his lifetime, *Só* (1892; "Alone"), inspired by nostalgic memories of a childhood spent in the company of peasants and sailors in northern Portugal. *Só* combines the simple lyricism of Portuguese traditional poetry with the more refined perceptiveness of Symbolism.

At first *Só* met with a mixed reception, but it became one of the most popular and most imitated works of poetry in Portugal. A final version appeared in 1898. A generation of poets who followed and imitated him was called the Sósino Generation.

Ill with tuberculosis, Nobre spent his remaining years in travel, seeking a favourable climate. Two more volumes of poetry were published after his death: *Despedidas* (1902; "Farewells") and *Primeiros Versos* (1921; "First Poems").

Nóbrega, Manuel da (b. Oct. 18, 1517, Portugal—d. Oct. 18, 1570, Rio de Janeiro), founder of the Jesuit mission of Brazil and leader of the order's activities there from 1549 to 1570.

Father Nóbrega with five other Jesuit missionaries sailed from Lisbon to Bahia (modern Salvador, Braz.) in 1549. His first concern there was the protection and conversion of the Indians. He established a school in 1553 on the site that later became São Paulo, and he resisted the hostility of planters seeking Indians for slaves. He also condemned African slavery, though Jesuits finally accepted the institution and even owned black slaves themselves. He was named the first provincial of the Society of Jesus in Brazil (1553–59), and, although he was again named provincial in 1570, he died before news of the appointment reached him.

When the French under Nicolas Durand de Villegaignon, including many Huguenots, settled in Rio de Janeiro (1555), Nóbrega worked earnestly for their expulsion. The Protestants were in fact forced out (1563), in part because Nóbrega won the Tamôio Indians over to the Portuguese side. In this and in other ways he shaped the destiny of southern Brazil into remaining both Catholic and Portuguese.

nocardiosis, chronic systemic bacterial disease of humans and many other animals originating in the respiratory tract and disseminated by way of the blood to other organs, especially the brain. It is caused either by introduction into the skin or by inhalation of *Nocardia asteroides,* a normal inhabitant of soil and compost heaps. The disease usually begins with malaise, loss of weight, fever, and night sweats. Most often it causes a cough productive of purulent and blood-tinged sputum (pseudotuberculosis). An uncommon disease, nocardiosis is found worldwide in persons of all ages. Chronic lung disease or immunosuppressive therapy can render an individual more susceptible.

Prolonged treatment with sulfonamide drugs, especially when begun before the disease has spread, has reduced mortality from nocardiosis greatly. If the organism has reached the brain, however, the outlook is still very poor. Amikacin is another drug that is used with patients who do not respond to sulfa drugs.

Nocera Inferiore, Latin NUCERIA ALFATERNA, also called NOCERA DEI PAGANI, town and episcopal see, Salerno *provincia,* Campania *regione,* southern Italy, in the Sarno River valley, northwest of Salerno. It originated as the Oscan and Roman town of Nuceria Alfaterna, which was sacked by the Carthaginian general Hannibal in 216 BC but was rebuilt by the emperor Augustus. In the old castle, ruins of which are extant, Helen, widow of King Manfred of Sicily, died in captivity (1271) five years after Manfred's death in the Battle of Benevento. The origin of the epithet *dei Pagani* ("of the Pagans") is not historically established and is sometimes attributed to a nearby medieval settlement of Saracen colonists or to Pagano, the name of an important local medieval family. Although there are several old churches and convents, the town is primarily modern in appearance. In the nearby village of Nocera Superiore is the 5th-century circular domed church of Santa Maria Maggiore.

Nocera Inferiore is economically one of the most important centres in the province because of its agricultural exports, lumber mills, food processing, and textile plants. Pop. (1991 prelim.) mun., 49,021.

noctilucent cloud, rare cloud form, probably composed of ice crystals and meteoric dust, that occurs at a higher altitude than any other cloud form (about 82 km [50 miles]). It is silvery or bluish white and is visible only on summer nights in high latitudes. The ice crystals form because this level is the coldest in the entire upper atmosphere; even the minute amounts of water vapour present in this thin, dry air freeze. The cloud often exhibits a tenuous, wavy pattern that indicates the existence of strong winds at that altitude.

noctule (*Nyctalus*), any of about nine species of bats of the common bat family, Vespertilionidae, found in Europe and Asia. Noctules are yellowish to dark brown and 5–10 cm (2–4 inches) long without the 3.5–6.5-centimetre tail. They are swift, erratic fliers and commonly leave their roosts (generally in caves or buildings) at or before sunset. They eat insects and apparently are fond of beetles. The best known and most widely distributed species is the Eurasian *N. noctula,* a reddish brown, migratory inhabitant of wooded regions.

nocturne (French: "Nocturnal"), in music, a composition inspired by, or evocative of, the night, and cultivated in the 19th century primarily as a character piece for piano. The form originated with the Irish composer John Field, who published the first set of nocturnes in 1814, and reached its zenith in the 19 examples of Frédéric Chopin. In Germany the nocturne, or *Nachtstück,* attracted composers from Robert Schumann to Paul Hindemith (*Suite for Piano*, 1922). At the turn of the century Claude Debussy most successfully transferred the genre to the orchestra with his three brilliant pieces so entitled. Later in the 20th century Béla Bartók developed a very personal night-music style of distinctly macabre quality, for example, in *Out of Doors* (fourth movement) and in the *Fourth String Quartet* (third movement).

The late 18th-century Italian notturno, a collection of lightweight pieces for chamber ensemble, bore little relation to the lyrical 19th-century nocturne. Like the serenades and cassations of Haydn and Mozart, however, it was intended, at least originally, for nocturnal, usually outdoor, performance.

Noda, city, Chiba Prefecture (*ken*), Honshu, Japan, between the Edo-gawa (Edo River) and the Tone-gawa. The city served as an important river port during the Tokugawa era (1603–1867), when it first became known for its production of soy sauce. The central area of Noda now contains numerous soy sauce factories and other factories related to its production. Since World War II Noda has gradually developed as a residential suburb of the Tokyo–Yokohama Metropolitan Area, to which it is connected by rail. Pop. (1995) 119,790.

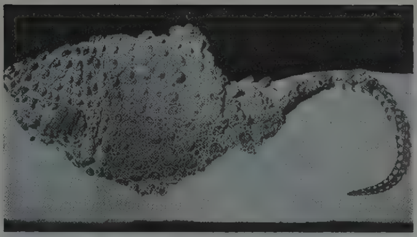
node, in astronomy, the intersection of the orbit plane of some celestial body, such as the Moon, a planet, or comet, with the plane of the ecliptic (the apparent path of the Sun among the stars) as projected on the celestial sphere. The ascending node is the one where the body crosses from the south to the north side of the ecliptic, the opposite one being the descending node. An eclipse of the Sun or Moon can occur only when the Moon is at or near a node; similarly, only when one of the inner planets is at or near a node can it appear in transit across the Sun. *See also* orbit.

Nodier, Charles (b. April 29, 1780, Besançon, Fr.—d. Jan. 27, 1844, Paris), writer more important for the influence he had on the French Romantic movement than for his own writings.

Nodier had an eventful early life, in the course of which he fell foul of the authorities for a skit on Napoleon. In 1824 he settled in Paris after his appointment as director of the Bibliothèque de l'Arsenal (Arsenal Library) and soon became one of the leaders of the literary life of the capital. In his drawing room at the Arsenal, Nodier drew together the young men who were to be the leading lights of the Romantic movement: Victor Hugo, Alfred de Musset, and Charles-Augustin Sainte-Beuve.

An ardent admirer of Goethe and Shakespeare, he did much to encourage the French Romantics to look abroad for inspiration. Nodier wrote a great deal, but the only works of his that are still read are his fantastic, masterfully written short stories, rather in the style of the German Romantic E.T.A. Hoffmann. By his revelation of the creative power of the dream and by his equation of a state of innocence with certain conditions normally called mad, Nodier was rebelling against the tyranny of "common sense" and opening up a new literary territory for later generations. His election to the Académie Française in 1833 virtually constituted official recognition that Romanticism had become a significant and respectable literary movement.

Nodosaurus, extinct genus of Late Cretaceous armoured dinosaurs of North America (the Cretaceous Period began 136,000,000 years ago and lasted 71,000,000 years). *Nodosaurus,* a heavy animal about 6 metres (20 feet) long, had a long tail but a very small head and minuscule brain. For protection against predators, *Nodosaurus* relied upon a heavy coat of thick bony plates and knobs that covered its back. The front legs were much smaller than the hind legs, and the back was strongly arched.



Nodosaurus, external skeleton

By courtesy of the American Museum of Natural History, New York

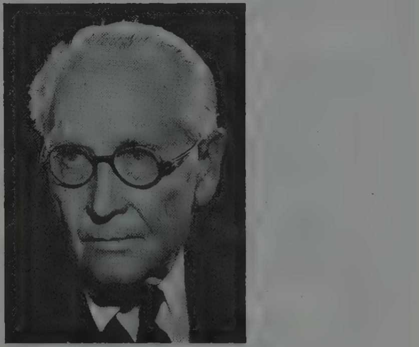
nodule, rounded mineral concretion that is distinct from, and may be separated from, the formation in which it occurs. Nodules commonly are elongate with a knobby irregular surface; they usually are oriented parallel to the bedding.

Chert and flint often occur as dense and structureless nodules of nearly pure silica in limestone or chalk, where they seem to be replacements of the carbonate rock by silica. Clay ironstone, a mixture of clay and siderite (iron carbonate), sometimes occurs as layers of dark-gray to brown, fine-grained nodules overlying coal seams. Phosphorites, massive phosphate rocks, often occur in phosphate deposits, in some limestones and chalks, and on the present sea bottom as black, fine-grained, and dense nodules with an elliptical shape and no structure.

Noe: *see* Noah.

Noël, Alexandre: *see* Natalis, Alexander.

Noel-Baker (of the City of Derby), Philip John Noel-Baker, Baron, original name PHILIP JOHN BAKER (b. Nov. 1, 1889, London—d. Oct. 8, 1982, London), British statesman and advocate of international disarmament, who received the Nobel Prize for Peace in 1959. Fluent in seven languages, he campaigned widely for 40 years for peace through multilateral disarmament.



Noel-Baker

Camera Press

The son of Canadian-born Quakers, Baker added his wife's surname, Noel, to his own about 1926. He studied at Haverford College in Pennsylvania, at King's College, Cambridge, and at the Universities of Munich and Paris. A noted athlete, he ran in the 1912 and 1920 Olympic Games, and as captain of the British team at Antwerp in 1920 he won the silver medal in the 1,500 metres. He also competed in the 1924 Olympics at Paris. As a Quaker, Noel-Baker could not enlist in World War I but served with bravery in an ambulance unit and received several medals. From 1924 to 1929 he was professor for International Relations at London University.

A member of the British delegation to the Paris Peace Conference in 1919, Baker (as he then was) subsequently joined the League of Nations secretariat. He assisted Fridtjof Nansen, the Norwegian explorer and humanitarian who received the Nobel Prize for Peace in 1922. At the League of Nations assembly in 1923–24, Baker served as personal assistant to Lord Robert Cecil (later Viscount Cecil of Chelwood), promoter of the League and recipient of the Nobel Prize for Peace in 1937. He also was principal assistant to Arthur Henderson, president of the disarmament conference at Geneva, in 1932–33.

Noel-Baker sat in the House of Commons as a Labour member from 1929 to 1931 and from 1936 to 1970. Between 1945 and 1961, he was successively minister of state, secretary of state for air and for Commonwealth relations, and minister of fuel and power. He helped to draft the UN charter and was a member of the British delegation to the General Assembly in 1946–47. From 1960 to 1982 he was president of the International Council on Sport and Physical Recreation of UNESCO. His survey of the disarmament problem was published as *The Arms Race: A Programme for World Disarmament* (1958).

Other works include *Disarmament* and *The League of Nations at Work,* both published in 1926, and *The Arms Race* (1960), for which Noel-Baker was awarded the Albert Schweitzer Prize in 1960. A retrospective study, *The First World Disarmament Conference, 1932–33, and Why It Failed,* was published in 1979. Noel-Baker was made a life peer in 1977 and spent his retirement working for the cause of world disarmament. In 1981, at the age of 91, he wrote and recorded a popular song on the subject.

Noether, (Amalie) Emmy (b. March 23, 1882, Erlangen, Ger.—d. April 14, 1935, Bryn Mawr, Pa., U.S.), German mathematician whose innovations in higher algebra gained her recognition as the most creative abstract algebraist of modern times.

Noether received the Ph.D. degree from the University of Erlangen in 1907, with a dissertation on algebraic invariants. From 1913 she lectured occasionally at Erlangen, substituting for her father, Max Noether (1844–1921). In 1915 she went to the University of Göttingen and was persuaded by the eminent mathematicians David Hilbert and Felix Klein to remain there over the objections of some faculty members; she won formal admission as an academic lecturer in 1919.

The appearance of "Moduln in nichtkommutativen Bereichen, insbesondere aus Differential- und Differenzen-Ausdrücken" (1920; "Concerning Moduli in Noncommutative Fields, Particularly in Differential and Difference Terms"), written in collaboration with a Göttingen colleague, Werner Schmeidler, and published in *Mathematische Zeitschrift,* marked the first notice of Noether as an extraordinary mathematician. For the next six years her investigations centred on the general theory of ideals (special subsets of rings), for which her residual theorem is an important part. On an axiomatic basis she developed a general theory of ideals for all cases. Her abstract theory helped draw together many important mathematical developments.

From 1927 Noether concentrated on noncommutative algebras (algebras in which the order in which numbers are multiplied affects the answer), their linear transformations, and their application to commutative number fields. She built up the theory of noncommutative algebras in a newly unified and purely conceptual way. In collaboration with Helmut Hasse and Richard Brauer, she investigated the structure of noncommutative algebras and their application to commutative fields by means of cross product (a form of multiplication used between two vectors). Important papers from this period are "Hyperkomplexe Grössen und Darstellungstheorie" (1929; "Hypercomplex Number Systems and Their Representation") and "Nichtkommutative Algebra" (1933; "Noncommutative Algebra").

Noether
Bryn Mawr College Archives

In addition to research and teaching, Noether helped edit the *Mathematische Annalen.* From 1930 to 1933 she was the centre of the strongest mathematical activity at Göttingen. The extent and significance of her work cannot be accurately judged from her papers. Much of her work appeared in the publications of students and colleagues; many times a suggestion or even a casual remark revealed her great insight and stimulated another to complete and perfect some idea.

When the Nazis came to power in Germany in 1933, Noether and many other Jewish professors at Göttingen were dismissed. In October she left for the United States to become visiting professor of mathematics at Bryn Mawr College and to lecture and conduct research at the Institute for Advanced Study, Princeton, N.J.

Nofretete (Egyptian queen): *see* Nefertiti.

Nogal Valley (Somalia): *see* Nugaaleed Valley.

Nogales (Mexico): *see* Heroica Nogales.

Nogales, city, seat (1899) of Santa Cruz county, southern Arizona, U.S. A port of entry on the Mexican border, it adjoins Heroica Nogales, Sonora. Divided by International Avenue, the two communities are known as Ambos Nogales. Originally called Issaac-town (for Jacob Issaacson, who built an inn at Nogales Pass before the arrival of the Southern Pacific Railroad in 1882), it was renamed Nogales for its walnut (*nogal*) trees. It was the scene of fighting between Pancho Villa's forces and U.S. national guardsmen (1916) and between town militia of the two communities (1918). Nearby are the Tumacacori Mission (since 1908 a national monument) and the ruins of the first white settlements in Arizona. Cattle raising, mining, and border trade are the economic mainstays. Pop. (1990) 19,489.

Nogaret, Guillaume de (b. 1260/70, Saint-Félix-de-Caraman, Toulouse [now in France]—d. April 1313), magistrate under King Philip IV the Fair of France, who became one of the most vigorous of the *légistes,* or expositors, of the royal power, especially in ecclesiastical affairs; in the conflict between Philip and Pope Boniface VIII, he played a direct role in carrying out the king's retribution against the pope.

Nogaret, the son of a bourgeois, began his career as a teacher of jurisprudence in 1291, entered the royal service about 1294, and was soon a member of the king's council. In March 1303 Nogaret denounced Pope Boniface VIII as irregularly installed and as a heretic, a simonist, and a notorious sinner and demanded the summoning of a general council of the church to try him. Authorized by Philip IV to go to Italy, Nogaret contacted Italian factions hostile to Boniface and, with these, on Sept. 7, 1303, entered Anagni, where he seized the person of the pope (who had intended to publish a bull excommunicating Philip IV the next day). Faced by popular hostility, however, he abandoned Anagni two days later, leaving the pope behind.

Nogaret had acted as a sincere Christian desirous of freeing the church from a pope whom he thought unworthy, but, unsurprisingly, he was excommunicated by Boniface's successor, Benedict XI, in 1304. Philip IV showed him increased favour, however, and, after Nogaret had greatly aided him in his measures against the Templars, managed to procure his minister's absolution. The proviso that he should journey to the Holy Land as a pilgrim had not been fulfilled at the time of his death two years later.

Nogaret de la Valette, Jean-Louis de: *see* Épernon, Jean-Louis de Nogaret de la Valette, duc d' (duke of).

Nōgata, city, Fukuoka *ken* (prefecture), Kyushu, Japan, at the confluence of the Onga River and the Hikosan River. Formed as a castle town in 1626, it declined about 100 years later, barely maintaining its importance as a trade and distribution centre of agricultural products. With the exploitation of the nearby Chikuhō Coalfield in the late 19th century, Nōgata revived. After World War II, however, the mines were gradually closed, and the city is now a commercial centre producing machinery and other industrial goods. Included in the northern Kyushu Industrial Region, which is centred on Kita-Kyūshū, Nōgata is gradually becoming a suburb of Kita-Kyūshū. Pop. (1990) 62,532.

Noginsk, city, Moscow *oblast* (province), western Russia, on the Klyazma River east of Moscow. Originally Yamskaya village, it became the town of Bogorodsk in 1781 and was renamed Noginsk in 1930. It is one of the largest Russian textile centres; cotton forms most of its production. Pop. (1991 est.) 122,700.

Nógrád, *megye* (county), Hungary, occupying an upland area of 982 square miles (2,544 square km) dominated by the Cserhát Hills, a continuation of the Transdanubian Mountains. A few monadnocks (hills of resistant rock surmounting a peneplain) and isolated volcanic intrusions stand out from a sandy, clayey terrain. To the north the Cserhát region is drained into the Nógrád River basin along the Ipoly River. Original forest cover has been cleared where possible for plowland. Agriculture is not so prominent as elsewhere in Hungary, but poppy seeds and lentils are important. There are several clay pits in the vicinity of Romhány. Around the town of Hollókő is the Palóc (people of northeastern Hungary) country, noted for traditional weaving, embroidery, wood carving, and ornate peasant costumes. Salgótarján (*q.v.*), the *megye* seat, lies in the Tarján River valley. Pop. (1990 prelim.) 227,180.

Noguchi, Hideyo, original name NOGUCHI SEISAKU (b. Nov. 24, 1876, Inawashiro, Japan—d. May 21, 1928, Accra, Gold Coast colony [now Ghana]), Japanese bacteriologist who first discovered *Treponema pallidum,* the causative agent of syphilis, in the brains of persons suffering from paresis. He also proved that both Oroya fever and verruga peruana could be produced by *Bartonella bacilliformis;* they are now known to be different phases of Carrion's disease, or bartonellosis.

Hideyo Noguchi
Boyer—H. Roger-Viollet

Noguchi graduated in 1897 from a proprietary medical school in Tokyo and then went in 1900 to the University of Pennsylvania, in Philadelphia, where he worked on snake venoms under Simon Flexner. In 1904 he went to the Rockefeller Institute for Medical Research, New York City, which sponsored his work for almost a quarter of a century. Noguchi devised means of cultivating microorganisms that had never before been grown in the test tube. He studied poliomyelitis and trachoma and worked on a vaccine and serum for yellow fever. He died of yellow fever, which he contracted during research on the disease in Africa.

Noguchi, Isamu (b. Nov. 17, 1904, Los Angeles, Calif., U.S.—d. Dec. 30, 1988, New York, N.Y.), American sculptor and designer, one of the strongest advocates of the expressive power of organic abstract shapes in 20th-century American sculpture.

Noguchi spent his early years in Japan, and, after studying in New York City with Onorio Ruotolo in 1923, he became Constantin Brancusi's assistant for two years in Paris. There he met Alberto Giacometti and Alexander Calder and became an enthusiast of abstract sculpture. He was also influenced by the Surrealist works of Pablo Picasso and Joan Miró. Noguchi's first exhibition was in New York City in 1929.

Much of his work, such as his "Bird C(MU)" (1952–58), consists of elegantly abstracted, rounded forms in highly polished stone. Such works as "Euripides" (1966) employ massive blocks of stone, brutally gouged and hammered. To his terra-cotta and stone sculptures Noguchi brought some of the spirit and mystery of early art, principally Japanese earthenware, which he studied under the Japanese potter Uno Jinmatsu on his first trip to Japan made in 1930–31.

Noguchi, who had premedical training at Columbia University, sensed the interrelatedness of bone and rock forms, the comparative anatomy of existence, as seen in his "Kouros" (1945). On another trip to Japan, in 1949, Noguchi experienced a turning point in his aesthetic development: he discovered "oneness with stone." The importance to him of a closeness to nature was apparent in his roofless studio.

Recognizing the appropriateness of sculptural shapes for architecture, he created a work in low relief (1938) for the Associated Press Building in New York City and designed a fountain for the Ford Pavilion at the New York World's Fair of 1939. He also made many important contributions toward the aesthetic reshaping of physical environment. His garden for the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in Paris (1958), his playground in Hawaii, his furniture designs, and his fountain for the Detroit Civic Center Plaza (1975) won international praise. Noguchi also designed sculptural gardens for the Chase Manhattan Bank and the John Hancock Building, both in New York City, and stage sets for Martha Graham, George Balanchine, and Merce Cunningham. In 1982 he was awarded the Edward MacDowell Medal for outstanding lifelong contribution to the arts. In 1985 Noguchi opened the Isamu Noguchi Garden

"Black Sun," black tamba granite sculpture by Isamu Noguchi, 1960–63; in a private garden

Lee Boltin

Museum in Long Island City, N.Y. The museum and outdoor sculpture garden contain some 500 sculptures, models, and photographs.

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noh theatre (Japanese theatre): *see* nō theatre.

noiade, in Lapp (Saami) religion, a shaman who mediated between the people that he served and the supernatural beings and forces that he either confronted or made use of for the benefit of his clients.

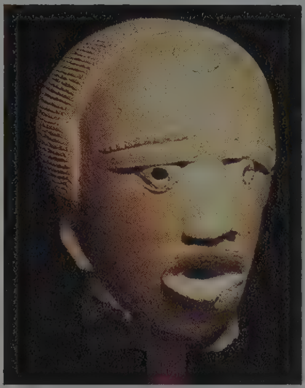
The shamanic practices of the Finno-Ugric peoples have been best preserved among the Khant (Ostyak) and Mansi (Vogul), as well as the Lapps. Basically they consist of the manipulation of the supernatural by a specially trained, usually naturally gifted, sensitive person in order to aid people in various serious troubles, of which illness was probably the most common. On being asked to help, the *noiade* performs a dramatic séance with a traditional sequence of steps, including divinatory procedures, falling into trance, confrontation of supernatural beings either to fight them or to receive aid from them, and the actual ritual treatment of the patient, in the case of illness. The *noiade*s can perform both good and evil and formerly were much feared owing to their powers, which they also used to political and economic advantage. In Finland the term *noita* survives mainly in the sense of an evil-working sorcerer, with another term, *tietäjä* (*q.v.*), applied to the specialist in beneficial mediation with the supernatural.

The word *noiade* is genetically related to several other terms used by the Finno-Ugric peoples for their religious specialists. Finnish *noita,* Mansi *nait,* and Estonian *noit* belong together linguistically, and their origin may be traced back to the common Finno-Ugric period before 2500 BC.

noise, in acoustics, any undesired sound, either one that is intrinsically objectionable or one that interferes with other sounds that are being listened to. In electronics and information theory, noise refers to those random, unpredictable, and undesirable signals, or changes in signals, that mask the desired information content. Noise in radio transmission is known as static, and in television it is called snow. White noise is a complex signal or sound that covers the entire range of component frequencies, or tones, all of which possess equal intensity.

Nok culture, also called NOK FIGURINE CULTURE, ancient Iron Age culture that existed on the Benue Plateau of Nigeria between about 500 BC and AD 200.

First discovered in 1928 in the small tin-mining village of Nok, artifacts of similar features were found over an area that stretched about 300 miles (480 km) east to west and 200 miles (320 km) north to south. The most characteristic Nok artifacts are clay figurines of animals and stylized human beings, usually heads; perforated eyes of an elliptical or triangular shape are typical of the style. Other artifacts of the Nok culture include iron tools, stone axes and other stone tools, and stone ornaments.



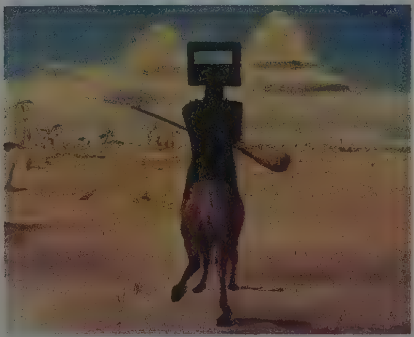
Terra-cotta head of the Nok culture, found at Tsauni, near Jemaa, Nigeria; in the Nigerian Museum, Lagos

André Held

Nola, town and episcopal see, Napoli *provincia,* Campania *regione,* southern Italy. It lies in the fertile and highly cultivated Campanian plain, just east-northeast of Naples. It originated as a city of the Aurunci, Oscans, Etruscans, and Samnites (ancient Italic peoples) and was known as Novla ("New Town") before it passed to the Romans in 313 BC. The emperor Augustus died there in AD 14. Sacked by Gaiseric, king of the Vandals, in 455 and later by the Saracens, Nola was captured by King Manfred of Sicily in the 13th century and later belonged to the Orsini family before passing to the Kingdom of Naples in 1528. There are traces of a Roman amphitheatre and a necropolis with frescoed tombs and of later basilicas and other constructions of the 4th and 5th centuries. The Gothic cathedral (1395–1402) is believed to occupy the site of a church erected by the town's patron, St. Paulinus (elected bishop of Nola in 410), in honour of St. Felix of Nola, the city's first bishop. Other notable landmarks are the Palazzo Orsini (1461) and a monument to the philosopher Giordano Bruno, who was born in Nola in 1548.

Nola is now an agricultural and commercial centre on the Naples-Avellino-Foggia railway. Its products include vegetables, fruit, corn (maize), and hemp. Pop. (1991 prelim.) mun., 32,573.

Nolan, Sir Sidney (Robert) (b. April 22, 1917, Melbourne, Australia—d. Nov. 27, 1992, London, Eng.), artist known for his paintings based on Australian folklore.



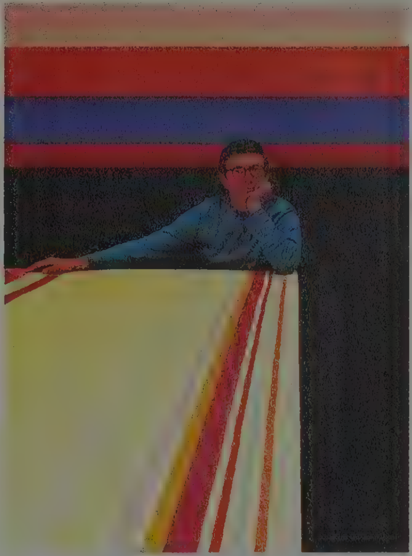
"Kelly," oil painting by Sir Sidney Nolan, 1954; in a private collection

By courtesy of the owner

With little formal art training, Nolan turned to painting at 21 after varied experiences as a racing cyclist, cook, and gold miner. His early works show the influences of Paul Klee and László Moholy-Nagy and include the controversial abstract work "Boy and the Moon" (1940)—a splash of yellow against a raw blue background. He developed a more representational style over the years, however. Apart from his landscapes, most of his works deal with Australian historical or legendary characters and events—notably, the bushranger Ned Kelly. His style is highly individual, as are many of the mediums he employed, such as ripolin and polyvinyl acetate on masonite, glass, paper, or canvas.

Nolan moved to England in 1955. He designed stage sets for Serge Lifar's ballet *Icarus* in 1941, for Kenneth Macmillan's version of *The Rite of Spring* at Covent Garden in 1962, and for Camille Saint-Saën's opera *Samson et Dalila,* also at Covent Garden, in 1981. His work has been exhibited internationally, and permanent exhibitions are at the Tate Gallery in London and the Museum of Modern Art in New York City. He was knighted in 1981 and became a member of the Order of Merit in 1983.

Noland, Kenneth (b. April 10, 1924, Asheville, N.C., U.S.), American painter of the Abstract Expressionist school. He was one of the first to use the technique of staining the canvas with thinned paints and of deploying his colours in concentric rings and parallels, shaped and proportioned in relation to the shape of the canvas.



Noland, photograph by Arnold Newman, 1967

© Arnold Newman

Noland attended Black Mountain College in North Carolina and studied under the French sculptor Ossip Zadkine in Paris (1948–49). He presented his first one-man show there in 1949. He and Morris Louis, influenced by the work of Helen Frankenthaler, worked together on the technique of staining with thinned paints. This method presented pure, saturated colour as an integral part of the canvas. Noland arrived at his characteristic style in the late 1950s.

Noland taught at the Institute of Contemporary Arts (1950–52) and at Catholic University (1951–60), both in Washington, D.C., and at Bennington (Vt.) College in 1968. His work has been exhibited internationally, and permanent collections of his paintings are housed at the Museum of Modern Art in

New York City, the Tate Gallery of London, and the Zürich Kunsthaus.

Nolascan (Christian order): *see* Mercedarian.

Nolasco, Saint Peter: *see* Peter Nolasco, Saint.

Nolde, Emil, original name EMIL HANSEN (b. Aug. 7, 1867, Nolde, near Bocholt, Ger.—d. April 15, 1956, Seebüll, near Niebüll, W.Ger.), German expressionist painter, printmaker, and watercolourist known for his violent religious works and his foreboding landscapes.

Born of a peasant family, the youthful Nolde made his living as a wood-carver. He was able to study art formally only when some of his early works were reproduced and sold as postcards. In Paris Nolde began to paint works that bear a superficial affinity to Impressionistic painting. In 1906 he was invited to join Die Brücke, an association of Dresden-based Expressionist artists who admired his "storm of colour." But Nolde, a solitary and intuitive painter, dissociated himself from that tightly knit group after a year and a half.

"Dance Around the Golden Calf," oil painting by Emil Nolde, 1910; in the Bayerische Staatsgemäldesammlungen, Munich

By courtesy of the Nolde-Foundation; photograph, Bayerische Staatsgemaldesammlungen, Munich

Fervently religious and racked by a sense of sin, Nolde created such works as "Dance Around the Golden Calf" (1910) and "In the Port of Alexandria" from the series depicting "The Legend of St. Maria Aegyptica" (1912), in which the erotic frenzy of the figures and the demonic, masklike faces are rendered with deliberately crude draftsmanship and dissonant colours. In the "Doubting Thomas" from the nine-part polyptych "The Life of Christ" (1911–12), the relief of Nolde's own religious doubts may be seen in the quiet awe of St. Thomas as he is confronted with Jesus' wounds. During 1913 and 1914 Nolde was a member of an ethnological expedition that reached the East Indies. There he was impressed with the power of unsophisticated belief, as is evident in his lithograph "Dancer" (1913).

Back in Europe, Nolde led an increasingly reclusive life on the Baltic coast of Germany. His almost mystical affinity for the brooding terrain led to such works as his "Marsh Landscape" (1916), in which the low horizon, dominated by dark clouds, creates a majestic sense of space. Landscapes done after 1916 were generally of a cooler tonality than his early works. But his masterful realizations of flowers retain the brilliant colours of his earlier works. He was a prolific graphic artist especially noted for the stark black and white effect that he employed in crudely incised woodcuts.

Although Nolde was an early advocate of Germany's National Socialist Party, when the Nazis came to power, they declared his work "decadent" and forbade him to paint. After World War II he resumed painting but often merely reworked older themes. His last "Self-Portrait" (1947) retains his vigorous brushwork but reveals the disillusioned withdrawal of the artist in his 80th year.

Nöldeke, Theodor (b. March 2, 1836, Harburg, Hanover [Germany]—d. Dec. 25, 1930, Karlsruhe, Ger.), German Orientalist noted for his Semitic and Islāmic studies, which included a history of the Qurʾān (1859).

After holding several academic posts, Nöldeke became professor of Oriental languages at the University of Strasbourg (1872–1906), then within the German Empire. His large contribution to the history of Semitic languages included the publication of several grammars. His other scholarly works included *Geschichte der Perser und Araber zur Zeit der Sasaniden* (1879; "History of the Persians and Arabs to the Sāsānid Period"), a version of the Arabic chronicle of aṭ-Ṭabarī. Among his works intended for a general readership were *Orientalische Skizzen* (1892; *Sketches from Eastern History*, 1892) and a life of Muḥammad (1863).

Nolichucky River, river rising in the Blue Ridge Mountains in western North Carolina, U.S., and flowing northwest into Tennessee, then west to join the French Broad River after a course of 150 miles (241 km). A dam on the Nolichucky just south of Greeneville, Tenn., impounds Davy Crockett Lake, named for the frontiersman, who was born (1786) on the river near Limestone. John Sevier, first governor of Tennessee, lived on the riverbank (1783–90) and was nicknamed "Nolichucky Jack." The river was named for a Cherokee village, and the word probably means "spruce tree place."

Noll, Chuck, byname of CHARLES H. NOLL (b. Jan. 5, 1932, Cleveland, Ohio, U.S.), American professional football player and coach, who as coach of the National Football League (NFL) Pittsburgh Steelers (1969–91) led them to four Super Bowl victories (1975–76, 1979–80).

At Benedictine High School (Cleveland) Noll played guard on the football team and also competed in wrestling and track and field. At Dayton (Ohio) University he played offensive tackle and defensive back. He played right guard for the NFL Cleveland Browns (1953–59) and was on the Browns NFL championship teams (1954–55). He became a defensive line coach for the American Football League (AFL) Los Angeles (later San Diego) Chargers (1960–65), ultimately taking on all the defensive coaching, as he did for the NFL Baltimore Colts (1966–68).

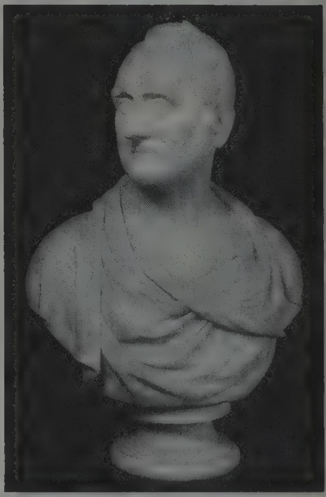
After he became the Steelers' coach, they were in the championship playoffs several years from 1972 on.

nolle prosequi (Latin: "to be unwilling to pursue"), plural NOLLE PROSEQUIS, in Anglo-American law, request by a plaintiff in a civil suit, or by a prosecutor in a criminal action, that the prosecution of the case should cease, either on some or all of the counts or with respect to some or all of the defendants. It is usually used when there is insufficient evidence to ensure successful prosecution or when there has been a settlement between the parties out of court.

In English criminal law, the power to enter a nolle prosequi is vested in the attorney general and is rarely used. In the United States the power is generally exercised at the discretion of the prosecuting officer, typically the district attorney, and is an important adjunct to the administration of criminal justice. Particularly in large cities, many more criminal prosecutions are initiated than it is feasible to try. The nolle prosequi thus serves as a screening device that enables the district attorney to exercise a measure of control over the criminal docket. It is also used to effect an informal settlement, as where a thief agrees to make restitution to his victim. In some states the common-law rule that the entry of a nolle prosequi is within the sole discretion of the district attorney still exists; in others, his discretion is subject to the will of the court. When entered before trial, the nolle prosequi does not bar a subsequent prosecution on the basis of a new indictment or new information.

Nollekens, Joseph (b. Aug. 11, 1737, London, Eng.—d. April 23, 1823, London), Neoclassical sculptor whose busts made him the most fashionable English portrait sculptor of his day.

At 13 Nollekens entered the studio of the noted sculptor of tombs and busts Peter Scheemakers, from whom Nollekens learned to appreciate the sculpture of antiquity. In 1760 he went to Rome, where David Garrick and Laurence Sterne were among the English visitors who sat for him. After his return to England in 1770 he became a member of the Royal Academy (1772) and was patronized by George III. Among his famous likenesses are those of George III, William Pitt, Charles James Fox, and Benjamin West. Many of his works were influenced by ancient Roman busts of the late Republic style. He personally preferred sculpturing mythological works based on ancient prototypes, especially genteel but erotic Venuses delicately modeled in an almost Rococo manner.



William Wellesley-Pole, 3rd Earl of Mornington, marble bust by Joseph Nollekens, 1811; in the National Portrait Gallery, London

National Portrait Gallery, London

Consult the INDEX *first*

Noma Hiroshi (b. Feb. 23, 1915, Kōbe, Hyōgo *ken* [prefecture] Japan—d. Jan. 2, 1991, Tokyo), Japanese novelist who wrote *Shinkū chitai* (1952; *Zone of Emptiness*), which is considered to be one of the finest war novels produced after World War II.

Noma was brought up to succeed his father as head priest of a Buddhist sect, but as a youth he was increasingly drawn to Marxist ideology. He became interested in French Symbolist poetry, showing strong influences of James Joyce, André Gide, and Marcel Proust, and before entering the University in 1935 he studied under the Symbolist poet Takeuchi Katsutarō. He graduated from Kyōto Imperial University in 1938 with a specialty in French literature and was heavily involved in the Kerun, the underground student movement, and the Kansai labour movement. During World War II he was drafted and sent to the Philippines and northern China but later was imprisoned (1943–44), on charges of subversive thought, in Ōsaka Military Prison.

Noma attracted attention after the war with the novels *Kurai e* (1946; "Dark Painting") and *Kao no naka no akai tsuki* (1947; *A Red Moon in Her Face*), both of which present a protagonist's conflict between self-image and carnal desire. The novel *Kurai e* combined the techniques of Symbolism and the Proletarian Literature Movement, using stream-of-consciousness prose. *Shinkū chitai* conveys a broad view of the Japanese wartime army by tracing the parallel fate of two soldiers—a cultured middle-class idealist and a bewildered peasant youth.

After 1950 Noma's work employed more straightforward prose. In 1949 he published the first of a multivolume work completed in 1971, *Seinen no wa* ("Ring of Youth"), which won the Tanizaki Prize in 1971. Other later works include the autobiographical *Waga tō wa soko ni tatsu* (1961; "My Tower Stands There"), *Shinran* (1973), and *Sayama saiban* (1976; "The Sayama Trial"). These works, while conveying a deepening interest in Buddhism, also show Noma's continued concern for social causes. He also wrote many critical essays, including discussions of André Gide and Jean-Paul Sartre.

Noma joined the Communist Party in 1947 but was expelled in 1964.

nomadism, way of life of peoples who do not live continually in the same place but move cyclically or periodically. It is distinguished from migration, which is noncyclic and involves a total change of habitat. Nomadism does not imply unrestricted and undirected wandering; rather, it is based on temporary centres whose stability depends on the availability of food supply and the technology for exploiting it. The term nomad encompasses three general types: nomadic hunters and gatherers, pastoral nomads, and tinker or trader nomads.

Although hunting and gathering generally imposes a degree of nomadism on a people, it may range from daily movements, as among some Kalahari San, to monthly, quarterly, or semiannual shifts of habitat. In areas where resources are abundant or where there are storage facilities, populations may be more or less stable. Nomadic hunters and gatherers are usually organized into small, isolated bands that move through a delimited territory where they know the water holes, the location of plants, and the habits of game.

Pastoral nomads, who depend on domesticated livestock, migrate in an established territory to find pasturage for their animals. Most groups have focal sites that they occupy for considerable periods of the year. Pastoralists may depend entirely on their herds or may also hunt or gather, practice some agriculture, or trade with agricultural peoples for grain and other goods. Some seminomadic groups in Southwest Asia and North Africa cultivate crops between seasonal moves. The patterns of pastoral nomadism are many, often depending on the type of livestock, the topography, and the climate. *See also* transhumance.

Some nomadic groups are associated with a larger society but maintain their mobile way of life. These groups include tinker or trader nomads, who may also make and sell simple products, hunt, or hire out as labourers. The diverse groups that are loosely termed Gypsies are the best-known example of this type of nomadism.

Other nomadic peoples practice a limited kind of agriculture, moving periodically from place to place in order to find new areas in which to raise their crops. They often combine agriculture with hunting and gathering. Anthropologists may refer to such groups as horticultural peoples, to distinguish them from settled agricultural peoples.

Nomadism has declined in the 20th century for economic and political reasons, including the spread of systematic agriculture, the growth of industry, and the policies of governments that view nomadism as incompatible with modern life.

nomarch, governor of the ancient Egyptian administrative division called the nome (*q.v.*).

Nome, city, western Alaska, U.S., port on the south Seward Peninsula shore of the Bering Sea. The discovery (September 1898) of gulch gold at nearby Anvil Creek resulted in a remarkable mining stampede. The miners' camp, known as Anvil City, had an estimated population of 20,000 in 1900, which by 1903 had greatly decreased and was 852 at the 1920 census. The settlement was renamed for Cape Nome, as given on a chart dated 1849 and said to be a British naval draftsman's misinterpretation of the query "?Name." Gold mining remained the chief occupation until the dredge fields were closed in 1962. Transportation, tourism, government construction, fishing, reindeer herding, and Eskimo handicrafts are now the economic mainstays. Nome is served by airlines, freight steamers (in summer), and roads radiating into the tundra. Inc. 1901. Pop. (1990) 3,500.

nome, administrative division of ancient Egypt. The system of dividing the country into nomes was definitely in force by the time of the Old Kingdom (*c.* 2575–*c.* 2130 BC) and persisted with modifications until the Muslim conquest (AD 640). In late times there were 42 nomes, or provinces, 22 in Upper and 20 in Lower Egypt. In Ptolemaic times, a *heptanomis* of seven nomes was formed in Middle Egypt. The Nile valley south of Ombos was sometimes regarded as one with the province of Nubia, although in the Old Kingdom Elephantine was considered the "door of the south."

Each nome during the Old and Middle Kingdoms was administered by a nomarch, or district governor, who levied taxes, administered justice, and maintained an army.

nomenclature, in biological classification, system of naming organisms. The species to which the organism belongs is indicated by two words, the genus and species names, which are Latinized words derived from various sources. This system, which is called the Linnaean system of binomial nomenclature, was established in the 1750s by Carolus Linnaeus. Subsequent to the work of Linnaeus, a proliferation of binomial names took place as new species were established and higher taxonomic categories were formed, with the result that by the late 19th century there was much confusion in the nomenclature of many groups of organisms. In the 20th century, the establishment of rules by international committees in the fields of zoology, botany, bacteriology, and virology has done much to clarify the situation.

Contrary to the widely held view that scientific names, once assigned, are fixed and universal in their use, continuing research on the relationships of organisms and probing into the history of names, coupled with disagreements among scientists on the validity of certain names, results in multiple names being applied to some well-known species. The international rules, however, are gradually bringing stability to the taxonomy of many groups through the minimizing of name changes, the use of standard methods of establishing new names, and the functioning of respected committees to arbitrate controversies.

nominalism, in philosophy, position taken in the dispute over universals—words that can be applied to individual things having something in common—that flourished especially in late medieval times. Nominalism denied the real being of universals on the ground that the use of a general word (*e.g.,* "humanity") does not imply the existence of a general thing named by it. The nominalist position did not necessarily deny, however, that there must be some similarity between the particular things to which the general word is applied. Thoroughgoing nominalists would withhold this concession, as Roscelin, a medieval nominalist, is said to have done. But unless such similarity is granted, the application of general words to particulars is made to appear entirely arbitrary. Such stricter forms of nominalism as existed in the Middle Ages can perhaps be viewed as reactions against Platonic realism, on which some enthusiasts, such as Guillaume de Champeaux, based the opinion that universals had real being. The realist position invited a defensive alliance between empiricism and nominalism; the most notable medieval example of such a synthesis was the work of William of Ockham.

In the Middle Ages, when Platonic and Aristotelian realisms were associated with orthodox religious belief, nominalism could be interpreted as heresy. But religious implications aside, nominalism does indeed reject Platonic realism as a requirement for thinking and speaking in general terms; and though it seems to deny also Aristotelian realism, such moderate nominalists as the 17th-century philosopher Thomas Hobbes affirm that some similarity exists between particulars and the general word applied to them—otherwise thought and speech would be impossible. By explaining thought and speech through the use of symbols, such as mental images or linguistic terms, nominalism seems to imply some form of conceptualism that involves more than the mere correct use of symbols and thus is not clearly distinguishable from conceptualism.

In modern logic a nominalistic concern is reflected in the form that is given to the universal quantifier. Instead of saying "man is mortal," or even "all men are mortal," the modern logician circumvents the universal by saying "for any *x,* if *x* is a man it is mortal." Neopositivism, in repudiating metaphysics, has often been explicitly nominalistic, insisting that there exist only "the facts" of observation and experiment. In the mid-20th century, Nelson Goodman, a philosopher of science and of language, and Willard Van Orman Quine, a logician, have championed a modern nominalism that specifically rejects classes—Goodman for their being "nonindividuals" and Quine for their being "abstract entities."

nomocanon, Byzantine collection of ecclesiastical legislation (canons) and civil laws (Greek *nomoi*) related to the Christian church. The nomocanon in its various redactions served as legal text in the Eastern church until the 18th century. In form and content it reflected a tight alliance between church and state and met the requirements of judges and lawyers obliged to use simultaneously the ecclesiastical canons and the imperial laws. In the 6th century, two main forms of the nomocanon were accepted simultaneously: the *Nomocanon 50 titulorum* and the *Nomocanon 14 titulorum.* The latter, compiled by the patriarch Johannes Scholasticus (565–577), was later updated by the patriarch Photius (*c.* 820–891) and published anew in 883. A Slavic adaptation of the Byzantine nomocanons was compiled by Sava, the first archbishop of Serbia (1219), under the title of *Kormchaya kniga* ("Book of the Helmsman"), which was adopted by all the Slavic Orthodox churches. In the 18th century the need for collections of imperial laws having disappeared, new compilations, including only the ecclesiastical canons, replaced both the nomocanons and the *Kormchaya kniga.* The most important of these new compilations, excerpts from the nomocanon, were the *Pēdalion* ("Rudder"), for the Greeks, and the

Kniga pravil ("Book of Rules"), for the Russians.

nomograph, also called ALIGNMENT CHART, calculating chart with scales that contain values of three or more mathematical variables, widely used in engineering, industry, and the natural and physical sciences.

In the most common form, a nomograph consists of three parallel graduated lines, known values on any two scales determining a straight index line (transversal) that passes through the solution value on the third. Some chart forms employ one or more curved graduated lines; or if straight, they may be arranged in the shape of the letter N.

nomos, plural NOMOI, in music, class of traditional melodies used by ancient Greek epic singers, often with lyre accompaniment. The nomos was an important art form for professional soloists, especially in musical competitions. Nomoi were in three, five, or seven movements and originally in a single harmonia. There were no strophic repetitions.

Nomoi were also performed on the kithara (lyre) and the aulos (double-piped oboe). Best known is the five-movement nomos depicting Apollo's victory over the dragon, played on an aulos at Delphi in 586 BC.

nomos (Greek: "law," or "custom"), plural NOMOI, in law, the concept of law in ancient Greek philosophy. The problems of political authority and the rights and obligations of citizens were a major concern in the thought of the leading Greek Sophists of the late 5th and early 4th centuries BC. They distinguished between nature (physis) and convention (nomos), putting laws in the latter category. Law generally was thought to be a human invention arrived at by consensus for the purpose of restricting natural freedoms for the sake of expediency and self-interest. This view of law as arbitrary and coercive was not conducive to social stability, however, and thus was amended by Plato and other philosophers, who asserted that nomos was, or at least could be, based upon a process of reasoning whereby immutable standards of moral conduct could be discovered, which could then be expressed in specific laws. The dichotomy between the negative and positive views of law was never actually resolved.

non expedit (Latin: "it is not expedient"), a late 19th- and early 20th-century policy of the Roman Catholic church that prohibited its Italian members from participating in politics. The *non expedit* dramatically emphasized that Pope Pius IX and his successors refused to recognize the newly formed Italian state, which had deprived the papacy of its lands in central Italy.

In the early 1860s a Turin journalist, Giacomo Margotti, had coined the phrase *nè eletti nè elettori* ("neither elected nor electors") in launching a campaign urging that devout Roman Catholics protest the seizure of papal land by not voting. This policy of nonparticipation, the *non expedit,* was officially adopted by the Holy See in 1868 and was confirmed on successive occasions through the 19th century (notably by Pius IX in 1874).

Enough Roman Catholics observed the *non expedit* to cause a significant political absenteeism and preclude the formation of a strong conservative party in Italian national politics. Local government was exempted from the ban out of fear for the growing power of the left. Seeking better relations with the Italian government, Pope Pius X virtually ended the *non expedit* in 1904–05. Benedict XV formally ended it in 1919, giving his approval to the Italian Popular Party (PPI). This marked the entrance of Italian Roman Catholics into political life as an organized force.

Non-proliferation of Nuclear Weapons, Treaty on the, also called NUCLEAR NON-PROLIFERATION TREATY, agreement of July 1, 1968, signed by the United Kingdom, the United States, the Soviet Union, and 59 other states, under which the 3 major signatories agreed not to assist states not possessing nuclear explosives in obtaining or producing them. The treaty became effective in March 1970 and was to remain so for a 25-year period. Additional nations later ratified the treaty, including the world's two other major nuclear powers, France and China, in 1992. The treaty was extended indefinitely in 1995 by a consensus vote of 174 countries at the United Nations headquarters in New York.

nonalignment (international relations): *see* neutralism.

nonbiting midge (insect): *see* midge.

Nonconformist, also called DISSENTER, or FREE CHURCHMAN, any English Protestant who does not conform to the doctrines or practices of the established Church of England. The word Nonconformist was first used in the penal acts following the Restoration of the monarchy (1660) and the Act of Uniformity (1662) to describe the conventicles (places of worship) of the congregations that had separated from the Church of England (Separatists). Nonconformists are also called dissenters (a word first used of the five Dissenting Brethren at the Westminster Assembly of Divines in 1643–47). Because of the movement begun in the late 19th century by which Nonconformists of different denominations joined together in the Free Church Federal Council, they are also called Free Churchmen.

The term Nonconformist is generally applied in England and Wales to all Protestants who have dissented from Anglicanism—Baptists, Congregationalists, Presbyterians, Methodists, and Unitarians—and also to independent groups such as the Quakers, Plymouth Brethren, English Moravians, Churches of Christ, and the Salvation Army. In Scotland, where the established church is Presbyterian, members of other churches, including Anglicans, are considered Nonconformists.

Noncooperation Movement (September 1920–February 1922), unsuccessful attempt, organized by Mohandas Gandhi, to induce the British government of India to grant self-government, or swaraj, to India. It arose from the outcry over the massacre at Amritsar in April 1919, when the British killed about 400 Indians, and from later indignation at the government's alleged failure to take adequate action against those responsible. Gandhi strengthened the movement by supporting (on nonviolent terms) the contemporaneous Muslim campaign against the dismemberment of Turkey after World War I.

The movement was to be nonviolent and to consist of the resignations of titles; the boycott of government educational institutions, the lawcourts, government service, foreign goods, and elections; and the eventual refusal to pay taxes. Noncooperation was agreed to by the Indian National Congress at Calcutta in September 1920 and launched that December. In 1921 the government, confronted with a united Indian front for the first time, was visibly shaken, but a revolt by the Muslim Moplahs of Kerala (southwestern India) in August 1921 and a number of violent outbreaks alarmed moderate opinion. After an angry mob murdered police officers at Chauri Chaura (February 1922), Gandhi himself called off the movement; the next month he was arrested without incident. The movement marks the transition of Indian nationalism from a middle-class to a mass basis.

nondirective psychotherapy, also called CLIENT-CENTRED PSYCHOTHERAPY, an approach to the treatment of mental disorders that aims primarily to foster the patient's general personality growth by helping him gain insight into his feelings and behaviour. The function of the therapist is to extend consistent, warm "unconditional positive regard" toward the "client" (avoiding the negative connotations of "patient") and, by repeating and restating the client's own verbalized concerns, to enable the client to see himself more clearly and react more openly with the therapist and others. Pace, direction, and termination of therapy are controlled by the client; the therapist merely acts as a facilitator. The nondirective approach was originated by the American counseling psychologist Carl Rogers in the 1940s and influenced later individual and group psychotherapeutic methods. *See* psychotherapy.

nonfiction novel, story of actual people and actual events told with the dramatic techniques of a novel. The American writer Truman Capote claimed to have invented this genre with his book *In Cold Blood* (1965). A true story of the brutal murder of a Kansas farm family, the book was based on six years of exacting research and interviews with neighbours and friends of the victims and the two captured murderers. The story is told from the points of view of different "characters," and the author attempts not to intrude his own comments or distort fact. Critics pointed out earlier precedents for this type of journalistic novel, such as John Hersey's *Hiroshima* (1946), an account of the World War II atomic bombing of the Japanese city told through the histories of six survivors. Norman Mailer's *The Executioner's Song* (1979) is another notable example of the genre.

Nong Khai, also spelled NONGKHAI, town, northeastern Thailand. Nong Khai is a Mekong River port and the main Thai port of entry for traffic to and from nearby Vientiane, the capital of Laos. In 1994 the Thai-Lao Friendship Bridge, the first bridge across the lower reaches of the Mekong River, was opened; it links Nong Khai by road with Vientiane. Nong Khai is the northern terminus of a railway from Bangkok and lies on the Bangkok-Vientiane highway. Pop. (1992 est.) 26,381.

Temple at Nong Khai, Thailand

Shostal

Nong Sa Rai, Battle of (1593), in Southeast Asian history, military encounter between the Tai (Thai) kingdom of Ayutthaya and the Toungoo dynasty of Myanmar (Burma) which put an end to the aggression that had been waged intermittently by Myanmar.

In 1569 the Toungoo conquered Ayutthaya and reduced it to a vassal state. After the great Toungoo conqueror King Bayinnaung was succeeded by his son Nanda Bayin (reigned 1581–99), it soon became apparent that the Toungoo empire was in less able hands. Although then-prince Naresuen, the actual ruler of Ayutthaya, performed vassal military service to Nanda Bayin against the rebel king of Ava in late 1583, he recognized that the time was ripe to pursue Tai independence. His renunciation of vassalage to Myanmar in 1584 was followed in the next two years by four unsuccessful Toungoo invasions of Ayutthaya.

Despite the bloodshed, misery, and resources exhausted by continual warfare, Nanda Bayin continued to attempt to crush Tai independence, launching further offensives in 1586 and 1587. Again, Naresuen was able to withstand the Myanmar onslaught. From 1587 to 1590, the kingdom of Ayutthaya experienced three years of relative peace. War had devastated the countryside, however, and earthquakes and famine created additional hardships.

At the end of 1592, the last Toungoo invasion was launched by Nanda Bayin in a final effort to subjugate Ayutthaya. A huge army commanded by the inept Crown Prince Minkyi-zwa invaded the Tai kingdom. The decisive battle took place at Nong Sa Rai, where Naresuen (who had become king in 1590) commanded the superior field position. After Naresuen slew the Toungoo crown prince in a man-to-man combat, the Toungoo forces, confused and demoralized, abandoned the expedition. The Battle of Nong Sa Rai marked the end of years of warfare and misery for both kingdoms. Myanmar did not pose a threat to Tai independence for the next 150 years.

Nonimportation Agreements (1765–75), in U.S. colonial history, attempts to force British recognition of political rights through application of economic pressure. In reaction to the Stamp Act (1765) and the Townshend Acts (1767), colonial nonimportation associations were organized by Sons of Liberty and Whig merchants to boycott English goods. In each case, British merchants and manufacturers suffered curtailed trade with the colonies and exerted the anticipated pressure on Parliament. When the acts were subsequently repealed, the boycotts collapsed. After the Intolerable Acts of 1774, the first Continental Congress immediately provided for both nonimport and nonexport committees. Britain had developed new markets in Europe, however, and the expected influence on Parliament did not materialize. For 10 years nonimportation was the main weapon employed by the colonists in an attempt to win their demands from the mother country by peaceful means. When it failed, they resorted to armed resistance.

Nonjuror, in British history, any of the beneficed clergy of the Church of England and the Episcopal Church in Scotland who refused to take the oaths of allegiance to William III and Mary II after the deposition of James II in the Revolution of 1688. They numbered about 400 in England, including eight bishops and some of the most devout and learned men in the Anglican church. Among the most prominent of the Nonjurors were: the archbishop of Canterbury, William Sancroft; the saintly hymn writer Thomas Ken; the ecclesiastical polemicist Jeremy Collier; the historian Henry Dodwell; and Henry Hyde, 2nd earl of Clarendon. They considered William and Mary to be usurpers, adhered to their oaths to James II, but adopted a policy of nonresistance to the established authorities. From 1694 they maintained a separate ecclesiastical succession, but they were divided over liturgical usages, and their numbers dwindled in the 18th century; the last Nonjuror bishop died in 1805.

In Scotland the disestablishment of the Episcopal church in 1690 resulted in the defection of the greater part of the clergy. Unlike their Church of England counterparts, the Scottish Nonjurors actively supported the Stuart cause, participated in the Jacobite uprisings of 1715 and 1745, and suffered severe reprisals. In 1788, with the death of Charles Edward, the Young Pretender, the bishops agreed to recognize King George III.

A large number of Presbyterians in Scotland, principally among the Cameronians, also refused to take the oaths of allegiance to William and Mary, but as their refusal was on different grounds, they are not usually referred to as Nonjurors.

nonliterate society, a people or culture without a written language. The term nonliterate is distinguished from "illiterate," which indicates a member of a literate society who has not learned to read or write. Although the term is not entirely satisfactory because it distinguishes by the sole criterion of written language, it has several advantages over the loosely equivalent terms primitive, preliterate, preurban, savage, and others. For a further treatment of terminology and a list of MACROPAEDIA articles on nonliterate societies, *see* primitive culture.

nonmetal, substance that does not exhibit such characteristic properties of metals as hardness, mechanical adaptability, or the ability to conduct electricity. This classification is generally applied to the chemical elements carbon, nitrogen, phosphorus, oxygen, sulfur, selenium, fluorine, chlorine, bromine, iodine, and the noble-gas elements. These elements have few physical properties in common; most are gases, one (bromine) is liquid, and others are solids.

The atoms of nonmetals generally are small and contain relatively large numbers of electrons in their outermost shells. In the noble-gas atoms, the electron shells are completely filled; thus, the elements are almost completely inert. The other nonmetals have nearly filled electron shells, requiring only a few additional electrons to assume the stable, noble-gas configuration. Therefore, in the presence of other atoms, these nonmetallic atoms have pronounced tendencies to attract electrons to themselves (high electronegativities). They form chemical compounds by attracting electrons away from other atoms of lower electronegativities or by sharing electrons with atoms of comparable electronegativities.

Although there are only a few nonmetallic elements, they constitute a large portion of the Earth's crust and are essential for the growth and existence of living things.

Nonnus (fl. 5th century AD; b. Panopolis, Egypt), the most notable Greek epic poet of the Roman period.

His chief work is the *Dionysiaca,* a hexameter poem in 48 books; its main subject, submerged in a chaos of by-episodes, is the expedition of the god Dionysus to India. Nonnus' fertile inventiveness and felicitous descriptive fantasy, which are well served by a unique command of the language and his vast literary knowledge, made him the often-imitated leader of the last Greek epic school. His style, with its ever-recurring, often daring metaphors and unremittingly bombastic tone, appealed to the taste of the time. Later in life he was converted to Christianity and composed a hexameter paraphrase of St. John's Gospel (*Metabole*), which shows all his earlier stylistic faults without his compensatory descriptive ability.

Nono, Luigi (b. Jan. 29, 1924, Venice, Italy—d. May 8, 1990, Venice), leading Italian composer of electronic, aleatoric (chance), and serial music.

Nono began his musical studies in 1941 at the Venice Conservatory. He then studied law at the University of Padua, receiving a doctorate there, while at the same time studying with the prominent avant-garde composer Bruno Maderna and the noted conductor Hermann Scherchen. He came to public attention in 1950 with his work *Variazioni Canoniche,* orchestral variations on a 12-tone theme of Arnold Schoenberg, whose daughter Nuria he married in 1955. He continued to explore avant-garde techniques and lectured widely in Europe and the United States. He also taught at the New Music Summer School at the Kranichsteiner Music Institute in Darmstadt, Ger., from 1957.

Nono

Cameraphoto, Venice

Nono's music is distinguished by its clarity of form. Polyphony (simultaneous melodic lines), monophony (melody without harmony), and rhythm are explored in a straightforward manner in his *Polifonica-monodia-ritmica* (1951) for seven instruments. *The Suspended Song* (1955–56), a serial setting for voices, chorus, and orchestra of letters written by victims of Nazism, passes its melody among the instruments and voices with each performer rarely playing more than a single note at a time. Nono also adopted this technique of fragmentation in several works involving voices and percussion. *Per Bastiana Tai-yang Cheng* (1967), based on a Chinese folk song and celebrating the birth of the Nonos' daughter, is somewhat aleatoric and calls for three instrumental groups playing in quarter tones and for magnetic tape.

An avowed Communist, Nono often produced works of political substance, many of which sparked controversy and reaction. When his opera *Intolleranza 1960,* which Nono referred to as a "mural," premiered in Venice in 1961, the performance was stormed by neofascists, causing a riot with the communists. The work attacked fascism, the atom bomb, and segregation and ended in a symbolic fashion in which the world is flooded and destroyed. The opera was later revised as *Intolleranza 1970.*

La Scala in Milan commissioned a new opera from Nono in the early 1970s. *Al Gran Sole Carico d'Amore* (1972–75; "In the Great Sun of Blooming Love") took its title from a poem by Arthur Rimbaud, "Les Mains de Jeanne-Marie," and is about the Paris Commune of 1871. Its theme was devoted to the class struggle, with no conventional plot or characters, and showed the influence of Arnold Schoenberg's pre-World War I Expressionism. The opera did not, however, premier at La Scala but at Teatro Lirico. La Scala produced a revised version in 1978.

Nono was greatly inspired by the Spanish poet Federico García Lorca and wrote *Der Rote Mantel* (1954; "The Red Overcoat") based on one of his poems. His *Epitaffio per Federico García Lorca* (1952) was hailed as a major work and is a set of three pieces in memory of Lorca. Other politically inspired works include the dramatic cantata *Sul ponte di Hiroshima* (1962; "On the Bridge of Hiroshima"), dealing with the implications of nuclear warfare; *Ein Gespenst geht um in der Welt* (1971; "A Spirit Haunts the World"), a setting for voice and orchestra of *The Communist Manifesto;* and *Canto per il Vietnam* (1973; "A Song for Vietnam").

A longtime member of the Italian Communist Party, Nono was elected to its Central Committee in 1975.

Nonomura Seisuke (Japanese potter): *see* Ninsei.

Nonpartisan League, also called FARMERS' NONPARTISAN LEAGUE, or (after 1917) NATIONAL NONPARTISAN LEAGUE, in U.S. history, alliance of farmers to secure state control of marketing facilities by endorsing a pledged supporter from either major party. It was founded in North Dakota by a Socialist, Arthur C. Townley, in 1915, at the height of the Progressive movement in the Northwest. To protect the farmer from alleged wheat trade monopolies by speculators and officials, the league demanded state-owned mills, grain elevators, banks, and hail insurance companies.

In 1916 the league candidate, Lynn J. Frazier, won the North Dakota gubernatorial election, and in 1919 the state legislature enacted the entire league program. The league gradually declined in the 1920s and after 1932 became a rigid political machine. It affiliated with the Democrats in 1956.

nonsense verse, humorous or whimsical verse that differs from other comic verse in its resistance to any rational or allegorical interpretation. Though it often makes use of coined, meaningless words, it is unlike the ritualistic gibberish of children's counting-out rhymes in that it makes these words sound purposeful.

Skilled literary nonsense verse is rare; most of it has been written for children and is modern, dating from the beginning of the 19th century. The cardinal date could be considered 1846, when *The Book of Nonsense* was published; this was a collection of limericks composed and illustrated by the artist Edward Lear, who first created them in the 1830s for the children of the earl of Derby. This was followed by the inspired fantasy of Lewis Carroll, whose *Alice's Adventures in Wonderland* (1865) and *Through the Looking-Glass* (1872) both contain brilliant nonsense rhymes. "Jabberwocky," from *Through the Looking-Glass,* may be the best-known example of nonsense verse. It begins thus:

> 'Twas brillig, and the slithy toves
> Did gyre and gimble in the wabe;
> All mimsy were the borogoves,
> And the mome raths outgrabe.

Another of Carroll's poems, *The Hunting of the Snark* (1876), has been called the longest and best sustained nonsense poem in the English language.

Hilaire Belloc's volume *The Bad Child's Book of Beasts* (1896) holds an honoured place among the classics of English nonsense verse, while, in the United States, Laura E. Richards, a prolific writer of children's books, published verses in *Tirra Lirra* (1932) that have been compared to those of Edward Lear.

nonstoichiometric compound, any solid chemical compound in which the numbers of atoms of the elements present cannot be expressed as a ratio of small whole numbers; sometimes called berthollide compounds in distinction from daltonides (in which the atomic ratios are those of small integers), nonstoichiometric compounds are best known among the transition elements. Several of them are important as components of solid-state electronic devices, such as rectifiers, thermoelectric generators, photodetectors, thermistors, and magnets useful in high-frequency circuits.

The existence of nonstoichiometric compounds is related to the presence of defects in the lattice structures of crystalline substances, such as the absence of ions from sites that would normally be occupied. For example, a sodium chloride crystal that lacks a sodium ion and a chloride ion is defective, but still stoichiometric because the numbers of sodium ions and chloride ions are the same; if the sodium ion site, however, is filled by a neutral sodium atom, which then gives up its valence electron to fill the chloride ion site, the crystal defect is remedied, but the crystal is now nonstoichiometric because it contains more sodium ions than chloride ions.

Most nonstoichiometric compounds have compositions that are close to those of stoichiometric compounds and can be expressed by such formulas as WO_{3-x}, $Co_{1-x}O$, or $Zn_{1+x}O$, in which x is a positive quantity much smaller than 1. In certain cases apparent nonstoichiometry has been shown to result from the existence of homologous series of stoichiometric compounds, such as the series of molybdenum oxides having the formulas Mo_nO_{3n-1}, in which the compounds corresponding to $n = 8, 9, 10, 11, 12$, and 14 are known; a true nonstoichiometric compound MoO_{3-x} would show a continuous variation of x within some range of values, and no discrete species would be detectable.

Nonthaburi, city, south-central Thailand, just north of Bangkok. The city, a northern, fast-growing suburb of Bangkok, lies on the east (left) bank of the Chao Phraya River and is linked to the metropolis by riverboats and major roads. Nonthaburi has a lively market near the river and is the site of national job-training centres, the Sukhothai Thammathirat Open University (founded 1978), and a large prison. Across the river from the city is the Chalerm Phra Kiat Temple, which was built during the reign (1824–51) of Rama III of Siam and is partly decorated in multicoloured ceramic tiles. Rice growing and fruit and vegetable cultivation are important in the surrounding area. Pop. (1993 est.) 261,335.

nontropical sprue: *see* celiac disease.

noodle, a cooked egg-and-flour paste prominent in European and Oriental cuisine, generally distinguished from other pasta (*q.v.*) by its elongated, ribbonlike form. Noodles are commonly used to add body and flavour to broth soups. They are commonly boiled or sautéed and served with sauces and meats or baked in casseroles.

Oriental noodles are made primarily from starch ingredients other than flour, although the recipes for some Oriental pan-fried and stir-fried dishes allow the substitution of wheat-flour noodles for the Chinese *mein.* Noodles made from rice flour or the starch of the mung bean are softened in water, then boiled and drained, in preparation for being fried or added to soups.

Noord-Brabant, English NORTH BRABANT, *provincie* (province), second largest of The Netherlands, extending northward from the Belgium border, between the provinces of Zeeland (west) and Limburg (east), to the Maas (Meuse) and Merwede rivers. It is drained by the Mark (Merk) and Dommel rivers and the Zuidwillemsvaart and Wilhelmina canals. Its capital is 's Hertogenbosch. Neolithic, Bronze, and Iron Age remains attest to early occupation of the area; there were ancient Roman camps along the Maas. After the Middle Ages, the division between east and west (discernible in two different Iron Age groups) was continued in political divisions: the barony of Breda to the west and the Meierij van 's Hertogenbosch (Bois-le-Duc) to the east, both subject to the duchy of Brabant. The affinities of the west still lie with Belgium and France, and those of the east with the Rhineland. Nearly all the inhabitants are Roman Catholic.

The province's fertile coastal lands, flooded in 1953, support wheat and sugar beets; the more acid, poorly drained riverine lands are mostly pasture. The southern heaths contain woods, many recently planted conifers, small lakes, and peat bogs. The poor soils support restricted mixed farming, including the raising of sheep. Extensive heathlands were reclaimed in the 19th century, and several new settlements were established in the raised bogs of De Peel (southeast of Deurne), where the sale of peat was combined with horticulture and cattle raising. Reclamation slackened after 1900; immigration from rural areas has been heavy, and more than half the population now is urban. Formerly, Bergen op Zoom was the centre of the marshlands, Breda of the riverlands, and 's Hertogenbosch of the inner sandy areas, but the largest provincial communities now also include the industrial centres at Tilburg and Eindhoven. Area 1,910 square miles (4,947 square km). Pop. (1994 est.) 2,259,779.

Noord-Holland, English NORTH HOLLAND, coastal *provincie* (province), northwestern Netherlands, comprising a peninsula (area 1,030 square miles [2,667 square km]) surrounded by the North Sea (west), the Waddenzee (north), and the IJsselmeer (Lake IJssel; east). It includes the west Frisian island of Texel, off its northern tip. The island of Marken in the IJsselmeer has been connected by embankment with the mainland since 1957; the former island of Wieringen, now united after drainage with the mainland, is the starting point of the Afsluitdijk, the 19-mile (31-kilometre) dam that encloses the IJsselmeer and links Noord-Holland and Friesland. The province, drained by the Zaan, Amstel, and Vecht rivers, is mainly low fenland, with dunes, and sea and river clays. Formed by the division (1840) of Holland into North and South, its capital is Haarlem. The province contains Amsterdam, the chief city of The Netherlands.

Along the shore, sand dunes form a smooth, unbroken protection for the inland regions. Coastal resorts include Zaandvoort, Bergen aan Zee, Egmond aan Zee, and Wijk aan Zee. Of the fishing ports, IJmuiden, the foreport of Amsterdam at the western end of the North Sea Canal, is most important. This canal area has developed into an important industrial district (IJmond) centred on IJmuiden, Velsen, and Beverwijk and manufacturing steel products, paper, fertilizer, and chemicals. Haarlem is an industrial town and flower-bulb trading centre. Petten, on the western coast, is the centre of Dutch nuclear research.

Sandy geest soils, behind the inner dunes, support the famous Dutch bulb fields of hyacinths, tulips, narcissus, and crocuses that continue southward from Haarlem into Zuid-Holland. North of the North Sea Canal, market gardening dominates on the geest.

Most of the province lies at or below sea level, consisting of peat in the older parts and clay in the considerable reclaimed areas (polders). To the north of the North Sea Canal (cut 1865–76, after the drainage of the IJ inlet of the IJsselmeer), the Wormer, Schermer, Purmer, and Beemster lakes were drained in the 17th century; several sea polders farther north were added to the mainland in the early 19th century. Wieringermeer was reclaimed by 1930. This part of the province is traversed by the 46-mile North Holland Canal (1819–25) between Amsterdam and Den Helder. South of the North Sea Canal, the Haarlemmermeer polder was reclaimed between 1840 and 1852. This region is typically Dutch, with canals and windmills. There is market gardening, and the northern polders, especially the Wieringermeer, produce grains and sugar beets; but the main occupations are cattle raising and dairy farming. There are cattle and cheese markets at Purmerend and Alkmaar. The province's economy is centred on Amsterdam, the chief commercial centre, and the Zaanstreek industrial area, particularly at Zaandam.

Once heath-covered, with small rural villages, the Gooi region of lakes and woods to the southeast has grown into a considerable resort, residential, and industrial area that is centred on Hilversum (site of many powerful radio stations, including Radio Nederland) and Bussum. Pop. (1992 est.) 2,421,700.

noösphere (from Greek *noös,* "mind"), in theoretical biology, that part of the world of life that is strongly affected by man's conceptual thought; regarded by some as coextensive with the anthroposphere. The noösphere, as proposed by scientific theorists Pierre Teilhard de Chardin, Vladimir Ivanovich Vernadsky, and Édouard Le Roy, is the level of the intellect, as opposed to the geosphere, or nonliving world, and the biosphere, or living world.

Noot, Henri van der (b. Jan. 7, 1731, Brussels, Austrian Netherlands [now in Belgium]—d. Jan. 12, 1827, Strombeek, Neth.), Belgian lawyer and political activist who, along with Jean-François Vonck, led the Belgian revolt of 1789 against the regime of the Austrian Habsburg Holy Roman emperor Joseph II. He failed to maintain national support, however, and yielded to an Austrian invasion the following year.

Van der Noot served as an advocate in Brabant and in 1787 began to organize against the sweeping religious and political reforms of Joseph II, which violated traditional local privileges. After influencing the guilds of Brabant to form a militia, he escaped arrest in August 1788 by fleeing to Breda in the United Provinces (Dutch Republic). There and in London he offered sovereignty over Belgium to the Dutch House of Orange and won a promise of support from Prussia. In 1789 he joined forces with J.-F. Vonck's army led by Jean-André van der Meersch at Breda. After the rebels' victory over the Austrians, he returned triumphantly to Brussels in December 1789.

Van der Noot and his supporters, the "Statist party," who sought a return to oligarchic rule, were able to force Vonck's democratic faction out of the government. He was unable to unify the country, however, and went into exile (where he remained until 1792) after the Austrians took Belgium in December 1790, defeating a Belgian army weakened by the statists' arrest of van der Meersch. Van der Noot was imprisoned in 1796 by the French Directory and was never again prominent in public life except for a brief emergence in 1814, when he argued for the return of Belgium to Austrian rule.

Consult the INDEX *first*

Noot, Jan Baptista van der, byname JONKER JAN (b. *c.* 1540, Brecht, near Antwerp [now in Belgium]—d. *c.* 1595, Antwerp), the first Dutch poet to realize fully the new French Renaissance poetic style in Holland. He also influenced the English and German poets of his time.

Van der Noot went into political exile in 1567, and his first work was published in England—*Het bosken* (1570 or 1571; "The Little Wood"), a collection of his earliest poetry in the style and form of the Italian poet Petrarch and the French poet Pierre de Ronsard. In 1568 one of his main works had appeared, *Het theatre oft toon-neel* ("Theatre for Voluptuous Worldlings"), a prose defense of the virtues of Calvinism and a condemnation of the worldliness of Dutch society. It is prefaced by sonnets and epigrams that were translated by Edmund Spenser for an English version.

In van der Noot's unique Renaissance production and main poetical work, the *Olympiados* epic, he described in clear, unadorned language his dream of an allegorical journey toward his divine love, Olympia. Van der Noot interpolated numerous sonnets in the work, and their German translations are the earliest known instances of the pure sonnet in that language.

Nootka, Indians of the Northwest Pacific Coast of North America, located on the southwest coast of Vancouver Island and on Cape Flattery, the northwest tip of the state of Washington. The groups on the southeast end of the island were the Nitinat, those on Cape Flattery, the Makah. The Nootka were culturally related to the Kwakiutl (*q.v.*).

In the central and southern Nootka regions, local groups were socially and politically independent; in northern areas they usually formed larger tribes with common winter villages. There were also several confederacies of tribes, dating to prehistoric times, that shared summer villages near the coast and the fishing and hunting grounds. The Nootka moved seasonally to areas of economic importance, returning to their principal homesites during the winter when subsistence activity slowed.

The Nootka were specialized whale hunters, employing special equipment such as large dugout canoes and harpoons with long lines and sealskin floats. The whale harpooner was a person of high rank, and families passed down the magical and practical secrets that made for successful hunting. There was also a whale ritualist who, by appropriate ceremonial procedures, caused whales that had died of natural causes to drift ashore. Many features of this whaling complex suggest ancient ties with Eskimo and Aleut cultures.

The most important Nootkan ceremony was the shamans' dance, a reenactment of the kidnapping of an ancestor by supernatural beings who gave him supernatural gifts and released him. The ceremony served to define each individual's place in the social order. The public performance ended with a potlatch (*q.v.*), a ceremonial distribution of property.

Nootka Sound, an inlet of the Pacific Ocean, on the western coast of Vancouver Island, British Columbia, Canada, some 168 miles (270 km) northwest of Victoria. The sound, which forms a good harbour, is 6 miles (10 km) wide and has three arms, one of which separates Nootka Island from Vancouver Island.

Captain James Cook visited the sound in 1778. He called it King George's Sound, then renamed it Nootka Sound, believing that to be its Indian name.

Nootka Sound controversy (1790), dispute over the seizure of vessels at Nootka Sound, an inlet on the western coast of Vancouver Island, that nearly caused a war between Great Britain and Spain. Its settlement ended the Spanish claim to a monopoly of trade and settlement on the western coast of North America and made possible the eventual expansion of the Canadian provinces to the Pacific.

The dispute arose as a result of the seizure by the Spaniards in 1789 of four British trading vessels owned by Captain John Meares and his associates. In April 1790, Meares appealed to the British government for redress, and a major dispute quickly developed with Spain. The Spaniards claimed possession of the whole northwestern coast of America on the basis of a papal grant of 1493, confirmed when their explorers had formally taken possession of the area. Great Britain, however, contended that rights of sovereignty could be established only by actual occupation of the land.

The British threatened war over the Nootka Sound incident, but because of Spain's military weakness and because of Prussian diplomatic support on behalf of Great Britain, Spain yielded to the British demands in the Nootka Sound Convention, signed on Oct. 28, 1790. The convention acknowledged that each nation was free to navigate and fish in the Pacific and to trade and establish settlements on unoccupied land.

Nora, ancient site about 22 miles (35 km) southwest of Cagliari (Caralis) on the island of Sardinia. Although tradition ascribes its foundation to Iberians from Tartessus, the site, which lies on a triangular promontory ending in a steep cliff, is characteristically Phoenician. Apart from remains of ■ Sardinian *nuraghe,* or towerlike monument, the earliest antiquities discovered at Nora are Phoenician, dating from the 7th century BC. After the Roman annexation of Sardinia, Nora was its capital in the republican period and later became a municipium (Romanized community) under the empire (after 27 BC).

Ruins of the Roman theatre at Nora, Sardinia

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Excavations in 1952–54 revealed a wealthy imperial Roman city overlying a typical Phoenician port. The Phoenician town had narrow irregular streets and buildings of typical Carthaginian construction. The violence during the time of the First Punic War (264–241 BC) is evidenced by a *tophet,* where the ashes and burned bones of children were buried in great jars under stelae carved with a temple facade and an image of the goddess Tanit. The Roman city dates from the late 1st century AD; a fine theatre, an aqueduct, a temple of Juno, a nymphaeum, baths, and private villas have been uncovered.

noradrenaline (hormone): *see* epinephrine and norepinephrine.

Noranda (city, Canada): *see* Rouyn-Noranda.

Norbert OF XANTEN, SAINT (b. *c.* 1080, Xanten, Duchy of Lower Lorraine [Germany]—d. June 6, 1134, Magdeburg, Saxony; canonized 1582; feast day June 6, among Premonstratensians July 11), archbishop of Magdeburg and founder of the Premonstratensians (Norbertines, or White Canons), a congregation of priests.

Norbert was ordained in 1115. Failing to reform his peers at the collegiate church of Xanten, he traveled throughout France and Belgium, preaching moral reform. In 1119 Pope Calixtus II asked him to found a religious institute at Prémontré, Fr. With such notable disciples as Hugh of Fosses and St. Evermod, he established his community, the Premonstratensians, in 1120. The congregation was dedicated to preaching, pastoral work, and education. Norbert adopted the rule of Bishop St. Augustine of Hippo for his new order, and he modeled its constitutions after that of the Cistercians, an austere group of cloistered, vegetarian monks practicing perpetual silence. His monastery at Prémontré became the motherhouse of the Premonstratensians.

Norbert was chosen archbishop of Magdeburg in 1126. He became an important church figure four years later when he defended Pope Innocent II, whose claim to the papacy was threatened by Antipope Anacletus II. Norbert won the German church for Innocent's cause and influenced the German king Lothair II/III to defend Innocent.

Norbertine (religious order): *see* Premonstratensian.

Norcross, John (American author): *see* Conroy, Jack.

Nord, *département,* Nord-Pas-de-Calais *région,* northern France. It extends for 200 miles (320 km) along the Belgian frontier and borders the Strait of Dover for 20 miles (32 km). Nord is the most populous *département* of France and one of the most productive in agriculture and industry. Created mainly from French portions of the historical provinces of Flanders and Hainaut, Nord occupies a low-lying land over which many battles, including some of those of World Wars I and II, have been fought throughout the history of Europe. From northwest to southeast it comprises a coastal plain reclaimed from the sea and including Dunkirk; the Flanders plain extending to Armentières, where the *département* is at its narrowest; the densely populated industrial area of Lille, Roubaix, and Tourcoing; the coal basin around Douai, Denain, and Valenciennes through which the Schelde (Escaut) River flows; the territory around Cambrai; the valley of the Sambre River flowing through Maubeuge; and the area of Avesnes-sur-Helpe on the western approaches of the Ardennes plateau. The entire *département* is laced with an intricate network of canalized rivers, canals, and roads, including the highway linking Lille, the departmental capital, with Paris. One of France's largest coalfields crosses the *département* as a narrow strip running from east of Valenciennes to west of Douai.

The climate is mild and humid. Cereals, potatoes, sugar beets, flax, and hops are cultivated intensively. Dairy farming and market gardening have been highly developed, and an exceptionally heavy density of livestock is maintained. The traditional textile industry of Roubaix and Tourcoing remains important in the *département* and produces woolen, cotton, and synthetic fabrics. Besides coal mining (which has declined) and coking and distilling plants, the *département* has several major concentrations of iron- and steelworks. The concentration around Valenciennes, in the east of the coal basin, began production in 1834; another group is located nearby at Denain. The huge complex at Dunkirk includes four furnaces that entered service between 1933 and 1973 and is modern in both conception and production methods. Other industrial activities include engineering, chemical works, food processing, glassworks, and marble cutting. Oil refineries and mineral works have been developed in the area of Dunkirk, which is one of the main French seaports and has an important shipbuilding yard.

Although the fighting of World Wars I and II took its toll of the *département*'s old buildings, some fine *hôtels de ville* (city halls) and several of the *département*'s noted belfries miraculously survived, as did the elaborate but outdated fortifications of several of the old towns of French Flanders. The *département* has six *arrondissements*—Lille, Cambrai, Douai, Dunkirk, Valenciennes, and Avesnes-sur-Helpe. It is in the educational division of Lille. Area 2,217 square miles (5,742 square km). Pop. (1992 est.) 2,532,900.

Nord-du-Québec, English NORTH OF QUEBEC, formerly NOUVEAU-QUÉBEC, administrative region constituting the northern half of Quebec province, Canada. The name Nouveau-Québec ("New Quebec") once was used synonymously with Ungava for that part of the Labrador-Ungava peninsula between Hudson Bay and the Labrador Sea, north of the Eastmain and Churchill (Hamilton) rivers, which was, at the time, a part of the Northwest Territories. In 1912, however, when the territory was annexed by Quebec, the term Nouveau-Québec generally replaced Ungava. Following the establishment of the Quebec-Newfoundland boundary in 1927, use of the name was limited to a territory in northern Quebec province, which in 1967 became a political subdivision of the province; during the 1980s the region's name was changed to Nord-du-Québec. Governed from the city of Quebec, Nord-du-Québec is the largest but least populous of Quebec province's regions. Pop. (1991) 20,284.

Nord-Norge, English NORTHERN NORWAY, geographic region of Norway. It reaches from Nordland about 575 miles (925 km) northward to the North Cape (Nordkapp), the northernmost point in Europe. It includes the *fylker* (counties) of Nordland, Troms, and Finnmark. An arm of the Gulf Stream, the North Atlantic Current, which flows past its coast, provides a relatively mild maritime climate. Commonly known as the "Land of the Midnight Sun," it has a five-month summer, from May through September; in the far north the sun does not set from mid-May to late July. The northeastern section, in which herds of reindeer range across the tundra, is part of Lapland. The remainder of the region is extremely mountainous, with dense forests and many rivers. The entire region is dotted with thousands of lakes, while the coastline is indented by numerous fjords. Adjacent to the coast are hundreds of islands, the most important group being the Lofoten-Vesterålen near Narvik.

Nord-Norge is connected to southern Norway via coastal shipping and passenger ferries and by highways and a railroad that runs as far north as Bodø in the middle of the region. Principal economic activities include fishing, farming (as far north as 70° N), shipping (especially Swedish iron ore through Narvik), and tourism. Bodø, Narvik, Tromsø, Hammerfest, Harstad, Vardø, and Kirkenes are the main towns and ports. Area 43,598 square miles (112,918 square km). Pop. (1992 est.) 465,089.

Nord-Ostsee-Kanal (Germany): *see* Kiel Canal.

Nord-Pas-de-Calais, *région,* encompassing the northernmost French *départements* of Nord and Pas-de-Calais. The capital is Lille. The *région* is bounded by the *départements* of Somme and Aisne to the south. The English Channel lies to the northwest and Belgium to the northeast. Flatlands predominate in the north, with much of the land lying below sea level. The hills of Cambrais and Avesnois rise to the southwest and southeast, respectively, but elevations rarely exceed 650 feet (200 m). Nord-Pas-de-Calais is drained by the Canche and Schelde (Escaut) and Sambre rivers. A mild and humid climate prevails.

The *région* is densely populated. The population increased by nearly 140 percent between 1801 and 1911, representing one of the few *régions* of France to show such a trend during the period; immigrants from Belgium accounted for much of the increase. Later immigrants have come from Poland and southern Europe. Population growth has lagged behind the national average since 1950, reflecting the relative stagnation of industry, and the migratory balance has become negative. Though most of the population is urban, the countryside also is densely populated.

The *région*'s agriculture is highly mechanized and employs only a small percentage of the workforce. Farmland in the north tends to be enclosed, while that in the south tends to be open. The leading crops are wheat, barley, and potatoes. Industrial crops are also grown and include flax and hops. The *région* is a leading producer of pork.

Textiles, whose production centres on Lille, Roubaix, Tourcoing, and Armentières, are the *région*'s leading manufactured product. Automation has sharply reduced the workforce employed in weaving. Declining coal production has seriously undermined the *région*'s metalworking industries and has been only partially offset by imported natural gas. Area 4,793 square miles (12,413 square km). Pop. (1992 est.) 3,969,300.

Nord-Trøndelag, *fylke* (county), central Norway. It extends from the Norwegian Sea (west) to the Swedish border (east), with the southern boundary running in a general northwest-southeast direction south of Trondheims Fjord. The *fylke* has an area of 8,673 square miles (22,463 square km); the county seat is at Steinkjer (*q.v.*). The major road and rail links between Trondheim and northern Norway pass through the narrow Nam Valley (Namdalen) in the north-central section. The low, hilly areas in the south are one of the best agricultural areas of Norway and produce grains, hay, and potatoes. Fishing and fish processing are carried on from the many small coastal ports and offshore islands. Pyrite is mined in the Nam Valley and near the Swedish border, and iron ore is extracted west of Trondheims Fjord. The towns of Steinkjer, Namsos, Grong, and Levanger are manufacturing centres. Area 8,673 square miles (22,463 square km). Pop. (1993 est.) 127,450.

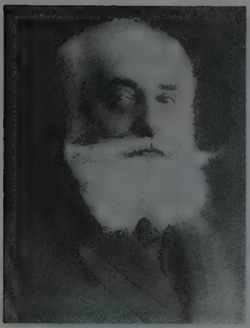
Nordal, Sigurdur Jóhannesson (b. Sept. 14, 1886, Eyjólfsstadir, Vatnsdalur, Húnavatnssýsla, Iceland—d. Sept. 21, 1974, Reykjavík), Icelandic philologist, critic, and writer.

Nordal received his doctorate in Old Norse philology from the University of Copenhagen in 1914. He studied philosophy in Berlin and at the University of Oxford. Upon his return to Iceland in 1918, Nordal was appointed professor of Icelandic Language and Literature at the University of Iceland. He lectured extensively there and abroad on Icelandic language, literature, and philology. From 1951 to 1957 he was Iceland's ambassador to Denmark, and later he taught at several universities in Europe and the United States.

Nordal published fundamental studies of the Eddic poem *Völuspá* (1922–23) and many of the Icelandic sagas. He was instrumental in altering the critical approach to the sagas, showing by careful internal analysis that they are to be regarded more as literary works written by individual writers than as historically accurate products of an oral folk tradition. Nordal also wrote many notable historical works, including a life of the medieval writer Snorri Sturluson (1920) and *Íslenzk menning* (1942; *Icelandic Culture*). He also published essays, novels, short stories, and poems. His short-story collection *Fornar ástir* (1919; "Old Loves") played a significant role in the development of the modern Icelandic short story, and his Icelandic anthology, *Íslenzk lestrarbók 1400–1900* (1924), was also influential.

Nordau, Max, original name MAX SIMON SÜDFELD (b. July 29, 1849, Pest [now Budapest], Hung.—d. Jan. 23, 1923, Paris, France), physician, writer, and early Jewish nationalist who was instrumental in establishing recognition of Palestine as a potential Jewish homeland to be gained by colonization.

In 1880, after serving as Viennese correspondent for a Budapest newspaper and traveling extensively in Europe, Nordau settled permanently in Paris, where he established a medical practice. A prolific writer of travel books, plays, poems, and essays, he achieved his greatest success in 1883 with *Die conventionellen Lügen der Kulturmenschheit* (*The Conventional Lies of Our Civilization*), a vitriolic attack on the inadequacy of 19th-century institutions to meet human needs; he took a



Nordau
Keystone

particularly harsh look at organized religion. Banned in Russia and Austria, the book nevertheless was translated into numerous languages and went into some 73 editions.

After he met the charismatic Jewish nationalist Theodor Herzl in Paris in 1892, Nordau became deeply interested in Zionism and served as vice president of the Zionist congresses under Herzl, delivering a number of brilliant addresses on the condition of world Jewry. Following Herzl's death in 1904, Nordau broke with the "practical Zionists" (younger men advocating colonization of Palestine without guarantees of political sovereignty), who gained control of the Zionist congresses; Nordau refused to participate in these meetings after 1911.

Nordenflycht, Hedvig Charlotta (b. Nov. 28, 1718, Stockholm, Sweden—d. June 29, 1763, Lugnet, near Stockholm), Swedish poet considered to be Sweden's first feminist. Though influenced by Enlightenment ideas, she was largely self-educated and had a distinct pietistic and sentimental side; both the intellectual and the highly emotional strain are evident in her work.

Hedvig Nordenflycht, detail of an oil painting by Johan Henrik Scheffel, 1754; in the Svenska Porträttarkivet, Stockholm
By courtesy of the Svenska Portrattarkivet, Stockholm

The deaths of a fiancé in 1737 and of her husband in 1741 (seven months after their marriage) inspired her earliest poems, some of which were published in *Den sörjande turturduvan* (1743; "The Mourning Turtledove"). She settled in Stockholm and became a leading literary figure, publishing four volumes of poetry in the next six years. During the 1750s she formed a literary society, Tankarbyggarorden ("Order of the Thought Builders"), with Finnish-born Gustav Philip Creutz and Gustaf Fredrik Gyllenborg. Their literary collaboration resulted in two anthologies, the first (in three volumes) was entitled *Våra försök* (1753, 1754, 1756; "Our Attempts"), the second (in two volumes) *Witterhetsarbeten* (1759, 1762; "Literary Works"). In 1761 she fell in love with a man much younger than herself. This love was unrequited, and Nordenflycht's poems of this period are tender and controlled and are considered to be her highest achievement. Her collected works were edited by Hilma Borelius in three volumes (1924–38).

Nordenskiöld, Adolf Erik, Baron (Friherre), in full NILS ADOLF ERIK, BARON NORDENSKIÖLD (b. Nov. 18, 1832, Helsinki, Fin.—d. Aug. 12, 1901, Dalbyö, Sweden), Swedish geologist, mineralogist, geographer, and explorer who sailed from Norway to the Pacific across the Asiatic Arctic, completing the first successful navigation of the Northeast Passage.

In 1858 Nordenskiöld settled in Stockholm, joined an expedition to the Arctic island of Spitsbergen, between Norway and Greenland, and became professor and curator of mineralogy at the Swedish State Museum. He returned to Spitsbergen again in 1861 and led his own expeditions there in 1864, 1868, and 1872–73, adding to geologic knowledge of the area. In 1870 he also led an expedition to western Greenland to study the inland ice.

Adolf Erik Nordenskiöld, detail of an oil painting by Georg von Rosen, 1886; in the National Museum, Stockholm
By courtesy of the Nationalmuseum, Stockholm

Before attempting to cross the Northeast Passage, Nordenskiöld made preliminary voyages in 1875 and 1876, on which he penetrated the Kara Sea, north of Siberia, to the mouth of the Yenisey River. Sailing from Tromsø, Nor., aboard the steam vessel *Vega* on July 21, 1878, he reached Cape Chelyushkin, Siberia, roughly the midpoint of his journey, on August 19. From the end of September until July 18, 1879, the ship was frozen in near the Bering Strait. Resuming its course, the *Vega* reached Port Clarence, Alaska, on July 22 and returned to Europe by way of Canton (China), Ceylon (now Sri Lanka), and the Suez Canal. When Nordenskiöld reached Stockholm on April 24, 1880, he was created a baron by King Oscar. In 1883, while returning from western Greenland, where he penetrated far into the inland ice, he became the first to break through the great sea ice barrier of the southeast Greenland coast.

Nordenskiöld also made notable contributions in the field of cartography.

Nordenskiöld, Erland, in full NILS ERLAND HERBERT NORDENSKIÖLD (b. July 19, 1877, Strömm, Sweden—d. July 5, 1932, Stockholm), Swedish ethnologist, archaeologist, and a foremost student of South American Indian culture.

Son of the scientist-explorer Adolf Erik Nordenskiöld and cousin of explorer-geographer Otto Nordenskjöld, he made zoological expeditions to Patagonia (1899) and Argentina and Bolivia (1901–02) but turned to archaeological research in the mountains of Peru and Bolivia (1904–05). He made two subsequent expeditions to the forestlands bordering Bolivia and Brazil, one noteworthy result being his paper (1912) dealing with mounds and urn burials in Bolivia. In 1913 he became principal curator of ethnology at the Göteborg Museum. His final expedition took him to the Chocó and Cuna Indians of Colombia and Panama (1927). Pioneering in methods of mapping the distribution of many elements of South American culture, he succeeded in developing a remarkably clear reconstruction of cultural history in an area of considerable complexity.

In addition to accounts of his travels written in a semipopular vein, Nordenskiöld wrote many scientific articles and books, including the richly illustrated work *L'Archéologie du bassin de l'Amazone* (1930; "Archaeology of the Amazon Basin"). His major work is *Comparative Ethnographical Studies,* 10 vol. (1918–38), in which he analyzed the material culture of Bolivian tribes and sought to relate natural environment and other influences on cultural patterns. He was skeptical of the theory of *Kulturkreis* ("culture sphere"), which postulates early diffusion of cultural elements from a primeval area of human development. He suggested that if there were Oceanian influences in South America, they dated from an extremely remote antiquity and that impetus to high civilization of America was Indian.

Erland Nordenskiöld
Nordiska Museet, Stockholm

Nordenskjöld, Otto, in full NILS OTTO GUSTAF NORDENSKJÖLD (b. Dec. 6, 1869, Småland, Sweden—d. June 2, 1928, Göteborg), Swedish geographer and explorer.

A nephew of the scientist-explorer Adolf Erik Nordenskiöld, he became a lecturer in mineralogy and geology at the University of Uppsala, Sweden, in 1894 and led a geologic expedition to southern South America (1895–97). His findings in Patagonia and Tierra del Fuego formed an important contribution to world glacial geology. On Oct. 16, 1901, he sailed aboard the *Antarctic* from Göteborg and the following February established an Antarctic station on Snow Hill Island off Graham Coast, where he wintered with five companions. Their ship, which had wintered at the island of South Georgia, 54° S and due east of Tierra del Fuego, was crushed in the pack ice when it returned to relieve them in February 1903. Nordenskjöld's party was again forced to winter in the Antarctic until rescued by the Argentine vessel *Uruguay* in November 1903.

Otto Nordenskjöld
Nordiska Museet, Stockholm

Nordenskjöld published his extensive findings in *Wissenschaftliche Ergebnisse der schwedischen Südpolar-expedition 1901–1903* (1905–20; "Scientific Results of the Swedish South Polar Expedition 1901–1903"). He subsequently became professor of geography (1905) and first rector of advanced commercial studies (1923) at the University of Göteborg.

Norderney, island off the North Sea coast of Germany, one of the East Frisian Islands. A part of Lower Saxony *Land* (state), the island is 8 miles (13 km) long and up to 1.25 miles (2 km) wide, with dunes rising to 68 feet (21 m). The northern coast is exposed to the sea, but the more sheltered water of the Wattenmeer (shoals produced by tidal water that floods wide mud flats) lies to the south between the island and the mainland. Most of the population lives in Norderney, a small fishing port and the oldest German seaside resort (1797), which was formerly frequented by fashionable international society and is noted for its fine beach and mild climate. There are ferry connections to Norden on the mainland. Pop. (1989 est.) town, 6,187.

Nordfriesische Inseln (German), Danish NORDFRISISKE ØER, English NORTH FRISIAN ISLANDS (Europe): *see* Frisian Islands.

Nordhausen, city, Thuringia *Land* (state), central Germany, lying on the Zorge River, at the southern slopes of the Harz Mountains, in the fertile lowland known as the Goldene Aue ("Golden Meadow"). First mentioned in 927 as the site of a royal castle near the older Frankish settlement of Northusen (Nordhusa), it was made a free imperial city in 1290 and accepted the Reformation in 1522. It lost its independence in 1802, when it was annexed by Prussia, forming part of Prussian Saxony (except for the period 1807–13, when it was Westphalian) until 1945. It incorporated the neighbouring villages of Salza and Krimderode in 1950. Historic buildings that survived heavy air attacks in World War II include the 17th-century town hall with the oaken statue of Roland (1717), a symbol of civic liberty; the late Gothic cathedral with a Romanesque crypt; and the 13th-century Church of St. Blasius, which contains works by Lucas Cranach the Elder and the Younger. The city has a civic museum, a theatre, a teachers' training college, an institute of agricultural technology, and a sports school.

Industries include brewing; distilling; the manufacture of chewing tobacco, machinery, clothing, chemicals, and wood products; and shaft-sinking processes. Pop. (1989 est.) 48,734.

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Nordheim, Sondre (b. *c.* 1825, Morgedahl, Telemark, Norway—d. 1897), Norwegian skier who revolutionized ski design and ski equipment and helped to standardize certain aspects of the sport.

Nordheim in 1860 was the first to use bindings of willow, cane, and birch root around the heel from each side of the toe strap to fasten the boot to the ski, thus revolutionizing skiing and making ski jumping possible. He himself won the first known jumping competition, held at Telemark in 1866. He also designed skis with incurving sides, the prototype for modern skis. He developed basic skiing turns, which became standard as the stem turn, the Christiania, and the stem Christiania. In 1850 he had been the first skier to perform parallel turns. In 1868 Nordheim and some friends skied 322 km (200 miles) from Telemark to Christiania (later Oslo), where he made a jump of 18 m (59 feet). He is credited with developing in 1870 the first modern sidecut in skis, producing a ski narrower in the middle and wider at the ends.

Nordhorn, town, Lower Saxony *Land* (state), northwestern Germany, on the Vechte River at the junction of the Almelo-Nordhorn, Ems-Vechte, and Süd-Nord canals, 4 miles (6 km) from the Dutch border. First mentioned about 1000 and chartered in 1379, the city suffered heavily from plague, fire, and war in the 15th and 16th centuries. Part of the Augustinian Frenswegen Abbey (founded 1394) and the 15th-century Protestant church survive. Modern Nordhorn is a textile centre, with oil wells nearby. Its area was expanded in the 1920s by the addition of neighbouring communities. Pop. (1989 est.) 48,556.

Nordic Council of Ministers, organization of the Nordic states of Denmark, Finland, Iceland, Norway, and Sweden for the purpose of consultation and cooperation on matters of common interest. The Council was established in February 1971 under an amendment to the Helsinki Convention (1962) between the Nordic countries. It consists of the ministers of state of the member countries, as well as other ministers with responsibility for the subject under discussion. Formal decisions are usually binding on the member governments. The Council of Ministers provides funds for a large number of joint Nordic institutions and projects in such fields as investment finance, scientific research and development, culture, education, and social welfare and health. A related organization, the Nordic Council, serves as an advisory body.

Nordic skiing, also called CLASSIC SKIING, techniques and events that evolved in the hilly terrain of Norway and the other Scandinavian countries. The modern Nordic events are the cross-country races (including a relay race) and ski-jumping events. The Nordic combined is a separate test consisting of a 15-kilometre cross-country race and special ski-jumping contest, with the winner determined on the basis of points awarded for performance in both. Cross-country racing is sometimes called Nordic racing. Nordic events were included in the first winter Olympic program in 1924; the Alpine events (downhill and slalom) were not added until 1936. A Nordic World Cup for cross-country events has been awarded since 1979. The governing body is the Fédération Internationale de Ski.

See Sporting Record: *Skiing. See also* Olympic Games.

Nordica, Lillian, original name LILIAN NORTON (b. May 12, 1857, Farmington, Maine, U.S.—d. May 10, 1914, Batavia, Java, Dutch East Indies [now Jakarta, Indon.]), American soprano, acclaimed for her opulent voice and dramatic presence, especially in Wagnerian roles.

Nordica studied at the New England Conservatory, Boston, then gave recitals in the United States and London before resuming study in Milan. In 1879 she made her debut in Milan as Donna Elvira in W.A. Mozart's *Don Giovanni* and in Brescia as Violetta in Giuseppe Verdi's *La traviata.* After singing in many Italian, German, and Russian cities, she made her Paris Opéra debut in 1882 as Marguerite in Charles Gounod's *Faust.*

In 1887 Nordica first appeared in London at Covent Garden and until 1893 performed there and at Drury Lane in such parts as Lucia, Donna Elvira, and Aida. In 1894 she was engaged at Bayreuth, Ger.—the first American to be so honoured—as Elsa in Richard Wagner's *Lohengrin,* and such was her tumultuous reception that she thereafter concentrated on Wagnerian parts. In 1895 she sang Isolde at the Metropolitan Opera in New York City, where she remained until 1909, excelling especially as Brünnhilde and Kundry. After retiring from the Metropolitan, she launched a world farewell tour that ended in 1913 with a shipwreck near Java, where she died.

Nordica as Selika in Giacomo Meyerbeer's *L'Africaine,* 1892

The Bettmann Archive

Nordjylland, *amtskommune* (county commune), northern Jutland, Denmark, created in 1970 from the former counties of Ålborg and Hjørring, with an area of 2,383 square miles (6,173 square km). It comprises most of the Himmerland region between Mariager Fjord and Lim Fjord and extends to the northernmost tip of the Jutland peninsula at Skagen. It has soil of generally poor quality with large areas of moorland in the south and extensive dunes in the north. Its economy depends largely on dairying and agriculture; there are also coastal resorts and some fishing in the north. The port of Ålborg serves as the administrative seat; other important centres include Hjørring, Frederikshavn, and Skagen. Pop. (1989 est.) 483,754.

Nordland, *fylke* (county), northern Norway, bordering the Norwegian Sea. Its many offshore islands include most of the Lofoten Islands and the Vesterålen archipelago. With an area of 14,798 square miles (38,327 square km), including the northern islands, Nordland extends for about 300 miles (500 km) along the coast; about two-thirds of the *fylke* is north of the Arctic Circle. The coastline is rugged and indented by fjords. Most residents live on the coastal lowlands and in narrow inland valleys. Narvik and Bodø (the county seat) are cities; other towns are Svolvær and Mo. The economy is based on fishing (especially cod), stock raising (cattle and goats), some farming (rye and potatoes), and mining. The port of Narvik has a direct rail connection to the rich Kiruna-Gällivare iron-ore fields in Sweden. The chief pyrite deposits are near Mo and Sulitjelma, while iron ore is mined in Dunderlands Valley. Hydroelectric power has been extensively developed, providing a base for metal-processing industries (steel at Mo and aluminum at Mosjøen). Pop. (1990 est.) 239,571.

Nördlingen, city, Bavaria *Land* (state), southern Germany, on the Eger River. A seat of the bishop of Regensburg in 898, it became a free imperial city in 1215. Several battles in the Thirty Years' War (17th century) and the French Revolutionary Wars (18th century) were fought outside the medieval walls that still surround the old city. Notable buildings include the late-Gothic town hall, the Church of St. George (1427–1505), and the Church of St. Salvator (1381–1422). The oldest horse race in Germany is held annually in Nördlingen. Industries include the manufacture of clothing, precision instruments, and paper. Pop. (1989 est.) 18,278.

Nördlingen, Battle of (Sept. 5–6, 1634), battle fought near Nördlingen in southern Germany in the Thirty Years' War. Ending in a decisive victory for the forces of the Holy Roman Empire and Spain over the Swedes, it led to the dissolution of the Heilbronn alliance (1633), ended Swedish domination in southern Germany, and forced Cardinal de Richelieu to bring France into active participation in the war.

Led by Matthias Gallas, the combined imperial and Spanish forces fought the Swedish army, which, under the dual command of Gustav Karlsson Horn and Bernhard of Saxe-Weimar, was weakened by the absence of large contingents that had been sent to fight the Poles. Although the Swedes gained an advantage on the first day of the battle, they could not overcome the incompatibility of their two leaders; Horn was captured, and the Swedish army was completely routed.

Nordraak, Rikard, Nordraak also spelled NORDRAACH (b. June 12, 1842, Christiania [now Oslo], Nor.—d. March 20, 1866, Berlin [Germany]), Norwegian composer perhaps best known as the composer of the music for the Norwegian national anthem, "Ja, vi elsker dette landet" (1864; "Yes, We Love This Land").

Nordraak began composing music as a child. He was sent at age 15 to Copenhagen, Den., for training in business, but he also studied music while there. In 1859 he gave up the study of business and went to Berlin for six months to continue his music training, returning to Norway for two further years of study. During this period he became involved in the Nye Norske Selskab ("New Norwegian Society"), met Ole Bull, and immersed himself in the nationalistic movement then popular in literature and the other arts. His *Four Dances* for piano was published in 1859–60. After working in Berlin for two more years, Nordraak went to Copenhagen and, with Edvard Grieg and others, founded Euterpe, a musical society dedicated to the performance of works by young Scandinavian composers. In 1864 Nordraak's music for the national anthem, with words by his cousin Bjørnstjerne Bjørnson, was published. In May 1865, Nordraak once again traveled to Berlin to work and study. While there, he contracted tuberculosis and died.

His works—which include the incidental music *Maria Stuart i Skotland* and *Sigurd Slembe,* several pieces for a capella male chorus, and a number of songs and instrumental pieces—are characterized by simplicity and economy. His compositions were much influenced by Norwegian folk music, which he collected.

Nordrhein-Westfalen (Germany): *see* North Rhine–Westphalia.

Nordström, Ludvig Anselm (b. Feb. 25, 1882, Härnösand, Swed.—d. April 15, 1942, Stockholm), Swedish writer whose realistic, socially conscious works are set in the Norrland region in which he matured.

Born of a Swedish father and an English mother, Nordström was much influenced by English writers, especially Charles Dickens, Thomas Carlyle, Laurence Sterne, H.G. Wells, and G.K. Chesterton. He most delighted his readers with such freshly observed, idiomatic, and lively short stories as those found in *Fiskare* (1907; "Fishermen"), *Borgare* (1909; "Burghers"), *Herrar* (1910; "Gentlemen"), and *Lumpsamlaren* (1910; "The Junk Collector"). His three-volume *Petter Svensks historia* (1923–27; "The Story of Peter Svensk") is the chief work in which he expounds his vision (which he called "totalism") of an anti-individualistic, industrial society in which group and communal values are stressed. In this and other long works of fiction, his sociopolitical views were often put forward at the expense of his art, and most of his long fiction is not memorable. He was able to achieve a certain measure of political influence, however, with two journalistic essays: *Bonde-nöden* (1933; "The Distress of the Peasantry") and *Lort-Sverige* (1938; "Dirt-Sweden"), dealing with the limits of common rural existence and with the filth of the supposedly "clean" Swedish countryside. Both aroused widespread discussion and, together with the contemporaneous economic studies of Gunnar and Alva Myrdal, helped to prompt subsequent reforms. Only two of Nordström's novels, *Landsorts-bohème* (1928; "Small-town Bohemia") and *Planeten Markatten* (1937; "The Monkey Planet"), are considered to be of value.

Nordström, detail of an oil portrait by Leander Engström, 1919; in a private collection, Stockholm

By courtesy of the Svenska Portrattarkivet, Stockholm

Nore, The, sandbank in the Thames Estuary, extending between Shoeburyness (north) and Sheerness (south), county of Kent, southeastern England. The Nore Lightship, anchored 4 miles (6 km) southeast of Shoeburyness, was the first to be established in English waters (1732). The Nore anchorage was much-used by the English fleet in the wars of the 17th and 18th centuries. In 1797 sailors at The Nore mutinied against their conditions, and their leader, Richard Parker, was hanged from the yardarm of his ship. Until 1961 The Nore gave its name to a naval command for the eastern area of England. The name is used also for the estuarine area that roughly coincides with the naval port of Sheerness.

norepinephrine (hormone): *see* epinephrine and norepinephrine.

Norfolk, county of eastern England, bounded by Suffolk (south), Cambridgeshire and Lincolnshire (west), and the North Sea (north and east). It comprises seven districts—Breckland, Broadland, Great Yarmouth, North Norfolk, Norwich, South Norfolk, and King's Lynn and West Norfolk—over an area of 2,073 square miles (5,368 square km).

Norfolk is low-lying, and a large part is drained by the Rivers Wensum, Yare, and Bure and their tributaries into the North Sea. The northwest corner of the county is drained by the Ouse into The Wash, a shallow North Sea inlet. There are chalk outcrops in western Norfolk, and, in the eastern half of the county, chalk is overlain by later deposits. Along the northwest edge of the county, clays and sandstones older than the chalk are exposed. Norfolk is a rich farming county, but regions of natural or seminatural vegetation survive. Around parts of the 90-mile (145-kilometre) coastline there are sand dunes, as at Blakeney Beach on the northern coast. There are also salt marshes, as at Scolthead Island. Along the valleys of the Yare and Bure are a number of shallow expanses of water and reed swamp—the famous Broads that resulted from medieval peat cutting and a subsequent change in sea level. In the southwest of the county and extending into Suffolk are the sandy heathlands of Breckland, which have been planted with conifers in many places.

Paleolithic, Mesolithic, and Neolithic artifacts have been found in the county. The most impressive Stone Age monuments are the flint mines, such as Grime's Graves, in Breckland. Long barrows (mounds) and Bronze Age round barrows are also found. In the 3rd century BC the early British Iceni people, of whom later the famous Boudicca (Boadicea) was a queen, entered the area from the European continent. During the Roman period, there were two towns in Norfolk, Caister St. Edmund and Caister next Yarmouth. After the ensuing Anglo-Saxon invasions, Norfolk became part of the kingdom of East Anglia. Town life in Norwich and Thetford started at this time, the former town having a mint from 920. Subsequently the area was subjected to Danish raids, and it eventually became part of the administrative entity called the Danelaw.

By the time of Domesday Book (1086), the record of the land survey ordered by William I the Conqueror, Norfolk was one of the most heavily populated and wealthiest regions in England, and it remained so throughout the medieval period. The region's prosperity depended largely on wool. Little Walsingham, in the north of the county, was a famous shrine in the Middle Ages, attracting pilgrims from far and wide. During the English Civil Wars of the mid-17th century, Norfolk saw little action because the county was strongly behind Cromwell and the Parliamentary cause. There are several surviving castles in the area, as at Norwich, Caister next Yarmouth, and Oxborough; there are also large private mansions, as at Sandringham (the Norfolk home of the royal family).

Norfolk's economy is predominantly agricultural, with barley, wheat, sugar beets, oats, and vegetables as the major crops. Barley is grown for the distilling industry and for animal feed. Large areas of peas and beans are grown for canning and freezing at such centres as Great Yarmouth. Most types of livestock are raised, but the county is especially noted for its turkeys. Fishing is important at many points around the coast. Norwich has developed an important boot and shoe industry and, together with most other major towns in the county, has attracted some light industry. Catering for tourists is also important, especially at points along the coast (Cromer and Great Yarmouth) and on the Broads. Pop. (1989 est.) 748,500.

Norfolk, city, Madison county, northeastern Nebraska, U.S., on the north fork of the Elkhorn River. Settled in 1866 by German farmers from Xonia and Watertown, Wis., its name, originally proposed as North Fork, was abbreviated to Norfork and then changed by the post office to Norfolk. The economy depends primarily on agriculture (grain and livestock) and food processing, augmented by manufacturing (medical equipment and electronic resistors and circuits). Nebraska Christian College was founded there in 1932 and Northeast Technical Community College in 1973. Gavins Point Dam and Nebraska Sand Hills Recreation Area are nearby. Inc. village, 1881; city, 1886. Pop. (1990 est.) 21,476.

Norfolk, independent city and port of entry, in the Tidewater region of southeastern Virginia, U.S., at the mouth of Chesapeake Bay. It is part of an urban complex that includes the cities of Portsmouth (west), Chesapeake (south), Virginia Beach (east), and, northward across the harbour of Hampton Roads, Newport News and Hampton.

Laid out as a town in 1682 following an act of the Virginia General Assembly (1680) that each county should establish a trade centre, it was named for Norfolk county, Eng. The land was bought from Nicholas Wise, a carpenter, for 10,000 pounds (4,500 kg) of tobacco. For many years Norfolk was a trade outlet for eastern North Carolina (tar, lumber, hides, and tobacco). Later, shipbuilding and ship repairing became important. A lucrative trade developed with Britain and the West Indies, and, in recognition of its commercial importance, Norfolk was presented a silver mace by Lieutenant Governor Robert Dinwiddie in 1753.

The harbour at Norfolk, Va.

© Ann Purcell

During the American Revolution, the royal governor, Lord Dunmore, made it his headquarters (December 1775), declared martial law, and defeated the Virginia militiamen at nearby Kempsville. Later in the month Colonel William Woodford and his Virginia riflemen routed the British at Great Bridge and occupied Norfolk, which on Jan. 1, 1776, was bombarded by Dunmore's fleet anchored in the Elizabeth River. The Virginians later burned what was left of the town except for St. Paul's Church (which still has a cannonball in its wall) to prevent its use by the British. Norfolk's recovery was hampered by the stifling of West India trade by Britain, restriction on shipping and privateering by the European powers during the Napoleonic Wars, a disastrous fire in 1799, and intercity rivalry. During the War of 1812 it was twice saved from the British—when a local militia beat off a land attack on Portsmouth and when General Robert B. Taylor's defense of Craney Island prevented a barge invasion.

With subsequent canal and railroad construction, prosperity returned until a yellow-fever epidemic struck in 1855 (killing 10 percent of the population). During the American Civil War, Norfolk fell (May 1862) to Union forces under General John E. Wool and was occupied for the rest of the war. Its prosperity resumed after 1870 with the converging of railways on the port and was stimulated during World Wars I and II with the installation of a huge naval and naval-air complex. Norfolk, with Portsmouth, is now headquarters of the U.S. Atlantic Fleet and the Supreme Allied Command, Atlantic (Saclant), of the North Atlantic Treaty Organization (NATO).

Shipping, shipbuilding, and light industry are the major economic activities. Old Dominion University (1930), Norfolk State College (1968), and Virginia Wesleyan College (1966; partly in Virginia Beach) are located there. A botanical garden, the burial site and memorial for U.S. general Douglas MacArthur, and the Cultural and Convention Center are notable landmarks. The annual International Azalea Festival is dedicated to NATO. Inc. borough, 1736; city, 1845. Pop. (1990) city, 261,229; Norfolk–Virginia Beach–Newport News MSA 1,396,107.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Norfolk, EARLS AND DUKES OF, titled English nobility of several creations, notably in the families Mowbray and Howard, grouped below chronologically and indicated by the symbol •. Norfolk is the premier English nonroyal dukedom.

•**Norfolk, Thomas of Brotherton, Earl of** (b. June 1, 1300, Brotherton, near Pontefract, Yorkshire, Eng.—d. August 1338), half brother of King Edward II of England and of Edmund of Woodstock, Earl of Kent.

He was created Earl of Norfolk in 1312 and was given vast lands in England, Wales, and Ireland; Edward II further distinguished him by creating him marshal of England. However, although he at first sided with the king, he was one of the first to join Queen Isabella when she landed in England in 1326 and was one of the group of nobles who brought about the deposition of Edward II. Thomas, more fortunate than the executed Edmund of Woodstock, however, provided no opportunity for the jealousy of the ruler Roger de Mortimer, and he survived to welcome Edward III's seizure of power, becoming a close ally of the young king.

•**Norfolk, Thomas Mowbray, 1st Duke of,** Earl of Nottingham, Earl Marshal (b. *c.* 1366—d. Sept. 22, 1399, Venice [Italy]), English lord whose quarrel with Henry of Bolingbroke, Duke of Hereford (later King Henry IV, reigned 1399–1413), was a critical episode in the events leading to the overthrow of King Richard II (reigned 1377–99) by Bolingbroke. The quarrel dominates the first act of William Shakespeare's play *Richard II.*

The son of John, 4th Lord Mowbray, Thomas was made Earl of Nottingham in 1383. Several years later he joined the group of powerful nobles—known as the lords appellant—who from 1387 to 1389 forced Richard II to submit to their authority. Nevertheless, after Richard regained power, he employed Mowbray on military and diplomatic missions. In 1397 Richard arrested three leading appellants, including Thomas of Woodstock, Duke of Gloucester. Committed to Mowbray's charge, Gloucester was mysteriously murdered, possibly on orders from Richard.

Although Mowbray was then created Duke of Norfolk in 1397, he feared that the king would have him arrested for his earlier disloyalty. He confided these fears to Bolingbroke, who immediately denounced him to Richard as a traitor. Mowbray denied the charges and, as the two men were about to decide the dispute by duel, Richard intervened and banished them both (Sept. 16, 1398). Norfolk died in Italy shortly before Bolingbroke forced Richard to abdicate.

•**Norfolk, John Howard, 1st Duke of,** Earl Marshal, Lord Howard (b. *c.* 1430—d. Aug. 22, 1485, near Market Bosworth, Warwickshire, Eng.), English lord who supported the Yorkist kings in the Wars of the Roses.

John Howard was the son of Sir Robert Howard by his wife, Margaret, daughter of Thomas Mowbray, the 1st Duke of Norfolk of that family. In 1455 John Howard was sent to Parliament as member for Norfolk; in 1461 he was knighted; and in 1470, although he appears to have been a consistent Yorkist, he was created a baron by Henry VI. He was treasurer of the royal household from 1467 to 1474 and went to France with Edward IV in 1475. After Edward's death, however, Howard supported Richard III, who created him Duke of Norfolk and made him earl marshal of England in June 1483. He was killed at Bosworth Field while fighting for this king, and the title thus suffered attainder.

John Howard, 1st Duke of Norfolk, detail of an anonymous portrait, mid-15th century; at Arundel Castle, Sussex

By courtesy of the Duke of Norfolk, Arundel Castle

•**Norfolk, Thomas Howard, 2nd Duke of,** Earl of Surrey, Earl Marshal (b. 1443—d. May 21, 1524, Framlingham, Suffolk, Eng.), noble prominent during the reigns of Henry VII and Henry VIII of England.

Son of the 1st Duke of Norfolk, Thomas Howard early shared his father's fortunes; he fought at Barnet for Edward IV and was made steward of the royal household and created Earl of Surrey in 1483 (at the same time that his father was created duke). Taken prisoner at Bosworth Field while fighting for Richard III, he was attainted and remained in captivity until January 1489, when he was released and restored to his earldom of Surrey but not to the dukedom of Norfolk. He was then entrusted with the maintenance of order in Yorkshire and with the defense of the Scottish borders; he was made lord treasurer and a privy councillor in 1501, and he helped to arrange the marriage between Margaret, the daughter of Henry VII, and James IV of Scotland. Henry VIII, too, employed him on public business, but the earl grew jealous of Thomas Wolsey, and for a short time he absented himself from court. He commanded the army that defeated the Scots at Flodden in September 1513, and he was created Duke of Norfolk in February of the following year, with precedency as of the creation of 1483.

In his later years Norfolk worked more harmoniously with Wolsey. He was guardian of England during Henry's absence in France in 1520, and he acted as lord high steward at the trial of his friend Edward Stafford, Duke of Buckingham, in 1521.

•**Norfolk, Thomas Howard, 3rd Duke of,** Earl of Surrey, Earl Marshal (b. 1473—d. Aug. 25, 1554, Kenninghall, Norfolk, Eng.), powerful English noble who held a variety of high offices under King Henry VIII. Although he was valuable to the King as a military commander, he failed in his aspiration to become the chief minister of the realm.

Howard was the brother-in-law of King Henry VII and the son of Thomas Howard, 2nd Duke of Norfolk. In May 1513 he became lord high admiral, and on September 9 he helped rout the Scots at Flodden Field near Branxton, Northumberland. He became lord deputy of Ireland in 1520 but soon left this post to command a fleet against the French.

Succeeding his father as Duke of Norfolk in 1524, he headed the faction opposed to Henry's chief minister, Thomas Wolsey. Upon Wolsey's fall in 1529, Norfolk became president of the royal council. He supported the marriage of his niece Anne Boleyn to Henry in 1533, but, by the time of Anne's fall in 1536, his relationship to Henry had already been weakened by the rise of Thomas Cromwell. As lord high steward, Norfolk was assigned to preside at her trial and execution. He momentarily regained royal favour by skillfully suppressing the rebellion of Roman Catholics in northern England known as the Pilgrimage of Grace (1536). A conservative in religion, Norfolk became a leading opponent of two influential church reformers: the king's chief adviser, Thomas Cromwell, and the archbishop of Canterbury, Thomas Cranmer. Upon Cromwell's execution (1540) Norfolk emerged as the second most powerful man in England, but his position was again weakened when Henry's fifth wife, Catherine Howard—another of Norfolk's nieces—was put to death in 1542.

Thomas Howard, 3rd Duke of Norfolk, detail of a painting by Hans Holbein the Younger; at Castle Howard, Yorkshire

By courtesy of Castle Howard; photograph, Courtauld Institute of Art

In December 1546 Norfolk was accused of being an accessory to the alleged treasonable activities of his son, Henry Howard, Earl of Surrey. Surrey was executed and Norfolk condemned, but before the sentence could be carried out Henry VIII died (January 1547). Norfolk remained in prison during the reign of the Protestant king Edward VI (reigned 1547–53); in August 1553, following the accession of Queen Mary (reigned 1553–58), a Roman Catholic, he was released and restored to his dukedom. He died in 1554 after failing to suppress the uprising, led by Sir Thomas Wyat, protesting the marriage of Mary I to King Philip of Spain.

•**Norfolk, Thomas Howard, 4th Duke of,** Earl of Surrey, Earl Marshal (b. March 10, 1538, Kenninghall, Norfolk, Eng.—d. June 2, 1572, London), English nobleman executed for his intrigues against Queen Elizabeth I on behalf of Mary Stuart, Queen of Scots, a Roman Catholic claimant to the English throne.

He was the son of Henry Howard, Earl of Surrey, who was put to death for alleged treasonable activities in 1547. Restored to his father's title on the accession of Queen Mary Tudor in 1553, he succeeded his grandfather as Duke of Norfolk in 1554. Norfolk was in favour with both Queen Mary and her successor, Elizabeth I. He commanded the English forces that invaded Scotland in 1559–60, and he presided over the commission that inquired in 1568 into the quarrel between Mary Stuart and Scotland's Protestant nobility.

Mary had just fled to England, where she became Elizabeth's prisoner. Norfolk listened readily to suggestions from the Scottish statesman William Maitland and others that the difficulties between England and Scotland could be resolved if Norfolk would wed Mary and have her declared Elizabeth's successor. Norfolk, however, was neither bold enough to ask Elizabeth's consent for the match nor disloyal enough to raise an insurrection against her.

Thomas Howard, 4th Duke of Norfolk, detail of a portrait by Sir Anthony More; in a private collection

Courtauld Institute of Art, London

Instead, several Roman Catholic nobles in northern England revolted in an attempt to free the Queen of Scots, marry her to Norfolk, and restore Roman Catholicism to England. The uprising was suppressed, and in October 1569 Elizabeth had Norfolk arrested. He was released the following August, but he soon allowed himself to be drawn into the plot of Roberto Ridolfi, an Italian merchant living in London, for a Spanish invasion of England and installation of Mary on the English throne. Discovery of the plot led to Norfolk's imprisonment and execution.

BIBLIOGRAPHY. Neville Williams, *Thomas Howard, Fourth Duke of Norfolk* (1964, reissued 1989 as *A Tudor Tragedy*).

•**Norfolk, Thomas Howard, Earl of:** *see* Arundel, Thomas Howard, 2nd (or 14th) Earl of.

Norfolk and Western Railway Company, major American railroad that dates back to an eight-mile single-track predecessor line opened in 1838 to connect Petersburg and City Point (now Hopewell), Va.

In 1870 the City Point Rail Road and others were consolidated as the Atlantic, Mississippi and Ohio Railroad. In 1881 the system was reorganized as the Norfolk and Western Railroad, and in 1896 it was incorporated under its current name.

Expansion took it to Chicago, St. Louis, Kansas City, Omaha, Detroit, and Montreal with lines running chiefly east and west to 16 states and two Canadian provinces. The rival Virginian Railroad was absorbed in 1959, and in 1964 it acquired three more lines, including the New York, Chicago and St. Louis Railroad Company (the Nickel Plate). It merged with Southern Railway Company in 1982, both railways becoming subsidiaries of the newly created holding company Norfolk Southern Corporation.

The main source of traffic results from carrying the immense coal output of the West Virginian coalfields. Other sources of freight revenue are grain, chemicals, and automobiles and automotive parts. The road held out against converting from steam to diesel power for a decade longer than other railroads, but it finally converted in 1960.

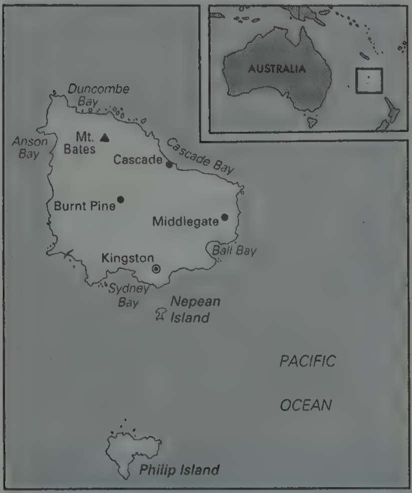
Norfolk four-course system, method of agricultural organization established in Norfolk county, England, and in several other counties before the end of the 17th century; it was characterized by an emphasis on fodder crops and by the absence of a fallow year, which had characterized earlier methods.

In the Norfolk four-course system, wheat was grown in the first year, turnips in the second, followed by barley, with clover and ryegrass undersown, in the third. The clover and ryegrass were grazed or cut for feed in the fourth year. The turnips were used for feeding cattle and sheep in the winter. This new system was cumulative in effect, for the fodder crops eaten by the livestock produced large supplies of previously scarce animal manure, which in turn was richer because the animals were better fed. When the sheep grazed the fields, their waste fertilized the soil, promoting heavier cereal yields in following years.

The system became fairly common on the newly enclosed farms by 1800, remaining almost standard practice on most British farms for the best part of the following century. During the first three quarters of the 19th century, it was adopted in much of continental Europe.

Norfolk Island, external territory of Australia, in the southwestern Pacific Ocean, 1,041 miles (1,676 km) northeast of Sydney. The island, with an area of 13 square miles (35 square km), is about 5 miles (8 km) long and 3 miles (5 km) wide. It is volcanic in origin, and its generally rugged terrain, with a mean elevation of 360 feet (110 m) above sea level, rises to Mount Bates (1,047 feet [319 m]) and Mount Pitt (1,043 feet [318 m]). Kingston, in the south, is the main settlement and administrative centre.

Physical and human geography. The island, composed of flows of basalt lava lying horizontally and overlaid in most places by lateritic soil, rises precipitously (with some cliffs reaching heights of more than 300 feet [90 m] above sea level) from an extensive submarine ridge. Kingston and the landing place at Cascade on the northern side of the island are among the few points where the coast is not bound by cliffs. The soil, although fertile, is easily eroded if stripped of its vegetation cover. Temperatures average 60° F (15° C), and rainfall exceeds 50 inches (1,300 mm) annually. Two smaller islands, Philip (a volcanic pinnacle rising to 900 feet [275 m]) and Nepean (a limestone formation), lie off the southern shore. Although much of the land has been cleared for cropping and pasture, the once-dominant Norfolk Island pines (species *Araucaria excelsa,* or *A. heterophylla*) remain a notable feature of the landscape. The island has a wide variety of flora; fauna includes geckos, bats, turtles, plentiful fishes, and numerous seabirds.



Norfolk Island

The island's population includes the descendants of mutineers from the HMS *Bounty* who were transferred from Pitcairn Island in 1856, as well as descendants of later settlers, mostly from Australia and New Zealand. About one-third of the present population may claim lineal descent from the Pitcairners. Strong Polynesian characteristics and residual traits and customs persist on the island, and a distinctive society has developed, based on neighbourliness, self-help, barter, and respect for authority. Immigration is now strictly controlled.

Since the mid-1960s the major economic activity of Norfolk Island has been tourism; many of the islanders are employed in the operation of hotels, duty-free stores, and other aspects of the industry. About 30,000 or more tourists (many of them from New Zealand) visit the island annually. Subsistence farming produces Kentia palm seed, cereals, fruits, and vegetables. Livestock grazing and fishing are also important locally. Foodstuffs are imported from Australia and New Zealand, mainly for the tourist trade; fuels and consumer goods are also imported. Seed of the Norfolk Island pine is exported, and there is a forestry program to increase the island's resource of pines. Budgetary revenue comes mostly from the sale of stamps and from customs duty and liquor sales (a government monopoly). The island has about 50 miles (80 km) of motor roads and an airport for passenger and air freight service with Australia and New Zealand.

The administrator of Norfolk Island is appointed by the governor-general of Australia. Under the Norfolk Island Act of 1979, the territory has an elected nine-member legislative assembly. An executive council is composed of the executive members of the legislative assembly who have ministerial-type responsibilities. The act continues Australia's responsibility for the island as a territory under its authority and provides that consideration will be given to an extension of the powers of the legislative assembly. The judiciary consists of the island's Supreme Court and a Court of Petty Sessions. Education is free and compulsory for children between 6 and 15 years of age. Teachers for the island's school are provided by the New South Wales Department of Education. There is a small hospital on Norfolk Island.

History. The English navigator Captain James Cook discovered the uninhabited island in 1774 and, impressed by the abundance of local flax (species *Phormium tenax*) and the potential of the indigenous pines to provide ships' masts, named the island for the Duke of Norfolk. It became the second British possession in the Pacific when it was claimed by the Australian colony of New South Wales in 1788 and settled by a small party, including 15 convicts. After 26 years as a British penal colony, with a maximum of 1,100 convicts and free settlers, the island was abandoned in 1814 and the population removed mostly to Van Diemen's Land (now Tasmania).

Ruined officers' quarters of the former penal settlement at Kingston on Norfolk Island

Photographic Library of Australia

Reestablished as a penitentiary (1825–55) for the reception of the most desperate criminals from the British convict settlements in Australia, Norfolk Island became notorious as a place of merciless discipline and punishment. The evacuation again of all convicts to Tasmania resulted as much from the difficulty of supervising administrators as from the difficulty of supervising the prisoners. In 1856 the population of Pitcairn Island, descendants of the mutineers from the HMS *Bounty*, was resettled on Norfolk. Not all of the islanders settled happily on Norfolk; two small parties returned to Pitcairn. Norfolk Island was originally made "a distinct and separate settlement" from the mainland colonies on June 24, 1856. Rapidly the islanders established their own systems of land tenure and society generally. In 1897 Britain conferred administrative status on the governor of New South Wales, though the island remained a separate British colony.

In 1913, under the Norfolk Island Act (effective 1914), the colony became a territory of the commonwealth, but the precise constitutional relationship with Australia was never the subject of complete agreement. An airfield constructed on the island during World War II gave Norfolk a link with the outside world. A royal commission in 1975 undertook clarification of the status of Norfolk Island, and the present administrative system was established in 1979. Pop. (1992 est.) 1,900.

Norfolk Island pine (species *Araucaria excelsa,* or *A. heterophylla*), evergreen timber and ornamental conifer of the family Araucariaceae, native to Norfolk Island, situated in the South Pacific Ocean between New Caledonia and New Zealand. In nature this pine grows to a height of 60 m (200 feet), with a trunk sometimes reaching 3 m (10 feet) in diameter.

Norfolk Island pine (*Araucaria excelsa*)

Robert C. Hermes from The National Audubon Society Collection/Photo Researchers

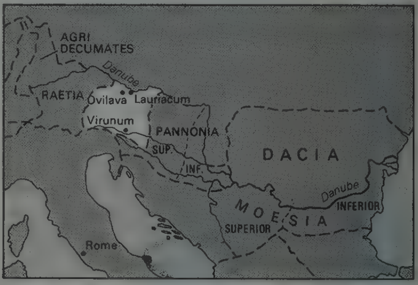
The wood of large trees is used in construction, furniture, and shipbuilding. The sapling stage is grown throughout the world as a houseplant and as an outdoor ornamental in regions with a Mediterranean climate.

Norge: *see* Norway.

nori (algae): *see* laver.

Noric Alps, German NORISCHE ALPEN, segment of the Eastern Alps extending across southern Austria between the Hohe Tauern range and Katschberg Pass (west) and the city of Graz on the Mur River (east). With the Drava River to the south and the upper Mur River to the north, the mountains rise to Eisenhut (8,008 feet [2,441 m]) and consist of several subranges, the highest of which are the Gurkthaler Alpen in the west. Summer resorts and some skiing centres are within the range.

Noricum, region of Europe north of what is now Italy, roughly comprising modern central Austria and parts of Bavaria, Ger. Noricum was originally a kingdom controlled by a Celtic confederacy that dominated an earlier Illyrian population. It reached its greatest extent during the early period: on the east it included Carnuntum (about 20 miles [32 km] east of Vindobona [now Vienna]), Savaria (Szombathely, Hung.), Poetovio (Ptuj, Slovenia), and Emona (Ljubljana, Slovenia), together with the portion of the tribe of the Taurisci that lived near the source of the Sava River. Noricum was annexed by Rome, apparently as a bloodless conquest, about 15 BC, and the new province was placed under an equestrian governor, first called a *praefectus* but from Claudius' time a *procurator.* As a Roman province its western boundary, against Raetia, was approximately the Inn River; in the south it met Italy at the summit of the Carnic Alps; and in the east, at least by Tiberius' time, the frontier with Pannonia was a line running south from a point west of Vindobona. Noricum received Roman protection in the late 2nd century BC and, with wealth derived from its mineral resources (iron and gold), was able to develop a markedly Romanized culture (evident from Latin legends on coins and other Latin inscriptions. Five of its communities were made into Roman *municipia* by the emperor Claudius (reigned AD 41–54), and the province supplied many soldiers for legions and the Praetorian Guard. Crude iron was exported to Italy, especially to Aquileia, and there were also steel manufactures in the province.



Noricum in the time of Augustus

Adapted from R. Treharne and H. Fullard (eds.), *Muir's Historical Atlas: Ancient, Medieval and Modern*, 9th ed. (1965); George Philip & Son Ltd., London

After the barbarian invasion of 167, the frontier was reorganized. Under the later empire Noricum suffered severely from raids by Alamanni and other tribes. Franks and Rugi settled Noricum before the end of the 5th century AD.

Noriega (Morena), Manuel (Antonio) (Feb. 11, 1938, Panama City, Pan.), Panamanian military leader, commander of the Panamanian Defense Forces (1983–89), who, for the years of his command, was the actual power behind the civilian president.

Noriega was born into a poor family of Colombian extraction. Educated at one of the top high schools in Panama, he took a scholarship to the Military School de Chorrios in Lima, Peru. Upon his return to Panama, he was commissioned a sublieutenant in the National Guard (Guardia Nacional) and stationed in Colón, where he became acquainted with Captain Omar Torrijos. Noriega was promoted to first lieutenant and was instrumental in the military coup that brought down the government of Arnulfo Arias and in a later coup attempt to unseat Torrijos. For his loyalty, Noriega was promoted to lieutenant colonel and was named chief of military intelligence, in which position he established contact with the U.S. intelligence service. His service to Richard Nixon's administration—helping, for example, to obtain the release of two American freighter crews from Havana, Cuba—was coloured by persistent reports of his involvement in drug trafficking. As the head of the Panamanian intelligence service, Noriega also was known for the tactics of intimidation and harassment that he used against opposition groups and their leaders; by the late 1970s he was considered to be the most feared man in Panama. When in 1981 Torrijos died in a plane crash, military and civilian leaders struggled to gain the upper hand. In 1983 Noriega succeeded to the command of the National Guard, unified the armed forces into the Panamanian Defense Forces, and promoted himself to the rank of general.

Charges against Noriega mounted in the mid-1980s over events connected with the blatant and brutal murder of Hugo Spadafora, a vocal opponent. Further evidence of the laundering of drug money and the sale of restricted American technology and information brought an inevitable conflict with the U.S. government to a head, particularly in light of the imminent transfer of power agreed upon in the Panama Canal Treaty. When in 1989 an attempted military coup against Noriega failed, the United States invaded Panama, chiefly for the purpose of capturing Noriega (which it succeeded in doing on Jan. 3, 1990) and bringing him to trial in the United States. In 1992, in a U.S. federal court, he was convicted of cocaine trafficking, racketeering, and money laundering.

Norilsk, city, Krasnoyarsk *kray* (region), central Russia, in the Rybnaya Valley amid the Putoran Mountains. Founded in 1935, Norilsk lies north of the Arctic Circle and is one of the world's leading producing centres for nickel and platinum. Copper is also mined. Power is supplied to Norilsk by hydroelectric plants on the Khantayka and Kureyka rivers, and natural gas is piped from northern Tyumen *oblast* (province). A railway links Norilsk to the port of Dudinka, situated on the Yenisey River. Pop. (1991 est.) 169,000.

norito, in the Shintō religious practices of Japan, words, or prayer, addressed by worshipers to a deity. The efficacy of prayer is founded on the concept of *koto-dama,* the spiritual power that resides in words. According to ancient belief, beautiful, correct words bring about good, whereas ugly, coarse language can cause evil. Accordingly, *norito* are expressed in elegant, classical language, typified by that found in the *Engi-shiki* ("Institutes of the Engi Period"), a 50-volume work compiled in the 10th century. Prayers usually include words of praise for the deities, lists of offerings, and petitions. During the period when State Shintō was under the control of political authorities, the wording of prayers recited at public shrines was determined by the government. At present, the chief priest of a shrine pronounces the *norito* on behalf of the worshipers, and the contents and wordings of the prayer may vary.

norm, also called SOCIAL NORM, rule or standard of behaviour shared by members of a social group. Norms may be internalized—*i.e.,* incorporated within the individual so that there is conformity without external rewards or punishments, or they may be enforced by positive or negative sanctions from without. The social unit sharing particular norms may be small (*e.g.,* a clique of friends) or may include all adult members of a society. Norms are more specific than values or ideals: honesty is a general value, but the rules defining what is honest behaviour in a particular situation are norms.

There are two schools of thought regarding why people conform to norms. The functionalist school of sociology maintains that norms reflect a consensus, a common value system developed through socialization, the process by which an individual learns the culture of his group. Norms contribute to the functioning of the social system and are said to develop to meet certain assumed "needs" of the system. The conflict school holds that norms are a mechanism for dealing with recurring social problems. The Marxian variety of conflict theory states that norms reflect the power of one section of a society over the other sections and that coercion and sanctions maintain these rules. Norms are thought to originate as a means by which one class or caste dominates or exploits others. Neither school adequately explains differences between and within societies.

Norm is also used to mean a statistically determined standard or the average behaviour, attitude, or opinion of a social group. In this sense it means actual, rather than expected, behaviour.

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Normal, town, McLean county, central Illinois, U.S. It adjoins Bloomington (south) and was called North Bloomington until 1857, when the Illinois State Normal (now Illinois State) University was established. The town grew up around the school. Normal is in one of the world's richest corn- (maize-) producing areas, and, in addition to the university, agriculture is an economic factor. There is some manufacturing, notably of tires. Normal is the site of the Illinois Soldier's and Sailor's Children's School (1869). Inc. 1865. Pop. (1990) town, 40,023; Bloomington-Normal MSA, 129,180.

normal distribution, also called GAUSSIAN DISTRIBUTION, the distribution function that is the indefinite integral of the normal density function, the graph of which is the typical bell-shaped normal curve. The specific form of the normal density function is a constant, k, times the exponential of the negative quadratic $-(x - x_0)^2/2\sigma^2$. The quantity x_0 is the mean, or average, of the distribution and also corresponds to the point at which the distribution function is a maximum. The quantity sigma (σ) is the standard deviation and characterizes the width of the distribution; the probability is about 68 percent that a given value will be found within the interval $x_0 - \sigma$ to $x_0 + \sigma$. The constant, $k = 1/\sigma\sqrt{2\pi}$, is called the normalizing coefficient and has the effect that the sum or integral of the distribution over all possible values of x will give a total probability of unity.

normal school, also called TEACHERS' COLLEGE, or TEACHER-TRAINING COLLEGE, institution for the training of teachers. One of the first schools so named, the École Normale Supérieure ("Normal Superior School"), which was established in Paris in 1794, was intended to serve as a model for other teacher-training schools; that institution later became affiliated with the University of Paris. The first public normal school in the United States was founded in Lexington, Mass., in 1839.

Normal schools were established chiefly to train elementary-school teachers. They were commonly state-supported and offered a two-year course beyond the secondary level. In the 20th century the tendency has been to extend teacher-training requirements to at least four years and, especially after World War II, for the schools to broaden their programs. Thus, by the 1960s most former normal schools had been absorbed into colleges or universities as departments or schools of education.

This assimilation of the normal school parallels the halting elevation of teaching to the status of a profession over the last 150 years. The normal school represented a forward step over the practice of assigning teaching responsibilities to the most deserving eighth-grade graduate in the early 1800s. In the 20th century, licensing requirements have stiffened considerably in public education, and salary increases and advancement often depend on the earning of advanced degrees.

Norman, member of those Vikings, or Norsemen, who settled in northern France (or the Frankish kingdom), together with their descendants. The Normans founded the duchy of Normandy and sent out expeditions of conquest and colonization to southern Italy and Sicily and to England, Wales, Scotland, and Ireland.

The Normans (from *Nortmanni:* "Northmen") were originally pagan barbarian pirates from Denmark, Norway, and Iceland who began to make destructive plundering raids on European coastal settlements in the 8th century. During the later 9th century their raids on the northern and western coastlands of France grew in scale and frequency, and the Vikings had secured a permanent foothold on Frankish soil in the valley of the lower Seine River by about 900. A Viking named Rollo, who had already won a reputation as a great leader of Viking raiders in Scotland and Ireland, soon emerged as the outstanding personality among the new settlers. In 911 the Frankish king Charles III the Simple made the Treaty of St. Clair-sur-Epte with Rollo, ceding him the land around the mouth of the Seine and what is now the city of Rouen. Within a generation the Vikings, or Normans, as they came to be known, had extended their rule westward to the districts of Lower Normandy. From then on until the mid-11th century, the history of the Normans in Normandy (*q.v.*) was marked by a line of ruthless and forceful rulers calling themselves counts, or dukes, of Normandy and struggling to establish political hegemony over the indigenous Frankish population of the region.

Despite their eventual conversion to Christianity, their adoption of the French language, and their abandonment of sea-roving for Frankish cavalry warfare in the decades following their settlement in Normandy, the Normans retained many of the traits of their piratical Viking ancestors. They displayed an extreme restlessness and recklessness, a love of fighting accompanied by almost foolhardy courage, and a craftiness and cunning that went hand in hand with outrageous treachery. In their expansion into other parts of Europe, the Normans compiled a record of astonishingly daring exploits in which often a mere handful of men would vanquish an enemy many times as numerous. An unequaled capacity for rapid movement across land and sea, the use of brutal violence, a precocious sense of the use and value of money—all these traits characterized the Normans.

From their settlements in Normandy the adventurous Normans embarked on several major expansionary campaigns in Europe. The most important of these was the invasion of England in 1066 by William, duke of Normandy, who became king of England upon the success of what is now known as the Norman Conquest (*q.v.*). Early in the 11th century, Norman adventurers also began a somewhat more prolonged and haphazard migration to southern Italy and Sicily, where they served the local nobility as mercenaries fighting the Arabs and the Byzantines. As more Normans arrived they carved out small principalities for themselves from their former employers. Among the most remarkable of these Norman adventurers were the sons of Tancred de Hauteville, who established their rule over the southern Italian regions of Calabria and Puglia (Apulia) in the 1050s and over Sicily in the following decades. Their possessions were amalgamated by Roger II, a grandson of Tancred, in the early 12th century as the kingdom of Sicily, whose rulers retained a basically Norman character until the last decades of that century.

Among the Norman traits regarded by their contemporaries as specially characteristic were their utterly unbridled character and their capacity for quick and fruitful imitation and adaptation. The former characteristic contributed to the production, by a process akin to natural selection, of lines of outstandingly able and ruthless rulers wherever a Norman state came into being. Many of the early Norman rulers of Normandy, England, and Sicily were among the most powerful and successful secular potentates of their age in western Europe in their ability to create political institutions that were both stable and enduring.

The Normans' capacity for imitation and adaptation was even more significant for the history of Europe. The Normans began as pagan destroyers bent upon plundering and slaughter. Forced to come to terms with the Carolingian and Capetian dynasties and to adopt French as their language and Christianity as their religion, they quickly became missionaries and proselytizers of the civilization that they had attacked and that had ultimately absorbed them. They quickly grasped the principles of Carolingian feudalism, and Normandy became in the 11th century one of the most highly feudalized states in western Europe.

The art of building castles was not a Norman invention, but the Normans became masters in the use of the simple yet enormously effective motte-and-bailey castle—a mound (motte) topped by a timber palisade and tower, surrounded by a ditched and palisaded enclosure (bailey). These little fortifications, which were complementary to the warfare conducted in open country by small units of cavalry, became the hallmark of Norman penetration and conquest. Again, although the Normans were at first novices and imitators in the practice of fighting on horseback, they soon became masters of cavalry warfare as it was then practiced in continental Europe. Mounted on much the same breed of war horse as his Frankish, Angevin, or Breton opponent, wearing the heavy mail hauberk that was standard among the warriors of northwestern Europe, protected by a conical helmet and a kite-shaped shield, and armed with a long, broad-bladed sword and a slender lance, the Norman cavalryman proved on countless occasions that he could outfight and overwhelm the most powerful forces brought against him. To some extent, no doubt, this was due to the importance which the Norman knightly class attached to the training of young warriors. They eagerly adopted the carefully fostered cult of knighthood which had grown up in the old Carolingian empire in the 10th and 11th centuries. But Norman knights were also fierce and brutal soldiers who had received an arduous training that left little room for the feelings of humanity and mercy with which Christian teaching was later to endow the concept of chivalry.

Just as the Normans became the typical exponents of Carolingian feudalism and of cavalry and castle warfare, so they also became in part the exponents and champions of religious orthodoxy. Under the patronage of the ducal house of Normandy, religious life in the province flourished, and a number of Norman monasteries became renowned centres of Benedictine life and learning. This was chiefly due to the encouragement given to non-Norman scholars and reformers to make their home in Normandy. The great religious and ecclesiastical revival that marks 11th-century Normandy found another expression in the popularity among the Normans of pilgrimages to Rome and to the Holy Land. This yearning for pilgrimages was one of the factors responsible for the Norman conquest of southern Italy. Many Norman nobles journeyed to the Mediterranean inspired by a naive mixture of religious devotion, a love of adventure, and a desire for fresh conquests. Surprisingly, though, the part played by the Normans in the early Crusades was relatively slight, consisting chiefly of the erection of the short-lived principality of Antioch by Norman nobles in the 12th century.

The Normans were quick to imitate whatever they saw, and this faculty of imitation is evident in all the different countries where the Normans settled. But Norman imitation was never slavish, and is certainly not the whole story of Norman achievement. A truer explanation of Norman success would be that they combined a boundless self-confidence with a marked capacity for adapting to their own purposes the institutions they found in newly won territories. Thus, in Puglia and Sicily their control was based on faith in their own military superiority, their strategic use of castles and harbours, and their importation of feudalism to govern the relations of the count or king with his more important subjects. In government, however, they adopted the highly advanced and largely literate techniques already developed by the Byzantine Greeks and the Muslims.

In England the Normans similarly brought their own brand of feudalism and their own ideas of strong personal government and fiscal institutions. But there too they adopted many of the existing institutions and customs. Even at the end of Henry I's reign (1135) in England the whole structure of royal government remained fundamentally Anglo-Saxon—monarchy, king's council, royal seal and writing office, the shire system and the sheriffs, the twofold revenue system consisting of the produce of royal estates compounded into annual cash payments and a direct tax levied on the landowning class, all originated before the Norman Conquest. But under Norman direction, and with a number of Norman innovations such as the exchequer, the itinerant justices, and the sworn inquest, this system worked much more efficiently after 1066 than before, and, a fact of equal importance, England was made safe from foreign invasion. Norman influence on the church in England also worked powerfully in the direction of better organization and discipline. The role of the Normans in Europe in the 11th and 12th centuries may be summarized in saying that by their fierce energy and enterprise, they extended the practice of centralized authoritarian rule, feudalism, cavalry warfare, and religious reform.

Norman, city, seat (1907) of Cleveland county, central Oklahoma, U.S. The city is located on the South Canadian River, immediately southeast of Oklahoma City. Beginning as a tent city in April 1889 when Oklahoma was opened to white settlement, it was named for Abner Norman, a Santa Fe Railway engineer. Its development was assured when the University of Oklahoma was established there in 1892 on land donated by its citizens. A marketing and distribution point for an extensive agricultural area, the city also has some light industry; there are oil and gas wells in the vicinity. The Central Oklahoma Mental Health Institute and the nearby Tinker Air Force Base are additional economic assets. Inc. 1891. Pop. (1990) 80,071.

The Bizzell Memorial Library, University of Oklahoma, Norman

Bob Taylor—EB Inc.

Norman, Jessye (b. Sept. 15, 1945, Augusta, Ga., U.S.), American operatic and concert singer.

Having sung informally since childhood, Norman won a scholarship to Howard University (Washington, D.C.) to study voice. She graduated in 1967 and received further musical training at the University of Michigan. After winning the Bavarian Radio Corp. International Music Competition in 1968, Norman made her operatic debut as Elisabeth in Wagner's *Tannhaüser* in 1969 in Berlin. The beauty, range, and flexibility of Norman's vibrant soprano voice assured her further operatic engagements, the most notable being the title role in *Aïda* in productions in Berlin and at La Scala in Milan and the role of Cassandra in Berlioz' *Les Troyens* (*The Trojans;* Covent Garden, 1972). Besides her operatic performances, she toured throughout the 1970s, giving recitals of works by Wagner, Schubert, Mahler, and other composers at music festivals and in concerts with major orchestras. Norman gradually achieved increased control over her voice, and by the mid-1980s she was one of the most popular and highly regarded dramatic soprano singers in the world.

Norman Conquest, the military conquest of England by William, duke of Normandy, primarily effected by his decisive victory at the Battle of Hastings (Oct. 14, 1066), and resulting ultimately in profound political, administrative, and social changes in the British Isles.

Edward the Confessor, last king of the Old English royal line, had almost certainly in 1051 designated William as his successor. Although on Edward's death (Jan. 5, 1066) Harold, the powerful earl of Wessex, had himself crowned king, his position was far from secure. On the Continent the political situation favoured William's enterprise; and by August 1066 he had assembled a force of about 5,000 knights ready for embarkation.

Harold had kept his militia on guard throughout the summer; in early September, with supplies exhausted, it was dismissed. Harold had then to hasten to Yorkshire, where at Stamford Bridge (September 25) he defeated an invading army led by Harold III Sigurdsson, king of Norway.

The northerly wind, which for eight weeks had penned William's transports in harbour, changed on September 27. William crossed the Channel immediately, landing in Pevensey Bay on September 28 and moving directly to Hastings. Harold made a forced march southward and by October 13 was approaching Hastings with about 7,000 men, many poorly armed and untrained. He was almost certainly unwise in thus forcing an early engagement. Surprised by William at dawn on October 14, he drew up his army on a ridge 10 miles (16 km) northwest of Hastings. Throughout the day William attacked with cavalry charges interspersed with flights of arrows. The English were gradually worn down; late in the afternoon Harold was killed by a chance arrow, and by nightfall the remaining English had scattered and fled.

William then made a sweeping advance to isolate London, and at Berkhamstead the major English leaders submitted to him. He was crowned in Westminster Abbey on Christmas Day 1066. Sporadic native revolts continued until 1071. The most serious, in Northumbria (1069–70), William suppressed in person, proceeding thereafter to devastate vast tracts of the North. The subjection of the country was completed by the rapid building of a great number of castles.

The extent and desirability of the changes brought about by the Conquest have long been disputed among historians. Certainly in political terms William's victory destroyed England's links with Scandinavia, bringing the country instead into close contact with western Europe. Inside England the most radical change was the introduction of military feudalism. While tenure of land in return for services had existed before the Conquest, William's establishment of a system that would provide him with upward of 4,000 knights for his feudal host revolutionized the upper ranks of society. England was parceled out among about 180 Norman tenants in chief and innumerable mesne tenants, all holding their fiefs by knight service. The resultant almost total replacement of an English with a Norman aristocracy was paralleled by a similar change of personnel among the upper clergy and administrative officers.

Anglo-Saxon England had developed a highly organized central and local government and an effective judicial system. All these were retained and utilized by William, whose coronation oath showed his intention of continuing in the English royal tradition. The old administrative divisions were not superseded by the new fiefs; nor did feudal justice normally usurp the customary jurisdiction of shire and hundred courts. In them, and in the king's court, the common law of England continued to be administered. Innovations included the new but restricted body of "forest law" and the introduction in criminal cases of the Norman trial by combat alongside the old Saxon ordeals. Increasing use was made of the inquest procedure—the sworn testimony of neighbours, both for administrative purposes and in judicial cases. A major change was William's removal of ecclesiastical cases from the secular courts, which allowed the subsequent introduction into England of the then rapidly growing canon law.

Apart from the tragedy of the dispossessed Old English aristocracy, probably the most regrettable effect of the Conquest was the total eclipse of the English vernacular as the language of literature, law, and administration. Superseded in official documents and other records by Latin and then increasingly in all areas by Norman-French, written English hardly reappeared until the 13th century.

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Norman River, river rising in the Gregory Range of the Eastern Highlands of Queensland, Australia, and flowing for 260 miles (420 km) northwest through level country to the Gulf of Carpentaria at Karumba, a centre for the prawning industry. For long stretches the river flows through tropical forests with many cattle stations. About 55 miles (88 km) from its mouth is the township of Norman, which can be reached by small ships. The Norman is fed by the Carron, Yappar, and Clara rivers and may be perennial only in its lowest reaches.

Norman style, Romanesque architecture that developed in Normandy and England between the 11th and 12th century and during the general adoption of Gothic architecture in both countries. Because only shortly before the Norman Conquest of England (1066) did Normandy become settled and sophisticated enough to produce an architecture, the Norman style developed almost simultaneously in the two countries; early buildings, erected soon after the Conquest, are extremely similar. Eventually, however, the styles of the two countries diverged, and the architecture of Normandy drew closer in form to typical French Romanesque, whereas that of England (called Anglo-Norman architecture) became a much more distinctive national tradition.

The common early Norman style followed the general Romanesque features of massive construction based on the rounded arch and on additive spatial compartmentalization; the building type was a Romanesque elaboration of the Early Christian basilica plan (longitudinal with side aisles and an apse, or semicircular projection of the eastern, or sanctuary, end of the centre aisle)—a raised nave (centre aisle) with windows piercing the upper walls (clerestory), a tripartite interior articulation of the nave into a lower arcade (separating nave from side aisles), a triforium arcade (separating the upper nave from galleries above the side aisles), and the clerestory, transepts (forming a transverse aisle crossing the nave in front of the sanctuary), and a western facade completed by two towers. The definitive example of the early Norman style is the Church of Saint-Étienne at Caen (begun in 1067), which provided a close model for the later English cathedrals of Ely (*c.* 1090), Norwich (*c.* 1096), and Peterborough (*c.* 1118), all of which, however, show the peculiarly English characteristic of increased scale. Later Norman architecture in Normandy was characterized by careful structural articulation and elaboration of tower and spire.

Nave of Saint-Étienne, Caen, Fr., Norman style, begun 1067

Jean Roubier

Later Anglo-Norman architecture, though basically an extension of the earlier Norman style, was also affected by influences from other areas and by an increasingly distinct indigenous approach to construction. The chief characteristics of this English architecture are enormously long church plans, massive, dignified appearance (particularly in the frequent use of great round columns sometimes as wide as the spaces between them in the lower nave arcade), and a relative indifference to structural logic. This indifference was expressed in a wide variation of nonessential structural detail (as in the varying proportions of the three stories of the nave and the occasional addition of a fourth story) and in a tendency to encrust masonry surfaces with shallow geometric and interlaced ornamentation that obscured rather than elucidated basic structure.

With the exception of smaller parish churches, which preserved the Saxon decorative tradition, figural sculpture was rare. Most Anglo-Norman churches had timber roofs instead of the usual Romanesque rounded stone vaults; the notable exception is Durham Cathedral, the nave and choir of which (*c.* 1104) are supported by the first known examples of pointed ribbed vaults (which cross at the top and carry the weight of the building to a skeletal structure of vertical shafts), anticipating by nearly a century the general adoption of what was to become the characteristic feature of Gothic construction. A squared-off eastern end instead of a rounded apse is standard in English Gothic architecture. In addition to the cathedrals of Ely, Norwich, Peterborough, and Durham, the major churches begun in the Anglo-Norman style are Canterbury (*c.* 1070), Lincoln (*c.* 1072), Rochester (*c.* 1077), St. Albans (*c.* 1077), Winchester (*c.* 1079), Gloucester (*c.* 1089), and Hereford (*c.* 1107) cathedrals, Southwell Minster (11th century), and the abbey church at Tewkesbury (*c.* 1088). Less closely related to the main Anglo-Norman tradition but important in their own right are the many Cistercian abbeys built during the Romanesque period in England—among them, Rievaulx (*c.* 1132), Fountains Abbey (*c.* 1135), Kirkstall (*c.* 1152), Buildwas (*c.* 1155), Byland Abbey (*c.* 1175), and Furness (*c.* 1175).

Normanby Island, one of the D'Entrecasteaux Islands, 10 miles (16 km) across Goschen Strait from the eastern tip of Papua New Guinea, in the Solomon Sea, southwestern Pacific Ocean. Normanby Island lies southwest across Dawson Strait from Fergusson Island. Volcanic Normanby, measuring 45 miles (72 km) by 12–15 miles (19–24 km), has a total land area of 400 square miles (1,000 square km) and rises to 3,600 feet (1,100 m) in the Prevost Range. Sewa Bay deeply creases the west coast and Sewataitai Bay the east. The island was visited in 1873 by British Captain John Moresby, who named it after the Marquess of Normanby, governor of Queensland (1871–74) in Australia. It may have been a secret British military base during World War II. Having once produced gold, Normanby now exports copra and some timber.

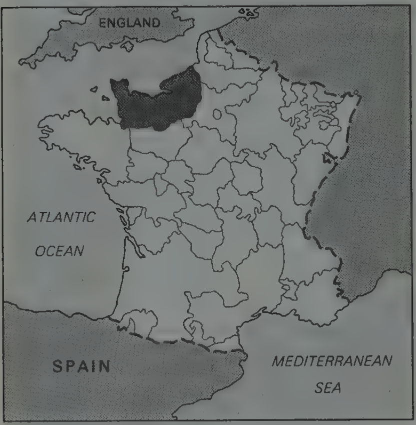
Midway between Normanby and Fergusson Island to the north is Dobu Island, whose inhabitants have been the subject of several anthropological studies. Pop. (1980 prelim.) Normanby and Dobu, 12,817.

Normandes, Îles: *see* Channel Islands.

Normandie, Louis-Charles, duc de (duke of): *see* Louis XVII *under* Louis (France).

Normandy, French NORMANDIE, historic and cultural region encompassing the northern French *départements* of Manche, Calvados, Orne, Eure, and Seine-Maritime and coextensive with the former province of Normandy.

Ancient history. The Seine and Eure valleys were inhabited from paleolithic times. Their Celtic inhabitants were conquered by Julius Caesar in 56 BC, and the region eventually became the Roman province of Gallia Lugdunensis Secunda. Its inhabitants were Christianized in the 3rd and 4th centuries AD and passed under Merovingian Frankish rule in the late 5th century, becoming part of the Frankish kingdom of Neustria.



The *gouvernement* of Normandy in 1789

The Normandy coast was repeatedly devastated by raids of the Vikings, or Northmen, from the 8th century on, and as its Carolingian rulers became weaker, the Vikings penetrated farther inland in the course of their depredations. Finally the French king Charles III the Simple ceded the territory around Rouen and the mouth of the Seine River to Rollo, the chief of the largest band of Vikings, in the Treaty of St. Clair-sur-Epte (911). Rollo's Scandinavian countrymen immigrated in large numbers to settle the country, and they adopted the French language, customs, and religion. These Vikings became known as Normans, and the region they settled became known as Normandy. Rollo's Christianized successors to the dukedom of Normandy acquired neighboring territories in a series of wars, becoming so powerful that the control they exercised over their domains was practically independent of the French crown. William, duke of Normandy and a distant successor to Rollo, mounted an invasion of England in 1066, becoming William I of England (William the Conqueror) and thus uniting the rule of England and Normandy in himself. When William died in 1087, the personal union of Normandy and England was broken as his sons disputed the succession. Their fraternal quarrels ended in 1106, when one son, Henry I, king of England, defeated his brother, Robert, duke of Normandy, in the Battle of Tinchebrai, after which the succession in Normandy temporarily passed to the English kings. However, in 1144 Geoffrey Plantagenet, count of Anjou, conquered Normandy. In 1150 he ceded the duchy to his son Henry, who later became king of England as Henry II in 1154.

In this way Normandy became part of the so-called Angevin (from Anjou) empire, which was a series of far-flung territories ruled by Henry II and succeeding English kings. But Normandy thus also became a primary objective for the Capetian kings of France in their struggle against the Plantagenet Angevins of England. The military and diplomatic struggles of the French Capetian monarchs Louis VII and Philip II Augustus to gain control of the region from its English Angevin rulers culminated in the complete conquest and annexation of Normandy by Philip in 1204. However, it was only with the Treaty of Paris (1259) that the English crown in the person of Henry III formally surrendered its claim to Normandy, thus acknowledging the loss of the duchy to France. The English subsequently reconquered Normandy in the early 15th century during the Hundred Years' War, but the French again recovered it, achieving permanent control in 1450 after their victory in the Battle of Formigny.

The French province. Louis XI of France gave the duchy of Normandy to his brother Charles in 1465 but soon took it back and finally persuaded the French estates-general at Tours in 1468 to declare Normandy inalienable from the French crown. Thereafter Normandy was governed as a province.

Louis XIV's intendants worked to assimilate Normandy's institutions to those of France and to promote its commerce and its maritime activity. The revocation of the Edict of Nantes (1685) led to a mass emigration of Huguenots, who had contributed greatly both to the economy and to the navy, but even so Normandy soon recovered its prosperity in the 18th century. In 1791 the French Revolutionary government divided the old province of Normandy into the *départements* of Manche, Calvados, Orne, Eure, and Seine-Inférieure (now Seine-Maritime). The name Normandy occurs in the history of World War II as the site of the Allied invasion of German-occupied France in June of 1944.

Normandy is a region of flat grasslands and farmlands interrupted by gentle hills and the hedges that commonly serve to demarcate fields. The principal economic activities are farming, cattle raising, fishing, and tourism. The historic capital of Rouen produces textiles, while the ports of Cherbourg and Le Havre are shipbuilding and trading centres supplemented by textile and oil-refining industries. Much of the rural populace of the plains of eastern Normandy tends to be concentrated in large villages. Farms are ordinarily small, though emigration from the countryside has increased the consolidation of farmland.

Roman Catholicism predominates, though there were many converts to Protestantism after 1528. Protestant enclaves remain in Rouen, Caen, and the village of Luneray in Seine-Maritime. The influence of the Roman Catholic Church is still highly visible in the traditional life of the region, particularly in the activities of the brotherhoods of charity sponsored by many country churches. Normandy has many historic fairs and festivals, including an international festival of music and folklore in the town of Gisors in early July.

The names of Norman places and families show Nordic, Anglo-Saxon, and Frankish influences. The Norman patois, which incorporates a number of English expressions and words of Nordic derivation, is in decline.

Norman cuisine relies heavily on cream, which is served with eggs, fish, poultry, and vegetables. Calvados produces superlative apple cider, which is aged with nuts in small oaken barrels or distilled into the celebrated apple brandy that bears its name.

Normandy, HOUSE OF, English royal dynasty that provided three kings of England: William I the Conqueror (reigned 1066–87) and his sons, William II Rufus (reigned 1087–1100) and Henry I Beauclerc (reigned 1100–35). During their reigns and the reigns of their immediate successors, England bore the aspect of a conquered country, administered largely by men whose political conceptions were French, under kings whose personal interests were centred in France.

William, the only (and bastard) son of Robert I the Devil, duke of Normandy, succeeded to the dukedom in 1035 and sometime later, perhaps in 1051, received from his English kinsman, King Edward the Confessor, a promise of the English succession. Two years later he strengthened the claims that he had thus established by marrying Matilda of Flanders, who traced her descent in the female line from King Alfred the Great. About 1064, another possible claimant, Harold, visited the Norman court and added another link to William's connection by promising to support William's claims upon the English succession. However, upon the Confessor's death in 1066, Harold secured his own coronation. William mounted an invasion force, delivered a crushing defeat on Harold at the Battle of Hastings (October 14), and on Christmas Day was crowned at Westminster.

The succession proceeded in order to William's two sons, but, after Henry I's only son, William the Aetheling, was drowned in the White Ship (1120), Henry declared his daughter, the empress Matilda, to be his heir. At his death in 1135, however, Stephen of Blois, grandson of William I through his daughter Adela, claimed the throne. Stephen's reign (constituting that of the English royal House of Blois) was occupied by his wars with the supporters of Matilda. Finally, by the Treaty of Wallingford (1153), Stephen was allowed to retain his kingship for life, but the succession was designated for Matilda's son, Henry of Anjou, who in 1154 became Henry II, first of the House of Plantagenet, or Anjou.

Normandy Invasion, also called OPERATION OVERLORD, the Allied invasion of northern Europe that began on June 6, 1944.

As the tide of battle in World War II began to turn in favour of the Allies, the U.S. Gen. Dwight D. Eisenhower had the task of forming the largest invasion fleet in history in order to effect an amphibious landing on the northern coast of France. If successful, the landing would be the starting point for a massive Allied thrust eastward through France and on into the heart of Nazi Germany. While the invasion plans were being formed by American and British commanders in England, Field Marshal Erwin Rommel, the German commander charged with resisting the expected invasion, was strengthening the German defensive fortifications on the coastline of France by the construction of underwater obstacles, bombproof bunkers. and minefields.

The invasion of northern France from England was launched not in May, as its planners had initially prescribed, but on June 6, the famous "D-Day" of World War II. A huge armada had been assembled, including 1,200 fighting ships, 10,000 planes, 4,126 landing craft, 804 transport ships, and hundreds of amphibious and other special purpose tanks; 156,000 troops (73,000 U.S. and 83,000 British or Canadian) were landed in Normandy, 132,500 of them seaborne across the Channel, 23,500 airborne. The beaches chosen for the landings stretched from the estuary of the Orne to the southeastern edge of the Cotentin Peninsula, the British, with the Canadians, taking the eastern beaches, the Americans the western. The ground forces for the initial assault, under British Gen. Sir Bernard Montgomery's direction, comprised: (1) the Canadian 1st Army under Lieut. Gen. H.D.G. Crerar, the British 2nd Army under Lieut. Gen. Sir Miles Dempsey, and the British 1st and 6th Airborne divisions; and (2) the U.S. 1st Army and the U.S. 82nd and 101st Airborne divisions under Lieut. Gen. Omar N. Bradley.

Delayed 24 hours by the worst Channel weather in 25 years, the invasion began before dawn on June 6 with units of the U.S. 82nd and 101st Airborne divisions making night landings near the town of Saint-Mère-Église, while British commando units captured key bridges and knocked out Nazi communications. In the morning, the assault troops of the combined Allied armies landed at five beaches along the Normandy coast code-named Utah, Omaha, Gold, Juno, and Sword. While four beaches were taken easily and quickly, the forces landing at "Bloody Omaha" encountered stiff German resistance. By nightfall, sizable beachheads had been secured on all five landing areas, and the final campaign to defeat Germany was under way.

The Allies' supremacy in the air was pivotal.

Their air forces destroyed most of the bridges over the Seine to the east and the Loire to the south, thus preventing the Germans from quickly reinforcing their beleaguered forward units at the beachheads.

In the original plan, the British forces were to take Caen on the first day of the landing. The coastal defenses were overcome by 9 AM, but the advance inland to Caen did not start until afternoon, partly because of a paralyzing traffic jam on the beaches and partly because of the excessive caution of the commanders on the spot. When they eventually pushed on toward Caen, a Panzer division—the only one in the invasion area—arrived and checked their progress. A second Panzer division came up next day. More than a month of heavy fighting passed before Caen was at last secured and cleared on July 9. In the western sector, meanwhile, the Americans faced serious resistance in the Cotentin but finally took the crucial port of Cherbourg on June 26.

The Germans' main handicap was that they had 3,000 mi of western European coastline to cover, and half of The Netherlands to the Italian mountain frontier. Their 59 divisions in Western Europe were of a static type and were anchored to sectors of that long coastline. But the other half were field divisions, and of these the ten Panzer divisions were highly mobile. Thus the Germans had the possibility of concentrating overwhelming superiority to throw the invaders back into the sea before they became established. However, any such strong and prompt counterstroke was frustrated by discord in the German high command, both about the probable site of the invasion and about the best method of meeting it. Before the event, Hitler's intuition proved better than his generals' calculation in gauging where the Allies would land. After the landing, his continual interference and rigid control deprived his generals of the chance of retrieving the situation and eventually enabled the Allied forces to break out of their initially confined position and begin their rapid sweep across France.

normative ethics, that part of moral philosophy, or ethics, concerned with criteria of what is morally right and wrong. It includes the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like.

The central question of normative ethics is determining how basic moral standards are arrived at and justified. The answers to this question fall into two broad categories—deontological and teleological. The principal difference between them is that deontological theories do not appeal to value considerations in establishing ethical standards, while teleological theories do. Deontological theories use the concept of their inherent rightness in establishing such standards, while teleological theories consider the goodness or value brought into being by actions as the principal criterion of their ethical value. In other words, a deontological approach calls for doing certain things on principle or because they are inherently right, whereas a teleological approach advocates that certain kinds of actions are right because of the goodness of their consequences. Deontological theories thus stress the concepts of obligation, ought, duty, and right and wrong, while teleological theories lay stress on the good, the valuable, and the desirable. Deontological theories set forth formal or relational criteria such as equality or impartiality; teleological theories, by contrast, provide material or substantive criteria, as, for example, happiness or pleasure.

The application of normative theories and standards to practical moral problems is the concern of applied ethics. This subdiscipline of ethics deals with many major issues of the contemporary scene, including human rights, social equality, and the moral implications of scientific research, particularly in the area of genetic engineering.

Norn, in Germanic mythology, any of a group of supernatural beings who corresponded to the Greek Moirai; they were usually represented as three maidens who spun or wove the fate of men. Some sources name them Urd, Verdandi, and Skuld, perhaps meaning "past," "present," and "future." They were depicted as living by Yggdrasill, the world tree, under Urd's well and were linked with both good and evil. Being frequently attendant at births, they were sometimes associated with midwifery. The name Norn appears only in Scandinavian sources, but the cult of Nornlike beings occurs in several European folklores. In Norse literature the Norns are sometimes called *dísir.*

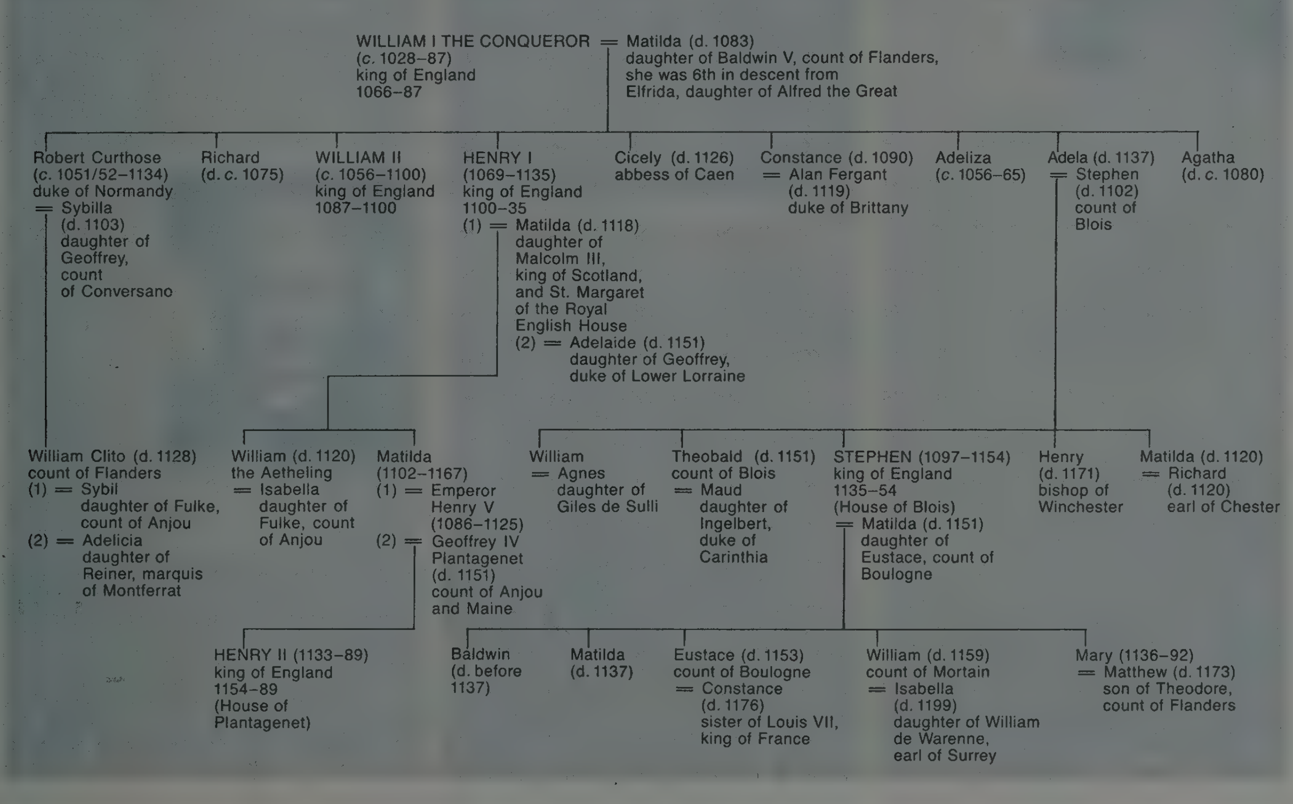
Norodom, also spelled NAROTTAMA, original name VODY (b.1834, Cambodia—d. April 24, 1904, Phnom Penh), king of Cambodia (1860–1904) who, under duress, placed his country under the control of the French in 1863.

Norodom was the eldest son of King Duong. He was educated in Bangkok, capital of the Thai kingdom, where he studied Pāli and Sanskrit Buddhist scriptures and the sacred canons of Theravāda Buddhism. The purpose of his early training was to strengthen ties between Siam (Thailand) and Cambodia.

Cambodia had been under the joint vassalage of Vietnam and Siam since 1802. According to established protocol, Cambodian kings were crowned jointly, with representatives of the two suzerains attending. When Duong died in 1860, Norodom was chosen the successor, but he remained uncrowned. The Thais, who held the symbols of Cambodian royalty—the crown, the sacred sword, and the royal seal—refused to release them, insisting that the newly elected king was their deputy and denying the Vietnamese the right to crown Norodom; thus the Siamese sought to undermine Vietnamese claims to Cambodia and to assert their own private domination of the vassal state.

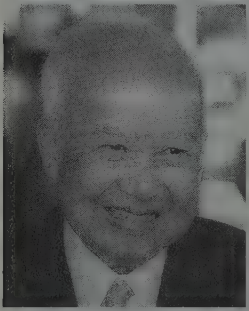
An attempted coup d'etat, led in 1861 by Norodom's half brother Si Votha, was put down with the aid of Thai troops. At this

House of Normandy


WILLIAM I THE CONQUEROR (c. 1028–87) king of England 1066–87
= Matilda (d. 1083) daughter of Baldwin V, count of Flanders, she was 6th in descent from Elfrida, daughter of Alfred the Great
Robert Curthose (c. 1051/52–1134) duke of Normandy = Sybilla (d. 1103) daughter of Geoffrey, count of Conversano
Richard (d. c. 1075)
WILLIAM II (c. 1056–1100) king of England 1087–1100
HENRY I (1069–1135) king of England 1100–35
(1) = Matilda (d. 1118) daughter of Malcolm III, king of Scotland, and St. Margaret of the Royal English House
(2) = Adelaide (d. 1151) daughter of Geoffrey, duke of Lower Lorraine
Cicely (d. 1126) abbess of Caen
Constance (d. 1090) = Alan Fergant (d. 1119) duke of Brittany
Adeliza (c. 1056–65)
Adela (d. 1137) = Stephen (d. 1102) count of Blois
Agatha (d. c. 1080)
William Clito (d. 1128) count of Flanders
(1) = Sybil daughter of Fulke, count of Anjou
(2) = Adelicia daughter of Reiner, marquis of Montferrat
William (d. 1120) the Aetheling = Isabella daughter of Fulke, count of Anjou
Matilda (1102–1167)
(1) = Emperor Henry V (1086–1125)
(2) = Geoffrey IV Plantagenet (d. 1151) count of Anjou and Maine
William = Agnes daughter of Giles de Sulli
Theobald (d. 1151) count of Blois = Maud daughter of Ingelbert, duke of Carinthia
STEPHEN (1097–1154) king of England 1135–54 (House of Blois) = Matilda (d. 1151) daughter of Eustace, count of Boulogne
Henry (d. 1171) bishop of Winchester
Matilda (d. 1120) = Richard (d. 1120) earl of Chester
HENRY II (1133–89) king of England 1154–89 (House of Plantagenet)
Baldwin (d. before 1137)
Matilda (d. 1137)
Eustace (d. 1153) count of Boulogne = Constance (d. 1176) sister of Louis VII, king of France
William (d. 1159) count of Mortain = Isabella (d. 1199) daughter of William de Warenne, earl of Surrey
Mary (1136–92) = Matthew (d. 1173) son of Theodore, count of Flanders

point the French, who had been ceded much of Cochinchina (southern Vietnam), sought to assert Vietnamese claims to Cambodian tribute, seeing the adjacent Cambodian provinces as future colonial possessions. The French forced Norodom to accept French protection early in 1863, but, before the agreement was ratified in Paris, Norodom signed a clandestine treaty with Siam on Aug. 11, 1863, which was ratified on Jan. 22, 1864. It made Norodom the viceroy of Siam and governor of Cambodia; Siam acquired the Cambodian provinces of Bătdâmbâng and Siĕmréab. The French moved to stop Siam from asserting further claims over Cambodia and forced Siam to return the royal regalia, and Norodom was finally crowned at Oudong, Cambodia, in June 1864, with both French and Siamese officials attending. He was installed as king in Phnom Penh in 1866, and in 1867 Siam officially acknowledged the French protectorate over Cambodia. The French imposed land reforms, a reorganization of Cambodian military forces, and the abolition of slavery. Throughout Norodom's reign the French increased their domination of Cambodian affairs.

Norodom Sihanouk, in full PREAH BAT SAMDECH PREAH NORODOM SIHANOUK (b. Oct. 31, 1922, Phnom Penh, Camb.), king of Cambodia from 1941 to 1955; thereafter he was prime minister, head of state, and president, and in 1993 he became king again. He attempted to steer a neutral course for Cambodia in its civil and foreign wars of the late 20th century.



Norodom Sihanouk, 2000
Andy Eames/AP Wide World

Sihanouk was, on his mother's side, the grandson of King Monivong (reigned 1927–41), whom he succeeded on the throne at age 18. During World War II the young king, encouraged by the Japanese, first attempted to declare Cambodia's independence from France; but, when French military forces moved back into the region, he decided to wait until France's retreat from Indochina, which occurred in 1954. He founded the Sangkum Reastr Niyum ("People's Socialist Community") in January 1955, won a referendum in February approving its program, and on March 2 abdicated in favour of his father, Norodom Suramarit, becoming the new monarch's prime minister, foreign minister, and subsequently permanent representative to the United Nations. Five years later, after the death of his father (April 3, 1960), he accepted the role of head of state (June 13).

Sihanouk steered a neutralist course in his foreign policy. In return for North Vietnamese nonsupport of the Khmer Communist Party (Khmer Rouge), he let Vietnamese communists operate covertly from bases inside eastern Cambodia. He steered clear of U.S. aid and assistance, relying on his immense popularity with the Cambodian people to keep radicals of both the right and the left under control. Under Sihanouk's benign rule, Cambodia experienced 15 years of fragile peace and mild prosperity while much of Southeast Asia was in a state of upheaval.

Sihanouk's maintenance of Cambodian neutrality in the Vietnam War ended in 1970 when he was ousted in a U.S.-supported coup led by General Lon Nol. He then lived in Peking, campaigning on behalf of the Khmer Rouge underground.

Following the Khmer Rouge takeover of Cambodia in 1975, Sihanouk returned home, only to be put under house arrest by the Khmer Rouge government. He was released in January 1979 because the Khmer Rouge regime was falling to Vietnamese military forces and needed an advocate in the United Nations. After denouncing the Vietnamese invasion, he dissociated himself from the Khmer Rouge as well. In 1982 Sihanouk became president of an uneasy coalition government-in-exile made up of the three principal anti-Vietnamese Khmer forces—the Khmer Rouge, the anticommunist Khmer People's National Liberation Front, and Sihanouk's neutralist party. He retained his role as resistance leader until 1991, when he was elected president of Cambodia's Supreme National Council, an interim administrative body.

In September 1993, following UN-sponsored elections in May 1993, Cambodia's National Assembly voted to restore the monarchy, and Sihanouk once again became king. His son, Norodom Ranariddh, served as first prime minister until 1997, when he was overthrown in a coup by Hun Sen, who nevertheless left Sihanouk on the throne.

In later years Sihanouk retreated from politics to work as a filmmaker and composer.

Norrbotten, *län* (county) of northern Sweden, touching upon the Gulf of Bothnia, Finland, and Norway. It is Sweden's largest *län,* as well as the northernmost, extending above the Arctic Circle. It comprises the traditional *landskap* (province) of Norrbotten in the east and part of Lappland *landskap* in the west. From the coast the land rises to the barren, mountainous frontier with Norway; this area contains the highest point in Sweden, Mount Kebne (6,926 feet [2,111 m]).

Few crops can mature in the short summer, and timber grows only slowly; but the region's vast iron deposits are worked at Kiruna, Gällivare, and Malmberget, and iron is smelted at Luleå, the capital. Area 38,191 square miles (98,913 square km). Pop. (2000) 256,238.

Norris, Frank, byname of BENJAMIN FRANKLIN NORRIS (b. March 5, 1870, Chicago, Ill., U.S.—d. Oct. 25, 1902, San Francisco, Calif.), American novelist who was the first important naturalist writer in the United States.

Norris studied painting in Paris for two years but then decided that literature was his vocation. He attended the University of California in 1890–94 and then spent another year at Harvard University. He was a news correspondent in South Africa in 1895, an editorial assistant on the *San Francisco Wave* (1896–97), and a war correspondent in Cuba for *McClure's Magazine* in 1898. He joined the New York City publishing firm of Doubleday, Page, and Company in 1899. He died after an operation for appendicitis.

Norris' first important novel, *McTeague* (1899), is a naturalist work set in San Francisco. It tells the story of a stupid and brutal dentist who murders his miserly wife and then meets his own end while fleeing through Death Valley. With this book and those that followed, Norris joined Theodore Dreiser in the front rank of American novelists. Norris' masterpiece, *The Octopus* (1901), was the first novel of a projected trilogy, *The Epic of the Wheat,* dealing with the economic and social forces involved in the production, distribution, and consumption of wheat. *The Octopus* pictures with bold symbolism, the raising of wheat in California and the struggle of the wheat growers there against a monopolistic railway corporation. The second novel in the trilogy, *The Pit* (1903), deals with wheat speculation on the Chicago Board of Trade. The third novel, *Wolf,* unwritten at Norris' death, was to have shown the American-grown wheat relieving a famine-stricken village in Europe. *Vandover and the Brute,* posthumously published in 1914, is a study of degeneration. *McTeague* was filmed by Erich von Stroheim in 1924 under the title *Greed* and staged as an opera by composer William Bolcom and director Robert Altman in 1992.

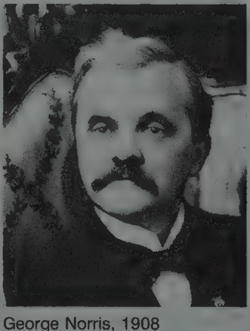
After the example of Émile Zola and the European naturalists, Norris in *McTeague* sought to describe with realistic detail the influence of heredity and environment on human life. From *The Octopus* on he adopted a more humanitarian ideal and began to view the novel as a proper agent for social betterment. In *The Octopus* and other novels he strove to return American fiction, which was then dominated by historical romance, to more serious themes. Despite their romanticizing tendencies, his novels present a vividly authentic and highly readable picture of life in California at the turn of the century.

Norris' writings were collected (10 vol.) in 1928, and *The Letters of Frank Norris* was edited by Franklin Walker in 1956.

Norris, George W., in full GEORGE WILLIAM NORRIS (b. July 11, 1861, Sandusky, Ohio, U.S.—d. Sept. 2, 1944, McCook, Neb.), U.S. senator noted for his advocacy of political reform and of public ownership of hydroelectric-power plants.

Largely self-educated, Norris taught school and studied law at Northern Indiana Normal School (now Valparaiso University). He was admitted to the bar in 1883 and two years later moved to Nebraska to begin practice. In 1902 he was elected to Congress as a Republican and was reelected four times in succession, becoming leader of an insurgent group that in 1910 forced reforms in the House rules to reduce the autocratic control of the speaker.

Elected in 1912 to the Senate, where he served until 1943, Norris became known as an independent, saying he "would rather be right than regular." His strong antiwar convictions led him to vote against U.S. entry into World War I, and he denounced the Treaty of Versailles that followed it. He was the author of the 20th Amendment to the Constitution, which abolished the so-called lame-duck sessions of Congress. He fought for the introduction of presidential primaries and for direct election of U.S. senators. One of his most significant contributions was his introduction of the bill establishing the Tennessee Valley Authority. He was coauthor of the Norris–La Guardia Act, which restricted the use of injunctions in labour disputes.



George Norris, 1908
By courtesy of the Library of Congress, Washington, D.C.

Though always a Republican, Norris felt his party ties lightly; he endorsed Progressives Theodore Roosevelt in 1912 and Robert M. La Follette in 1924 and Democrats Alfred E. Smith in 1928 and Franklin D. Roosevelt in each of his campaigns for the presidency. In 1945 his book *Fighting Liberal* was published.

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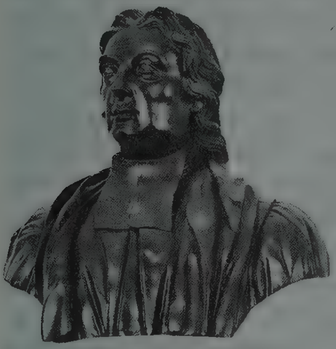
Norris, John (b. 1657, Collingbourne-Kingston, Wiltshire, Eng.—d. 1711, Bemerton, Wiltshire), Anglican priest and philosopher remembered as an exponent of Cambridge Platonism, a 17th-century revival of Plato's ideas, and as the sole English follower of the French Cartesian philosopher Nicolas Malebranche (1638–1715).



John Norris, bronze sculpture by Sir Henry Cheers, 1756
Thomas Photos, Oxford

Norris was elected a fellow of All Souls College, Oxford, in 1680. In 1689 he was named vicar of Newton St. Loe in Somerset, and two years later he was transferred to the rectory of Bemerton, near Salisbury, where he spent the remainder of his life.

Norris wrote numerous theological and philosophical works. It is in his moral and mystical writings that the influence of Cambridge Platonism is clearest. His first major philosophical work was *Reflections upon a Late Essay Concerning the Human Understanding* (1690), in which he anticipated many later criticisms of John Locke's theory contained in *An Essay Concerning Human Understanding;* he did, however, agree with Locke in dismissing the doctrine of innate ideas (which asserts that humans hold their mental ideas at birth). Norris' *An Account of Reason and Faith in Relation to the Mysteries of Christianity* (1697) was one of the best contemporary responses to *Christianity Not Mysterious,* by the English deist John Toland. Norris' most significant work, *An Essay Towards the Theory of the Ideal or Intelligible World* (1701–04), treats the intelligible world in two parts: first, in itself, and second, in relation to human understanding. This work is a complete exposition of the views of Malebranche and refutes the assertions of Locke and others who emphasized the importance of sense experience in arriving at knowledge.

Norris–La Guardia Act (1932), in the history of the United States, legislative act that removed certain legal and judicial barriers against the activities of organized labour. The act declared that the members of labour unions should have "full freedom of association" unmolested by employers, and it made illegal the "yellow-dog" contracts by which employers had forced workers to state that they would not join a union. It barred the federal courts from issuing injunctions to sustain such contracts or to prevent strikes, picketing, or boycotts by labour groups.

The Norris–La Guardia Act was cosponsored in Congress by George Norris and Fiorello La Guardia. It was passed during the depths of the Great Depression, when public opinion had shifted both against employers who sought to prevent workers from joining unions and against judges who were willing to proscribe normal union activities. The act was a precursor to the more sweeping Wagner Act of 1935.

Norrish, Ronald George Wreyford (b. Nov. 9, 1897, Cambridge, Cambridgeshire, Eng.—d. June 7, 1978, Cambridge), British chemist who was the corecipient, with fellow Englishman Sir George Porter and Manfred Eigen of West Germany, of the 1967 Nobel Prize for Chemistry. All three were honoured for their studies of very fast chemical reactions. Norrish and Porter, who worked together between 1949 and 1955, were able to stop chemical reactions at intervals approaching one-thousandth of a millionth of a second and to study the intermediate stages of the progressive changes.

Norrish did his undergraduate and doctoral work at the University of Cambridge, served as research fellow at Emmanuel College, Cambridge, and directed the university's physical chemistry department for 28 years. He achieved emeritus status in 1963, though he continued to work with individual students and as an industrial consultant.

Norristown, borough, seat of Montgomery county, southeastern Pennsylvania, U.S. It lies on the north bank of the Schuylkill River, 17 miles (27 km) northwest of Philadelphia and near the eastern terminus of the Pennsylvania Turnpike.

The site was purchased in 1704 by Isaac Norris and William Trent from William Penn, Jr. (son of the state's founder), and was organized as a township in 1730. The land was acquired in 1776 by the College and Academy of Philadelphia. During the American Revolution the school was suspected of disloyalty, and the state assembly revoked its charter and transferred its assets to the newly created University of Pennsylvania. When Montgomery county was created in 1784, Norristown (then The Town of Norris) became the county seat. Canalization of the Schuylkill and Delaware rivers and completion of a railroad link (1834) to Philadelphia spurred the borough's development as an industrial centre.

Borough Hall, Norristown, Pa.
Camerique

Norristown's manufactures include chemicals, machinery, metal products, plastics, steel, rubber, and textiles. Valley Forge National Historical Park, the encampment site for George Washington's army during the winter of 1777–78, is nearby. Mill Grove, early home of the naturalist-artist John James Audubon, has been developed as a wildlife sanctuary. Inc. borough, 1812. Pop. (1990) 30,749.

Norrköping, town and port, *län* (county) of Östergötland, Sweden. It lies along the Motala River southwest of Stockholm. *Hällristningar,* or rock carvings, from the Late Bronze Age are found in the area.

The town was founded about 1350 and received its charter in 1384. Medieval churches remain at Östra Eneby and Tingstad. Frequent fires, notably in 1719 during the Northern War, cleared the way for the town to be rebuilt on modern lines. The falls in the river provided power for the textile industry, which dominated the town from the 1660s to the 1950s.

Since 1950 engineering has been Norrköping's principal industry. The Lindö Canal, completed in 1961, permits the harbour to take vessels of up to 30-foot (9-metre) draft. Norrköping is a focus for both rail and road transport between Stockholm and the south and west of Sweden, and there is an airport on the outskirts. Pop. (1993 est.) mun., 120,798.

Norrland, region, northern Sweden, encompassing the traditional *landskap* (provinces) of Gästrikland, Hälsingland, Medelpad, Ångermanland, Västerbotten, Norrbotten, Härjedalen, Jämtland, and Lappland. Its land area constitutes about 60 percent of Sweden's total territory. Its most striking features are extensive forests; mountains, notably Mount Kebne (the highest in Sweden) and Mount Sarjek; and great rivers—Ångerman, Ljusn, Ljung, Indals, Ume, Vindel, Skellefte, Pite, Lule, and Kalix—which formerly were used for transporting timber down to the sawmills near the coast and are now a source of hydroelectric power. Beginning about the mid-19th century, the region was torn by the so-called Norrlandsfrågan ("Norrland Question") over the acquisition of land by the lumber companies at the expense of small landholders and farmers; the issue was not resolved until 1901–04.

There is some agriculture, but the region's vast resources of timber, iron ore, and waterpower have made forestry, mining, and the production of hydroelectric power of prime importance. The region is accessible by road, rail, or air. Area 93,720 square miles (242,733 square km). Pop. (1993 est.) 1,207,518.

Norse language, Old: *see* Old Norse language.

Norseman: *see* Viking.

Norske folkeeventyr (1841–44; "Norwegian Folktales"), collection of folktales and legends, by Peter Christen Asbjørnsen and Jørgen Engebretsen Moe, that had survived and developed from Old Norse pagan mythology in the mountain and fjord dialects of Norway. The authors, stimulated by a revival of interest in Norway's past, gathered the tales of ghosts, fairies, gods, and mountain trolls and compiled them into a brilliant narration that preserved the oral feeling and distinctively Norwegian characteristics of the tales while rendering them in standard Norwegian.

Asbjørnsen's vivid prose sketches of folklife and Moe's poems recaptured the folk heritage of Norway for the modern age. The *Norske folkeeventyr* stimulated further research into folktales and ballads and reawakened a sense of national identity.

Norske Kirke (Norwegian Lutheran church): *see* Norway, Church of.

Norskehavet (Europe): *see* Norwegian Sea.

Norstad, Lauris (b. March 24, 1907, Minneapolis, Minn., U.S.—d. Sept. 12, 1988, Tucson, Ariz.), U.S. Air Force general, commander of the North Atlantic Treaty Organization (NATO) forces in Europe during the Berlin crisis of 1961, when East Germany erected the Berlin Wall.

Norstad grew up in Red Wing, Minn., and graduated from the U.S. Military Academy at West Point, N.Y., in 1930. He was commissioned as a cavalry officer but transferred to the Air Corps in 1931. He served in various command posts during World War II: in 1943 he was appointed director of operations for the Mediterranean Allied Air Forces. In 1944 he became chief of staff of the 20th Air Force. Promoted to major general, he was responsible for planning the two atomic bomb missions against Japan.

Norstad transferred to the newly created Air Force in 1947 and became a four-star general in 1952. In 1956 he was appointed supreme commander of NATO military forces in Europe, retiring in 1963 to become president of the Owens-Corning Fiberglass Corporation; from 1967 to 1972 he was the company's chief executive and chairman.

Norte de Santander, *departamento,* northeastern Colombia, bounded east by Venezuela and located where the Andean Cordillera Oriental bifurcate, one arm continuing northward as the Sierra de Ocaña and Serranía (mountains) de los Motilones, the other bending eastward to form the Venezuelan Andes. Cedar and pine are the principal forest trees. The *departamento* was created in 1910.

The Catatumbo River region, near the Venezuelan border, is an important oil-producing area with a refinery at Tibú and pipelines running west and southwest from the fields. In the cooler uplands, grains, potatoes, and horsebeans are the principal crops. Coffee and sugarcane are cultivated on the middle slopes and lower valleys, as in the vicinity of Cúcuta (*q.v.*), the capital of the *departamento.* The highway network is well developed, and Cúcuta has an airport. Area 8,362 square miles (21,658 square km). Pop. (1993 est.) 1,022,816.

North, Douglass C., in full DOUGLASS CECIL NORTH (b. Nov. 5, 1920, Cambridge, Mass., U.S.), American economist, recipient, with Robert W. Fogel, of the 1993 Nobel Memorial Prize for Economic Science. The two were recognized for their pioneering work in cliometrics—also called "new economic history"—the application of economic theory and statistical methods to the study of history.

North studied economics at the University of California at Berkeley (B.A., 1942; Ph.D., 1952). From 1950 he taught economics at the University of Washington, leaving in 1983 to join the faculty of Washington University (St. Louis, Mo.). From 1960 to 1966 he was director of the Institute for Economic Research, and from 1967 to 1987 he was director of the National Bureau of Economic Research. He also acted as economic consultant to the governments of Russia, Argentina, Peru, and the Czech Republic.

North's work was primarily theoretical. He argued that technical innovations alone are insufficient to propel economic development: in order for a market economy to flourish, certain legal and social institutions, such as property rights, must be in place. His ideas were expressed in a number of books, including *Structure and Change in Economic History* (1981) and *Institutions, Institutional Change, and Economic Performance* (1990).

North, Sir Dudley (b. May 16, 1641, Westminster, Eng. [now in London]—d. Dec. 31, 1691, London), English merchant, civil servant, and economist, an early advocate of what later came to be called laissez-faire.

North entered the eastern Mediterranean trade at an early age and spent many years residing in Smyrna and Constantinople (now İzmir and Istanbul), finally returning to England, a wealthy man, in 1680. He then served under Charles II as one of the sheriffs of the City of London and received a knighthood; under James II he was appointed a commissioner of customs. A confirmed Tory, he retired from public affairs shortly after the Revolution of 1688.

His fame rests on the contribution to political economy made in his *Discourses Upon Trade: Principally Directed to the Case of the Interest, Coynage, Clipping, Increase of Money,* published anonymously in 1691 or possibly 1692. This work attracted little attention until reprinted in 1822, after James Mill had hailed the importance of North's ideas as summarized in the biography by his brother, Roger North, published in 1744.

The *Discourses,* though brief and aphoristic, are probably the most thoroughgoing statement of free-trade theory made in the 17th century. Although the older mercantilist view was that trade was the exchange of goods not needed by the producing country, the *Discourses* insisted "that the whole world as to trade, is but as one nation or people, and therein nations are as persons." Sumptuary laws and legal restrictions on interest rates are denounced as harmful and ineffective. Subsequent monetary doctrines are anticipated in the insistence that the supply of money can be left to free market forces "without any aid of politicians."

North (of Kirtling), Frederick North, Lord, also called (from 1790) 2ND EARL OF GUILFORD, BARON GUILFORD (b. April 13, 1732, London, Eng.—d. Aug. 5, 1792, London), prime minister from 1770 to 1782, whose vacillating leadership contributed to the loss of Great Britain's American colonies in the American Revolution (1775–83).

The son of a Tory nobleman, the 1st earl of Guilford, North was educated at Eton and Trinity College, Oxford. Elected member of Parliament for Banbury at the age of 22, he represented the town (of which his father was high steward) for nearly 40 years. The Duke of Newcastle, when prime minister, made him a lord of the treasury in 1759, and North held this office under the succeeding prime ministers, the Earl of Bute and George Grenville, until 1765. On the fall of the Marquess of Rockingham's first ministry in 1766, North was sworn a member of the Privy Council and made paymaster general by the next prime minister, the Duke of Grafton. On the death of Charles Townshend in September 1767 North became chancellor of the exchequer.

North succeeded Grafton as prime minister in February 1770 and continued in office for 12 of the most eventful years in English history. George III had at last clinched the defeat of the Whiggish Newcastle-Rockingham connection and found in North a congenial Tory and chief minister. The path of the minister in Parliament was a hard one; he was popular and an able debater, but at times he had to defend measures which he had not designed and of which he had not approved, and this too in the House of Commons in which the oratorical ability of Edmund Burke and Charles James Fox was ranged against him.

Lord North, detail of a portrait by Sir Nathaniel Dance-Holland; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

During peacetime North's financial administration was sound, but he lacked the initiative to introduce radical fiscal reforms. The most important events of his ministry were those concerned with the American Revolution. He cannot be accused of causing it, but one of the first acts of his ministry was the retention of the tea duty, and his ministry responded to the Boston Tea Party with the Coercive Acts of 1774. Underestimating the colonists' powers of resistance, he attempted to combine severity and conciliation. He faced war halfheartedly and was easily depressed by reverses; after 1777 it was only George III's repeated entreaties not to abandon his sovereign to the mercy of the Rockingham Whigs that induced North to defend a war that at times he felt to be hopeless and impolitic. In March 1782 he insisted on resigning, after the news of Cornwallis' surrender at Yorktown made defeat in the House of Commons imminent.

North had been rewarded for his assistance to the king by honours for himself and sinecures for his relatives, but in April 1783 he formed a famous coalition with the prominent Whig Fox (much to George III's disgust) and became secretary of state with Fox under the nominal premiership of the Duke of Portland. The coalition went out of office on Fox's India bill in December 1783. For about three years North continued to act with Fox in opposition, but failing eyesight then caused his retirement from politics. He succeeded to the earldom of Guilford on his father's death in 1790.

North, Simeon (b. July 13, 1765, Berlin, Conn., U.S.—d. Aug. 25, 1852, Middletown, Conn.), American pistol and rifle manufacturer who, about the same time that the American inventor Eli Whitney was doing so, developed the use of interchangeable parts in manufacturing.

After spending his early youth as a farmer, North at age 16 tried but failed to enlist in the Continental Army during the American Revolution. In 1795 he opened a small scythe-making business in an old mill next to his farm and four years later was awarded his first government contract, to deliver 500 horse pistols within a year. His excellent craftsmanship brought more contracts, including one dated April 16, 1813, for 20,000 pistols. To fulfill the contract, he suggested that the specifications call for identical construction of each firearm, so that pistols could be mass assembled. On Dec. 10, 1823, he received his first rifle contract, for 6,000 rifles to be delivered in five years; he supplied rifles and carbines to the U.S. government until 1850. In 1825 he devised a repeating rifle that could fire 10 rounds without reloading.

North, the, region, northern United States, historically identified as the free states that opposed slavery and the Confederacy during the Civil War. This struggle against slavery and secession obscured the reality that the North was actually four separate and not so similar areas: New England, the Middle Atlantic states, the Old Northwest (East North Central States in federal terms), and the Great Plains (West North Central States). Recognized as these four areas, the North includes Connecticut, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota, Vermont, and Wisconsin. Of these, Nebraska, North Dakota, and South Dakota were not states at the time of the Civil War, and Missouri, though part of the Union, was a slave state; thus, regional lines were, and remain, unclear. Regional distinctions, however, did exist. As early as 1796 President George Washington used the terms North and South, warning against the danger of basing political differences upon geographic lines. The most critical sectional distinction, however, had already been recognized in 1787, when slavery was banned in the Northwest Territory. Soon after the United States War of Independence, slavery disappeared in all states north of the Mason and Dixon Line, the boundary between Pennsylvania and Maryland.

The North's development was characterized by a common system of free labour, commercial vigour, and agricultural diversity. In the 19th century transportation developed markedly along east-west lines; *e.g.,* the Erie Canal opened up the Great Lakes in 1825, and New York City was connected to Chicago by rail in 1852. Thus, both immigration and trade bound northern sections together, creating a remarkable homogeneity of ideology, political and educational institutions, cultural ties, and economic patterns.

By the 1850s the question of the extension of slavery into the western territories was the central issue uniting the North and bringing it into conflict with the South. On the eve of the American Civil War (1861), there were 19 free and 15 slave states, the boundary between them following the Mason and Dixon Line, the Ohio River, and latitude 36°30′ (except for Missouri). The North attained its highest self-consciousness as a region during the war, when its name became synonymous with the Union. Including the four border states that fought with the Union, the North at this time had a population of 22 million, produced 75 percent of the nation's wealth, and possessed 81 percent of its factories.

The North attempted, largely unsuccessfully, to ensure the political enfranchisement and socioeconomic equality of blacks in the South during the Reconstruction period (1865–77). Meanwhile, the North itself was experiencing an unprecedented period of economic growth as it underwent industrialization. As the 19th century progressed, the North, particularly the Middle Atlantic states and the Great Lakes area of the Middle West, became more and more typified by big cities, big business, and big industrial complexes. Its ample natural resources, excellent inland-waterway system, and proliferating railways confirmed the North as the economic hub of the country, while the vast expanse of prairie and plain on both sides of the Mississippi gave the western reaches of the North the agricultural dominance that would make it America's breadbasket.

This dominance, however, was not without its costs. Immigration brought millions of southern and eastern Europeans to northern cities, swelling their populations and providing a cheap source of industrial labour but also causing problems of housing, health, and education. When this wave of immigration slowed dramatically after 1920, it was replaced in the second half of the 20th century by another wave made up of Southern blacks, Latin Americans, and East Asians. During the late 1950s the South was the initial locus of the civil-rights movement, but by the late 1960s and '70s the inclusion of minorities in the political and economic mainstream of the nation was as much a challenge in the North as in the South.

Continuing heavy industrialization had affected the environment, causing water- and air-pollution problems, while the concentration of blacks in Northern inner-city ghettos spawned tension and violence and severely affected patterns of housing, education, employment, and public health. These difficulties, coupled with the decay of the North's industrial base owing to foreign competition and other factors, contributed to further demographic shifts, notably a significant migration of people from the North to southern and western states. In 1939 the North had 70 percent of the country's manufacturing establishments within its borders. By the late 1970s this figure had fallen to barely more than half. Likewise, the North accounted for 58 percent of the total population of the United States in 1940, but only 45 percent in the mid-1980s. Efforts at renewal and revitalization were undertaken by many Northern cities, with varying effect.

North, Sir Thomas (b. May 28, 1535, London, Eng.—d. 1603?), English translator whose version of Plutarch's *Parallel Lives* was the source for many of William Shakespeare's plays.

North may have been a student at Peterhouse, Cambridge, and, in 1557, he was entered at Lincoln's Inn, London, where he joined a group of young lawyers interested in translating. In 1574 North accompanied his brother on a diplomatic mission to France. Thomas North had an extensive military career: he fought twice in Ireland as captain (1582 and 1596–97), served in the Low Countries in defense of the Dutch against the Spanish (1585–87), and trained militia against the threatened invasion of England by the Spanish Armada in 1588. He was knighted about 1596–97, was justice of the peace for Cambridge, and was pensioned by Queen Elizabeth in 1601.

In 1557 North translated, under the title *Diall of Princes,* a French version of Antonio de Guevara's Spanish translation of the *Meditations* of Marcus Aurelius. Although North retained Guevara's mannered style, he was also capable of quite a different kind of work. His translation of Oriental beast fables from the Italian, *The Morall Philosophie of Doni* (1601), for example, was a rapid and colloquial narrative. His *Lives of the Noble Grecians and Romanes,* translated in 1579 from Jacques Amyot's French version of Plutarch's *Parallel Lives,* has been described as one of the earliest great masterpieces of English prose. Shakespeare borrowed from North's *Lives* for his plays *Antony and Cleopatra, Julius Caesar, Timon of Athens,* and *Coriolanus,* and, in fact, he put some of North's prose directly into blank verse, with only minor changes.

North Adams, city, Berkshire county, northwestern Massachusetts, U.S. It lies along the Hoosic River, at the western end of the Hoosac Tunnel (extending 5 miles [8 km] under the Hoosac Range) and the Mohawk Trail, 18 miles (29 km) north of Pittsfield. It was the site of Fort Massachusetts, built by the Massachusetts Bay Colony in 1745 (later burned by the French and Indians). The site's permanent settlement dates from the 1770s, when a Quaker group arrived from Rhode Island. Originally part of Adams, it was set off and incorporated as the town of North Adams in 1878. Waterpower from the Hoosic and the completion of the Hoosac Tunnel in the mid-1870s led to early industrialization. The city's manufactures now include leather products, textiles, paper, and electrical machinery.

North Adams State College was opened as a normal school in 1894, and Williams College (1793) is 6 miles (10 km) west. A natural rock bridge crosses Hudson Creek within the city limits, and Mount Greylock (3,491 feet [1,064 m], highest peak in the state, within Greylock State Reservation) and Savoy Mountain State Forest lie just to the south and southwest. Inc. city, 1895. Pop. (1990) 16,797.

North Africa, region of the northern African Mediterranean littoral, stretching from the Atlantic Ocean on the west to the Egyptian desert on the east and comprising, according to usual definitions, the countries of (east to west) Libya, Tunisia, Algeria, and Morocco. Areas directly peripheral to these countries are often included in discussions of the region, but Egypt, because of the distinct cultural and political history that it enjoys with respect to the other countries of the region, is treated separately in the *Encyclopædia Britannica.*

A brief treatment of North Africa follows. For full treatment, *see* MACROPAEDIA: North Africa.

The four countries constituting the North African region occupy an area of about 1,835,000 square miles (4,753,000 square km) that may be divided into several broad geographic regions (from west to east): Morocco's Atlantic Ocean littoral; the Atlas Mountains, trending southwest-northeast, extending from Morocco to Tunisia and divided into a number of smaller, often discontinuous ranges, the High (or Haut) Atlas and Saharan Atlas (Atlas Saharien) being the chief topological features; and easternmost, a low plateau of unremarkable relief, constituting most of Libya. All of these regions are backed to the south by the vast stony pavements (reg) and sand seas (erg) of the Sahara.

The population in all countries of North Africa is predominantly Arabic and Muslim with strong admixtures of Berber or other smaller ethnic groups, most of which give distinct cultural flavour to the regions they inhabit. European colonists settled in Morocco, Algeria, Tunisia, and Libya in the 19th and early 20th centuries, but many departed when independent sovereign states were created from the former French and Italian territories after World War II.

North Africa's inhabitants are confined chiefly in the narrow Mediterranean coastal belt and in scattered Saharan oases with their characteristic date palms. Most of North Africa has a marked dry season, and cultivation depends on frequent intensive irrigation. Wheat, barley, potatoes, olives, tomatoes, oranges, dates, and grapes are grown, although crop yields tend to be low. Sheep and goats are the region's principal livestock.

There are important mineral deposits, including iron ore, phosphates, petroleum, and natural gas; Algeria and Libya are major world producers of oil and natural gas. Manufacturing industries, which generally are not well developed in the region's rapidly expanding towns, mostly process agricultural commodities and produce building materials and crude steel. Tourism is an important source of foreign exchange, primarily in Morocco and Tunisia.

Algeria, Libya, and Tunisia are republics, and each was governed by a single political party throughout most of their independent existence. Morocco is a constitutional monarchy. Pop. (1991 est.) 64,205,000.

North America, third in size among the world's continents, lying for the most part between the Arctic Circle and the Tropic of Cancer, extending for more than 5,000 miles (8,000 km) to within 500 miles of both the North Pole and the Equator, and covering an area of 9,355,000 square miles (24,230,000 square km).

A brief treatment of North America follows. For full treatment, *see* MACROPAEDIA: North America.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

Except where the relatively narrow Isthmus of Panama extends southeastward to connect with Colombia in South America, the continent, shaped like an inverted triangle, is completely surrounded by water. The Pacific Ocean extends the length of its western coast, the narrow Bering Strait separates it from Russia and Asia to the northwest, the Arctic Ocean and several of the continent's major islands lie to the north, the Atlantic Ocean lies to the east, and the Caribbean Sea and the Gulf of Mexico are situated in the southeast. The population in 1990 for the entire continent was estimated to be 424,523,000, or about one-twelfth of the world's population.

The land. North America was the first continent to achieve its current approximate size and shape. Its geologic structure is built around a stable platform of Precambrian rock called the Canadian (Laurentian) Shield. To the southeast of this rose the ancient Appalachian Mountains; to the west rose the younger and considerably taller Cordilleras.

The Cordilleras extend the length of the continent, from the Aleutian Islands in the northwest through Panama in the south and into South America, and occupy about one-third of the continent's total land area. A complex mountain system, the Cordilleras comprise two major branches: the Western Cordillera (or the coastal ranges) and the Eastern Cordillera. The coastal ranges contain some of the continent's highest mountains; its highest, Mount McKinley, rises to 20,320 feet (6,194 m) above sea level in Alaska. Stretches of the coastal ranges are geologically very active, dramatically so along an east-west extension located in southern Mexico and much of Central America, an area that periodically experiences severe earthquakes and volcanic eruptions.

The Rocky Mountains, which join the Mackenzie Mountains in the Yukon to the north and form a chain southward with Mexico's Sierra Madre Oriental range and the nonvolcanic ranges of Central America, constitute the continent's Eastern Cordillera. Even though the Eastern Cordillera has no peaks that reach as high as some of those in the coastal ranges, several do exceed 14,000 feet (4,270 m). The eastern ranges form a drainage divide that separates the Pacific drainage to the west from the watersheds of the Arctic to the north and those of the Atlantic and Caribbean to the east.

Interspersed within the North American Cordillera system are several plateaus, basins, troughs, and valleys. The large plateau region of the western United States and northern Mexico consists of the Columbia Plateau, the Colorado Plateau, the Basin and Range Province, and the Central Mexican Plateau. The region also possesses an extensive interior drainage basin (the Great Basin) containing the Great Salt Lake, spectacular canyons cut by the Colorado River watershed, and the continent's major desert areas.

The eastern two-thirds of the continent is dominated by four major lowland regions: the Canadian Shield to the northeast; the Great Plains and the Interior Lowlands, extending westward and southward from the shield region; and the Coastal Plain, extending the length of much of the continent's eastern seaboard from New England in the United States through Mexico's Yucatán Peninsula. The bowl-shaped Canadian Shield, occupying the entire northeastern portion of the continent, is partially submerged at its centre, forming Hudson Bay. The southern and western boundaries of the shield are marked by the Great Lakes and smaller bodies of water; southward, the Laurentide Scarp drops precipitously by as much as 2,000 feet (610 m) along the length of the St. Lawrence River and the northern coasts of Lakes Huron and Superior; westward are a series of smaller lakes, dominated by the Great Bear Lake to the north. West of the lake systems lie the Great Plains, which extend south from the Arctic to the Rio Grande. Lying south of the Great Lakes are the Interior Lowlands, which extend eastward from the Great Plains to the Appalachian Mountains. The Great Plains, rising gradually from east to west, are terminated abruptly by the Rocky Mountains, which rise along the entire westernmost extent of the plains. The Interior Lowlands occupy the remaining lowlying terrain west of the Appalachian Mountains; this includes both the "Corn Belt" of the United States and the Ontario Lowlands of Canada, two of the most productive agricultural areas in the world.

The Coastal Plain, generally submerged along the eastern seaboard of the United States, is characterized by inundated river basins and extensive sand formations and rises gradually along the Piedmont Uplands to meet the Appalachian escarpment. The remaining plains include the Florida Peninsula and continue westward to meet the lower extensions of the Great Plains and the Interior Lowlands before turning southward along the entire eastern seaboard of Mexico. The Appalachians extend southwestward from Newfoundland in Canada to Alabama in the United States. The Caribbean Islands (Antilles Arc) make up the remainder of the continent's land area and essentially comprise partly submerged mountain chains that extend eastward from Central America and northward from South America.

The Mississippi River basin, including its major tributaries, the Missouri and Ohio rivers, has an area of about 1,250,000 square miles (3,250,000 square km), occupies more than one-eighth of North America's total area, and accounts for about one-fifth of the continent's total runoff. Three major rivers, the Mackenzie, the Yukon, and the Nelson, have outlets north of 55° N latitude and combine to drain an area larger than that of the Mississippi; their combined runoff is nearly equal to the Mississippi's. The inland waterways provided by the Mississippi and its tributaries, together with that of the Great Lakes and the St. Lawrence River, are unequaled in the world. Roughly following the perimeter of the Canadian Shield, a chain of lakes, including the Great Bear, Great Slave, and Winnipeg lakes to the west and the five Great Lakes to the south, contains an immense quantity of fresh water; their combined area, including Lake Superior's 31,700 square miles (the largest surface area of any freshwater lake), is nearly equal to the total land area of Germany. The Columbia and Colorado rivers in the western United States have been harnessed for irrigation and hydroelectric power. The Rio Grande forms part of the boundary between Mexico and the United States.

Between the extreme climatic conditions of the humid tropical regimes in Central America and the bitterly cold Arctic deserts, generally temperate climatic conditions prevail from Hudson Bay through much of Mexico. While average annual temperatures vary primarily with latitude and elevation, precipitation patterns generally are more critical in determining regional climatic variations. The wet regions, with more than 65 inches (1,600 mm) of average precipitation (though this is often seasonal), are located for the most part along the northwestern Pacific coast, throughout much of Central America, and in the Dominican Republic among the Caribbean Islands. Extreme aridity (characterized by annual precipitation averaging less than 10 inches [250 mm] but often much less) is found in the western deserts stretching through the Great Basin region of the western and southwestern United States into northern Mexico (including Baja California) and in the extreme northern stretches of the continent, including most of the Arctic islands. Relatively humid regions (those experiencing between 50 and 65 inches [1,300 and 1,600 mm] of annual precipitation) lie in the southeastern United States and in much of the Caribbean. The Interior Lowlands and much of the Canadian Shield receive between 20 and 50 inches (500 and 1,300 mm). The Great Plains and most of northern Canada receive between 10 and 20 inches; much of this precipitation falls as snow and varies from year to year. Frost-free periods range from about 90 to 120 days along much of the U.S.-Canadian frontier and from about 240 to 270 days along the Mexican-U.S. frontier. Throughout most of Mexico and the Florida Peninsula, frost occurs in intermittent years (and then for only brief periods).

Across the far northern reaches of Canada and Alaska is found a vast marshy region of tundra vegetation. To the south of this, one of the world's largest areas of coextensive forests—the North American boreal forest (taiga)—stretches across northern Canada from Newfoundland to Alaska. Other forested regions include the Pacific coniferous forest along the Pacific coast from California to Alaska, containing immense redwoods and firs; the largely coniferous Cordilleran forest in the montaine regions of western North America; a variety of mixed broadleaved and coniferous forests in the east-central and southeastern parts of the continent; and the tropical rain forests of southern Mexico and Central America. The Great Plains and western Interior Lowlands, once covered by vast grassland prairies, now consist largely of farms and rangeland. Cacti, sagebrush, and mesquite grasses are typical of the western desert regions, while mangrove swamps are found along much of the Gulf Coast from Mexico to the well-known Everglades of Florida.

North American wildlife includes huge herds of caribou and packs of timber wolves in the far north; elk, mountain goats, and grizzly bears in the Mackenzie and Rocky mountains; moose and beaver throughout much of the Canadian Shield; such reptiles as alligators and snakes in the southeastern United States; and a variety of species in the Central American rain forests, including parrots, monkeys, exotic reptiles and amphibians, and leopards.

The people. Originally inhabited by Indians, North America long remained a sparsely settled and economically undeveloped land in global terms, but, with the coming of the Europeans (particularly the Spanish, French, and British) and the Africans they introduced as slaves, the continent underwent a profound transformation. The European colonizers regarded much of the continent as empty and waiting to be developed; hence, they bought out or pushed out the Indians and took over the country. The process of removing the Indians from their lands in the United States led to bitter disputes and to the creation of Indian "territories" that were eventually reduced to relatively small, isolated "reservations," most of which were located west of the Mississippi River. In Canada the system of reservations was adopted early and protected Indian settlements throughout the eastern part of the country, even in rich agricultural areas. Intermarriage between whites and Indians was much more common in Mexico than in the United States and Canada; mestizos, of mixed Indian and white descent, now account for some three-fifths of the Mexican population. European immigration to Central America has been negligible since the Spanish conquest, and Indians make up much of the population there (as high as 50 percent in Guatemala).

Canada's share of the total continental population is about 6 percent, and its overall population density is relatively low. A member of the Commonwealth, Canada's population is nearly half British in ancestry and more than three-fifths English-speaking. About one-fourth of the people can speak French, and about one-fifth habitually speak only French. Most of Canada's population is native-born, but immigration continues, with more non-British than British now settling there.

The United States dominates the continent with more than half of the total continental population. English is the official language, and, of the total U.S. population, about 12 percent is of predominantly African ancestry and about 9 percent is of Hispanic origin. The average population density is higher than that of Canada but is low in comparison with that of western Europe.

Mexico, the Caribbean, and Central America together have more than one-third of the continent's total population (Mexico alone has about one-fifth) and are growing rapidly. Birth rates have remained high, while death rates have dropped dramatically. Thus, the annual rate of population growth for most countries of the region is at least twice—and frequently more than three times—that of the United States.

The degree of health care varies from country to country. The continent's best health and sanitary conditions are found in Canada and the United States. Elsewhere, health conditions range from good in Bermuda, Costa Rica, Cuba, Grenada, Guadeloupe, Jamaica, and Martinique to extremely poor in Guatemala, Haiti, and Nicaragua. The leading cause of death in Canada and the United States is heart disease; in undeveloped countries such as Guatemala and Haiti, infectious and parasitic diseases continue to be the most crucial health problems. Because of a severe shortage of doctors, many of the sick in El Salvador, Guatemala, Haiti, and Honduras receive little or no modern medical care. Infant mortality is highest in Haiti, Nicaragua, Guatemala, and the Dominican Republic and lowest in Canada, Cuba, and the United States. Life expectancy in North America ranges from more than 75 years in Canada, Cuba, Costa Rica, Dominica, and the United States to less than 65 years in Guatemala, Haiti, and Nicaragua.

The economy. North America has a mixture of developed economies (Canada and the United States), partly developed economies (Mexico, much of Central America, and the larger Caribbean islands), and developing economies (the remaining nations). This range of economic development is reflected in a comparable range of gross national products (GNPs) per capita: included in the continent are countries with some of the world's highest rates (Bermuda, the United States, and Canada) and countries with rates among the world's lowest (Haiti, Nicaragua, and Honduras). The GNPs of the developed nations stem mainly from manufacturing and services, while in the partly developed and developing nations, mining or agriculture are the principal components. The economy of the United States is larger than those of all the other countries of North America combined.

North America has adequate reserves of most metallic resources and the world's largest reserves of cadmium, copper, lead, molybdenum, silver, and zinc. The continent almost totally lacks chromite, manganese, platinum, rutile, tantalium, and tin, all necessary for technologically advanced industries. North America's estimated reserves of petroleum and natural gas each represent about one-tenth of estimated global reserves. It is also estimated to have about one-fourth of the world's economically recoverable coal and a substantial proportion of its uranium. North America's installed hydroelectric capacity represents about one-third of the world total.

North America's arable land accounts for about one-eighth of the continent's total land area. Favoured with excellent soils and relatively stable weather patterns, much of the continent's cropland is among the world's most productive.

North America is the world's leading food producer, largely because of mechanized and scientific farming that predominates in the United States and Canada. Irrigation is important in the western United States, Mexico, and Cuba. The continent produces about one-fifth of the world's cereal crops and leads in corn (maize), soybeans, and grapefruit. It also ranks high in the production of wheat, barley, oats, rice, sorghum, sugarcane and sugar beets, potatoes, tomatoes, cotton, bananas and plantains, grapes, oranges, lemons, limes, dry beans, sunflower seeds, and peanuts (groundnuts). Processing of other important agricultural products yields raw and refined sugar, wine, and tobacco products.

Pastures occupy approximately one-sixth of the continent's total land area and are found principally in Canada, the United States, and Mexico. Dairying is an important industry in Canada and the United States, which are exporters of dairy products; beef and pork production is important in Canada, the United States, and Mexico. In the smaller nations, dairying and meat production are mainly domestic subsistence enterprises and often fail to meet domestic needs, thereby necessitating imports.

Although North America's forests are greatly diminished from their presettlement extent, they still cover about one-third of the total land surface. Canada, the United States, Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, El Salvador, Cuba, and Haiti are timber producers. The continent accounts for about one-fifth of the world's annual lumber production and is a net exporter of roundwood. The United States and Canada are major world producers of pulpwood, sawed wood, wood paneling, plywood, and paper products.

Every North American nation has a maritime coast, and fishing is important throughout the continent. The United States, Canada, and Mexico rank among the world's leading fishing nations. Many of the smaller Caribbean nations depend on fish and shellfish for export income.

Mining and quarrying are important throughout most of the continent. Fossil-fuel production includes coal, natural gas, and petroleum and is concentrated in Canada, the United States, Mexico, Guatemala, and Trinidad and Tobago; the remaining nations lack these minerals and must import their energy fuels. The continent outranks the rest of the world combined in (among other minerals) lithium, molybdenum, uranium, and magnesium output and mines one-fifth or more of the world's total production of phosphates, selenium, potash, nickel, silver, ilmenite (titanium ore), bismuth, lead, zinc, tellurium, copper, fluorspar, and cadmium. Nearly all of these are produced by the United States, Canada, and Mexico; the only other significant mineral producers on a global scale are Jamaica (bauxite) and Cuba (cobalt and nickel).

Manufacturing is of major importance in developed North America, where the heavy and technologically complex industries are concentrated, while lighter industries and agricultural industries predominate in most of the smaller countries. In the late 20th century, Canada and the United States—while remaining important manufacturers of basic metals, machinery, transportation equipment, petrochemicals, plastics, consumer appliances, and cotton textiles and clothing—increasingly shifted toward aerospace, electronics, communications, and computer and software manufacture. Financial services, insurance, and legal services also grew rapidly, while some traditional heavy industries such as shipbuilding and steelmaking stagnated or declined. The developing countries expanded their traditional manufacturing industries as markets opened in the developed nations.

Tourism from both abroad and within the continent is an important source of income, especially to the smaller Caribbean nations. Most of the Caribbean islands, Mexico, Hawaii, Florida, and California all draw winter visitors from the United States, Canada, and Europe. The mainland United States and Canada have fine winter sports facilities and numerous historic sites, scenic national parks, and natural wonders.

The continent's transportation network is well developed in most of the United States and Canada and fairly well-developed in most of Central America and the Caribbean. The continent's inland waterways are found mainly in the United States, Canada, Mexico, and Nicaragua. The most important waterways are the St. Lawrence–Great Lakes system, which serves Canada and the United States, and the Panama Canal, which connects the Atlantic and Pacific oceans.

The continent has a widely contrasting trade pattern, involving Canada, a major exporter of food, raw materials, and manufactured goods; the United States, an important food and manufactured-product exporter but also a major importer of fuels, raw materials, and manufactured goods; and the oil-exporting nations of Mexico and Trinidad and Tobago and the bauxite exporter, Jamaica. The Bahamas and Panama are major international centres for banking and financial services. The remaining nations of Central America and the Caribbean depend heavily on specialized tropical crops, timber, textiles, and fish exports and must import many of their manufactured goods. There is significant regional trade and development aid between the smaller nations and Canada and the United States. Membership in the Caribbean Community and Common Market (Caricom) or the Commonwealth or overseas departmental status with France opens wider markets for the smaller nations and places them in a better position to compete with the large, developed nations.

Cultural background. North America can be divided into five cultural regions (north to south): Canadian, American (U.S.), Mexican, Caribbean, and Central American. In Canada the English Canadian culture dominates life in all the provinces except Quebec, where a separate French culture has remained active. In the United States a distinctively American culture has developed from the admixture of British and other European influences, the country's own frontier heritage, and cultural strains from Latin America, Africa, and Asia. In Mexico the arts have been shaped by both Spanish and Indian cultural heritages. In spite of the divergencies in ancestry, language, and history, the island countries of the Caribbean share many elements of a common culture, the result of their often parallel experiences as plantation colonies of African and Asian labourers dominated by distant European economic and political powers. Central America's cultural life has been largely shaped by Indian, Spanish, and black African cultures.

Education is compulsory in all North American countries. Enrollment ratios for primary-school-age children exceed 95 percent in The Bahamas, Canada, Cuba, Jamaica, Mexico, and the United States, and at the secondary level in these same countries (except Mexico), the enrollment ratios exceed 60 percent. The lowest ratios for primary-school-age children in North America are found in Guatemala, El Salvador, and Haiti, which have a shortage of teachers and school facilities. The continent has many major institutions of higher learning; among the best known are the National Autonomous University of Mexico, the University of Toronto and McGill University in Canada, and Harvard, Yale, Princeton, and Stanford universities and the University of Chicago, as well as major state university systems, such as the University of California, in the United States.

Freedom of the press in North America is confined to democratically governed states such as Canada, Costa Rica, and the United States. The freest and most influential press (including the broadcast media) operates in the United States, where freedom of the press is guaranteed by the Constitution and where the news media often serve as a check upon government power. Canada's press, including its government-owned broadcast media, also is free. By contrast, the press in Cuba generally espouses the policies and positions of the government. In El Salvador, Guatemala, and Mexico, the media, though privately owned, seldom criticize government actions.

History. North America's first inhabitants, the American Indians, are believed to have come from Asia, mostly by way of the Bering Strait land bridge, out of eastern Siberia. Their migrations probably originated anywhere from 35,000 to 20,000 years ago, during the last interglacial period. These migrants remained Stone Age hunters and fishermen for millennia; indeed, a number of them were still in this state when the first Europeans saw them.

The greatest North American pre-Columbian civilizations were in Meso-America. The Olmec were the earliest, dating from about 1150 BC. Olmec civilization developed in what is now southern Veracruz and Tabasco states, Mexico, and became best known for its sculpture. The Maya of Guatemala and the Yucatán Peninsula (300 BC–AD 900) possessed one of the greatest civilizations of the Western Hemisphere. They built large stone buildings and pyramid temples, worked gold and copper, developed a precise calendar, and used hieroglyphic writing. The Toltec (*c.* 10th to 12th century) are believed to have built a large empire in north-central Mexico, which by the 14th century had become the empire of the Aztec, centred on the city of Tenochtitlán (now Mexico City). All of these Meso-American peoples had highly developed cultures. The Aztec, however, were no match for the technologically superior Spaniards, who by the mid-16th century had conquered all of Meso-America.

The population of pre-Columbian Mexico and Central America has been estimated at between 5,000,000 and 10,000,000, that of North America north of Mexico at between 1,000,000 and 4,000,000. The Indians north of Mexico did not develop intensive agriculture or an urban way of life, but various semisedentary peoples had established villages; and, among the Cherokee and the Iroquois, powerful federations of tribes had arisen by the time of European contact.

The European discovery of America resulted from a desire to find a western water route to the Orient. When it became obvious that North America stood in the way of this objective, the continent attracted the attention of those European powers interested in empire and mercantile trade. The Spaniards were the first to colonize the New World beginning early in the 16th century. The French established their first colony at Port Royal in Nova Scotia in 1605, the British at Jamestown in 1607. Both the Dutch and the Swedes set up short-lived colonies, and the Russians settled Alaska in the late 18th century. The British colonized the Eastern Seaboard of what is now the United States, while the French settled eastern portions of present-day Canada. The British became supreme in all of northern North America after defeating the French militarily in 1763 in the French and Indian War. The British were, in turn, evicted by the 13 colonies that officially became the United States of America in 1783. Canada remained in British hands until independence in 1926, and independence from Spain for Mexico and Central America came in 1821. By the time the westward-moving Americans had formally acquired the northern portion of Mexico in 1848, the current political boundaries of North America, for the most part, were established. The North American style of life became Latin American (Hispanic) south of the Rio Grande and Anglo-American to the north, with enclaves of French influence in Quebec (Canada) and Louisiana (U.S.). Slavery, carried on between the 16th and 19th century, and its legacy added a significant minority culture of African origin, particularly in the United States and the Caribbean islands.

The United States industrialized during the late 19th and early 20th centuries, and, by the end of World War II, it had become the wealthiest and most powerful nation in the world. The United States' huge economy, abundant natural resources, large population, and military might gave North America and its peoples considerable global influence.

The nations of North America have sought hemispheric unity as members of the Organization of American States (OAS), a group whose membership also includes South American countries. The OAS aims to strengthen the security of the Western Hemisphere and promote the peaceful settlement of disputes among member states.

Two North American countries—Canada and the United States—project military power beyond the continent. Canada maintains troops in western Europe as part of a commitment to the North Atlantic Treaty Organization (NATO). The United States, which possesses a large and sophisticated nuclear-weapons force, is the linchpin of NATO and maintains troops in western Europe, Japan, and South Korea.

North American Desert, ecological complex in western North America that basically consists of an arid region lying in the rain shadow of the Pacific mountain system to the west and bounded by the Rocky Mountains to the east. The North American Desert extends nearly 2,000 miles (3,200 km) from northern Mexico to southern Oregon and Idaho. Estimates of its size range from 500,000 square miles (1,300,000 square km) to 730,000 square miles (1,900,000 square km).

A brief treatment of the North American Desert follows. For full treatment, *see* MACROPAEDIA: North America.

The North American Desert is actually a complex of desert plains or basins that are separated from each other by north–south-trending mountain ranges or other types of terrain. The North American Desert can be subdivided into regions of cold mid-latitude (north) and hot mid-latitude desert (south). The Great Basin Desert is classified as a cold mid-latitude desert. It includes the Great Sandy Desert of southeastern Oregon, the Snake River Plains of southern Idaho, nearly all of Nevada, most of Utah, and the Painted Desert of northern Arizona and the Red Desert of southern Wyoming (the latter two considered extensions of the Great Basin Desert).

Around the southern end of the Sierra Nevada the Great Basin Desert of Nevada merges into the hot mid-latitude desert region characterized by the Mojave (Mohave) Desert, which is bounded on the south and southeast by the arid Sonoran Desert. From the coast of western Mexico to the east, the Sonoran Desert extends inland to blend into the southern Arizona Upland Desert. Farther east is the Chihuahuan Desert, stretching across the Mexican states of Chihuahua, Coahuila, and San Luis Potosí.

Because of long periods of erosion, the landforms of the North American Desert are characteristically sharp and angular and contain some beautiful scenery. Most of the soils are aridisols (a dry-soil group), but local variations occur. The vegetation of the North American Desert includes xerophytes, sagebrush, saltbrush, Joshua tree, and creosote bush. The Arizona Upland Desert is noted for the giant saguaro cactus. Fauna include coyote, bobcat, fox, skunk, and various lizards and snakes.

North American Free Trade Agreement (NAFTA), trade pact signed in 1992 that would gradually eliminate most tariffs and other trade barriers on products and services passing between the United States, Canada, and Mexico. The pact created a free-trade bloc among the three largest countries of North America.

NAFTA was inspired by the success of the European Community in eliminating tariffs in order to stimulate trade among its members. A Canadian-U.S. free-trade agreement was concluded in 1988, and NAFTA basically extended this agreement's provisions to Mexico. NAFTA was negotiated by the administrations of U.S. president George Bush, Canadian prime minister Brian Mulroney, and Mexican president Carlos Salinas de Gortari. Preliminary agreement on the pact was reached in August 1992, and it was signed by the three leaders on Dec. 17, 1992. NAFTA was ratified by the three countries' national legislatures in 1993 and went into effect on Jan. 1, 1994.

NAFTA's main provisions called for the gradual reduction of tariffs, customs duties, and other trade barriers between the three members, with some tariffs being removed immediately and others over periods of as long as 15 years. NAFTA ensured eventual duty-free access for a vast range of manufactured goods and commodities traded between the signatories. Other provisions were designed to give U.S. and Canadian companies greater access to Mexican markets in banking, insurance, advertising, telecommunications, and trucking.

North American Nebula (catalog number NGC 7000), ionized-hydrogen region in the constellation Cygnus. The nebula is a cloud of interstellar gas ionized from within by young, hot stars. Interstellar dust particles in part of this cloud absorb the light emitted by recombining atoms. The shape of the nebula roughly resembles that of North America, with the dusty region being shaped like the Gulf of Mexico. The North American Nebula is approximately 700 parsecs (2,300 light-years) from the Sun. It has a diameter of about 20 parsecs (65 light-years) and a total mass equal to 8,000 solar masses.

North American Review, American magazine (1815–1940), one of the country's leading literary journals of the 19th and 20th centuries. Founded in Boston, Mass., under the auspices of the *Monthly Anthology* (1803–11), it began publication as a regional magazine, reflecting the intellectual ideas and tastes of Boston and New England. The poet William Cullen Bryant's first contribution to the review, "Thanatopsis" (1817), made him famous. Other early contributors included Daniel Webster, John Adams, Henry Wadsworth Longfellow, and Francis Parkman.

The *North American Review* had become somewhat dull by midcentury but regained its prestige under the editorships of James Russell Lowell (1863–72) and Henry Adams (1872–76). In 1877 it was purchased by Allen Thorndike Rice, who served as editor until his death in 1889. Rice moved the review to New York City and transformed it into a national periodical dealing with contemporary issues, affairs, and movements. It became noted for its critical influence and outstanding writing concerning social and political issues. William Dean Howells, Walt Whitman, and Henry James contributed to the magazine, which attained a peak circulation of 76,000 in 1891. By the turn of the century the review's diverse contributors included William Gladstone, Oliver Wendell Holmes, Mark Twain, and H.G. Wells. The magazine's circulation fell after World War I, however, and in 1935 it was sold to Joseph Hilton Smyth, under whose editorship it ceased publication in 1940.

In 1964, with the consent of the remaining members of the North American Review Corporation, the review was revived by Robert Dana at Cornell (Iowa) College. Publication was moved in 1968 to the University of Northern Iowa in Cedar Falls.

North Aslian languages: *see* Jahaic languages.

North Atlantic Current, also called NORTH ATLANTIC DRIFT, part of a clockwise-setting ocean-current system in the North Atlantic Ocean, extending from southeast of the Grand Bank, off Newfoundland, Canada, to the Norwegian Sea, off northwestern Europe. It constitutes the northeastward extension of the

Gulf Stream; the latter issues from the Gulf of Mexico and gradually emerges as the North Atlantic Current in mid-ocean. It is composed of several broad currents with speeds of about 0.2 knots, as compared with the Gulf Stream's rather concentrated flow at 1 to 6 knots. Major branches of the current include the Irminger, Norway, and Canary currents (*qq.v.*).

North Atlantic Treaty Organization (NATO), military alliance established in April 1949 by the North Atlantic Treaty (also called the Washington Treaty) as a counterweight to the Soviet Union. Its members include Belgium, Canada, the Czech Republic, Denmark, France, Germany (West Germany, 1955–90), Greece, Hungary, Iceland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Spain, Turkey, the United Kingdom, and the United States. All were original signatories except Greece and Turkey (February 1952), Germany (May 1955), Spain (May 1982), and the Czech Republic, Hungary, and Poland (March 1999). France withdrew from the integrated military command of NATO in 1966, but it remained a member of the organization.

The heart of NATO is Article 5, in which the signatory members agree that "an armed attack against one or more of them in Europe or North America shall be considered an attack against them all" and pledge to assist any member that is attacked. NATO invoked Article 5 for the first time in 2001, after terrorist attacks destroyed the World Trade Center in New York City and part of the Pentagon outside Washington, D.C., killing some 3,000 people. Article 6 defines the geographic scope of the treaty as covering "an armed attack on the territory of any of the Parties in Europe or North America."

Historical background. After World War II, western Europe was economically exhausted and militarily weak (the western Allies had rapidly and drastically reduced their armies at the end of the war), and newly powerful communist parties had arisen in France and Italy. By contrast, the Soviet Union emerged with its armies dominating the states of central and eastern Europe, and by 1948 Moscow-sponsored communists had consolidated their control of those countries and suppressed all noncommunist political activity. What became known as the Iron Curtain, a term popularized by Winston Churchill, had descended over central and eastern Europe. Further, wartime cooperation between the western Allies and the Soviets had completely broken down. Each side was organizing its own sector of occupied Germany, so that two German states would emerge, a democratic one in the west and a communist one in the east.

In 1948 the United States launched the Marshall Plan (*q.v.*), which infused massive amounts of economic aid to the countries of western and southern Europe. Under the Brussels Treaty of 1948, the United Kingdom, France, and the Low Countries concluded a collective-defense agreement called the Western European Union. It was soon recognized, however, that a more formidable alliance would be required to provide an adequate military counterweight to the Soviets.

By this time Britain, Canada, and the United States had already engaged in secret talks on security arrangements that would serve as an alternative to the United Nations (UN), which was becoming paralyzed by the rapidly emerging Cold War. In March 1948, following a virtual communist coup d'état in Czechoslovakia in February, the three governments began discussions on a multilateral, collective-defense scheme to enhance western security and promote democratic values. France, the Low Countries, and Norway eventually joined these discussions, which in April 1949 resulted in the North Atlantic Treaty.

Organization. Spurred by North Korea's invasion of South Korea in 1950, the United States sought to demonstrate that it would resist any Soviet military expansion or pressures in Europe. General Dwight D. Eisenhower, the Allied leader in western Europe in World War II, was named Supreme Allied Commander Europe (SACEUR) by the North Atlantic Council (NATO's governing body) in December 1950. He was followed as SACEUR by a succession of American generals.

The North Atlantic Council, which was established soon after the treaty came into effect, is composed of ministerial representatives of the member states, who meet at least twice a year. At other times the council, chaired by the NATO secretary-general, remains in permanent session at the ambassadorial level.

NATO's military organization encompasses a complete system of commands for possible wartime use. The Military Committee, consisting of representatives of the military chiefs of staff of the member states, subsumes two major commands: the European Command, headed by the SACEUR and located at Supreme Headquarters Allied Powers Europe (SHAPE) in Casteau, Belg.; and the Atlantic Command, headed by the Supreme Allied Commander Atlantic (SACLANT) and headquartered in Norfolk, Va., U.S. A third major command, the Channel Command (for the English Channel), was headed by the Commander in Chief Channel (CINCHAN) until it was disbanded in 1994.

During the alliance's first 20 years, more than $3 billion worth of "infrastructure" for NATO forces—bases, airfields, pipelines, communications networks, depots—was jointly planned, financed, and built. NATO funding generally is not used for the procurement of military equipment, which is provided by the member states—though the NATO Airborne Early Warning Force, a fleet of radar-bearing aircraft designed to protect against a surprise low-flying attack, was funded jointly.

The role of Germany. A serious issue confronting NATO in the early and mid-1950s was the negotiation of West Germany's participation in the alliance. The prospect of a rearmed Germany was greeted with unease and hesitancy in western Europe, but the country's strength had long been recognized as necessary to protect western Europe from a possible Soviet invasion. Accordingly, arrangements for West Germany's "safe" participation in the alliance were worked out as part of the Paris Agreements of October 1954, which ended the occupation of West German territory by the western Allies and provided for both the limitation of West German armaments and the country's accession to the Brussels Treaty. In May 1955 West Germany joined NATO, prompting the Soviet Union to form the Warsaw Pact (*q.v.*) alliance the same year. The West Germans subsequently contributed many divisions and substantial air forces to the NATO alliance. By the time the Cold War ended, some 900,000 NATO troops were stationed in West Germany.

The role of France. France's relationship with NATO became strained after 1958, as President Charles de Gaulle increasingly criticized the organization's domination by the United States and the intrusion upon French sovereignty by NATO's many international staffs and activities. He argued that such "integration" subjected France to "automatic" war at the decision of foreigners. In July 1966 France formally withdrew from the military command structure of NATO and required NATO forces and headquarters to leave French soil; nevertheless, de Gaulle proclaimed continued French adherence to the treaty in case of "unprovoked aggression." After NATO moved its headquarters from Paris to Brussels, France maintained a liaison relationship with NATO's integrated military staffs, continued to sit in the council, and continued to maintain and deploy ground forces in West Germany, though it did so under bilateral agreements with the West Germans rather than under NATO jurisdiction.

NATO during the Cold War. From its founding, NATO's primary purpose was to unify and strengthen the western Allies' military response to a possible Soviet-led invasion of western Europe. In the early 1950s NATO relied partly on the threat of massive nuclear retaliation from the United States to counter the Warsaw Pact's much larger ground forces. Beginning in 1957, this policy was supplemented by deploying American nuclear weapons in western European bases. NATO later adopted a "flexible response" strategy, which the United States interpreted to mean that a war in Europe did not have to escalate to an all-out nuclear exchange. Under this strategy, many allied forces were equipped with American battlefield and theatre nuclear weapons under a dual-control (or "dual-key") system, which allowed both the country hosting the weapons and the United States to veto their use. Britain retained control of its strategic nuclear arsenal but brought it within NATO's planning structures; France's nuclear forces remained completely autonomous.

A stalemate between the two sides continued from the 1960s through the mid-1980s. After 1985, however, far-reaching economic and political reforms introduced by Soviet leader Mikhail Gorbachev fundamentally altered the status quo. In July 1989 Gorbachev announced that Moscow would no longer prop up Europe's communist governments, thereby signaling his tacit acceptance of their replacement by freely elected (and noncommunist) administrations. Moscow's abandonment of control over central and eastern Europe meant the dissipation of much of the military threat that the Warsaw Pact had posed to western Europe, especially after the Warsaw Pact's dissolution in 1991. The reunification of Germany in October 1990 and its retention of NATO membership created both a need and an opportunity for NATO to be transformed into a more "political" alliance devoted to maintaining international stability in Europe.

NATO in the post-Cold War era. After the Cold War, NATO was reconceived as a "cooperative-security" organization whose mandate included two main objectives: to foster dialogue and cooperation with former adversaries in the Warsaw Pact and to "manage" conflicts in areas on the European periphery, such as the Balkans. In keeping with the first objective, NATO established the North Atlantic Cooperation Council (1991; later replaced by the Euro-Atlantic Partnership Council) to provide a forum for the exchange of views on political and security issues, as well as the Partnership for Peace (PfP) program (1994) to enhance European security and stability through joint military training exercises with NATO and non-NATO states, including former Soviet republics and allies. Special cooperative links were also set up with two PfP countries: Russia and Ukraine.

The second objective entailed NATO's first use of military force, when it entered the war in Bosnia and Herzegovina in 1995 by staging air strikes against Bosnian Serb positions around the capital city of Sarajevo. The subsequent Dayton Accords, which were initialed by representatives of Bosnia and Herzegovina, the Republic of Croatia, and the Federal Republic of Yugoslavia, committed each state to respect the others' sovereignty and to settle disputes peacefully and laid the groundwork for stationing NATO peacekeeping troops in the region. A 60,000-strong Implementation Force (IFOR) was initially deployed, though a smaller contingent remained in Bosnia under a different name, the Stabilization Force (SFOR). In March 1999 NATO launched massive air strikes against Serbia in an attempt to force the Yugoslav government of Slobodan Milošević to accede to diplomatic provisions designed to protect the predominantly Muslim Albanian population in the province of Kosovo. Under the terms of a negotiated settlement, NATO deployed a peacekeeping force called the Kosovo Force (KFOR).

The Kosovo crisis gave renewed impetus to efforts by the European Union (EU) to construct a new crisis-intervention force to make the EU less dependent on NATO and U.S. military resources. These efforts prompted significant debates about whether enhancing the EU's defensive capabilities would strengthen or weaken NATO. Simultaneously, some observers argued that NATO should be dissolved, noting that it was created to confront an enemy that no longer existed; others called for a broad expansion of NATO membership to include Russia. Most suggested alternative roles, including peacekeeping.

During the 1990s the United States led an initiative to enlarge NATO membership gradually to include some of the former Soviet allies. Supporters of the initiative argued that NATO membership was the best way to begin the long process of integrating these states into regional political and economic institutions such as the EU. Opponents pointed to the enormous cost of modernizing the military forces of new members; they also argued that enlargement, which Russia would regard as a provocation, would hinder democracy in that country and enhance the influence of hardliners. Despite these disagreements, Poland, the Czech Republic, and Hungary joined NATO in 1999, and the alliance agreed to revisit the question of enlargement again in 2002. (D.G.H.)

North Auckland Peninsula, peninsula of northern North Island, New Zealand, nearly coextensive with Northland (*q.v.*) local government region.

North Bay, city, seat of Nipissing district, southeastern Ontario, Canada. It lies 224 miles (360 km) north of Toronto. Named for its location on the northern bay of Lake Nipissing, the city originated as a rail yard on the Canadian Pacific Railway in 1882. It is now the southern terminus and head office of the Ontario Northland Railway and a major station on two transcontinental rail lines. Owing to these transportation links, North Bay has become an important wholesale- and retail-distributing centre and a popular summer resort. The city's industries include lumbering, dairying, and fur processing. It is the site of a large air base and Canada's first missile base. Inc. 1925. Pop. (1996) 54,332.

North Brabant (The Netherlands): *see* Noord-Brabant.

North Canadian River, main tributary of the Canadian River in the south-central United States. It rises in a high plateau in Union county, New Mexico, and flows east through the Texas and Oklahoma panhandles past Oklahoma City, joining the Canadian River in Eufaula Reservoir, below Eufaula, Okla. The North Canadian River is 800 miles (1,287 km) long and drains 14,290 square miles (37,011 square km). Above the mouth of Wolf Creek, one of its tributaries, the North Canadian is also known as Beaver River.

North Cape Current, oceanic surface current, the northernmost extension of the Norway Current (a part of the North Atlantic Current), bathing the northern coasts of Norway, Finland, and Russia's Kola Peninsula. Characterized by warm temperatures (39°-54° F [4°-12° C]) and average oceanic salinity (34-35 parts per 1,000), the current flows at speeds of about 0.5-0.8 knot, but it becomes colder and less saline as it enters the Barents Sea of the Arctic Ocean before separating into many branches. This combination produces a very unstable climate with many storms; at the same time, the higher temperatures of the current's waters produce more temperate winters and high precipitation.

North Carolina, constituent state of the United States of America, in the southeastern part of the country. It is bounded on the north by Virginia, on the east by the Atlantic Ocean, on the south by South Carolina and Georgia, and on the west by Tennessee. The state capital is Raleigh.

A brief treatment of North Carolina follows. For full treatment, *see* MACROPAEDIA: United States of America: *North Carolina.*

The first permanent white settlement in North Carolina was made in the 1650s when settlers from Virginia arrived in the Albemarle Sound area. In 1663 the English king Charles II issued a charter that established Carolina as a proprietary colony. The northern part of the Carolina colony was known as Albemarle until 1691, when it was renamed North Carolina and given a deputy governor, who ruled from Charleston. In 1712 the colony was officially divided in two, and North Carolina was given its own governor. The colony reverted to royal status in 1729, and the boundary with South Carolina was fixed in 1735. Growth accelerated after 1729. The Battle of Guilford Court House (1781) was a strategic victory for the Americans during the Revolution. North Carolina reluctantly seceded from the Union in 1861 and was readmitted in 1868.

North Carolina is divided into three physiographic regions. The Coastal Plain, constituting 45 percent of the state, is a gently rolling plain and swampy tidewater close to the Atlantic coast. The Piedmont Plateau, another 45 percent of the state's area, is west of the Coastal Plain and is characterized by rolling, forested hills. The southern extension of the Appalachian mountain system in the far west of the state includes the parallel, northeast-southwest–trending Blue Ridge and Great Smoky ranges and associated high intermontane plateaus.

North Carolina has warm summers and mild winters. Its average annual temperatures range from 66° F (19° C) in the east to 60° F (16° C) in the central region and 55° F (13° C) in the mountains. Annual rainfall averages 46–54 inches (1,170–1,370 mm) in coastal areas, 44–50 inches (1,118–1,270 mm) in the Piedmont, and 40–80 inches (1,015–2,030 mm) in the mountains.

The original Native American inhabitants of North Carolina were primarily Cherokee peoples. Though forcibly removed from the state in the 1830s, about 13,000 Cherokees (of some 80,000 Native Americans) resided in North Carolina in the late 20th century. The state has the largest Native American population of any state east of the Mississippi River. The early European immigrants were a heterogeneous group, representing a variety of religious faiths and nationalities. African Americans represented 33 percent of the population in 1790 but only 22 percent in 2000, a decline attributable to continued emigration. The population has grown faster than the national average, and in 2000 North Carolina had the 11th largest population among the states in the Union. The population is almost half rural.

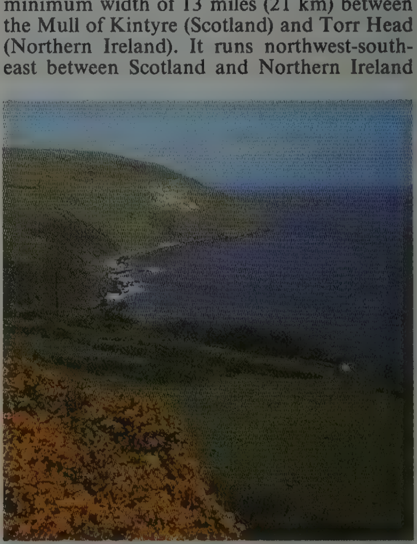
Agriculture remains important. Its principal crops include tobacco, sweet potatoes, corn (maize), soybeans, and peanuts (groundnuts). Forest products are employed in the construction of furniture and as a source of pulp and paper. The state has one of the nation's largest phosphate reserves. Tourism is also an important source of revenue. North Carolina's industrial output was eighth in the nation in the early 1990s. The major industries include textiles, tobacco, electrical equipment, metalworking, chemicals, plastics, and food processing. North Carolina has two Atlantic ports and a large trucking fleet; the state is one day's trucking time from New York and Florida.

The North Carolina Museum of Art and the North Carolina Symphony were the first state-supported institutions of their type in the nation. The University of North Carolina at Chapel Hill (1789) is the oldest state-supported university in the country. Duke University (1838) at Durham is a prestigious centre of higher education. Area 52,672 square miles (136,420 square km). Pop. (2000) 8,049,313.

North Cascades National Park, national park in northwestern Washington, U.S. The park was established in 1968 to preserve majestic mountain scenery, snowfields, glaciers, alpine meadows, and other unique natural features in the northern part of the Cascade Range. Formed of durable granites and related rocks, the northern Cascades have elevations mostly between 8,000 and 9,000 feet (2,440 and 2,740 m). The Ross Lake National Recreation Area separates the park into two sections, the northern unit extending to the Canadian border and the southern unit adjoining the Lake Chelan National Recreation Area. The park covers an area of 789 square miles (2,043 square km).

North Celebes (Indonesia): *see* Sulawesi Utara.

North Channel, strait linking the Irish Sea with the North Atlantic Ocean and reaching a minimum width of 13 miles (21 km) between the Mull of Kintyre (Scotland) and Torr Head (Northern Ireland). It runs northwest-southeast between Scotland and Northern Ireland and includes the larger Arran and Gigha islands and the smaller Ailsa Craig. The Scottish coast of the channel is deeply indented by the Sound of Jura, Kibrannan Sound, and the Firth of Clyde, and the Irish coast by the Belfast Lough.



The North Channel coast south of Torr Head, Northern Ireland

© Michael Jennet/Robert Harding Picture Library

North Channel, northern arm of Lake Huron in south-central Ontario, Canada, lying between the Ontario mainland (north) and the islands of Manitoulin, Cockburn, and Drummond (south). It is 120 miles (195 km) long and 1 to 20 miles (1.6 to 32 km) wide. The channel is connected on the west with St. Marys River (via St. Joseph Channel) and on the east with Georgian Bay. Many small islands lie within the channel. A road and rail bridge extends from the mainland to Great Cloche Island before crossing to Manitoulin Island at the town of Little Current.

North Chicago, city, Lake county, northeastern Illinois, U.S., on Lake Michigan. A wire-manufacturing plant was established there in 1891, and other industries soon followed. A strike at a plant in 1937 led to a major U.S. Supreme Court ruling in 1939 (*National Labor Relations Board* v. *Fansteel Metallurgical Corporation*) declaring sit-down strikes illegal. The city is a centre of pharmaceutical research and production. Great Lakes Naval Training Center and a Veterans Administration Hospital are to the south. Inc. 1909. Pop. (2000) 35,918.

North China Plain, Wade-Giles romanization HUA-PEI P'ING-YÜAN, Pinyin HUABEI PINGYUAN, also called YELLOW PLAIN, large alluvial plain of eastern Asia, built into the Yellow Sea by deposits of the Huang Ho (Yellow River) and a few other, comparatively minor rivers of eastern China. Covering an area of about 158,000 square miles (409,500 square km), most of which is less than 160 feet (50 m) above sea level, it is one of the most densely populated areas in the world and, since earliest history, has been a major focus of Chinese (Han) culture. It is bordered on the north by the Yen Mountains, on the west by the T'ai-hang Mountains and the Honan highlands, and on the southwest by the T'ung-pai and Ta-pieh mountains. To the south it merges into the Yangtze Plain. From northeast to southeast it fronts the Po Hai (Gulf of Chihli), the hills of Shantung Peninsula, and the Yellow Sea. Most of the rivers flow across the plain on elevated beds that are above the interstream regions. Throughout most of history, in about two years out of three, widespread flooding was common on the plain. After 1949, however, large-scale projects for flood control and irrigation were built. Wheat, cotton, sesame seed, peanuts (groundnuts), and tobacco are raised. Sea salt is sun-dried along the coast. Peking, the national capital, is located on the northwest edge of the plain, and Tientsin, an important industrial city and commercial port, is situated near the northeast coast. The Grand Canal, beginning at Peking, crosses the eastern part of the plain to the south and southeast.

North Chŏlla (South Korea): *see* Chŏlla-puk.

North Ch'ungch'ŏng (South Korea): *see* Ch'ungch'ŏng-puk.

North College Hill, city, Hamilton county, extreme southwest Ohio, U.S., residential northern suburb of Cincinnati. The first settler, probably Gershom Gard, arrived in 1795. In 1916 three subdivisions in the "Clovernook" area east of Hamilton (Meyersville, Sunshine, and Clovernook) combined to become the village of North College Hill, so named for the now-closed Farmers' College, founded in 1846 in nearby College Hill by Freeman Grant Cary. It achieved city status in 1940. The Clovernook Center for the Blind (1903) is in the northern part of the city. Pop. (2000) 10,082.

North Cornwall, district, administrative county of Cornwall, southwestern England, in the northeastern part of the county. Most of the district lies within the historic county of Cornwall, but an area extending west from Werrington along the River Otter belongs to the historic county of Devon. North Cornwall district is an area of elevated, open terrain. Bodmin Moor, a bleak granite intrusive 800 to nearly 1,400 feet (240 to 425 m) high, having only grass cover because of high winds and infertile soils, is at the centre of the southern border. A lower, rolling landscape comprising sedimentary soils suitable for fodder crops and the rough grazing of dairy cattle characterizes the southeast and southwest. The northern coast, 50 miles (80 km) long, is a wild, surf-beaten line of steep cliffs.

The small coastal resorts of Padstow, Bude, Boscastle, and Tintagel cater to rock climbers and hikers. The village of Tintagel is, according to legend, the birthplace of King Arthur. The slate quarry at Delabole, 3 miles (5 km) south of Tintagel, has been worked continuously since the reign of Henry VII (1457–1509) to provide roofing stone for most of Cornwall. Bodmin, the district seat, and Launceston are agricultural and light industrial centres. Both, at different times, were the seat of the county of Cornwall. Many prehistoric monoliths are found in the Bodmin Moor between Bodmin and Launceston. Fruits and vegetables are grown along Cornwall's eastern border. A transatlantic telephone cable extends from Widemouth Bay, near Bude in the extreme north, to Canada and the United States. Area 461 square miles (1,195 square km). Pop. (1998 est.) 80,700.

North Dakota, constituent state of the United States of America, lying in the west north-central United States, bounded on the east by Minnesota, on the south by South Dakota, on the west by Montana, and on the north by the Canadian provinces of Saskatchewan and Manitoba. The capital is Bismarck.

A brief treatment of North Dakota follows. For full treatment, *see* MACROPAEDIA: United States of America: *North Dakota.*

Various tribes of Plains Indians, especially the Mandan and the Hidatsa, were the original inhabitants of North Dakota. The first European explorer to reach the area was the Frenchman Pierre Gaultier de Varennes. Traders from Hudson Bay and Montreal began to visit North Dakota regularly in the 1790s. Most of present-day North Dakota became a part of the United States by way of the Louisiana Purchase of 1803. The explorers Meriwether Lewis and William Clark wintered among the Mandan Indians in 1804–05. The northeastern corner of the state became a part of the United States by treaty with Great Britain in 1818.

The fur trade declined in the 1860s, and white settlement began in earnest in 1871, when railroads reached the Red River. A flood of pioneers acquired land under the Homestead Act and turned to wheat farming. The Dakota Boom (1878–86) saw the population increase almost sixfold. In 1889 North Dakota became the 39th state.

North Dakota straddles two major physiographic regions. To the east is the Central Lowland, comprising the Red River valley and the Drift Prairie, the latter consisting of rolling country covered with glacial drift. To the west are the Great Plains, the North Dakota portion of which is called the Missouri Plateau. Here the landscape has been shaped by running water that in some places has carved spectacular cliffs, buttes, and valleys.

North Dakota has a continental climate with hot summers and cold winters. In July the average daytime high temperatures range from 88° F (31° C) in the south to 82° F (28° C) in the north. In January they range from 26° F (−3° C) in the southwest to 10° F (−12° C) in the northeast. Average precipitation for the whole state is about 17 inches (430 mm).

North Dakota's population is predominantly white and of northern European extraction. At the beginning of the 21st century Native Americans comprised roughly 3 percent of the population and African Americans only one-half of a percent. The earliest white settlers included many Norwegians, Canadians, and Germans. The single largest religious denomination is Lutheran, followed by Roman Catholic. During most of the 20th century, the state consistently lost population until 1970. The urban population is just less than one-half of the total, and the overall population density is relatively low.

Agriculturally, the state produces large numbers of beef cattle and ranks first in the nation in the production of barley, sunflower, and flaxseed. Wheat is the most important source of farm income, and rye, oats, sugar beets, and potatoes are also major crops. Oil is the most important natural resource, followed by lignite coal. Manufacturing accounts for only about one-tenth of the state's income.

North Dakota's transportation network includes a well-developed system of rail lines and east–west- and southeast–northwest-oriented highway routes.

Without a large metropolitan centre, the cities and towns with colleges and universities provide the main cultural leadership. Orchestras are in Fargo, Minot, and Grand Forks. Grand Forks also has the North Dakota Ballet. Indigenous folk traditions continue among the Sioux, Ojibwa, Arikara, Hidatsa, and Mandan Indians. Norwegian language and literature are taught at the University of North Dakota. Area 70,702 square miles (183,119 square km). Pop. (2000) 642,200.

North Devon, district, administrative and historic county of Devon, southwestern England, bordering the Bristol Channel on the north and west. North Devon's northern cliff-lined coast is especially popular with tourists. The district is an extensively dissected upland, descending southwesterly and westerly from the Exmoor, a bleak, misty moor at an elevation of about 1,500 feet (455 m) in the northeast, to sea level at the sand dunes embanking the River Taw estuary on the west coast. Much of the area is formed of dark shales interbedded with sandstones that have generally weathered to form soil given over to grassland. The western extensions of Exmoor along the north coast of North Devon include rugged cliffs 400 to 500 feet (about 120 to 150 m) high and headlands interspersed with wooded, narrow valleys (combes), where the resorts of Lynmouth and Ilfracombe are located. The bulk of the district is given over to the grazing of sheep and beef and dairy cattle, many of which are local breeds. The resort of Barnstaple on the River Taw, the district seat and largest town, is among the oldest boroughs in England (chartered *c.* 930). The 18th-century poet and dramatist John Gay and the 20th-century adventurer Sir Francis Chichester were born in Barnstaple. Area 419 square miles (1,086 square km). Pop. (1998 est.) 87,100.

North Dorset, district, administrative and historic county of Dorset, south-central England. North Dorset is an area of rolling countryside diagonally split by chalk downs 400 to 900 feet (120 to 275 m) high, ranging northeast to southwest, which are in turn breached northwest to southeast by the valley of the meandering River Stour. It is generally fertile, with dairy cattle and cereals raised throughout. The northerly section of the chalk downs (Cranborne Chase) was formerly part of a royal hunting preserve; much mixed deciduous forest remains. The area's largest agricultural centres, Shaftesbury and Blandford Forum, the district seat, are both old towns ("parishes") and were important button-manufacturing towns prior to the 19th century. Blandford Forum has developed a light industrial base, and a military camp is located 2 miles (3 km) northeast of the town. Area 235 square miles (609 square km). Pop. (1998 est.) 60,500.

North Down, district, Northern Ireland. Formerly within County Down, North Down was established in 1973 and consists of gently undulating lowland on the southern shores of Belfast Lough (inlet of the sea). It is bordered by the city of Belfast to the west and by the districts of Castlereagh and Ards to the south. North Down's northern border is a 15-mile (25-kilometre) coastline on Belfast Lough, extending from Holywood in the west to Orlock Point in the east. The town of Bangor, now the administrative seat of the district, grew up around a monastery founded by St. Comgall at the mouth of Belfast Lough in about 555. The monastery was destroyed by the Danes in the 9th century, rebuilt in the 12th century, and dissolved by the English in 1542. Later, Scots and Welsh Protestants founded Bangor town.

There is some dairy farming and light industry in North Down. Most of the working population, however, is employed in the city of Belfast, making North Down essentially a residential and recreational district. Tourism flourishes in the area; Bangor is a popular seaside resort. The Ulster Folk and Transport Museum (opened 1964) located outside Holywood has open-air buildings brought from their original sites and reerected in similar surroundings. A primary highway extends along the coast of North Down from Belfast to Bangor. Area 29 square miles (74 square km). Pop. (1998 est.) 73,500.

North East Derbyshire, district, administrative and historic county of Derbyshire, England. The district surrounds Chesterfield on three sides. The east and north are part of a major coalfield, though less important than formerly. Iron, steel, and heavy engineering industries are significant on the eastern side of the district. Dronfield and Eckington are also residential areas for commuters to neighbouring Sheffield. The west and south is more rural in character. The land rises in the west toward the Pennines, and part of the district is within the Peak District National Park. The district's council meets in neighbouring Chesterfield. Area 107 square miles (276 square km). Pop. (1998 est.) 98,300.

North East Fife, former district (1975–96) in the former county of Fife, Scotland. The region is now incorporated in the unitary council area of Fife (*q.v.*).

North East Frontier Agency (India): *see* Arunāchal Pradesh.

North East Lincolnshire, unitary authority, geographic and historic county of Lincolnshire, England, centred on the town of Grimsby on the River Humber estuary of the North Sea. Grimsby is the country's premier fishing port and a leading centre for food processing. Chemical plants and other industries lie along the Humber estuary. Grimsby is also the unitary authority's administrative and service centre. The unitary authority includes the neighbouring coastal resort of Cleethorpes to the east and Immingham Dock—one of Britain's most important ports for bulk cargoes—and other industrial installations to the west. Inland the rural countryside extends over the coastal flats to the lower slopes of the Lincolnshire Wolds. Area 74 square miles (192 square km). Pop. (1998 est.) 156,200.

North Frisian Islands, German NORDFRIESISCHE INSELN, Danish NORDFRISISKE ØER, part of the Frisian Islands (*q.v.*), lying in the North Sea just off the coast of northern Europe. They are divided between Germany and Denmark.

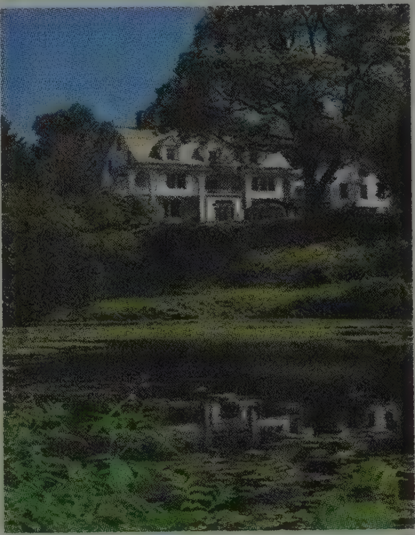
North German Confederation, German NORDDEUTSCHER BUND, union of the German states north of the Main River formed in 1867 under Prussian hegemony after Prussia's victory over Austria in the Seven Weeks' War (1866). Berlin was its capital, the king of Prussia was its president, and the Prussian chancellor was also its chancellor. Its constitution served as a model for that of the German Empire, with which it merged in 1871.

North German Plain, lowland region of northern Germany extending from the North and Baltic seas southward to the foreland of the Central German Uplands. It is a portion of the Great European Plain that spreads from the Belgian coast east into the lowlands of central Russia.

Nearly the entire North German Plain lies less than 330 feet (100 m) above sea level. The lowland is drained by the north-flowing Rhine, Ems, Weser, Elbe, and Oder rivers; a network of shipping canals and inland waterways connect the rivers from east to west. Glacial action formed the region's landform patterns, which can be divided into three major areas of relief from west to east: the alluvial deposits of the Lower Rhineland, the flat glacial sands and gravels of Lower Saxony west of the Elbe River, and the series of morainic uplands and troughs extending eastward from Schleswig-Holstein along the Baltic Sea. The climate is maritime, characterized by cool summers and mild winters, considerable precipitation, and strong northwesterly winds.

North Hempstead, town (township), Nassau county, New York, U.S. It lies on western Long Island and includes 30 incorporated villages and several large unincorporated communities.

During the American Revolution numerous British units were stationed in the area. Hessian officers were quartered in the Roslyn home of Hendrick Onderdonck (later called the Washington Tavern, to commemorate George Washington's visit, April 24, 1790). North Hempstead separated from Hempstead (*q.v.*) in 1784. It remained agrarian during the 18th century, and an active shipping trade was conducted through its harbours and bays. Sands Point Lighthouse (1806) on Cow Neck remains a conspicuous landmark. Fine examples of colonial mills survive at Plandome, Roslyn, and Saddle Rock.



Cedarmere, home of William Cullen Bryant, Roslyn, N.Y.

© Steve Gravano

Urban development was fostered by the Long Island Rail Road, which reached Mineola (1837), Roslyn (1864), and Port Washington (*q.v.;* 1898). Millionaires built large estates in the area, such as that of Clarence Hungerford Mackay at Roslyn and those of Henry C. Phipps and Cornelius Vanderbilt Whitney at Old Westbury. Many writers became residents of the town. Cedarmere, home of the poet William Cullen Bryant, is preserved at Roslyn. Other notable residents included Frances Hodgson Burnett (at Plandome), F. Scott Fitzgerald (Great Neck; *q.v.*), George M. Cohan (Kings Point), and John Philip Sousa (Port Washington). The U.S. Merchant Marine Academy was established on the former estate of Walter Chrysler at Kings Point in 1943. During World War II many new industries were located in the town, notably aircraft engineering at Port Washington. Services now predominate in North Hempstead.

The Nassau county charter of 1938 preserved the rights of existing incorporated villages but denied that option for any future villages. The larger incorporated villages are Great Neck (1921), Mineola (1906), Westbury (1932), East Hills (1931), and Williston Park (1926). Unincorporated communities include Manhasset, North New Hyde Park, and Port Washington. Pop. (2000) 222,611.

North Hertfordshire, district, administrative and historic county of Hertfordshire, southeastern England. The 400-foot- (120-metre-) high plateau area of North Hertfordshire is a northeasterly extension of the chalky Chiltern Hills. The district is cultivated throughout, but especially in the fertile loams and gravels around Hitchin in the west, where cereals (including wheat and barley) are grown. Letchworth, directly northeast of Hitchin, is the district's largest town and administrative seat; it was founded in 1903 by Sir Ebenezer Howard, an idealist and social reformer, as the world's first garden city (*q.v.*). His company's aim was to provide homes in pleasant rural surroundings for families such as Howard had seen crowded into London slums 40 miles (65 km) to the south. Many experiments of combined rural-and-urban living were first undertaken in this town.

The market towns of Hitchin and Baldock have Georgian buildings and a variety of light industries. Letchworth produces such machinery as computers, mobile cranes, and automobile gears. Sir Henry Bessemer, the 19th-century inventor and engineer who discovered the first process for manufacturing steel inexpensively, was born at Charlton, near Hitchin. Royston is the market centre for the eastern part of the district. Area 145 square miles (376 square km). Pop. (1998 est.) 116,700.

North Holland (The Netherlands): *see* Noordholland.

North India, Church of, merger in 1970 of six Christian denominations, including the United Church of Northern India; the Anglican Church of India, Pakistan, Burma (Myanmar) and Ceylon; the British and Australian Methodist churches; the Council of Baptist Churches in Northern India; the Church of the Brethren; and the Disciples of Christ.

The decolonization of India in 1947 revitalized negotiations initiated in 1929, and a draft plan of church union, submitted in 1951, was entrusted to a committee of delegates. The final plan of union was approved in 1965. The activities of the Church of North India extend beyond religious training to include education, medical and health care, and relief and social work on behalf of the orphaned, widowed, aged, and disabled in the community at large. Its headquarters are located in New Delhi.

North Indian temple architecture, style of architecture produced throughout northern India and as far south as Bijāpur district, characterized by its distinctive *śikhara,* a superstructure, tower, or spire. The style is sometimes referred to as Nāgara, a type of temple mentioned in the *Śilpa-śāstra*s (traditional canons of architecture), but exact correlation of the *Śilpa-śāstra* terms with extant architecture has not yet been established.

The typical Hindu temple in northern India, on plan, consists of a small square-shaped sanctuary (called the *garbhagṛha,* or "womb-room") housing the main image, preceded by one or more adjoining pillared *maṇḍapa*s (porches or halls), which are connected to the sanctum by an open or closed vestibule (*antarāla*). The entrance doorway of the sanctum is usually richly decorated with figures of river goddesses and bands of floral, figural, and geometric ornamentation. An ambulatory is sometimes provided around the sanctum. Above the main sanctuary rises a spire

Galaganātha Temple at Pattadakal, Karnātaka, India, North Indian style, early 8th century AD

P. Chandra

(*śikhara*), which is usually curvilinear in outline, and smaller rectilinear *śikhara*s of the *phāmsanā* type frequently top the *maṇḍapa*s as well. The whole may be raised on a terrace (*jagati*) with attendant shrines at the corners. If a temple is dedicated to the god Śiva, the figure of the bull Nandi, the god's mount, invariably faces the sanctum, and, if dedicated to the god Vishnu, standards (*dhvaja-stambha*) may be set up in front of the temple.

The centre of each side of the square sanctum is subjected to a gradated series of projections, creating a characteristic cruciform plan. The exterior walls are usually decorated with sculptures of mythological and semidivine figures, with the main images of the deities placed in niches carved on the main projections. The interior is also frequently richly carved, particularly the coffered ceilings, which are supported by pillars of varying design.

That the prototype of the North Indian temple already existed in the 6th century can be seen in surviving temples such as the temple at Deogarh, Bihār state, which has a small stunted *śikhara* over the sanctuary. The style fully emerged in the 8th century and developed distinct regional variations in Orissa, central India, Rājasthān, and Gujarāt. A classification of North Indian temples is generally made on the basis of *śikhara* types, such as the rectilinear *phāmsanā* and the curvilinear *latina*, with its two variations, the *śekharī* and the *bhūmija* (*see* śikhara).

One typical form of the North Indian style is seen in the early temples at Orissa, such as the graceful 8th-century Paraśurāmeśvara Temple at Bhubaneswar, a city that was a great centre of temple-building activity. From the 10th century a characteristic Oriya style developed that exhibited a greater elevation of the wall and a more elaborate spire. The Liṅgarāja Temple at Bhubaneswar, of the 11th century, is an example of the Oriya style in its fullest development. The Sun Temple at Konārak, the sanctum of which is badly damaged, is the largest and perhaps the most famous Oriya temple.

A development from the simpler to a more elevated and elaborate style is evident in central India, except that the *śekharī* type of superstructure, with multiple tenets, is more favoured from the 10th century onward. Interiors and pillars are more richly carved than in Orissa. The Central Indian style in its most developed form appears at Khajurāho, as seen in the Kaṇḍārya Mahādeva Temple (*c.* 11th century). There, an overall effect of harmony and majesty is maintained despite the exuberance of sculpture on the outer walls; the rich profusion of miniature shrines on the *śekharī* spire reinforces the ascending movement considerably.

Large numbers of temples are preserved in Gujarāt, but most of them have been badly damaged. The early 11th-century Sun Temple at Modhera is one of the finest.

North Island, island, the smaller of the two principal islands of New Zealand in the South Pacific Ocean, separated from South Island by Cook Strait. It rises to a central mountain range (a continuation of the South Island range), which parallels the east coast and reaches its highest point at the volcanic Mount Ruapehu (9,176 feet [2,797 m]). Rainfall, heaviest in the winter months, tends to be more evenly distributed than it is on South Island. North Island has an area of 44,204 square miles (114,489 square km). It has a majority of the national population and is gaining an increasingly larger proportion, concentrated in the vicinity of the major urban areas, Wellington (the national capital) and Auckland. Pop. (1998 est.) 2,866,300.

North Karelia (Finland): *see* Pohjois-Karjala.

North Kesteven, district, administrative and historic county of Lincolnshire, east-central England, south of the city of Lincoln. The district is partly low-lying alluvial plain and partly reclaimed marshland, both usually lower than 100 feet (30 m) in elevation. It is split in the west-central part by a narrow limestone plateau more than 200 feet (60 m) high having a steep western scarp and extending northward from the Cotswold Hills. Gradually descending to the east, the almost treeless plateau has a few scattered villages built of stone.

Both sides of the narrow plateau are agriculturally productive, but the former fens (marshlands) in the southeast, having been drained and systematically irrigated, are more intensively cultivated. Crops grown (especially in the southeast) include cereals (barley and wheat), potatoes, and assorted market-garden produce. Limestone is quarried near the village of Blankney. A principal industry at Sleaford, the district's administrative centre, in the southeast, is the malt brewery. Other industries in the district manufacture agricultural machinery and electrical equipment. The Royal Air Force College near Sleaford provides specialized training for air force officers. Examples of Decorated Gothic (1250–1375) church architecture are found throughout the district. Area 356 square miles (923 square km). Pop. (1998 est.) 87,600.

North Kingstown, town (township), Washington county, south-central Rhode Island, U.S., on Narragansett Bay. The area, settled in 1641 as Kings Towne (Kingstown from 1689), was incorporated in 1674. In 1722–23 it was divided into North Kingstown and South Kingstown (*q.v.*). North Kingstown includes the villages of Allenton, Davisville, Hamilton, Lafayette, Quonset Point, Saunderstown, Slocum, and Wickford (the administrative centre).

Early economic activities were textile milling, fishing, farming, and boatbuilding. Industrial tools and machinery are now major manufactures. Davisville was the home of the Atlantic Seabees (naval mobile construction battalions) from 1942 to 1991, when the base was closed. The area occupied by the Naval Air Station at Quonset Point until 1974 has been developed as an industrial park. The Quonset Air Museum is at what is now Quonset State Airport. Lafayette has state fish hatcheries.

Wickford is the site of the Old Narragansett Church (1707) and of Smith's Castle at Cocumscussoc (1678), used as a rendezvous for settlers who fought the Narraganset Indians in the Great Swamp Fight (1675; a battle in King Philip's War). At Saunderstown the birthplace of Gilbert Stuart, portraitist and creator of the most popular image of George Washington, has been restored; and nearby the Silas Casey Farm (*c.* 1750) is maintained as a typical New England farmstead. Pop. (2000) 26,326.

North Kyŏngsang Province (South Korea): *see* Kyŏngsang-puk.

North Lanarkshire, council area, west-central Scotland, on the eastern periphery of the Glasgow metropolitan area. It lies mostly within the historic county of Lanarkshire, but the area around Cumbernauld in the north is part of the historic county of Dunbartonshire, and the council area's northernmost extension, around Kilsyth, belongs to the historic county of Stirlingshire. North Lanarkshire encompasses a portion of the Midland Valley (Central Lowlands) extending from the valley of the River Clyde in the west to the upper valley of the River Almond in the east. It incorporates an area of rolling hills in the southeast and a section of the Kilsyth Hills in the north.

Most of the population lives in the southwestern portion of North Lanarkshire. Many of the smaller towns are residential suburbs of Glasgow. The older industrial towns of Motherwell, Wishaw, and Coatbridge owe their early development to local coal and iron ore production, which supplied a large-scale iron and steel industry. By the end of the 20th century, coal mining had ceased in the area, and the collapse of heavy industry had caused economic hardship in these towns. The development of specialized manufactures and service activities has partly compensated for this loss. North Lanarkshire also has agricultural areas in the north and east devoted largely to dairy farming, pigs, poultry, and fodder crops. Coatbridge, Cumbernauld, and Motherwell are the administrative centres. Area 180 square miles (466 square km). Pop. (1999 est.) 327,940.

North Little Rock, city, Pulaski county, central Arkansas, U.S., on the Arkansas River opposite Little Rock. It was settled in 1812 as De Cantillon, became Huntersville in 1853, and was later renamed Argenta for the Hotel Argenta, built there in the late 1850s. The community developed after the arrival of the railroad in 1853 and later became the site of freight classification yards and maintenance shops. Annexed by the city of Little Rock in 1890, Argenta was separately incorporated as a town in 1901 and renamed North Little Rock. It became a city in 1904 and absorbed the town of Levy to the north in 1946.

The city's economy is based on transportation (rail and trucking), health-related services, food processing, and the manufacture of cosmetics and wood products. North Little Rock is the home of Shorter College, a two-year institution (1886). Lake Conway and Camp Robinson Military Reservation—the latter an important training centre in both world wars—are to the north. Pop. (2000) city, 60,433; Little Rock–North Little Rock MSA, 583,845.

North Norfolk, district, administrative and historic county of Norfolk, eastern England, occupying an area of 373 square miles (966 square km), bordering the North Sea for about 55 miles (89 km) on the north and northeast. Inland North Norfolk contains fertile agricultural areas around the market centres of Fakenham in the northwest and North Walsham in the northeast. The north-central part of the district has a less fertile series of low-lying gravel ridges extending southwest from the coastal town of Cromer. The Broads, in the east, are a series of near sea-level lakes that reach some 15 miles (24 km) inland. They are surrounded by reed marshes abounding in waterfowl, and boating is popular there.

The coast has intermittent sand and gravel beaches with spits and islands at the western extreme, an area subject to accretion. East of Sheringham the coast suffers from wave erosion. Situated directly inland on the west is an alluvial plain of salt marshes and woodlands. The north-central and western-coastal resorts of Cromer, Sheringham, and the yachting centres of Blakeney and Wells-next-the-Sea are generally dependent on the summer tourist trade. Walsingham Abbey, which is located inland from Wells-next-the-Sea, is a pilgrimage site for both Roman Catholics and Anglicans; miracles have been associated with the locale since before the Norman Conquest in 1066. After 1967 the small town of Bacton on the northeast coast became the terminal for much of Britain's North Sea natural gas. Barley, wheat, and sugar beets are raised in the agricultural areas of the district, and crab and lobster fishing is locally important at Cromer and Sheringham. North Walsham and Fakenham have canning and food-processing industries. Cromer is the district seat. Pop. (1991 prelim.) 90,400.

North Ossetia, also called NORTHERN OSSETIA, or OSSETIA, Russian SEVERNAYA OSETIYA, Ossetia also spelled OSSETIYA, or OSETIYA, republic in southwestern Russia, on the northern flank of the Great Caucasus Range. It is bordered on the south by Georgia and on the north by the Sunzha and Terek ranges.

North Ossetia is mountainous, with the Glavny (Main) Range reaching 15,682 feet (4,780 m) at Mount Dzhimara and other peaks in the republic reaching more than 14,000 feet (4,250 m). Parallel to the Glavny crest range is a series of lower ranges through which the rivers have cut deep and picturesque gorges. The republic lies wholly in the basin of the upper Terek River and its fast-flowing tributaries, which emerge in the mountains and join before cutting through the Sunzha Range to the north in another deep gorge. A northern panhandle of the republic extends over the Sunzha and Terek ranges to include part of the middle Terek Plain around Mozdok.

Climate, soils, and vegetation all vary sharply with the relief. In the lowest areas there is steppe vegetation on fertile black-earth soils, which give way higher up to dense deciduous forests of oak and beech. Higher still are coniferous forests of spruce, fir, and pine, eventually giving way to alpine meadow and finally to bare rock and ice. The severity of the temperature regime and the rainfall both increase with height. In the river basins precipitation is 24 inches (600 mm) a year or less; on higher areas, up to 35 inches (900 mm).

The Ossetians are a people of mixed Iranian-Japhetic (Caucasian) origin; their language belongs to the Iranian group of the Indo-European family of languages. From the 7th century BC to the 1st century AD, Ossetia came under Scythian-Sarmatian influence, which was succeeded by that of the warlike Alani, who are believed to be the direct ancestors of the present-day Ossetians. Later the Mongol empire of the 13th century extended its sway over Ossetia, and the Alani were forced to move into the mountainous regions. Russian colonization began in the northern Ossetian area, especially after the establishment of the fortress of Vladikavkaz in 1784.

In addition to Ossetians and Russians, the republic is populated by Ingush, Armenians, Georgians, and Ukrainians. The largest city is the capital, Vladikavkaz (*q.v.*).

Industry in the republic is concentrated in Vladikavkaz and includes metallurgy and the manufacture of building materials and food products; there is also mining for lead, zinc, and boron. In the mountains, timber exploitation, particularly of beech forests, is important on both flanks of the Caucasus. Hydroelectric plants have been built on the Terek River at Vladikavkaz and on the Gizeldon River.

Agriculture is concentrated on the lower slopes and near Mozdok; the irrigated fields produce wheat, corn (maize), potatoes, hemp, and fruit. Sheep and cattle are raised on the higher slopes.

Two major highways across the Caucasus pass through Ossetia—the Georgian and Ossetian military highways, which were built in the 19th century during the Russian conquest of the Caucasus. A new all-weather highway to essentially replace these roads as a major transport route was under construction in the late 20th century. Vladikavkaz is also linked by highways with Grozny and the Caspian and with Rostov-na-Donu. The republic is also served by the Rostov-Baku railway. Area 3,100 square miles (8,000 square km). Pop. (1991 est.) 642,500.

North Platte River, one of the two main arms of the Platte River, rising in north-central Colorado, U.S. It rises in several headstreams in the Medicine Bow and Park ranges and the Rabbit Ears Range and flows north into Wyoming, bends east-southeast at Casper, and continues into western Nebraska past Scottsbluff to North Platte city. There, after a 680-mile (1,094-kilometre) course, it joins the South Platte River to form the Platte River. On the Wyoming-Nebraska boundary the river flows through Goshen Hole, where its valley widens to 50 miles (80 km) in places.

The North Platte is part of a comprehensive, multipurpose (irrigation, power, flood-control) project of the Missouri River basin. It has large reservoirs and dams (including Pathfinder, 1909; Guernsey, 1927; Seminoe, 1939; Alcova, 1938; Kingsley, 1941; Kortes, 1951; and Glendo, 1958). The North Platte's chief tributaries are the Sweetwater, Laramie, and Medicine Bow rivers.

North Polar Basin, vast and deep submarine depression in the Arctic Ocean defined by the continental shelves of Eurasia and North America. The basin is divided into two main parts, the Central Polar Basin and the Norwegian Basin, by a sill, or narrow underwater ridge, lying between north Greenland and the Svalbard archipelago of Norway. The larger of the two parts, the Central Polar Basin, has a maximum depth of 16,995 feet (5,180 m) and occupies a triangular area stretching across the North Pole from the Mackenzie River delta (northern Canada) to the Svalbard archipelago, and to the Taymyr Peninsula in northern Siberia. The Norwegian Basin is a shallower, roughly rectangular depression situated between Scandinavia, Greenland, and Iceland. A cleft in the middle of the sill separating the two basins allows free movement of deep water between the two parts. The North Polar area is characterized by unusually broad extensions of continental shelf, which cover almost two-fifths of the bottom of the North Polar Basin.

north polar sequence, group of 96 stars near the north celestial pole, used from about 1900 to 1950 as standards of magnitude and colour by which other stars are measured. First proposed by the American astronomer Edward Charles Pickering, the system has been largely superseded by the UBV system (*q.v.*).

North Pole, northern end of the Earth's axis, lying in the Arctic Ocean, about 450 miles (725 km) north of Greenland. This geographic North Pole does not coincide with the magnetic North Pole—to which magnetic compasses point and which in 1993 lay west of Ellef Ringnes Island, in the Queen Elizabeth Islands of extreme northern Canada (at about 78°27′ N, 104°24′ W)—or with the geomagnetic North Pole, the northern end of the Earth's geomagnetic field (about 79°13′ N, 71°16′ W). The geographic pole, located at a point where the ocean is 13,410 feet (4,087 m) deep and covered with drifting pack ice, experiences six months of complete sunlight and six months of total darkness each year. The American explorer Robert E. Peary claimed to have reached the pole by dog sledge in 1909; it was definitely reached by the American explorer Richard E. Byrd by airplane in 1926 and by the international team of Roald Amundsen, Lincoln Ellsworth, and Umberto Nobile by dirigible in the same year. Since then, the North Pole has been reached several times, including visits by the U.S. nuclear submarines *Nautilus* (1958) and *Skate* (1959).

North Rhine–Westphalia, German NORDRHEIN-WESTFALEN, constituent *Land* (state) of western Germany. It is bordered by The Netherlands and Belgium (west) and by the *Länder* (states) of Lower Saxony (north), Hesse (east), and Rhineland-Palatinate (south). North Rhine–Westphalia plays a leading role in the national economy. The Rhine-Ruhr region—the nation's most important industrial area—runs through the centre of the state and dominates it economically and culturally. The Rhine-Ruhr is one of the most heavily populated areas of the world, and its rich natural resources support a wide variety of highly developed industries. Outside of this complex, the state exhibits a contrasting character of rural charm grounded in the German past. The state capital is at Düsseldorf, and Bonn in the south is the seat of the national government. North Rhine–Westphalia is the most populous state of Germany, containing about one-fifth of the country's total population.

Physical geography. The state includes the upland regions of North Eifel in the south and the mountains of the Sauerland in the southeast. Volcanic rock occurs in the region of the Siebengebirge ("Seven Hills") on the eastern bank of the Rhine River. In the east, the Wester Forest—a mountainous region bordering the Weser River—is characterized by several escarpments and by the narrow, elongated ridges of the Teutoburg Forest and some small mountains. The northwest is composed of lowlands that gradually merge with the upland regions on the south and east. The north-flowing Rhine River drains the largest physical region of the state. Areas bordering on the west are drained by the Maas River, on the north by the Ems, and on the northeast by the Weser. Ultimately, the entire drainage system empties into the North Sea.

The state's proximity to the North Sea (and the Gulf Stream) makes the lowland zones mild in the winter, with mean January temperatures of about 34° F (1° C), while July temperatures average about 63° F (17° C). Precipitation is often less than 30 inches (762 mm) in the Rhine valley. The mountainous regions, however, are cool and receive high precipitation. Forests predominate in the higher mountain regions, but in the lowlands large forests are generally found only in infertile sandy areas.

The people. The principalities that existed until about 1800 in the area are recalled by regional names: Berg in the vicinity of the cities of Dusseldorf and Cologne; Sauerland in the southeast; and Münsterland in the north. The Rhineland-Westphalian boundary—running through the state from northwest to southeast—corresponds to the old border between the Saxons and the Franks and is reflected in certain dialectal variations in the German language. During the Reformation, the principalities in the area were divided between Roman Catholicism and Protestantism. These differences still exist; more than half of the total state population is Roman Catholic, but local dominance of either religion often claims more than 75 percent of a region's inhabitants. These cultural differences are strongest in the rural areas, which account for a relatively small proportion of the state's population. North Rhine–Westphalia has a great number of medium-sized and large cities, many in the Rhine-Ruhr area. Among them are Cologne, Essen, Düsseldorf, Dortmund, Duisburg, Bonn, Bochum, Aachen, Wuppertal, Solingen, and Münster.

The economy. North Rhine–Westphalia is the most important industrial, mining, and energy-producing area of Germany. Bituminous coal deposits are located in the regions of the Ruhr and Aachen, and lignite is mined west of Cologne. The state's coal production represents the vast majority of Germany's production of that mineral. Petroleum refineries concentrated in the Ruhr and along the Rhine are connected with the North Sea ports of Wilhelmshaven and Rotterdam, Neth., by a system of pipelines. The water supply used by the state's heavy industries and urban inhabitants is maintained by about 60 dams, located mainly in the mountains of the Sauerland, Berg, and north Eifel regions.

Heavy industry is the linchpin of the state's economy. Blast furnaces, steel mills, and rolling mills, using coke from local coal deposits, dot the Ruhr region, mainly in Duisburg and Dortmund. The state's raw steel production accounts for most of Germany's production of that metal. Other industries in the Ruhr produce chemicals, textiles, glass, heavy machinery, electrical equipment, and precision instruments. In the Berg region to the south, the iron and metallurgical industries and textiles play a leading role. The state's service industries are also highly developed, with many commercial enterprises, trading houses, loan societies, and banks. *See also* Ruhr.

Outside of the Ruhr, much of the state's land is devoted to commercial farms, gardens, or orchards. Wheat and sugar beets are grown in the southern lowlands, and in the north fruits and vegetables are cultivated. In Münsterland and in the regions of the lower Rhine, cattle raising and pig breeding play considerable roles. The total forested area represents almost one-quarter of the state's total land area.

The state has federal superhighways, as well as several thousand miles of federal, provincial, and county roads. The Rhine River is one of the world's most heavily traveled water routes and is the main means of transport for bulk cargoes and manufactured goods moving between the Ruhr and the ports on the North Sea. Duisburg-Ruhrort, at the mouth of Ruhr River, is the largest inland harbour in Europe. Living and health standards in the state are very high. The system of higher education includes universities in Bonn, Münster, Aachen, Cologne, Bochum, Düsseldorf, Dortmund, and Bielefeld.

History. North Rhine–Wesphalia *Land* was created in 1946 through the amalgamation of the former Prussian province of Westphalia and the northern portion of the Prussian Rhine province; the state of Lippe was incorporated in 1947. *See also* Lippe; Rhineland; Westphalia. Area 13,155 square miles (34,070 square km). Pop. (1993 est.) 17,679,200.

North Sea, shallow, northeastern arm of the Atlantic Ocean extending southward from the Norwegian Sea between Norway and the British Isles, connecting the Skagerrak (channel between Norway and Denmark) with the English Channel (between France and the United Kingdom).

A brief treatment of the North Sea follows. For full treatment, *see* MACROPAEDIA: Atlantic Ocean.

The North Sea is bordered by the Shetland Islands to the north, the United Kingdom and the Orkney Islands to the west, Norway and Denmark to the east, and France, Belgium, The Netherlands, and Germany to the south. It has an area of about 220,000 square miles (570,000 square km). Few parts of the sea are more than 300 feet (90 m) deep. The floor dips to the north and is generally irregular. Southern depths reach less than 120 feet (40 m); many shallow, shifting banks, presumably of glacial origin, have been reworked by tidal currents and present serious navigational hazards. Off northern England the vast moraine called Dogger Bank is only 50 to 100 feet (15 to 30 m) below sea level and is one of the sea's finest fishing areas. In contrast, the waters deepen in the Norwegian Trench, an unusual trench parallel to the coast of southern Norway. There are also deep trenches in the western part of the sea, including Devil's Hole east of Edinburgh, where depths exceed 1,500 feet (450 m). The North Sea is generally less saline than its North Atlantic connection because of colder, less-saline waters coming from the Baltic Sea and large quantities of fresh water contributed by the Thames, Rhine, Elbe, and other northern European rivers. Its waters are warmed by the North Atlantic Drift, which enters via the Norwegian Sea to the north. Norway, Denmark, Germany, The Netherlands, and the United Kingdom are the major beneficiaries of the huge North Sea petroleum and natural-gas fields that were developed during the late 1970s.

North Sea Canal, Dutch NOORDZEEKANAAL, waterway in The Netherlands that extends in an east-west direction from Amsterdam to IJmuiden on the North Sea coast. Navigable by oceangoing vessels, the canal is 15 miles (24 km) long, 49 feet (15 m) deep, and 771 feet (235 m) wide. Built between 1865 and 1876, it gave Amsterdam access to the sea and made that city a major port. The sea locks at IJmuiden were destroyed during World War II but later rebuilt.

North Semitic alphabet, the earliest fully developed alphabetic writing system. It was used in Syria as early as the 11th century BC and is probably ancestral, either directly or indirectly, to all subsequent alphabetic scripts, with the possible exception of those scripts classified as South Semitic (*e.g.,* Ethiopic, Sabaean). Apparently related to the earlier writing systems seen in the Canaanite and Sinaitic inscriptions, North Semitic gave rise to the Phoenician and Aramaic alphabets, which, in turn, developed into the European, Semitic, and Indian alphabets. North Semitic had 22 letters, all representing consonants, and was written from right to left; these characteristics are typical of most of the later Semitic alphabets (*e.g.,* Hebrew and Arabic).

North Shore, city in the Northern Auckland urban area, northern North Island, New Zealand. It is located on a peninsula about 2 miles (3 km) north of Auckland city across Stanley Bay, and it faces Rangitoto Channel to the east. North Shore was designated a city in 1989 and consists of the former towns ("boroughs") of Devonport and Takapuna. Devonport to the south is one of Auckland's oldest suburbs, with beaches and homes of the Auckland affluent. Takapuna to the north has some of Auckland's most popular beaches and is linked with that city through the Auckland Harbour Bridge. Pop. (1993 est.) 155,500.

North Shropshire, district, county of Shropshire, west-central England, bordering Wales to the northwest. Almost entirely rural in character, North Shropshire is an undulating plain containing large areas of former marshland. Many scenic meres (small, shallow lakes) are in the north, especially in the vicinity of Ellesmere. Dairy farming is the principal economic pursuit in the district. Assorted cereals and sugar beets, as well as pigs, are raised. The district's market centres, including Ellesmere, Market Drayton, Wem, and Whitchurch, have developed a light-industrial base. Wem is the district seat. Area 263 square miles (680 square km). Pop. (1992 est.) 53,800.

North Siberian Lowland, Russian SEVERO-SIBIRSKAYA NIZMENNOST, low-lying region, east-central Russia. It is situated between the lower Yenisey River in the west and the lower Kolyma River in the east. To the south lies the Central Siberian Plateau, to the north the Byrranga Mountains of the Taymyr Peninsula, and farther east the Laptev Sea. The western part of the plain is sometimes known as the Taymyr Plain, and the portion east of the Lena River as the Yana-Indigirka and Kolyma plains. The lowland has an east-west extent of 1,850 miles (3,000 km) and a width of up to 375 miles (600 km) and lies at 165–230 feet (50–70 m) above sea level. There are frequent low ridges and hills. The plain is extremely swampy, and the vegetation is tundra or forest-tundra in character.

North Star: *see* polestar.

North Sumatra: *see* Sumatera Utara.

North Tonawanda (New York, U.S.): *see* Tonawanda–North Tonawanda.

North Tyneside, borough and district, metropolitan area of Tyne and Wear, northeastern England. The district lies adjacent to the northeastern quarter of the city of Newcastle upon Tyne and is bordered by the Tyne River to the south and the North Sea to the east. North Tyneside includes the Tyne River industrial conurbation of North Shields and Wallsend, as well as the sandy-beach resort communities of Tynemouth and Whitley Bay on the North Sea coast. North Shields has oil-storage facilities, ship-repair yards, and fish canneries, and shipbuilding and the manufacture of marine parts and equipment are important at Wallsend. The northwestern portion of North Tyneside is a residential area for workers who commute to Newcastle upon Tyne. Area 32 square miles (84 square km). Pop. (1992 est.) 195,200.

North Vancouver, city, southwestern British Columbia, Can. It lies along Burrard Inlet of the Strait of Georgia and is linked to Vancouver by the Lions Gate and Second Narrows bridges. The community, founded shortly after a sawmill was built on the site in 1863, was for years the largest settlement on the inlet. In 1872 it was named Moodyville (after Sewell Moody, who owned the sawmill). In 1907 it was renamed North Vancouver and was incorporated as a city. Its economy depends chiefly on the shipping of grain, lumber, and ore and on shipbuilding and sawmilling. There is also some light manufacturing. Fishing, mountain climbing, and skiing attract tourists and sportsmen. Pop. (1991) 38,436.

North Warwickshire, borough and district, county of Warwickshire, central England. It is a generally rural district adjoining the West Midlands to the northeast of Birmingham and northwest of Coventry. Central North Warwickshire occupies a 500-foot- (150-metre-) high upland, which is mostly coextensive with a section of the Warwickshire coalfield extending through the district for 16 miles (26 km) in a north-south direction. Assorted cereal crops and livestock are raised in the district. There are industries producing boots, shoes, hats, and knitwear in the old market town of Atherstone, the district seat, in the eastern part of the district. Many inhabitants of the district work in nearby conurbations, including Birmingham and Coventry.

The southern portion of the district is part of what is sometimes called "George Eliot country"; Arbury Hall, south of the district boundary, is where the Victorian novelist lived as a child. Among the district towns ("parishes") are Coleshill in the west and Polesworth in the north. Area 110 square miles (286 square km). Pop. (1992 est.) 61,300.

North-West, province, north-central South Africa. It was created in 1994 from portions of Transvaal and Cape of Good Hope provinces. North-West is bordered by Botswana to the north and northwest, Northern province to the northeast, Gauteng province to the east, Orange Free State province to the southeast, and Northern Cape province to the southwest. The provincial capital is Mafikeng.

North-West province occupies the relatively flat interior plateau (Highveld) of southern Africa and stretches from the usually dry Molopo River southward to the Vaal River. Savanna and thornveld country predominate, and there are salt pans in the south. Summers are hot, and rainfall averages 20 inches (500 mm) annually.

Blacks constitute 91 percent of the population and are mostly rural Tswana-speaking peoples. Whites make up about 8 percent of the population and mainly speak Afrikaans. Corn (maize), peanuts (groundnuts), and sorghum are grown throughout the province, and tobacco, wheat, and citrus fruits are raised in the northeast. Cattle and sheep are grazed in large numbers. Mining also plays an important role in the economy. Diamonds, chromite, platinum, and uranium are mined in the province, which forms the western part of the Witwatersrand and contains the Klerksdorp goldfields. The major urban centres in the province are Klerksdorp and Potchefstroom. The latter city has a university. Area 45,834 square miles (118,710 square km). Pop. (1993 est.) 3,506,800.

North West Company, Canadian fur-trading company, once the chief rival of the powerful Hudson's Bay Company. The company was founded in 1783 and enjoyed a rapid growth. It originally confined its operations to the Lake Superior region and the valleys of the Red, Assiniboine, and Saskatchewan rivers but later spread north and west to the shores of the Arctic and Pacific oceans. It even penetrated the area then known as the Oregon Country, where it constructed posts in what are now the U.S. states of Washington and Idaho. Its wilderness headquarters was located first at Grand Portage on Lake Superior and after 1805 at Fort William (also on Lake Superior, at the site of the present city of Thunder Bay, Ont.).

Competition with the Hudson's Bay Company became especially intense when that company established the colony of Assiniboia on the Red River (in present-day Manitoba) in 1811–12, across the North West Company's line of communications. A few years later, open conflict broke out, during which North West Company men destroyed the Red River colony (*see* Seven Oaks Massacre) and Hudson's Bay Company men destroyed the North West Company post of Fort Gibraltar (located on the site of modern Winnipeg, Man.) and captured Fort William.

Under pressure from the British government, the old North West Company and the Hudson's Bay Company were merged in 1821 under the name and charter of the latter company.

The New North West Company, or XY Company, had a brief existence (1798–1804) as a competitor of the old North West Company before being absorbed by the latter.

North-West Frontier Province, northernmost province of Pakistan. It is bounded by Afghanistan to the west and north, the territory of Jammu and Kashmir to the northeast, Punjab province to the southeast, and Balochistān province to the southwest. Peshāwar is the provincial capital.

In ancient times, the state of Ghandhāra occupied the Vale of Peshāwar and adjoining areas. This kingdom was important because of its strategic location at the eastern end of the Khyber Pass. Gandhāra was annexed by the Persian Achaemenian Empire in the early 6th century BC and remained a Persian satrapy until 327 BC. The region then passed successively under Greek, Indian, Indo-Bactrian, Sakan, Parthian, and Kushān rule.

Hindu Kush Mountains near Lowarai Pass, North-West Frontier Province, Pakistan
© Diane Rawson—Photo Researchers

Muslim rule was first brought to the region by the Turks, whose ruler, Sebüktigin, gained control of Peshāwar in AD 988. His son, Maḥmūd of Ghazna, invaded northern India several times between 1001 and 1027 and brought a large area of the present province into the boundaries of his Ghaznavid empire. Beginning in the late 12th century, the region was held successively by the Ghurids, by various Muslim Afghan dynasties, and then by the Mughals. After the invasion of the Iranian ruler Nādir Shāh in 1738, the territory remained under a loose form of Afghan Durrānī rule. Beginning about 1818, invading Sikhs from the Punjab region of India increasingly secured control of the frontier territory until the coming of the British in 1849.

The northwestern frontier areas were annexed to India by the British after the Second Sikh War of 1849. The territories thenceforth formed a part of the Punjab until the North-West Frontier Province was created in 1901. After Pakistan attained independence in 1947, the region continued to exist as a separate Pakistani province. The inhabitants of the tribal territories, the westernmost area along the Afghanistan border, are not subject to the Pakistani legal code, however. During the 1980s the province was inundated by Afghan refugees seeking asylum from the Soviet occupation of their country.

The terrain of the North-West Frontier Province consists of mountain ranges, undulating submontane areas, and plains surrounded by hills. In the north the mountain ranges generally run north-south, while south of the Kābul River, which bisects the province from east to west, the ranges generally run east-west. The Hindu Kush region in the north, long noted for its scenic beauty, is divided by the Kunar River into two distinct ranges—the northern Hindu Kush and the Hindu Rāj. Tirich Mīr rises to 25,230 feet (7,690 m) and is the highest peak of the northern Hindu Kush. To the south of the Hindu Rāj lies the rugged country of the Pānjkora, Swāt, and Kandia river basins. The Lesser Himalayas and the sub-Himalayas are situated in the eastern part of the province and form definite ranges broken by hilly country and small plains. The fertile Vale of Peshāwar extends northward along the Kabul River. Though it covers less than one-tenth of the province's area, this region contains about one-half of its total population. The city of Peshāwar lies in the western portion of the vale. West of Peshāwar, the historic Khyber Pass is strategically important as the most easily negotiable route between Afghanistan and the Indian subcontinent. South of the Kābul River lies the east-west-trending Safed Koh Range. The Kurram, Tochi, and Gumal rivers drain the province's southern region, and the Indus River forms part of the province's eastern border.

The mountain slopes in the north of the province support stands of evergreen oak and pine. There are also extensive mountain grasslands. The hills to the south are sparsely covered with bushes, acacia, and grasses.

The North-West Frontier Province is inhabited mainly by the Pashtun, who are noted for their independence. The Pashtun comprise many tribes and clans, each taking great pride in its genealogy. Pashto is the main language in the province, except for some areas where Punjabi predominates, and virtually all the population is Muslim. Only a small part of the overall population is urban. The province has two cities, Peshāwar and Mardān.

The North-West Frontier's economy is essentially agricultural, even though the mountainous terrain is not favourable to extensive cultivation. Irrigation is carried out on about one-third of the cultivated land. Wheat, corn (maize), sugarcane, and tobacco are the major crops. The province's principal industries are the manufacture and refining of sugar, the canning and preservation of fruits and vegetables, tobacco processing, and the manufacture of small arms and accessories. Other products are cotton textiles, cement, ghee (clarified butter), furniture, and milled grains.

The Pashtun tribal order is inherently resistant to social change, and educational progress in the province has been quite slow. The literacy rate among the total population is lower than that of Pakistan as a whole.

In the tribal areas on the province's western fringe, the Pashtun tribes are free to govern themselves according to their own customs. Political and military agents who are responsible to the central government have the power to award or withhold subsidies and to control entry into and departure from the tribal areas.

Peshāwar is the site of the University of Peshāwar (1950), the Peshāwar Museum, and other colleges and cultural institutes. Area, including federally administered tribal areas, 39,282 square miles (101,741 square km). Pop. (1983 est.) including federally administered tribal areas, 13,987,000.

North West Leicestershire, district, county of Leicestershire, south-central England, incorporating one of the oldest (13th century) coal-mining areas in Great Britain. It is essentially an upland area of undulating meadows, but some cultivation of crops occurs in the southwest and along the River Soar valley in the north. The two principal towns ("parishes"), Coalville and Ashby-de-la-Zouch, are in the upland area bordering Charnwood Forest, a former royal hunting ground to the east. Charnwood Forest consists of a series of barren ridges rising above 900 feet (275 m) and exposing outcrops of late Precambrian tuffs, some of England's oldest bedrock.

Declining amounts of coal are mined near Coalville, Ibstock, and Moira. Coalville, now industrially diversified, has brick and tile making and metalworks. Ashby-de-la-Zouch manufactures biscuits (cookies) and soap.

The ruins of the 15th-century Ashby Castle are at Ashby-de-la-Zouch, and the tournament field described in Sir Walter Scott's novel *Ivanhoe* lies about 1 mile (1.5 km) north. Many monasteries were built in the district in the 12th and early 13th centuries. A mid-19th-century Cistercian (Trappist) abbey remains in Charnwood Forest.

East Midlands (international) Airport in the northern part of the district serves greater Derby, Nottingham, and Leicester. Coalville is the district seat. Area, 108 square miles (280 square km). Pop. (1992 est.) 82,500.

North Wiltshire, district, county of Wiltshire, southern England, with an area of 297 square miles (768 square km) in the northwestern part of the county, some 20 miles (32 km) east of Bristol. North Wiltshire bestrides the upper reaches of the Avon River valley. It is a fertile clay plain extending into the Cotswold

Hills on the west and bordered by the steep chalk escarpment of the Marlborough Downs on the east; in the north is a headwaters area for many watercourses, including the Thames.

Many churches of the district date from before 1500, and about 500 buildings are officially listed as being of historical importance. The nearby Cotswolds are a source of oolitic limestone used in the construction of many of the district's buildings. Lacock in the southern part of the district is one of England's prettiest villages, with winding streets, gabled roofs, and timbered buildings. Its 13th-century abbey is well preserved, and a local museum (opened 1975) commemorates the pioneer photography of William Henry Fox Talbot.

Wheat and barley are intensively raised in North Wiltshire, as are cattle, sheep, and pigs. Malmesbury and Wootton Bassett are local market centres. Calne has a bacon-curing industry, and Chippenham, the district seat, has agricultural and railway-related industries. Pop. (2001) 125,370.

North Wolds (England): *see* East Yorkshire.

North York, city, constituting, together with the cities of Toronto, Scarborough, York, and Etobicoke and the borough of East York, the municipality of Metropolitan Toronto, southeastern Ontario, Can. It is bounded by the townships of Vaughan and Markham (north); by Scarborough (east); by East York, the city of Toronto, and York (south); and by Etobicoke, York, and the Humber River (west). North York Township (created in 1922 from York Township) was constituted as a borough in 1967 and became a city in 1979. Since World War II there has been planned industrial and residential development. The city has more than 4,000 acres (1,620 hectares) of parks and open space, and the 475-acre (192-hectare) campus of York University (1959) forms part of its northern boundary. The Black Creek Pioneer Village depicts the early settlers' way of life.

North Yorkshire, administrative and geographic county in northern England, part of the historic county of Yorkshire. The administrative county comprises seven districts: Craven, Hambleton, Richmondshire, Ryedale, Selby, and the boroughs of Harrogate and Scarborough. The geographic county includes the entire administrative county; the unitary authorities of Middlesbrough, Redcar and Cleveland, and the city of York; and the part of the unitary authority of Stockton-on-Tees that lies south of the River Tees.

The geographic county has two upland regions. The one in the west comprises the Pennines, the major uplands of northern England; they reach an elevation of more than 2,200 feet (670 metres) in the northwest at Pen-y-Ghent, Whernside, Ingleborough, and Mickle Fell and are deeply dissected by the valleys (dales) of the Rivers Swale, Ure, Nidd, and Wharfe. In the east is a region of limestones and sandstones forming the upland mass of the North York Moors and Cleveland Hills. Separating these two regions is the Vale of York, a lowland with glacial clay soils. To the north the Cleveland Hills drop to the North Sea coast and the Tees valley in a dramatic escarpment.

The county is largely agricultural. The large landholdings of the Vale of York are major grain producers, while dairy farming is especially important in the wetter, western areas of the Pennine dales and lower slopes. Hill sheep farming is characteristic of the moorlands of the Pennines and North York Moors. There is some food processing and light manufacturing in the county's towns, and coal is mined around Selby, but heavy manufacturing is important only along the Tees estuary. The unitary authority of Redcar and Cleveland has steel mills, petroleum refining, chemical industries, and one of Britain's leading seaports, while neighbouring Middlesbrough is an engineering centre. Research and other service activities are significant in York and Harrogate, and high-technology firms are a growing presence in the county. The towns of Harrogate and Scarborough, frequently settings for British political conferences and conventions, are also centres of tourism associated with the Yorkshire Dales and the North York Moors national parks. The major rail and road links connecting London and Edinburgh traverse the county. Area administrative county, 3,102 square miles (8,034 square km); geographic county (excluding Stockton-on-Tees), 3,320 square miles (8,600 square km). Pop. (2001) administrative county, 569,660; (1998 est.) geographic county (excluding Stockton-on-Tees), 1,025,800.

Northam, town, southwestern Western Australia. It lies at the confluence of the Avon (upper course of the Swan) and Mortlock rivers. One of the state's oldest settlements, it was founded in 1833 and named by Governor Sir James Stirling after Northam in Devonshire, England. During the 1890s Northam was a major stop for miners eastward bound for the Yilgarn, Eastern, and Dundas goldfields. It now serves part of the eastern Wheat Belt, which also produces fodder, sheep, beef cattle, and pigs. The town's industries include flour mills, metal-fabrication and cold-storage works, a plasterboard factory, and brick and charcoal kilns. Northam is situated at the junction of several rail lines and is also at the intersection of the Great Eastern and Southern highways. It is the site of the Holden Immigration Centre, and nearby are a military training camp and Muresk Agricultural College. Along the Aron River is a sanctuary for many species of birds, including rare white swans. Pop. (2001 prelim.) 6,527.

Northampton, town and borough, administrative and historic county of Northamptonshire, in the Midlands region of England. Originating about AD 1100 as a walled town with a castle on the River Nen, Northampton was granted its first charter in 1189. The town walls survived until the Restoration (1660) after the English Civil Wars; they were then demolished because Northampton had sided with Parliament and against the king. The railway station now occupies the site of the old castle.

Much of the town was destroyed by fire in 1675. Rebuilding continued through the 18th century, providing the town with a fine range of buildings surrounding the large market square, with the focal point at All Saints Church. A Roman Catholic bishopric was founded in 1850, and the cathedral was begun in 1864 and completed in 1960. The Guildhall also dates from 1864.

Northampton is best known for its shoe and leather industry. Other industries include light engineering, primarily related to electronics, and brewing. The town is also an important retail and market centre serving Northamptonshire and North Buckinghamshire. Northampton was designated a planned new town in 1965, and expansion followed. Great Brington Church lies 6 miles (10 km) to the northwest. Area 31 square miles (81 square km). Pop. (2001) 194,472.

Northampton, city, seat (1662) of Hampshire county, west-central Massachusetts, U.S. It lies along the Connecticut River, 17 miles (27 km) north-northwest of Springfield. The site, originally known as Nonotuck (an Algonquian word meaning "middle of the river"), was settled in 1654 and named for Northampton, England. It subsequently became a self-sufficient farming community. During King Philip's War (1675–76) and Queen Anne's War (1702–13), the area was the scene of brutal raids.

A woolen mill was established in 1809, and, connected to the Connecticut communities by canal (1834) and by railroad (1845), Northampton developed as a manufacturing centre, particularly for silk (which has since declined). Great impetus was given to Northampton's growth by the establishment there in 1875 of Smith College, an exclusive school for women. President Calvin Coolidge, who practiced law in Northampton, served as mayor (1910–11) and died there in 1933; the Forbes Library (1893) houses a collection of Coolidge memorabilia.

The city's economy is now dependent on services (education and health care) and trade. Manufactures include plastic moldings and electronic equipment. Look Memorial Park is a popular recreational area. Inc. town, 1655; city, 1883. Pop. (2000) 28,978.

Northampton, EARLS AND MARQUESSES OF, titled English nobility of several creations, most notably in the families Parr, Howard, and Compton, grouped below chronologically and indicated by the symbol •. (In 1812 the Compton earl was elevated to a marquess.)

• Northampton, William Parr, Marquess of, EARL OF ESSEX, BARON PARR (b. Aug. 14, 1513, Kendal Castle?, Westmorland, Eng.—d. Oct. 28, 1571, Warwick, Warwickshire), brother of Henry VIII's queen Catherine Parr, and Protestant supporter of Lady Jane Grey and Queen Elizabeth I.

He took part in suppressing the uprising in the north of England in 1537 and, after serving as member of Parliament for Northamptonshire, was made Baron Parr in 1539. In December 1543, just after his sister had married the king, he was created Earl of Essex, a title formerly held by his father-in-law, Henry Bourchier, who had died in March 1540. Under Edward VI, who called him his "honest uncle," Parr was equally prominent, being created Marquess of Northampton in 1547 and becoming lord-lieutenant of five of the eastern counties and being great chamberlain from 1550 to 1553. He favoured the claim of Lady Jane Grey to the English throne, and consequently the accession of Queen Mary I was quickly followed by his attainder (1553), with loss of his titles. Although sentenced to death he was pardoned and released from prison at the end of 1553. After enjoying the favour of Queen Elizabeth I, he was re-created Marquess of Northampton in 1559. The title became extinct upon his death, he having been childless through three marriages.

• Northampton, Henry Howard, Earl of, BARON OF MARNHULL (b. Feb. 25, 1540, Shottesham, Norfolk, Eng.—d. June 15, 1614, London), Roman Catholic intriguer during the reigns of Elizabeth I and James I of England, known for his unscrupulousness and treachery.

He was the second son of the poet Henry Howard, Earl of Surrey, and the younger brother of Thomas Howard, 4th Duke of Norfolk. After discovery of his brother's plot to wed Mary, Queen of Scots, and of his own correspondence with her, he was arrested more than once on suspicion of harbouring treasonable designs.

At the close of the reign of Queen Elizabeth I, he joined with Robert Cecil in courting the heir to the throne in Scotland, the main object of his long letters of advice being to poison King James VI's mind against Sir Walter Raleigh and other rivals, whom he at the same time hoped to ensnare into compromising relations and correspondence with Spain. These methods, which could not influence Elizabeth, were completely successful with James, and on the latter's accession Howard received a multitude of favours. In 1603 he was made a privy councillor, and in 1604 he was made lord warden of the Cinque Ports and earl of Northampton and Baron Howard of Marnhull in Dorset.

He was one of the judges at the trials of Raleigh and Lord Cobham in 1603, of Guy Fawkes in 1605, and of Garnet in 1606, in each case pressing for a conviction. The climax of his career was reached when he assisted his grandniece, Frances Howard, Lady Essex, in obtaining her divorce from her husband in order to marry the favourite Robert Carr, earl of Somerset, whose mistress she already was and whose alliance Northampton was eager to secure for himself. He obtained the divorce by the decree of a special commission, and when Sir Thomas Overbury's influence seemed likely to prevent Somerset from completing the marriage project, he caused Overbury to be imprisoned in the Tower of London. Shortly afterward Overbury died from the effects of poison administered according to the wishes of Lady Essex; and the close intimacy which existed between Lady Essex and Northampton leaves his name tarnished with suspicion. He advised against the summoning of Parliament in 1614 and then fomented disputes to compel James to dissolve it. He died unmarried, a Roman Catholic, in 1614, at which time his title became extinct.

Northampton, Spencer Compton, 2nd earl of, Lord Compton (b. May 1601—d. March 19, 1643, Hopton Heath, Shropshire, Eng.), Royalist commander during the English Civil Wars.

The son of William Compton, 1st earl in the Compton line (whom he succeeded in 1630), he warmly supported King Charles I. On the outbreak of the Civil War he was entrusted with the execution of the commission of array in Warwickshire. After varying success and failure in the Midlands, he fought at Edgehill, and after the king's return to Oxford he was given, in November 1642, the military supervision of Banbury and the neighbouring country. He was attacked in Banbury by the Parliamentary forces on December 22 but was relieved by Prince Rupert the next day. In March 1643 he marched from Banbury to relieve Lichfield and, having failed there, proceeded to Stafford, which he occupied. Thence on March 19, accompanied by three of his sons, he marched out with his troops and engaged Sir John Gell and Sir William Brereton at Hopton Heath. In the moment of victory he was surrounded by the enemy and, refusing quarter, was slain. His son James (1622–81) succeeded him as 3rd earl.

Northampton, Assize of (1176), group of ordinances agreed upon by King Henry II of England and the magnates in council at Northampton. The ordinances were issued as instructions to six committees of three judges each, who were to visit the six circuits into which England was divided for the purpose. The first part of the assize repeated the substance of some provisions of the Assize of Clarendon (1166), but with several differences. The second part of the assize defined some of the rights of the heir, the lord (or lords), and the widow of a deceased free tenant; its protection of the heir's right to succeed to land established the possessory action known as mort d'ancestor (*i.e.,* an action to recover lawfully inherited land that had been taken by another before the heir was able to take possession). In line with this, the justices were also ordered to hear pleas of novel disseisin (an action to recover lands of which the plaintiff had been dispossessed) arising since May 1175 and to try proprietary actions commenced by the king's writ for the recovery of land held by the service of half a knight's fee or less.

The rest of the assize's text contains other instructions to the judges concerning their various administrative, political, judicial, and financial duties.

Northamptonshire, county of the East Midlands region, England. The county is oval in shape, with the long axis extending for 56 miles (90 km) in a southwest–northeast direction. A ridge of hills, an escarpment of Jurassic rocks, runs along the long axis and separates the basin of the River Nen in the south from that of the Welland in the north. Both these rivers flow east into The Wash. Among the rocks above the escarpment are the ore-bearing Northampton Sands, which yield a low-grade iron ore and have been extensively worked.

The wooded hills and well-watered valleys seem early to have attracted settlement to the area. There are pre-Celtic as well as Roman remains; parts of the churches at Earls Barton, Brigstock, and Brixworth are Saxon and may be as early as 7th century. At the Domesday Inquest ordered by William I the Conqueror in 1086, the boundaries of the shire (county) were virtually identical with those of today. Norman and Early English building styles are well-represented, but, architecturally, the chief feature of the county is the large number of mansions and country houses, from 13th-century Barnwell Castle, to Tudor Rockingham Castle and Castle Ashby, and to Sulgrave Manor, the ancestral home of George Washington's family.

In spite of its numerous aristocracy and squirearchy, the county was largely pro-Parliament in the English Civil War of 1642–45. The decisive battle, in which King Charles I was defeated, was fought just north of Naseby near the county's northern border in 1645.

In some ways Northamptonshire epitomizes the rural life of a bygone England, with great estates and parks, rolling pastoral lands, and some of Britain's best-known fox hunts (*e.g.,* the Pytchley). At the same time, however, it plays an important role in the contemporary economy. It is notable for the number of reservoirs that have been constructed on the Nen and its tributaries. Its industries are varied. Since the Industrial Revolution it has been best-known for footwear, with boot and shoe factories in all its towns and many of its villages. This industry, however, has been steadily shrinking since the 1950s, and its replacements are engineering and food processing. The county is remarkable for the number of small industrial centres it possesses rather than for major concentrations.

Crossed by two main railway routes from London to the Midlands and the north and by the main motorway link (M1), the county is well-situated for manufacturing and marketing. The steelmaking town of Corby developed in the 1930s. The continued use of lean local ores has, however, proved uneconomical in competition with rich imported ores. In addition, the aging of the steel plant has contributed to the uncertainty of the industry.

Northampton, Corby, Kettering, and Wellingborough are the principal county centres. The county has seven districts: Corby, Daventry, East Northamptonshire, Kettering, Northampton, South Norththamptonshire, and Wellingborough. Its area is 914 square miles (2,367 square km). Pop. (1985 est.) 546,100.

Northavon, district, county of Avon, southwestern England, occupying an area of 178 square miles (462 square km) directly northeast of the city of Bristol. Northavon is primarily a fertile clay valley extending eastward from the mud flats of the Severn Estuary. It crosses the steep westward-facing escarpment of the limestone Cotswold Hills (600 feet [180m]) in the extreme east. Large amounts of milk are trucked from the small valley dairies to regional urban areas; beef cattle and cereals (including wheat and barley) are also raised. Cereal cultivation has chiefly replaced sheep farming in the Cotswolds. Parts of Northavon are within the exhausted Bristol coalfield.

Parishes (towns) northeast of Bristol (such as Yate, Chipping Sodbury, and Westerleigh) are experiencing residential growth. Filton, an older industrial centre directly north of Bristol, has major aircraft works of both the British Aerospace and Rolls-Royce companies. The Oldbury nuclear power station is located adjacent to the tidal reservoir of the Severn Estuary in the northwestern corner of the district. Celestite (strontium sulfate) is quarried near Yate. The Severn suspension bridge (completed 1966) connects the district and southern England to Wales. Thornbury, a market centre in the west, is the district seat. Pop. (1985 est.) 124,100.

Northbrook, Thomas George Baring, 1st earl of, Viscount Baring of Lee, Baron Northbrook of Stratton (b. Jan. 22, 1826, London—d. Nov. 15, 1904, Stratton Park, Hampshire, Eng.), British statesman who served as viceroy of India.

The son of Sir Francis Baring, afterward 1st Baron Northbrook, he studied at Christ Church, Oxford. He was private secretary to several officials and became Liberal member of Parliament for Falmouth and Penryn (1857–66). He was a junior lord of the Admiralty (1857–58) and under secretary for India (1859–61; 1868–72) and for war (1861–66).

After the assassination of Lord Mayo, viceroy of India, in 1872, Prime Minister Gladstone appointed Baring to succeed him. Baring's general policy was to lighten taxes, reduce legislation, and give the land rest. A believer in free trade, he abolished most export duties and reduced import duties. In the Bengal famine of 1874 he sanctioned the construction of the Sone Canal and North Bengal railway as relief works. Repeatedly in disagreement with the secretary of state for India, Lord Salisbury, over matters of policy, Baring resigned in 1876. He was made earl of Northbrook in 1876 and served as first lord of the Admiralty (1880–85), during which time he was sent on a special mission to Egypt (August–November 1884) to inquire into financial problems. He parted decisively from Gladstone on the Irish question in 1886 and thereafter defended the union against Home Rule.

Northcliffe (of Saint Peter), Alfred Charles William Harmsworth, Viscount, also called (from 1905) Baron Northcliffe of the Isle of Thanet (b. July 15, 1865, Chapelizod, near Dublin—d. Aug. 14, 1922, London), the most successful newspaper publisher in the history of the British press and a founder of popular modern journalism.

After an impoverished childhood and a few attempts at making a quick fortune, young Harmsworth embarked on free-lance journalism as a contributor to popular papers, rose to editorial positions, and, inspired by the success of *Tit-Bits,* a popular weekly of informative scraps, decided to start a similar paper of his

Northcliffe, 1918

Associated Newspapers Ltd.

own called *Answers to Correspondents.* After some difficulty in securing financial backing, he began publication, soon shortening the name to *Answers*. As the paper gained public favour he was joined by his brother Harold, whose financial ability and capacity for attracting advertising, combined with Alfred's genius for sensing the public taste, made it a success. *Answers* was followed by many other inexpensive popular periodicals, chief among them *Comic Cuts* ("Amusing Without Being Vulgar") and *Forget-Me-Not,* for the new reading public of women. These formed the basis for what became the Amalgamated Press (from 1959 Fleetway Press), the largest periodical publishing empire in the world.

In 1894 Harmsworth entered the newspaper field, purchasing the nearly bankrupt *London Evening News* and transforming it into a popular newspaper with brief news reports, a daily story, and a column for women. Within a year, circulation had grown to 160,000 copies, and profits were substantial. Conceiving the idea of a chain of halfpenny morning papers in the provinces, he bought two papers in Glasgow and merged them into the *Glasgow Daily Record*. He then launched a national daily in London. The *Daily Mail,* first published on May 4, 1896, was a sensational success. Announced as "The penny newspaper for one halfpenny" and "The busy man's daily journal," it was exactly suited to the new reading public. All news stories and feature articles were kept short, and articles of interest to women, political and social gossip, and a serial story were made regular features. Although news headlines remained, at first, modest in size, far more were used than in any previous paper. With its first issue, the *Mail* established a world record in daily newspaper circulation, a lead it never lost while its founder lived.

Next Harmsworth bought the *Weekly Dispatch* when it was nearly bankrupt and turned it (as the *Sunday Dispatch*) into the biggest-selling Sunday newspaper in the country. In 1903 he founded the *Daily Mirror,* which successfully exploited a new market as a picture paper, with a circulation rivaling that of the *Daily Mail*. Harmsworth saved the *Observer* from extinction in 1905, the year in which he was made Baron Northcliffe. In 1908 he reached the pinnacle of his career by securing control of *The Times,* which he transformed from a 19th-century relic into a modern newspaper.

Northcliffe's contributions to the British war effort in World War I began with his early exposure in the *Daily Mail* of the British army's shell shortage. His criticisms of Lord Kitchener aroused intense resentment in some quarters, but he also pressed for the creation of a separate Ministry of Munitions and for the formation (1915) of a wartime coalition government. For his service as head of the British war mission in the United States in 1917, he was created a viscount that year. He acted as the British government's director of propaganda aimed at Germany and other enemy countries in 1918. By this time Northcliffe's press empire appeared to hold such power over public opinion that he tried unsuccessfully to influence the composition of Prime Minister David Lloyd George's cabinet. Always unpredictable, Northcliffe became the victim of a megalomania that damaged his judgment and led to the breakdown that preceded his death.

Northcliffe's success as a publisher rested on his instinctive understanding of the new reading public that had been created by compulsory education. His legacy lay in changing the direction of much of the press away from its traditional informative and interpretative role to that of the commercial exploiter and entertainer of mass publics.

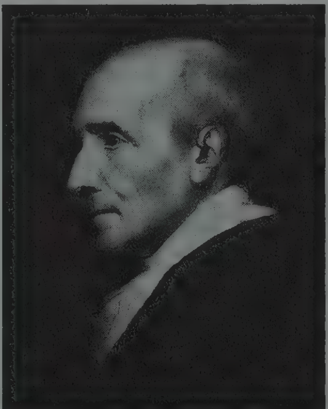
Northcote (of Exeter), Henry Stafford Northcote, Baron, also called (from 1887) SIR HENRY STAFFORD NORTHCOTE, BARONET (b. Nov. 18, 1846, London, Eng.—d. Sept. 29, 1911, Ashford, Kent), British diplomat and administrator, governor-general of Australia from 1904 to 1908.

The second son of Sir Stafford Henry Northcote (afterward 1st Earl of Iddesleigh), he attended Eton College and Merton College, Oxford (B.A., 1869; M.A., 1873). He became a Foreign Office clerk in 1868 and, as an aide, accompanied his father to Washington, D.C., in 1871 in the settlement of the *Alabama* claims. He was private secretary to Lord Salisbury in Constantinople in 1876 and private secretary to his father as chancellor of the Exchequer from 1877 to 1880. He stood election from his family's seat of Exeter and served in the House of Commons from 1880 to 1899, during which he held minor posts in Salisbury's first and second governments. Upon his father's death in 1887, he was created a baronet.

In 1899 he was appointed governor of Bombay Presidency and, before leaving England (January 1900), was created a baron. At that time the area of Bombay, including Gujarāt, was suffering from famine and plague, and Northcote tried to improve hospital conditions and effect some land reform, benefiting small cultivators. Because government funds were meagre, some of his aid came out of his own purse.

Appointed governor-general of Australia in August 1903, he was sworn in at Sydney in January 1904 and remained in Australia almost five years (returning to England in the fall of 1908). During his term of office he traveled throughout Australia, averaging yearly some 10,000 miles (16,000 km) by land and sea. He gave his office considerable prestige and, being wealthy, was able to entertain hospitably in a grand manner. After his return to England, he bore the standard of the Commonwealth of Australia at the coronation of George V (1911). Northcote died without issue, and the peerage became extinct.

Northcote, James, in full THOMAS JAMES NORTHCOTE (b. Oct. 22, 1746, Plymouth, Devon, Eng.—d. July 13, 1831, London), English portraitist and historical painter.



Self-portrait by James Northcote, detail, oil on canvas, 1827; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Northcote was apprenticed to his father, a poor watchmaker of Plymouth, and, during his spare hours, learned to use paintbrush and pencil. In 1769 he left his father and started as a portrait painter. Four years later he went to London and was admitted as a pupil into the studio and house of the great portraitist Sir Joshua Reynolds. In 1775 he left Reynolds, and about two years later, having acquired the necessary funds by portrait painting in Devon, he went to study in Italy. After his return to England three years later he settled (1781) in London, where John Opie and Henry Fuseli were his rivals. He was elected an associate of the Royal Academy of Arts in 1786 and full academician the following spring.

Northcote's many portraits were clearly influenced by Reynolds. He also executed a number of competent but dull history paintings. The "Young Princes Murdered in the Tower," his first major historical work, dates from 1786, and it was followed by the "Burial of the Princes in the Tower," both paintings, along with seven others, being executed for Boydell's Shakespeare Gallery. The "Death of Wat Tyler" was exhibited in 1787. Perhaps his most individual painting, "Emperor Alexander I of Russia Rescuing a Boy from Drowning" (1820), reflects the melodramatic Romanticism then coming into fashion.

Northcote also fancied himself a writer, and in 1813 he embodied his recollections of his old master in *Memoirs of Sir Joshua Reynolds.* In 1826 the writer William Hazlitt published in the *New Monthly Magazine* his recollections of Northcote's pungent and cynical opinions in their conversations together.

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Northcote, Sir Stafford Henry, 8TH BARONET, also called (from 1885) 1ST EARL OF IDDESLEIGH, VISCOUNT SAINT CYRES (b. Oct. 27, 1818, London, Eng.—d. Jan. 12, 1887, London), British statesman and a leader of the Conservative Party who helped to shape national financial policy.

On leaving Balliol College, Oxford, he became in 1843 private secretary to William Gladstone at the Board of Trade. He was afterward legal secretary to the Board and, after acting as one of the secretaries to the Great Exhibition of 1851, cooperated with Sir Charles Trevelyan in framing the report that revolutionized the conditions of appointment to the civil service. He succeeded his grandfather as 8th baronet in 1851. He entered Parliament in 1855 and, steadily supporting his party, became president of the Board of Trade in 1866, secretary of state for India in 1867, and chancellor of the Exchequer in 1874. In the interval between these last two appointments he had been one of the commissioners for the settlement of the *Alabama* claims by the United States.

On Benjamin Disraeli's elevation to the House of Lords in 1876, Northcote became leader of the Conservative Party in the Commons. As finance minister he was largely dominated by the policies laid down by Gladstone; but he distinguished himself by his dealings with the debt, especially his introduction of the new sinking fund (1876), by which he fixed the annual charge for the debt in such a way as to provide for a regular series of payments off the capital. His temper as leader was, however, too gentle to satisfy the more ardent spirits among his own followers, and party cabals (in which Lord Randolph Churchill took a leading part) led to Sir Stafford's transfer to the Lords in 1885, when Salisbury became prime minister. Taking the titles of Earl of Iddesleigh and Viscount St. Cyres, he was included in the cabinet as first lord of the Treasury.

In Lord Salisbury's 1886 ministry Northcote became secretary of state for foreign affairs. Among Northcote's works are *Twenty Years of Financial Policy* (1862), a valuable study of Gladstonian finance, and *Lectures and Essays* (1887).

Northeast Caucasian languages: *see* Nakho-Dagestanian languages.

Northeast Passage, Russian SEVERNY MORSKOY PUT, maritime route along the northern coast of the Eurasian landmass, lying mainly off northern Russian Siberia. Early explorers of the area included Willem Barents and Olivier Brunel. Under the auspices of the Russian tsar Peter I the Great, Semyon Dezhnyov probably (1648) and Vitus Bering certainly (1728) sailed northward through the Bering Strait. Captain James Cook, however, was the first to see both sides of the strait (1778) and to demonstrate that Asia and North America are two separate continents. After many attempts the Northeast Passage was first traversed by the Swedish explorer Baron Adolf Erik Nordenskiöld in 1878–79. Since the late 1960s the passage has been kept open in the summer months by icebreakers, aided by aerial observations and radar and sonar.

Northeast Svalbard Nature Reservation, Norwegian NORDAUST-SVALBARD NATURRESERVAT, nature reserve established in 1973 by Norway in the Svalbard archipelago in the Arctic Ocean. With an area of 7,350 square miles (19,030 square km) and an average elevation of 2,740 feet (835 m), the reserve comprises all of North East Land, Kvit Island, Kong Karls Land, smaller adjoining islands, and the surrounding territorial waters. North East Land, the largest component of northeastern Svalbard, is covered by glaciers and ice caps. Animal life of the park includes arctic fox, reindeer, polar bear, walrus, and ringed and bearded seal.

Northeastern school, Portuguese COLÉGIO NORDESTINO, group of 20th-century Brazilian regional writers whose fiction dealt primarily with the culture and social problems of Brazil's hinterland Northeast. Stimulated by the Modernist-led revival of nationalism of the 1920s, the regionalists looked to the diverse ethnic and racial cultures of Brazil for inspiration.

The gifted and dedicated group of prose writers of the Northeastern school included Gilberto Freyre, leader of the movement and author of the monumental *Casa-Grande e Senzala* (1933; *The Masters and the Slaves*); José Lins do Rego, who depicted the clash of the old and new ways of life in his Sugar Cane cycle of novels (1932–36); and Jorge Amado, who gave Brazil some of its best proletarian literature in such novels as *Terras do sem fim* (1942; *The Violent Land*) and *Dona Flor e Seus Dois Maridos* (1966; *Dona Flor and Her Two Husbands*). Also associated with the school were Graciliano Ramos, who explored the inner struggle of the individual, and Rachel de Queiroz, who wrote of the bandits, religious mystics, and forgotten men who inhabit the hinterland.

Northeim, town, Lower Saxony *Land* (state), north-central Germany. It lies on the Leine River, 12 miles (19 km) north of Göttingen, and is served by two autobahn access roads and a rail junction. The site dates from the 9th century. It obtained civic rights in 1252 (being then the seat of the counts of Northeim) and later became successively a market village and a member of the mercantile Hanseatic League. A Protestant town during the Reformation, it was stormed by imperial troops in 1627 and generally suffered severely during the Thirty Years' War. It came under the control of Hanover and then Prussia (1866).

Despite such wars, the town has managed to preserve much of its medieval architectural character, with many half-timbered buildings and extensive remains of the old town walls. (Outside the walls, parts of the town have grown up in a modern style.) Of the Benedictine abbey of Sankt Blasien, founded in 1080 and dissolved at the Reformation, there survive only a chapel, some offices, and monastic houses. Other sites include the restored Church of Sankt Sixtus and various medieval houses. Northeim's industries include machinery construction, metalworking, sugar processing, prefabricated housing, and various food-processing enterprises related to local agriculture. Pop. (1995 est.) 32,476.

Northern, province, northeastern South Africa. The northernmost South African province, it is bordered by Zimbabwe on the north; Mozambique on the east; the provinces of Mpumalanga, Gauteng, and North-West on the south; and Botswana on the west and northwest. Northern was created out of part of Transvaal province in 1994. Pietersburg is the provincial capital.

Northern province consists of the vast Lowveld plain, which is interrupted by several mountain ranges rising out of the Highveld plateau in the province's south and centre. Among these ranges are the forested Soutpans Mountains, which extend about 80 miles (130 km) from east to west. The Water Mountains in the southwest rise to more than 6,500 feet (2,000 m) and are densely covered with thorn trees and shrubs. The Lowveld extends across the eastern, northern, and western parts of the province and is a subtropical parkland with mopane (mopani) and baobab trees. The Limpopo River forms the province's northern and western borders. Part of Kruger National Park lies along the eastern border. The northern part of the province has a hot, subtropical climate with 12 to 20 inches (300 to 500 mm) of rainfall annually. The southern mountains have a more temperate climate with about 30 inches (760 mm) of rainfall yearly.

The population of Northern province is composed mostly of rural blacks of the Pedi (Northern Sotho), Tsonga, Venda, and other Bantu-speaking peoples. The white minority speaks mostly Afrikaans. Many blacks earn their livelihood by subsistence farming or through work as migrant labourers. Corn (maize), sorghum, potatoes, tobacco, peanuts (groundnuts), and grapes are important crops. Citrus and other fruits are also grown in the Lowveld. Cattle raising is widespread, and goats and sheep are also herded. Asbestos and tin are mined, and there are deposits of chromite, platinum, iron ore, copper, and coal. Pietersburg, the only major city in the province, is connected by road and rail with Pretoria. Area 47,599 square miles (123,280 square km). Pop. (1994 est.) 5,201,630.

Northern Cape, province, western South Africa. It is bordered on the north by Namibia and Botswana; on the east by North-West, Free State, and Eastern provinces; on the south and southwest by Western Cape province; and on the west by the Atlantic Ocean. Northern Cape was administratively created out of northern and central Cape of Good Hope province in 1994. Kimberley is the provincial capital.

The Northern Cape's eastern half and southwest form part of the Highveld, an arid plateau that gradually rises to the Great Escarpment (more than 6,000 feet [1,900 m] in elevation) along the province's southern border. To the northwest is desert, including the sand dunes of Kalahari Gemsbok National Park. The Orange River traverses the province from east to west and provides water for irrigation. The Orange is joined by one of its main tributaries, the Vaal River, near Douglas, in the east. Thornveld is the natural vegetation of the province, and the climate is generally hot and arid. Annual rainfall increases from 4 inches (100 mm) in the west to about 14 inches (350 mm) in the east.

Northern Cape is the largest and most sparsely populated province of South Africa. About half of the population is of mixed race. Blacks make up 30 percent of the population and are mostly Tswana-speaking peoples. Whites constitute about 15 percent and mostly speak Afrikaans. The major urban centres are Kimberley and Upington.

Merino sheep are raised in the south and Karakul sheep in the north, and cattle are grazed throughout the province. Pig raising and horse breeding are also practiced. Wheat, alfalfa (lucerne), cotton, peanuts (groundnuts), citrus fruit, and grapes are grown under irrigation. Major copper mines are located near Prieska and Okiep. Diamonds are recovered from the arid region of Namaqualand in the west, along the Atlantic coast. Tungsten, zinc, lead, asbestos, iron ore, and manganese are also extracted at various locations. Area 139,692 square miles (361,800 square km). Pop. (1994 est.) 737,306.

Northern Dvina River, Russian SEVERNAYA DVINA, river formed by the junction of the Sukhona and Yug rivers at the city of Velikiy Ustyug, in Vologod *oblast* (province) of Russia. The Northern Dvina is one of the largest and most important waterways of the northern European portion of Russia. It flows 462 miles (744 km) in a generally northwesterly direction and enters the Dvina inlet of the White Sea below the city of Arkhangelsk. The river drains a basin that, with an area of 138,000 square miles (357,000 square km), is larger than the whole of Poland.

Until its confluence with the tributary Vychegda River, the Northern Dvina is also called the Little Northern Dvina, with the remainder of its course known as the Greater Northern Dvina. The Northern Dvina's important tributaries include the Sukhona, Vychegda, Vaga, and Pinega rivers, all of which are themselves large rivers. At its mouth, the river's delta has an area of 425 square miles (1,100 square km) and is laced with a multitude of channels and branches.

The landscape drained by the Northern Dvina is formed of low, undulating plains sloping gradually down to the White Sea. The river's basin is bounded on the east by the low Timansky Ridge (where the Vychegda and its tributaries have their source) and the Northern Uvaly Hills, which form the watershed with the Volga River basin to the south. The northern and central portions of the basin have a thick covering of coniferous forests, while mixed forests, with conifers predominant, are found to the south. In all, more than half the basin is forest-clad. Beyond the left (west) bank of the river there are many low-lying bogs and lakes—including the large Lake Kubena—which are often the source of tributary rivers. Only along the river's floodplain are there open meadows.

The Northern Dvina is primarily fed by melting snow, which brings a marked maximum flow of 700,000 cubic feet (19,800 cubic m) per second in the spring. In its upper course, the river begins to freeze in November and becomes ice-free again by the end of April; the lower course is frozen for a slightly longer period. The spring witnesses frequent ice jams and floods along the whole river.

The Northern Dvina is navigable for most of its length, and since early times it has been the chief waterborne-transport route of northern European Russia. Early fur hunters and colonists used the river, and monasteries and towns (including Arkhangelsk) were later established at important confluences. The river retains its economic importance and is linked with the Volga-Baltic Waterway via the Sukhona River. The Northern Dvina's main cargo is timber, which is cut on a large scale throughout the basin and rafted to sawmilling centres along the river's banks. The most important of these are Velikiy Ustyug, Kotlas, and, above all, Arkhangelsk, which is the largest sawmilling centre in Russia. Arkhangelsk is a major timber-exporting port and one of the western terminal ports of the North Sea route. At the western end of the river's delta is the port of Severodvinsk.

Northern Ireland, country of the United Kingdom lying in the northeast of the island of Ireland. The Republic of Ireland bounds it on the south and west, the Irish Sea and the North Channel on the east, and the Atlantic Ocean on the north. Northern Ireland is often referred to as the province of Ulster, though it includes only part of the historic Ulster.

A brief treatment of Northern Ireland follows. For full treatment, *see* MACROPAEDIA: United Kingdom: *Northern Ireland.*

For current history and for statistics, *see* BRITANNICA BOOK OF THE YEAR.

Physical and human geography. Topographically, Northern Ireland can be thought of as a saucer centred on Lough (lake) Neagh, its upturned rim forming the province's highlands. Five of the six former counties—Antrim, Down, Armagh, Tyrone, and Londonderry—met at the lake, and each had a highland region on the saucer's rim. To the north and east the Mountains of Antrim (which form a plateau) tilt upward toward the coast, reaching a height of 1,817 feet (554 m) at Trostan. The rounded landscape of drumlins—smooth mounds created by glaciation—in the southeast is punctuated by Slieve Croob at 1,745 feet (532 m) and culminates in the Mourne Mountains, which rise to Slieve Donard at 2,789 feet (850 m).

Northern Ireland's climate is temperate and maritime. Most of its weather comes from the southwest in a series of low-pressure systems, bringing the rain and clouds that often lend character to the landscape. Rainfall decreases from west to east, and a relatively dry spring gives way to a wet summer and wetter winter. The country is exposed to the ameliorating effects of the North Atlantic Current and experiences no extremes of heat or cold. January temperatures range from 38° F (3° C) on the northern coast to 35° F (2° C) on the eastern coast; in July, temperatures of 65° F (18° C) are common.

The economy of Northern Ireland is integrated with that of the United Kingdom. Its trade is dominated by imports from and exports to other parts of the United Kingdom. Northern Ireland is an industrialized country, with manufactured goods comprising a large volume of its exports. Industries include engineering, shipbuilding, vehicle manufacture, textiles, food and beverage processing, and clothing. The service industry employs about two-thirds and manufacturing less than one-fifth of the country's workers. Londonderry is well known for shirt and pajama production. The shipyards of Belfast, the capital city, are world famous, and Belfast also has chemical plants and rope factories. The city is a major port of the British Isles; other significant ports are Larne and Londonderry.

Dunluce Castle near Giant's Causeway, Northern Ireland
Tim Thompson

Mineral resources in Northern Ireland are meagre. For power, Northern Ireland depends on imported coal and oil, although local chalk, clays, limestone, and gravel support the production of lime, bricks, and cement. More important, Northern Ireland possesses considerable agricultural resources, which it is developing as a major part of its economy. The number of farms has declined since the 1970s, with consolidation bringing a better livelihood for fewer farmers. Mixed farming predominates, and most farm income is derived from livestock. To the south of Lough Neagh lies rich orchard country.

In the arts and cultural life it is generally difficult to distinguish between native and imported. Few traces remain of any culture predating the Tudor invasions of the 16th century and the forced settlements of Scots early in the following century. Folk participation and recreation are periodically focused on colourful and noisy religious ceremonies and processions. In other respects, the cultural milieu of Northern Ireland is one shared with the remainder of the British Isles. The accents given to the English language represent the most obvious of the few truly distinctive regional characteristics.

The University of Ulster (with campuses at Coleraine, Jordanstown, Londonderry, and Belfast) was established in 1984 by the merger of the New University of Ulster and Ulster Polytechnic. It is the principal institution of higher learning. Northern Ireland has an Arts Council, which encourages all aspects of the arts. Its activities tend to be concentrated in Belfast because this city alone can support ballet and opera companies. Belfast has theatres, a touring company based on the University of Ulster, a symphony orchestra, and a youth orchestra. In addition, it possesses a permanent art gallery, as does Londonderry. Ulster Television, Ltd., provides local programming in competition with the British Broadcasting Corporation. The Ulster Museum is the national museum, while the Ulster Folk and Transport Museum provides an interesting link with peasant origins in Northern Ireland.

History. Until the 20th century the history of Northern Ireland formed part of Irish history as a whole. Nonetheless, a distinctive Christian culture, known by the Celtic name of Ulaid (English: Ulster), developed in the northern region from the 5th and 6th centuries onward. The earliest written sources about the history of Ulster date to the 7th century.

By the 8th century the island's clans had grouped themselves into five provinces, of which Ulster under the Uí Néill dynasty was the leading one until the 11th century. Norman adventurers from England, South Wales, and the European continent succeeded in establishing themselves in Ireland by the mid-12th century. But in 1205 the English king, John Plantagenet, took control and created an earldom of Ulster.

In the 16th and 17th centuries English and Scottish settlers arrived in Ireland, predominantly in Ulster, bringing with them their Protestant beliefs. Ulster's Protestant population increased still further in the 18th century when the region became a refuge of Huguenots forced to leave their homeland after the revocation of the Edict of Nantes in 1685. The immigrants' commercial and industrial skills contributed to the development of the linen-cloth manufacture that became the foundation for the 19th-century industrialization of Belfast and the Lagan Valley.

In 1801 the Act of Union created the legislative union of Great Britain and Ireland, under the name of United Kingdom. Yet a number of crises in the 19th century, including the Great Famine of the 1840s, built momentum for Irish Home Rule (limited self-government; *see* Home Rule). The first Home Rule bill was introduced in 1886, the second in 1893, and the third in 1912–14; but the outbreak of World War I postponed implementation until after the war. In 1920 the Government of Ireland Act provided for the establishment of two modestly self-governing units, one comprising 6 of Ulster's 9 counties (now Northern Ireland), the other comprising the 23 counties of southern Ireland along with 3 counties of Ulster (which together now form the Republic of Ireland). Whereas the Roman Catholic majority in southern Ireland, radicalized by the Easter Rising of 1916, now rejected Home Rule altogether in favour of outright independence, the Protestant majority in the six Ulster counties settled for Home Rule, even though they preferred union with Great Britain.

From 1921 to 1940 Northern Ireland was an openly sectarian state, controlled by the Protestant majority and ruled in their interest. The Roman Catholic minority, even though it suffered discrimination, flocked from the countryside to the industrial centres, especially Belfast, where work was available in the textile and shipbuilding industries.

In the mid-1960s the fragile stability of Northern Ireland began to erode. By the late 1960s a civil rights movement had emerged and communal violence had increased. British forces entered Northern Ireland in the early 1970s to keep peace but were soon regarded with hostility by Roman Catholics. The Irish Republican Army (IRA) mounted a terrorist campaign to force the withdrawal of British troops as a prelude to Northern Ireland's unification with Ireland. In 1972 British Prime Minister Edward Heath suspended the constitution and parliament of Northern Ireland. Thereafter, various efforts were made to restore Home Rule and establish reconciliation, including the Anglo-Irish Agreement (1985), which gave Ireland a consultative role in the affairs of Northern Ireland. Frameworks for all-party peace talks—notably the Downing Street Declaration in 1993—were put forward, and in 1994 both the IRA and the unionist paramilitary groups announced a cease-fire.

Under the Belfast Agreement (also known as the Good Friday Agreement) of April 1998, local government responsibilities were to devolve to an elected assembly. After voters in both Ireland and Northern Ireland approved the accord, elections to the new Northern Ireland assembly resulted in the election of David Trimble, leader of the Protestant Ulster Unionist party, as "first minister" and Seamus Mallon, from the Roman Catholic Social Democratic and Labour Party, as his deputy. After international mediators temporarily resolved the issue of the decommissioning (disarmament) of paramilitary groups, including the IRA, power was officially devolved to the assembly in December 1999. The IRA's continued failure to decommission prompted Britain to suspend devolution and restore direct rule less than three months later. The assembly was recalled in May 2000. Area 5,452 square miles (14,120 square km). Pop. (1999 est.) 1,691,800.

Northern Kantō, Japanese KITA-KANTŌ, industrial region, east-central Japan, occupying portions of Gumma, Saitama, and Tochigi *ken* (prefectures). Situated just north of, and adjacent to, the Keihin (Tokyo-Yokohama) Industrial Zone, the area consists mostly of plains, interrupted by the Kantō Range and Echigo Range. Northern Kantō is neither an administrative nor a political entity.

The region's industries include the manufacture of electrical machinery, metal products, and transport equipment. Copper, zinc, and iron mining, forestry, and sericulture are other economic activities. The silk and paper industries were first mechanized in Gumma prefecture in 1912 and 1914; an iron and steel factory opened in Koyuma in 1939. Later industrial development included precision machinery (began operation in Niza, 1946); diesel engines, trucks, and buses (Ageo, 1950); motor vehicles (Ōta, an aircraft-production centre during World War II); electrical appliances (Ōra, 1959); and textiles (Ashikaga and Kiryū). During the 1960s, industrial output developed rapidly, and as industries migrated outward from the Keihin area, Northern Kantō gained further importance. Although Northern Kantō's heavy-industrial production is small compared with Japan's other industrial regions, it is strong in light manufacturing. Cameras and electrical appliances are assembled from parts manufactured in Keihin and are returned to Keihin for distribution. Agricultural products from the area include rice, livestock, mulberries, pears, and chestnuts.

Northern Kyūshū, Japanese KITA-KYŪSHŪ, industrial region of southwestern Japan, centring on the city and port of Kita-Kyūshū and bounded by the Gen Sea to the northwest and the Inland Sea to the east. The region is drained by the Onga, Chikugo, and Yamakuni rivers and is composed of portions of Fukuoka, Saga, Ōita, and Nagasaki *ken* (prefectures). The Northern Kyūshū region specializes in chemical and heavy industries, particularly iron and steel. Transport equipment, machinery, electrical appliances, and textiles are manufactured as well. Agricultural products include mandarin oranges, fish, and rice. The city of Kita-Kyūshū was created in 1963 from the former cities of Wakamatsu, Yamata, Tobata, Kokura, and Moji.

During the Tokugawa period (1603–1867), the region began to evolve as an industrial centre through limestone quarrying (for fertilizer and cement) and small-scale bituminous-coal mining. Coal production increased during the Meiji period (1868–1912), and government ironworks and related chemical factories were established in Yahata in 1901. Located on Japan's southwestern island of Kyūshū, the region maintained a strategic position for trade in iron ore with China and for national defense during the Russo-Japanese War (1904–05). Chemical industries in Minamata and heavy industries in Ōmuta and Ōita cities expanded early in the Shōwa period (1926–45). In 1932 the Yahata ironworks were converted for steel production. Military demands during the Sino-Japanese War (1937–45) and World War II were followed by economic stagnation. As land and coal-mine subsidence and the conversion of Japanese industry to oil as an energy source accelerated the region's decline, a number of industries relocated to the Keihin (Tokyo-Yokohama) and Keihanshin (Kyōto-Ōsaka-Kōbe) industrial zones. In an attempt to remedy the situation, factories for consumer goods were built in Fukuoka city and a petrochemical complex was constructed on reclaimed land in the city of Ōita.

northern lights, also called AURORA BOREALIS, luminous atmospheric display visible in the Northern Hemisphere. *See* aurora.

Northern Mariana Islands, also called NORTHERN MARIANAS, officially COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS, self-governing commonwealth in political union with the United States, in the western Pacific Ocean, composed of 22 islands located north of, but not including, Guam. The islands extend 450 miles (720 km) in a north-south arc and have a land area of 184 square miles (477 square km). Saipan (47 square miles [122 square km]), Tinian (39 square miles [101 square km]), and Rota (33 square miles [85 square km]) are the principal islands and, together with Alamagan and Agrihan, are inhabited. Another island, Pagan, was evacuated in 1981 after a severe volcanic eruption. Besides Guam, the nearest neighbours are the Bonin Islands (north) and the Federated States of Micronesia (southeast). The Mariana capital is Chalan Kanoa, on Saipan.

A brief treatment of the Northern Mariana Islands follows. For full treatment, *see* MACROPAEDIA: Pacific Islands.

The land. The Mariana landscape is varied. Rota, the southernmost island, consists of a volcanic base capped with coral limestone, giving it a terraced appearance. Four southern islands (Farallon de Medinilla, Saipan, Tinian, and Agiguan) are composed of limestone and have few mountains. The islands farther north are volcanic peaks. Mount Pagan erupted several times in the 1980s. Farallon de Pajaros, the northernmost of the Marianas, and Asuncion are also notable. Agrihan volcano, the highest of the Northern Mariana group, rises to 3,165 feet (965 m).

The climate is tropical, with average yearly temperatures on Saipan ranging between 79° F (26° C) and 82° F (28° C) and rainfall averaging about 70 inches (1,800 mm). Rainfall is significantly less on the northernmost islands. Most of the southern limestone islands have tropical or scrub forests at higher elevations and coconut palms and casuarina trees along the coast. Where level or gently sloping areas occur, cattle are grazed. The steep slopes of the volcanic islands from Guguan northward are mostly barren, although coarse grass, coconut palms, breadfruit trees, and casuarina trees are found along the coasts of these islands. Soils are generally shallow and low in fertility.

The people. The indigenous people of the Northern Marianas are Micronesian. Almost one-third of the population are Chamorro, who represent a mixture of the indigenous Mariana people and a variety of European and Asian groups. Another one-third of the population are Filipino, and another one-fifteenth are Carolinians, descendants of people who migrated from the Eastern Carolines during the 19th century. Having lost most of their original Pacific Islands culture, the people of the Northern Marianas have a mode of life that is Spanish Roman Catholic but influenced by American culture since 1947. They live in villages, and vegetable gardening is the main occupation. Salaried employment, mostly available on Saipan in government offices, is another major source of income. Saipan contains more than 90 percent of the commonwealth's total population. Chamorro (related to Indonesian) and English are the principal languages.

Economy. The cash economy centres on tourism, but subsistence farming, including the cultivation of taro, cassava, yams, breadfruit, and bananas, is widely practiced. Copra production, fishing, pig and cattle raising, and the making of handicrafts provide additional revenue. Vegetables, beef, and pork are exported. The garment industry on Saipan is the chief manufacturing activity.

Transportation among the islands is by boat or air. Tinian and Saipan are the main ports. Saipan has an international airport, paved roads, a television station, and radio stations.

Government and social conditions. Part of the Trust Territory of the Pacific Islands granted to the United States by the United Nations in 1947, the Northern Marianas voted for status as a United States commonwealth in 1975. A constitution was approved, and elections were held in 1977 for a governor, a lieutenant governor, and a bicameral legislature made up of senators and representatives. The islands became internally self-governing in 1978 and became a U.S. commonwealth territory on Nov. 4, 1986. Its residents on that date became U.S. citizens. The U.S. Department of the Interior administers federal funds for the islands.

History. After their discovery by Ferdinand Magellan (1521), the Portuguese navigator sailing for Spain, the Marianas were visited frequently but were not colonized until 1668, when their name was changed by Jesuit missionaries from Ladrones Islands (Thieves Islands) to honour Mariana of Austria, then regent of Spain. The Jesuits began to forcibly convert the native Chamorros to Roman Catholicism. Guam was ceded to the United States following the Spanish-American War (1898), and the northern Marianas were sold to Germany in 1899. Occupied by Japan in 1914, they became a Japanese mandate from the League of Nations after 1919.

The Marianas were the site of fierce fighting during World War II. The successful U.S. campaign to take Saipan (June 15–July 9, 1944) cracked Japan's main defensive line in the Pacific and led to the fall of Prime Minister Tōjō Hideki and his cabinet (July 18). Tinian was occupied that same month, and one year later it served as the base for the American planes that dropped atomic bombs on Hiroshima and Nagasaki. Pop. (2000 est.) 71,900.

Northern Norway (region): *see* Nord-Norge.

Northern Pacific Railway Company, one of the northern transcontinental railroads of the United States, operating between St. Paul, Minn., and Seattle, Wash., and merged into the Burlington Northern in 1970.

The Northern Pacific was chartered by Congress in 1864 to build a line from Lake Superior westward to a port on the Pacific coast and was given a land grant of 40,000,000 acres (16,200,000 hectares). It nevertheless encountered difficulty in finding financial backing for its venture into a mostly unsettled wilderness until the Philadelphia banker Jay Cooke undertook to raise $100,000,000. In 1873 the railroad was approaching Bismarck, in the Dakota Territory, when Cooke's bank collapsed. The road went into receivership, and construction stopped for six years. In 1878 the railroad was taken over by Henry Villard, who built it westward to Helena in Montana Territory, where it was connected with the Oregon Railway to Seattle in Washington Territory in 1883.

The Northern Pacific encountered new financial difficulties in the 1890s, when it was reorganized by the banker J.P. Morgan. Morgan shared control of it with James J. Hill, whose Great Northern Railway Company was a close competitor. Hill sought to combine the two railroads with the Chicago, Burlington and Quincy Railroad Company through the Northern Securities Company, with Hill as president. In 1904 the U.S. Supreme Court declared this arrangement a violation of the Sherman Anti-Trust Act. The three railroads continued to be financially linked, however, and in 1970 they were permitted to merge as the Burlington Northern, Inc. With the addition of the St. Louis–San Francisco Railway Company in 1980, the Burlington system had about 30,000 miles (48,000 km) of track, stretching from the West Coast through the Rocky Mountains to the Great Lakes and down to the Gulf of Mexico. The Burlington Northern acquired the Santa Fe Pacific Corporation in 1995.

Northern Penner River (India): *see* Penneru River.

Northern Plateau (Mexico): *see* Mesa del Norte.

Northern Rhodesia (Africa): *see* Zambia.

Northern Sarkārs, Sarkārs also spelled CIRCĀRS, group of four, later five or six, *sarkārs* (districts into which the emperor Shēr Shāh of Sūr divided his empire). They corresponded roughly to modern Srikākulam, Vishākhapatnam, and East and West Godāvari districts of northeastern Andhra Pradesh state, India.

Their cession by Ṣalābat Jang to the French East India Company in 1753 marks the beginning of their common history. They were occupied by the British in 1758.

Northern Sotho (people): *see* Pedi.

Northern Tableland (Australia): *see* New England Range.

Northern Territory, self-governing territory of northern Australia, occupying the central section of the northern part of the continent.

A brief treatment of the Northern Territory follows. For full treatment, *see* MACROPAEDIA: Australia.

Physical and human geography. The Northern Territory is bounded by the Timor and Arafura seas on the north, Queensland and the Gulf of Carpentaria on the east, South Australia on the south, and Western Australia on the west.

The coastland and many offshore islands are flat and mostly fringed with mangrove swamps. Inland from the coastal belt and the Arnhem Land plateau there is a gradual rise to the town of Tennant Creek (1,230 feet [375 m]), which lies on a vast Precambrian plateau that extends southward and westward into neighbouring states.

The territory's vegetation is mostly open woodland with short eucalyptus trees and tall grasses of low nutritive value. In the Alice Springs area the rocky hills carry the stiff grasses called spinifex, and on the light-textured soils of the lower slopes and valleys an association of mulga (an acacia tree) with short grasses is a valuable fodder resource. The territory's mammals include the egg-laying echidna and a variety of marsupials, including rat kangaroo, rock wallaby, wallaroo, and the black wallaroo.

The pastoral potential of the territory was first recognized during construction of the Overland Telegraph Line, and, on its completion in 1872, areas near Alice Springs and Darwin were stocked with cattle. In the 1880s cattle stations were also formed on the Barkly Tableland. Beef, live cattle, and shrimp are now the major exports. Mineral products include manganese ore, copper and gold ores, uranium ores, and alumina and bauxite. Oil and natural gas are exploited in the Amadeus Basin in central Australia. Manufacturing consists only of small service industries to serve local needs. The Northern Territory has one single-track railway from Alice Springs to Adelaide in South Australia.

The Northern Territory is extremely sparsely inhabited. About three-fourths of the territory's population is of European descent and one-fifth Aborigine, with 70 other nationality groups constituting the remainder. For the most part the whites live in the towns and the Aborigines in rural areas. In 1976 the Aboriginal Land Rights Act gave Aborigines ownership of large areas of the Northern Territory. The Northern Territory (Self-Government) Act of 1978 provides for a territorial administrator and for a legislative assembly, the members of which are elected for four-year terms. The government maintains hospitals at or near Darwin, the territory capital, and provides medical and dental services as well as personnel for the Royal Flying Doctor Service of Australia. The Department of Education and Science maintains correspondence schools supplemented by School of the Air broadcasts, in which pupils may participate by two-way radio, to serve the more widely dispersed population.

History. Although Arnhem Land legends record early contact with a seafaring people, the first confirmed contact with non-Aborigines occurred in 1605, when a Dutch ship explored part of the Gulf of Carpentaria. Other Dutch ships followed, as did Indonesian peoples, but not until the surveys initiated in the early 19th century by Matthew Flinders was a thorough examination of the coast completed. The Northern Territory first became part of Australian territory in 1825, when the New South Wales colony was extended westward to the 129th east meridian; in 1863 the area was annexed to the province of South Australia with an eye toward cattle grazing. It underwent a gold rush and division into cattle stations in the following decades. Aboriginal lands were confiscated, and when Aborigine resistance was met slaughter often ensued. In 1911 the Northern Territory passed under the control of the new Commonwealth government of Australia. Little development occurred, and Aborigines continued to suffer at the hands of whites. In 1947 the Northern Territory won the right to a partly elective Legislative Assembly, and in 1974 it won the right to a fully elected body and representation in the Australian Senate. In 1978 the territory achieved self-government, with status equal to that of the other Australian states. Area 519,800 square miles (1,346,200 square km). Pop. (1993 est.) 170,800.

Northern Uvaly, range of hills in western Russia. *See* Severnye Uvaly.

Northern War, FIRST (1655–60), final stage of the struggle over the Polish-Swedish succession. In 1665 the Swedish king Charles X Gustav declared war on Poland on the pretext that Poland's John II Casimir Vasa had refused to acknowledge him; the real reason was Charles's desire to aggrandize more Baltic territories. The Swedes, allied with Brandenburg, invaded Poland with initial success; but then Russia, Denmark, and Austria declared war on Sweden, and Brandenburg deserted the Swedes to join the coalition. The Swedes were driven from Poland but twice invaded Denmark. The war ended with the Polish sovereigns renouncing their claim to the Swedish throne and the Swedes acquiring Skåne from Denmark.

Northern War, SECOND, also called GREAT NORTHERN WAR (1700–21), military conflict in which Russia, Denmark-Norway, and Saxony-Poland challenged the supremacy of Sweden in the Baltic area. The war resulted in the decline of Swedish influence and the emergence of Russia as a major power in that region.

Sweden's expansion in the Baltic Sea coastlands during the 16th and 17th centuries had antagonized the neighbouring states: Russia's access to the Baltic was blocked by Swedish-held Karelia, Ingria, Estonia, and Livonia; Denmark-Norway resented its loss to Sweden of provinces in the Scandinavian peninsula, especially Scania (Skåne), and was also aggrieved by Sweden's alliance with the ducal house of Holstein-Gottorp, which contained Denmark from the south and prevented the Danish crown's reabsorption of the duchies of Schleswig and Holstein; the German princes disliked Sweden's power in the Holy Roman Empire, and Brandenburg in particular coveted Swedish Pomerania; and many magnates of the Polish republic still thought of Swedish Livonia as Polish by right. The death of the Swedish king Charles XI in 1697, when his heir, Charles XII, was but a boy of 14, became the signal for Denmark-Norway to organize an anti-Swedish coalition.

Upon the formation of the coalition (1698–99), Augustus II the Strong, king of Poland and elector of Saxony, attacked Livonia (February 1700), while Frederick IV, king of Denmark and Norway, marched into Schleswig and Holstein (March 1700) and Peter I the Great, tsar of Russia, laid siege to Narva (October 1700). Charles XII of Sweden responded first by concentrating his forces against Denmark. Landing a few miles from Copenhagen, he compelled Frederick to withdraw from the anti-Swedish alliance and to sign the Treaty of Traventhal (August 1700), which restored the status quo. Charles next confronted the Russians, victoriously attacking them at Narva (Nov. 30, 1700). He then turned against the Poles and the Saxons, occupying Courland and forcing Augustus to retreat into Poland. Determined to depose Augustus, Charles spent six years fighting him; only after the Swedes invaded Saxony, however, did Augustus agree to relinquish his Polish crown and to break his Russian alliance (Treaty of Altranstädt; September 1706).

Meanwhile, the Russians under Peter the Great had used this period to reorganize their army and to establish themselves on the eastern Baltic coast (Peter had founded the city of St. Petersburg and the naval port of Kronshtadt in 1703. When Charles resumed his attack on Russia (late 1707), Peter defeated Charles's auxiliary corps at Lesnaya (October 1708), then decisively defeated the main Swedish army at the Battle of Poltava (July 8, 1709; *see* Poltava, Battle of). Charles fled to Turkey and induced the Turks to declare war on Russia (1710). After their victory at the Pruth River (1711), however, the Turks, satisfied with a negotiated peace that gave them control of Azov, withdrew from the war. Meanwhile, the anti-Swedish coalition, which had revived after the Battle of Poltava, began (autumn 1709) to seize Swedish possessions along the Baltic coast. In May 1713 it defeated (at Tönning in Holstein) the Swedish army that had been raised in 1712 to defend those territories. In 1714 the Russians defeated the Swedish naval fleet at Hangö (Hanko) and, having captured the Åland Islands, threatened Stockholm. Charles returned to Swedish territory in November 1714.

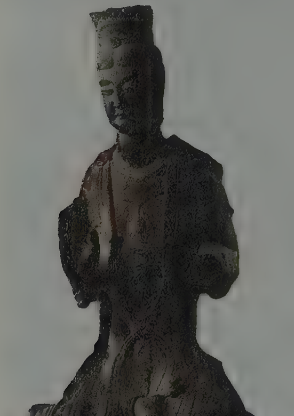
By this time most of Sweden's possessions along the Baltic coast were either occupied or threatened by the anti-Swedish coalition. Frederick William I of Prussia and George I of England, in his capacity as elector of Hanover, joined the coalition after they had demanded territory from Sweden in return for their continued neutrality and been substantively refused by Charles. In December 1715 Charles returned to southern Sweden proper and set about reorganizing his country effectively for a new stage of the war. He opened peace negotiations in 1717–18 while simultaneously expanding his army to 60,000 men in anticipation of a new offensive. In September 1718 Charles invaded southeastern Norway, but he was killed at the siege of Frederikshald in November 1718.

Charles had left no children, and the throne devolved upon his only surviving sister, Ulrika Eleonora, and her husband, Frederick of Hesse-Kassel (Frederick I of Sweden). Frederick negotiated a series of peace settlements in 1719–21. By the Treaties of Stockholm (1719–20), Sweden, Saxony, and Poland returned to the status quo *ante bellum,* and Denmark gave back its conquests to Sweden in return for a substantial sum of money. Sweden ceded Bremen to Hanover and gave up Stettin (Szczecin) and part of Swedish Pomerania to Prussia. By the Treaty of Nystad (Sept. 10, 1721), which concluded the war between Sweden and Russia, Sweden ceded Ingria, Estonia, Livonia, and a strip of Finnish Karelia to Russia.

Northern Wei DYNASTY: *see* Wei dynasty.

Northern Wei sculpture, Chinese sculpture dating from the Northern Wei period (AD 386–534/535) of the Six Dynasties (220–589) and representing the first major influence of Buddhism upon China. Northern Wei sculpture, produced in northern territory that was occupied and ruled by foreign invaders and that was quick to respond to Buddhism, is distinct from the more traditional indigenous art produced in the south, which was still ruled by native Chinese dynasties.

Few examples of Northern Wei sculpture survive from the period prior to 446–452, during which a major persecution of Buddhism was carried out. With surprising suddenness, however, Buddhism was restored to favour, and there followed a major period of Buddhist art. The art—consisting primarily of sculpture but also of some wall painting and reflecting various iconographic types, with simple images of the Buddha predominating—may be divided into two major periods: the first from immediately following the persecution to 494, when the capital of the Northern Wei was moved from the northern city of P'ing-ch'eng (the present Ta-t'ung, Shansi province) to the ancient centre of Chinese civilization, Lo-yang (Honan province); and the second from 494 to the end of the Northern Wei period. The style of the first period is a curious amalgam of foreign influences that are ultimately traceable to the Buddhist art of India, which emphasizes the heavy stylization of blocky volumes, giving a certain naive and archaic quality to the figures (*see* Yün-kang caves). While that style is found later, it was ultimately replaced by an entirely different Chinese, or Lung-men, style, which clothes the Buddha in the costume of the Chinese scholar and stylistically emphasizes a svelte and sinuous cascade of drapery falling over an increasingly flattened figure (*see* Lung-men caves).



Stone sculpture of the *bodhisattva* Maitreya, c. AD 530, Northern Wei dynasty; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, gift of Denman W. Ross in memory of Okakura Kakuzo

Northland, local government region, the northernmost of North Island, New Zealand. It is coextensive with most of the North Auckland Peninsula. Northland extends about 96 miles (250 km) northwest from Kaipara Harbour to Cape Reinga and North Cape and is bounded on the west by the Tasman Sea and on the east by the Pacific Ocean. The North Auckland Peninsula, which is no more than 50 miles (80 km) wide, is generally lower than the rest of North Island but rises to about 2,500 feet (760 m) in the volcanic Tutamoe and Maungataniwha ranges. The peninsula's western shore is sandy and indented by the large but shallow Hokianga and Kaipara harbours. On the peninsula's east coast the shoreline is rocky, with good anchorages in Parengarenga and Rangaunu harbours, Doubtless Bay, Bay of Islands, and Bream Bay.

Northland is relatively undeveloped. Livestock is raised, and towns, with the exception of Whangarei, are small. Maoris constitute a large proportion of the region's population. Area 4,866 square miles (12,604 square km). Pop. (1993 est.) 134,000.

Northman: *see* Viking.

Northrop, John Howard (b. July 5, 1891, Yonkers, N.Y., U.S.—d. May 27, 1987, Wickenberg, Ariz.), American biochemist who received (with James B. Sumner and Wendell M. Stanley) the Nobel Prize for Chemistry in 1946 for successfully purifying and crystallizing certain enzymes, thus enabling him to determine their chemical nature.

Northrop was educated at Columbia University, where he received his doctorate in chemistry in 1915. In World War I he was a captain in the U.S. Army Chemical Warfare Service.

During World War I Northrop conducted research on fermentation processes suitable for the industrial production of acetone and ethyl alcohol. This work led to a study of enzymes essential for digestion, respiration, and general life processes. At that time the chemical nature of enzymes was unknown, but through his research Northrop was able to establish that enzymes obey the laws of chemical reactions. He crystallized pepsin, a digestive enzyme present in gastric juice, in 1930 and found that it is a protein, thus resolving the dispute over what enzymes are. Using the same chemical methods, he isolated in 1938 the first bacterial virus (bacteriophage), which he proved to be a nucleoprotein. Northrop also helped isolate and prepare in crystalline form pepsin's inactive precursor pepsinogen (which is converted to the active enzyme through a reaction with hydrochloric acid in the stomach), the pancreatic digestive enzymes trypsin and chymotrypsin, and their inactive precursors trypsinogen and chymotrypsinogen.

Northrop was first an assistant at, and then a member of, the Rockefeller Institute for Medical Research in New York City from 1916 until his retirement in 1961, when he became professor emeritus. He was also a visiting professor of bacteriology and biophysics at the University of California at Berkeley (1949–58). His book *Crystalline Enzymes* (1939) was an important text.

Northrop, John Knudsen (b. Nov. 10, 1895, Newark, N.J., U.S.—d. Feb. 18, 1981, Glendale, Calif.), American aircraft designer, an early advocate of all-metal construction and the flying wing design.

Northrop graduated from high school in 1913 and in 1916 became a draftsman and designer for the Lockheed (formerly Loughead) brothers, builders of seaplanes and sport biplanes in Santa Barbara, Calif. From 1923 to 1927 he designed fuel tanks for the Douglas Aircraft Company in Santa Monica, and then he joined Allan Lockheed as chief engineer for the Lockheed Aircraft Company, Hollywood. There he designed and built the Vega, a high-wing monoplane noted for its plywood fuselage of monocoque, or stressed-skin, construction, in which the plywood sheath, rather than heavy internal trusses, provided the structural support.

John Knudsen Northrop, 1949

By courtesy of the Northrop Corporation

In 1928 Northrop cofounded the Avion Corporation in nearby Burbank, where he perfected a light, strong "multicellular" wing, built up from a number of sheathed-over, boxlike subcompartments. In 1929 Avion was bought by United Aircraft and Transport Corporation and was renamed Northrop Aircraft Corporation. Under this arrangement Northrop produced the low-wing, aluminum Alpha, which was used to carry mail and passengers. In 1932 he formed the Northrop Corporation in partnership with Douglas, which used his multicellular wing structure on its famous DC-3 passenger and transport plane. In 1939 he founded Northrop Aircraft, Inc., and directed it until his retirement in 1952. Northrop's lifelong interest was in the flying wing, a configuration consisting essentially of a short but very broad wing with no fuselage and tail. From the 1920s he experimented with several small prototypes, and during World War II he designed a bomber 172 feet (52 m) wide and 53 feet (16 m) long. First flown in 1946, the XB-35 was powered by pusher propellers; its jet-propelled version, the YB-49, first flew in 1947. The following year the U.S. Air Force rejected the flying wing, citing as one factor the instability caused by its lack of a vertical tail fin, but four decades later the Northrop Corporation adapted Northrop's design to new control mechanisms and radar-avoiding materials in designing the B-2 stealth bomber.

Northrop Grumman Corporation, formerly (1939–58) NORTHROP AIRCRAFT, INC., or (1958–94) NORTHROP CORPORATION, American aerospace company that produces military aircraft, guidance and navigation systems, electronic countermeasure and surveillance systems, and precision-guided munitions. Its headquarters are in Los Angeles.

The company was founded in Hawthorne, Calif., in 1939, by John K. Northrop, a pioneer aeronautical engineer. During World War II he designed the P-61 Black Widow, the first night interceptor. Under the leadership of Thomas V. Jones, who became president in 1959, the Northrop Corporation diversified as a maker of various missile and aircraft systems and parts. In the 1950s the company developed the N-156, a lightweight, supersonic jet fighter built for simple maintenance. As the T-38 Talon, it became a standard air force trainer, and in its F-5 Freedom Fighter and F-5E Tiger II versions it was sold around the world. Northrop also made the F-89 interceptor and the Snark missile system. In the 1970s it helped develop the F/A-18 jet fighter in conjunction with McDonnell Douglas. Northrop also became a major supplier of guidance systems for tactical and strategic missiles. In the 1980s it developed the B-2 stealth bomber.

In 1994 Northrop purchased the Grumman Corporation, another major American defense contractor. That company had been founded by Leroy Randle Grumman in 1929 and had specialized in military aircraft. Grumman's chief products during the Cold War were the A-6 attack aircraft, the F-14 carrier-based fighter jet, and the E-2C Hawkeye early-warning aircraft. By the time it was purchased by Northrop in 1994, Grumman had reoriented its business toward battlefield surveillance and electronics systems.

Northumberland, northernmost county of England. It is bounded north by Scotland, east by the North Sea, and west and south by the counties of Cumbria and Durham and by the area of Tyne and Wear. It comprises six districts: Alnwick, the borough of Berwick-upon-Tweed, the borough of Blyth Valley, the borough of Castle Morpeth, Tynedale, and Wansbeck. Morpeth is the county town (seat). Northumberland is a county of strongly contrasting landscapes from the eastern coastal plain to the sparsely populated, rugged hills and moors of the west and the densely populated urban and industrial areas of the coalfield and the River Tyne's valley to the south.

The Cheviots, rounded hills that stand 1,000–2,500 feet (300–760 m) high, form the Scottish and Cumbrian borders. The western hills and moors, composed of grits and impure limestone, are deeply dissected by the Rivers Rede and North Tyne. Carboniferous rocks dip east and south from the Cheviot Hills to the coast and the Tyne valley. Along the coast a notable landscape feature is Whin Sill, a doleritic (lava) intrusion that forms the Farne Islands and Bamburgh Castle Rock and carries sections of a Roman wall. The coastal plain, underlain by limestone in the north and coal measures in the south, is covered by glacial deposits varying in character from light sands and gravels to heavy clays and loams. The county's upland soils are thin, acid, and peaty. The climate is cool because of its northerly latitude, elevation, and exposure to easterly winds. Winters are severe, springs late, and summers cool, temperatures rarely exceeding 60° F (16° C); the coast suffers from cool sea fogs. Rainfall is generally low, ranging from 25 inches (635 mm) on the coast to 50 inches (1,270 mm) in the Cheviot Hills. The county is famed for its wild, exposed scenery: half the area is mountain and moorland with large areas, notably Kielder, Wark, and Redesdale forests, taken over by the British Forestry Commission, a state body.

There is evidence of prehistoric settlement in the area before the period of Roman domination began in AD 122, when Hadrian's Wall from the River Tyne to the Solway Firth was constructed. In 547 the Angle king Ida built the fortress at Bamburgh (subsequently the seat of Saxon kings) and founded the kingdom of Bernicia. His grandson, Aethelfrith the Destroyer, established the predominance of the Angles in 603 by defeating the combined forces of Strathclyde Britons and Scots and by annexing the neighbouring kingdom of Deira in 605. Henceforth the area between the Forth and Humber became known as Northumbria, which was the most powerful of the 7th-century Anglo-Saxon states. Holy Island (Lindisfarne) was the centre for the spread of Christianity throughout this kingdom.

Entrance gateway, Alnwick Castle, Northumberland

A.F. Kersting

The Normans ruthlessly harried the north and built castles against invasions from Scotland and across the North Sea. Northumberland's subsequent history until the union of Scotland with England (1603) is a continuous record of border warfare. The Roman Catholic north rose in support of Mary, Queen of Scots, in 1569. In 1644 Newcastle was captured by the Scots in the English Civil Wars.

Medieval Northumberland prospered from the production and export of wool and hides. Coal was mined in Roman times, and the coal trade between London and the Tyne developed rapidly from the 13th century. Shipbuilding consequently developed, and in the early 19th century new investment and inventions (including the steam turbine) created great shipbuilding and repairing works which still dominate the economy. Local iron foundries were encouraged in the 1830s by the building of iron ships. Other industries dependent on coal also developed—salt panning at the river mouths and glassmaking, which was introduced in the early 17th century from Lorraine, in France. For about a century the Tyneside (now Tyne and Wear) chemical industries were among the most important in the country, but, like the glassworks, they failed to survive. Lead, silver, and iron were mined in Allendale from the 12th to the 19th century.

Modern industrial complexes on the Rivers Tyne and Blyth produce heavy electrical machinery, pottery, and soap. Approximately 50 percent of Northumberland is mountain and rough hill pasture, 45 percent medium-quality farmland, and 5 percent good farmland. The county was not brought into settled agricultural use until late in the 18th century: even in the 1770s at least half of Northumberland was still wasteland, and parts of the moors are still among the most sparsely populated areas of England. Much of the coastal plain is sheep, cattle, and barley country with large, highly mechanized mixed farms that include some of the richest fattening pastures in England. Sheep (mainly Cheviots) greatly outnumber cattle. Traditional salmon fishing in the Tyne and Tweed still flourishes. The larger towns and industrial and mining villages are found in the south and east of the county, while the sparsely populated fells are served by the small market towns of Wooler, Rothbury, and Bellingham. Area 1,943 square miles (5,032 square km). Pop. (1992 est.) 307,200.

Northumberland, EARLS AND DUKES OF, titled English nobility of several creations, most notably in the Percy family, grouped below chronologically and indicated by the symbol •.

• **Northumberland, Henry Percy, 1st Earl of,** Baron Percy of Alnwick (b. Nov. 10, 1341—d. Feb. 20, 1408, Bramham Moor, near Tadcaster, Yorkshire, Eng.), English statesman, leading figure during the reigns of England's Richard II and Henry IV. He and his son Sir Henry Percy, the celebrated "Hotspur," are commemorated in William Shakespeare's play *1 Henry IV.*

Son of the 3rd Baron Percy of Alnwick (d. 1368), he led English troops in France by the age of 18 and was a warden of the Scottish marches two years later. In 1376 he became marshal of England and was created Earl of Northumberland at Richard II's coronation in 1377. He served Richard in numerous capacities—military, diplomatic, and administrative—but after 1398 he supported the Duke of Hereford (afterward Henry IV) and took a prominent part in Richard's abdication.

Henry IV's success in gaining the crown was largely owed to Northumberland's support, and the earl remained an important member of the privy council. The Scottish wars in 1400–03, however, gradually turned the two Percys, father and son, against the king; they complained of inadequate funds and rewards in prosecuting the wars and of being deprived of ransoms for their Scottish prisoners. The earl made an alliance with the Welsh leader Owen Glendower, raised a large force, and with his brother and son issued a manifesto declaring that Henry had acquired his crown by fraud. In the ensuing rebellion, his son Hotspur was slain at the Battle of Shrewsbury (July 21, 1403), and his brother, the Earl of Worcester, was captured and beheaded. Northumberland took no part in the battle, having reached the scene too late with his troops. He retired northward but afterward met the king and repledged his oath of fealty.

By February 1405 he was again in league with Owen Glendower and other disaffected nobles, and the rebellion was again renewed—and again crushed by the king's army. Northumberland fled to Scotland and then to Holland, but in the summer of 1407 he was again in Scotland and, raising a force, moved southward in February 1408. His troops were defeated and he himself slain at the Battle of Bramham Moor.

• **Northumberland, John Neville, Earl of,** Lord Montagu, also called (1470–71) 1st Marquess of Montagu (b. between 1428 and 1435—d. April 14, 1471, Barnet, Hertfordshire, Eng.), leading partisan in the English Wars of the Roses. He was the son of Richard Neville, Earl of Salisbury, and the brother of Richard Neville, Earl of Warwick, the "Kingmaker."

John Neville was a ringleader in the conflict between the Nevilles and Percys in 1453, which was the real beginning of the civil war called the Wars of the Roses. This rivalry, involving an ambition to control the Scottish march, dominated Neville's career. Despite close personal ties with Henry VI, Neville supported Edward IV and, as warden of the east march, beat down the last traces of Lancastrian resistance in 1464, notably at Hedgeley Moor (April) and Hexham (May). For this he was created, in May 1464, Earl of Northumberland, a title heretofore held by the Percy family.

A hesitant man, he held aloof from Warwick's intrigues against Edward IV in the summer of 1470. But the king, suspicious of Neville, restored the earldom of Northumberland to Henry Percy (March 1470), creating Neville Marquess of Montagu, a title without lands. Neville joined the rebels, which was the immediate cause of Edward's flight abroad (October 1470), but did not attack him on his landing in Yorkshire in March 1471. However, he finally joined his brother at Coventry and was killed with him in battle at Barnet.

• **Northumberland, John Dudley, Duke of,** Earl of Warwick, Viscount Lisle, Baron Lisle (b. 1502—d. Aug. 22, 1553, London, Eng.), English politician and soldier who was virtual ruler of England from 1549 to 1553, during the minority of King Edward VI. Almost all historical sources regard him as an unscrupulous schemer whose policies undermined England's political stability.

His father, Edmund, was executed by King Henry VIII in 1510. Dudley became deputy governor of the English-occupied port of Calais, Fr., in 1538, and in 1542 he was made Viscount Lisle and appointed lord high admiral. He served under Edward Seymour, earl of Hertford, in the invasion of Scotland in 1544. In September of the same year he captured the French city of Boulogne. The title earl of Warwick was conferred upon him in 1546.

Upon Henry VIII's death (Jan. 28, 1547), Warwick became a member of the regency council set up to govern the country during the minority of Edward VI. He acquiesced while Hertford assumed almost supreme power as protector with the title of duke of Somerset. At first the two men continued to work together. Warwick's military ability was chiefly responsible for Somerset's victory over the Scots at Pinkie in September 1547. But in 1549 Warwick took advantage of popular unrest generated by Somerset's policies to join with the propertied classes and the Roman Catholics in a coalition that deposed and imprisoned the protector. When the coalition collapsed, Somerset was released (February 1550), and the two rivals were ostensibly reconciled. But Warwick was now in complete control of the government.

Warwick's foreign policy included the abandonment of English efforts to obtain control of Scotland. At home he reversed Somerset's liberal agrarian policies by suppressing peasants who resisted enclosure—normally the taking by propertied classes of arable land held in common by the peasants. In continuing the consolidation of the Protestant Reformation in England, he seized for himself and his henchmen much of the remaining wealth of the Church. A second *Book of Common Prayer* was imposed by another Act of Uniformity (1552).

The general unpopularity of his rule caused him to strengthen his position by making himself duke of Northumberland (1551) and by having the potentially dangerous Somerset arrested and (on Jan. 22, 1552) executed. Thereafter he imposed strict conformity to Protestant ceremony and doctrine. The only aspects of his policies that historians have applauded were his attempts to deal with England's economic ills by fighting inflation, stabilizing coinage, and expanding trade.

When it became evident in 1553 that the 15-year-old Edward VI would die of tuberculosis, Northumberland caused his son, Guildford Dudley, to marry Lady Jane Grey and persuaded the King to will the crown to Jane and her male heirs—thereby excluding from the succession Henry VIII's daughters, Mary and Elizabeth. Edward died on July 6, 1553, and on July 10 Northumberland proclaimed Jane queen of England. But the councillors in London and the populace backed Mary Tudor. Northumberland's supporters melted away, and on July 20 he surrendered to Mary's forces. A month later he was executed for treason. See B.L. Beer, *Northumberland* (1973).

John Dudley, duke of Northumberland, painting by J.V. Belkamp, 1551; in the collection of Lord Sackville

By courtesy of Lord Sackville; photograph, Courtauld Institute of Art, London

• **Northumberland, Thomas Percy, 7th earl of** (b. 1528—d. Aug. 22, 1572, York, Yorkshire, Eng.), English conspirator during the reign of Elizabeth I, seeking the release of Mary, Queen of Scots, and the free exercise of the Roman Catholic religion.

His father, Sir Thomas Percy (son of the 5th earl), was attainted and executed at Tyburn for his part in the Yorkshire rebellion of 1536 called the Pilgrimage of Grace (*q.v.*). His brother, the 6th earl, fearing the consequences, surrendered his estates, and the title fell into abeyance on his death the following year. In 1557, after faithful military service, Thomas Percy was made 7th earl of Northumberland.

Other honours and services followed, but his Catholicism made him an object of suspicion at the Elizabethan court, and he was passed over in various preferments that he thought due him. After Mary, Queen of Scots, crossed into England and was imprisoned, Northumberland sympathized with her misfortune, as the victim of his faith. By 1569 he was in communication with Spanish envoys and, late that year, joined like-minded nobles in issuing proclamations promising the release of Mary and the restoration of the Catholic religion. Within a month (December 1569) the northern rebels were scattered or killed by government forces, and Northumberland escaped to Scotland. At long last, in August 1572, the Scots handed him over to Elizabeth's officers on payment of £2,000. He was beheaded in the marketplace at York.

• **Northumberland, Henry Percy, 8th earl of** (b. 1532?—d. June 21, 1585, London), English Protestant member of the predominantly Roman Catholic Percy family, who nevertheless died in their cause.

Brother of the 7th earl, Henry Percy served both Mary I and Elizabeth I in several capacities. During the northern rebellion, in which his brother was a leading agent, he was on the royal side, vigorously attacking the rebels. After his brother's execution in 1572, Elizabeth permitted him to assume the title of earl of Northumberland.

Nevertheless, family persuasions eventually overcame his loyalty, and he began intriguing for the escape of Mary, Queen of Scots, from imprisonment. Under suspicion, he was seized and lodged in the Tower of London for 18 months (1571–73), then released and gradually returned to favour. He was associated with the conspiracies of Francis Throckmorton (*q.v.*) and other Catholic agents and again sent to the Tower (September 1582), to be released after a few weeks. New intrigues brought him to the Tower a third time (December 1584), where six months later he was found dead, shot through the heart. The official verdict, probably accurate, was suicide.

• **Northumberland, Henry Percy, 9th earl of** (b. 1564, Tynemouth Castle, Northumberland, Eng.—d. Nov. 5, 1632, Petworth, Sussex), English Roman Catholic imprisoned in the Tower of London from 1605 to 1621 on suspicion of complicity in the Gunpowder Plot (*q.v.*).

On the death of his father, the 8th earl, in 1585, he succeeded to the earldom and settled in London. Although an unavowed Catholic, he wished only open toleration for English Catholics and ardently favoured the accession of James I after the Scottish king had given assurances on the question.

During the first two years Northumberland supported the new regime but then fell out over the punishment of his friend Sir Walter Raleigh and the continued punishment of Catholics. How deeply or marginally he was involved in the Gunpowder Plot (in which his kinsman Thomas Percy played a leading role) is unclear, but he was arrested, tried in 1606, and sentenced to life imprisonment in the Tower. He was released on clemency in 1621 and took no further part in public affairs.

• **Northumberland, Algernon Percy, 10th earl of,** also called (1627–32) BARON PERCY (baptized Oct. 13, 1602, London—d. Oct. 13, 1668), English Roman Catholic moderate during the turbulent reign of Charles I of England.

He became a peer as Baron Percy in 1627 and succeeded his father, the 9th earl, as earl of Northumberland in 1632. During the years immediately preceding the English Civil War he served as an admiral, making earnest but unsuccessful efforts to reform the navy, and in 1637 he was made lord high admiral of England. In 1639 Charles I appointed him general of the forces north of the Trent and a member of the council of regency.

Northumberland played a distinguished and honourable part in the troubled times of the Civil War. He was a friend of the Earl of Strafford, and gave evidence at his trial which, though favourable on the important point of bringing the Irish army to England, was on the whole damaging; and he afterward leaned more and more toward the Parliamentary party, of which he soon became leader in the House of Lords. He was a member of the Committee of Safety and later of the Committee of Both Kingdoms (England and Scotland), and he took an active part in the attempts to come to terms with the King, whom he visited at Oxford for that purpose in 1643 and at Uxbridge two years later.

Northumberland helped to organize the New Model Army; and in 1646 he was entrusted by Parliament with the charge of the King's younger children. He led the opposition in the House of Lords to the proposal to bring Charles I to trial, and during the Commonwealth he took no part in public affairs.

At the Restoration he was called to the privy council by Charles II and with his habitual moderation he deprecated harsh proceedings against the regicides. On the death of his son Joceline, the 11th earl, in 1670, the male line of Percy earls of Northumberland became extinct.

Northumbria, Old English NORTHANHYMBRE, one of the most important kingdoms of Anglo-Saxon England, lying north of the Humber River. During its most flourishing period it extended from the Irish Sea to the North Sea, between two west–east lines formed in the north by the Ayrshire coast and the Firth of Forth and in the south by the Ribble River, or the Mersey, and the Humber.

Its military strength was greatest in the 7th century, when the supremacy of three of its rulers, Edwin (616–632), Oswald (633–641), and Oswiu (641–670), was recognized by the southern English kingdoms. But Northumbria's most significant contribution to Anglo-Saxon history was made in the late 7th and in the 8th century, in the religious, artistic, and intellectual achievements of what has often been called a golden age. The twin monasteries of Wearmouth and Jarrow achieved preeminence in the intellectual life not only of England but also of western Europe. The Venerable Bede (died 735), a theologian and historian who won international fame, was a monk of Jarrow; but the excellent library there, which made his scholarship possible, was probably equalled in the monasteries of Hexham, Whitby, and Lindisfarne. The Gospel book from Lindisfarne (now in the British Museum) epitomizes Northumbrian attainment in writing and illumination, and the skill of Northumbrian sculptors survives in the stone crosses at Bewcastle and Ruthwell.

Northumbria was formed from the coalition of two originally independent states, Bernicia, which was a pirate settlement at Bamburgh on the Northumberland coast, and Deira, lying to the south of it. Aethelfrith, ruler of Bernicia (593–616), won control of Deira, thereby creating the kingdom of Northumbria. He was killed in battle by supporters of Edwin, a representative of the Deiran royal house, who then ruled both kingdoms; but thereafter, apart from a few very short intervals, Bernician royalty controlled a united Northumbria. The kingdom probably reached the west coast by the mid-7th century, and it also rapidly expanded northward, at one time extending as far as the River Tay.

The cultural life and the political unity of Northumbria were destroyed by the arrival of the Danes. The Danish "great army" captured York in 866, and many of its members settled in that area. Early in the 10th century other Scandinavians entered and settled western Northumbria from the Irish Sea. Meanwhile, in the north, the newly formed kingdom of Scotland drove the Northumbrian boundary back to the River Tweed. Eventually the rulers of the southern kingdom of Wessex imposed their authority throughout England. After the last Scandinavian ruler of York was expelled in 944, there ceased to be independent kings of Northumbria, which then became an earldom within the kingdom of England.

Northwest, also called PACIFIC NORTHWEST, region, northwestern U.S., including the states of Oregon and Washington and part of Idaho.

Originally claimed by Spain, Britain, Russia, and finally the United States, the Northwest was jointly occupied by Britain and the United States until 1846, when the 49th parallel was made the boundary between the United States and British-held Canada. The area had been explored by Meriwether Lewis and William Clark in 1804–06 and by various trappers and fur traders, and settlers began arriving there by way of the Oregon Trail in the 1840s. Farming and trapping were the original economic mainstays, to be followed in later years by lumbering, fishing, and mining.

A region of spectacular beauty and valuable natural resources, the Northwest has attracted relatively few immigrants largely because of its basically wet climate. Furthermore, the economy has tended to rely on a few big industries, such as timber, and aeronautics in Washington, so that fluctuations in the business cycle are particularly severe in the region.

Growth rates in the Northwest have been high but generally below those of neighbouring states in the Southwest. Government, particularly in Oregon, has tended to be progressive and especially sensitive to environmental issues.

Northwest Airlines, Inc., American airline founded in 1926 as Northwest Airways, Inc., and incorporated on April 16, 1934, under its current name. Originally flying a mail route between Chicago and Minneapolis–St. Paul, Minn., the company expanded in subsequent decades to eventually include a domestic and international system radiating from Chicago, Minneapolis–St. Paul, and Seattle, Wash., to other points in the United States, Canada, the Far East, and Europe. The company's trade name is Northwest Orient. Northwest's parent holding company, NWA Incorporated, was created in a corporate reorganization in 1984. Headquarters are at Minneapolis–St. Paul International Airport.

From 1928 to 1933 Northwest expanded westward, city by city, through the Dakotas, Montana, and Washington state. In 1945, after serving the U.S. government in various northern and Pacific theatres of war, the airline secured an extension of its routes eastward from Minneapolis–St. Paul to New York City, via Milwaukee and Detroit, and thereby became the nation's fourth transcontinental airline—although, unlike TWA, United, and American, it did not initially serve the California market. The following year Northwest was certified to fly to the Far East and began service in 1947. In 1958 it secured the lucrative Florida route from the Midwest. Northwest started service to the Benelux countries and London in 1979 and 1980, respectively. In 1982 it established routes to South America and China; the latter had not been linked directly to the United States by air in more than 30 years. In 1986 Northwest purchased Republic Airlines, Inc., thereby acquiring routes to Mexico and the Caribbean.

Northwest Caucasian languages: *see* Abkhazo-Adyghian languages.

Northwest Coast Indian, member of any of the native North American Indian peoples who inhabited a narrow but rich belt of coastland and offshore islands from Yakutat Bay in the north, near the border of Alaska, to Cape Mendocino in the south, in northwestern California. From north to south there were the following linguistic divisions: Tlingit; Haida; Tsimshian; northern Kwakiutl, or Heiltsuq; Bella Coola; southern Kwakiutl; Nootka; Coast Salish; Quileute-Chimakum; Kwalhioqua; and Chinook. Along the Oregon coast and northwestern California there were a series of smaller divisions: Tillamook, Alsea, Siuslaw, Umpqua, Coos, Tututni-Tolowa, Yurok, Wiyot, Karok, and Hupa.

A brief treatment of the Northwest Coast Indians follows. For full treatment, *see* MACROPAEDIA: American Peoples, Native.

The Northwest Coast Indians were primarily hunters and gatherers, who relied mostly on salmon fishing and the collection of such other marine life as mollusks, which was plentiful on the seashores. Because of the richness of its resources, the Northwest Indian territory was densely populated by comparison with other areas, with some of its villages numbering hundreds of inhabitants. The villages were permanent, the houses being built of planks around a rectangular floor plan and usually constructed large enough to accommodate several families. The people might migrate at certain seasons, following the salmon runs or the harvest fluctuations, but they always returned to their permanent dwelling places.

In a group, the highest ranking member was the chief; subsequent chiefs descended in a direct line from him. The chief was the administrator of the group, the one who set the times for fishing, determined the ceremonies attendant on the first salmon caught in the new season, and guided the group from its summer to winter habitations. The chief also determined the times of the "potlatch," a ceremonial feast to which other groups were invited and which celebrated certain occasions in the life cycle of the group: the death of a chief, the bestowal of rank or prerogatives, or the assumption of power by an heir.

The economy of the Northwest Coast Indians was built around the fishery. In the main, they used dugout canoes, some very large, being built for the transport of the chief and his retinue, and others being used to transport lumber, fish, and foodstuffs.

Northwest Coast Indians were also skilled craftsmen. Their famous totem poles were only one aspect of elaborate decoration in wood that involved animal and ancestral figures in highly stylized representations.

Northwest Ordinances, also called ORDINANCES OF 1784, 1785, AND 1787, several ordinances enacted by the U.S. Congress for the purpose of establishing orderly and equitable procedures for the settlement and political incorporation of the Northwest Territory—*i.e.,* that part of the American frontier lying west of Pennsylvania, north of the Ohio River, east of the Mississippi River, and south of the Great Lakes.

Until about 1780 the lands of the Northwest Territory were claimed by several existing states, including New York and Virginia. These states soon ceded their territorial holdings to the central government, and by the time that the U.S. War of Independence ended in 1783, specific measures were needed to guide the settlement and division of the Northwest Territory. The Ordinance of 1784, drafted by Thomas Jefferson and passed by Congress, divided the territory into a handful of self-governing districts. It stipulated that each district could send one representative to Congress upon its attaining a population of 20,000, and it would become eligible for statehood when its population equaled that of the least populous existing state. (This ordinance was superseded by the Ordinance of 1787.)

The Ordinance of 1785 provided for the scientific surveying of the territory's lands and for a systematic subdivision of them. Land was to be subdivided according to a rectangular grid system; the basic unit of land grant was the township, which was a square area measuring six miles on each side. A township could then be subdivided into a number of rectangular parcels of individually owned land. The minimum land sale was set at one square mile (640 acres), and the minimum price per acre was one dollar. One section in each township was to be set aside for a school. These procedures formed the basis of American public land policy until the Homestead Act of 1862.

The Northwest Ordinance of 1787, the most important of the three acts, laid the basis for the government of the Northwest Territory and for the admission of its constituent parts as states into the Union. Under this ordinance, each district was to be governed by a governor and judges appointed by Congress until it attained a population of 5,000 adult free males, at which time it would become a territory and could form its own representative legislature. The Northwest Territory must eventually comprise a minimum of three and a maximum of five states; an individual territory could be admitted to statehood in the Union after having attained a population of 60,000. Under the ordinance, slavery was forever outlawed from the lands of the Northwest Territory; freedom of religion and other civil liberties were guaranteed; the resident Indians were promised decent treatment; and education was provided for. Under this ordinance, the principle of granting new states equal rather than inferior status to older ones was firmly established.

Northwest Passage, historical sea passage of the North American continent, representing centuries of effort to find a route from the Atlantic Ocean to the Pacific Ocean through the Arctic archipelago of what became Canada. One of the world's severest maritime challenges, the route is located 500 miles (800 km) north of the Arctic Circle and less than 1,200 miles (1,930 km) from the North Pole. It consists of a series of deep channels through Canada's Arctic Islands, extending about 900 miles (1,450 km) east to west, from north of Baffin Island to the Beaufort Sea, above Alaska. To reach the Northwest Passage from the Atlantic requires a hazardous voyage through a stream of about 50,000 giant icebergs, up to 300 feet (90 m) in height, constantly drifting south between Greenland and Baffin Island. The exit to the Pacific is equally formidable, because the polar ice cap presses down on Alaska's shallow north coast much of the year and funnels masses of ice into the Bering Strait, between Alaska and Siberia.

Since the end of the 15th century, Western explorers have attempted to establish a commercial sea route north and west around the American land barrier encountered by Christopher Columbus. Such an accomplishment would realize an objective that has eluded man since King Henry VII of England sent John Cabot in search of a northwest route to the Orient in 1497. Five years earlier, Columbus had set out in search of a westward route after conquest of the Middle East by the Ottoman Turks in the mid-15th century disrupted Europe's overland routes to the East. Vasco da Gama sailed south around Africa to India in 1498; Ferdinand Magellan sailed southwest around South America to the East Indies in 1521; and Dutch explorers vainly sought a northeast passage around Russia. But it was the Northwest Passage that captured the imagination of many of the world's famed explorers, including Jacques Cartier, Sir Francis Drake, Sir Martin Frobisher, and Captain James Cook. All met with failure, and many with disaster. Sir Humphrey Gilbert, whose treatise on the passage inspired many voyages by others, drowned on his own attempt in 1583. Henry Hudson, his young son, and seven others were cast adrift by a mutinous crew in 1611, when his discovery of Hudson Bay proved to be an icy trap instead of the passage he sought. Knowledge of an Arctic passage came slowly, over hundreds of years, from information gathered during voyages by such explorers as John Davis, William Baffin, Sir John Ross, Sir William Parry, Frederick William Beechey, and Sir George Back, augmented by overland expeditions by Henry Kelsey, Samuel Hearne, and Sir Alexander Mackenzie. The worst tragedy came when Sir John Franklin and 128 men aboard HMS *Erebus* and HMS *Terror* vanished in 1845. One searcher for the lost expedition, Robert McClure, entered the passage from the west, became locked in the ice for two winters, then sledged overland to another rescue ship coming from the east to complete the first Northwest Passage in 1854. Adolf Erik Nordenskiöld led a Swedish-Russian voyage through the Northeast Passage over the top of Eurasia in 1878–79, and Soviet polar icebreakers have opened this route to limited use in modern times. But the Northwest Passage was not finally conquered by sea until 1906, when the Norwegian explorer Roald Amundsen, who had sailed secretly to escape creditors seeking to stop the expedition, completed an arduous three-year voyage in the converted 47-ton herring boat *Gjöa.* The first single-season transit was achieved in 1944, when Sergeant Henry A. Larsen, of the Royal Canadian Mounted Police, made it through in a schooner.

Opening the Northwest Passage to regular commercial ocean traffic would have worldwide economic significance in natural resources, transportation, and trade relations among nations. The greatest impact would be on the United States and Canada, but effects could be felt from the Persian Gulf to Panama, and from Chile to Scandinavia. But competitive developments, governmental policies, and many complex economical issues are likely to determine how soon, and how much, such a route would be used. The cost of strengthening ships against ice and the probable high insurance rates for vessels used in Arctic service, however, could inhibit use of the Northwest Passage as a trade route. But it would cut the distance between London and Tokyo, for example, to less than 8,000 miles (12,870 km) from the 14,670-mile (23,600-kilometre) route around Africa made necessary when the Suez Canal was shut down (1967–75). The Northwest Passage would permit use of far larger vessels than allowed by dimensions of the Panama and Suez canals. Icebreaking techniques learned in the Northwest Passage could be applied in other ice-locked waters from the Great Lakes to the Baltic Sea, including Russia's Northeast Passage with its vast Siberian oil fields. Canada has held sovereignty over the Arctic Islands since 1880, but some countries, including the United States, contend that much of the Northwest Passage is in international waters. Canada has indicated that it would welcome international commerce over the route, subject to pollution-control regulations.

Northwest Spitsbergen National Park, Norwegian NORDVEST-SPITSBERGEN NASJONALPARK, national park and bird sanctuary established in 1973 by Norway on the northwestern corner of the island of Spitsbergen, in the Svalbard archipelago in the Arctic Ocean. With an area of 1,268 square miles (3,283 square km), the park typifies a high-arctic-tundra biologic community. The glaciated uplands of Albert I Land and Haakon VII Land, together with offshore islands, constitute the park, which ranges in elevation from sea level to 4,311 feet (1,314 m). The park is particularly rich in bird life, containing five separately established bird sanctuaries in the south and west of the park: Kongsfjorden, Blomstrandhamna, Guissezholmen, Skorpa, and Moseøya. Animal life includes Arctic fox and reindeer; walrus congregate on Moffen Island, the northern extremity of the park.

Northwest Territories and Nunavut, vast region of northern Canada, divided into the federally administered territories of Northwest Territories in the west and Nunavut in the east. Nunavut was created out of the eastern portion of the Northwest Territories in 1999. Yellowknife is the capital of the Northwest Territories, and Iqaluit is the capital of Nunavut. Area 1,322,910 square miles (3,426,320 square km), of which about 733,000 square miles (1,900,000 square km) is in Nunavut. Pop. (1999 est.) Northwest Territories, 41,668; Nunavut, 27,146.

A brief treatment of the Northwest Territories and Nunavut follows. For full treatment, *see* MACROPAEDIA: Canada.

The territories stretch across the roof of the North American continent. They reach into the Arctic Circle and include thousands of islands, the largest of which are Victoria Island in the west and Baffin Island in the east. The flat relief of the Canadian Shield dominates much of the region, though the land rises in the west in the Mackenzie Mountains. The climate is largely cold Arctic, though it is moderated somewhat in the southwestern lowlands.

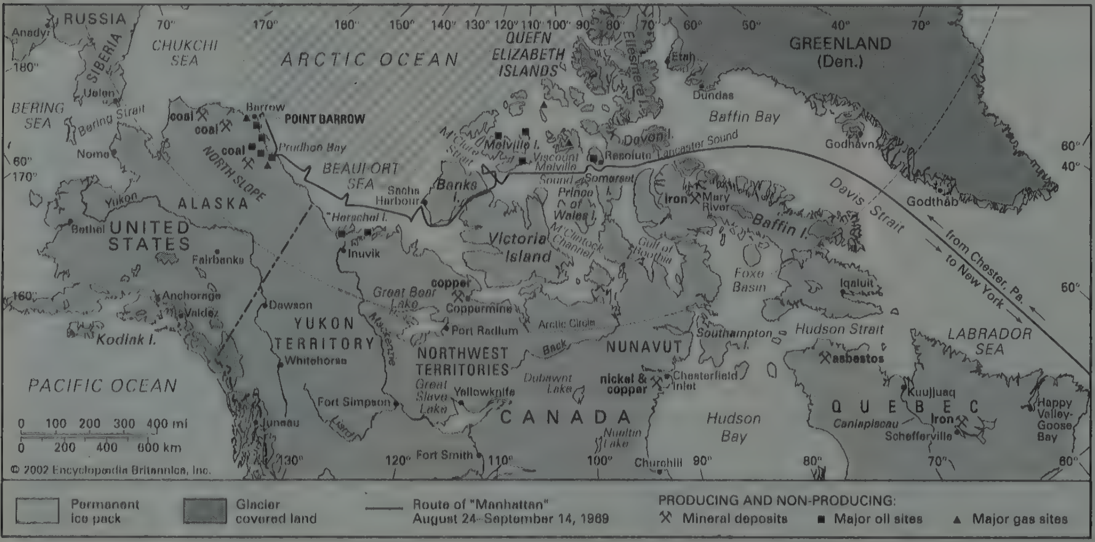
About one-third of the people in the Northwest Territories are American Indians (who call themselves Dene). Nearly all the rest are of European descent or are Métis (mixed ancestry), with a tiny proportion of Inuit. Virtually the entire population of Nunavut is Inuit.

The Athabaskan-speaking Dene consisted of small hunting bands that readily adapted to the fur trade when it reached the Mackenzie area (the western portion of the region) in the 18th century. No Dene reserves were established. The decline of the fur trade in the 20th century left many Dene unemployed.

The Inuit living in the region can be traced to the prehistoric, maritime Thule culture. Their numbers were reduced in the 19th century by European diseases. The Inuit learned to adapt to the fur trade in the 20th century and came to depend upon outside sources for necessities.

The region's ecology has been subject to serious threats. The introduction of firearms and, later, oil spills from ships did much to upset the fragile balance of nature in the region. As fuel and game resources near settlements were depleted, the population began to concentrate around trading posts and missions. Most of the population now lives in small settlements along the Mackenzie River and the Arctic coast.

Mining is the principal industry and centres on the petroleum and natural-gas fields in the western and northern Arctic coastal regions.



The Northwest Passage

Gold is mined at Yellowknife and near Bathurst Inlet, Nunavut, and diamond deposits are worked in the Northwest Territories. Fur trapping provides income for some native people. Forestry is limited, and sawmills process timber for local use only. Some crops are grown for local consumption, but most foodstuffs are imported, and transportation costs are high. Nearly all passenger and much freight traffic is carried by scheduled and chartered air services. Surface transportation for heavy freight is mainly by water. Snowmobiles have largely replaced the dogsled for overland winter travel.

Tourism has increased with the construction of hotels and the development of the vast Wood Buffalo, Nahanni, and Auyittug national parks. Public policies favour the revival of traditional Inuit arts and crafts, and cooperatives have developed to market Inuit craftwork, both to tourists and by shipment to other provinces.

Each territorial government consists of a 19-member Legislative Assembly elected by universal adult suffrage. A commissioner, appointed by the Canadian federal government, is the chief executive for each territory and is responsible to the Department of Indian Affairs and Northern Development. Each government also has an executive council composed of assembly members; the territorial-government leader serves as the minister responsible for the executive. One elected member represents each territory in the Canadian Parliament.

In the Northwest Territories the judiciary consists of a territorial court, a police magistrate, and justices of the peace; in Nunavut there is a single level of trial courts. Police service is provided by the Royal Canadian Mounted Police (RCMP) in the Northwest Territories and by community-based police (aided by the RCMP) in Nunavut. The territorial governments retain the same rights as a provincial government, except that the federal government controls and administers the development of resources aside from game, forestry, and fire suppression.

Housing, health, social, and educational services are provided by the territorial government, but with heavy federal funding. Free compulsory public elementary, secondary, and vocational education is provided through the 12th grade, and a wide range of special- and adult-education programs have been developed to serve special needs. Higher education is available for qualified students in the provincial universities, although each territory provides some postsecondary programs and courses.

Explorers in the 16th and 17th centuries searched for the fabled Northwest Passage to East Asia. In the 18th century Samuel Hearne journeyed inland as an employee of the Hudson's Bay Company, as did Alexander Mackenzie for the Northwest Company. European settlements were first established to serve the whaling fleet. Fur traders, missionaries, and police dominated the Northwest Territories until the 1920s, when the Canadian government established a territorial administration after the discovery of oil. The Inuit began negotiating in the 1980s for a separate territory, resulting in the formation of Nunavut in 1999.

Northwest Territory, U.S. territory created by Congress in 1787 encompassing the region lying west of Pennsylvania, north of the Ohio River, east of the Mississippi River, and south of the Great Lakes. Virginia, New York, Connecticut, and Massachusetts had claims to this area, which they ceded to the central government between 1780 and 1800. Land policy and territorial government were established by the Northwest Ordinances of 1785 and 1787. Ultimately, five states—Ohio, Indiana, Illinois, Michigan, and Wisconsin—were organized from the territory, and a small part, the land lying between the St. Croix and Mississippi rivers, was incorporated into Minnesota.

Consult the INDEX *first*

Northwich, town ("parish"), Vale Royal borough, administrative and historic county of Cheshire, England. Local brine springs have been used to produce salt since Roman times, but their exploitation has caused severe subsidence of buildings in the town. The present large-scale chemical industry has developed from the ancient salt trade. Other manufactures include iron and steel, leather goods, carpets, and clothing. Pop. (1991) 34,520.

Northwood, John (b. 1836, Wordsley, Staffordshire, Eng.—d. 1902), English glassmaker, a technical innovator who sparked a resurgence of British interest in classical Greek and Roman glassworking methods, particularly in the art of cameo glass.

Northwood studied art before serving as an apprentice in the large glass-manufacturing firm of W.H., B., and J. Richardson, at Wordsley (in the glassmaking district of Stourbridge). After working for a time in his brother's carpentry workshop, Northwood went to work for Benjamin Richardson, a former partner in the firm, who had established his own glassmaking business. Richardson's admiration for ancient glass and his desire to produce comparable modern pieces inspired Northwood's ventures into new techniques for carving and etching glass. After studying the Elgin Marbles and the Portland Vase in the British Museum, Northwood began work on his Elgin Vase (1873), commissioned by the glass-factory owner Benjamin Stone. The two-handled urn—encircled by a frieze carved in relief and decorated with etched classical motifs—inspired many British glassworkers to similarly embellish their works, with the aid of a glass-etching machine developed by Northwood himself.

Northwood's major work, his Portland Vase (completed in 1876), was a copy of the Roman original made during the 1st century AD. Instead of using glass-etching tools to cut into the superimposed layers of coloured glass (an opaque white casing over a dark blue ground), Northwood worked by hand, with steel tools of his own design, to create the white-on-blue cameo figures. The piece took more than three years to complete, during which time Northwood repeatedly visited the British Museum to see and handle the original. Although Richardson had, many years earlier, offered £1,000 to any glassmaker who could produce a replica of the famous Roman vase, Northwood's masterpiece was commissioned by another local manufacturer, Philip Pargeter.

Northwood's Portland Vase was the first such successful reproduction in the original medium, and his accomplishment was celebrated by glassmakers throughout the world. The art of cameo glass, thus revived in England, was carried on by numerous craftsmen of note, including Northwood's nephew William (1858–1937) and his son, John Northwood II (1870–1960).

Norton, town (township), Bristol county, south-central Massachusetts, U.S., 12 miles (19 km) southwest of Brockton. It was settled in 1669 by a cabin boy, William Wetherell, according to local lore, and incorporated in 1711. Norton was a centre of witchcraft hysteria in the early 18th century. It was known for the presence of the alleged witches Dora Leonard and Naomi Burt, and Major George Leonard was supposed to have sold his soul to the devil there in return for gold.

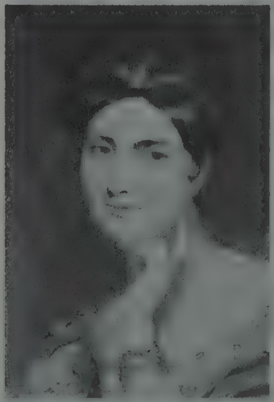
Norton is notable for Wheaton College. Opened in 1835 as Wheaton Female Seminary by Judge Laban Wheaton, in memory of his daughter, the college occupies a 100-acre (40-hectare) campus studded with Georgian colonial buildings. It was one of the pioneer institutions dedicated to the education of women; it was chartered as a college in 1912, and it has admitted men since 1988. The town economy is based on services (including education and the distribution of food products), retail trade, and light manufacturing. Pop. (2000) 18,036.

Norton, town, north-central Zimbabwe. It was named after a farm family murdered (1896) in the Shona uprisings. Developed in the 1960s as a planned industrial township, it is located 29 miles (46 km) west of Harare (formerly Salisbury) on the road and rail line to Bulawayo and 5 miles (8 km) from Lake McIlwaine. Adjacent to the town's industrial zone is Chibero College of Agriculture (1961), and to the north lies the Darwendale Dam, Lake, and Recreational Park. Pop. (1992) 20,405.

Norton, Caroline (Elizabeth Sarah), *née* SHERIDAN (b. March 22, 1808, London, Eng.—d. June 15, 1877, London), English poet and novelist whose matrimonial difficulties and her resultant efforts to secure legal protection for married women made her a notorious figure in mid-Victorian society.

One of three granddaughters of the playwright Richard Brinsley Sheridan, she began to write while in her teens. In 1827 she made an unfortunate marriage to the Honourable George Norton, whom she left after three years. In retaliation, Norton brought action against her friend Lord Melbourne for seducing his wife. The suit may have been a political move to discredit Melbourne (then prime minister). When the case came to trial in 1836, the evidence was so flimsy that the jury decided against Norton without leaving the courtroom. Norton then refused his wife access to their children, and her outcries against this injustice were instrumental in introducing the Infant Custody Bill, which was finally carried in 1839. In 1855 she was again involved in a lawsuit because her husband not only refused to pay her allowance but demanded the proceeds of her books. Her eloquent letter of protest to Queen Victoria had great influence on the Marriage and Divorce Act of 1857, abolishing some of the inequities to which married women were subject.

Among her contemporaries, Mrs. Norton held a high literary reputation. *The Dream, and Other Poems* appeared in 1840 to critical enthusiasm, and *Aunt Carry's Ballads* (1847), dedicated to her nephews and nieces, was written with tenderness and grace. Her novels—*Stuart of Dunleath* (1851), *Lost and Saved* (1863), and *Old Sir Douglas* (1867)—



Caroline Norton, detail of an oil painting by John Hayter

By courtesy of the trustees of the Chatsworth Settlement, Derbyshire were based on her own unhappy experiences. After her husband's death in 1875, she married Sir William Stirling-Maxwell.

Norton, Charles Eliot (b. Nov. 16, 1827, Cambridge, Mass., U.S.—d. Oct. 21, 1908, Cambridge), American scholar and man of letters, an idealist and reformer by temperament, who exhibited remarkable energy in a wide range of activity.

Charles Eliot Norton, 1903
By courtesy of the Library of Congress, Washington, D.C.

After graduating from Harvard in 1846, Norton opened a night school in Cambridge, was director of a housing experiment in Boston, and worked zealously as an editor for the Union cause during the Civil War. From 1864 to 1868 he was coeditor of the *North American Review,* and he helped found *The Nation* in 1865. From 1874 to 1898 he lectured on the history of art at Harvard, where he was one of the most popular teachers of the day. A friend of many literary men, including Thomas Carlyle, Ralph Waldo Emerson, John Ruskin, Henry Wadsworth Longfellow, and James Russell Lowell, he contributed valuable editions of their letters and other biographical material. Norton also wrote on art and edited collections of poetry, notably that of John Donne (1895–1905). Probably Norton's best literary work was his prose translation of Dante's *The Divine Comedy* (1891–92). His letters, published in 1913, were edited by Sara Norton and M.A. De Wolfe Howe.

Norton Sound, arm of the Bering Sea, indenting for 125 miles (200 km) the west coast of Alaska, U.S., with a width of 70 miles (115 km) between the Seward Peninsula (north) and the Yukon River delta (south). The sound is navigable from May to October. The city of Nome, on the northern shore, is the commercial centre of northwestern Alaska. Captain James Cook noted the sound in 1778 and named it for the speaker of the British House of Commons, Sir Fletcher Norton.

Nōrūz, also spelled NŌ RŪZ, or NŌ-RŪZ, the New Year festival often associated with Zoroastrianism and Parsiism. The festival is celebrated in many countries, including Iran, Iraq, India, and Afghanistan. It usually begins on March 21, which in many of these countries is the first day of the new year.

Among the Parsis, the Nōrūz ("New Day") is a celebration that warrants the performance of five prescribed liturgies: the Āfringān, prayers of love or praise; the Bāj, prayers honouring *yazata*s ("ones worthy of worship") or *fravashi*s ("preexistent souls"); the Yasna, a rite that includes the offering and ritual drinking of the sacred liquor, *haoma;* the Fravartigan, or Farokhshi, prayers commemorating the dead; and the Satum, prayers recited at funeral feasts. Throughout the day, Parsis greet one another with the rite of *hamāzor,* in which one's right hand is passed between the palms of another. Words of greeting and good wishes are then exchanged.

Norwalk, city, Los Angeles county, southwestern California, U.S. Once a part of the Rancho Los Coyotes, a 1784 Spanish land grant, it was founded as Corvallis in 1868 by Gilbert and Atwood Sproul. The city was renamed for Norwalk, Conn. After the arrival of the Southern Pacific Railroad in 1875, it became a service point for logging, dairying, and ranching. Located at the intersection of major freeways, it experienced rapid industrial development after World War II. Since 1964 Norwalk has held an annual Space, Science and Technology Show. Cerritos Community College was founded there in 1955. Inc. 1957. Pop. (1994 est.) 100,744.

Norwalk, city, coextensive with the town (township) of Norwalk, Fairfield county, southwestern Connecticut, U.S., on Long Island Sound at the mouth of the Norwalk River. Roger Ludlow purchased the land from the Norwalk (Norwaake, or Naramake) Indians in 1640. In 1779, during the U.S. War of Independence, the settlement was burned by Loyalist forces under Major General William Tryon. It was from Norwalk that Nathan Hale crossed Long Island Sound to Long Island, where he was captured by the British and executed as a spy. The manufacture of hats, long the principal industry, is now part of a diversified industrial economy including textiles, machinery, and hardware. Although Norwalk was known for its oysters in earlier years, overexploitation and pollution of the waters have virtually ended the oyster fishery. It is a summer resort and has the Norwalk Community-Technical College, which opened in 1961.

The town of Norwalk, organized in 1651, contained the cities of Norwalk (incorporated borough, 1836; city, 1893) and South Norwalk (incorporated 1870), as well as some small villages. In 1913 all these divisions were consolidated and incorporated as the city of Norwalk. Located in nearby New Canaan is the Silvermine Guild Arts Center, with exhibits of mostly New England artists and craftsmen. Pop. (1994 est.) city, 78,710; Stamford-Norwalk PMSA, 331,835.

Norwalk, city, seat (1818) of Huron county, northern Ohio, U.S., 59 miles (95 km) west-southwest of Cleveland. It was originally part of the Western Reserve known as the Sufferers' Lands, or Firelands, set aside in 1792 for Connecticut residents whose homes were burned by Loyalists during the U.S. War of Independence. The settlement was founded by Platt Benedict in 1817 and named for Norwalk, Conn. Many Classic Revival houses, built in the early 19th century by its New England settlers, survive. The Firelands Museum, formerly Preston Wickham House (1836), contains Indian and pioneer relics. Rutherford B. Hayes, later U.S. president, attended the Norwalk Academy, a widely known institution in the 1830s. Since World War II both population and industry have grown steadily. Manufactures include wire products, auto seats, truck cabs, thermostats, furniture, and candy. Inc. village, 1828; city, 1881. Pop. (1994 est.) 15,204.

Norway, officially KINGDOM OF NORWAY, Norwegian KONGERIKET NORGE, Europe's fifth largest country, located in the western part of the Scandinavian Peninsula. Dotted with more than 160,000 lakes, this mountainous country lies between latitudes 58° and 72° N (about 1,089 miles [1,752 km] north-northeast to south-southwest) and longitudes 4° and 32° E (about 267 miles [430 km] wide from east-southeast to west-northwest). It is bordered by the Barents Sea (north), the Norwegian Sea and North Sea (west), Skagerrak (Skager Strait; south), and Sweden, Finland, and Russia (east). The capital is Oslo. Area 125,050 square miles (323,878 square km). Pop. (1995 est.) 4,355,000.

A brief treatment of Norway follows. For full treatment, *see* MACROPAEDIA: Norway.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

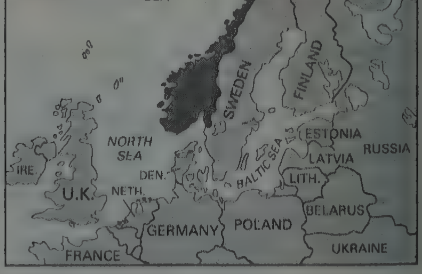
The land. More than half of Norway lies at elevations of less than 1,600 feet (500 m), with only some 15 percent higher than 3,200 feet (975 m). Geologically, it is formed of some of the oldest rocks (1,000,000,000 to 2,000,000,000 years old) on Earth. Its mountain system is a continuation of the Caledonian System of the British Isles; Galdhø Peak (8,100 feet [2,469 m]), the country's highest elevation, is in the south. Glåma (Glomma) is the principal river (372 miles [598 km] long), and Lake Mjøsa is the largest lake (142 square miles [368 square km]). Glaciated several times in the Quaternary Period (began 1.6 million years ago), Norway still has about 1,700 glaciers; fjords indent the northern and western coasts.

Norway is situated in almost the same northern latitudes as Alaska; its warmer climate is caused by the Gulf Stream, which usually keeps the fjords from freezing. Mean July temperatures vary from 63° F (17° C) in the south to 50° F (10° C) in the north, and mean January temperatures from 28° F (−2° C) in the southeastern coast to 14° F (−10° C) in the inland valleys. Annual mean precipitation varies from less than 30 inches (750 mm) in the east to about 80 inches (2,052 mm) in the west. The country is subject to frequent gales and weather changes. Northern Norway is the land of the midnight Sun; there, the Sun does not set from mid-May to the end of July, and conversely, the Sun does not rise above the horizon from the end of November to the end of January.

Deciduous forests (oak, ash, elm, and maple) are found at the lower elevations, coniferous (spruce and pine) up to 2,800 feet (850 m), and willows and dwarf birch at higher elevations. North of the Arctic Circle, pine grows mainly in inland valleys. Reindeer, wolverines, lemmings, foxes, martens, and otters are found throughout the country. Wolves and polar bears are considered to be endangered.

Norway traditionally has been a fishing and lumbering country, but since the end of World War II it has greatly increased its mining and manufacturing activities. It is one of the world's largest exporters of iron-based alloys and metals combined. Norway has western Europe's largest offshore petroleum and natural-gas fields and Europe's largest deposit of ilmenite (titanium ore), and it ranks among the world's largest producers of hydroelectric power and magnesium metal.

The people. Most of the population (98 percent) is of Germanic (Nordic, Alpine, Baltic) stock, and the largest minority group is the Sami (Lapps), who constitute less than 1 percent. Almost 90 percent of the population is Lutheran, and Norwegian is the official language. Norway has a relatively low population density. The population under 15 years of age is about one-fifth of the total, and the 60-years-and-over age group also is about one-



Norway

fifth. Life expectancy is very high, 74 years for males and 80 years for females.

Since World War II the birth rate has decreased. The death rate has also decreased because of improved health care that has especially alleviated infant mortality and tuberculosis. Migration from rural to urban areas since World War II has been extensive; three-fourths of the population is urban. A balance between immigration and emigration rates helps to maintain a low rate of overall population increase.

The economy. Norway has a developed mixed economy that is largely based on services, the production of petroleum and natural gas, and light and heavy industries. The gross national product (GNP) is growing about as rapidly as the population, and the GNP per capita remains among the highest in the world.

Agriculture accounts for less than 3 percent of the gross domestic product (GDP) and employs some 5 percent of the workforce. Only about 3 percent of the total land area is arable, and it is concentrated in valleys and around lakes and fjords. The chief crops are barley, potatoes, oats, and wheat, and the principal livestock are sheep, cattle, and pigs. Foxes (blue and silver) and minks are raised for fur.

Forests cover more than one-fourth of the land, and forestry is an important industry. Conifers predominate.

Norwegian boats land herring, blue whiting, capelin, Atlantic cod, prawn, and shrimp, and frozen and canned fish are exported. Beginning in the 1970s, fish-farming has been developed by the government.

Norway has been a significant exporter of petroleum from its North Sea fields since 1975. The government participates in the exploration and production of offshore petroleum and natural gas through Statoil (the Norwegian Government Oil Company). Norway is one of the world's major producers of aluminum, made from imported bauxite. Copper is widely mined, as are iron pyrites and iron ore. Coal is mined only on the island of Svalbard in the Barents Sea.

Industry accounts for about one-seventh of the GDP and employs a comparable fraction of the workforce. Manufactures are mainly based on domestic raw materials such as iron, timber, and fish. Abundant hydroelectric power has helped to expand the production of aluminum. Computer services and the manufacture of paper, furniture, silicon alloys, and electrotechnic products have become important industries. Electricity is largely generated by hydroelectric-power plants.

Norway's merchant marine is one of the largest and most modern in the world, but, owing to economic difficulties in the shipping industry after 1975, sales to foreign firms reduced the country's number of ships, and the shipbuilding industry itself began to decline.

Labour unions have been active since the late 19th century. Settlements between labour and management have tended to equalize wages by granting larger increases to workers with lower incomes.

Taxes are highly progressive. Public expenditures account for approximately one-fourth of the GDP, and expenditures for social security have increased since the 1960s.

Norway's major trading partners include the United Kingdom, Germany, and Sweden. Machinery and transport equipment (including road vehicles and ships), metals and metal products (including iron and steel), and food products are the principal imports. Exports include petroleum and natural gas, machinery and transport equipment, and metals and metal products (including aluminum).

Government and social conditions. Norway is a hereditary constitutional monarchy. Its constitution, adopted in 1814, vests legislative power in the modified unicameral parliament, the Storting. Its members are elected by proportional representation to a four-year term. After elections, one-quarter of the members form the Lagting (upper house) and the remaining members form the Odelsting (lower house); the two houses meet separately or jointly depending on the legislative issue. Executive power is nominally held by the monarch, whose functions are mainly ceremonial; the State Council, led by the prime minister, exercises executive authority. The monarch nominally selects the prime minister and the State Council with the agreement of the Storting. The major political parties are the Norwegian Labour Party (Det norske Arbeiderparti) and the Conservative Party (Høyre).

The judicial system includes the Supreme Court, the final arbiter of legal decisions; courts of appeal; and local courts. Norway is a member of the North Atlantic Treaty Organization (NATO).

Norway's comprehensive welfare system provides benefits for sickness and maternity, family allowances, and pensions for old age, disability, or loss of support that guarantee a standard of living close to that achieved during the individual's working life. The compulsory national health-care system provides free hospital care and physician's compensation. Well-staffed health facilities, along with extensive programs of preventive medicine, have nearly eliminated most serious infectious diseases, notably tuberculosis. A national housing shortage created by World War II is no longer felt. Government housing assistance includes rent allowances and low-cost loans for construction and improvement of homes.

Norway's virtually 100 percent literacy rate reflects its comprehensive educational system. Education is compulsory between the ages of 7 and 16, and almost all school-aged children are enrolled. General elementary education is followed by specialized secondary education offering a choice of technical training or continuation of a general curriculum leading to university study. Institutions of higher education have greatly expanded to accommodate the growing number of students.

Norway's press has high standards, and the independence of its editors is universally recognized. Most newspapers are affiliated with a political party. Television and radio broadcasting is controlled by the Norwegian Broadcasting Corporation (Norsk Rikskringkasting). Educational and informational programs have priority over entertainment.

Cultural life. Arts and crafts and industrial design flourish side by side, often inspired by archaeological finds from the Viking age, by the culture of the northern Sami, and by advanced schools of design. Furniture, enamelware, textiles, tableware, and jewelry design may reflect historical, ethnic, or avant-garde styles.

Although Norway is one of the world's smaller language communities, the country is among the leaders in publishing. Most of the new titles released are of Norwegian origin. Norwegian writers have made important literary contributions. Best known among them is the playwright Henrik Ibsen. Other internationally prominent writers are Bjørnstjerne Bjørnson, Knut Hamsun, and Sigrid Undset. Permanent theatres have been established in several cities, and the state traveling theatre, the Riksteatret, organizes tours throughout the country. Notable, too, are the musical compositions of Edvard Grieg.

Norwegian painters of the 20th century have excelled in mural painting to such an extent that they are rivaled only by Mexican painters. Other artists are world-renowned for their multimedia assemblages, pictorial weaving, and nonfigurative art in sculpture as well as painting. Edvard Munch, probably Norway's best-known painter, is regarded as a founder of Expressionism. The works of Gustav Vigeland are assembled in Oslo's Vigeland sculpture park. Architecture has drawn inspiration from medieval stave churches (built of upright logs) as well as houses of horizontal logs notched at the corners. Private homes, almost all of which are made of wood, are built to fit snugly into the terrain.

Science and research have limited means, but in the natural sciences individual efforts have won substantial acclaim. Beginning with Vikings Erik the Red and his son Leif Eriksson and continuing in modern times with such men as Fridtjof Nansen, Roald Amundsen, and Thor Heyerdahl, Norwegians have been renowned explorers.

History. The earliest known traces of human occupation in Norway are stone tools dating to 7000–6000 BC that have been found along the coast. Between 3000 and 2500 BC new migrants settled in eastern Norway. During the first four centuries AD the people of Norway were in contact with Roman-occupied Gaul. The period of the collapse of the Roman Empire in the West (AD 400–600) is characterized in Norway by chieftains' graves containing magnificent weapons and gold objects. The years 800 to 1050 were those of the Viking age, when Scandinavians set out on innumerable plundering expeditions. Men of Norwegian descent settled in Greenland and undertook expeditions to Vinland (the coast of Newfoundland).

Harald I, who took control of the western coastal districts late in the 9th century, is traditionally held to be Norway's first king, though local rule by chieftains remained the standard. Olaf II Haraldsson became the first effective king of all Norway in 1015. Olaf returned to Norway from England instilled with the beliefs of Christianity and organized the conversion of many Norwegians.

Between 1130 and 1240 civil wars were fought among several claimants to the Norwegian throne. During the later years of civil war the authority of the crown was strengthened, and Norway was ruled by one king, Haakon IV (1217–73). Through the remainder of the 13th and most of the 14th centuries, the wealth and power of the crown grew.

In 1389 Eric of Pomerania was crowned king of Norway and later (1397) king of Sweden and Denmark also. After Eric's deposition in 1442, Norway was ruled by Danish kings until 1814, when it was united with Sweden, although retaining a degree of independence and receiving a new constitution. This rule by the Swedish crown continued until 1905, when King Oscar II relinquished the crown of Norway and the Norwegians voted to reestablish their own monarchy rather than institute a republic. Prince Charles of Denmark was elected Haakon VII.

Between 1905 and 1914 Norway experienced rapid economic growth. A number of social reforms were enacted, such as health insurance, a 10-hour workday, and a 48-hour week. In 1913 the right to vote was extended to women.

Norway remained neutral during World War I, although its shipping industry played a vital role in the conflict. Following the war, government economic policy pursued a liberal course. By 1927 unemployment in Norway had reached 20 percent, and during the Great Depression of the 1930s it rose to 33 percent. Despite these economic difficulties, the period between the wars produced economic expansion and industrial growth.

Norway declared itself neutral at the outbreak of World War II in 1939, but in 1940 German troops invaded and defeated the Norwegian army. The king and government fled to England. German occupation continued until the end of the war, when German troops capitulated with little resistance.

From 1945 to 1965 the Norwegian Labour Party governed almost without interruption.

Many of the social programs initiated in the 1930s were continued. A right-wing coalition ousted the Labour government in 1965 and remained in power until 1971. After that, the Labour Party was intermittently in power until 1981; during part of that time it was under the leadership of Gro Harlem Brundtland, Norway's first female prime minister. Norway's first Conservative administration in more than 50 years took power from 1981 to 1986, but thereafter Labour and the Conservatives seesawed for control, each sometimes having to lead minority governments.

Norway, Church of, Norwegian NORSKE KIRKE, established, state-supported Lutheran church in Norway, which changed from the Roman Catholic faith during the 16th-century Protestant Reformation.

Unsuccessful attempts were made to win converts to Christianity in Norway during the 10th century, but in the 11th century Kings Olaf I Tryggvason (reigned 995–*c.* 1000) and Olaf II Haraldsson (reigned 1015–30), each of whom had been baptized outside Norway before becoming king, forced many of their subjects to accept Christianity. Olaf II brought clergy from England to organize the church. After he was killed in battle, he became a national hero and was eventually canonized as Norway's patron saint (1164). The country was primarily Christian by the end of the 11th century. In 1152 the church was organized nationally, with the seat of the archbishop in Nidaros (now Trondheim).

The Reformation was brought to Norway by Christian III, king of Denmark and Norway (reigned 1534–59), who was converted to Lutheranism as a young man. Norwegians officially accepted the new faith in 1539. Roman Catholic bishops and clergy who would not accept Lutheranism were forced out of the church, and the church's property was taken over by the government. By the end of the 16th century the church had been reorganized, and Lutheranism was accepted by most of the people and clergy.

During the 17th century, Lutheran orthodoxy prevailed, but in the 18th century the church was influenced by Pietism. A work with a Pietistic emphasis, *Truth Unto Godliness,* an explanation of Martin Luther's Small Catechism published in 1737 by Erik Pontoppidan, a Danish-Norwegian Lutheran professor and bishop, extensively influenced Norwegian religious life for about 200 years. A Pietistic revival from 1797 to 1804 was led by Hans Hauge, a peasant's son who experienced a religious conversion when he was 25 years old. Although laymen were legally forbidden to preach, Hauge did so throughout the country and established brotherhoods that met for religious study and prayer. Despite being opposed by some of the clergy and being imprisoned several times for his activities, he and his followers remained within the Church of Norway and influenced it greatly. The work of Gisle Johnson, a theological professor from 1849 to 1873 who combined Lutheran orthodoxy and Pietism, also influenced the clergy and people and led to the establishment of mission programs.

In the 20th century the church experienced theological disagreements between liberals and conservatives. During World War II the bishops and clergy led the resistance movement against the Nazis, who attempted to control the church after defeating Norway. The bishops gave up their state offices, and almost all the clergy resigned from their parishes, but they continued to work with and were supported by the people. After Germany's defeat, pastors returned to their churches, and the state church again resumed functioning.

Norway is divided into dioceses, each headed by a bishop, with the bishop of Oslo as the primate of the bishops. The king and the Storting (parliament) retain power to determine church organization, practices, doctrine, and education in the church. The king has complete freedom in appointing bishops and pastors, and the government has refused to authorize changes in church organization requested by the bishops that would allow more autonomy for the church. Since 1845 a Norwegian could legally withdraw from the state church and join another or no church, but nearly 90 percent retain official membership in the state church.

Norway Current, branch of the North Atlantic Current, sometimes considered a continuation of the Gulf Stream (issuing from the Gulf of Mexico). The Norway Current enters the Norwegian Sea north of Scotland and flows northeastward along the coast of Norway before flowing into the Barents Sea. With subsurface temperatures ranging from 46° F (8° C) in the south to about 39° F (4° C) in the north, the current exerts a moderating influence on the climate of Norway and northern Europe. The main flow of water reaches a velocity of about 0.5 knot and is dispersed westward in eddies that meet those of the southwest-flowing East Greenland Current. This thermal mixing of the water creates excellent fishing grounds, especially around coastal regions of the Faroe and Shetland islands and of Norway.

Norway lobster: *see* scampi.

Norwegian elkhound, breed of dog that originated thousands of years ago in western Norway, where it was used as an all-purpose hunter, shepherd, guard, and companion. It generally excels in tracking European elk and has also been used for hunting bear, lynx, and lion. A medium-sized dog with erect, pointed ears, the Norwegian elkhound has a short, compact body and a thick, smooth coat of black-tipped gray hairs; it carries its tail curled high over its back. It stands 18 to 20 inches (46 to 52 cm), weighs 40 to 50 pounds (18 to 23 kg), and is characterized as a bold, energetic dog.

Norwegian elkhound

Sally Anne Thompson

Norwegian language, Norwegian NORSK, North Germanic language of the West Scandinavian branch, existing in two distinct and rival norms—Dano-Norwegian (Bokmål, or Riksmål) and New Norwegian (Nynorsk). Dano-Norwegian stems from the written Danish introduced during the union of Denmark and Norway (1380–1814). New Norwegian was created by the language scholar Ivar Aasen during the mid-19th century, primarily from the dialects of the western rural districts, in order to carry on the tradition of Old Norse. The use of Dano-Norwegian is more widespread than that of New Norwegian; it is used in all national newspapers and in most of the literature. Both of these mutually intelligible languages are used in government and education, and plans have been made to bring them closer together gradually into a common Norwegian language, Samnorsk, though resistance to these plans has been vigorous.

Old Norwegian had diverged from the other Scandinavian languages by the end of the 12th century. Spoken language in Scandinavia underwent rapid evolution late in the Middle Ages. This change, the lack of a printing press in Norway until 1643, and the influence of unions with Sweden (1319) and then Denmark (1380) hindered the development of a national written language in Norway. Between the late 14th and the early 16th centuries Middle Norwegian became the tongue of most native speakers, though the urban elite were influenced by Danish.

Norwegian literature, body of writings of the Norwegian peoples.

A brief treatment of Norwegian literature follows. For full treatment, *see* MACROPAEDIA: Scandinavian Literature.

Among the literatures of modern Europe, Norwegian literature is remarkable for being so late-flowering and yet so impressively deep-rooted. Only after the separation of Norway from Denmark in 1814 is it possible to point to a literature that is unambiguously Norwegian; its roots, of course, reach back more than 1,000 years into the pagan Norse past.

In its evolution Norwegian literature became intertwined with Icelandic and then with Danish literatures. A distinctively Norwegian literature had its origins in the work of the dramatist Henrik Wergeland (1808–45), who in his passionate, revolutionary poetry and oratory engendered the age of "national Romanticism" in Norway. By the end of the 19th century, however, Norwegian literature—particularly by virtue of the achievements of Henrik Ibsen—occupied an influential position in Western literature. Twentieth-century Norwegian writers of note include Knut Hamsun and Sigrid Undset, both winners of the Nobel Prize for Literature.

Norwegian Sea, Norwegian NORSKEHAVET, section of the North Atlantic Ocean, bordered by the Greenland and Barents seas (northwest through northeast); Norway (east); the North Sea, the Shetland and Faroe islands, and the Atlantic Ocean (south); and Iceland and Jan Mayen Island (west). The sea reaches a maximum depth of about 13,020 feet (3,970 m), and it maintains a salinity of about 35 parts per 1,000. A submarine ridge linking Greenland, Iceland, the Faroe Islands, and north Scotland separates the Norwegian Sea from the open Atlantic. Cut by the Arctic Circle, the sea is often associated with the Arctic Ocean to the north. The warm Norway Current flows northeastward off the Norway coast and produces generally ice-free conditions. Colder currents mixing with this warm water create excellent fishing grounds (mainly for cod, herring, and whitefish), especially around coastal regions of Iceland and Norway and the Shetland and Faroe islands.

Norwest Corporation, former American bank holding company that merged with Wells Fargo (*q.v.*) in 1998. The company was incorporated in Minnesota as Northwest Bancorporation in 1929 to control banks, trust companies, and other financial institutions in the north-central United States. It conducted a general banking business through its subsidiary banks, all of which provided a full range of commercial services and many of which provided trust services. Northwest Bancorporation merged with Dial Financial Corporation, an Iowa-based consumer loan company, in 1982. The corporate name was changed from Northwest Bancorporation to Norwest Corporation in 1983.

Norwest's ties to Wells Fargo reached back to William G. Fargo, who in 1872 had been one of the original investors in the North Western

National Bank of Minneapolis. By the start of the 21st century, this and other mergers made Wells Fargo the fifth largest financial service company in the United States.

Norwich, city (district), administrative and historic county of Norfolk, England. It is located along the River Wensum above its confluence with the River Yare, about 100 miles (160 km) northeast of London.

The site does not seem to have been occupied until Saxon times, when the village of Northwic was founded on a gravel terrace above the Wensum. By 1004, when Norwich was sacked by the Danes, it had become an important market centre. Shortly after the Norman Conquest (1066), the cathedral church and a Benedictine monastery were founded near the river. The distinctive cathedral has a Norman apse and nave; among its Perpendicular Gothic additions is a 15th-century stone spire rising to 315 feet (96 metres), one of the tallest in England. The cathedral also has well-preserved cloisters that are the largest in England. A Norman castle (12th century) east of the town's principal market has been since 1894 the city's main museum and art gallery, with an archaeological collection and paintings of the Norwich school, which flourished in the 19th century.

Until the late 18th century Norwich was one of the most prosperous of English provincial towns, challenged only by Bristol and York. The first charter dates from 1158. The prosperity of the medieval town is reflected in the number of churches dating from this period, 30 of which still exist. The town's prosperity was based upon the woolen industry, which was aided by Edward III, who induced Flemish weavers to settle in Norwich in 1336, and also by the influx of immigrants (mainly from the Low Countries) during the reign of Elizabeth I. In 1579 nearly one-third of the town's population of 16,000 were immigrants. During the 15th century the flint Guildhall was built overlooking the market square. At the time of the English Civil Wars (1642–51) the population was predominantly behind the Parliamentary cause, and the town saw little strife. From the 18th century Norwich declined in relation to the new industrial centres of the north. Today Norwich is one of England's largest centres of footwear manufacturing. Engineering, printing, and the processing of mustard are also important.

The University of East Anglia, founded in 1964, includes the Centre of East Anglian Studies and is situated at Earlham Hall, long associated with the Gurney family. The city also has a central library and the little Maddermarket Theatre.

Norwich is one of England's major agricultural and livestock markets and serves as a shopping and entertainment centre for an extensive area. It is the traditional regional capital of East Anglia and an important centre of modern administration; located there are headquarters of the Norfolk county authority, as well as those of the county districts of Broadland, Norwich City, and South Norfolk. Area 15 square miles (39 square km). Pop. (1998 est.) 124,000.

Norwich, city, coextensive with the town (township) of Norwich, New London county, southeastern Connecticut, U.S. It lies at the confluence of the Yantic and Shetucket rivers, which there form the Thames.

The settlement, which was begun in 1659 by a company from Saybrook led by Captain John Mason and the Reverend James Fitch, became a legal township in 1662. Shipbuilding and shipping and the production of cotton, paper, and nails were important to its economy in the 18th century, and from the U.S. War of Independence to the American Civil War firearms were made there. Textiles then dominated the economy until after 1912, when there was a trend toward diversification. Norwich is the birthplace of the Revolutionary War traitor Benedict Arnold. It is also the site of Leffingwell Inn, scene of Revolutionary War councils and the Native American Burial Grounds for members of the Mohegan Indian tribe. The homes of the Huntington family, many members of which led early American civil and military affairs, are also there. Norwich is the seat of Thames Valley State Technical College (1963) and Mohegan Community College (1969). The city was incorporated in 1784 and consolidated with the town in 1952. Pop. (1990) city, 37,391; New London–Norwich MSA, 290,734; (2000) city, 36,117; New London–Norwich MSA, 293,566.

Norwich school, significant group of English regional landscape painters that was established in 1803 as the Norwich Society of Artists and flourished in Norwich, Norfolk, in the first half of the 19th century. The work of the leaders of the group, John Crome (d. 1821) and John Sell Cotman (d. 1842), was inspired by the Dutch landscapists and by the English painter Thomas Gainsborough. Other members of the Norwich school were Miles Edmund and John Joseph Cotman (sons of John Sell), John Bernay Crome (the son of John), George Vincent, James Stark, John Thirtle, Joseph Stannard, John Middleton, Robert Dixon, and Henry Bright.

Norwich terrier, short-legged terrier breed developed about 1880 in England, where it soon became a fad with Cambridge students. It was later used by various American hunt clubs and has also drawn notice as a rabbit hunter. It is stockily built, with either erect or hanging ears, and it has a dense, wiry, weather-resistant coat, usually reddish brown. A small, characteristically rugged and loyal dog, the Norwich terrier stands about 23 to 28 cm (9 to 11 inches) and weighs 4.5 to 6.5 kg (10 to 14 pounds).

Norwich ware, delft (tin-glazed) earthenware produced in Norwich, Norfolk, Eng., of which little is known. About 1567 two Flemish potters, Jasper Andries and Jacob Janson, who had moved to Norwich from Antwerp, may have made paving tiles and vessels for apothecaries and others. So far nothing made by them in Norwich has been identified, and they moved to London about 1570. Potting was still active in the town in 1696, but although posset pots and other white ware, as well as a type of puzzle jug often decorated with a tulip on the front, are known, they were probably imported from Delft, Holland, or Antwerp. Some wares of this type have Norfolk placenames.

Norwid, Cyprian Kamil (b. Sept. 24, 1821, Laskowo-Głuchy, near Warsaw, Pol., Russian Empire [now in Poland]—d. May 23, 1883, Paris, France), Polish poet, the most original and innovative of the 19th century, whose genius was not appreciated until his rediscovery in the 20th century.

Norwid lived in exile after the suppression of the Polish insurrection against Russia of 1830–31. From 1842 he lived for some time in Italy, where he studied painting and sculpture. In 1849 he went to Paris and in 1852 to the United States but in 1854 returned via England to Paris, where he led a life of penury and obscurity until his death.

His literary failure in his own day resulted from his idiosyncratic and difficult literary style. He wrote poems (*Poezye,* 1863), plays (*Krakus,* 1863; *Wanda,* 1901; *Kleopatra,* 1904), and a treatise on aesthetics, in prose and verse, included in *Poezye*. His poetry is essentially philosophical. Norwid's work was restored to posterity by Zenon Przesmycki (pseudonym Miriam), who began publishing his works in 1901.

Norwood, town, Norfolk county, eastern Massachusetts, U.S., on the Neponset River, southwest of Boston. Settled in 1678, it was incorporated (from parts of Dedham and Walpole) in 1872. The town has a diversified economy that includes industry, engineering research, and many corporate headquarters. The Norwood Memorial Municipal Building has a lofty 170-foot (52-metre) tower containing a 52-bell carillon. Area 10.5 square miles (27 square km). Pop. (2000) 28,587.

Nosaka Sanzō (b. March 30, 1892, Yamaguchi prefecture, Japan—d. Nov. 14, 1993, Tokyo), politician who was the leading figure in the Japanese Communist Party (JCP) throughout the late 1950s and '60s. He was responsible for the party's pursuit of its revolutionary goals through peaceful participation in parliamentary politics.

Nosaka first became interested in Communism following the 1917 Bolshevik Revolution in Russia. He graduated in 1917 from Keiō University, where as a student he had joined the Yūaikai, a labour organization formed by Suzuki Bunji. After studying in England, he joined the English Communist Party in 1920 and was deported a few months later. He returned to Japan in 1922 and played a major role in establishing the Japanese Communist Party. Arrested in 1923, he was released at the end of the year and became active in the Japanese labour movement. He was arrested again in 1928 as a result of mass arrests of Communists known as the March 15th Incident but was released because of ill health and went to the Soviet Union in 1931 as the JCP representative to the executive committee of the Comintern, the Soviet organization in charge of the international activities of the Communist Party. Under orders of the Comintern, Nosaka went to the United States twice in the 1930s to do underground work such as smuggling Communist tracts into Japan. In 1940 he went to the Chinese Communist liberated area in Yenan, where he engaged in propagandist activities against the Japanese army, which was attempting to occupy China.

In 1946 Nosaka returned to Japan, where he was elected to the Central Committee of the reestablished Japanese Communist Party and was elected also to the Lower House of the Diet (parliament). As one of the major Japanese Communist theoreticians, he was blamed by the Cominform, the postwar equivalent of the Comintern, for his doctrine of peaceful evolution into Communism. When the U.S. occupation authorities purged Communists from Japanese politics during the 1950s Cold War era, Nosaka went underground to avoid arrest. In 1955 he reemerged as first secretary and leading figure of the Japanese Communist Party, calling for unity among Communists.

Nosaka was subsequently elected a member of the House of Councillors in 1956, a post that he held until 1977. He became chairman of the Central Committee of the party in 1958, retiring from that position in 1982 at the age of 90. Nosaka was dismissed as honorary chairman of the JCP in 1992 after party leaders claimed to have discovered documents indicating that in the late 1930s he had falsely denounced a Japanese Communist leader to the Soviet Union.

nose, the prominent structure between the eyes that serves as the entrance to the respiratory tract and contains the olfactory organ. It provides air for respiration, serves the sense of smell, conditions the air by filtering, warming, and moistening it, and cleans itself of foreign debris extracted from inhalations.

The nose has two cavities, separated from one another by a wall of cartilage. The external openings are known as nares or nostrils. The roof of the mouth and the floor of the nose are formed by the palatine bone, the mouth part of which is commonly called the hard palate; a flap of tissue, the soft palate, extends back into the nasopharynx, the nasal portion of the throat, and during swallowing is pressed upward, thus closing off the nasopharynx so that food is not lodged in the back of the nose.

The shape of the nasal cavity is complex. The forward section, within and above each nostril, is called the vestibule. Behind the vestibule and along each outer wall are three elevations, running generally from front to rear. Each elevation, called a concha, hangs over an air passage. Beside and above the uppermost concha is the olfactory region of the nasal cavity. The rest of the cavity is the respiratory portion. The respiratory area is lined with a moist mucous membrane with fine hairlike projections known as cilia, which serve to collect debris. Mucus from cells in the membrane wall also helps to trap particles of dust, carbon, soot, and bacteria. Sinus cavities are located in the bony skull on both sides of the nose.

In the olfactory (smelling) portion of the nose, most of the lining is mucous membrane. A small segment of the lining contains the nerve cells that are the actual sensory organs. Fibres, called dendrites, which project from the nerve cells into the nasal cavity, are covered only by a thin layer of moisture. The moisture dissolves microscopic particles that the air has carried into the nose from odour-emitting substances, and the particles dissolved in the fluid stimulate the olfactory nerve cells chemically.

For a depiction of the nasal passages in human anatomy, shown in relation to other parts of the body, see the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

nose ring, ornament inserted through different parts of the nose for personal adornment and used sometimes to signify social rank. Nose ornaments have been found especially among people in India, New Guinea, Polynesia, the pre-Columbian Americas, Australia, and parts of Africa.

Sometimes, the ala, or wing of the nose, and the septum are perforated. Often, only a small hole is made through the septum; but the hole can also be big enough for a finger to be passed through. Not only gold and jewels are worn in the nose: in New Guinea, especially among the Tuburi and the Solomon Islanders, the men wear great pointed sticks or the tusks of wild pig through holes in the nose.

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nosebleed, also called EPISTAXIS, an attack of bleeding from the nose. It is a common and usually unimportant disorder but may also result from local conditions of inflammation, small ulcers or polypoid growths, or severe injuries to the skull. Vascular disease, such as high blood pressure, may provoke it, and such diseases as scurvy and hemophilia also may be responsible. Usually it is easily controlled by rest and application of cold and pressure. On occasion it may require expert care.

Young girl holding a nosegay, "The Children of Israel and Sarah Griffith," oil on canvas by Oliver Tarbell Eddy, 1844; in the Maryland Historical Society, Baltimore

By courtesy of the Maryland Historical Society, Baltimore

nosegay, also called TUSSIE-MUSSIE, or POSEY, small, hand-held bouquet popular in mid-19th-century Victorian England as an accessory carried by fashionable ladies. Composed of mixed flowers and herbs and edged with a paper frill or greens, the arrangement was sometimes inserted into a silver filigree holder. When supplied by an admirer, a nosegay became a vehicle for the floral "language of love"—*e.g.,* a red tulip was a declaration of love; a sprig of dogwood returned by the young lady was a sign of indifference; a variegated pink meant that she rejected her suitor's affection. This variety of bouquet has enjoyed periodic revivals.

noselite, also called NOSEAN, variety of the feldspathoid mineral sodalite (*q.v.*).

Nosema, genus of parasitic spore-forming protozoans, of the order Microsporida, found in host cells where it undergoes repeated asexual divisions followed by spore formation.

The species *N. bombycis,* which causes the epidemic disease pébrine in silkworms, attacks all tissues and all developmental stages from embryo to adult. In advanced infections, small brown spots cover the body of the silkworm. Diseased larvae, which either are unable to spin cocoons or else spin them loosely, die without pupating. Louis Pasteur identified the spores ("corpuscles") of *Nosema* as the disease agent in 1865 and suggested control by destruction of infected silkworm colonies and improved sanitation.

Another species, *N. apis,* attacks the gut epithelium of honeybees (especially workers) and causes nosema disease, a serious form of dysentery in animals.

Noshiro, city, Akita *ken* (prefecture), Honshu, Japan. It is located at the mouth of the Yoneshiro River, where it meets the Japan Sea. During the Tokugawa period (1603–1867), the city was a trading centre and shipping port for products (mostly rice) from the Yoneshiro Plain. Toward the end of the Meiji period (1868–1912), the cedar lumber industry developed there, and the city became a major producer. South of Noshiro, on the coast of the Japan Sea, pears are grown and shipped to other parts of northeastern Japan. Pop. (1985) 59,170.

Noske, Gustav (b. July 9, 1868, Brandenburg, Prussia [Germany]—d. Nov. 30, 1946, Hannover, Ger.), right-wing Social Democratic German politician, notorious for his ruthless suppression of a communist uprising in Berlin, who was defense minister of the Weimar Republic from 1919 to 1920.

A member of the Reichstag (parliament), Noske became controversial within his own party for his support of imperial military and colonial programs. He joined other conservative socialists after 1914 in supporting Germany's participation in World War I. Regarded as his party's military expert, he was commissioned by the last imperial government to restore order at Kiel following the sailors' mutiny of October 1918. In December he was elected to the six-member ruling council, which, until the accession of the Weimar National Assembly (February 1919), provided an interim republican government for Germany.

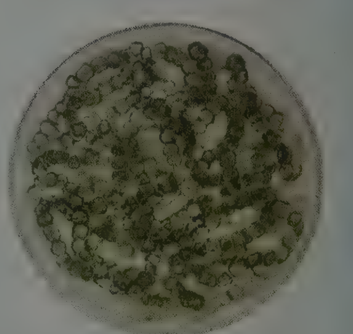
In January 1919 Noske was called upon to suppress the communist insurrection in Berlin, a task that he accomplished brutally but with dispatch. He served as minister of defense in the first Weimar Cabinet from February 1919 until he resigned in March 1920 under growing socialist criticism in the aftermath of an abortive right-wing attempt to overthrow the government (the Kapp Putsch). Subsequently, Noske served as governor of the province of Hanover (1920–33) and in July 1944 took part in the unsuccessful coup against Adolf Hitler.

Nossi-Bé (Madagascar): *see* Nosy Be.

Nossob River, also spelled NOSSOP RIVER, or NOSOB RIVER, intermittently flowing river, west-central Namibia, formed by two intermittent streams, the White Nossob and the Black Nossob, both of which rise northeast of Windhoek (the national capital). Their confluence is north of Leonardville, which is located near the tropic of Capricorn. The Nossob then follows a southeasterly course, passing through the thick, porous sands of the semiarid western Kalahari (Desert). Upon leaving Namibia, it forms a part of the border between Botswana and South Africa and bisects the Kalahari Gemsbok National Park that sits astride the border of these two countries. At the southern extremity of the park, the Nossob is joined by the intermittently flowing Auob River, which rises to the southwest of the Nossob in central Namibia and roughly parallels its course. From its confluence with the Auob River, the Nossob flows southward into the southwestward-extending, intermittently flowing Molopo River, a tributary of the Orange, which flows westward into the Atlantic Ocean.

The Nossob has a length (including the Black Nossob) of some 460 miles (740 km) to its confluence with the Molopo. The Nossob's drainage area of roughly 40,000 square miles (100,000 square km) is sparsely covered by varied grasses, low shrubs, and thorny woodland, typical of the Kalahari. Because of irregular precipitation and scant desert runoff, the wide riverbed of the lower Nossob has contained flowing water only a few times in the past century. Its high groundwater table, however, provides water for grasses and other vegetation, and its watering holes are visited by animals (especially antelope).

Nostoc, genus of blue-green algae with cells arranged in beadlike chains that are grouped together in a gelatinous mass. Ranging from microscopic to walnut-sized, masses of *Nostoc* may be found on soil and floating in quiet water. Reproduction is by fragmentation. A special thick-walled cell (akinete) has the ability to withstand desiccation for long periods of time. After 70 years of dry storage, the akinete of one species germinates into a filament when



Nostoc colony (highly magnified)

Winton Patnode—Photo Researchers/EB Inc.

moistened. Like most blue-green algae, *Nostoc* contains two pigments, blue phycocyanin and red phycoerythrin, and has the ability to fix nitrogen. A terrestrial species is a food source in the East.

Nostradamus, also called MICHEL DE NOTREDAME, or NOSTREDAME (b. Dec. 14, 1503, Saint-Rémy, France—d. July 2, 1566, Salon), French astrologer and physician, the most widely read seer of the Renaissance.

Nostradamus began his medical practice in Agen in 1529 and moved to Salon in 1544, where he gained renown for his innovative medicine and treatment during outbreaks of the plague at Aix and Lyon in 1546–47. He began making prophecies about 1547, which he published in 1555 in a book entitled *Centuries.* The work consisted of rhymed quatrains grouped in hundreds, each set of 100 called a century. Astrology was then at a peak, and an enlarged second edition, dedicated to the French king, appeared in 1558.

Some of his prophecies appeared to be fulfilled, and his fame became so widespread that he was invited to the court of Catherine de Médicis, queen consort of Henry II of France, where he cast the horoscopes of her children. He was appointed physician-in-ordinary by Charles IX when Charles became king in 1560. The subject of many commentaries, Nostradamus' prophecies were condemned in 1781 by the Congregation of the Index, the body set up by the Roman Catholic church for the examination of books and manuscripts. Because of their cryptic style and content—commingling French, Spanish, Latin, and Hebrew words—the prophecies have continued to create much controversy. Some of them are thought to have foretold actual historical events that have occurred since Nostradamus' time, including certain details of the French Revolution of the 18th century. Others, having no apparent meaning, are said to foretell events that have not yet occurred.

Nosy-Be, also called NOSSI-BÉ, island lying about 5 miles (8 km) off the northwestern shore of Madagascar. The name means "big island." It is 19 miles (30 km) long and 12 miles (19 km) wide and has an area of 120 square miles (300 square km). Nosy-Be is a volcanic island that has forests and numerous craters and crater lakes. Its highest point is Mount Passot (1,079 ft [329 m]). It has an annual rainfall of 78–118 inches (1,975–3,000 mm). The island's products, chiefly sugar and oils for perfumery, also include rum, vanilla, black pepper, and bitter oranges. The capital, in the south, is Hell-Ville, a resort and port for foreign shipping and trade along the west coast of Madagascar. There is an airfield at Fascène, 7 miles (12 km) away.

Beach on Nosy-Be, Madagascar
Gerald Cubitt

The arrival of Captain Passot's warship *Colibri* in 1840 initiated the cession of the island to the French, and the town Hell-Ville was named after Passot's commander in chief, Admiral de Hell. The island has been part of Madagascar since 1896. Pop. (latest est.) 39,000.

Not-Being, denial of, in Eleatic philosophy, the assertion of the monistic philosopher Parmenides of Elea that only Being exists and that Not-Being is not, and can never be. Being is necessarily described as one, unique, unborn and indestructible, and immovable.

The opposite of Being is Not-Being (*to mē eon*), which for the Eleatics meant absolute nothingness, the total negation of Being; hence, Not-Being can never be. Parmenides knew that the assertion that Not-Being also exists must be wrong, although no formal logic existed that would enable him to say precisely what was wrong with it. But he was nonetheless certain about his position: "For you cannot know Not-Being (*to mē eon*), nor even say it."

The problem of the existence of total nothingness, or "the void" (Greek: *kenon*), was important in the theoretical foundations of Greek atomism, which asserted, despite the seemingly rigorous logic of the Eleatics, that nothingness must in fact exist.

The Eleatic denial of the void is sometimes seen as a direct refutation of an earlier Pythagorean view, a pre-Parmenidean atomism asserting that a kind of Not-Being, understood as a cosmic air, exists. No documentary evidence for such a view has survived, however.

In the 20th century the question was treated in a revolutionary way by the German existentialist philosopher Martin Heidegger, who summarized the function of Not-Being in the neologistic words *das Nichts nichtet* ("Not-Being, or Nothingness, Denied").

Notabile (Malta): *see* Mdina.

notary, also called NOTARY PUBLIC, public official whose chief function in common-law countries is to authenticate contracts, deeds, and other documents by an appropriate certificate with a notarial seal. In Roman law the *notarius* was originally a slave or freedman who took notes of judicial proceedings. The work of the modern notary, however, corresponds more to that of the Roman *tabularius,* who took and preserved evidence. In medieval times the notary was an ecclesiastical officer who preserved evidence, but his duties were mainly secular.

The modern notary is appointed, after making application, by a secular official; the appointment usually becomes effective on payment of a fee, on the taking of an oath of office, and, in many parts of the United States, on the deposit of a bond to assure the proper performance of duties.

In the United States, qualifications for the position vary little from state to state, and, in general, a notary must be a citizen of legal age and a resident of the area in which he desires appointment. The jurisdiction of the notary's office is limited to the state or, in some states, only the county in which he resides. In countries such as France and Italy, however, and in the Canadian province of Quebec, which follow the civil-law tradition, there are educational requirements for notaries similar to those for lawyers.

In the civil-law countries of western Europe, and in Latin American and French areas of North America, the office of notary is a much more important position than in the United States and England. The civil-law notary may be roughly described as a lawyer who specializes in the law relating to real estate, sales, mortgages, and the settlement of estates but who is not allowed to appear in court. Documents prepared by him or authenticated in the proper manner are, in these countries, admissible in court without further proof of their authenticity; the notary guarantees the identity of the parties.

In the Anglo-American–law countries, on the other hand, courts will not accept as true the facts certified by a notary except in the case of a bill of exchange protested abroad. Nor may a notary draw up legal documents such as wills, contracts, mortgages, and deeds for a fee, for such work constitutes the practice of law. Nevertheless, many statutes require that the authenticity of specified documents be certified by a notary; the most common of these in the United States are deeds conveying land. In these cases the notary must not take the acknowledgment of a person who does not appear before him or who is not known to him unless evidence of identification is presented.

Certain other officials may be given notarial functions by statute, such as justices of the peace, consular officials, certain military officers, and various court officials.

note, in the notation of Western music, sign indicating pitch by its position on the staff and showing duration by its shape. Notes evolved in the 13th century from neumes (*q.v.*), signs indicating relative or absolute pitch and nuance but not necessarily rhythm. The earliest notes were the longa, 𝆷, and brevis, ■; and their derivatives, the maxima, 𝆶, and semibrevis, ◆. In modern notation the brevis and semibrevis correspond to the double whole note, 𝅜, and the whole note, 𝅝. Other modern notes, in diminishing time value, are the half note, 𝅗𝅥; quarter note, 𝅘𝅥; eighth note, 𝅘𝅥𝅮; sixteenth note, 𝅘𝅥𝅯; thirty-second note, 𝅘𝅥𝅰; and sixty-fourth note, 𝅘𝅥𝅱.

"Note" may also refer to a tone, the sound either produced by a singer or musical instrument or represented by a pitch name (such as G, or sol), a neume, or a written note. The term is also used in describing the French lai form.

Noteburg (town, Russia): *see* Shlisselburg.

Noth, Martin (b. Aug. 3, 1902, Dresden, Ger.—d. May 30, 1968, Ḥorvot Shivta, Israel), German biblical scholar who specialized in the early history of the Jewish people.

In his book *Das System der zwölf Stämme Israels* (1930; "The Scheme of the Twelve Tribes of Israel"), written when he was just 28, Noth proposed the theory that the unity called Israel did not exist prior to the covenant assembly at Shechem in Canaan (Joshua 24), where, in his view, the tribes, theretofore loosely related through customs and traditions, accepted the worship and the covenant of Yahweh imposed by Joshua. Oral traditions from the various tribes were combined in the Pentateuch after the covenant union, and it was only at the time of Ezra that the traditions were finally written down, often combining different narrative elements into a single tale. Thus, the story of the Passover and that of the Exodus, once separate traditions, were linked in the written books of Moses. The two major narrative traditions, the Jehovistic and Elohistic (so called from the name used for God in each), formed a framework around the other traditional elements.

Noth served as professor of theology at the University of Bonn from 1945 to 1965, continuing his studies after his retirement.

Notharctus, extinct genus of primitive primates (family Notharctidae) that were among the evolutionary ancestors of modern lemurs. The genus is well known from complete fossil remains found in Eocene deposits (those formed between 57.8 and 36.6 million years ago) in Europe and North America.

Notharctus was small and resembled the modern lemurs on Madagascar. Its skull was about 5 cm (2 inches) long, with a prominent muzzle and a long lower jaw. Its canine teeth were still primitive, and four premolars were retained instead of three; but the upper incisors were relatively modern. The legs and tail were long and slim, and the first digit of the feet and hands was set off from the rest. *Notharctus* must have been an able and agile climber. During the Eocene it inhabited the dense subtropical forests that flourished over much of North America and Eurasia. At the close of the Eocene, conditions changed, and *Notharctus* and related forms disappeared from the Northern Hemisphere. Other, more modern lemurs continued on in tropical forests elsewhere and were particularly successful on Madagascar, where they remained relatively free from competition.

nothingness (mysticism and religion): *see* emptiness.

Nothosaurus, genus of primitive marine reptiles found as fossils in Triassic rocks (those formed 245 to 208 million years ago) of southwestern and eastern Asia, North Africa, and especially of Europe. *Nothosaurus* was characterized by a slender body, long neck and tail, and long limbs. Although it was an aquatic form, the limbs were not particularly specialized for life in the water, even though webbing probably was present between the digits. In many ways, *Nothosaurus* and related forms, known as the nothosaurs, resembled the more successful plesiosaurs but were not ancestral to them. The palate in the nothosaurs was closed, and the air passages were separated from the food passages, an adaptation to aid feeding while in the water. Numerous pointed teeth were present along the margins of the jaws. *Nothosaurus* probably swam through the water and could whip its long, slender neck about in pursuit of fleeing fish. It is probable that *Nothosaurus* and related forms evolved from terrestrial reptiles.

Notitia Dignitatum, official list of all ancient Roman civil and military posts, surviving as a 1551 copy of the now-missing original. It is a major source of information on the administrative organization of the late Roman Empire—late 4th and early 5th centuries—and is divided into two sections, covering the eastern and western parts of the empire as divided in AD 395.

The document goes into detail about the chief civil and military officials of the empire, together with their departmental staffs and, occasionally, the areas of their expertise or competence. The manuscript includes drawings of the insignia or regimental shield of each magistrate and the fort of each military commander.

Notke, Bernt (b. *c.* 1440, Lassahn, Pomerania [now in Germany]—d. before May 12, 1509, Lübeck), sculptor, painter, and engraver who was one of the most important artists in eastern Germany and the surrounding area during the 15th century. His intense and expressionistic works were instrumental in the development of sculpture in Germany.

In 1505 Notke was named *Werkmeister* of Petrikirche in Lübeck, and he also lived in other parts of the Baltic Sea area. Though he was a highly productive artist, few of his works are preserved. During the 1480s and '90s, Notke lived intermittently in Sweden. He produced his major sculptural group, "St. George and the Dragon," in Stockholm in 1489. Other documented works include the high altar at Tallinn (1482), the high altar at Århus, Den. (1479), and the "Triumphal Cross" in the Cathedral of Lübeck (1477).

Noto, town and episcopal see, Siracusa *provincia,* southeastern Sicily, Italy. It lies on the southern slopes of the Hyblaei Hills southwest of Syracuse. Noto was founded in 1703 about 4 miles (7 km) southeast of the Siculan and Roman city of Netum, which was destroyed in the earthquake of 1693. The town's 18th-century cathedral and the Palazzo Ducazio are notable among its many fine Baroque churches and palaces. Between 1837 and 1865 Noto replaced Syracuse as the provincial capital. The communal library houses a small local museum.

SS. Mira e Corrado Church, Noto, Sicily

Art Resource

An agricultural centre, Noto has light industries including food processing. Pop. (1993 est.) mun., 21,811.

Noto Peninsula, Japanese NOTO-HANTŌ, peninsula in Ishikawa *ken* (prefecture), Honshu, Japan, jutting into the Sea of Japan and enclosing Toyama Bay. The largest peninsula on the northern Honshu coast, it extends northward for 50 miles (80 km) and has a width of about 19 miles (30 km). The peninsula is separated from mainland Honshu by the Lake Ōchi graben (a depression of the Earth's crust bounded by faults). The peninsula's mountainous interior is similar to that of Sado, an island to the northeast.

The Noto Peninsula has been settled since ancient times, and there is evidence of early contact with the island of Tsushima and with northern Korea and Manchuria. The town of Wajima, at the peninsula's northern tip, is known for its women pearl divers and its production of elaborate lacquer ware. Parts of the peninsula were designated national park land in 1968.

notochord, flexible rodlike structure of mesodermal cells that is the principal longitudinal structural element of chordates and of the early embryo of vertebrates, in both of which it plays an organizational role in nervous system development. In later vertebrate development, it becomes part of the vertebral column. The notochord derives during gastrulation (infolding of the blastula, or early embryo) from cells that migrate anteriorly in the midline between the hypoblast and the epiblast (inner and outer layers of the blastula). These cells coalesce immediately beneath the developing central nervous system. With the formation of the vertebral column, the notochord is incorporated into the column as the centres of the intervertebral discs, called the nuclei pulposi, which cushion the vertebrae.

notopterid, also called KNIFEFISH, or FEATHERBACK, any of about eight species of air-breathing, freshwater fishes constituting the family Notopteridae, found in quiet waters from Africa to Southeast Asia. Notopterids are long-bodied, small-scaled fishes with a small dorsal fin (if present) and a long, narrow anal fin that runs along most of the undersurface and continues into the tail fin. Undulations along the anal fin enable the fishes to swim both forward and backward. Notopterids are predacious and nocturnal and, in some areas are sought as food. The largest (*Notopterus chitala*) may grow to a length of about 80 cm (32 inches). The species *Xenomystus nigri* is sometimes kept in aquariums.

Knifefish, or featherback (*Xenomystus nigri*)

Jane Burton—Bruce Coleman Ltd.

Notoungulata, extinct group of mammals found as fossils, mostly in South America, in deposits of the later Paleocene Epoch (66.4 to 57.8 million years ago); the oldest forms seem to have an East Asian origin. The peak of notoungulate evolution occurred during the Oligocene Epoch (36.6 to 23.7 million years ago). By the Pliocene Epoch (5.3 to 1.6 million years ago) they had been reduced in numbers and diversity; the reason may have been climatic. In South America the notoungulates evolved and diversified free from competition from more advanced forms that were evolving elsewhere. When North America and South America were rejoined late in the Pliocene, the notoungulates, apparently unable to compete with more efficient forms from North America, became extinct.

In their time the notoungulates included a variety of hoofed animals whose development paralleled the evolution of more advanced forms elsewhere. One group, the toxodonts, was clumsily built and rather massive; *Toxodon* itself stood about 2 m (6 feet) high at the shoulder. Other notoungulates developed along lines similar to the rabbits and rodents.

Notre Dame, University of, private institution of higher learning in Notre Dame, near South Bend, Ind., affiliated with the Roman Catholic church. Formerly a men's university, it became coeducational in 1972.

The university was founded in 1842 by the Congregation of the Holy Cross, a French religious community led by Father Edward Sorin (president from 1842 to 1865). It included a men's college, an elementary school, a college-preparatory school, a vocational ("manual labour") school, and a novitiate. A sister school for women, St. Mary's Academy (later St. Mary's College), was opened in 1843. The university added science, law, and engineering departments, an academic press, and a library in the 1860s and '70s.

In the 1920s the secondary school was discontinued and the university was reorganized into colleges of arts and letters, science, engineering, and business administration. The university also has a graduate school and a law school. It was in the 1920s that Notre Dame's reputation in intercollegiate football was first built under a famous coach, Knute Rockne. Under the presidency (1952–87) of the Reverend Theodore M. Hesburgh, undergraduate and graduate programs were strengthened.

Notre-Dame de Paris, also called NOTRE-DAME CATHEDRAL, cathedral church in Paris, France. It is the most famous of the Gothic cathedrals of the Middle Ages and is distinguished for its size, antiquity, and architectural interest.

Notre-Dame lies at the eastern end of the Île de la Cité and was built on the ruins of two earlier churches, which were themselves predated by a Gallo-Roman temple dedicated to Jupiter. The cathedral was initiated by Maurice de Sully, bishop of Paris, who about 1160 conceived the idea of converting into a single building, on a larger scale, the ruins of the two earlier basilicas. The foundation stone was laid by Pope Alexander III in 1163, and the high altar was consecrated in 1189. The choir, the western facade, and the nave were completed by 1250, and porches, chapels, and other embellishments were added over the next 100 years.

Notre-Dame Cathedral consists of a choir and apse, a short transept, and a nave flanked by double aisles and square chapels. Its central spire was added during restoration in the 19th century. The interior of the cathedral is 427 by 157 feet (130 by 48 m) in plan, and the roof is 115 feet (35 m) high. Two massive Early Gothic towers (1210–50) crown the western facade, which is divided into three stories and has its doors adorned with fine Early Gothic carvings and surmounted by a row of figures of Old Testament kings. The two towers are 223 feet (68 m) high; the spires with which they were to be crowned were never added. At the cathedral's east end, the apse has large clerestory windows (added 1235–70) and is supported by single-arch flying buttresses of the more daring Rayonnant Gothic style, especially notable for their boldness and grace. The cathedral's three great rose windows alone retain their 13th-century glass.

Notre-Dame de Paris

By courtesy of Electa, Milano

Notre-Dame Cathedral suffered damage and deterioration through the centuries, and after the French Revolution it was rescued from possible destruction by Napoleon, who crowned himself emperor of the French in the cathedral in 1804. Notre-Dame underwent major restorations by the French architect E.-E. Viollet-le-Duc in the mid-19th century. The cathedral is the setting for Victor Hugo's historical novel *Notre-Dame de Paris* (1831).

Notre-Dame-des-Ermites (Switzerland): *see* Einsiedeln.

Notre Dame Mountains, French MONTS NOTRE-DAME, mountain range in eastern Quebec province, Canada. The mountains are a continuation of the Green Mountains of Vermont, U.S., and an outcrop of the northern Appalachians. Named by Samuel de Champlain, the French explorer, they extend for about 500 miles (800 km) in a northeasterly direction through the Gaspé Peninsula. Elevations average 3,500 feet (1,070 m). An extension, the Mont Chic-Choc (Shickshock Mountains), forms the backbone of the Gaspé Peninsula and follows the south shore of the St. Lawrence River for 100 miles (160 km), reaching a maximum height of 4,160 feet (1,268 m) at Jacques Cartier, or Tabletop, in the Gaspesian Provincial Park.

Notre-Dame school, during the late 12th and early 13th centuries, an important group of composers and singers working under the patronage of the great Cathedral of Notre-Dame in Paris. The Notre-Dame school is important to the history of music because it produced the earliest repertory of polyphonic (multipart) music to gain international prestige and circulation. Its four major forms are organum (*q.v.*), a setting (for two to four voice parts) of a chant melody in which the chant is sung in sustained notes beneath the florid counterpart of the upper voice(s); clausula (*q.v.*), actually a section within an organum composition corresponding to a melismatic (many notes per syllable) section of the chant and characterized by a decisive acceleration of pace in the voice having the chant; conductus (*q.v.*), a processional composition in chordal style and not derived from any preexistent chant; and motet (*q.v.*), similar to the clausula, from which it evidently evolved, but with the addition of new texts, often secular, in the upper parts.

The composers of the Notre-Dame school are all anonymous except for two, Léonin (*q.v.*), or Leoninus (late 12th century), and Pérotin (*q.v.*), or Perotinus (flourished *c.* 1200), both of whom are mentioned in a 13th-century treatise by an anonymous Englishman studying in Paris. According to the treatise, Léonin excelled in the composition of organa and, in fact, composed the *Magnus liber organi* ("Great Book of Organa"), which contains a series of two-part organa for the entire liturgical year. Pérotin, the apparent successor to Léonin, is cited for his three- and four-voice organa, as well as his "substitute clausulae," newly composed clausulae intended for insertion within the older organa.

Nottawasaga Bay, large inlet of Georgian Bay (and Lake Huron) indenting Grey and Simcoe counties in southeastern Ontario, Canada, and fed by the Nottawasaga, Bighead, Beaver, and Pretty rivers. The bay's entrance lies between Cape Rich (west) and Christian Island (east). Many apple orchards are located near the bay's shores, which form a popular summer-resort area, most notably near the town of Wasaga Beach. Important settlements around the bay include Meaford, Thornbury, and Collingwood. The name is from Huron Indian words meaning "outlet of the river of the Iroquois" (whose war parties used the Nottawasaga River to attack the Hurons).

Nottaway River, river in western Quebec province, Canada. The river drains Lake Matagami at 765 feet (233 m) above sea level, flows northwestward for 140 miles (225 km), and empties into Rupert Bay at the south end of James Bay. Its chief headstreams, the Bell, Chibougamau, and Waswanipi, all flow into Lake Matagami; each adds more than 150 miles (240 km) to the length of the main stream. The swift-flowing Nottaway, with its great hydroelectric potential, was explored by Robert Bell, a Canadian government geologist, in the 1870s.

Nottingham, city and district, county of Nottinghamshire, England. The city lies along the River Trent.

The original site, on a sandstone hill commanding a crossing of the Trent, was occupied by the Anglo-Saxons in the 6th century. Colonizing the area by river, they gave their settlement the name of Snotingaham, the "ham," or village, of Snot's people. Peaceably occupied by the Danes in the 9th century, the community became one of the five towns of the Danelaw. After the Norman Conquest (1066), new rulers founded a borough that existed side by side with the older Saxon town, both communities being separately administered until about 1300. In 1449, Henry VI confirmed all previous privileges, instituted the office of sheriff, and granted that the town (excepting the castle and jail) should function as a county in itself.

A marketplace, mentioned in the charter of 1155, was established in the small valley between the Norman and Saxon settlements. The old market square, 5.5 acres (2 hectares) in area, is now one of the major features of the townscape in central Nottingham. Dominated on the eastern side by the Council House (opened 1928), the square is flanked with shops, but the central area is reserved for pedestrians. The old Saxon town is now marked by Nottingham Castle on Standard Hill, so named because there, in 1642, Charles I raised his standard at the outbreak of the English Civil Wars. The present castle, after renovation by the corporation (1875–78), houses a museum and art gallery. The link between Nottingham and the legendary outlaw Robin Hood is commemorated by a statue on Castle Green. University College was opened in Nottingham in 1881 and moved to its present site west of the city in 1928. The land was given by Lord Trent, otherwise Jesse Boot, founder of Boots Company, Ltd., who subsequently financed much of its development. The university was incorporated in 1948. The city has two important theatres—Theatre Royal (1865) and the Playhouse (opened 1963)—and literary figures associated with Nottingham include the poet Lord Byron and the novelist D.H. Lawrence.

Nottingham, the county town (seat), lies at the heart of the East Midlands coalfield and is a major route centre. It is also traditionally associated with the hosiery trade and the lace industry; a distinctive lace quarter still survives in the southeast corner of the central area of the city. The city has pharmaceutical and tobacco industries and a bicycle-manufacturing plant. The service sector of the economy provides the major proportion of employment; but the city's diversified economic structure has resulted in sustained prosperity. Area 29 square miles (75 square km). Pop. (2001) 266,995.

Nottingham, EARLS OF, titled English nobility of several creations, notably in the families Mowbray, Howard, and Finch, grouped below chronologically and indicated by the symbol •.

• **Nottingham, Thomas Mowbray, Earl of:** *see* Norfolk, Thomas Mowbray, 1st Duke of.

• **Nottingham, Charles Howard, 1st Earl of,** also called (1573–97) 2ND BARON HOWARD OF EFFINGHAM (b. 1536—d. Dec. 14, 1624, near Croydon, Surrey, Eng.), English lord high admiral who commanded England's fleet against the Spanish Armada. Although he was not as talented a seaman as his subordinates Sir Francis Drake and John Hawkins, Howard's able leadership contributed greatly to this important English victory.

Howard, the son of William, 1st Baron Howard of Effingham, was a cousin of Queen Elizabeth I. In 1569 he helped suppress a rebellion of the Roman Catholic lords of northern England. He succeeded to his father's title of Lord Howard of Effingham in 1573 and in 1585 became lord high admiral.

Charles Howard, 1st Earl of Nottingham, detail of an oil painting by an unknown artist, 1602; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

In mobilizing his forces against the Armada, Howard, on the flagship *Ark,* led the main body of the fleet to join Sir Francis Drake's advance force off the southwest coast of England (May 1588). As the Spanish fleet approached, Howard harassed it from a distance with long-range cannon and slowly shepherded it up the English Channel. His cautious tactics proved successful, but he was open to criticism for stopping to capture a crippled vessel at the moment when the rest of the Armada, its close formation broken by English fireships, was being mauled by Drake off the coast of France (Aug. 7–8, 1588).

In 1596 Howard and Robert Devereux, 2nd Earl of Essex, commanded the expedition that sacked Cádiz, Spain. The queen made Howard earl of Nottingham in 1597, and in the summer of 1599 he was given the exceptional office of lord lieutenant general of England, which he held until 1619. He helped put down Essex's uprising against Elizabeth (1601) and served as a commissioner at Essex's trial. It was to Howard that Elizabeth, on her deathbed, named James I as her successor. The venerable earl served on ambassadorial missions and investigatory commissions throughout most of James's reign.

•**Nottingham, Heneage Finch, 1st Earl of,** BARON FINCH OF DAVENTRY (b. Dec. 23, 1621, Kent, Eng.—d. Dec. 18, 1682, London), lord chancellor of England (1675–82), called "the father of equity."

He was descended from an old family, many of whose members had attained to high legal eminence, and was the eldest son of Sir Heneage Finch, recorder of London. He was educated at Westminster and at Christ Church, Oxford, where he remained until he became a member of the Inner Temple in 1638. He was called to the bar in 1645 and soon obtained a lucrative practice. He was a member of the Convention Parliament of April 1660, and shortly afterwards he was appointed solicitor-general, being created a baronet the day after he was knighted. In May of the following year he was chosen to represent the University of Oxford in Parliament. In 1670 he became attorney general and in 1675 lord chancellor. He was created Baron Finch in 1674 and Earl of Nottingham in May 1681.

His most important contribution to the statute book is "The Statute of Frauds." While attorney general he superintended the edition of Sir Henry Hobart's *Reports* (1671). He also published *Several Speeches and Discourses in the Tryal of the Judges of King Charles I* (1660); *Speeches to Both Houses of Parliament* (1679); *Speech at the Sentence of Viscount Stafford* (1680).

Nottinghamshire, county of the East Midlands of England, bordered by the counties of Leicestershire, Derbyshire, Humberside, and Lincolnshire and by the area of South Yorkshire. Its area is 836 square miles (2,164 square km). The county has eight districts: Ashfield, Bassetlaw, Broxtowe, Gedling, Mansfield, Newark, Rushcliffe, and the city of Nottingham.

The county is oval in shape and extends 51 miles (82 km) from north to south but only half that distance from east to west, while the major routes of communication of the county follow a north-south direction. This is in part dictated by geology, for Nottinghamshire lies on the eastern slope of the Pennine chain, the "spine" of England. Geological formations outcrop in north-south belts, the oldest in the west and the youngest in the east, while the surface generally falls from west to east.

In the west lie coal measures, and the exposed coalfield, with its multiple railway lines and numerous mining towns, forms the principal north-south highway in the west of the county. The centre of Nottinghamshire is occupied by a broad belt of Triassic pebble beds and sandstones. The chief feature of this central belt is its infertility; its natural vegetation is forest and heath, and it is here that the great medieval forest of Sherwood, the haunt of Robin Hood, stretched north across the county from the city of Nottingham. While little of the original oak forest now remains, subsequent plantings conserve at least some impression of the original woodland.

On the east, underlain by clays and marls, is lowland Nottinghamshire, effectively the valley of the River Trent and the adjoining Vale of Belvoir. The Trent forms the second main north-south channel of the county. The river carries a small amount of traffic, but its principal use today is to provide cooling water for a remarkable concentration of thermal electric power stations along its banks.

Southwestern Nottinghamshire, comprising the coalfield area and the city of Nottingham itself, is a densely populated and heavily industrialized tract, with mining, steelmaking, engineering, chemical, and textile (lace and hosiery) industries. Industrial outliers are found in Mansfield, Worksop, and Newark. The centre of the county is empty by contrast: the former royal forest of Sherwood was gradually converted into a series of great estates (sometimes collectively described as The Dukeries), and the sandy, infertile land was given over to new forest plantations, park landscapes, and imposing mansions (*e.g.,* Welbeck, Wollaton, Newstead). This is one of the few agricultural regions of Great Britain where irrigation is extensively used to cultivate the so-called Forest Sands.

The largest uninterrupted area of farmland in the county is to be found in the Vales of Trent and Belvoir. Agriculture is mixed and comprises dairying (including the manufacture of Stilton cheese), the production of cereal grains, and the growing of sugar beets, which are refined at Newark.

The county's major buildings of note are the great mansions of The Dukeries and the cathedral at Southwell. There is a university and a polytechnic in the city of Nottingham. Pop. (2001) 1,015,498.

Nouadhibou, formerly PORT-ÉTIENNE, town, northwestern Mauritania, on Ras Nouadhibou (formerly Cape Blanc) peninsula facing a protective bay on the Atlantic coast. It has developed as a fishing centre, and fishing continues to be important; but, since 1964, with the completion of a special pier and a 419-mile (674-kilometre) railway to the Iron Mountains near Zouîrât and Fdérik, the port's main economic importance has rested on exports of high-grade iron ore to Europe and the United States. Nouadhibou is the site of an international airport. Pop. (2000) 74,414.

Nouakchott, city, capital of Mauritania, on a plateau near the West African Atlantic coast, about 270 miles (435 km) north-northeast of Dakar, Senegal. Originally a coastal village on the desert trail north from Dakar, it was developed after independence (1960) as the capital of the new nation. Nouakchott was a major refugee centre during the Saharan droughts of the 1970s, and its rapid growth during that period (together with a sharp decline in the number of Mauritania's nomads) was attributed to migration and urbanization in response to the droughts. The city focuses on a square, the Place de l'Indépendence, and includes an airport and industrial area. It is centrally located on the main north-south highway, connecting the more populated agricultural south with the sparsely populated but mineral-rich north. A port facility has been built about 5 miles (8 km) west for the export of petroleum and copper. The copper is mined near Akjoujt (120 miles (195 km) northeast). While there has been a steady increase in the port's activity, the level of traffic remains below that of the more northern port of Nouadhibou. The University of Nouakchott was founded in 1981. Pop. (2000) 611,883.

Place de l'Indépendence in Nouakchott, Mauritania

Picturepoint, London

nougat, aerated confection made by mixing nuts and sometimes fruit pieces in a sugar paste whose composition is varied to give either a chewy or a brittle consistency. Nougat originated in Mediterranean countries, where honey, together with almonds or other nuts, was beaten into egg whites and then sun-dried.

In the modern preparation of nougat, honey or sugar and egg albumen are cooked at a temperature below which the albumen coagulates. The resulting mass is then stiffened to the desired degree under heat and combined with hard-cooked sugar and corn syrup. Vegetable fats such as coconut oil are often added to facilitate cutting and biting.

Nougat is traditionally flavoured with almonds or pistachio nuts. Crystallized fruit pieces are sometimes incorporated.

Nouméa, also spelled NUMEA, city, port, and capital of the Territory of New Caledonia, southwestern Pacific, in the southwestern corner of the island of New Caledonia. It was founded in 1854 under the name Port-de-

France. It is situated on an excellent deepwater harbour protected by Nou Island and a reef. The Grand Quai has a 1,450-foot- (442-metre-) long frontage. The city, backed by low hills, has modern buildings, a large public market, and St. Joseph's Cathedral, an old stone structure. Also located there are a campus of the French University of the Pacific, a coral aquarium, a hydroelectric plant at Yaté Falls, and a nickel-refining plant at nearby Duiambo Point. The city is served by two international airports, Tontouta and Magenta. Pop. (1989 prelim.) 65,110.

noumenon, plural NOUMENA, in the philosophy of Immanuel Kant, the thing-in-itself (*das Ding an sich*) as opposed to what Kant called the phenomenon—the thing as it appears to an observer. Though the noumenal holds the contents of the intelligible world, Kant claimed that man's speculative reason can only know phenomena and can never penetrate to the noumenon. Man, however, is not altogether excluded from the noumenal because practical reason—*i.e.*, the capacity for acting as a moral agent—makes no sense unless a noumenal world is postulated in which freedom, God, and immortality abide.

The relationship of noumenon to phenomenon in Kant's philosophy has engaged philosophers for nearly two centuries, and some have judged his passages on these topics to be irreconcilable. Kant's immediate successors in German Idealism in fact rejected the noumenal as having no existence for man's intelligence. Kant, however, felt that he had precluded this rejection by his refutation of Idealism, and he persisted in defending the absolute reality of the noumenal, arguing that the phenomenal world is an expression of power and that the source from which this power comes can only be the noumenal world beyond.

Nourrit, Adolphe (b. March 3, 1802, Montpellier, France—d. March 8, 1839, Naples [Italy]), French dramatic tenor who created many new roles in French opera.

His father, Louis Nourrit, was both a leading tenor at the Paris Opéra and a diamond merchant. Adolphe studied voice with Manuel García, a famous tenor of the time, and at 19 years of age he made his successful debut at the Paris Opéra as Pylades in Christoph Willibald Gluck's *Iphigénie en Tauride.* Within five years he succeeded his father as the leading tenor at the Paris Opéra. During the next decade, Nourrit created such new roles in leading French operas as Aménophis in Gioacchino Rossini's French version of his *Mosè* in *Egitto,* Arnold in Rossini's *Guillaume Tell,* Eléazar in Fromental Halévy's *La Juive,* for which Nourrit wrote the lyrics of the aria "Rachel, quand du seigneur," Robert in Giacomo Meyerbeer's *Robert le diable,* and Raoul in his *Les Huguenots.* He also wrote scenarios for four ballets, among them *La Sylphide,* and translated some of Franz Schubert's songs for French performance.

When his rival, Gilbert Duprez, was also hired by the Opéra in 1837, Nourrit decided to leave Paris. He traveled to Italy for his health and to study with Gaetano Donizetti. He performed in Naples, but his voice was affected by his poor health. His career faltered in Italy, he became depressed, and finally he jumped to his death from his hotel in Naples.

Nouveau Parti Démocratique (Canada): *see* New Democratic Party.

Nouveau-Québec (administrative region, Canada): *see* Nord-du-Québec.

nouveau roman: *see* antinovel.

Nouvelle Amsterdam, island in the southern Indian Ocean, administratively a part of Terres Australes et Antarctiques Françaises (*q.v.*). An extinct volcano rising to 2,989 feet (911 m) above sea level with an area of 18 square miles (47 square km), it was discovered in 1522 by members of Ferdinand Magellan's crew and named in 1633 by a Dutch explorer, Anthony van Diemen. With the island of Saint-Paul, it was annexed by France in 1843. In 1949 a permanent research and administrative station, Camp Heurtin, was established on the island.

Nouvelle-Calédonie, Territoire de la: *see* New Caledonia.

nouvelle cuisine, eclectic style in international haute cuisine developed during the 1960s and '70s that stressed freshness, lightness, and clarity of flavour. In reaction to some of the richer and more calorie-laden extravagances of classic French haute cuisine, nouvelle cuisine sought to emphasize the natural flavours, textures, and colours of foodstuffs. Acknowledging the unhealthiness of a diet heavy in fats, sugars, refined starches, and salt, it minimized the use of these ingredients.

The basic characteristics of nouvelle cuisine included the use of sauces thickened not by roux (a cooked mixture of flour and fat) but rather by purees of vegetables or fruits; the serving of novel combinations of foods in very small quantities that were artistically arranged on large plates; a return to the importance of purchasing of food; and infinite attention to texture and detail.

Luxury was achieved through meticulous preparation and imaginative presentation and through the liberal use of fresh seasonal fruits and vegetables. Kiwi fruits, raspberries, mangoes, and other fruits were frequently combined with meats and seafood, and fruit-flavoured vinegars were a popular seasoning.

The phrase nouvelle cuisine was coined by the French food critics Christian Millau and Henri Gault to describe the styles created by a group of French chefs, notably Paul Bocuse, Jean and Pierre Troisgros, Michel Guérard, Roger Verge, and Paul Haeberlin.

Nouvelle Revue française, La (NRF), leading French review of literature and the other arts. It was founded in February 1909 (after a false start in November 1908) by a group that included André Gide, Jacques Copeau, and Jean Schlumberger. The *NRF*'s founders wished to emphasize aesthetic issues and to remain independent of any political party or moral or intellectual school. During the period between the two world wars, under the editors Jacques Rivière (1919–25) and Jean Paulhan (1925–40), the *NRF* became France's leading literary journal, publishing works by many notable writers. After the German occupation of France in 1940, Pierre Drieu La Rochelle became editor, and the *NRF* became pro-fascist; it ceased publication in 1943. The review was revived in 1953 as *La Nouvelle Nouvelle Revue française,* under the direction of Paulhan and Marcel Arland; it resumed its original name in 1959. The publishing house Editions Gallimard was established in 1911 as an offshoot of the *NRF.*

nouvelle vague (cinema): *see* New Wave.

Nouvelles-Hébrides (Pacific Ocean islands): *see* Vanuatu.

nova, plural NOVAS, or NOVAE, any of a class of exploding stars whose luminosity temporarily increases from several thousand to as much as 100,000 times its normal level. A nova reaches maximum luminosity within hours after its outburst and may shine intensely for several days or occasionally for a few weeks, after which it slowly returns to its former level of luminosity. Stars that become novas are nearly always too faint before eruption to be seen with the unaided eye. Their sudden increase in luminosity, however, is sometimes great enough to make them readily visible in the nighttime sky. To observers, such objects may appear to be new stars; hence the name nova from the Latin word for "new."

Most novas are thought to occur in double-star systems in which members revolve closely around each other. Both members of such a system, commonly called a close binary star, are aged: one is a red giant and the other a white dwarf. In certain cases, the red giant expands into the gravitational domain of its companion. The gravitational field of the white dwarf is so strong that hydrogen-rich matter from the outer atmosphere of the red giant is pulled onto the smaller star. When a sizable quantity of this material accumulates on the surface of the white dwarf, a nuclear explosion occurs there, causing the ejection of hot surface gases on the order of $^{1}/_{10,000}$ the amount of material in the Sun. According to the prevailing theory, the white dwarf settles down after the explosion; however, the flow of hydrogen-rich material resumes immediately, and the whole process that produced the outburst repeats itself, resulting in another explosion about 1,000 to 10,000 years later. Recent research, however, suggests that such outbursts may recur at much longer intervals—every 100,000 years or so. It is explained that a nova eruption separates the members of the binary system, interrupting the transfer of matter until the two stars move close together again after a considerable length of time. *See also* supernova.

Nova, João da, Spanish JUAN DE NOVA (b. 15th century, Galicia, Spain—d. 1509, Cochin, India), Spanish navigator who in the service of Portugal discovered the islands of Ascension and St. Helena, both off the southwestern coast of Africa.

Commanding a fleet of four ships, Nova left Portugal on a voyage to India in 1501. His crews included Amerigo Vespucci, after whom America was later named. En route he discovered Ascension Island. In India he established a trading post at Cannanore. During his return voyage to Portugal Nova discovered St. Helena.

Returning to India later, Nova favoured the sea captain Francisco de Almeida in a power struggle with Afonso de Albuquerque. Nova remained associated with Almeida, who was made the first viceroy of Portuguese India. The chronicles indicate that on his return to Portugal he became immensely popular.

Nova Cassiopeiae 1572: *see* Tycho's Nova.

Nova Friburgo, city, east-central Rio de Janeiro *estado* ("state"), in eastern Brazil, on the Rio Grande in the Serra de Nova Friburgo, 2,776 feet (846 m) above sea level.

Nova Friburgo has textile mills but is best known as a summer mountain resort built in Swiss Alpine style. It can be reached by railroad and highway from Niterói, southwest, and from Rio de Janeiro, the state capital. Pop. (1991 prelim.) mun., 166,941.

Nova Herculis, also called DQ HERCULIS, one of the brightest novas of the 20th century, discovered Dec. 13, 1934, by the British amateur astronomer J.P.M. Prentice, in the northern constellation Hercules. It reached an apparent visual magnitude of 1.4 and remained visible to the unaided eye for months. At its centre was found an eclipsing binary pair of small stars, revolving around each other with a period of 4 hours and 39 minutes.

Nova Iguaçu, city and northwestern suburb of the city of Rio de Janeiro, Rio de Janeiro state, Brazil. Formerly called Maxambamba, it lies in the Sarapuí River valley, at 85 feet (26 m) above sea level. The city's varied industries include marmalade and orange juice factories, vegetable canneries, and plants manufacturing chemicals and pharmaceutical products. Extensive orange groves are in the agricultural hinterland. The main railroad and highway linking Rio de Janeiro with São Paulo pass nearby. Pop. (2000 prelim.) 915,364.

Nova Lamego (Guinea-Bissau): *see* Gabú.

Nova Lima, city, east-central Minas Gerais *estado* ("state"), Brazil. It lies along the Cristais River at 2,444 feet (745 m) above sea level. Nova Lima was made the seat of a municipality in 1891 and became a city in 1936. It is known for its Mineração Morro Velho ("Old Mountain Mine"), British-owned from 1834 until 1959, when it was sold to a Brazilian concern. The air-cooled shaft, which penetrates 8,501 feet (2,591 m), is one of the deepest in the Americas. The mine accounts for as much as half of Brazil's gold production. Ore crushed at the site is shipped by rail and road to nearby Belo Horizonte, the state capital, and to other neighbouring communities. Pop. (2000 prelim.) 62,951.

Nova Lisboa (Angola): *see* Huambo.

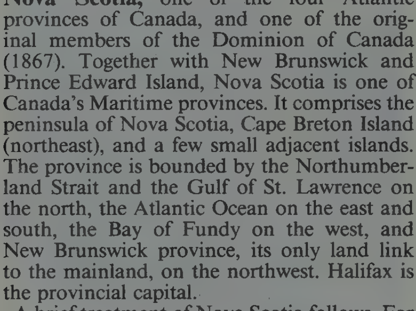
Nova Ophiuchi 1604: *see* Kepler's Nova.

Nova Persei, bright nova that attained an absolute magnitude of −9.2. Spectroscopic observations of the nova, which appeared in 1901, provided important information about interstellar gas. The shell thrown off by the exploding star was unusually asymmetrical, and a bright nebulosity near the star appeared to be expanding incredibly fast, at practically the speed of light. This apparent speed is thought to have been an effect of reflection within a preexisting dark nebula around the star. From this phenomenon, sometimes called a light echo, it was possible to calculate the distance of the nova from Earth, about 650 light-years.

Nova Scotia, one of the four Atlantic provinces of Canada, and one of the original members of the Dominion of Canada (1867). Together with New Brunswick and Prince Edward Island, Nova Scotia is one of Canada's Maritime provinces. It comprises the peninsula of Nova Scotia, Cape Breton Island (northeast), and a few small adjacent islands. The province is bounded by the Northumberland Strait and the Gulf of St. Lawrence on the north, the Atlantic Ocean on the east and south, the Bay of Fundy on the west, and New Brunswick province, its only land link to the mainland, on the northwest. Halifax is the provincial capital.

A brief treatment of Nova Scotia follows. For full treatment, *see* MACROPAEDIA: Canada.

Originally settled by the Micmac Indians, the region was first visited by Norse Vikings about AD 1000 and was sighted in 1497 by John Cabot, who claimed it for England. French settlers arriving in 1605 adopted the Micmac name, Acadie, or Acadia, for the region. Theirs was the first permanent European settlement in North America lying north of Florida. The arrival of English and Scottish colonists after 1621 led to a long conflict between France and England over control of the area, which was awarded to Britain under the terms of the Treaty of Utrecht (1713). The region was renamed Nova Scotia, and in the 1750s the descendants of the first French settlers, who refused to swear loyalty to Britain, were expelled from the colony; many of these Acadians resettled in Louisiana, where they became known as Cajuns. (The Acadians' tragedy was vividly portrayed in *Evangeline,* by the American poet Henry Wadsworth Longfellow.) The province still retains some of the feeling of 17th-century Acadia.



Bay St. Lawrence, a fishing village on Cape Breton Island, Nova Scotia

Bill Brooks/Masterfile

Britain's offers of free land attracted immigrants not only from the British Isles but also from New England. The New Englanders helped secure the first elected assembly in the province, and, by the time of the American Revolution, they constituted roughly one-half of Nova Scotia's population. During the Revolution and afterward, some 35,000 American loyalists (*i.e.,* supporters of British rule) immigrated to the province. Meanwhile, Prince Edward Island had split off from Nova Scotia in 1769, and New Brunswick followed in 1784, though Cape Breton Island was reunited with Nova Scotia in 1820. In 1848 Nova Scotia became the first British colony to exercise the right of government responsible to the people through their elected representatives. Despite opposition, the union of Nova Scotia with Ontario, Quebec, and New Brunswick was carried out in 1867, forming the Dominion of Canada.

Nova Scotia's five upland regions reach a maximum elevation of more than 1,700 feet (520 m) in the Cape Breton Highlands of the northeast. The most important lowlands lie along the Bay of Fundy and the Minas Basin, in the southwest, and along the Northumberland Strait. Almost nine-tenths of Nova Scotia's land area is unsuitable for agriculture, owing either to poor soils or hilly or mountainous terrain. More than 3,000 lakes and hundreds of short streams have been impounded by, or have cut through, the irregularly varied landforms of the province.

Nova Scotia has a modified continental climate with a marked maritime effect along the coasts. The temperature rarely exceeds 88° F (31° C) or falls below 14° F (−10° C) anywhere in the province. Rainfall ranges from 55 inches (1,400 mm) in the south, where fog commonly occurs, to 40 inches (1,000 mm) elsewhere. Forests, consisting mostly of softwoods (balsam, spruce, hemlock, and pine), occupy about four-fifths of the land area.

Both Nova Scotia's past and present are tied closely to the maritime life of fishing, shipbuilding, and transatlantic shipping. In the age of "wood, wind, and water," Nova Scotia was famous for its shipbuilding. In modern times, the export trade—particularly from the port of Halifax, with its container piers—provides an important source of income. Shipyards, a naval dockyard, construction industries, and assembly plants also provide a major source of employment in the Halifax-Dartmouth area. Despite economic setbacks caused by competition with U.S. ports, Halifax seems to be regaining some of the importance that it once had in the days of sail and the West Indies trade.

Fisheries remain a major activity, with lobster, cod, scallops, haddock, and herring being the significant catches. One of North America's largest fish-processing plants is located in Lunenburg. Extensive forestry resources supply the province's pulp and paper mills and numerous sawmills and provide Christmas trees and maple syrup as well. Coal is the leading mined product and provides nearly three-fourths of the province's energy requirement. Salt, barite, anhydrite, and gypsum are other important minerals. The limited farming in Nova Scotia has focused on dairy products, livestock, poultry and egg production, and fruit cultivation. Subsistence living on family farms traditionally characterized the province's agriculture, though more efficient land use and increasing mechanization have reduced the number of farms and made them more productive.

The offshore exploration of oil and natural gas near Sable Island continues, and the continent's first tidal-energy project harnesses the tides of the Bay of Fundy for hydroelectric energy. The province is well served by highways, railways, and airlines, while ferries operate between it and New Brunswick, Prince Edward Island, and the U.S. state of Maine.

Representative government in Nova Scotia was established in 1848, and the province joined Canada in 1867. Since then it has had a unicameral legislative assembly, elected by universal adult suffrage. The premier is the leader of the majority party in the assembly, and he selects and heads the executive cabinet. The lieutenant governor represents the British monarch and is appointed by Canada's governor-general. Judges are appointed by the federal government.

Primary and secondary school through the 12th grade, including technical and vocational, is free and compulsory. Nova Scotia has several universities, including Halifax's Dalhousie University (1818), with the Bedford Institute of Oceanography and a medical research centre that coordinates activities with the city's hospitals.

The cultural inheritances of both the Acadians and British immigrants have been preserved. The Nova Scotia Museum and Parks Canada jointly administer historical sites at the Annapolis Royal Habitation, Fortress Louisbourg, Halifax Citadel, and other sites. Halifax is the home of the Neptune Theatre and the Atlantic Symphony Orchestra. St. Francis Xavier University (1853) in Antigonish offers courses in Celtic studies, and the Gaelic College in St. Ann's, Cape Breton, fosters folk arts such as piping, singing, dancing, and handicrafts. Clan gatherings take place annually at the Gaelic College, and summer festivals are held in many communities. St. Francis Xavier University has attracted international interest with its adult-education programs. Area 21,425 square miles (55,490 square km). Pop. (1999 est.) 940,825.

Nova Sofala (Mozambique): *see* Sofala.

novaculite, very dense, light-coloured, even-textured sedimentary rock, a bedded chert in which microcrystalline silica (silicon dioxide, SiO_2) in the form of quartz predominates over silica in the form of chalcedony. Deposits of novaculite exhibit stratification. The name is applied chiefly to formations in Arkansas, Oklahoma, and Texas. *See also* chert and flint.

Novaës, Guiomar, in full GUIOMAR NOVAËS PINTO (b. Feb. 28, 1896, São João da Boã Vista, Braz.—d. March 7, 1979, São Paulo), Brazilian pianist known especially for her interpretations of works by Frédéric Chopin and Robert Schumann.

After early studies in São Paulo with Luigi Chiafarelli, Novaës was sent by the Brazilian government to the Paris Conservatory, where she took first place in the entrance examinations (1909). There she studied with Isidor Philipp, graduating with a first prize in 1911. Acclaimed at her debuts in Paris (1911), London (1912), and New York City (1915), she enjoyed a concert career of more than 50 years. She championed the works of Brazilian composers, including those of her husband, Octavio Pinto. Her graceful, poetic, and intensely lyrical style is shown to full advantage on only a few of the many recordings she made after the early 1920s.

Novaia Zemlia (Russia): *see* Novaya Zemlya.

Novák, Vítězslav (b. Dec. 5, 1870, Kamenice nad Lipou, Bohemia, Austria-Hungary [now in Czech Republic]—d. July 18, 1949, Skutec, Czech. [now in Czech Republic]), Czech composer, one of the principal proponents of nationalism in Czech music and the teacher of many Czech composers of the 20th century.

Novák studied under Antonín Dvořák at the Prague Conservatory and in 1909 began teaching there. His early works were influenced by German Romantic music, but, after a visit to Moravia, he began to write music that reflected the spirit of his homeland and made use of its folk music. He was also influenced by Claude Debussy and Richard Strauss. His works include four operas, two ballets, and the orchestral works *V Tatrach* ("In the Tatra") and the *Slovakian Suite*. The *De Profundis* for orchestra and the *May Symphony* were written during World War II. He also composed chamber works, songs, and choral works.

Novalis, pseudonym of FRIEDRICH LEOPOLD, BARON (Freiherr) VON HARDENBERG (b. May 2, 1772, Oberwiederstedt, Prussian Saxony [Germany]—d. March 25, 1801, Weissenfels, Saxony [Germany]), early German Romantic poet and theorist who greatly influenced later Romantic thought.

Novalis, detail of an engraving by Edouard Eichens, 1845

By courtesy of the Staatliche Museen zu Berlin, Germany; photograph, Walter Steinkopf

Novalis was born into a family of Protestant Lower Saxon nobility and took his pseudonym from "de Novali," a name his family had formerly used. Young Novalis studied law at the University of Jena (1790), where he became acquainted with Friedrich von Schiller, and then at Leipzig, where he formed a friendship with Friedrich von Schlegel and was introduced to the philosophical ideas of Immanuel Kant and Johann Gottlieb Fichte. He completed his studies at Wittenberg in 1793, and in 1796 he was appointed auditor to the Saxon government saltworks at Weissenfels.

In 1794–95 Novalis fell in love with and was engaged to the 14-year-old Sophie von Kühn. She died of tuberculosis in 1797, however, and Novalis expressed his grief in the beautiful *Hymnen an die Nacht* (1800; *Hymns to the Night*). In these six prose poems interspersed with verse, Novalis celebrates night, or death, as an entry into a higher life in the presence of God and anticipates a mystical and loving union with Sophie and with the universe as a whole after his own death. In 1797 he went to the Academy of Freiberg to study mining. In 1798 Novalis again became engaged (to Julie von Charpentier), and in 1799 he became a mine inspector at the saltworks at Weissenfels, but he died of tuberculosis in 1801 before he could marry.

Novalis' last years were astonishingly creative, filled with encyclopaedic studies, the draft of a philosophical system based on idealism, and his real poetic work. Two collections of fragments that appeared during his lifetime, *Blütenstaub* (1798; "Pollen") and *Glauben und Liebe* (1798; "Faith and Love"), indicate his attempt to unite poetry, philosophy, and science in an allegorical interpretation of the world. His celebrated mythical romance *Heinrich von Ofterdingen* (1802), set in an idealized vision of the European Middle Ages, describes the mystical and romantic searchings of a young poet. The central image of his visions, a blue flower, became a widely recognized symbol of Romantic longing among Novalis' fellow Romantics.

In the essay *Die Christenheit oder Europa* (1799; "Christendom or Europe"), Novalis calls for a universal Christian church to restore, in a new age, a Europe whose medieval cultural, social, and intellectual unity had been destroyed by the Reformation and the Enlightenment.

Novara, Latin NOVARIA, capital of Novara *provincia,* Piemonte (Piedmont) *regione,* northwestern Italy. It lies along the Agogna River, west of Milan. It originated as the Roman colony of Novaria, which was founded by Julius Caesar and destroyed in the 5th century; a new commune, established in the 6th century, was burned by the Holy Roman emperor Henry V in 1110. It recovered to become a member of the Lombard League (an alliance of northern Italian towns) in 1167. Novara was dominated by Milan until it passed to Austria in 1714 and to Savoy in 1738. It was the scene of Austrian victories in 1821 and 1849; in the last battle, the Austrians, under Joseph Radetzky, defeated Piedmontese forces led by Charles Albert, king of Sardinia, leading to the latter's abdication.

The city's notable buildings include the cathedral (rebuilt 1863–69) with an ancient baptistery, the Church of San Gaudenzio (rebuilt 1577–1659), the ruins of a castle of the medieval Sforza family, a civic museum, and a picture gallery.

An important agricultural market, particularly for rice, Novara also has growing industries that include cotton and silk mills, chemical and printing plants, cheese and biscuit (cookie) factories, and the Agostini cartographic and geographic institute. Pop. (1991 prelim.) mun., 102,473.

Novara, Battle of (March 23, 1849), battle of the first Italian War of Independence in which 70,000 Austrian troops under Field Marshal Joseph Radetzky thoroughly defeated 100,000 poorly trained Italian troops (not all of whom were actually employed in the battle) under Charles Albert, king of Sardinia-Piedmont. It was fought at Novara, 28 miles (45 km) west of Milan, 11 days after Charles Albert had denounced the armistice that he had signed the previous August after his defeat at the first Battle of Custoza. This new defeat, a result of Radetzky's military superiority and Piedmont's lack of support from the smaller Italian states, led to a treaty on Aug. 9, 1849, which included an indemnity of 65 million francs to be paid to Austria. The defeat also led to the abdication of Charles Albert in favour of his son Victor Emmanuel II.

Novatian, Latin NOVATIANUS (b. *c.* 200, Rome [Italy]—d. *c.* 258), the second antipope in papal history, in 251. He was the first Roman theologian to write in Latin and inspired the Novatian Schism—a break from the Christian church by rigorists who condemned apostasy. (His name was certainly Novatianus, not Novatus, as given by the Greeks.)

Novatian was ordained at Rome and about 250 became a leader of the Roman clergy, in whose name he wrote two letters to Bishop Cyprian of Carthage concerning the *lapsi*—*i.e.,* those early Christians who renounced their faith during the persecutions. He had shared with Cyprian a moderate attitude toward apostates, but, when Cornelius was elected pope in 251, Novatian became the champion of rigorism. By then he had a high reputation as a learned theologian. While a majority favoured Cornelius as pope, a minority declared itself for Novatian, and he set himself up as antipope. His rigorist doctrine was uncompromising, and, by denying the administration of penance, he refused to admit the *lapsi* into the church. Novatian and his followers were excommunicated at a synod convened by Cornelius in 251.

Although Cyprian and Cornelius joined forces against the Novatianists, the schism developed into a sect that spread across the empire and lasted for several centuries. Despite opposition, Novatian managed to build his own church with his own bishops throughout Christendom. During the persecution of Christians from 251 to 253, he fled Rome. The assertion of the church historian Socrates (d. *c.* 445) that Novatian was martyred about 258 under the Roman emperor Valerian appears confirmed by the inscription "novatiano . . . martyri" found in a cemetery near San Lorenzo, Rome, in 1932.

Novatian's apologetic *De trinitate* ("On the Trinity"), considered to be his most important work, summarizes and defends the orthodox doctrine of the Trinity against contemporary heresies. In *De cibis Judaicis* ("Concerning Jewish Foods"), he points out that dietary laws and other practical prohibitions of the Old Testament must be understood spiritually rather than literally. In *De spectaculis* ("On Spectacles"), he condemns Christians who attend public games, and, in *De bono pudicitiae* ("Concerning the Value of Chastity"), he praises chastity.

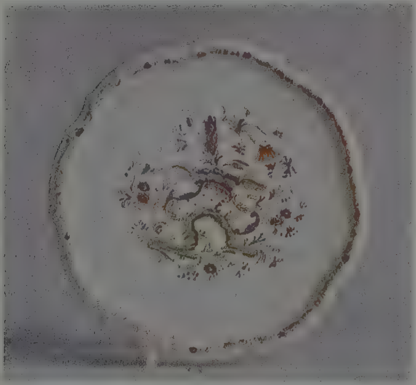
Novato, city, Marin county, western California, U.S. It lies along Novato Creek, between San Pablo Bay (east) and Point Reyes National Seashore (west). The original site was partly on the Rancho de Novato, an 1839 Mexican land grant that occupied most of the Canada de Novato (a valley probably named for a Christianized Indian chief). Francis C. DeLong acquired the land and founded the community in 1888. It remained a small agricultural village until 1935, when Hamilton Field (now Hamilton Air Force Base) was established there. Postwar development has been mainly residential, the chief industry being the large McGraw-Hill Book Distribution Center. Inc. 1960. Pop. (1991 est.) 48,576.

Novaya Zemlya, also spelled NOVAIA ZEMLIA, archipelago in northwestern Russia, lying in the Arctic Ocean and separating the Barents and Kara seas.

Novaya Zemlya ("New Land") consists of two large islands, Severny (northern) and Yuzhny (southern), aligned for 600 miles (1,000 km) in a southwest-northeast direction, plus several smaller islands. The two major islands are separated by a narrow strait, Matochkin Shar, only about 1 to 1.5 miles (1.6 to 2.4 km) wide. The most southerly point, the island of Kusova Zemlya, is separated from Vaygach Island and the mainland by the Kara Strait. The island group has an area of 31,900 square miles (82,600 square km).

Novaya Zemlya, a continuation of the Ural Mountains system, is for the most part mountainous, though the southern portion of Yuzhny Island is merely hilly. The mountains, which rise at most to 5,220 feet (1,590 m), consist of igneous and sedimentary materials, including limestones and slates. More than one-quarter of the land area, especially in the north, is permanently covered by ice, and most of the northern island, as well as part of the southern, lies in the zone of Arctic desert. The climate is severe, and temperature varies from 3° to −8° F (−16° to −22° C) in winter to 36° to 44° F (2° to 7° C) in summer. There are frequent fogs and strong winds. The vegetation in those portions of the islands free from ice is predominantly low-lying tundra, with much swamp, though low bushes are found in sheltered valleys. Lemmings, Arctic foxes, seals, walruses, and occasionally polar bears are found on Novaya Zemlya; a rich bird life abounds in summer. Novaya Zemlya has been known since at least medieval times, though it was not explored until the 18th and 19th centuries. Pop. (latest est.) 400.

Nove ware, primarily majolica, or tin-glazed earthenware, made in Nove, Italy, in the 18th century. The factory was founded by Giovanni Battista Antonibon in 1728, and in the latter part of the century it had connections with a factory in nearby Bassano, where majolica had been made two centuries earlier.



Nove majolica plate, *c.* 1750; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

Most Nove ware was in the prevalent Rococo style. From 1752 the factory also produced a porcelain painted with deep reds and yellowish greens. Nove also produced a fine-quality cream-coloured earthenware (*terra inglese*).

Novecento movement, group of Italian artists, formed in 1922 in Milan, that advocated a return to the great Italian representational art of the past. The nationalism of the Novecento (20th-century) movement led to a commitment to fascism. Members included the sculptors Marino Marini and Arturo Martini and the painters Ottone Rosai, Massimo Campigli, Carlo Carrà, Mario Sironi, and Felice Casorati.

novel, an invented prose narrative of considerable length and a certain complexity that deals imaginatively with human experience usually through a connected sequence of events involving a group of persons in a specific setting. Within its broad framework, the genre of the novel has encompassed an extensive range of types and styles: picaresque, epistolary, Gothic, romantic, realist, historical—to name only some of the more important ones.

A brief treatment of the novel follows. For full treatment, *see* MACROPAEDIA: Literature, The Art of.

Although forerunners of the genre are to be found in a number of places, including classical Rome, 11th-century Japan, and Elizabethan England, the European novel is usually said to have begun with the *Don Quixote* of Miguel de Cervantes (part I, 1605). In its juxtaposition of impossible idealism and earthy practicality in the figures of the knight and his squire, this work adumbrates what was to become one of the central concerns of the Western novel, just as its playful exploitation of the authorial *persona* anticipates many of the technical questions raised by later novelists.

Despite some interesting works in 17th-century France, it was in England that the genre first took permanent root. Daniel Defoe, Samuel Richardson, and Henry Fielding were all writing in the first half of the 18th century, and their works did much to establish the novel as the most popular literary form in England. This popularity soon became a general phenomenon, leading in the 19th century to an extraordinary surge of fiction writing, particularly in Britain, France, Russia, and the United States.

A partial explanation of the novel's popularity is to be found in the scope it gave writers to explore areas of human experience that had previously lain outside the province of literature. For the first time, the minutiae of daily life became a fit subject for the writer's attention. The heroes and heroines of this new genre were as likely to be servants as courtiers. Their lives did not have to display preeminent virtue or vice; there needed be nothing epic in their destinies. Inevitably, this shift in emphasis was helped or hindered by the social and historical context in any given country.

When all the exceptions have been counted, however, it remains the case that the mainstream of the European novel has based its appeal on the claim to provide a more faithful image of everyday reality than can be achieved by any other literary form. Even the extravagant fantasies of the Gothic novel or the modern novel of science fiction depend for their impact on the detailed rendering of surface reality. The history of the novel is in part a history of the changes in conventions established to achieve this verisimilitude. Perhaps because of the novel's realist bias, its greatest period is usually held to be the mid- to late-19th century, a time when improved literacy rates had increased the size of the potential audience and the modern mass media had not yet arrived to diminish it. Across this period and just before, Charles Dickens, William Makepeace Thackeray, and George Eliot were writing in England; Honoré de Balzac, Gustave Flaubert, and Émile Zola in France; Ivan Turgenev, Leo Tolstoy, and Fyodor Dostoyevsky in Russia; and Nathaniel Hawthorne and Herman Melville in the United States.

With the coming of the 20th century the novel began to change somewhat in character. The old certainty that experience could be adequately represented by the language and structures of the conventional novel was increasingly called into question. Writers such as James Joyce, Virginia Woolf, and Dorothy Richardson began to examine the ways in which reality eluded the grasp of literature. In trying to capture the complex and fragmentary quality of experience, some of these writers stretched the limits of the conventional novel to a point at which it became more and more remote from the expectations—and sometimes the comprehension or interest—of the average reader, a process that perhaps culminated in the mid-20th century in the so-called antinovel, or *nouveau roman.* These modernist experiments sometimes produced works of outstanding interest, but they also tended to widen the gap between the popular and the "literary" novel.

novel of sensibility: *see* sentimental novel.

novella, short and well-structured narrative, realistic and satiric in tone, that influenced the development of the short story and the novel throughout Europe. Originating in Italy during the European Middle Ages, the novella was based on local events, humorous, political, or amorous in nature; the individual tales often were gathered into collections along with anecdotes, legends, and romantic tales. Writers such as Giovanni Boccaccio, Franco Sacchetti, and Matteo Bandello later developed the novella into a psychologically subtle and highly structured short tale, often using a frame story to unify the tales around a common theme.

Geoffrey Chaucer introduced the novella to England with the *Canterbury Tales.* During the Elizabethan period, William Shakespeare and other playwrights extracted dramatic plots from the Italian novella. The realistic content and form of these tales influenced the development of the English novel in the 18th century and the short story in the 19th century.

In Germany, where it is known as the *Novelle,* the novella flourished in the 18th, 19th, and early 20th centuries in the works of writers such as Heinrich von Kleist, Gerhart Hauptmann, J.W. von Goethe, Thomas Mann, and Franz Kafka. As in Boccaccio's *Decameron,* the prototype of the form, German *Novellen* are often encompassed within a frame story based on a striking news item (plague, war, or flood), either real or imaginary. The individual tales are related by various reporter-narrators to divert the audience from the misfortune they are experiencing. Characterized by brevity, self-contained plots that end on a note of irony, a literate and facile style, restraint of emotion, and objective rather than subjective presentation, these tales were a major stimulant to the development of the modern short story in Germany. The *Novelle* also survived as a unique form, although unity of mood and style often replaced the traditional unity of action; the importance of the frame was diminished as was the necessity for maintaining absolute objectivity.

Sometimes "novella" is used interchangeably with "short novel," or "novelette," to describe a prose form longer than a short story but shorter than a full-length novel.

Novello, Ivor, original name DAVID IVOR DAVIES (b. Jan. 15, 1893, Cardiff, Glamorganshire, Wales—d. March 6, 1951, London, Eng.), Welsh actor-manager, composer, and playwright, best known for his lush, sentimental, romantic musicals.

Novello, the son of the celebrated Welsh singing teacher, Dame Clara Novello Davies, was educated at Magdalen College, Oxford, and served with the Royal Naval Air Service during World War I. He became famous with a phenomenally successful patriotic wartime song, "Keep the Home Fires Burning" (1915). After he was demobilized in 1919, he accepted a motion-picture role in *The Call of the Blood,* and he acted in several other motion pictures throughout his career. His real love, however, was the theatre.

He first appeared on stage in 1921, and he presented his first play, *The Rat* (written with Constance Collier), in 1924. Though he was not an extraordinary actor, his many talents and winning personality made him a great popular success. Thereafter he wrote, produced, and acted in such successful comedies as *The Truth Game* (performed 1928), *A Symphony in Two Flats* (performed 1929), *Party* (performed 1932), and *Fresh Fields* (performed 1934). He was best known, however, for his Ruritanian musicals, especially *Glamorous Night* (performed 1935), *Careless Rapture* (performed 1936), *The Dancing Years* (performed 1939), *Perchance to Dream* (performed 1945), and *King's Rhapsody* (performed 1949)—all with lyrics by Christopher Hassall.

Novello, Vincent (b. Sept. 6, 1781, London, Eng.—d. Aug. 9, 1861, Nice, Fr.), English composer, conductor, and founder of the Novello music publishing house.

From 1797 to 1822 Novello was organist at the Portuguese embassy chapel, where he directed the first English performances of masses by Joseph Haydn and W.A. Mozart. In 1812 he became pianist and conductor at the Italian Opera, London. From 1840 to 1843 he was organist at the Roman Catholic chapel at Moorfields, London. A founder of the Philharmonic Society, he had a distinguished circle of friends, including the Lambs, Leigh Hunt, P.B. Shelley, and John Keats. Although Novello was a prolific composer, his work as an editor and publisher was more significant. His *Collection of Sacred Music* (1811) marks the founding of the publishing house of Novello. He retired to Nice in 1849.

His daughter Clara Anastasia Novello (1818–1908) was one of the most famous sopranos of her time. His son Joseph Alfred Novello

(1810–96) began a career as a bass singer but in 1829 became active in the publishing house, developing the business greatly and introducing inexpensive editions of large-scale choral works to England.

November, 11th month of the Gregorian calendar. *See* month.

November Insurrection (1830–31), Polish rebellion that unsuccessfully tried to overthrow Russian rule in the Congress Kingdom of Poland as well as in the Polish provinces of western Russia.

When a revolution broke out in Paris (July 1830) and the Russian emperor Nicholas I indicated his intention of using the Polish Army to suppress it, a Polish secret society of infantry cadets staged an uprising in Warsaw (Nov. 29, 1830). Although the cadets and their civilian supporters failed to assassinate the Emperor's brother Grand Duke Constantine (who was commander in chief of the armed forces in Poland) or to capture the barracks of the Russian cavalry, they did manage to seize weapons from the arsenal, arm the city's civilian population, and gain control of the northern section of Warsaw.

The insurgents' partial success was aided by the Grand Duke's reluctance to take action against them and his eagerness to retreat to safety. But lacking definite plans, unity of purpose, and decisive leadership, the rebels lost control of the situation to moderate political figures, who restored order in the city and futilely hoped to negotiate with Nicholas for political concessions. Although the rebellion gained widespread support and its new leaders formally deposed Nicholas as king of Poland (Jan. 25, 1831), the conservative military commanders were unprepared when Nicholas' army of 115,000 troops moved in (Feb. 5–6, 1831). The Polish Army of 40,000 offered strong resistance at several battles, but it was unable to stop the Russian advance toward Warsaw until February 25, when it fought a major but indecisive battle at Grochów.

The Russians then settled into winter camps, and uprisings sympathetic to the Poles broke out in Russian-controlled Lithuania, Belorussia, and the Ukraine (spring 1831). Nevertheless, the Polish commanders hesitated to strike and then quickly retreated. Furthermore, the divided political leaders not only refused to pass reforms to win the support of the peasantry but also failed to gain the foreign aid that the generals were depending on.

As a consequence, the rebellion lost its impetus, particularly after a major Russian victory at Ostrołęka on May 26, 1831. The uprisings in the western Russian provinces were crushed, and people in the cities began losing confidence in the revolution's leaders. When the Russians finally attacked Warsaw on September 6, the Polish Army withdrew to the north two days later. Leaving the territory of Congress Poland, which subsequently fell under stricter and more repressive Russian control, the Poles crossed the border into Prussia (October 5) and surrendered, thus ending the November Insurrection.

Novembergruppe, English NOVEMBER GROUP, group of artists formed in Berlin in November 1918 by Max Pechstein and César Klein. Taking its name from the month of the Weimar Revolution, this group of Expressionist artists hoped to bring about a new unity in painting, sculpture, architecture, crafts, and city planning, and to bring the artist into close contact with the worker. In an attempt to reach the working masses, the Novembergruppe established Workers' Councils for Art in 1919; support, however, came from the middle classes who, with greater education and more leisure time, more readily accepted this radical, intellectual group and their new (and often abstract) art forms. Among the leading artists associated with the Novembergruppe were the architects Walter Gropius, Erich Mendelsohn, Ludwig Mies van der Rohe, Hans Poelzig, and Bruno Taut; the painters El Lissitzky, Lyonel Feininger, Otto Müller, and Heinrich Campendonck; the sculptors Gerhard Marcks, László Moholy-Nagy, and Rudolf Belling; the filmmakers Hans Richter and Viking Eggeling; the composers Alban Berg, Paul Hindemith, and Kurt Weill; and the dramatist Bertolt Brecht.

The most important activity of the Novembergruppe consisted of public exhibitions (held through the 1920s); but it also sponsored lectures and avant-garde concerts and film presentations. The group's support of Socialism and its ideal of unification of the arts were common concerns of this period and the goals of other organizations as well, notably of the Weimar Bauhaus, established in 1919 by Walter Gropius (*see* Bauhaus).

Noventa y Ocho, Generación del (Spanish literature): *see* '98, Generation of.

Noverre, Jean-Georges (b. April 29, 1727, Paris—d. Oct. 19, 1810, Saint-Germain-en-Laye, Fr.), distinguished French choreographer whose revolutionary treatise, *Lettres sur la danse et sur les ballets* (1760), still valid, brought about major reforms in ballet production, stressing the importance of dramatic motivation, which he called ballet d'action, and decrying overemphasis on technical virtuosity. His first choreographic success, *Les Fêtes chinoises* (1754), attracted the attention of David Garrick, who presented it in London in 1755. After producing such masterpieces as *Medée et Jason* and *Psyché et l'Amour* (at Stuttgart, 1760–67), he was appointed ballet master at the Paris Opéra in 1776.

Novgorod, *oblast* (province), northwestern Russia, occupying an area of 21,300 square miles (55,300 square km) and extending across the morainic Valdai Hills, which rise to 971 ft (296 m); the lowland basins of Lake Ilmen lie to the west and of the upper Volga River to the east. Much of the *oblast*'s terrain is in swamp of peat bog or reed and grass marsh, with innumerable small lakes. The remainder (about 60 percent) is mostly in mixed forest of spruce, oak, pine, and birch, and soils are usually infertile. Agriculture is poorly developed, with under one-tenth of the area plowed. Dairying, especially to supply the Leningrad market, is the principal activity, with some cultivation of flax, rye, oats, and potatoes. Since 1870, much swamp has been drained for pasture and improved forest. Much peat is cut for fuel. Machine-building, metalworking, chemical, and food-processing industries have been developed. Aside from Borovichi, Staraya Russa, and the *oblast* headquarters, Novgorod city, settlements are small and engaged in processing timber and flax. Pop. (1991 est.) 754,600.

Novgorod, city and administrative centre of Novgorod *oblast* (province), northwestern Russia, on the Volkhov River just below its outflow from Lake Ilmen. Novgorod is one of the oldest Russian cities, first mentioned in chronicles of 859. In 882 Oleg, prince of Novgorod, captured Kiev and moved his capital there. In 989, under Vladimir, Novgorod's inhabitants were forcibly baptized. In 1019 Prince Yaroslav I the Wise of Kiev granted the town a charter of self-government; the town assembly, or *veche,* elected their prince, chiefly as a military commander. After 1270 the *veche* elected only a burgomaster, and sovereignty resided in the town itself, which was styled Lord Novgorod the Great. The town was divided into five ends, each with its own assembly and each responsible for one-fifth of Novgorod's extensive territorial possessions. It flourished as one of the greatest trading centres of eastern Europe, with links by river routes to the Baltic, Byzantium, Central Asia, and all parts of European Russia. Trade with the Hanseatic League was considerable since Novgorod was the limit of Hanseatic trade into Russia. Prosperity was based upon furs obtained in the forests of northern Russia, much of which came under Novgorod's control. "Daughter" towns were founded by Novgorod in the 12th century at Vologda and Vyatka.

Monument in the kremlin at Novgorod city, Russia, commemorating the 1,000th anniversary of Russia (1862), designed by M.O. Mikeshin

Shostal

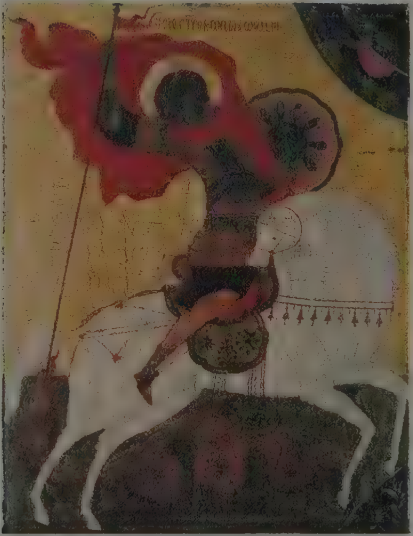
During the 12th century, Novgorod was engaged in prolonged struggles with the princes of Suzdal and gained victories in 1169 and 1216. Although the town avoided destruction in the great Tatar invasion of 1238–40, Tatar suzerainty was acknowledged. Under Alexander Nevsky, prince of Vladimir, Novgorod's defenders repulsed attacks by the Swedes on the Neva River in 1240 and by the Teutonic Knights on the ice of Lake Peipus in 1242. During the 14th and 15th centuries, Novgorod was involved in a long, bitter struggle for supremacy with Moscow and frequently sought help from Lithuania. Although the city survived Muscovite onslaughts in 1332 and again in 1386 by Dmitry Donskoy, it was defeated by Vasily II in 1456. It continued to oppose Moscow and again sought Lithuanian assistance, but in 1471 Ivan III the Great defeated Novgorod and annexed much of its northern territories, finally forcing the city to recognize Moscow's sovereignty in 1478. Opposition by its citizens to Moscow continued until Ivan IV the Terrible in 1570 massacred many of them and deported the survivors. In 1611 Novgorod was captured by the Swedes, who held it for eight years. From the reign (1682–1725) of Peter I the Great, the city declined in importance, although it was made a provincial seat in 1727.

During World War II, the city suffered heavy damage, but the many historic buildings were subsequently restored. These include the kremlin on the Volkhov left bank (the Sofiyskaya Storona). It was first built of wood in 1044, and its first stone walls date from the 14th century. Within the kremlin, the St. Sofia Cathedral, built in 1045–50 on the site of an earlier wooden church, is one of the finest examples of early Russian architecture, with magnificent bronze doors from the 12th century. From the 15th century date the Granite Palace (1433), the bell tower (1443), and the St. Sergey Chapel. The Chapel of St. Andrew Stratilata was built in the 17th century. Across the Volkhov (the Torgovaya Storona) stands the Cathedral of St. Nicholas, dating from 1113. In and around Novgorod are many other surviving churches, including the 12th-century cathedrals of the Nativity of Our Lady and of St. George, the 14th-century churches of the Transfiguration and of St. Theodore Stratilata, and the 17th-century Znamensky Cathedral.

Modern Novgorod is important as a tourist centre and as a major producer of chemical fertilizers. It also has radio and woodworking industries. Pop. (1993 est.) 234,400.

Novgorod, Treaty of (June 3, 1326), the peace treaty ending decades of Russo-Norwegian hostilities in the extreme northern area of present-day Norway and Russia's Kola Peninsula—then generally known as Finnmark (including the present Norwegian province of Finnmark). The treaty, rather than delimiting a clear frontier between Norway and the principality of Novgorod, created a buffer zone, the "common districts." Nominally under Norwegian sovereignty, the buffer zone offered Norwegians, Swedes, Finns, and Russians taxing rights over the indigenous Lapps and freedom to exploit the fish and fur of the region. This arrangement remained in effect until the present Norwegian-Russian frontier was established in 1826.

Novgorod school, important school of Russian medieval icon and mural painting that flourished around the northwestern city of Novgorod from the 12th through the 16th century. A thriving merchant city, Novgorod was the cultural centre of Russia during the Mongol occupation of most of the rest of the country in the 13th and 14th centuries. During that period it preserved the Byzantine traditions that formed the basis of Russian art and at the same time fostered the development of a distinct and vital local style, a style which, though provincial, contained most of the elements of the national Russian art that eventually developed in Moscow in the 16th century.



"Miracle of St. George over the Dragon," icon by an anonymous artist of the Novgorod school, egg tempera on panel, beginning of the 15th century; in the State Tretyakov Gallery, Moscow, I.A. Ostroukhov Collection

Novosti Press Agency

The first important phase of the Novgorod school lasted through the 12th century and the first half of the 13th, a period during which the Byzantine tradition spread from southern Kiev, the first capital and cultural centre of Russia, to the northern centres of Novgorod and Vladimir-Suzdal. In this period fresco painting was the dominant art form. In the second half of the 12th century the hieratic, aristocratic artistic tradition of Kiev was abandoned in favour of a more informal approach that combined Byzantine severity of style with a tenderness of gesture and an anecdotal picturesqueness. This spirit was matched in the beginning of the 13th century by a shift toward lighter, brighter colours and flatter forms, a softening of facial types, and an increasing definition of form by means of a graceful, rhythmic line. The progressive importance of line over modeled form in Novgorod painting brought about a gradual change in the Byzantine image. Strongly modeled Byzantine figures were characterized by a direct and penetrating gaze that in turn engaged that of the viewer. But as the predominance of line flattened the figures and faces in Novgorod painting, the direct gaze receded into a dreamy, abstracted, introspective look. In addition, the line invited a contemplation of its abstract patterns; Novgorod painting began to emphasize the lyricism of these patterns rather than the immediate presence of the figures.

In the early 14th century, a new artistic impetus was provided by the introduction of the iconostasis, a screen standing before the sanctuary on which icons, formerly scattered over the walls of the church, could be hung in a prescribed arrangement. The stylistic tendencies of the previous period of artistic activity, which had been dominated by fresco painting, were brought to bear on the visual problems created by the iconostasis and coalesced into a definitive Novgorod style. The complex of paintings on the iconostasis demanded a coherent overall impression. This overall effect was achieved through the use of strong, rhythmic lines and colour harmonies in each icon. Novgorod painters used jewellike juxtapositions of brilliant yet delicately balanced colours, dominated by yellow, emerald green, and fiery vermilion. The silhouette became all-important, as did the line, which assumed unprecedented grace with an elongation of the figure that became standard in Russian art. A number of Greek artists who arrived from Constantinople at the end of the 14th century brought a more varied subject matter to the Novgorod school and introduced the use of more complex architectural backgrounds. The most influential of these Byzantine immigrants was a mural painter, Theophanes the Greek. Theophanes contributed a greater understanding of the human form and a subtler use of colour and design to later Novgorod painting.

At the end of the 15th century Novgorod painting became somewhat repetitive, and, although works of outstanding quality continued to be produced, they lacked the freshness of the earlier paintings. The leadership in Russian painting passed in the 16th century to the more cosmopolitan art of the Moscow school (*q.v.*), and the final dissolution of the Novgorod school came with the forcible transfer of Novgorod artists to Moscow after a fire in the capital in 1547.

Novhorod-Siverskyy, Russian NOVGOROD-SEVERSKY, also spelled NOVGOROD-SEVERSKIJ, city, Chernihiv *oblast* (province), northern Ukraine. The city, now a tourist centre, is believed to date from the early 11th century. From 1098 it was the capital of Novhorod-Siverskyy principality, which defended the Russian nation from incursions by nomadic tribes from the steppe regions. There are many old buildings in the city, including the 17th-century Cathedral of the Assumption and the Monastery of the Transfiguration. Pop. (1991 est.) 15,600.

Novi Ligure, town, Alessandria *provincia,* Piedmont *regione,* northwestern Italy, north of Genoa. A free commune until 1192, it then fell successively to Tortona and Milan before passing to Genoa in 1447. It was the scene of an Austro-Russian army's defeat of the French in 1799. Novi Ligure is now an important rail and road junction with iron and steel, food, and textile industries. Pop. (1993 est.) mun., 29,653.

Novi Pazar, town, southern Serbia, Yugoslavia. It lies in the Raška River valley, in rough and hilly country near the site of Ras, which was the capital city of the medieval Serbian state in the 12th–14th century. In the vicinity are Roman baths, and the Church of St. Peter, one of the oldest in Yugoslavia (7th or 8th century), is an interesting example of early Slav architecture. A few miles west is the Monastery of Sopoćani, built in 1260. Its vast frescoes, done before 1264–65 and painted in the Byzantine manner, portraying the Gospels, are considered by many to be the finest in Europe from this period.

The town of Novi Pazar ("New Bazaar") was rebuilt by the Ottoman Turks after their conquest of the Balkans in the 15th century. It became an important market town and was the administrative centre of a Turkish military district. The Altum Alem Mosque (16th century) dates from the Ottoman period, as does an 18th-century caravansary on the town's main square.

Novi Pazar began to decline in the 18th century and was burned three times by the Serbs in the 19th century. After the Balkan Wars of 1912–13 it was ceded to Serbia. Agricultural trade is now the main economic activity, and industrial development since 1945 has centred on textiles. More than four-fifths of the inhabitants are Muslims. Pop. (1991) 51,749.

Novi Sad, German NEUSATZ, Hungarian ÚJVIDÉK, city and administrative capital of the ethnically mixed autonomous region of Vojvodina, Serbia, Yugoslavia. It is a transit port on the heavily trafficked Danube River northwest of Belgrade and is also situated on the Belgrade-Budapest rail line. The Bačka canal system connects with the Danube at Novi Sad, which is the economic and cultural focus for northern Vojvodina. The ethnic diversity of the region is exemplified by Radio Novi Sad, which broadcasts in Serbo-Croatian, Hungarian, Slovakian, Romanian, and Ruthenian.

Novi Sad, Yugos.

Salmer—Plessner International

Before the 18th century Novi Sad was a small fishing village called Petrovaradinski šanac ("Petrovaradin Ditch"). In the south bend of the Danube is the Serb Petrovaradin Fortress, which was rebuilt by the Austrians into the present huge structure after 1699 as part of the military frontier with the Ottoman Empire. During the period of Turkish rule of Serbia south of the Danube, Novi Sad became a centre of Serbian culture in Austrian lands, especially after the Serbian literary society Matica Srpska was founded there in 1826.

Novi Sad is the nucleus for Vojvodina's productive agricultural region, and the city hosts an annual international agricultural fair. The city's industrial development includes food processing, milling, textiles, chinaware, soap, oils, electrical apparatus, and dental equipment. A major petroleum refinery at Novi Sad, until 1978 supplied by river, began to receive oil in that year from Nadrljan via a 53-mile (86-kilometre) pipeline. The city's cultural centres include a university (1960), an art academy, a Serbian National Theatre (1861), and museums. Pop. (1991) 178,896.

Novial, artificial language constructed in 1928 by the Danish philologist Otto Jespersen, intended for use as an international auxiliary language, but little used today. Its grammar is similar in type to that of Esperanto or Ido. Novial has one definite article, no gender for nouns except those denoting persons, noun plurals in *-s,* forms for a possessive (genitive) and an objective (accusative) case (although these need not be used), adjectives with uninflected form, and verbs that are not inflected for person or number. The chief difference between Novial and Esperanto or Ido is the former's much larger use of Germanic word roots and grammatical structures (such as auxiliary verbs *sal* "shall, will," *vud* "would," *ha, had* "have, had," and *tu* "to" to mark the infinitive of the verb: *tu perda* "to lose").

Novikov, Nikolay Ivanovich (b. April 27 [May 8, New Style], 1744, Bronnitsky, near Moscow, Russia—d. July 31 [Aug. 12], 1818, Bronnitsky), Russian writer, philanthropist, and Freemason whose activities were intended to raise the educational and cultural level of the Russian people and included the production of social satires as well as the founding of schools and libraries. Influenced by Freemasonry, Novikov converted his journals and his ambitious publishing enterprise into vehicles of freethinking and even criticized Empress Catherine II the Great. She suspended publication of his journals and had him arrested in 1792. He was released by Emperor Paul in 1796 but was forbidden to resume his journalistic activities.

Novo Hamburgo, city, eastern Rio Grande do Sul *estado* ("state"), southern Brazil. It was founded by Germans in 1927 and named for Hamburg, Germany. Novo Hamburgo lies at 115 feet (35 m) above sea level. An industrial city, it manufactures shoes, hides, and leather from the cattle and hogs raised in the surrounding area. It is linked by rail and road to Pôrto Alegre, the state capital, which lies to the south. Pop. (1991 prelim.) 199,479.

Novo-Mariinsk (Russia): *see* Anadyr.

Novo Mesto, city, southern Slovenia, on the Krka River. Novo Mesto was founded in 1365 by Rudolf IV of Austria and became an important military base on the Ottoman frontier in the 15th century. Though ravaged twice by fire (1576 and 1664) and once by plague (1599), Novo Mesto developed into an important regional centre. The modern city has a hydroelectric power plant as well as textile, automobile, and chemical-pharmaceutical industries. Uranium deposits have been discovered nearby. Pop. (1992 est.) 22,760.

Novocherkassk, also spelled NOVOČERKASSK, city, Rostov *oblast* (province), southwestern Russia. It lies at the confluence of the Tuzlov and the Aksay rivers. The original 16th-century town of Starocherkasskaya stood along the Don River, but it was frequently inundated and was moved to its present site in 1805. Novocherkassk long served as the capital of the Don Cossack region and was a centre of opposition to the Bolsheviks in 1917–20 during the Russian Civil War. Modern Novocherkassk produces electric locomotives, mining machinery, machine tools, and chemicals for plastics and synthetic fibres. The city has numerous institutions of higher education and research. Pop. (1993 est.) 188,000.

Novohrad-Volynskyy, Russian NOVOGRAD-VOLYNSKY, also spelled NOVOGRAD-VOLYNSKIJ, city, Zhytomyr *oblast* (province), western Ukraine. It lies at the confluence of the Sluch and Smilka rivers. Documents first record the existence of the town in 1257. It was incorporated in 1795, before which it was known as Zvyagel. It contains the ruins of a 14th-century castle. Today the city has machine-building and woodworking industries. Pop. (1991 est.) 56,100.

Novokuybyshevsk, also spelled NOVOKUJBYŠEVSK, or NOVOKUIBYSHEVSK, city, Samara *oblast* (province), western Russia, near the Volga River. It was founded in 1948 in connection with the development of the oil industry and received city status in 1952. Novokuybyshevsk is situated amid the Volga-Urals oil field and has oil refining, petrochemicals, and associated industries. Synthetic alcohol, synthetic rubber, and plastics are also manufactured. Pop. (1993 est.) 115,600.

Novokuznetsk, also spelled NOVOKUZNECK, formerly KUZNETSK, (1931–32) NOVOKUZNETSK, or (1932–61) STALINSK, city, Kemerovo *oblast* (province), south-central Russia. The city lies along the Tom River just below its confluence with the Kondoma, in the Kuznetsk Coal Basin. Originally the small village of Kuznetsk, founded in 1617, stood on the river's right bank; it had about 4,000 inhabitants in 1926. In 1929, under the Soviet First Five-Year Plan, an ironworks was founded on the opposite bank; around the works a new town grew up, renamed Stalinsk in 1932. Development was extremely rapid, and the fully integrated iron plant became one of the largest in the Soviet Union. A second such plant was built in 1960–68. In 1961 the city was renamed Novokuznetsk. In addition to iron and steel, it produces ferroalloys and aluminum. There is also a chemical industry, using by-products. The city's principal heavy-engineering products are mining machinery and bridge girders. Large-scale coal mining is also carried on near the city. Novokuznetsk has metallurgical and teacher-training institutes. Pop. (1993 est.) 597,500.

Akademgorodok, a science centre, near Novosibirsk city in Novosibirsk *oblast,* Russia

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Novomoskovsk, formerly (until 1934) BOBRIKI, or (1934–61) STALINOGORSK, city, Tula *oblast* (province), western Russia, situated on the upper Don River. Founded in 1930 as Bobriki, the town developed as a major chemical centre, making fertilizers and plastics and mining lignite (brown coal). Pop. (1993 est.) 145,000.

Novomoskovsk, city, Dnipropetrovsk *oblast* (province), east-central Ukraine. The city lies along the Samara River a few miles above its confluence with the Dnieper River, and on the Kharkiv-Dnipropetrovsk railway and the Moscow-Crimea highway. The settlement of Samarchik, or Novoselitsa, dating from 1650, was resited there in 1784 and renamed Novomoskovsk. The modern city produces metal pipes, railroad ties, and furniture. The major historical landmark is an 18th-century cathedral. Pop. (1991 est.) 76,600.

Novorossiysk, also spelled NOVOROSSIJSK, or NOVORSSIISK, city, Krasnodar *kray* (region), southwestern Russia. It lies at the head of Tsemes Bay on the northeastern coast of the Black Sea. Founded as a fortress in 1838, it developed as a seaport, especially after the coming of the railway in 1888. In pre-Revolutionary days Novorossiysk was the largest grain-exporting port of Russia after Odessa. It is still a major Russian port on the Black Sea, with a naval base, shipbuilding yards, a refrigeration plant, grain elevators, and an oil-pipeline terminal. Novorossiysk is now one of the largest producers of cement in Russia. Pop. (1993 est.) 191,600.

Novoshakhtinsk, also spelled NOVOŠACHTINSK, city, Rostov *oblast* (province), southwestern Russia, on the Maly Nesvetay River. It developed as a major anthracite coal-mining centre, achieving city status in 1939. The city's dependence on the coal industry, which suffered as oil and natural gas increased in importance as fuels in the 1960s, led to a slight decline in its population between the 1959 and 1970 censuses after it had doubled in size between 1939 and 1959. Pop. (1993 est.) 107,200.

Novosibirsk, *oblast* (province), south-central Russia, in western Siberia. It lies across an extremely level plain known as the Baraba Steppe in the north and Kulunda Steppe in the south, most of which is exceptionally swampy, with many lakes. The *oblast* is drained by the Ob River and by tributaries of the Irtysh River. Lake Chany, which has no outlet, is a basin of inland drainage. The swampy forest, or taiga, of the north gives way southward to forest-steppe of birch groves and finally to true steppe on fertile soils.

Apart from the city of Novosibirsk, which is the economic and cultural capital of an area of Siberia that is vastly wider than the limits of the *oblast,* the towns are small, and the economy is almost wholly agricultural. In the north, wheat, rye, and flax are grown, while in the more fertile south, which is largely cultivated, spring wheat, oats, barley, and sunflowers predominate. Dairying is dominant in the swampy Baraba Steppe, which has been partly reclaimed. Fishing is important in the Lake Chany region. Area 68,000 square miles (178,200 square km). Pop. (2000 est.) 2,744,000.

Novosibirsk, city, administrative centre of Novosibirsk *oblast* (province) and the chief city of western Siberia, in south-central Russia. It lies along the Ob River where the latter is crossed by the Trans-Siberian Railroad. It developed after the village of Krivoshchekovo on the left bank was chosen as the crossing point of the Ob for the Trans-Siberian Railroad in 1893. The settlement was known variously as Gusevka or Aleksandrovsky, but in 1895 it was renamed Novonikolayevsky in honour of the accession of Tsar Nicholas II. The bridge was completed in 1897, and in 1903 town status was conferred.

Opera and ballet theatre, Novosibirsk, Russia
Sovfoto

The continued development of the town was based chiefly on its proximity to the Kuznetsk (Kuzbass) Coal Basin coalfield to the east and the establishment of important railway routes. In 1925 the town was renamed Novosibirsk ("New Siberia"). The city's industry was especially stimulated in World War II, when many factories were evacuated from European Russia to the area. It is now one of the largest cities in Siberia.

Novosibirsk is a major manufacturing centre. Although it has a wide range of industries, metallurgy and engineering predominate. The old, pre-Revolutionary iron industry has been transformed into the modern Kuzmin steelworks. The city also has a large tin smelter and a highly specialized gold refinery. Engineering works produce heavy machinery, hydraulic presses, electrothermal equipment, ore-concentrating and mining machinery, and agricultural machinery. Precision- and light-engineering plants make machine tools, instruments, radios, and automatic looms. There are also ship and locomotive repair shops. The chemical industry has developed rapidly. Consumer products include furniture, pianos, shoes, textiles, knitwear, and foodstuffs. Power is provided by a dam and hydroelectric station above Novosibirsk and several thermal stations in the city itself.

In addition to the trunk railway services via the Trans-Siberian, Kuzbass, and Turksib lines, local electric commuter trains link the suburbs to the city centre. There are two airports, a smaller one serving local air connections and a large main airport with direct flights to Moscow and other major cities of Russia. The Ob River is navigable. Transportation within the city is by bus, streetcar, and trolleybus.

Novosibirsk is the principal cultural and educational centre in Siberia. It has an opera and ballet theatre, botanical gardens, an art gallery, and museums, as well as a symphony orchestra.

There are many educational institutions, headed by the Novosibirsk State University, founded in 1959; other higher-educational establishments include railway engineering, electrotechnical, medical, agricultural, and teacher-training institutes. The university and a number of these institutes are located in the satellite town of Akademgorodok ("Academic Town"), on the southern outskirts of the city. Also in Akademgorodok are most of the specialist research institutes that the Academy of Sciences of Russia maintains in Novosibirsk. Pop. (1999 est.) 1,402,400.

Novosibirskye Ostrova (Russia): *see* New Siberian Islands.

Novosiltsev, Nikolay Nikolayevich, Count (Graf) (b. 1768—d. April 8 [April 20, New Style], 1838, St. Petersburg, Russia), Russian statesman and confidant of Tsar Alexander I, who made him a member of the Secret Committee (1801–03) for the planning of reforms. Under Alexander and his successor, Nicholas I, Novosiltsev served in the administration of Russian Poland.

Novosiltsev received his early training in the corps of pages and served in the military from 1783 to 1796. In 1803 he was named president of the St. Petersburg Academy of Sciences. Between 1804 and 1809 he served on a variety of diplomatic missions in Europe and in 1813 became the vice president of the provisional council charged with the administration of the duchy of Warsaw, in which capacity he was known for his severity toward the Poles.

He became chairman of the Council of State and the Cabinet of Ministers in 1832 and was granted the title of count in 1833.

Novotný, Antonín (b. Dec. 10, 1904, Letňany, near Prague, Bohemia, Austria-Hungary [now in Czech Republic]—d. Jan. 28, 1975, Prague), Czech communist leader of a Stalinist faction who was deposed in the reform movement of 1968.

Trained as a locksmith, Novotný became a member of the Communist Party in 1921. He was arrested during the German occupation of Czechoslovakia in 1938 and placed in Mauthasen concentration camp (1941–45). In 1946 he was elected to the party's Central Committee, and in February 1948 he took a leading role in the Stalinist communist takeover of the Czech government. He was admitted to the Politburo in 1951 and became first secretary of the Communist Party in 1953. After the death of Antonín Zápotocký (Nov. 13, 1957), he assumed the presidency and in 1964 was reelected to a five-year term.

Continuing his close cooperation with Moscow, Novotný had to face increasing criticism from the party's more nationalistic and less dogmatic reform factions. In January 1968 he was forced to resign the party leadership to Alexander Dubček, and in late March General Ludvík Svoboda replaced him as president. His party offices and membership were withdrawn later in the year. At the party congress of May 1971, with the Stalinists back in power, a compromise was worked out whereby Novotný was reinstated in the party in exchange for leniency toward the ousted Dubček.

Novotroitsk, also spelled NOVOTROICK, city, Orenburg *oblast* (province), west-central Russia. It lies along the Ural River, in the Orsk-Khalilovo industrial district of the southern Urals. The centre of ferrous metallurgy in the area, the city has a major integrated iron and steel plant that was developed in the 1950s on the basis of nearby iron-ore deposits. Chemical production is also of importance. Pop. (1999 est.) 109,700.

Novy Chardzhuy (city, Turkmenistan): *see* Chardzhou.

Novy Margelan (Uzbekistan): *see* Fergana.

Novy Mir (Russian: "New World"), literary journal, a highly influential monthly published in Moscow. Founded in 1925, it was an official organ of the Writers' Union of the U.S.S.R. Its pages carried the work of many of the Soviet Union's leading writers, and a good number of them were either censured or denied further publication there for expressing impermissible political views. Under the liberal editorship of Aleksandr Tvardovsky (1958–70), *Novy Mir* was the first to publish Aleksandr Solzhenitsyn's novel *One Day in the Life of Ivan Denisovich* (1962). The censorship of the magazine in the 1970s and '80s contributed to the development of a large underground press in the Soviet Union. *Novy Mir* still features literary criticism and commentary concerning the problems of contemporary Russian literature, and occasional analysis of domestic and international political issues.

Novykh, Grigory Yefimovich (Russian mystic): *see* Rasputin, Grigory Yefimovich.

Nowa Huta, industrial section of Kraków (Cracow) city, southern Poland, on the Vistula River. The original medieval village settlements of Mogiła and Pleszów grew up around a 13th-century Cistercian monastery. Population grew rapidly after 1949, attracted by the large modern Lenin iron and steel complex developed on the site. Nowa Huta, originally a separate city located just east of Kraków, was incorporated (1951) into Kraków.

Nowa Sól, German NEUSALZ, town, Lubuskie *województwo* (province), west-central Poland, on the Oder River. A railroad junction and port on the Oder, Nowa Sól has metalworks, paper and textile mills, chemical and glue plants, and an oil refinery. A museum houses ethnographic and historical displays of the region. Pop. (2000 est.) 42,367.

Nowell, Alexander (b. *c.* 1507, Whalley, Lancashire, Eng.—d. Feb. 13, 1602, London), English scholar, Anglican priest, and dean of St. Paul's Cathedral in London whose tactless preaching brought him into disfavour with Queen Elizabeth I. He was the author of the catechism still used by the Church of England.

Made master of Westminster School, London, in 1543, Nowell became prebendary at Westminster Abbey in 1551. On the accession of the Catholic queen Mary I in 1553, he was deprived of his position and fled to Europe, where at Strassburg and Frankfurt he developed Puritan views. When Mary was succeeded in 1558 by Elizabeth I, who promised religious toleration, he returned to England and received the deanery of St. Paul's, a post he held until his death. His sermons frequently antagonized Elizabeth; on one occasion in 1564 she interpreted his remarks against veneration of the crucifix as alluding to one she kept in the royal chapel.

Nowell's "Small Catechism," inserted before the order of confirmation in the Prayer Book of 1549 and supplemented in 1604, remains the official Anglican catechism. He was also the author of a "Larger Catechism" and a "Middle Catechism," designed for school use, both printed in 1570.

Nowgong (Assam state, India): *see* Nagaon.

Nowgong, also called NAOGAON, city, northern Madhya Pradesh state, central India. Nowgong is connected by road with other centres and is a major agricultural distribution centre. Chemical and pharmaceutical works and a distillery are the major industries. An important civil centre and military cantonment, Nowgong served as the British headquarters of the Bundelkhand Agency. The town has a hospital, a government polytechnic institute, a college affiliated with Awadesh Pratap Singh University, and a college for officer training. Pop. (2001) 33,024.

Nowra-Bomaderry, urban area in Illawarra district, southeastern New South Wales, Australia. It lies along the Shoalhaven River delta. Nowra was proclaimed a town in 1857 and given as a name the Aboriginal word for "black cockatoo." Made a municipality in 1871, it was incorporated into the shire of Shoalhaven in 1948 and became a city in 1979. The town of Bomaderry lies opposite Nowra on the northern bank of the Shoalhaven. Nowra-Bomaderry lies on the Prince's Highway and is the terminus of the South Coast rail line from Sydney (75 miles [121 km] northeast). It serves a region supporting dairy products, pigs, vegetables, corn (maize), and hardwoods. Manufactures include paper and rubber goods. A growing tourist industry is based on scenic river, coastal, and forest surroundings. A lyrebird festival is celebrated each October. Pop. (1996) 23,823.

Nowshera, also spelled NAUSHAHRA, town, North-West Frontier Province, northern Pakistan. Lying on a sandy plain surrounded by hills, on the banks of the Kābul River (there bridged), Nowshera is a commercial and industrial centre that is connected by rail and road with Dargai (Malākand Pass), Mardān, Peshāwar, and Rāwalpindi. The town's industries include cotton, wool, and paperboard mills and chemical and newsprint factories, powered by the Malākand-Dargai and Warsak hydroelectric projects. Nowshera has a government college affiliated with the University of Peshāwar. Pop. (1998) 84,428.

Nowy Sącz, town, Małopolskie *województwo* (province), southern Poland. It lies along the Dunajec River, a tributary of the Vistula. Nowy Sącz is situated in the fertile Kotlina Sądecka (Sącz Dale), a plain of the Carpathian Mountains noted for its apples. Its scenic surroundings and historic buildings make it a tourist centre as well. The regional museum is located there. The valley, which has been inhabited since prehistoric times, was chosen as the site for Nowy Sącz by King Wenceslas (Wacław) II in 1292. The town became an administrative, economic, and cultural centre for the region. Pop. (2000 est.) 84,382.

Noyes, Alfred (b. Sept. 16, 1880, Wolverhampton, Staffordshire, Eng.—d. June 28, 1958, Isle of Wight), English poet, a traditionalist remembered chiefly for his lyrical verse.

Noyes's first volume of poems, *The Loom of Years* (1902), published while he was still at the University of Oxford, was followed by others that showed patriotic fervour and a love for the sea. He taught modern English literature at Princeton University in the United States from 1914 to 1923. Of Noyes's later works, the most notable is the epic trilogy *The Torch-Bearers* (1922–30), which took as its theme the progress of science through the ages. His autobiography, *Two Worlds for Memory,* appeared in 1953.

Noyes, John Humphrey (b. Sept. 3, 1811, Brattleboro, Vt., U.S.—d. April 13, 1886, Niagara Falls, Ont., Can.), founder of the Oneida Community, the most successful of the utopian socialist communities in the United States.

The son of a well-to-do New England businessman, Noyes graduated from Dartmouth College (Hanover, N.H.) in 1830 and seemed bound for a legal career. But, after one year of studying law, he was swept up in the religious revival of the evangelist Charles Finney and decided to become a minister. He enrolled first at the Andover (Mass.) Theological Seminary but later transferred to Yale University.

It was there that Noyes first enunciated his belief in perfectionism, the idea that it is possible for an individual to become free of sin in this life through religious conversion and will power. Noyes declared himself free of sin and in a state of perfection. Because his views were in direct opposition to the prevailing Calvinist orthodoxy, he was refused a license to preach and forced to leave Yale. He then wandered around the Northeast, talking to other perfectionists and to social reformers.

In 1836 he organized a group of "Bible Communists" in Putney, Vt. The following year he wrote his "Battleaxe Letter," in which he advocated free love, but it was not until 1846 that the Putney community abandoned "simple" (monogamous) marriages in favour of Noyes's "complex" marriages.

In complex marriages, all the women of the community were wives of all the men and all men of the community were husbands of all the women. Sexual relations were permissible as long as there was mutual agreement and as long as men practiced continence so as to preclude pregnancy. Childbearing was a community decision and was based on selective breeding.

The Putney practices led to Noyes's arrest for adultery. He jumped bail and in 1848 established a new community at Oneida, N.Y. The Oneida Community (*q.v.*) lasted more than thirty years, evolving from a faltering agriculturally based economy to a highly successful industrial organization. Until 1879, when Noyes succumbed to outside pressure and declining popularity, Oneida did not waver from his principles. That year the community abandoned complex marriages, and in 1880 it reorganized itself as a joint-stock company specializing in the manufacture of silver flatware. Noyes, meanwhile, was forced to flee to Canada to avoid legal action.

Eager to provide the outside world with candid and complete knowledge of his views, Noyes throughout his lifetime published several books of perfectionist doctrine: *The Berean* (1847), *Bible Communism* (1848), *Male Continence* (1848), *Scientific Propagation* (1873), and *Home Talks* (1875). He also wrote *History of American Socialisms* (1870), an investigation of utopian communities in the United States.

Noyon, town, Oise *département,* Picardie *région,* northern France. It lies north-northeast of Paris. The town, on the lower slopes and at the foot of a hill, occupies both banks of the Verse River, which is a tributary of the Oise. Noyon formerly was an important ecclesiastical centre. Its Cathedral of Notre-Dame is a fine transitional late 12th-century Romanesque-Gothic edifice. The fifth church to be built on the site, it was restored after heavy damage in World War I. The Hôtel de Ville (town hall) and old ecclesiastical buildings were also ruined in the war but have been rebuilt.

The house in which the Geneva theologian John Calvin was born in 1509 has been rebuilt and contains a museum devoted to him. Charlemagne (later Holy Roman emperor) was crowned king of the western Frankish kingdom of Neustria at Noyon in 768; and Hugh Capet, king of France and founder of the Capetian dynasty (which ruled directly until 1328), was also crowned at Noyon, in 987. The modern town has metalworking and food-processing plants. Pop. (1990) 14,426.

Noyori Ryōji (b. Sept. 3, 1938, Kōbe, Japan), Japanese chemist who, with K. Barry Sharpless and William S. Knowles, won the Nobel Prize for Chemistry in 2001 for developing the first chiral catalysts.

Noyori earned a Ph.D. from Kyōto University in 1967 and the following year joined the faculty at Nagoya University. In 2000 he assumed the directorship of the university's Research Center for Materials Science.

Many molecules are chiral—they exist in two structural forms (enantiomers) that are nonsuperimposable mirror images. Likewise, the receptors, enzymes, and other cellular components made from these molecules are chiral and tend to interact selectively with only one or two enantiomers of a given substance. For many drugs, however, conventional laboratory synthesis results in a mixture of enantiomers. One form usually has the desired effect while the other form may be inactive or cause undesirable side effects, such as occurred with the drug thalidomide (*q.v.*). This problem led scientists to pursue chiral catalysts, which drive chemical reactions toward just one of two possible outcomes.

Building on the work of Knowles, Noyori began developing more general asymmetrical hydrogen catalysts in the 1980s. His catalysts had broader applications, could produce larger proportions of the desired enantiomer, and were suitable for large-scale industrial applications. They found wide use in the synthesis of antibiotics and other pharmaceutical products.

NP-complete problem, any of a class of computational problems for which no efficient solution algorithm has been found. Many significant computer-science problems belong to this class—*e.g.,* the traveling salesman problem (*q.v.*), satisfiability problems, and graph covering problems.

So-called easy, or tractable, problems can be solved by computer algorithms that run in polynomial time; *i.e.,* for a problem of size *n,* the time or number of steps needed to find the solution is a polynomial function of *n.* Algorithms for solving hard, or intractable, problems, on the other hand, require times that are exponential functions of the problem size *n.* Polynomial-time algorithms are considered to be efficient, while exponential-time algorithms are considered inefficient, because the execution times of the latter grow much more rapidly as the problem size increases.

A problem is called NP (nondeterministic polynomial) if its solution (if one exists) can be guessed and verified in polynomial time; nondeterministic means that no particular rule is followed to make the guess. If a problem is NP and all other NP problems are polynomial-time reducible to it, the problem is NP-complete. Thus, finding an efficient algorithm for any NP-complete problem implies that an efficient algorithm can be found for all such problems, since any problem belonging to this class can be recast into any other member of the class. It is not known whether any polynomial-time algorithms will ever be found for NP-complete problems, and determining whether these problems are tractable or intractable remains one of the most important questions in theoretical computer science. When an NP-complete problem must be solved, one approach is to use a polynomial algorithm to approximate the solution; the answer thus obtained will not necessarily be optimal but will be reasonably close.

NRA (sport organization): *see* National Rifle Association.

NRA (U.S. government agency): *see* National Recovery Administration.

Nsanje, formerly PORT HERALD, town, southern Malaŵi. It lies along the west bank of the Shire River and is situated north of the Ndindi Marsh. The nation's southernmost town, it serves as a customs post on the Mozambique border and is a trade and transportation centre on the north-south Blantyre-Beira railway (completed 1935). The surrounding area occupies the fertile western Shire valley, and cotton, tobacco, rice, and corn (maize) are the chief products. Pop. (1998) 16,987.

Nsenga, also spelled SENGA, a Bantu-speaking people inhabiting the Luangwa River valley area of southeastern Zambia. It is difficult to differentiate the Nsenga from other eastern Zambian peoples, since they share many social customs with the neighbouring Bemba, Bisa, and Lila peoples to the north but share the use of the Nyanja language with their Chewa and Ngoni neighbours to the east.

The Nsenga appear to be a historical offshoot of the Chewa, who in turn derive from a complex of Luba peoples called the Maravi. The Maravi early established a federation of chiefdoms in the Congo, and in the 15th century groups of them began migrating southward into what is now Zambia, eventually giving rise to all the Nyanja-speaking peoples of southeastern Zambia, including the Chewa and the Nsenga.

First Bemba and then Ngoni raids led Nsenga chiefs to build substantial stockades for self-defense. In the 1860s and '70s the Ngoni came to dominate the Nsenga and exacted tribute, settled in their area, intermarried, and assumed their language and culture.

The precolonial Nsenga were avid hunters, both for subsistence needs and for the ivory trade with the Portuguese. The Nsenga served as middlemen between the Portuguese and such peoples as the Lamba farther north. They also grew cotton and wove cloth from it. Later British colonizers prohibited hunting in the Nsenga homeland, in which several important game reserves containing elephant, buffalo, kudu, zebra, and lion are now located.

The alluvial soils of the Luangwa River valley are exceptionally fertile, and the climate is temperate. The Nsenga obtain four harvests annually of corn (maize) from permanent riverain gardens; other fields are cleared from bush, and composting is practiced. Tobacco and rice have long been cash crops. The tsetse fly has precluded cattle raising.

The Nsenga observe matrilineal descent. Chiefs are chosen from particular lineages within clans who rule designated lands, but exogamy between clans has created a situation whereby most clans are represented in each chiefdom. Although all precolonial Nsenga chiefs were equals, the British named a senior chief in order to centralize authority and administration. The Nsenga seek work in Malaŵi and other parts of southern Africa, or they go to the Zambian Copperbelt region west of their lands.

Nsukka, university town, Enugu state, southern Nigeria. It lies in the Udi Hills at an elevation of 1,300 feet (396 m). Nsukka is an agricultural-trade centre for the yams, cassava, corn (maize), taro, pigeon peas, and palm oil and kernels produced by the local Igbo (Ibo) people. Weaving is a traditional local craft. Coal deposits have been discovered east of Nsukka around Obolo, a town on the main Onitsha-Makurdi road.

Nsukka is the site of the University of Nigeria (1960), the first university established in Nigeria after independence. Nsukka is also the site of a teacher-training college and an agrometeorologic station. Pop. (1991 est.) 52,780.

Nu (Egyptian mythology): *see* Nun.

Nu, U, formerly THAKIN NU (b. May 25, 1907, Wakema, Burma [Myanmar]—d. Feb. 14, 1995, Yangôn), Burmese independence leader and prime minister of Myanmar (formerly Burma) from 1948 to 1958 and from 1960 to 1962.

U Nu was educated at the University of Rangoon (Yangôn), from which he received his B.A. degree in 1929. For some years headmaster of the National High School in Pantanaw, he returned to the university in 1934 to study law, becoming president of the Student Union of Rangoon and joining student political movements. His expulsion and that of the young leader Aung San from the university in 1936 resulted in a student strike. One of the first confrontations between young Burmese nationalists and the British colonial authorities, it gained Nu national prominence. The following year he joined the We-Burmans Association and played an important part in the struggle for independence. Jailed by the British in 1940 for sedition, he was released only after the Japanese invaded Burma.

In 1943 U Nu served as foreign minister in Ba Maw's pro-Japanese government. He soon, however, became disillusioned with the Japanese. Following the assassination in 1947 of Aung San, the principal nationalist leader, U Nu was asked to become head of the government and leader of Burma's leading political party, the Anti-Fascist People's Freedom League (AFPFL). When independence was declared in January 1948, U Nu became the first prime minister of Myanmar and served for 10 years, with only a brief interlude out of office in 1956–57. Although U Nu was an able and highly respected statesman, his government was plagued by communist and ethnic-minority insurrections, economic stagnation, and administrative inefficiency. His 1948 Pyidawtha (welfare) program included a Land Nationalization Act, but his efforts to elevate the living standard of the people were frustrated by the wide extent of war damage and by the drop in rice exports, which had constituted one of Myanmar's principal sources of foreign exchange. His party retained power after winning general elections in 1952 and 1956. U Nu was one of the founders of the Nonaligned Movement in the 1950s. In 1958 he resigned his post as prime minister and a "caretaker" government took over, headed by General Ne Win. In 1960 parliamentary government was restored, and U Nu again became prime minister after his party won elections. In March 1962, however, Ne Win staged a coup d'état, establishing a military government and putting U Nu in prison.

Following his release from prison, U Nu left Myanmar (1969) and began organizing a resistance movement against the Ne Win government. When this movement failed, he took up residence in India, but he returned to Myanmar in 1980 at the invitation of Ne Win. In July 1980 U Nu returned to Rangoon to become a Buddhist monk. He made an unsuccessful bid for power after pro-democracy demonstrations toppled Ne Win's government in 1988.

Nu Chiang, Pinyin NU JIANG (China): *see* Salween River.

Nü Gua (in Chinese mythology): *see* Nü Kua.

Nü Kua, Pinyin NÜ GUA, in Chinese mythology, the patroness of matchmakers; as wife or sister of the legendary emperor Fu Hsi, she helped establish norms for marriage (that included go-betweens) and regulated conduct between the sexes. She is described as having a human head but the body of a snake (or fish).

Legend credits Nü Kua with having repaired the pillars of heaven and the broken corners of earth, which the rebel Kung Kung had destroyed in a fit of anger. To accomplish her task, Nü Kua used the feet of a tortoise and melted-down stones that turned into a five-coloured mixture. Nü Kua is also said to have built a lovely palace that became a prototype for the later walled cities of China. The material of which it was made was prepared overnight by mountain spirits. By slipping a miraculous rope through the nose of the King of Oxen, she put a stop to the terror this monster visited on his enemies by means of his enormous horns and ears.

One story names Nü and Kua as the first human beings, who found themselves at the moment of creation among the Kunlun Mountains. While offering sacrifice, they prayed to know if they, as brother and sister, were meant to be man and wife. The union was sanctioned when the smoke of the sacrifice remained stationary.

Nuba, inhabitants of the Nuba hills in the Kordofan region of the central part of The Sudan. This region is studded with rugged granite hills that rise sharply from a wide clay plain and vary considerably in size and content.

The Nuba peoples live on or near the hills (the plains being mainly occupied by Baqqārah Arabs); their many tribal groups differ in physical type and culture. They all speak Nubian languages, which are Eastern Sudanic languages of the Chari-Nile branch of the Nilo-Saharan family.

Nuba wrestlers
George Roger—Magnum

Kinship descent among the Nuba is, broadly speaking, matrilineal in the south and patrilineal elsewhere. The Nuba are agriculturists, with hill terraces and larger cultivations on the plains. Their main crops are millet, sesame, corn (maize), groundnuts (peanuts), beans, onions, cotton, and tobacco. They also keep cattle, sheep, goats, donkeys, fowl, and (except in Islāmized areas) pigs. Their religious practices are linked with agricultural rituals; animal sacrifices are made to ancestral spirits; and priestly experts and rainmakers have an important position.

The Nuba's tribal units are under government-appointed chiefs. Marriage payments are made in livestock, weapons, and other objects and by agricultural service. In the remoter hills men still go naked, and women wear beads and lip plugs; but clothes are increasingly worn. In some areas the lower incisors are removed in both sexes; male circumcision is now more widely practiced. Wrestling and stick fighting are the principal sports. Varying degrees of Islāmization may be observed among the Nuba, and Arabic is used as the lingua franca.

Nubar Pasha, also called NUBAR PASHA NUBARIAN (b. January 1825, Smyrna, Ottoman Empire [now İzmir, Turkey]—d. Jan. 14, 1899, Paris, France), Egyptian statesman of Armenian descent who was instrumental in the negotiation of important treaties with the European powers and in the division of authority between Egyptian and British administrators.

Nubar's first important work involved the Suez Canal. The Ottoman khedive (viceroy) of Egypt, Ismāʿīl Pasha (ruled 1863–79), wanted to speed construction of the canal, which was impeded by disputes with the canal company.

Nubar Pasha, engraving

By courtesy of the Bibliotheque Nationale, Paris

Nubar represented the Egyptian government in negotiations to annul the disputed provisions. He also helped to establish a system of mixed courts (begun in 1875) to try cases involving Egyptians and Europeans. He proposed that the courts be staffed with Egyptian and foreign judges, who would administer a body of law based on French law and compiled by an international commission.

Nubar was caught up in the events that led to Ismāʿīl's deposition in 1879: under pressure by Britain and France in 1878, Ismāʿīl named Nubar prime minister in a government that was to institute financial and political reforms; these reforms, however, infringed upon Ismāʿīl's authority, and he soon dismissed Nubar. After the British occupation of Egypt (1882), Nubar again became prime minister, in 1884. Under the British, khedival authority was considerably curtailed while that of the prime minister was increased. Nubar successfully asserted Egyptian control of the ministries of justice and interior, thus helping to establish a dividing line between British and Egyptian authority in Egypt. His administrative talents provided an element of stability that was important for the peaceful continuance of British rule, but when, in 1888, he became too independent and tried to assert his authority over the provincial police, Britain secured his dismissal. In 1894 Nubar again became prime minister, but ill health and impatience with British domination led to his resignation the following year.

Nubia, ancient region in northeastern Africa, extending approximately from the Nile River valley (near the first cataract in Upper Egypt) eastward to the shores of the Red Sea, southward to about Khartoum (in what is now The Sudan), and westward to the Libyan Desert. The southern part of it to the southern end of the second cataract of the Nile was called Cush (Kush) under the 18th-dynasty pharaohs of ancient Egypt and called Ethiopia by the ancient Greeks. The northern part of the region, up to the first cataract of Aswān, was called Wawat.

The region of Lower Nubia, between the first and second Nile cataracts, saw one of the earliest phases of state formation in the world when rulers of the A-Group culture, who were buried in a cemetery at Qustul excavated by the Oriental Institute of the University of Chicago in the 1960s, adopted symbols of kingship similar to those of contemporary kings of Egypt of the Naqādah II–III period. With the rise of the 1st dynasty in Egypt (*c.* 2950 BC), the A-Group culture and Nubia's independence were extinguished. No archaeological remains of the native Lower Nubians of the next 500 years have been discovered.

Pharoah Snefru (*c.* 2575 BC) conducted a raid into Nubia and established an Egyptian outpost at Buhen. West of the Nile, quarries for gneiss were opened as mineral exploitation intensified. During the 6th dynasty, the Egyptian governors of Aswān started long-range trading expeditions, sometimes combined with military raids. The most famous governor among them, Harkhuf, penetrated southward far beyond the second cataract of the Nile to a land he named Yam, whence he obtained a pygmy whom he brought to Pepi II. Toward the end of Harkhuf's career, the Nubian chiefs united, imperiling the Aswān expeditions. A new population (called C Group by archaeologists) inhabited Wawat, while a group known in the present day as the Karmah culture occupied Cush. During the First Intermediate Period many Nubians served as mercenaries in Egypt.

When Sesostris I of the 12th dynasty invaded Nubia about 1915 BC, he named the land south of the second cataract Cush. Sesostris III, about 1826 BC, tried to occupy Sai Island but was compelled to fall back to Semna, where he built a chain of powerful fortresses. He forbade the Cushites to pass north of Semna, except to trade at Iken (Mirgissa), a major commercial centre at the northern end of the second cataract. Semna was also where the Egyptians recorded the Nile inundation levels during the Middle Kingdom.

The kingdom of Cush eventually broke through the frontier as Egyptian control waned in the later 13th dynasty. The Cushites seized Buhen and by 1650 BC had advanced northward to Aswān. Around the time of the Hyksos invasion of Egypt, they raided Upper Egypt, seizing many fine Middle Kingdom monuments that they carried off to Karmah, their capital. Archaeologists found those objects during the excavations of the large tumulus tombs of the Cushite chiefs, who were buried on beds, surrounded by hundreds of their sacrificed retainers. Some expatriate Egyptians took service with the rulers of Cush as mercenaries, while others probably worked in the glaze industry at Karmah. Hyksos seals from the Karmah tombs indicate that the Cushite princes had contact with the Hyksos; when Kamose of Egypt's Theban 17th dynasty attacked the Hyksos, the Hyksos ruler Apopis I sought to make an alliance with the Cushites. Kamose, however, intercepted the messenger, thwarting the scheme.

While expelling the Hyksos, the Thebans began to penetrate Nubia also and, under Ahmose, mounted a full invasion of the region. Amenhotep I (1514–1493 BC) conquered Karmah, destroying the kingdom of Cush. Nubia was colonized, and the viceroy of Cush became its chief Egyptian imperial official. Thutmose I extended Egyptian control to Kanisa-Kurgis, upstream from the fourth cataract of the Nile. Gold was the main resource exploited by the Egyptians, Cush producing significant amounts of this precious metal. The C-Group Nubians were gradually Egyptianized until, by the middle of the 18th dynasty, their culture had disappeared. In the 19th–20th dynasty, desiccation caused a partial depopulation of Wawat, but, in the civil wars of the late 20th dynasty, the viceroy of Cush played a major role. After Herihor took control in Upper Egypt, Nubia broke away from Egypt despite a long and costly war waged by the Thebans.

In the region of Cush a new kingdom appeared about 800 BC; under its ruler, Kashta, rapid Egyptianization started, and the Cushites occupied Upper Egypt. The Cushite ruler Piankhi (Piye) completed the Egyptianizaton and about 730 BC raided Lower Egypt. Ardent worshipers of Amon, the Cushites considered the Libyanized Lower Egyptians cultural degenerates, but they felt a strong affinity for the Thebans, who were also worshipers of Amon. The Cushite ruler Shabaka succeeded Piankhi and conquered all of Egypt in about 715 BC, ending the 22nd, 23rd, and 24th dynasties. Moving his capital to Memphis, he founded Egypt's 25th dynasty, which is called Cushite in the king lists. In 701 BC Shabaka backed the Hebrew king Hezekiah's revolt against Assyria. The Assyrian king Sennacherib marched into Palestine and defeated an Egypto-Cushite unit at Eltekeh but failed to take Jerusalem, as Prince Taharqa appeared with reinforcements. Peace between Egypt and Assyria followed until the Assyrian king Esarhaddon began aggressive movements in Palestine. An attempted invasion of Egypt in 674 BC failed, but in 671 the Assyrians succeeded and expelled Taharqa from Memphis. Taharqa intermittently reoccupied Egypt, but in 663 BC the Assyrian king Ashurbanipal drove him and his successor Tanutamon out, sacking Thebes. The Assyrians appointed the Saite princes as governors of Egypt, and by 656 BC the Saite prince Psamtik I had both gained Egypt's independence from Assyria and secured Upper Egypt against Cushite designs.

Because of continued intrigues, an Egyptian expedition sacked the capital of Cush, Napata, about 592. The Cushite capital was then transferred to Meroe, where the Cushite kingdom survived for another 900 years. The Persians are also believed to have tried to invade Nubia (522).

Cut off from Egypt, the Egyptian culture of Nubia grew increasingly Africanized until the accession in 45 BC of Queen Amanishakhete. She and her immediate successors temporarily arrested the loss of Egyptian culture, but thereafter it continued unchecked. Meanwhile, in 23, a Roman army under Gaius Petronius destroyed Napata.

By the 3rd century AD the Blemmyes of the eastern, or Arabian, desert (Beja) had destroyed the Meroitic culture in Lower Nubia, and Meroe itself was destroyed between 320 and 350 by an expedition that was dispatched by Aeizanes, king of Aksum. The Meroitic culture was followed in Nubia by what may have been that of the Nobatae, who replaced the northern kingdom of Napata. In approximately 540 the Nobatae were converted to Christianity, and shortly thereafter their king Silko defeated the Blemmyes and the people of Upper Nobatae. The capital of the Nobatae appears then to have been moved to Pachoras (Faras) until they were amalgamated later in the 6th century with Makurra (Muqarra) into the single kingdom of Dunqulah. South of Dunqulah was the kingdom of ʿAlwah, or Alodia (Aloa), which became Christian in 580. In 652 a Muslim army from Egypt captured Dunqulah and compelled the kingdom to pay tribute to Egypt; Dunqulah remained Christian until the 14th century, when it was overrun by Mamlūk armies from Egypt. Sūbah, the ʿAlwah capital, survived to the 16th century and then gave way to the Muslim Funj dynasty of Sennar.

Nubian Desert, Arabic AṢ-ṢAḤRĀʾ AN-NŪBĪYA, desert in northeastern Sudan. It is separated from the Libyan Desert by the Nile River valley to the west, while to the north is Egypt; eastward, the Red Sea; and southward, the Nile again. Unlike the Libyan Desert, the Nubian Desert is rocky and rugged, though there are some dunes, and toward the Red Sea the desert, rising in gentle slopes to the west, culminates in precipitous uplands of the Red Sea Hills (Jabal Erba 7,273 feet [2,217 m]) to the east. It is essentially a sandstone plateau interspersed with many wadis (seasonal rivers) that die out before reaching the Nile. The rainfall averages less than 5 inches (125 mm) a year.

Nubian languages, group of languages spoken in Egypt and The Sudan, chiefly along the banks of the Nile River between the first and fourth cataracts (Nile Nubian), but also spoken in enclaves in the Nuba Hills of western Sudan (Hill Nubian). Hill Nubian is composed of Midobi and Birked, which are not closely related. Some scholars divide Nile Nubian into three groups, each containing one language (Northern, or Kenuzi; Central, or Mahas; and Southern, or Dongola), while others group Northern and Southern Nubian together. Although many scholars formerly classified the Nubian languages as Hamitic or as Sudanese-Guinean, most now place the Nubian languages in the Eastern Sudanic subbranch of the Chari-Nile branch of the Nilo-Saharan language family.

The Nubian languages make much more use of suffixes than of prefixes or infixes, especially in noun inflection. Nouns have forms for the nominative, vocative, objective, genitive, locative, instrumental, and ablative cases in some of the languages. A collective noun used as the subject of a sentence may be followed by either a singular or a plural verb.

Documents in Old Nubian, which appears to be the ancestor of modern Central Nubian, date from the end of the 8th century to the beginning of the 14th century. These are usually translations of Christian writings originally in Greek and are written, as is modern Nubian, in an adaptation of the Coptic alphabet. Speakers of Nubian languages in modern times are Muslims, and the languages contain a number of Arabic borrowings.

nuclear clock, frequency standard (not useful for ordinary timekeeping) based on the extremely sharp frequency of the gamma emission (electromagnetic radiation arising from radioactive decay) and absorption in certain atomic nuclei, such as iron-57, that exhibit the Mössbauer effect. The aggregate of atoms that emit the gamma radiation of precise frequency may be called the emitter clock; the group of atoms that absorb this radiation is the absorber clock. The two clocks remain tuned, or synchronous, only as long as the intrinsic frequency of the individual pulses of gamma radiation (photons) emitted remains the same as that which can be absorbed. A slight motion of the emitter clock relative to the absorber clock produces enough frequency shift to destroy resonance or detune the pair, so absorption cannot occur. This allows for a thorough study at very low velocities of the Doppler effect (the change in the observed frequency of a vibration because of relative motion between the observer and the source of the vibration). Gamma photons from an emitter placed several stories above an absorber show a slight increase in energy, the gravitational shift toward shorter wavelength and higher frequency predicted by general relativity theory. Some pairs of these nuclear clocks can detect energy changes of one part in 10^{14}, being about 1,000 times more sensitive than the best atomic clock.

nuclear energy, also called ATOMIC ENERGY, energy that is released in significant amounts in processes that affect atomic nuclei, the dense cores of atoms. It is distinct from the energy of other atomic phenomena such as ordinary chemical reactions, which involve only the orbital electrons of atoms. One method of releasing nuclear energy is by controlled nuclear fission in devices called reactors, which now operate in many parts of the world. (*See* nuclear reactor.) Another method for obtaining nuclear energy, controlled nuclear fusion, had not been perfected by the late 1980s. Nuclear energy has been released explosively by both nuclear fusion and nuclear fission (*qq.v.*).

nuclear engineering, field of engineering that deals with the production and application of nuclear energy.

A brief treatment of nuclear engineering follows. For full treatment, *see* MACROPAEDIA: Engineering; Energy Conversion.

Nuclear engineering is chiefly concerned with the development, design, construction, operation, and maintenance of nuclear reactor systems; the manufacture and reprocessing of nuclear fuels; and the safe handling and disposal of the radioactive waste products that result from the operation of nuclear reactors.

Nuclear engineering also involves research and developmental work on fusion reactors, systems that would provide control over the rates of thermonuclear reactions in high-temperature plasmas so as to maintain the release of nuclear energy at a level at which it can be efficiently transformed into electrical energy.

Nuclear engineering emerged as a separate discipline after World War II as plans developed to turn the new knowledge gained from the nuclear weapons program that produced the first atomic bomb toward peaceful uses. Engineers and physicists from these programs became involved as the U.S. Atomic Energy Commission initiated reactor experiments at its laboratories. Admiral Hyman Rickover established a nuclear reactor program in the U.S. Navy with the development of nuclear-powered submarines as its objective. This had a profound effect on the development of commercial reactors by rapidly pushing ahead the construction of light-water reactors. This program resulted in the historic voyage of the nuclear submarine *Nautilus* under the Arctic icecap in 1958 and the development (1956–57) of the first American full-scale, experimental nuclear power plant, in Shippingport, Pa.

The basic academic discipline underlying nuclear engineering is physics, particularly nuclear physics. Knowledge of the engineering sciences is also essential. Whether they work for government, public utilities, or universities, nuclear engineers are a necessary adjunct of all work in reactor technology.

Nuclear engineering is a field steadily increasing in importance. By the late 20th century many countries had nuclear energy programs, with hundreds of nuclear reactors in operation, under construction, or in the final planning stages. Some countries, such as France, were committed to producing well over 50 percent of their electrical power needs with nuclear fission reactors.

nuclear family, also called ELEMENTARY FAMILY, in sociology and anthropology, a group of persons united by ties of marriage and parenthood or adoption and consisting of a man, a woman, and their socially recognized children. This unit was once widely held to be the most basic and universal form of social organization. Anthropological research, however, has illuminated so much variability of this form that it is safer to assume that what is universal is a nuclear family "complex" in which the roles of husband, wife, mother, father, son, daughter, brother, and sister are embodied by people whose biological relationships do not necessarily conform to the Western definitions of these terms. In matrilineal societies, for example, a child may not be the responsibility of his biological genitor at all but of his mother's brother, whom he calls father.

Closely related in form to the predominant nuclear-family unit are the conjugal family and the consanguineal family. As its name implies, the conjugal family is knit together primarily by the marriage tie and consists of mother, father, their children, and some close relatives. The consanguineal family, on the other hand, groups itself around a descent group or lineage whose members are said to be blood relatives (*see* descent; lineage) and consists of parents, their children, their children's children, and the children's spouses, who may belong consanguineally to another family.

The stability of the conjugal family depends on the quality of the marriage of the husband and wife, and this relationship is more emphasized in industrialized, highly mobile societies in which people frequently must leave the residences of their blood relatives. In nonliterate societies, the perpetuation of the line has priority, and the consanguineal family derives its stability from its corporate nature and its permanence.

nuclear fission, subdivision of a heavy atomic nucleus, such as that of uranium or plutonium, into two fragments of roughly equal mass. This process is accompanied by the release of a large amount of energy.

A brief treatment of nuclear fission follows. For full treatment, *see* MACROPAEDIA: Atoms: Their Structure, Properties, and Component Particles.

Nuclear fission was discovered in 1938 by Otto Hahn and Fritz Strassmann while attempting to produce elements heavier than uranium by bombarding uranium with neutrons. The two German chemists did not realize that they had in fact induced a fission reaction. Subsequent theoretical studies by others provided a description of the process and the principles involved. It was established that nuclear fission occurs when a particle such as a neutron strikes the nucleus of a uranium atom and causes it to split into two fission fragments, each of which is composed of a nucleus with roughly half the neutrons and protons of the original nucleus. This fission process releases a large quantity of thermal energy as well as gamma rays and two or more free neutrons (*i.e.,* neutrons not bound to the fission fragments). These free neutrons fission other uranium nuclei, which then give off neutrons that split still more nuclei. A series of fissions of this kind constitutes a chain reaction, which yields a continuous supply of nuclear energy.

Research by Niels Bohr of Denmark and John A. Wheeler of the United States suggested that the fission observed in uranium involved uranium-235, an isotope comprising only 1 part in 140 of natural uranium, rather than the much more abundant uranium-238 species. The latter does not fission as readily as uranium-235 because it absorbs most of the neutrons that strike it. The prediction by Bohr and Wheeler was later confirmed through the use of minute quantities of a target material somewhat richer in uranium-235 than normal.

In 1942 the Italian-born physicist Enrico Fermi and his coworkers at the University of Chicago produced the first controlled self-sustaining fission reaction. They accomplished this feat with a simple nuclear reactor (*q.v.*), the first such device ever constructed. Their so-called atomic pile consisted of large lumps of natural uranium embedded in hundreds of tons of specially purified graphite. The graphite was intended to slow down free neutrons to ensure their capture by the small number of uranium-235 nuclei in the natural uranium fuel. Fermi realized that unless this was done the bombarding neutrons would simply be absorbed by the more plentiful uranium-238 nuclei in the natural uranium, making it impossible to sustain a chain reaction. The advanced nuclear reactors of today still use the basic technique devised by Fermi (*i.e.,* employ a moderator to reduce the speed of free neutrons) to promote neutron capture by uranium-235 nuclei.

Nuclear fission is one of three types of nuclear reactions that release substantial amounts of energy, the other two being radioactive decay and nuclear fusion (*q.v.*). The energy derived from fission has come to be utilized on a relatively large scale for generating electric power and for propelling ships, notably submarines. Such energy is also the source of the vast destructive power of atomic bombs and neutron warheads.

nuclear fusion, process by which nuclear reactions between light elements form heavier ones (up to iron). Substantial amounts of energy are released in cases where the interacting nuclei belong to elements with low atomic numbers.

A brief treatment of nuclear fusion follows. Articles providing fuller treatment appear in the MACROPAEDIA. For the process and properties of nuclear fusion, *see* Atoms. For the applications of nuclear fusion, *see* Energy Conversion: *Fusion reactors;* War, The Technology of: *Modern weapons and weapon systems.*

In 1939 the physicist Hans A. Bethe suggested that much of the energy output of the Sun and other stars results from energy-releasing fusion reactions in which four hydrogen nuclei unite and form one helium nucleus. During the early 1950s American researchers produced the hydrogen bomb by inducing fusion reactions in a mixture of the heavy hydrogen isotopes deuterium and tritium, the reactions being ignited by the extremely high temperatures created in the fission reaction of an atomic bomb. More recently, scientists have sought to devise a practical method of controlled nuclear fusion, in which deuterium and tritium nuclei would combine to form helium nuclei under controlled high temperatures rather than in the uncontrollable heat of a detonating atomic bomb. Controlled nuclear fusion would provide a relatively inexpensive alternative energy source for electric-power generation and thereby help conserve the world's dwindling supply of oil, natural gas, and coal. Fusion also would be more advantageous than nuclear fission (*q.v.*), another kind of energy-producing nuclear reaction that occurs when a heavy nucleus such as the isotope uranium-235 absorbs a neutron, becomes unstable, and splits into two lighter nuclei. Deuterium, the primary fuel for a fusion-power system, is far more abundant and cheaper than any of the materials required for fission reactions, since it can be extracted from ordinary water. (Eight gallons of water contain about one gram of deuterium, which has an energy content equivalent to roughly 9,500 litres [2,500 gallons] of gasoline.) Many experts, however, believe that controlled fusion will not be achieved for some years because of various technical difficulties.

A fusion reaction can occur only if two nuclei approach each other within a distance on the order of 10^{-13} centimetre. At such a short distance it is possible for the nuclear forces of attraction to overcome the electrostatic forces of repulsion that result from the presence of positive electric charges on both nuclei. Because the forces of repulsion are so effective in keeping nuclei apart, reactions useful for controlled fusion seem largely limited to deuterium and tritium, nuclei with the lowest possible charge. Controlled energy-releasing reactions can be produced by heating a plasma (gas consisting of unbound electrons and an equal number of positively charged nuclei) of a deuterium-tritium mixture to many millions of degrees kelvin. Such high temperatures will not only induce but also sustain thermonuclear reactions so as to produce enough energy for electric-power generation. However, it has proved extremely difficult to contain plasmas at the high temperature levels required to achieve self-sustaining fusion reactions because the hot gases tend to expand and escape from the enclosing structure. Large-scale fusion reactor experiments have been conducted in various countries, including the United States and Russia, in an effort to develop a means of overcoming this problem. *See also* fusion reactor.

nuclear magnetic resonance, abbreviation NMR, selective absorption of very high-frequency radio waves by certain atomic nuclei that are subjected to an appropriately strong stationary magnetic field. This phenomenon was first observed in 1946. Nuclei in which at least one proton or one neutron is unpaired act like tiny magnets, and a strong magnetic field exerts a force that causes them to precess in somewhat the same way that the axes of spinning tops trace out cone-shaped surfaces while they precess in the Earth's gravitational field. When the natural frequency of the precessing nuclear magnets corresponds to the frequency of a weak external radio wave striking the material, energy is absorbed from the radio wave. This selective absorption, called resonance, may be produced either by tuning the natural frequency of the nuclear magnets to that of a weak radio wave of fixed frequency or by tuning the frequency of the weak radio wave to that of the nuclear magnets (determined by the strong constant external magnetic field).

Nuclear magnetic resonance is used to measure nuclear magnetic moments, the characteristic magnetic behaviour of specific nuclei. Because these values are significantly modified by the immediate chemical environment, however, NMR measurements provide information about the molecular structure of various solids and liquids.

By the early 1980s nuclear magnetic resonance techniques had begun to be used in medicine to visualize soft tissues of the body. This application of NMR, called magnetic resonance imaging (MRI), presented a hazard-free, noninvasive way to generate visual images of thin slices of the body by measuring the nuclear magnetic moments of ordinary hydrogen nuclei in the body's water and lipids (fats). NMR images show great sensitivity in differentiating between normal tissues and diseased or damaged ones. By the late 1980s MRI had proved superior to most other imaging techniques in providing images of the brain, heart, liver, kidneys, spleen, pancreas, breast, and other organs. MRI provides relatively high-contrast, variable-toned images that can show tumours, blood-starved tissues, and neural plaques resulting from multiple sclerosis. The technique presents no known health hazards, but it cannot be used on individuals who have cardiac pacemakers or certain other metal-containing devices implanted in their bodies.

nuclear medicine, medical specialty that involves the use of radioactive isotopes in the diagnosis and treatment of disease. Nuclear medicine began only after the discovery by Enrico Fermi in 1935 that stable elements could be made radioactive by bombarding them with neutrons. The atoms of the elements so bombarded capture these neutrons, thus assuming a different nuclear form while remaining the same elements. These radioisotopes have unstable nuclei, however, and dissipate excess energy by emitting radiation in the form of gamma and other rays.

In isotope scanning, a radioisotope is introduced into the body, usually by means of intravenous injection. The isotope is then taken up in different amounts by different organs. Its distribution can be determined by recording the radiation it emits, and through charting its concentration it is often possible to recognize the presence, size, and shape of various abnormalities in body organs. The radiation emitted is detected by a scintillation counter, which is moved back and forth over the organ being scanned; these messages can then be electronically recorded and studied by clinicians. The radioisotope usually has a short half-life and thus decays completely before its radioactivity can cause any damage to the patient's body.

Different isotopes tend to concentrate in particular organs: for example, iodine-131 settles in the thyroid gland and can reveal a variety of defects in thyroid functioning. Another isotope, carbon-14, is useful in studying abnormalities of metabolism that underlie diabetes, gout, anemia, and acromegaly. Various scanning devices and techniques have been developed, including tomography (*q.v.*) and magnetic resonance imaging. *See also* radiology.

nuclear model, any of several theoretical descriptions of the structure and function of atomic nuclei (the positively charged, dense cores of atoms). Each of the models is based on a plausible analogy that correlates a large amount of information and enables predictions of the properties of nuclei.

Nuclear models can be classified into two main groups. In those of the first group, called independent-particle models, the main assumption is that little or no interaction occurs between the individual particles that constitute nuclei; each proton and neutron moves in its own orbit and behaves as if the other nuclear particles were passive participants. The shell nuclear model (*q.v.*) and its variations fall into this group.

In a second group, called strong-interaction, or statistical models, the main assumption is that the protons and neutrons are mutually coupled to each other and behave cooperatively in a way that reflects the short-ranged strong nuclear force between them. The liquid-drop model and compound-nucleus model (*qq.v.*) are examples of this group.

Other nuclear models incorporate aspects of both groups, such as the collective model (*q.v.*), which is a combination of the shell model and the liquid-drop model.

Nuclear Nonproliferation Treaty: *see* Nonproliferation of Nuclear Weapons, Treaty on the.

nuclear reaction, change in the identity or characteristics of an atomic nucleus, induced by bombarding it with an energetic particle. The bombarding particle may be an alpha particle, a gamma-ray photon, a neutron, a proton, or a heavy ion. In any case, the bombarding particle must have enough energy to approach the positively charged nucleus to within range of the strong nuclear force.

A typical nuclear reaction involves two reacting particles—a heavy target nucleus and a light bombarding particle—and produces two new particles—a heavier product nucleus and a lighter ejected particle. In the first observed nuclear reaction (1919), Ernest Rutherford bombarded nitrogen with alpha particles and identified the ejected lighter particles as hydrogen nuclei or protons (${}^1_1$H or p) and the product nuclei as a rare oxygen isotope. In the first nuclear reaction produced by artificially accelerated particles (1932), the English physicists J.D. Cockcroft and E.T.S. Walton bombarded lithium with accelerated protons and thereby produced two helium nuclei, or alpha particles. As it has become possible to accelerate charged particles to increasingly greater energy, many high-energy nuclear reactions have been observed that produce a variety of subatomic particles called mesons, baryons, and resonance particles.

nuclear reactor, any of a class of devices that can initiate and control a self-sustaining series of nuclear fissions.

A brief treatment of nuclear reactors follows. For full treatment, *see* MACROPAEDIA: Energy Conversion.

In the fission process, a heavy nucleus such as uranium absorbs a neutron, after which it splits into two fragments of nearly equal mass. A substantial amount of energy is released simultaneously, as are several neutrons. These may then strike other heavy nuclei and cause them to fission. The continuous recurrence of this process results in a chain reaction in which many billions of nuclei may fission within a small fraction of a second. In a nuclear reactor such a self-sustaining series of fissions is carefully controlled, making it possible to utilize the enormous amount of energy released. This energy occurs in the form of radiation and the kinetic energy of the fission products expelled at high speeds. Much of it becomes thermal energy as the fission products come to rest. Some of the thermal energy is used to heat water and convert it to high-pressure steam. This steam drives a turbine, and the turbine's mechanical energy is then converted into electricity by means of a generator. Besides providing a valuable source of electric power for commercial use, nuclear reactors also serve to propel certain types of military surface vessels, submarines, and some unmanned spacecraft. Another major application of reactors is the production of radioactive isotopes that are used extensively in scientific research, medical therapy, and industry. These isotopes are created by bombarding nonradioactive substances with the neutrons released during fission.

The only material occurring in nature that is readily fissionable and able to sustain a chain reaction is the uranium isotope U-235. It is a rare isotope; in natural uranium it is outnumbered roughly 140 to 1 by another isotope, U-238. When a single slow-moving neutron collides with the nucleus of a U-235 atom, the nucleus becomes suddenly so unstable that it splits into two major fragments and releases, on the average, two or three neutrons. Of these neutrons, at least one must succeed in producing another fission if the chain reaction is to persist. This is difficult to accomplish with natural uranium. Because its concentration of U-235 nuclei is so small, the neutrons may escape the nuclear fuel without colliding with the fissionable nuclei, or they may strike the more plentiful U-238 nuclei and be absorbed. To reduce the possibility of this happening, enriched uranium, which contains a higher percentage of U-235 than does natural uranium, is often used instead of the latter as reactor fuel. Enrichment can be achieved by various processes, as, for example, gaseous diffusion. Since the energy from nuclear fuels would be limited if only U-235 were utilized, reactors known as breeder reactors have been designed to convert nonfissionable uranium or other elements into fissionable isotopes. *See also* breeder reactor.

Most commercial power reactors of the conventional variety require a moderator to slow neutrons to a tiny fraction of their initial speed so as to increase their likelihood of causing fissions of U-235. Such substances as ordinary water (termed light water), deuterium oxide (heavy water), and graphite have been found to be effective moderators because they are able to slow down neutrons during the fission process without appreciably reducing their number by absorption.

Control of the rate at which neutrons are emitted, and thus of the reaction, is achieved by introducing materials, usually in the form of rods, that readily absorb slow neutrons. Typically, rods made of cadmium or boron are gradually withdrawn from the reactor core until a chain reaction is initiated. They are reinserted into the core if the series of fissions begins to proceed at too great a rate, which would result in the release of an excessive amount of thermal energy and radiation and possibly cause meltdown of the core.

The heat released by fission is removed from the reactor core by a coolant, either liquid or gaseous, that is circulated through the core. Desirable coolants have good heat-transfer properties as well as low neutron-absorbing properties. Both light water and heavy water have been employed, as have liquid metals (*e.g.,* sodium), helium, and several other substances.

As a chain reaction continues, fission products accumulate in the reactor core. Most of these fragments are intensely radioactive and emit harmful gamma rays and neutrons. Consequently, the reactor must be surrounded by thick, heavy concrete shielding to protect operators and other individuals in the vicinity against radiation from these fragments and from that arising directly from the fission process itself.

The disposal of radioactive fission products and spent-fuel assemblies poses a more difficult problem than does the containment of radiation in the reactor core. Some of these nuclear wastes remain dangerously radioactive for thousands of years and thus must be eliminated or stored permanently. As yet, however, no practical method of safe and permanent disposal has been implemented.

The world's first nuclear reactor was built at the University of Chicago under the direction of the Italian-born physicist Enrico Fermi; it produced a chain reaction on Dec. 2, 1942. Immediately following World War II, scientists and engineers in various other countries undertook efforts to develop reactors for large-scale power production. In 1956 Great Britain opened at Calder Hall, Eng., the first full-scale commercial nuclear-power plant. The first such American power station went into operation in 1957. The number of large nuclear-power plants proliferated rapidly in many industrialized countries until about the late 1970s. Since that time, there has been a significant slowdown in the deployment of nuclear energy for commercial power production. This has resulted largely because of a sharp decrease in the projected rate of increase in electric-power demand, rising costs of constructing new nuclear plants, and public fears of nuclear power due to major accidents at the Three Mile Island power station, near Harrisburg, Pa., in the United States, and the Chernobyl installation in the Soviet Union. France, Japan, South Korea, and Taiwan, which have few alternative-energy resources, however, have continued to increase their use of nuclear power.

Nuclear Regulatory Commission (NRC), an independent regulatory agency that is responsible for overseeing the civilian use of nuclear materials in the United States. The NRC was established on Oct. 11, 1974, by President Gerald Ford as one of two successor organizations to the Atomic Energy Commission (AEC), which became defunct on that same day. The NRC took over the AEC's responsibility for seeing that civilian nuclear materials and facilities are used safely and affect neither the public health nor the quality of the environment. The commission's activities focus on the numerous nuclear reactors in the United States that are used to generate electricity on a commercial basis. It licenses the construction of new nuclear reactors and regulates their operation on a continuing basis. It oversees the use, processing, handling, and disposal of nuclear materials and wastes, inspects nuclear-power plants and monitors both their safety procedures and their security measures, enforces compliance with established safety standards, and investigates nuclear accidents. The NRC's commissioners are appointed by the president of the United States.

Nuclear Test-Ban Treaty, formally TREATY BANNING NUCLEAR WEAPONS TESTS IN THE ATMOSPHERE, IN OUTER SPACE AND UNDER WATER, treaty that banned all tests of nuclear weapons except those conducted underground.

The origins of the treaty lay in worldwide public concern over the danger posed by atmospheric radioactive fallout produced by the above-ground testing of nuclear weapons. This problem had become an important public issue by 1955, but the first negotiations to ban nuclear tests foundered on differing proposals and counterproposals made by the United States and the Soviet Union, which were the two dominant nuclear powers at the time. During most of 1959 both the United States and the Soviet Union temporarily suspended their testing, but negotiations over the next two years were slowed by renewed Cold War tensions between the two nations. A gradual rapprochement between the United States and the Soviet Union was speeded up by the Cuban Missile Crisis (October 1962), which vividly illustrated the dangers of nuclear confrontation. The Anglo-American and Soviet proposals for a draft treaty came to resemble one another during late 1962, and, after only 10 days of discussion in Moscow in July–August 1963, representatives of the three nuclear powers pledged themselves for an "unlimited duration" to conduct no more nuclear-weapons tests in the atmosphere, underwater, or in space.

The Nuclear Test-Ban Treaty was signed in Moscow on Aug. 5, 1963, by the United States, the U.S.S.R., and the United Kingdom as the original parties. The treaty banned nuclear-weapons tests in the atmosphere, in outer space, and underwater but permitted underground testing and required no control posts, no on-site inspection, and no international supervisory body. It did not reduce nuclear stockpiles, halt the production of nuclear weapons, or restrict their use in time of war. The treaty was signed within a few months by more than 100 governments, notable exceptions being France and the People's Republic of China. The three original parties to the treaty, the United States, the United Kingdom, and the Soviet Union, have the power to veto treaty amendments. Any amendment must be approved by a majority of all the signatory nations, including all three of the original parties.

nuclear weapon, also called ATOMIC WEAPON, or THERMONUCLEAR WEAPON, bomb or other warhead that derives its force from either the fission or the fusion of atomic nuclei and is delivered by an aircraft, missile, Earth satellite, or other strategic delivery system.

A brief treatment of nuclear weapons follows. For full treatment, *see* MACROPAEDIA: War, The Technology of.

Nuclear weapons are the most potent explosive devices yet invented and may be deployed in such "delivery systems" as missiles and even artillery shells. They derive their destructive force from energy contained in the core, or nucleus, of atoms. This energy may be explosively released in two types of nuclear reactions: fission, in which heavy-element nuclei break down into fragments (which actually constitute lighter elements), and fusion, in which the nuclei of the lightest element (hydrogen) are squeezed together at high temperatures and fuse to form helium nuclei. Nuclear weapons are accordingly classified as fission (or "atomic") or fusion ("hydrogen," or "thermonuclear") bombs.

The bombs. Fission devices use uranium or plutonium as fuel. When a sufficient amount of the fuel is suddenly brought together, the fission of one nucleus causes the fission of others; these bring about the fission of still more in turn. The process continues until all the fuel is consumed. This is called a chain reaction, and the amount of fuel needed for it to occur is called the critical mass. The critical mass depends upon the type and purity of the fuel and upon the amount (mass) of the fuel present. In gun-type devices, one subcritical-sized piece of fuel is fired down a gunlike barrel into another, so that there is a supercritical amount at the moment of impact that initiates the chain reaction. In implosion-type devices, explosives surround a hollow sphere of fissionable fuel, which at the moment of detonation is squeezed into one supercritical mass. The implosion technique is the more effective and requires less fuel.

Fusion devices are inherently vastly more powerful than those utilizing only fission, although very small ones have also been developed (*see* neutron bomb). A fission bomb is used as a detonator, to generate the extremely high temperatures needed to induce the atomic nuclei of hydrogen isotopes (deuterium and tritium) to combine, or fuse. Special radiation reflectors inside the bomb are used to control the X-ray and gamma-ray "radiation pressure" generated by the fission bomb, which would otherwise radiate outward. The reflectors direct the radiation pressure in such a way that it squeezes a small cylinder containing the fuel simultaneously from all sides. This has to be done before other, slower-moving blast fragments destroy the shields and other parts of the bomb; only a millionth of a second delay is required, however, for the radiation to race ahead of the blast fragments and cause fusion.

The explosive force, or "yield," of a nuclear device is measured in the number of thousands of tons (kilotons) or millions of tons (megatons) of TNT that it would take to generate an equivalently powerful blast. Fission bombs are usually measured in kilotons, while fusion bombs with yields of up to about 60 megatons have been tested.

History. A mere six years elapsed between the discovery of fission and the use of its energy to destroy the Japanese city of Hiroshima. Early in 1939 several physicists concluded that when atoms of a certain isotope of uranium are bombarded with neutrons, they split, releasing energy and more neutrons. The discovery that upon absorbing one neutron the uranium atom emits a few more raised the possibility of staging an energy-releasing chain reaction. U.S. President Franklin D. Roosevelt was alerted to the military significance of nuclear fission, and in response he created what became known as the Manhattan Project, which was given the task of designing and building the first atomic bomb. The Manhattan Project involved teams of scientists working on separate problems at several locations throughout the United States. On Dec. 2, 1942, a milestone in the project was reached when a self-sustaining chain reaction was achieved by the project's scientists in Chicago. Researchers at Los Alamos, N.M., tested the first atomic bomb on July 16, 1945. The test bomb was named *Trinity,* had a yield of 21 kilotons, and was of an implosion-type, plutonium-fuel design. It was an untested gun-type uranium bomb, however, that was dropped by a B-29 bomber on Hiroshima on Aug. 6, 1945, destroying two-thirds of the city. A duplicate of the *Trinity* bomb was dropped on Nagasaki three days later.

The development of atomic bombs was then undertaken by several other countries. The Soviet Union tested its first fission bomb in 1949, the United Kingdom in 1952, France in 1960, China in 1964, and India in 1974. Several other nations since then are reported to have acquired sufficient knowledge and materials to be able to produce nuclear weapons. Development of the fusion bomb followed that of the fission bomb, in part because of the elaborate calculations involved, which had to be carried out on the most advanced computers then available. On Nov. 1, 1952, the United States successfully tested the first thermonuclear fusion device on an island in the Pacific. The Soviet Union tested its first device in 1953, the United Kingdom in 1957, China in 1967, and France in 1968.

Effects and implications. The actual blast of a nuclear device is only one of its destructive effects. Others are the blinding light and searing heat that it produces, and still another is an amount of lethal radiation that may persist in the environment for hundreds or even thousands of years in the form of highly toxic radioactive isotopes. This "fallout," or radioactive dust kicked up by the blast into the atmosphere, may be carried by winds over great distances, posing a long-term radioactivity hazard.

The strategic effectiveness of nuclear weapons ultimately depends not so much upon their explosive power as upon the indetectability and accuracy of the delivery system used. The Hiroshima and Nagasaki bombs were carried by large, vulnerable airplanes. Today, nuclear devices have been sufficiently miniaturized to fit inside missiles and even artillery shells. The development of computerized missile-guidance systems has made possible MIRVs, or multiple warheads, each of which is independently guided to a different target after release by the carrier missile at the start of reentry from space. Missiles may also be launched from submarines or from land-based mobile launchers or "hardened" silos.

The first talks to restrict testing of nuclear weapons were carried out between the Soviet Union and the United States in the mid-1950s. In 1963 a Nuclear Test-Ban Treaty (*q.v.*) was worked out between the United States, the Soviet Union, and the United Kingdom—a treaty that all but a few nations have signed. Negotiations to limit or dismantle the weapons themselves (Strategic Arms Limitation Talks; Intermediate-Range Nuclear Forces Treaty; *qq.v.*) were conducted from the 1960s. *See also* arms control.

nuclear winter, the environmental devastation that certain scientists contend would probably result from the hundreds of nuclear explosions in a nuclear war. The damaging effects of the light, heat, blast, and radiation caused by nuclear explosions had long been known to scientists, but such explosions' indirect effects on the environment remained largely ignored for decades. In the 1970s, however, several studies posited that the layer of ozone in the stratosphere that shields living things from much of the Sun's harmful ultraviolet radiation might be depleted by the large amounts of nitrogen oxides produced by nuclear explosions. Further studies speculated that large amounts of dust kicked up into the atmosphere by nuclear explosions might block sunlight from reaching the Earth's surface, leading to a temporary cooling of the air. Scientists then began to take into account the smoke produced by vast forests set ablaze by nuclear fireballs, and in 1983 an ambitious study, known as the TTAPS study (from the initials of the last names of its authors, R.P. Turco, O.B. Toon, T.P. Ackerman, J.B. Pollack, and Carl Sagan), took into consideration the crucial factor of smoke and soot arising from the burning petroleum fuels and plastics in nuclear-devastated cities. (Smoke from such materials absorbs sunlight much more effectively than smoke from burning wood.) The TTAPS study coined the term "nuclear winter," and its ominous hypotheses about the environmental effects of a nuclear war came under intensive study by both the American and Soviet scientific communities.

The basic cause of nuclear winter, as hypothesized by researchers, would be the numerous and immense fireballs caused by exploding nuclear warheads. These fireballs would ignite huge uncontrolled fires (firestorms) over any and all cities and forests that were within range of them. Great plumes of smoke, soot, and dust would be sent aloft from these fires, lifted by their own heating to high altitudes where they could drift for weeks before dropping back or being washed out of the atmosphere onto the ground. Several hundred million tons of this smoke and soot would be shepherded by strong west-to-east winds until they would form a uniform belt of particles encircling the Northern Hemisphere from 30° to 60° latitude. These thick black clouds could block out all but a fraction of the Sun's light for a period as long as several weeks. Surface temperatures would plunge for a few weeks as a consequence, perhaps by as much as 11° to 22° C (20° to 40° F). The conditions of semidarkness, killing frosts, and subfreezing temperatures, combined with high doses of radiation from nuclear fallout, would interrupt plant photosynthesis and could thus destroy much of the Earth's vegetation and animal life. The extreme cold, high radiation levels, and the widespread destruction of industrial, medical, and transportation infrastructures along with food supplies and crops would trigger a massive death toll from starvation, exposure, and disease. A nuclear war could thus reduce the Earth's human population to a fraction of its previous numbers.

A number of scientists have disputed the results of the original calculations, and, though such a nuclear war would undoubtedly be devastating, the degree of damage to life on Earth remains controversial.

nuclease, any enzyme that cleaves nucleic acids. Nucleases, which belong to the class of enzymes called hydrolases, are usually specific in action, ribonucleases acting only upon ribonucleic acids (RNA) and deoxyribonucleases acting only upon deoxyribonucleic acids (DNA). Some enzymes having a general action (such as phosphoesterases, which hydrolyze phosphoric acid esters) can be called nucleases because nucleic acids are susceptible to their action. Nucleases are found in both animals and plants.

Restriction enzymes are nucleases that split only those DNA molecules in which they recognize particular subunits. Some split the target DNA molecule at random sites (Type I), but others split the molecule only at the recognition site (Type II) or at a fixed distance from the recognition site (Type III). Type II and III restriction enzymes are powerful tools in the elucidation of the sequence of bases in DNA molecules. They play a fundamental role in the field of recombinant DNA technology, or genetic engineering.

nucleation, the initial process that occurs in the formation of a crystal from a solution, a liquid, or a vapour, in which a small number of ions, atoms, or molecules become arranged in a pattern characteristic of a crystalline solid, forming a site upon which additional particles are deposited as the crystal grows.

Nucleation processes are classed as heterogeneous or homogeneous. In the former, the surface of some different substance, such as a dust particle or the wall of the container, acts as the centre upon which the first atoms, ions, or molecules of the crystal become properly oriented; in the latter, a few particles come into correct juxtaposition in the course of their random movement through the bulk of the fluid. Heterogeneous nucleation is more common, but the homogeneous mechanism becomes more likely as the degree of supersaturation or supercooling increases. Substances differ widely in the likelihood that they will crystallize under conditions in which the crystalline state is the inherently stable one; glycerol is a well-known example of a compound prone to supercooling.

nucleic acid, any of the substances that comprise the genetic material of living cells. Nucleic acids direct the course of protein synthesis, thereby regulating all cell activities. Furthermore, by their transmission from one generation to the next, nucleic acids are the vehicle for inherited characteristics.

A brief treatment of nucleic acids follows. For full treatment, *see* MACROPAEDIA: Biochemical Components of Organisms.

The molecules of nucleic acids are long chains consisting of repeating structural units called nucleotides. Each nucleotide is made up of a central sugar group, to which are attached a phosphate group and a nitrogenous organic base. Although oversimplified, it is helpful to visualize the phosphate group and the nitrogenous base as being oriented at right angles to each other. The backbone of the nucleic acid molecule is formed by the bonding of the sugar group of one nucleotide to the phosphate group of the next. The nitrogenous bases protrude from the backbone.

The two classes of nucleic acids—ribonucleic acids (RNAs) and deoxyribonucleic acids (DNAs)—differ in that the sugar in RNA is ribose, while in DNA the sugar is deoxyribose. They also differ in their nitrogenous bases: while the bases adenine, guanine, and cytosine are present in both DNA and RNA, the base uracil is found only in RNA and the base thymine occurs only in DNA. (Also, RNA may contain some additional, unusual bases.)

DNA is the major constituent of chromosomes in all cells, including those of bacteria and blue-green algae. DNA is also present in certain cell organelles, namely mitochondria and chloroplasts. RNA is commonly present in the nucleus and cytoplasm of cells. Most cytoplasmic RNA is associated with ribosomes, small particles that are the site of protein synthesis. Viruses, which are noncellular, contain a single nucleic acid molecule, either RNA or DNA.

The biological function of DNA is the preservation and transmission of a genetic message, which is encoded in the sequence of its bases. In 1953 J.D. Watson and F.H.C. Crick announced that the DNA molecule consists of two chains, or strands, of polynucleotides coiled around each other to form a double helix in which the bases of one strand are weakly bound—by hydrogen bonds—to complementary bases of the other. Adenine is paired with thymine, and cytosine with guanine. The entire configuration resembles a twisted ladder, with sides composed of sugar and phosphate groups and rungs made up of paired bases.

The Watson–Crick model helps to show how DNA passes along its encoded message from one generation of cells to the next: prior to cell division (mitosis), the double strands disengage, and each separate strand serves as a template upon which a new, complementary strand forms. Thus, one molecule of DNA forms two identical molecules of DNA, each containing one strand from the original DNA molecule and a newly synthesized strand. When the cell divides in two, each daughter cell receives one of the identical copies.

DNA replication also precedes meiosis, the process by which sex cells (sperm and eggs) are formed. Meiosis, however, involves two divisions, so that each sperm or egg winds up with half the DNA of the original cell. The union of a sperm and an egg marks the beginning of a new individual. This new organism has a full complement of DNA—half contributed by its male parent and half contributed by its female parent.

Most DNA molecules share a common genetic function and structural pattern, but RNA molecules perform several functions in the cell and their properties vary accordingly.

RNA exists in three forms in cells, and all are involved in protein synthesis. Messenger RNA (mRNA) is a single-stranded molecule that carries genetically coded information from DNA to the ribosomes. A molecule of mRNA forms by transcription. In this process, a portion of the double-stranded DNA molecule unwinds, exposing its nitrogenous bases. A complementary strand of mRNA forms along one of the unwound DNA strands. This mRNA molecule carries the DNA instructions for the synthesis of a particular protein (or part of a protein). The mRNA molecule detaches from its DNA template and travels to the ribosomes.

Ribosomes consist of various proteins and the second form of RNA—ribosomal RNA (rRNA). The precise function of rRNA is uncertain, but protein synthesis cannot occur in its absence.

The third form of RNA—transfer RNA (tRNA)—transports amino acids to the proper site along the mRNA. Amino acids are the structural components of proteins. Sets of three bases in a molecule of mRNA code for a particular amino acid; these three-base sequences are called codons. The tRNA has complementary sequences of three bases, known as anticodons, which signal the identity of the amino acid it carries; these anticodons link up with the appropriate codons on the mRNA. Once in place, the amino acids are linked together. The synthesis of proteins according to the instructions coded in the mRNA is known as translation.

Mistakes can occur during the replication, transcription, and translation of genetic information. Mutations are changes in the structure of the DNA and are passed to the cell's descendants. One base may replace another (base substitution), or one or more bases may be added (insertion) or lost (deletion).

nucleolus (cellular biology): *see* nucleus.

nucleon, either of the subatomic particles, the proton and the neutron, constituting atomic nuclei. Protons (positively charged) and neutrons (uncharged) behave identically under the influence of the short-range nuclear force, both in the way they are bound in nuclei and in the way they are scattered by each other. This strong interaction is independent of electric charge. Unstable subatomic particles heavier than nucleons (hyperons and baryon resonances) have a nucleon among their final decay products; the nucleon is thus the baryon ground state. The antinucleons include the antiproton and the antineutron.

nucleophile, in chemistry, an atom or molecule that in chemical reaction seeks a positive centre, such as the nucleus of an atom, because the nucleophile contains an electron pair available for bonding. Examples of nucleophiles are the halogen anions (I^-, Cl^-, Br^-), the hydroxide ion (OH^-), the cyanide ion (CN^-), ammonia (NH_3), and water. *Compare* electrophile.

nucleoprotein, conjugated protein consisting of a protein linked to a nucleic acid, either DNA (deoxyribonucleic acid) or RNA (ribonucleic acid). The protein combined with DNA is commonly either histone or protamine; the resulting nucleoproteins are found in chromosomes. Many viruses are little more than organized collections of deoxyribonucleoproteins. Little is known about the proteins linked with RNA; unlike protamine and histone, they appear to contain the amino acid tryptophan.

nucleoside, a structural subunit of nucleic acids, the heredity-controlling components of all living cells, consisting of a molecule of sugar linked to a nitrogen-containing organic ring compound. In the most important nucleosides, the sugar is either ribose or deoxyribose, and the nitrogen-containing compound is either a pyrimidine (cytosine, thymine, or uracil) or a purine (adenine or guanine).

Nucleosides are usually obtained by chemical or enzymatic decomposition of nucleic acids. Details of the structures of several natural nucleosides determined in the period 1891–1911 include the identities of the sugars and the nitrogenous compounds, the size of the ring of atoms in the sugar molecules, and the point of attachment between the two components. Chemical syntheses of adenosine and guanosine were described in 1948; since that time there has been rapid progress in the synthesis of nucleosides and their combination into nucleic acids. Puromycin and certain other antibiotics are nucleosides produced by molds or fungi.

nucleosynthesis, production on a cosmic scale of all the species of chemical elements from perhaps one or two simple types of atomic nuclei, a process that entails large-scale nuclear reactions including those in progress in the Sun and other stars. Chemical elements differ from one another on the basis of the number of protons (fundamental particles that bear a positive charge) in the atomic nuclei of each. Species of the same element, or isotopes, in addition, differ from each other in mass or on the basis of the number of neutrons (neutral fundamental particles) in their nuclei. Nuclear species can be transformed into other nuclear species by reactions that add or remove protons or neutrons or both.

Many of the chemical elements up to iron (atomic number 26) and their present cosmic abundances may be accounted for by successive nuclear fusion reactions beginning with hydrogen and perhaps some primeval helium. By repeated nuclear fusion, four hydrogen nuclei amalgamate into a helium nucleus. Helium nuclei, in turn, can be built up into carbon (three helium nuclei), oxygen (four helium nuclei), and other heavier elements.

Elements heavier than iron and some isotopes of lighter elements may be accounted for by capture of successive neutrons. The capture of a neutron increases the mass of a nucleus; subsequent radioactive beta decay converts a neutron into a proton (with ejection of an electron and an antineutrino), leaving the mass practically unchanged. The increase in the number of protons builds the nucleus to higher atomic numbers.

nucleotide, any member of a class of organic compounds in which the molecular structure comprises a nitrogen-containing unit (base) linked to a sugar and a phosphate group. The nucleotides are of great importance to living organisms, as they are the building blocks of nucleic acids, the substances that control all hereditary characteristics.

A brief treatment of nucleotides follows. For full treatment, *see* MACROPAEDIA: Biochemical Components of Organisms.

In the two families of nucleic acids, ribonucleic acid (RNA) and deoxyribonucleic acid (DNA), the sequence of nucleotides in the DNA or RNA codes for the structure of proteins synthesized in the cell. The nucleotide adenosine triphosphate (ATP) supplies the driving force of many metabolic processes. Several nucleotides are coenzymes; they act with enzymes to speed up (catalyze) biochemical reactions.

The nitrogen-containing bases of nearly all nucleotides are derivatives of three heterocyclic compounds: pyrimidine, purine, and pyridine. The most common nitrogen bases are the pyrimidines (cytosine, thymine, and uracil), the purines (adenine and guanine), and the pyridine nicotinamide.

Nucleosides are similar to nucleotides except that they lack the phosphate group. Nucleosides themselves rarely participate in cell metabolism.

Adenosine monophosphate (AMP) is one of the components of DNA and RNA and also the organic component of the energy-carrying molecule ATP (adenosine triphosphate). In certain vital metabolic processes, AMP combines with inorganic phosphate to form ADP (adenosine diphosphate) and then ATP. The breaking of the phosphate bonds in ATP releases great amounts of energy that are consumed in driving chemical reactions or contracting muscle fibres. Cyclic AMP, another nucleotide, is involved in regulating many aspects of cellular metabolism, such as the breakdown of glycogen.

A dinucleotide, nicotinamide adenine dinucleotide (NAD), participates in many oxidation reactions as an electron carrier, along with the related compound nicotinamide adenine dinucleotide phosphate (NADP). These substances act as cofactors to certain enzymes.

nucleus, in biology, a specialized structure occurring in most cells (except bacteria and blue-green algae) and separated from the rest of the cell by a double layer, the nuclear membrane. This membrane seems to be continuous with the endoplasmic reticulum (a membranous network) of the cell and has pores, which probably permit the entrance of large molecules. The nucleus controls and regulates the activities of the cell (*e.g.,* growth and metabolism) and carries the genes, structures that contain the hereditary information. Nucleoli are small bodies often seen within the nucleus; they play an important part in the synthesis of ribonucleic acid (RNA) and protein. The gellike matrix in which the nuclear components are suspended is the nucleoplasm.

A cell normally contains only one nucleus; under some conditions, however, the nucleus divides but the cytoplasm does not. This produces a multinucleate cell (syncytium) such as occurs in skeletal muscle fibres. Some cells—*e.g.,* the human red blood cell—lose their nuclei upon maturation. *See also* cell.

nucleus, in physics, the core of an atom. *See* atom.

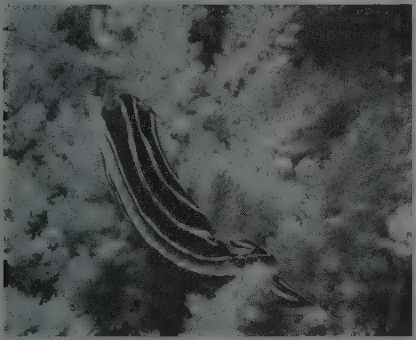
nuclide, also called NUCLEAR SPECIES, species of atom as characterized by the number of protons, the number of neutrons, and the energy state of the nucleus. A nuclide is thus characterized by the mass number (A) and the atomic number (Z). To be regarded as distinct a nuclide must have an energy content sufficient for a measurable lifetime, usually more than 10^{-10} second. The term nuclide is not synonymous with isotope, which is any member of a set of nuclides having the same atomic number but differing mass number.

Chlorine-37, the nucleus of which consists of 17 protons and 20 neutrons, is a different nuclide from sodium-23 (nucleus of 11 protons and 12 neutrons) or chlorine-35 (nucleus of 17 protons and 18 neutrons). Nuclear isomers, which have the same number of protons and neutrons but differ in energy content and radioactivity, are also distinct nuclides.

Nuclides are commonly expressed in the form $^{A}_{Z}\mathrm{X}$, where A denotes the total number of protons and neutrons, Z represents the number of protons, and the difference between A and Z is the number of neutrons. Thus $^{37}_{17}\mathrm{Cl}$ signifies chlorine-37.

Nuclides are associated with radioactive decay and may be stable or unstable species. About 1,700 nuclides are known, of which about 300 are stable and the rest radioactive.

nudibranch, also called SEA SLUG, any of the marine gastropods that constitute the order Nudibranchia (subclass Opisthobranchia of the class Gastropoda). Nudibranchs characteristically lack a shell, gills, and mantle cavity. The delicately coloured body has bizarre outgrowths, called cerata, which serve a defensive function, discharging nematocysts that the nudibranch has ingested from cnidarian prey. Antenna-like organs (rhinophores) arise from the animal's head. Nudibranchs reach lengths of 43 cm (16 inches).



Doridacean nudibranch (*Glossodoris*)
Douglas Faulkner

Nudibranchs occur in the shallow waters of all the world's oceans, where they feed chiefly on other invertebrates, particularly sea anemones. Those of the family Tethyidae can swim. Among bottom creepers in cold northern seas is the bushy-backed sea slug (*Dendronotus frondosus*), named for its stalked, lacy cerata. Occurring worldwide in warm seas are the blue sea slug (*Glaucus marina,* or *G. atlanticus*) and the doridacean nudibranchs such as *Doris* and *Glossodoris. See* gastropod.

The term sea slug is sometimes used to refer to all members of the subclass Opisthobranchia (*see* opisthobranch).

nudism, also called NATURISM, the practice of going without clothes, generally for reasons of health or comfort. Nudism is commonly a social practice in which the sexes interact freely but without engaging in sexual activities. The origin of the practice in Germany in the early 20th century coincided with a rebellion against the rigid moral attitudes of the late 19th century. Nudism spread through Europe after World War I and became established in North America during the 1930s; in the United States and Canada, however, the practice has remained restricted to a few secluded camps and beaches. The atmosphere of these camps is generally deliberately nonerotic, and most are governed by strict rules of conduct.

Although public nudity of varying degrees has become increasingly common in the latter part of the 20th century, nudism still is not widely accepted. Most nudists are adults, although families sometimes participate. Adults who practice nudism have been found to be psychologically healthy, but the impact of nudism on children is a subject of dispute among psychologists.

nuée ardente (French: "fiery cloud," or "glowing cloud"), highly destructive, incandescent mass of gas-enveloped volcanic particles that is associated with Pelean eruptions. These glowing avalanches, as they are sometimes called, can move very quickly down even slight inclines and may attain speeds as great as 160 km (100 miles) per hour. The temperature of the volcanic gases can reach about 600° to 700° C (1,100° to 1,300° F). *Nuées ardentes* are exceedingly destructive, killing all living things in their paths.

In some volcanic eruptions, the violent expansion of gas shreds the escaping magma into small, discrete particles. Both these masses of incandescent particles and the spectacular convoluting clouds of dust that rise above them actively liberate more gas. This series of expanding gas envelopes accounts for the nearly frictionless character of the flow as well as its great mobility and destructive power.

Most *nuées ardentes* occur in the Circum-Pacific region known as the Ring of Fire, but they may also occur in volcanic eruptions elsewhere. In 1902 the cloud of incandescent ash accompanying a glowing avalanche swept down on the city of St. Pierre, at the foot of Mount Pelée in the West Indies, killing all but two of a population of about 30,000 persons.

Nuer, people who live in the marshy and savanna country on both banks of the Nile River in the southern Sudan. They speak an Eastern Sudanic language of the Chari-Nile branch of the Nilo-Saharan family.

The Nuer are a cattle-raising people, devoted to their herds, although milk and meat must be supplemented by the cultivation of millet and the spearing of fish. Because the land is flooded for part of the year and parched for the rest of it, they spend the rainy season in permanent villages built on the higher ground and the dry season in riverside camps.

Politically, the Nuer form a cluster of autonomous communities, within which there is little unity and much feuding; the frequent homicides are settled by payments of cattle effected through the mediation of a priest. The basic social group is the patrilineal clan. The members of a clan have in their territory a slightly privileged status, although they form a minority of its population. The majority belong to other clans or are descendants of the neighbouring Dinka (*q.v.*), large numbers of whom have been subdued by the Nuer and incorporated into their society. In each community the men are divided into six age sets.

Marriage, which is polygynous, is marked by the giving of cattle by the bridegroom's people to the bride's kin. Because it is held that every man must have at least one male heir, it is the custom for a man's kin, should he die unmarried, to marry a wife to his name and beget children by her.

The Nuer pray and sacrifice to a spirit associated with the sky but also thought to be ubiquitous, like the air. This spirit is conceived of as a single creative spirit in relation to mankind as a whole; but it is also figured in different representations in relation to different social groups, such as clans, lineages, and age sets, and it may then be symbolized by material forms, often animals or plants.

Nueva Casas Grandes (Mexico): *see* Nuevo Casas Grandes.

Nueva Esparta, island *estado* ("state"), northeastern Venezuela. It lies off the Araya Peninsula of the mainland. Nueva Esparta consists of Margarita (*q.v.*), largest of the islands, and two small neighbours, Cubagua and Coche. There are numerous small islands in the area; most of them remain uninhabited. These islands are directly dependent on the federal government. Margarita dominates the economic life of the state and contains most of the population. Porlamar, in southeastern Margarita, is the largest town. La Asunción (*q.v.*), the state capital, boasts a colourful history and much distinguished architecture. Puerto Fermín is an important fishing port, and there are many small fishing villages. Fishing, pearl fishing, a tuna- and sardine-canning industry, and tourism are the principal economic activities. Pearling has been important almost since the time of Columbus, but many of the oyster beds are in danger of depletion. Freshwater is supplied by underwater pipeline from the mainland to Margarita. Area 440 square miles (1,150 square km). Pop. (1994 est.) 316,776.

Nueva Gerona, city, capital of the Cuban island *provincia* of Isla de la Juventud ("Isle of Youth"; until 1978, Isla de Pinos ["Isle of Pines"]), in the Caribbean Sea, just south of Cuba. It is situated on the western bank of the Las Casas River about 6 miles (10 km) above its mouth on the northern coast of the island. The city and its harbour are the principal market and export centre for the agricultural products of the island: citrus fruits (grapefruit, oranges, tangerines), mangoes, melons, and other tropical fruits. Marble-dimension stone and kaolin, used in the making of porcelain, are produced locally as well. For three centuries the island was the haunt of pirates of many nationalities, and it was not until 1830 that the city of Nueva Gerona was founded by Francisco Dionisio Vives. A museum and planetarium just south of the city contain archaeological exhibits of the island's history. Pop. (1990 est.) 40,411.

Nueva Ocotepeque, also called OCTOTEPEQUE, town, western Honduras. It lies along the Lempa River at 2,641 feet (805 m) above sea level. The town was originally situated just to the northeast, at the site of Ocotepeque, but it was relocated after the Marchala River, a tributary of the Lempa, overflowed in 1935. Nueva Ocotepeque is a trading centre in a fertile agricultural region. Pop. (1988 prelim.) 6,667.

Nueva Rosita, city, north-central Coahuila *estado* ("state"), northeastern Mexico. It is situated 1,410 feet (430 m) above sea level, on the Sabinas River, 65 miles (105 km) southwest of Piedras Negras, on the Mexico–United States border. The city's location in the Sabinas coal district led to its development, and since the 1930s it has become a prominent industrial centre, with a zinc smelter producing zinc sulfate and sulfuric acid, as well as coke. Pop. (1990) 36,300.

Nueva San Salvador, also called SANTA TECLA, city, west-central El Salvador. Founded in 1854 as Nueva Ciudad de San Salvador at the southern base of San Salvador Volcano, it briefly became the national capital when San Salvador (7 miles [11 km] east) was devastated by an earthquake. In 1859 the seat of government was moved back to San Salvador, which had been rebuilt. The city lies along the Inter-American Highway, a section of the Pan-American Highway, in a densely settled agricultural area. Pop. (1992) 98,392.

Nuevitas, port city, northeastern Camagüey *provincia,* east-central Cuba. It lies on a peninsula jutting out into the sheltered Nuevitas Bay, into which Christopher Columbus sailed to land in the area in 1492. Despite frequent pirate raids in the colonial era, the settlement prospered. Its economic base is now varied: sugarcane, molasses, coffee, sisal, and fruits from the agricultural hinterland are shipped to Nuevitas by railroad and highway. The city's industrial products include lumber, rope, fertilizer, coffee, textiles, soap, and furniture. Sugar refineries and a thermoelectric plant are located nearby. Pop. (1991) 42,694.

Nuevo Casas Grandes, also called NUEVA CASAS GRANDES, city, northern Chihuahua *estado* ("state"), northern Mexico. It lies along the Casas Grandes River, about 130 miles (210 km) southwest of Ciudad Juárez. The city was established in 1886 by members of the Church of Jesus Christ of Latter-day Saints (Mormons), and it remains a Mormon outpost. Situated at an elevation of 4,832 feet (1,473 m), Nuevo Casas Grandes lies 4 miles (7 km) from the extensive, multistoried pre-Columbian ruins called Casas Grandes by the Spaniards who settled the region in the 17th century. Pop. (2000 prelim.) 54,200.

Nuevo Laredo, city and port of entry, northern Tamaulipas *estado* ("state"), northeastern Mexico. It lies along the Rio Grande (Río Bravo del Norte), across from Laredo, Texas. The city is a cattle and natural-gas production centre, and the irrigation of its hinterland has brought some growth since the 1950s. A local bullring attracts tourists. A highway and a railroad linking San Antonio, Texas, with Mexico City, to the south, pass through Nuevo Laredo. Pop. (2000 prelim.) 309,000.

Nuevo León, *estado* ("state"), northeastern Mexico. It is bounded north by the United States, east and southeast by Tamaulipas, south and southwest by San Luis Potosí, and west by Coahuila. The state is crossed by the southeastward-running Sierra Madre Oriental, which has an average elevation of 5,000 feet (1,500 m). Nuevo León's territory contains a variety of climatic and vegetation types. The extreme north consists of the plain along the Rio Grande (Río Bravo del Norte). The climate of almost the entire northern half of the province is arid or semiarid, with sandy wastes that support only cactus and shrubs. Farther south the climate becomes more humid, with forested mountain slopes and subtropical valleys that support a variety of crops.

The state produces few minerals, but quantities of cotton, citrus fruits, sugarcane, cereals (especially corn [maize] and wheat), and vegetables are grown, in part with the aid of irrigation water provided by the international Falcón Dam on the Rio Grande. Nuevo León's principal importance lies in its industries. Its ironworks and steelworks and smelting plants were the first heavy-industrial establishments in Latin America, and the state also supports numerous textile enterprises, a large beer brewery, and other industrial activities. The region was made a state in 1824 and was occupied by U.S. forces during the Mexican War (1846–48). A major railroad and highway linking Laredo, Texas, with the Gulf port of Tampico and Mexico City pass through Monterrey (*q.v.*), the state capital, which also possesses an airport. Area 25,067 square miles (64,924 square km). Pop. (2000 prelim.) 3,826,240.

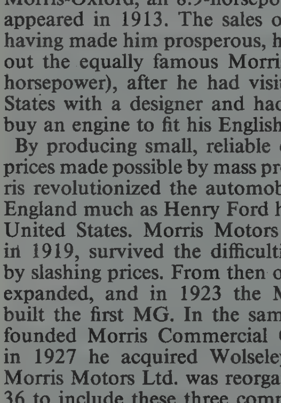
Nuffar (Mesopotamia): *see* Nippur.

Nuffield, William Richard Morris, Viscount, BARON NUFFIELD OF NUFFIELD (b. Oct. 10, 1877, Worcestershire, Eng.—d. Aug. 22, 1963, near Huntercombe, Henley-on-Thames, Oxfordshire), British industrialist and philanthropist whose automobile manufacturing firm introduced the Morris cars.

The son of a farm labourer, Morris was obliged by his father's illness to abandon plans to study medicine and go to work at age 15. Behind his home he set up a bicycle repair shop, built bicycles to order, and raced them with success. Later he sold and maintained motorcycles, an interest he easily extended to automobiles. In 1903 he took in a partner, but their garage went bankrupt. In 1904, with only his tools left and a £50 debt, he started again. He set up works in Cowley, and the first Morris-Oxford, an 8.9-horsepower two-seater, appeared in 1913. The sales of this machine having made him prosperous, he soon brought out the equally famous Morris-Cowley (11.9 horsepower), after he had visited the United States with a designer and had contracted to buy an engine to fit his English chassis.

By producing small, reliable cars at the low prices made possible by mass production, Morris revolutionized the automobile industry in England much as Henry Ford had done in the United States. Morris Motors Ltd., founded in 1919, survived the difficulties of 1920–21 by slashing prices. From then on, the business expanded, and in 1923 the Morris Garages built the first MG. In the same year, Morris founded Morris Commercial Cars Ltd., and in 1927 he acquired Wolseley Motors Ltd. Morris Motors Ltd. was reorganized in 1935–36 to include these three companies and also Riley (Coventry) Ltd. in 1938. After a merger with the Austin Motor Company in 1952, the resulting firm, the British Motor Corporation, became the third largest automobile company in the world.

Morris, who was made a baronet in 1929 and a baron in 1934, was created Viscount Nuffield in 1938. (His marriage was childless, and the peerage became extinct upon his death.) His philanthropic activities began in the early 1930s, beneficiaries including the Nuffield Institute for Medical Research, the University of Oxford; the Nuffield Trust; Nuffield College, Oxford; and the Nuffield Foundation.



Lord Nuffield, 1962

By courtesy of British Leyland Motor Corporation Ltd.

Nuffield Radio Astronomy Laboratories: *see* Jodrell Bank Experimental Station.

Nugaaleed Valley, also called NOGAL VALLEY, also spelled NUGAAL VALLEY, Somali DOOXO NUGAALEED, river valley, northeastern Somalia. It is a shallow valley, long and broad, with an extensive network of seasonal watercourses. The valley's principal watercourses, the Nugaaleed and the more westerly Dheere, fill briefly during and after rainstorms (April to June) and drain into the Indian Ocean. The Nugaaleed Valley is bounded by gradually ascending high plateaus that generally reach elevations of 1,650 to 3,300 feet (500 to 1,000 m) above sea level on the north, west, and south. To the east is a narrow strip of low-lying maritime plains. The beds of the watercourses have a few permanent wells, to which the predominantly nomadic population returns during the dry season. Low and erratic rainfall (about 5 inches [125 mm] annually) and the high salinity of the soil limit crop cultivation. Pastoral nomadism is the primary way of life for most of the people living in the valley. Goat and camel raising form the basis of the economy, and frankincense and myrrh are collected from wild trees.

Nuhayyan, Sheikh Zayed bin Sultan Al (Abu Dhabi emir): *see* Nahyān, Shaykh Zāyid ibn Sulṭān Al.

nuisance, in law, a human activity or a physical condition that is harmful or offensive to others and gives rise to a cause of action. A public nuisance created in a public place or on public land, or affecting the morals, safety, or health of the community, is considered an offense against the state. Such activities as obstructing a public road, polluting air and water, operating a house of prostitution, and keeping explosives are public nuisances. A private nuisance is an activity or condition that interferes with the use and enjoyment of neighbouring privately owned lands, without, however, constituting an actual invasion of the property. Thus, excessive noise, noxious vapours, and disagreeable odours and vibrations may constitute a private nuisance to the neighbouring landowners, although there has been no physical trespass on their lands.

While a public nuisance, as such, is actionable only by the state, through criminal proceedings, injunction, or physical abatement, the same activity or conduct may also create a private nuisance to neighbouring landowners and thus result in a civil suit. The conduct of a business in violation of a zoning ordinance creates a public nuisance, but it also may be actionable as a private nuisance by neighbours who can prove a decrease in the market value of their homes as a result.

Because a private nuisance is based upon interference with the use and enjoyment of land, it is actionable only by persons who have a property interest in such land. If the interference merely makes the use and enjoyment less comfortable, without inflicting physical damage to the land, the courts consider the character of the neighbourhood to determine whether the activity or condition is an unreasonable interference. An activity that causes physical damage to neighbouring land, however, will be held to be an actionable nuisance irrespective of the character of the neighbourhood. Such cases usually involve vibrations that cause walls to crack or noxious vapours that destroy vegetation.

The legal remedies available in the case of a private nuisance are actions to enjoin the operation or continuance of the activity or condition or to collect money damages. If the abatement of a nuisance by injunction would impose an excessive hardship on the community (the closing of factories that would deprive community workers of their livelihood), the usual practice of the courts is to deny an injunction and award money damages for the injury suffered.

Nujoma, Sam, byname of SAMUEL SHAFIIHUMA NUJOMA (b. May 12, 1929, Owambo, South West Africa [now Namibia]), first president of independent Namibia, from 1990.

Nujoma was born to a poor peasant family in the remote Ongandjera region of Owambo (Ovamboland) and spent his early years tending the family's few cattle and goats. His primary education began at night school, and he left school at age 16 to become a railway dining-car steward. After trying to form a trade union for railwaymen, he was discharged and subsequently worked as a clerk and a store assistant.

In the late 1950s he helped found the Ovamboland People's Organization, the forerunner of the South West Africa People's Organization (SWAPO). He went into exile in 1959 and was named president of SWAPO after it was founded on April 19, 1960. After several years of fruitlessly petitioning the United Nations to compel South Africa to release control of South West Africa, SWAPO embarked on an armed struggle in 1966. Although its guerrilla force failed to liberate any territory, it succeeded in focusing international attention on Namibia. In 1973 the UN General Assembly recognized SWAPO as the sole legitimate representative of the Namibian people, and in 1978 the Security Council adopted Resolution 435, which set out terms for eventual Namibian independence and which was finally accepted by South Africa in 1988. In September 1989, after about 30 years in exile, Nujoma returned to Namibia to lead SWAPO to victory in the UN-supervised November elections. On the day of Namibia's independence, March 21, 1990, Nujoma was sworn in as president.

Although often accused of being a Marxist, Nujoma professed himself drawn more to the pragmatism of Scandinavian democratic socialism. He pledged to work for national reconciliation.

Nûk (Greenland): *see* Nuuk.

Nukha (Azerbaijan): *see* Sheki.

Nuku Hiva, volcanic island of the northwestern Marquesas Islands, French Polynesia, in the central South Pacific. Nuku Hiva has an area of 131 square miles (339 square km). It is widely regarded as the most beautiful of the Marquesas. Its rugged wooded terrain rises to Mount Tekao (3,888 feet [1,185 m]) and is drained by small streams. There is no coastal plain or fringing coral reef.

First sighted by the French navigator Étienne Marchand in 1791, the island was named Madison Island by a U.S. naval officer, David Porter, who claimed it for the United States in 1813. France, however, annexed the Marquesas in 1842 and built a fort on the island. Nuku Hiva had a small sandalwood trade in the early 19th century and subsequently became a favoured stopping place for whalers. The narrow valleys are fertile and, under a warm and humid climate, yield copra and fruit for export. Tai-o-hae (Hakapehi) on the south coast, the main harbour and port, is the administrative seat for the Marquesas. Another harbour, Anaho Bay, is on the north coast. Nuku Hiva was the setting for Herman Melville's novel *Typee.* Pop. (1996) 1,687.

Nuku'alofa, capital and chief port of Tonga, on the northern shore of Tongatapu Island, in the southern Pacific Ocean. Its deep-draft harbour is protected by reefs. Commercial activities centre on the export of copra, bananas, and vanilla and the sale of traditional handicrafts from the Malae (Park) Market. A Small Industries Centre was developed on the outskirts of the city after 1977. Landmarks include the Royal Palace (1865–67) and Chapel (1862), on the seafront at the end of the old wharf, and the Royal Tombs. The town has several secondary schools (called colleges), a teachers' training school, Vaiola Hospital, government offices, and a large Wesleyan church. Modern buildings include the broadcasting studio and a development outside the town comprising housing, joinery works, and Copra Board enterprises. Fua'amotu International Airport is 14 miles (22 km) by road to the southeast. Pop. (1999 est.) 37,000.

Royal Palace at Nuku'alofa, capital of the Kingdom of Tonga

Bjorn Klingwall—Ostman Agency

Nukus, city, southwestern Uzbekistan. It lies near the head of the Amu Darya River delta. The tiny Nukus settlement, which lay amid the desert sands, was established as a city in 1932 and in 1939 replaced Trutkul (which was being eroded by the Amu Darya) as capital of the Kara-Kalpak A.S.S.R. The present city has a number of food-processing and other light industries, the Karakalpak branch of the Uzbek Academy of Sciences, Nukus State University (1979), a museum, and a theatre. Pop. (1999 est.) 199,000.

Nullarbor Plain, vast limestone plateau, extending westward for 400 miles (650 km) from Ooldea in South Australia into Western Australia and northward from the Great Australian Bight (a wide bay) for 250 miles (400 km) to the Great Victoria Desert. The plain occupies 100,000 square miles (260,000 square km) of generally flat surface in bedrock; the elevation averages 600 feet (180 m), but in places it rises to 1,000 feet (300 m). Its vegetation chiefly consists of saltbush and blue bush, with some grasses and flowers appearing after rare winter rains (annually averaging 10 inches [250 mm] or less). The Nullarbor National Park preserves rare vegetation and fauna. The plain has many limestone caves, including Koonalda Cave, an important archaeological site. The name Nullarbor is derived from the Latin *nullus arbor* ("no tree").

Crossed (1841) by the British colonial administrator Edward John Eyre, the plain is today traversed 100 miles (160 km) inland by the world's longest stretch of straight railroad track (330 miles [530 km]) and by the Eyre Highway, nearer the coast. There are scattered sheep stations along the margins, supplied by artesian water.

nullification, in U.S. history, doctrine upholding the right of a state to declare null and void within its boundaries an act of the federal government. Thomas Jefferson and James Madison advocated nullification in the Virginia and Kentucky Resolutions of 1798. The Union was a compact of sovereign states, Jefferson asserted, and the federal government was their agent with certain specified, delegated powers. The states retained the authority to determine when the federal government exceeded its powers, and they could declare acts to be "void and of no force" in their jurisdictions.

John C. Calhoun furthered the nullification doctrine in his *South Carolina Exposition and Protest,* published and distributed by the South Carolina legislature (without Calhoun's name on it) in 1829. Writing in response to Southern bitterness over the Tariff of 1828 ("Tariff of Abominations"), Calhoun took the position that state "interposition" could block enforcement of a federal law. The state would be obliged to obey only if the law were made an amendment to the Constitution by three-fourths of the states. The "concurrent majority"—*i.e.,* the people of a state having veto power over federal actions—would protect minority rights from the possible tyranny of the numerical majority.

When the Tariff of 1832 only slightly modified the Tariff of 1828, the South Carolina legislature decided to put Calhoun's nullification theory to a practical test. The legislature called for a special state convention, and on Nov. 24, 1832, the convention adopted the Ordinance of Nullification. The ordinance declared the tariffs of 1828 and 1832 "null, void, and no law, nor binding upon this State, its officers or citizens." It also forbade appeal of any ordinance measure to the federal courts, required all state officeholders (except members of the legislature) to take an oath of support for the ordinance, and threatened secession if the federal government tried to collect tariff duties by force. In its attempts to have other Southern states join in nullification, however, South Carolina met with total failure.

On Dec. 10, 1832, President Andrew Jackson issued his "Proclamation to the People of South Carolina," asserting the supremacy of the federal government and warning that "disunion by armed force is treason." Congress then (March 1, 1833) passed both the Force Bill—authorizing Jackson to use the military if necessary to collect tariff duties—and a compromise tariff that reduced those duties. The South Carolina convention responded on March 15 by rescinding the Ordinance of Nullification but three days later maintained its principles by nullifying the Force Bill.

As a consequence of the nullification crisis, Jackson emerged a hero to nationalists. But Southerners were made more conscious of their minority position and more aware of their vulnerability to a Northern majority as long as they remained in the Union.

Numa Pompilius (fl. *c.* 700 BC), second of the seven kings who, according to Roman tradition, ruled Rome before the founding of the Republic (*c.* 509 BC).

Numa is said to have reigned from 715 to 673. He is credited with the formulation of the religious calendar and with the founding of Rome's other early religious institutions, including the Vestal Virgins; the cults of Mars, Jupiter, and Romulus deified (Quirinus); and the office of *pontifex maximus.* These developments were actually, however, the result of centuries of religious accretion. According to legend, Numa is the peaceful counterpart of the more bellicose Romulus (the legendary founder of Rome), whom he succeeded after an interregnum of one year. His supposed relationship with Pythagoras was known even in the Roman Republic to be chronologically impossible, and the 14 books relating to philosophy and religious (pontifical) law that were uncovered in 181 BC and attributed to him were clearly forgeries.

Numan, town and port on the Benue River, Adamawa state, eastern Nigeria. It is located about 30 miles (50 km) from Yola, opposite the mouth of the Gongola River, which is the principal tributary of the Benue River. Numan is connected by road to Gombe, Shellen, Yola, Jalingo, and Ganye. Probably founded by the Njei (Jenjo, Jenge) people, it was occupied in the early 19th century by members of the Bata people who were fleeing the advance of the Fulani jihad̦ ("holy war"), and it became the centre of a small Bata kingdom in the 1850s. The town was selected in 1885 as a trading post by the National African (later Royal Niger) Company, which burned it in 1891 after an attack on a company ship by the Bachama peoples. Numan was gradually rebuilt, and the British established a garrison there in 1903. In 1912 the town became the headquarters of Numan division, a region that became the Numan federation in 1951. In 1921, Chief Hamma Mbi moved the Bachama traditional headquarters from Lamurde (20 miles west-northwest) and constructed his palace in the town.

Modern Numan, a local government headquarters, is a collecting point for peanuts (groundnuts) and cotton and an important trade centre (sorghum, millet, cowpeas, fish, goats, sheep, and cattle). Outside the town along the Benue are the state government's sugarcane estate and sugar-processing plant (1971), one of the largest sugar-producing complexes in western Africa. The town is served by several secondary schools, a teacher-training college, a government craft centre, and a hospital. Pop. (latest est.) 24,498.

Numantia, a Celtiberian town located near modern Soria in Spain on the upper Douro (Duero) River. Founded on the site of earlier settlements by Iberians who penetrated the Celtic highlands about 300 BC, it later formed the centre of Celtiberian resistance to Rome, withstanding repeated attacks. Finally, Scipio Aemilianus (Numantinus) blockaded it (133 BC) by establishing six miles of continuous ramparts around it. After an eight-month siege, Numantia was reduced by hunger, and the survivors capitulated, its destruction ending all serious resistance to Rome in Celtiberia. Numantia was later rebuilt by the emperor Augustus, but it had little importance.

Numayrī, Jaʿfar Muḥammad an- (president of The Sudan): *see* Nimeiri, Gaafar Mohamed el-.

Numazu, city, Shizuoka *ken* (prefecture), Honshu, Japan. It lies at the mouth of the Kano River, facing Suruga Bay. It developed as a castle town in the early 16th century and later served as a post town on the Tōkaidō ("Eastern Sea Highway"). Because of the city's location at the junction of land and sea routes, it became a regional commercial and administrative centre. During the 1960s industrialization was rapid; the city's products now include machinery, photographic film, chemicals, metal, and textiles. Fishing and tourism are diminishing and being replaced by industrialization. To counteract ground subsidence and pollution resulting from the withdrawal of groundwater for industrial use, rivers are being used as alternative water sources. Numazu Park contains a municipal aquarium and Sembonmatsubara ("Thousand-Pines Beach"), noted for its ancient, gnarled trees. Pop. (1995 prelim.) 212,245.

numbat, also called BANDED ANTEATER (*Myrmecobius fasciatus*), marsupial mammal of the family Dasyuridae (some authorities classify it as a family in its own right, Myrmecobiidae). It forages by day for termites in forests of southwestern Australia. Formerly widespread across southern Australia, the numbat is now restricted to the southwestern corner of the country and is regarded as an endangered species. It has a squat body and small, pointed head, together about 20 cm (8 inches) long, and a 15-centimetre (6-inch) bushy tail. Its coat is gray-brown to reddish brown, with about eight transverse white stripes on the rump. The teeth are small, and there are extra molars—50–52 teeth in all. The tongue is extensible and sticky, and the forefeet are strong-clawed, for digging. The numbat is pouchless; it normally has four young a year. It is the official animal emblem of the Australian state of Western Australia.

Numbat (*Myrmecobius fasciatus*)
Painting by Richard Ellis

number game, any of various puzzles and games that involve aspects of mathematics.

A brief treatment of number games follows. For full treatment, *see* MACROPAEDIA: Number Games and Other Mathematical Recreations.

The mathematical games that survived from Greco-Roman antiquity and aroused renewed interest in the Middle Ages were primarily of two kinds: those involving the manipulation of objects and those requiring computation. The first books devoted solely to recreational problems in mathematics appeared in the 17th century, and the volume and variety of mathematical games and puzzles greatly expanded in the following two centuries. During this period interest focused largely on such amusements as numerical curiosities; simple geometric puzzles; arithmetical story problems; magic squares; and traditional diversions concerning angle trisection, the duplication of the cube, and the squaring of the circle.

By the middle of the 20th century, interest had begun to swing toward more mathematically sophisticated topics: cryptograms; recreations involving modular arithmetic, numeration bases, and number theory; graphs and networks; lattices and group theory; topological curiosities; flexagons; the manipulation of geometric shapes and forms; combinatorial problems; probability theory; inferential problems; logical paradoxes; fallacies of logic; and paradoxes of the infinite. Modern mathematical games and recreations can be grouped into several general classes: arithmetic and algebraic recreations (*e.g.,* number patterns, cryptograms, perfect numbers, and magic squares); geometric and topological recreations (including geometric fallacies, tangrams and mazes, and map-colouring problems); manipulative recreations (puzzles involving configurations, chessboard problems, and polyominoes); and problems of logical inference (logical puzzles involving overlapping groups and paradoxes).

number system, any of various sets of symbols and the rules for using them to express quantities as the basis for counting, comparing amounts, performing calculations, determining order, making measurements, representing value, setting limits, abstracting quantities, coding information, and transmitting data. The most elementary representation of numbers is the tally or unitary system of notation. It originally consisted of single strokes that were put into one-to-one correspondence with the items being counted; later these were combined into groups of five or more.

The origins of our modern decimal, or base-10, number system can be traced to ancient Egyptian, Babylonian (Sumerian), and Chinese roots. The bulk of the credit for the base-10 system goes to the Hindu-Arabic mathematicians of the 8th to 11th centuries AD, and the beginning of our modern notation is attributed to the work *Liber abaci* published by Leonardo of Pisa (Fibonacci) in AD 1202.

The early Egyptians used a base-10 system that had a different symbol for each power of 10 up to 10^6, but it lacked a place-value notation and an explicit number zero. Similar systems were used by the ancient Chinese, Cretans, Greeks, Hebrews, and Romans. On the other hand, the Babylonian system was an incomplete sexagesimal (base-60) positional notation. It used only two symbols instead of the 60 distinct ones that a base-60 system could use, and thus suffered from ambiguities in representing value that could be resolved only by analyzing the context.

The Mayan system was nominally vigesimal (based on 20), but to conform to their 360-day calendar it was modified so that successive positions had the values: $20^0 = 1$, $20^1 = 20$, $18 \times 20^1 = 360$, $18 \times 20^2 = 7{,}200$, $18 \times 20^3 = 144{,}000$, etc., rather than strict powers of 20 ($20^0 = 1$, $20^1 = 20$, $20^2 = 400$, $20^3 = 8{,}000$, $20^4 = 160{,}000, \ldots$).

The use of zero as a numeral appeared sporadically in Egyptian number systems. It was used, however, only between two numbers to indicate an empty position, never at the end of a number. While the early Chinese did not have a symbol for zero, the invention and use of their abacus suggests that they had an implied appreciation for positional base notation and zero as a number. The Mayans did have a zero symbol, but their inconsistency in base notation rendered it virtually useless for computations. The first use of zero as a place holder in positional base notation was due probably to Muḥammad ibn Mūsā al-Khwārizmī (*c.* 780–850). This use of zero and the use of western Arabic (Gobar) numerals were spread throughout Europe in the 10th century principally by the efforts of Gerbert, who later became Pope Sylvester II.

The requirements of more demanding measurements, analytical quantifications, and complex calculations provided the impetus for the transfer from mere symbolic representation of amounts to modern number systems. The distinguishing characteristics of a modern number system are its use of base position notation (place value), zero as a number, and a point or comma to separate the parts of numbers greater and less than 1.

Some of the ancient number systems employed positional (base) notation but in an inconsistent and often confusing way. Since a separate symbol exists for each element within a modern number system, and its position determines its weighted value, greater condensation and simplicity is possible in representing numbers. This principle also makes it easy to extend calculations governed by general principles to other problems. The use of zero as a number permits the exact alignment of numbers for calculations and provides a consistent means of representing them.

Before the adoption of positional base notation, zero, and the point, calculations such as multiplication, division, and root extraction had to be relegated to a handful of experts. By the 1100s the algorists, using base-10 notation, were successfully challenging the abacists (those using the abacus) in the speed and accuracy of calculations and had the advantage of a permanent written record of their results. The development and widespread use of a number system with these components greatly enhanced the precision and ease of calculations needed in fields such as astronomy, manufacturing, and navigation. It eventually led to even more efficient forms of handling data such as logarithms, slide rules, mechanical and electrical calculators, and computers.

A general representation of numbers in any base may be expressed in the following way: $c_n b^n + c_{n-1} b^{n-1} + \ldots c_2 b^2 + c_1 b^1 + c_0 b^0 \cdot d_1 b^{-1} + d_2 b^{-2} + \ldots + d_n b^{-n}$, where b represents the base, and c_i and d_i are place-value coefficients. The number represented by the preceding extended expression would ordinarily be written without the plus signs and the powers of the base (these are implied by the place-value property of the system: $c_n c_{n-1} \ldots c_2 c_1 c_0 \cdot d_1 d_2 \ldots d_n$). In this representation: (1) each successive digit, counting leftward from the point, is the coefficient of an ascending power of the base beginning with b^0 (that is, 1); (2) the successive digits, counting to the right of the point, are the coefficients of descending powers of the base, beginning with b^{-1}; (3) numbers can be directly aligned around their basimal points, and calculations can be performed directly without having to determine how the order of the symbols affects their values (*e.g.,* LXIV = 64, while XLVI = 46); (4) the number of symbols required equals the value of the base (*e.g.,* in base 6, there are 6 symbols: 0, 1, 2, 3, 4, 5); (5) the symbols begin with zero and end with a value one less than the base (0, 1, 2, . . . $b-1$); (6) the base does not have a separate symbol but is always represented by "10" (one times b^1 plus zero times b^0) so that "10" equals 2 in base 2, 12 in base 12, etc.; (7) the value of a number is equal to the sum of the products of the coefficients multiplied by their respective base powers.

In the base-10 number system, the number 983.75 is a compact way of writing $900 + 80 + 3 + {}^{7}/_{10} + {}^{5}/_{100}$, or $9 \times 10^2 + 8 \times 10^1 + 3 \times 10^0 + 7 \times 10^{-1} + 5 \times 10^{-2}$. For comparison, the number 983.75 is expressed in base 2 as 1111010111.11 (that is, $1 \times 2^9 + 1 \times 2^8 + 1 \times 2^7 + 1 \times 2^6 + 1 \times 2^4 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 10^0 + 1 \times 2^{-1} + 1 \times 2^{-2}$) and in base 8 as 1727.6 (that is, $1 \times 8^3 + 7 \times 8^2 + 2 \times 8^1 + 7 \times 8^0 + 6 \times 8^{-1}$). Note that only in base 10 do the coefficients translate directly to numerical value without requiring a multiplication. Two properties illustrated by the previous example are: (1) a rational number (expressible as a ratio of integers) remains a rational number when expressed in any integral base; (2) any rational number can be represented by a terminating or repeating basimal (decimal in base 10).

Thomas Harriot (1560–1621) was the first to give a generalized treatment of positional number systems; but since his work was unpublished much of the credit is attributed to Gottfried Leibniz (1646–1716), who developed it independently. Leibniz was a great advocate of the base-2 system—for him, 1 stood for God and 0 the void.

The base-2 (binary, or dyadic) number system is ideal for reliable compact digital storage. Whereas the decimal system requires 10 symbols (0, 1, 2, . . . 9) and thus 10 electrical or mechanical states to represent each digit, the binary system has only two symbols, 0 and 1, and thus only requires two electrical states, most reliably off and on, to represent each digit. To the human eye, a number like 1,866 in base 10 appears more compact than the binary equivalent 11101001010. But since 10 states are required per digit in base 10, a 4-digit number requires $10 \times 10 \times 10 \times 10 = 10{,}000$ states, while the binary representation only requires $2^{11} = 2{,}048$ states.

Numbers can be classified in many ways. The simplest class comprises the counting, or natural, numbers (1, 2, 3, . . .), which with the addition of zero (not widely used until the 13th century) are known as the whole numbers. The use of the negatives of these numbers (−1, −2, −3) and negative numbers in general was not widely accepted until the 17th century. The natural numbers, their negative equivalents, and the zero constitute the integers. Rational numbers (fractions) date back to the earliest number systems; they can be defined as numbers expressible as ratios of integers, or equivalently, as terminating, or repeating, decimals ($4 = \frac{4}{1}$; $3\frac{1}{7} = \frac{22}{7} = 3.142857\ldots$; $2\frac{1}{2} = 2.5$; $\frac{1}{3} = .333\ldots$).

Irrational numbers cannot be expressed as a ratio of integers or as decimals that terminate or repeat; examples of them are $\sqrt{2} = 1.4142\ldots$; $\pi = 3.14159\ldots$; and $e = 2.71828\ldots$. Taken together, the rational and irrational numbers encompass the real number (*q.v.*) system.

Numbers that are the even roots of negative numbers ($\sqrt{-3}$, $\sqrt[4]{-16}$, $\sqrt[6]{-5}$, etc.) are not members of the real-number system; such numbers are called imaginary. They were first identified by Hero of Alexandria (*c.* AD 62), but up to the mid-19th century they were, for the most part, ignored or considered meaningless. The basic unit of the imaginary-number system is the irreducible form $\sqrt{-1}$, which is represented by i. Numbers that have a real and an imaginary component are known as complex numbers. Complex numbers are represented by the form $a + bi$; a is the real part and bi the imaginary part. Thus, the reals (for which $b = 0$) or the imaginaries ($a = 0$), taken by themselves, are subsets of the complex-number system. The magnitudes and signs of purely real or purely imaginary numbers may be conveniently represented by one-dimensional graphs, that is, as points along a line or as distances—positive or negative—between those points and a reference point corresponding to the number zero (the origin). Complex numbers in general, however, require two dimensions: each complex number corresponds to a point in a plane or to a line segment (a vector) directed from the origin to the point. These two-dimensional graphs of complex numbers were introduced independently about 1800 by Caspar Wessel of Norway and Jean Argand of France.

The Irish mathematician Sir William Hamilton (1805–65), by dropping the commutative axiom of multiplication ($ab = ba$), developed a system of hypercomplex numbers that he called quaternions, which have a basis of four elements ($1, i, j, k$). The quaternions proved adaptable to operations involving vectors in three-dimensional space, but nowadays they are regarded mostly as historical antecedents to the form of vector analysis developed by the American scientist J. Willard Gibbs. The numberlike quantities represented by multidimensional expressions now form the currency of several branches of mathematical study. *See also* algebra; matrix; tensor analysis; vector analysis.

Articles are alphabetized word by word,
not letter by letter

number theory, branch of mathematics concerned with the integers (positive and negative natural numbers and zero), and generalizations of the integers.

A brief treatment of number theory follows. For full treatment, *see* MACROPAEDIA: Number Theory.

In ancient times, number theory was associated with numerology, the supposed mystical properties of numbers. Thus, some writers attached great significance in the coincidence that the biblical Creation took six days and that 6 is the smallest "perfect" number—that is, one equal to the sum of its integral factors. Just as during the Renaissance astronomy gradually parted company with astrology and chemistry separated from alchemy, so did number theory throw off its association with numerology.

The modern theory of numbers reaches into almost every branch of mathematics to borrow tools for the solution of problems. It is one of the most popular subjects of amateur mathematicians and students. This is largely explained by the wealth of easily explainable problems, some of them formulated by amateurs. Although it is not hard to ask a good question in number theory, it is quite another thing to find an answer. It has been said, and it is largely true, that any unsolved mathematical problem that is more than a century old and is still considered interesting belongs to number theory.

One of the most famous problems of number theory is named after the 17th-century French mathematician Pierre de Fermat. Fermat was interested in the Diophantine equation $x^n + y^n = z^n$ (Diophantine equations are algebraic equations whose solutions are required to be integers or rational numbers). This equation has many integer solutions, such as $2^{-1} + 2^{-1} = 1^{-1}$, $6^1 + 7^1 = 13^1$, $3^2 + 4^2 = 5^2$, and $0^7 + 2^7 = 2^7$, but if x and y stand for positive integers and n is an integer greater than 2, no solutions exist. Diophantine equations take their name from Diophantus of Alexandria (*c.* 250 AD); Fermat owned a copy of Diophantus' book *Arithmetica* and had the habit of making notes in the margin. Concerning the equation $x^n + y^n = z^n$, Fermat wrote that he had a "wonderful proof" that it had no positive integer solutions with n at least 3, but the proof was too long for the margin. Although many mathematicians tried to find a proof for Fermat's statement, no one succeeded for 350 years, and it was long regarded as a conjecture.

Attempts to prove Fermat's conjecture led to the development of another branch of number theory, the study of algebraic numbers. These are complex numbers that are roots of polynomial equations with integer coefficients. Any rational number is also an algebraic number; for example, ${}^{3}/_{7}$ is a root of $7x - 3 = 0$. Many irrational numbers are also algebraic; for example, $(1 + \sqrt{5})/2$ and i ($= \sqrt{-1}$) are algebraic numbers, since the first is a root of $x^2 - x - 1 = 0$ and the second is a root of $x^2 + 1 = 0$. The connection with Fermat's conjecture is that if u is a root of $x^n + 1 = 0$, but not a root of $x^m + 1 = 0$ for any integer $m < n$, then the left side of Fermat's equation can be factored $x^n + y^n = (x - uy)(x - u^3y)\ldots(x - u^{2n-1}y)$. Since the right side has the factorization $z^n = zz\ldots z$ (n factors of z), it was hoped that these two different factorizations into algebraic numbers of the same number might yield some information. This approach did work for many special choices of n—in 1977 the Fermat conjecture was verified for every n up to 150,000—but more powerful techniques were required to settle the complete conjecture. Using sophisticated tools from algebraic geometry, the English mathematician Andrew Wiles, with the help of his former student Richard Taylor of the University of Cambridge, devised a proof of Fermat's last theorem that was published in the *Annals of Mathematics* in 1995.

A number that is not algebraic is called transcendental. Georg Cantor showed in 1874 that, in a certain natural sense, almost all numbers are transcendental. There remains, however, the difficult problem of placing a given number in the proper camp. Charles Hermite showed in 1873 that e, the base of the natural logarithms, is transcendental. The number π was shown to be transcendental by Ferdinand von Lindemann in 1882. Lindemann's result answered (in the negative) the problem, posed by the ancient Greeks, of whether a square can be constructed, using a straight edge and compasses, whose area is the same as that of a given circle.

Many problems in number theory are concerned with prime numbers. These are integers larger than 1 that have only themselves and 1 as factors. An integer larger than 1 that is not prime is called composite. Every composite number can be expressed in a unique fashion as a product of primes. This fact, which is known as the fundamental theorem of elementary number theory, was first precisely formulated by Carl Friedrich Gauss in his *Disquisitiones Arithmeticae* (1801).

Euclid gave an elegant proof that there are infinitely many primes. He reasoned that if there are only finitely many primes, then the product of all the primes is an integer N. Now consider $N+1$. Because every prime is by definition a factor of N, each prime will leave a remainder of 1 when divided into $N+1$. Thus, $N+1$ is neither prime nor the product of primes, which is impossible. Therefore the collection of all primes cannot be finite.

Tables of primes reveal great irregularity in the distribution of prime numbers. Among the large integers they tend to thin out. Thus there are 25 primes less than 100; 16 primes between 1,000 and 1,100; 11 primes between 10,000 and 10,100; and 6 primes between 100,000 and 100,100. This thinning out is not completely regular. For example, between 9,500 and 9,600 there are only 7 primes, but between 99,800 and 99,900 there are 10 primes. The issues of the regularities and irregularities in the distribution of primes are among the most important in number theory.

Twin primes are pairs of prime numbers such as 3 and 5, that differ by 2. There is some evidence that the number of twin primes is infinite, but this has not been proved. The problem has yielded somewhat to an attack that combines analytic methods with sieve methods, a tool of number theory that employs combinatorial counting arguments. Thus, Chen Jing-run showed in 1966 that there are infinitely many primes p for which $p+2$ is either prime or the product of two primes.

Combinatorial number theory considers questions about sets of integers with certain general properties. A well-known unsolved problem in this branch is whether it is true that if the sum of the reciprocals of the members of a set S of integers diverges to infinity, then S has arbitrarily large finite subsets that lie in arithmetic progression.

Computational number theory, as its name suggests, deals with efficient algorithms for doing arithmetic and other computational problems. A well-known cryptographic system bases its security on the present inability of computational number theorists to factor large composite numbers quickly.

Probabilistic number theory, mostly developed in the 20th century, blends the tools and ideas of probability theory with number-theoretic questions. One of the first results in the subject is the theorem that the "normal" number of prime factors of an integer n is $\ln \ln n$.

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Numbers, Hebrew BEMIDBAR ("In the Wilderness"), also called THE FOURTH BOOK OF MOSES, the fourth book of the Bible. The English title is a translation of the Septuagint (Greek) title referring to the numbering of the tribes of Israel in chapters 1–4.

The book is basically the sacred history of the Israelites as they wandered in the wilderness following the departure from Sinai and before their occupation of Canaan, the Promised Land. It describes their sufferings and their numerous complaints against God. The people are depicted as faithless and rebellious, and God as one who provides for and sustains his people.

These accounts continue the story of God's promise that the Israelites will inhabit the land of Canaan. The story, begun in Genesis and continued in Exodus and Leviticus, does not reach its conclusion until Israel successfully occupies the Promised Land. As the books now stand, the promise is fulfilled in the Book of Joshua. Many scholars have thus maintained that the first six books of the Old Testament form a literary unit, of which Numbers is an integral part. At one time, Numbers may have contained an account of the occupation of Canaan that was dropped when the Tetrateuch (Genesis, Exodus, Leviticus, and Numbers) was joined to other historical books of the Old Testament.

numbers game, the most widespread lottery game in the United States before lottery games were legalized in many states, though illegal wherever it is played. Patrons of the numbers game are drawn chiefly from the low-income classes. The player bets a trivial sum, usually amounting to less than one dollar. He selects his own number, any three-digit number from 000 to 999. The winning number is taken each day from a source that the promoters of the game cannot control—*e.g.,* bank financial balances or pari-mutuel totals at racetracks. The odds against winning are 999 to 1; as the game is usually played, the person who selects the winning number is paid 540 to 1, and the runner who accepted his bet receives 60 units; thus the gross average profit of the promoters is nearly 40 percent of the amounts wagered. The inducement to the bettor is that a 10-cent risk may yield $54.

The promoters and operators of numbers games may routinely pay large sums to politicians and police to protect against arrest. The amounts bet on numbers annually in the United States have been estimated as high as hundreds of millions of dollars, although such figures are unverifiable. Legal alternatives have been proposed, and several states initiated state-wide lotteries in the late 20th century, but the numbers game has continued. *See also* policy.

numbfish: *see* electric ray.

Numea (New Caledonia): *see* Nouméa.

Numedalslågen (Norway): *see* Lågen.

Numenius OF APAMEA (fl. late 2nd century), Greek philosopher chiefly responsible for the transition from Platonist idealism to a Neoplatonic synthesis of Hellenistic, Persian, and Jewish intellectual systems, with particular attention to the concept of ultimate being, or deity, and its relation to the material world.

Beyond his origins in Apamea (near modern Ḥimṣ, Syria), nothing is known of Numenius' life. His name may have been a Greek translation of a Semitic original. He showed extensive knowledge of Judaism, and he may have been acquainted with Christianity. Apparently he intended to seek the origin of Platonic ideas in the teachings of the ancient East: the spirit transmigration of Hinduism; the absolute, monotheistic deity and the trinity of divine functions in Judaism; and the esoteric dualism of Gnostic and Hermetic cults. Observing an influence of the older Semitic religions upon Greek thought, he called Plato "an Atticizing Moses." His search for primitive forms of theology was later to interest the Renaissance humanists.

Central to Numenius' thought is the dualism of an eternal divinity contrasting with eternal matter ("monad" opposed to "dyad"). As supreme deity in absolutely changeless perfection, God can have no contact with inferior being—hence the need for a second god, the Demiurge, of a dual nature, the "soul of the world" related to both God and matter and completing the Trinitarian hierarchy. Accentuating this dualism, Numenius identified matter with evil, relating it also to the evil world soul. Man, moreover, not only comprises the dualism of a body antithetical to his soul but also possesses a twofold soul, rational and irrational. Life is thus a process of escape from this dualism by the deliverance of the spirit from its material confinement.

Numenius' thought has been alleged to have influenced the 3rd-century development of Neoplatonism by Plotinus, the foremost representative of that school. The surviving fragments from Numenius' treatises *Peri tēs tōn Akadēmaikōn pros Platōna diastaseōs* ("On the Differences Between Plato and the Academicians"), *Peri tōn para Platōni aporrhētōn* ("On Plato's Secret Doctrines"), *Peri tagathou* ("On the Good"), and *Peri aphtharsias psychēs* ("On the Indestructibility of the Soul") have been collected by F. Thedinga (1875). Analyses of this thought have been made by K.S. Guthrie (1917) and E.A. Leemans (1937).

numeral system, any of various sets of symbols and the rules for using them to represent numbers, which are used to express how many objects are in a given set. Thus the idea of "oneness" can be represented by the Roman numeral I, by the Greek letter alpha *α* (the first letter) used as a numeral, by the Hebrew letter aleph (the first letter) used as a numeral, or by the modern numeral 1, which is Hindu-Arabic in origin.

A brief treatment of numeral systems follows. For full treatment, *see* MACROPAEDIA: Mathematics, The History of: *Numerals and Numeral Systems;* Arithmetic: *Number Systems and Notation.*

Modern numeral systems are place-value systems—that is, the value of the symbol depends upon the position or place of the symbol in the representation; for example, the 2 in 20 and 200 represent two tens and two hundreds, respectively. Such ancient systems as the Egyptian, Roman, Hebrew, and Greek numeral systems did not have this positional characteristic, thus making arithmetical calculations difficult. The most commonly used numeral system is the decimal-positional numeral system, the decimal referring to the use of 10 symbols—0, 1, 2, 3, 4, 5, 6, 7, 8, 9—to construct all numbers.

Numerian, Latin in full MARCUS AURELIUS NUMERIUS NUMERIANUS (d. 284), Roman emperor 283–284.

He succeeded his father, Carus, in the summer of 283, in the midst of a war with the Sāsānians. Numerian was emperor in the East, and his brother, Carinus, ruled the West. Numerian led the army home but contracted a disabling eye disease. Late in 284, after the army had reached the Bosporus, Numerian was found dead. His father-in-law, Aper, who had assumed command, was accused of his murder and executed, and the throne passed to Diocletian, commander of the household guards.

numerical analysis, the general study of methods for solving complicated problems, using the basic operations of arithmetic (addition, subtraction, multiplication, and division).

A brief treatment of numerical analysis follows. For full treatment, *see* MACROPAEDIA: Numerical Analysis.

The development of digital computers, which perform only the basic arithmetic operations, has made numerical analysis one of the basic areas in applied mathematics, and it is now central in much of modern science and engineering. To use computers in solving problems of science and engineering, numerical analysis must be applied at some stage. Numerical analysis includes the development of methods for approximating the processes of ordinary mathematical analysis (*i.e.,* calculus) by arithmetic operations. The plan of how the arithmetic is to be organized to solve a specific class of problems is called an algorithm. The detailed organization of procedures that a machine may take to implement a given algorithm is called a (machine) program. The list of detailed instructions or commands a specific machine employs to carry out a program is called a code.

The historical roots of numerical analysis are identical to those of mathematics. The problems considered during the dawn of mathematics concerned what are now simple problems of arithmetic and geometry, but the Greeks were already treating sophisticated problems of calculus by methods related to current techniques of numerical analysis. For example, the circumference, C, of a circle of radius r is known to be $C = 2\pi r$, where the Greek letter pi (π) represents the irrational number 3.1415926.... By constructing the regular N-sided polygons (N-gons) that are inscribed in and circumscribed about this circle, we easily obtain, respectively, lower and upper bounds on C. Specifically, if $l_N = Nh_N$ is the sum of the lengths, h_N, of the sides of the inscribed regular N-gon and $L_N = NH_N$ is the sum of the lengths, H_N, of the sides of the circumscribed regular N-gon, then $l_N < 2\pi r < L_N$. As the number of sides is doubled, l_N increases and L_N decreases, so $l_N < l_{2N} < l_{4N} < \ldots < 2\pi r < \ldots < L_{4N} < L_{2N} < L_N$. To compute the numbers l_{2N} and L_{2N} when l_N and L_N are known requires the basic arithmetic operations and the ability to take square roots. The sides h_{2N} and h_N of the inscribed $2N$-gon and N-gon are related by

$$h_{2N} = \sqrt{2}\, r \sqrt{1 - \sqrt{1 - \left(\frac{h_N}{2r}\right)^2}}.$$

All the geometric constructions necessary to derive these formulas were known to the Greeks.

The number pairs (l_N, L_N), (l_{2N}, L_{2N}), ... yield one of the most effective numerical methods for approximating the circumference, $2\pi r$. Indeed, the error at the Mth stage can be estimated by the difference $\varepsilon_M \equiv L_M - l_M$. So to be assured that we have approximated $2\pi r$ to within, say, 1/1,000,000, the computation need be continued only until ε_M is less than this desired error. One of the basic goals of numerical analysis is to give accurate estimates of the error of computed results. It is not always easy to do this, but the best numerical analysts always try.

numerical taxonomy (biology): *see* taximetrics.

numerology, use of numbers to interpret a person's character or to divine the future. The theory behind numerology is based on the Pythagorean idea that all things can be expressed in numerical terms because they are ultimately reducible to numbers. Using a method analogous to that of the Greek and Hebrew alphabets (in which each letter also represented a number), modern numerology attaches a series of digits to an inquirer's name and date of birth and from these purports to divine the person's true nature and prospects.

Numeyri, Gaafar Mohamed el- (Sudanese president): *see* Nimeiri, Gaafar Mohamed el-.

Numic languages, formerly PLATEAU SHOSHONEAN, North American Indian language group that was spoken by Native Americans in Nevada, Utah, and portions of California, Oregon, Idaho, Wyoming, Arizona, Colorado, and Oklahoma. These languages are currently divided into three groups: Western Numic, including Mono and Northern Paiute; Central Numic, including Panamint, Shoshoni, and Comanchi; and Southern Numic, including Kawaiisu, Ute, and Southern Paiute. Numic represents the northernmost extension of the Uto-Aztecan language family, but the precise groupings within Uto-Aztecan are not yet clear.

Numidia, under the Roman Republic and Empire, a part of Africa north of the Sahara, the boundaries of which at times corresponded roughly with those of modern Algeria. Its earliest inhabitants were divided into tribes and clans and were ethnically indistinguishable from the other Berber inhabitants of early North Africa. From the 6th century BC points along the coast were occupied by the Carthaginians, who by the 3rd century BC had expanded into the interior as far as Theveste (Tébessa). Numidians were frequently found in the Carthaginian armies by that time.

The inhabitants remained seminomadic, however, until the reign of Masinissa, the chief of the Massyli tribe living near Cirta (Constantine). During the Second Punic War he was initially an ally of Carthage, but he went over to the Roman side in 206 BC and was given further territory extending as far as the Mulucha (Moulouya) River. For nearly 50 years Masinissa retained the support of Rome as he tried to turn the Numidian pastoralists into peasant farmers. He also seized much Carthaginian territory and probably hoped to rule all of North Africa.

On his death in 148 BC the Romans prudently divided his kingdom among several chieftains, but the progress of civilization among the Numidians was not seriously interrupted, and indeed after 146 BC it received new impetus as thousands of Carthaginians fled to Numidia after the destruction of Carthage. In 118 Jugurtha, an illegitimate Numidian prince, usurped the throne and forcibly reunified Numidia until the Romans again took control in 105. Rome continued to dominate Numidia through client kings, though Numidian territory was considerably reduced. The third and final attempt by a Numidian to found a powerful state was that of Juba I, between 49 and 46 BC, ending with his defeat by Julius Caesar at Thapsus.

Caesar formed a new province, Africa Nova, from Numidian territory, and Augustus united Africa Nova ("New Africa") with Africa Vetus ("Old Africa," the province surrounding Carthage); but a separate province of Numidia was formally created by Septimius Severus.

The Roman army's third legion took up its permanent station at Lambaesis (Lambessa), and as a result of the increased security the Numidians' population and prosperity increased substantially during the first two centuries AD. A few native communities achieved municipal status, but the majority of the population was little touched by Roman civilization.

Christianity spread rapidly in the 3rd century AD, but in the 4th century Numidia became the centre of the Donatist movement. This schismatic Christian group was particularly strong among the Numidian peasantry, to whom it appealed as a focus of protest against deteriorating social conditions. After the Vandal conquest (AD 429), Roman civilization declined rapidly in Numidia, and the native elements revived to outlive in some places even the Arab conquest in the 8th century and to persist until modern times.

Numidicus, Quintus Caecilius Metellus (Roman general): *see* Metellus Numidicus, Quintus Caecilius.

numismatics: *see* coin collecting.

nummulite, any of the thousands of extinct species of relatively large, lens-shaped foraminifers (single-celled marine organisms) that were abundant during the Tertiary Period (66.4 to 1.6 million years ago). Nummulites were particularly prominent during the Eocene Epoch (57.8 to 36.6 million years ago), and limestone of this age that occurs in the Sahara is called nummulite limestone in reference to the great abundance of its contained fossil nummulites.

Nun, also spelled NU, oldest of the ancient Egyptian gods and father of Re, the sun god. Nun's name means "water," and he represented the primeval waters of chaos out of which Re-Atum began creation. Nun's qualities were boundlessness, darkness, and the turbulence of stormy waters; these qualities were personified separately by pairs of deities. Nun, his female counterpart Naunet, and three further pairs together formed the Ogdoad (group of eight gods) of Hermopolis. Various Egyptian creation myths retain the image of the emergence of a primeval hillock formed of mud churned from the chaotic waters of Nun. Since it was believed that the primeval ocean continued to surround the ordered cosmos, the creation myth was reenacted each day as the sun god rose from the waters of chaos. Nun was also thought to continue to exist as subsoil water beneath the earth and as the source of the annual flooding of the Nile River.

nun, woman who is a member of a monastic religious order or group. *See* monasticism.

Nun River, Portuguese RIO NUN, river in southern Nigeria, considered the direct continuation of the Niger River. After the Niger bifurcates into the Nun and Forcados rivers about 20 miles (32 km) downstream from Aboh, the Nun flows through sparsely settled zones of fresh water and mangrove swamps and coastal sand ridges before completing its 100-mile (160-kilometre) south-southwesterly course to the Gulf of Guinea, a wide inlet of the Atlantic Ocean, at Akassa.

The river was most extensively used for trade in the 19th century, when the Igbo kingdom centred at Aboh controlled commerce, and the Ijo peoples in the Niger River delta dealt directly with Europeans. Most of the trade in the early part of the century was in slaves, but later the Nun was a major passageway for exports of palm oil. By 1900, however, the accumulation of silt in the bar at the mouth of the river impeded access to the Nun, which was eclipsed in commercial importance by the Forcados River. In 1963 petroleum was discovered along the Nun (about 35 miles upstream). Since the completion in 1965 of the Trans-Niger Pipeline, oil from the Nun River fields has been piped to Rumuekpe, where there is a link with the Trans-Niger line.

nunatak, isolated mountain peak that once projected through a continental ice sheet or an Alpine-type ice cap. Because they usually occur near the margin of an ice sheet, nunataks were thought to be glacial refuges for vegetation and centres for subsequent reoccupation of the land. Later studies revealed the existence of more likely areas of refuge and the fact that postglacial weathering may destroy glacial evidence on peaks. Thus, identification of a true nunatak is difficult, and such peaks often cannot be used to determine former ice thicknesses.

Nunavut (Canadian territory): *see* Northwest Territories and Nunavut.

Nunc Dimittis, also called the SONG OF SIMEON, in the New Testament, a brief hymn of praise sung by the aged Simeon, who had been promised by the Holy Spirit that he would not die until he had seen the Messiah. Simeon was at the Temple in Jerusalem when Mary and Joseph came to present the infant Jesus for the rite of purification according to Jewish law and custom. Simeon recognized the baby as the promised Saviour, took him in his arms, and raised his hymn of praise. Found in Luke 2:29–32, it is called the *Nunc Dimittis* for its first words in the Latin of the Vulgate Bible: *Nunc dimittis servum tuum, Domine, secundum verbum tuum, in pace,* "Now, Master, you can let your servant go in peace, just as you promised." Because of its implications of fulfillment, peace, and rest, the early church viewed it as appropriate for the ending of the day. Since the 4th century it has been used in such evening worship services as Compline, Vespers, and Evensong.

nuncio, a Vatican representative accredited as an ambassador to a civil government that maintains official diplomatic relations with the Holy See. He promotes good relations between the government and the Holy See and observes and reports to the pope on the conditions of the Roman Catholic church in the region. A full nuncio is named only to those countries that adhere to a decision of the Congress of Vienna (1815) that the papal representative automatically becomes dean of the diplomatic corps there. In 1965 the name pronuncio was given to those ambassadors whose rank in the diplomatic corps depends solely on seniority. An internuncio is a Vatican diplomat with the rank of minister plenipotentiary; he is accredited to a civil government and performs duties corresponding to those of a nuncio. *Compare* apostolic delegate.

Nuneaton and Bedworth, district and borough, county of Warwickshire, in the Midlands of England. The original settlement seems to have grown around a 12th-century Benedictine nunnery, but the main impulse to growth and activity was coal mining, which began in the 13th century and continues today. Industry followed, and Nuneaton's situation at a junction of rail routes, with the M6 motorway also now adjacent to it, made it an attractive location to manufacturers. Together with its neighbour, Bedworth, it has grown into a single built-up area. Area 31 square miles (79 square km). Pop. (1991 prelim.) 115,300.

Nunes, Pedro, Latin PETRUS NONIUS (b. 1502, Alcácer do Sal, Port.—d. Aug. 11, 1578, Coimbra), mathematician, geographer, and the chief figure in Portuguese nautical science, noted for his studies of the Earth, including the oceans.

Nunes was professor of mathematics at Lisbon and Coimbra and became royal cosmographer in 1529, when Spain was disputing the position of the Spice Islands and maps did not agree in their longitude. He devoted himself to such problems as well as to maps and map projections. He went to Spain in 1538 but returned to Portugal in 1544 to become a leading authority on the new discoveries of Spain and Portugal.

Núñez, Rafael (b. Sept. 28, 1825, Cartagena, New Granada—d. Sept. 12, 1894, El Cabrero, Colom.), three-time president of Colombia who dominated that nation's politics from 1880 and ruled dictatorially until his death.

Entering politics in the Liberal Party while in law school, Núñez aided in the drafting of Colombia's first Liberal constitution (1853) while a member of Congress. He later served in the cabinets of several presidents during the long period of Liberal control of Colombia.

In 1863 Núñez left Colombia for Europe, where he studied other forms of government and came into contact with political thinkers; as a result, he abandoned many of his radical ideas. Returning to Colombia in 1875, Núñez failed in the following year to win the presidency because the Radicals refused to support him. In 1880, with the support of moderates from both the Liberal and the Conservative parties, he won his first term (1880–82) as president. A rebellion of Radicals and Liberals in 1884 forced him further into an alliance with the Conservatives to win election to his second term (1884–86). The constitution of 1886 solidified his regime and inaugurated 50 years of Conservative dominance. Núñez then instituted a series of reforms called the Regeneration, which replaced the supremacy of the various states with a centralized government and restored the power of the Roman Catholic church.

Regarded as the leading intellectual figure in Colombia, Núñez wrote on politics and economic policy and composed volumes of poetry. His regime was often administered by deputies in Bogotá while he ruled from his plantation, where he died.

Núñez Cabeza de Vaca, Álvar (b. *c.* 1490, Extremadura, Castile [now in Spain]—d. *c.* 1560, Seville, Spain), Spanish explorer who spent eight years in the Gulf region of present-day Texas and whose accounts of the legendary Seven Golden Cities of Cíbola probably inspired the extensive explorations of southern and southwestern North America by Hernando de Soto and Francisco Coronado.

Núñez was treasurer to the Spanish expedition under Pánfilo de Narváez that reached what is now Tampa Bay, Fla., in 1528. By September all but his party of 60 had perished; it reached the shore near present-day Galveston, Texas. Of this group only 15 were still alive the following spring, and eventually only Núñez and three others remained. In the following years he and his companions spent much time among nomadic Indians. Though he found only the gravest hardship and poverty during his wanderings, by the time he encountered a party of Spanish raiders in northern Mexico in 1536 he was full of stories of the fabulous riches of a new Eldorado, the Seven Golden Cities of Cíbola, lying somewhere beyond the regions he had passed through. He recounted his adventures in *Naufragios* . . . (1542; "Shipwrecks . . ."). He was later appointed governor of the province of Río de la Plata, and from November 1541 to March 1542 he blazed a route from Santos, Brazil, to Asunción, Paraguay. His power was usurped by a rebel governor, Domingo Martinez de Irala, who imprisoned him and had him deported to Spain (1545), where he was convicted of malfeasance in office and banished to service in Africa. His *La Relación y Comentarios* . . . (1555), describing his journey from Santos to Asunción, is a valuable geographic work.

Núñez de Arce, Gaspar (b. Aug. 4, 1832, Valladolid, Spain—d. June 9, 1903, Madrid), Spanish poet and statesman, once regarded as the great poet of doubt and disillusionment, though his rhetoric is no longer found moving.

Núñez de Arce became a journalist and Liberal deputy, took part in the 1868 revolution, and was colonial minister for a time after the Restoration. As a dramatist he had some success, his best play being the historical *El haz de leña* (1872; "The Bundle of Kindling"), on the imprisonment of Don Carlos, but he attained celebrity with *Gritos del combate* (1875; "Cries of Combat")—a volume of verse that tried to give poetic utterance to religious questionings and the current political problems of freedom and order.

Nunivak Island, island in the Bering Sea off the southwestern coast of Alaska, U.S. It is 55 miles (88 km) long and 40 miles (64 km) wide and is the second largest island in the Bering Sea. Separated from the mainland by Etolin Strait, the island is the site of the Nunivak unit of the Yukon Delta National Wildlife Refuge, notable for its reindeer, musk oxen, and shorebirds. Pop. (1990) 177.

nunlet, any of certain puffbird species. *See* puffbird.

Nuoro, city, capital of Nuoro *provincia,* east-central Sardinia, Italy, at the foot of Monte Ortobene. Although the site has been inhabited since prehistoric times, the city was first recorded, as Nugorus, in the 12th century. The centre of a province under Piedmontese rule from 1848 to 1860, it became the provincial capital when Nuoro province was created in 1927 out of parts of Cagliari and Sassari provinces. The surrounding area consists essentially of the highland backbone of Sardinia. It is the poorest region of the island, occupied mainly by shepherds; but after 1950, developments included 30 miles (50 km) of new roads, extensive improvement of mountain pastures, and the grafting of 2,000,000 wild olive trees. Nuoro city is a market centre and a summer resort for mountain excursions. Pop. (1991 prelim.) mun., 37,487.

Nupe, people living near the confluence of the Niger and Kaduna rivers in west-central Nigeria. They speak a language of the Kwa branch of the Niger-Congo family and are organized into a number of closely related territorial groups, of which the Beni, Zam, Batache (Bataci), and Kede (Kyedye) are the most important. The Kede and Batache are river people, subsisting primarily by fishing and trading; the other Nupe are farmers, the staple crops being millet, sorghum, yams, and rice. Commercial crops include rice, peanuts (groundnuts), cotton, and shea nuts. They practice shifting cultivation, using the hoe as their basic tool. Men do most of the farm work, while women prepare and market the crops. There is a highly developed guild organization for blacksmiths, brass smiths, weavers, tailors, and other craft specialists. The Nupe are noted throughout Nigeria for glass beads, fine leather and mat work, brass trays, and fine cloth.

They live in villages or towns ranging in size from a few families to several thousand people. Each village is governed by a chief, with the advice of a council of family heads. The chief controls community land resources, settles disputes, and organizes all large-scale cooperative actions. The indigenous Nupe kingdom was divided into four zones for purposes of government, with a series of ranked officials who owed allegiance to the king, the *etsu Nupe.* The Beni and the Kede both are organized as kingdoms within the greater Nupe kingdom. There are several titled classes above the commoners.

Most Nupe are now Muslims, but many older rituals are still performed. The indigenous religion includes belief in a sky god, in ancestral spirits, and in spirits associated with natural objects.

Nūr ad-Dīn (Muslim ruler): *see* Nureddin.

Nūr al-Hilmī, Burhanuddin bin Muhammad (b. 1911, Kota Bharu [now Kota Baharu], Malaya [now in Malaysia]—d. Oct. 25, 1969, Taiping, Malaysia), Malay nationalist leader who led the principal opposition party in the decades after World War II.

Nūr al-Hilmī attended Islāmic schools at home and in Sumatra before going to India in 1928. On his return home, he taught at a *madrasa* (school) in Singapore and became a member of the radical Young Malay Union. During the Japanese occupation he was an adviser on Malay custom and culture to the military administration. After the war, however, he emerged as a major national leader when he was elected president of the left-wing Malay Nationalist Party (MNP). Under his leadership the party worked with other left-wing organizations to produce constitutional proposals for an independent and multiracial Malaya. The outbreak of the Communist Emergency in 1948 brought an abrupt end to constitutional politics in Malaya, and Nūr al-Hilmī himself was detained by the British for two years from 1950 for supposed involvement in anti-British riots in Singapore. The MNP having been dissolved, Nūr al-Hilmī was now a politician without an effective party. In 1956 he became president of the Pan-Malayan Islāmic Party (PMIP), an organization whose own origins can be traced back to the MNP and associated nationalist groups in the late 1940s. Under his leadership, the PMIP became the principal opposition party in Malaysian politics, winning a substantial share of the Malay vote (Nūr al-Hilmī himself was elected to parliament in 1959) and mounting a strong agrarian-populist and anti-colonialist attack, especially upon the Malay centrist party. Detained again in 1965 for alleged pro-Indonesian activities during that country's "Confrontation" of Malaysia, he was released in 1966, in poor health and subject to stringent political surveillance. He continued as nominal president of the party until his death.

Nureddin, in full NŪR AD-DĪN ABŪ AL-QĀSIM MAḤMŪD IBN ʿIMĀD AD-DĪN ZANGĪ (b. February 1118—d. May 15, 1174, Damascus [Syria]), Muslim ruler who reorganized the armies of Syria and laid the foundations for the success of Saladin.

Nureddin succeeded his father as the atabeg (ruler) of Halab in 1146, owing nominal allegiance to the ʿAbbāsid caliph of Baghdad. Before his rule, a major reason for the success of the crusaders was the disunity of the Muslim rulers of the region, who were unable to present a unified military front against the invaders. Nureddin waged military campaigns against the crusaders in an attempt to expel them from Syria and Palestine. His forces recaptured Edessa shortly after his accession, invaded the important military district of Antakiya in 1149, and took Damascus in 1154. Egypt was annexed by stages in 1169–71.

An able general and just ruler, Nureddin was also noted for piety and personal bravery. He was austere and ascetic, disclaiming the financial rewards of his conquests: instead, he used the booty to build numerous mosques, schools, hospitals, and caravansaries. At the time of his death, his rule was recognized in Syria, in Egypt, and in parts of Iraq and Asia Minor.

Nurek Dam, one of the world's highest dams, located on the Vakhsh River in Tajikistan near the border with Afghanistan. An earthfill dam, it was completed in 1980 and rises 984 feet (300 m) and includes an impervious core of concrete reaching 52 feet (16 m) under the river to bedrock. The dam is 2,309 feet (704 m) wide at its crest. The nine-unit power plant associated with the dam has a design capacity of 2,700 megawatts of electricity, and the water impounded is used to irrigate some 1,600,000 acres (650,000 hectares) of farmland.

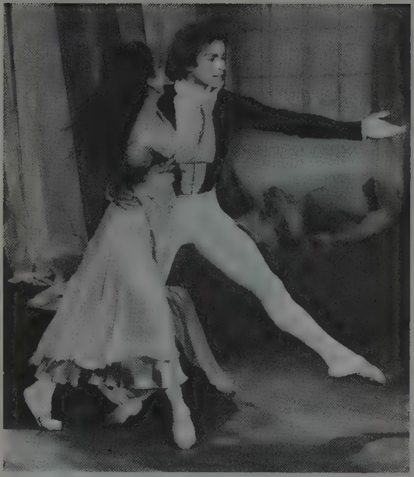
Nuremberg (Germany): *see under* Nürnberg.

Nūrestān, also spelled NŪRISTĀN, formerly (until 1895) KĀFIRISTĀN, historic region in eastern Afghanistan, about 5,000 square miles (13,000 square km) in area and comprising the upper valleys of the Alīngār, Pīch, and Landay Sind rivers and the intervening mountain ranges. Its northern boundary is the main range of the Hindu Kush, its eastern the Pakistani border, its southeastern the Konar (Kunar) Valley, and its western the mountain ranges above the Panjshēr and Nejrāb valleys. The region is mountainous, rainy, and forested.

Nūrestān's regional unity and distinction from the rest of Afghanistan spring from its isolation and the common cultural characteristics shared by its people, who strongly cherish independence, have a clan organization with village governments, and are now settled agriculturists (growing cereals and fruits and raising livestock) living in the valleys. They speak various Kafir languages. The region did not become part of Afghanistan until the 1890s, when ʿAbd ar-Raḥmān, the Afghan emir, conquered it and forcibly converted the inhabitants to Islām. He subsequently changed its name from Kāfiristān ("Land of the Kāfirs," *i.e.,* infidels) to Nūrestān ("Land of the Enlightened"). The forests of Nūrestān provide most of Afghanistan's timber.

Nureyev, Rudolf (Hametovich) (b. March 17, 1938, Irkutsk, Russian S.F.S.R.—d. Jan. 6, 1993, Paris, France), ballet dancer whose suspended leaps and fast turns were often compared to Vaslav Nijinsky's legendary feats. He was a flamboyant performer and a charismatic celebrity who revived the prominence of male ballet roles and significantly widened the audience for ballet.

Of Tatar descent, Nureyev began his ballet studies at 11, left school at 15, and supported himself by dancing. At 17 he entered the Leningrad Ballet School, where he was taught by Aleksandr Pushkin. He was an outstanding but rebellious student, refusing to join the Komsomol (Communist youth organization), disobeying curfew regulations, and learning English privately.



Nureyev and Margot Fonteyn

Keystone

After graduating in 1958, he became soloist with the Leningrad Kirov Ballet and danced leading roles with its touring company. While in Paris with the Kirov Ballet in June 1961, Nureyev eluded Soviet security men at the airport and requested asylum in France. He said later that the rigidly organized Soviet ballet had limited his opportunities to dance frequently and to perform in a variety of roles.

After his defection he danced with the Grand Ballet du Marquis de Cuevas and made his American debut in 1962, appearing on American television and with Ruth Page's Chicago Opera Ballet. Later that year he joined the Royal Ballet (London) as permanent guest artist, but he never became a member of a major dance troupe in the West, preferring to work with various companies on a temporary basis.

Nureyev became well known as Dame Margot Fonteyn's favourite partner. Dancing with her, he interpreted such roles as Albrecht in *Giselle,* Armand in *Marguerite and Armand,* and Prince Siegfried in *Swan Lake.* He was a popular guest artist in companies large and small throughout the world. Also working as a choreographer, Nureyev reworked *Swan Lake* (Vienna, 1964), giving the dominant role to the male dancer. His version of Sergey Prokofiev's *Romeo and Juliet* (1977) was produced by the London Festival Ballet, and his *Manfred* (1979) was performed by the Paris Opéra Ballet. In 1980 Nureyev staged *The Nutcracker* for the Berlin Ballet, and in 1981, owing to a further resurgence of interest in dance in Italy, Nureyev staged his version of *Romeo and Juliet* at La Scala, with Fonteyn as Lady Capulet. Nureyev's capabilities also extended to modern repertoires, and he performed in works by Martha Graham, Murray Louis, and Paul Taylor. Graham created the role of *Lucifer* (1975) for him, and in 1978 Nureyev appeared in the American premiers of *Canarsie Venus* and *Vivace,* choreographed for him by Louis.

His autobiography, *Nureyev,* was published in 1962. In 1973 he codirected (with Robert Helpmann) and starred in a filmed version of *Don Quixote,* and he had acting roles in the films *Valentino* (1977) and *Exposed* (1983).

Nureyev became an Austrian citizen in 1982. From 1983 to 1989 he was artistic director of the Paris Opéra Ballet.

Nurhachi, also spelled NURHACHU, formal title KUNDULUN KHAN, reign title T'IEN MING, Juchen title GEREN GURUN BE UJIRE GENGGIYEN ("Brilliant Emperor Who Benefits All Nations"), temple name T'AI TSU, posthumous name WU HUANG-TI, or KAO HUANG-TI (b. 1559, Manchuria—d. Sept. 30, 1626), chieftain of the Chien-chou Juchen, a Manchurian tribe, and one of the founders of the Manchu, or Ch'ing, dynasty. His first attack on China (1618) presaged his son Dorgon's conquest of the Chinese empire.

The Juchen (Jurchen) were a Tungus people who belonged to those border groups at the periphery of the Chinese empire that normally were under the influence of the Chinese imperial court. Nurhachi's tribe was the so-called Chien-chou Juchen, one of five Juchen tribes of Manchuria. The Chien-chou Juchen lived to the east of the Chinese border in the Long White Mountains north of the Yalu River. Four other Juchen tribes were located farther north of the central forest and steppe region of Manchuria. These tribes were rivals for power in a frontier relationship that alternated between fighting and cooperation, which included intermarriage. In this setting, Nurhachi established his career from very small beginnings. Born in 1559, he was called to leadership in his early 20s, after his father and grandfather had been killed in battle with rivals, supported in this case by China's Ming dynasty, which fostered rivalries among tribes on its borders as a way to make them less dangerous. At first, therefore, Nurhachi had to fight for survival in a situation of decline and disintegration of his own tribe. In 1586 he defeated a rival in his own tribe, who was supported by the Chinese. From this basic success, Nurhachi moved on to destroy, one by one, the challenges of the other Juchen states. To isolate his Juchen opponents from the Chinese, Nurhachi invaded the Chinese-controlled part of Manchuria and moved, thus, on to the attack against the Chinese empire.

In preparation and while defeating Juchen rivals, Nurhachi established a Manchu state, which at first remained undefined in its political relationship to his Manchurian opponents as well as to the Chinese empire. But its potential became clearer as the organization advanced. In 1599, under Nurhachi's direction, a Manchu nobleman and scholar, Erdeni, created a Manchu system of writing that laid the foundation for a Manchu national literature. This was the year also in which the first of the Juchen rivals was defeated and incorporated into the Nurhachi state. In 1601 Nurhachi established what was to become the military organization of the Manchus, the banner system. Although basically military, the banners were also units of administration and taxation for the Manchu people. Their commanders and administrators were appointed by Nurhachi, thus injecting an administrative structure into the Juchen tribal system. He assigned the four banners to three of his sons and one nephew, thereby preserving a part of the clan tradition without endangering his own authority. There were originally four banners; four more, established in 1615, were also given to reliable relatives.

This ingenious transformation of a tribal group into a military bureaucracy, which may have been inspired by the military-political structure of Chinese frontier settlements in Manchuria and elsewhere, prepared the way for the Manchu conquest of China.

To provide an economic base for expansion, Nurhachi shrewdly used his position in Manchuria to amass a great fortune from his monopoly of mining in the area and the trade in pearls, fur, and ginseng (a medicinal root) from the area and from Korea. He even developed a new, profitable method of curing ginseng. He also accumulated silver reserves from his tribute missions to Peking, which combined tribute with the trading ventures.

Nurhachi launched his first attack against China in 1618. By that time, he already had defeated two more of the Juchen rivals, the Hoifa and the Ula, and incorporated them in his union, and the final showdown with the most dangerous opponent, the Yehe, and their Chinese supporters was at hand. The Chinese border city of Fushun was captured when its commander, Li Yung-fang, defected to the Manchu side. This defection was possible only because the Chinese official saw in the Manchu system the opportunity of serving a Manchu ruler without abandoning his Chinese cultural and political experience. He was only the first of a number of Chinese who surrendered or were captured and entered Manchu service in an administration that adapted many Chinese methods.

Nurhachi's relationship to the Ming emperor at Peking was at first ambiguous. He himself went several times at the head of tribute missions to Peking. In 1601, when the four banners were established, Nurhachi issued a vague claim of having founded a great "Yeh," a family realm or state. In 1616, before the attack against Fu-shun, Nurhachi proclaimed himself as khan ("emperor"), using the Chinese phrase T'ien Ming (Heavenly Mandated). He called his dynasty Chin or sometimes Hou Chin (Later Chin) to indicate a continuation of the Juchen dynasty of the 12th century. Even then, this assertion of Imperial authority did not necessarily imply a challenge to the supreme authority of the Ming, since the Chin dynasty of the 12th century had never ruled the whole of China. The attack against Imperial Chinese forces that followed in 1618 was justified by seven alleged grievances, accusations against the Chinese for their support of his enemies, their responsibility for the killing of Nurhachi's father and grandfather, and other complaints, all within the loyalty relationship between the Ming and his own state.

Nurhachi's ambition, however, clearly went further. He moved his capital into Chinese Manchuria, first to Liao-yang and finally to Shen-yang (Mukden), in 1625, and from there attempted to defeat the Chinese forces guarding the entrance to China proper. In February 1626 he was defeated for the first time by the Chinese at Ningyuän, and he died September 30 of wounds.

Nurhachi thus never saw final success of his great political–military venture. On the foundation he established, however, his successors carried out his plans. As a tribal ruler who rose to khanship, Nurhachi had a harem of three wives and many concubines, mostly taken from the families of Juchen chieftains. He had 16 known sons, of whom one, Abahai (died 1643), succeeded him as khan, and another, Prince Dorgon (*q.v.*), perhaps one of the most brilliant of the early Manchu leaders, as regent directed the final conquest of China and established the Manchu dynasty in Peking in 1644. (F.H.M.)

BIBLIOGRAPHY. Arthur W. Hummel (ed.), *Eminent Chinese of the Ch'ing Period, 1644–1912*, vol. 1, pp. 594–599 (1944), is the most useful biography of Nurhachi, written by Fang Chao-ying, a well-known specialist in the field of history of the Manchus. It contains a detailed listing of Chinese, English, and Japanese sources on Nurhachi and his period. Franz Michael, *The Origin of Manchu Rule in China* (1942, reprinted 1965), analyzes in detail the role of Nurhachi in creating the Manchu state and contains a bibliography of works on Manchu history.

Nuri as-Said (b. 1888, Baghdad—d. July 14, 1958, Baghdad), Iraqi army officer, statesman, and political leader who maintained close ties with Great Britain and worked for Arab unity.

Nuri was commissioned in the Turkish Army in 1909, when Iraq was a province of the Ottoman Empire. During World War I (1914–18) he participated in Ottoman military operations against the British. He was soon captured by the British, however, and in 1916 he joined the Sharīfian Arab army led by Amīr Fayṣal I, which Great Britain was supporting in a revolt against Ottoman rule in the Arab provinces; Nuri distinguished himself in battle. At the war's end Fayṣal established a short-lived Arab state, centred in Damascus, and Nuri served actively in its administration. After the French destroyed this state in 1920, Fayṣal became the first king of Iraq (1921). Nuri returned to occupy a number of influential positions, becoming prime minister in 1930. In this capacity Nuri negotiated a 20-year treaty with Great Britain that, although maintaining substantial British influence, granted independence to Iraq.

Nuri as-Said
Keystone

Nuri served as prime minister on 14 different occasions, remaining faithful to two dominant policies: a pro-British attitude and support of the Hāshimite dynasty, which King Fayṣal represented until his death in 1933. Neither of these beliefs was shared by the rising generation of younger army officers, and at the beginning of World War II open conflicts developed. Nuri wished to support the British by declaring war against Germany and breaking off diplomatic relations with Italy. He was opposed by influential army officers, who in April 1941 supported a coup under the leadership of Rashid Ali. Nuri and the King fled into exile. The British defeated the government of Rashid Ali in open warfare; Nuri then returned to Iraq and served as prime minister under British sponsorship in 1941–44.

Nuri maintained political order in Iraq while advocating a union of several Arab nations into a single state. Iraq became a charter member of the Arab League in 1945. Through tough and effective use of the police and the press, Nuri repressed critics of the Iraqi crown and eliminated opportunities for army intervention.

Violent nationalist feeling in Iraq after World War II precluded renewal of the Anglo-Iraqi treaty, despite Nuri's ardent support. In 1955 the United States sponsored the Baghdad Pact, a mutual security agreement among Middle Eastern states, and Nuri saw Iraqi membership as a solution to the troublesome problem of the Anglo-Iraqi treaty. He hoped to induce other Arab states to join the pact and then assert leadership of the Arab unity movement and secure popular support in Iraq. Popular resentment against the West, however, had become too widespread for the Baghdad Pact to serve these ends. When Nuri sponsored an Arab union with Jordan in February 1958 (Jordan was closely allied with the West), Iraqi army units, under the leadership of Abdul Karim Kassem, overthrew the monarchy; Nuri was assassinated by a mob following the revolution of July 1958.

Nūristāni, also called NURI, KAFFIR, or KAFIR (Arabic: Infidel), people of the Hindu Kush mountain area of Afghanistan and the central area of Pakistan. Their territory, formerly called Kafiristan, was renamed Nūristan, "Land of Light" or "Enlightenment," when they became Muslims at the turn of the 20th century. The territory now forms the northern part of the Afghan province of Nangarhār and has a population of about 65,000. Only about 3,000 live in Pakistan.

Their language, Kafiri (or Nūristāni), belongs to the Indo-Aryan subgroup of the Indo-Iranian branch of the Indo-European language family. They are nominally Sunnī Muslims but continue in many of their traditional ways dating from before their conquest by the Afghans in 1895.

Their earlier record was one of brigandage and plundering; they were, and still are, intensely loyal to their own people and strongly cherish their independence. They have a clan organization with village government and are now settled agriculturists. The region as a whole has a most distinctive culture, and although it is possible to establish certain cultural differences between the three main valleys, they share a culture which gives them a unique position within Afghanistan.

The houses in the highest northern regions are built of stone or clay, but in the forested regions they are mainly of wood, often (to save space) in several stories, stepwise above each other. The small enclosed fields (often no bigger than an ordinary floor space), mostly lying in steep, narrow mountain valleys, are cultivated by the women, while the men hunt or tend livestock. The main crop is wheat, with barley, corn (maize), millet, and peas. Grapes and mulberries are grown in the lower areas. Livestock consists mainly of goats, with some cattle and a few sheep in the upper, wider valleys. There are no horses.

Nurmi, Paavo (Johannes) (b. June 13, 1897, Turku, Fin.—d. Oct. 2, 1973, Helsinki), track athlete who dominated long-distance running in the 1920s, capturing six gold medals in three Olympic Games (1920, 1924, 1928). For eight years (1923–31) he held the world record for the mile run: 4 min 10.4 sec.

Along with numerous other Finns who gained Olympic honours from 1920, Nurmi was inspired by his countryman Hannes Kolehmainen, who won three long-distance races in the 1912 Olympic Games. In training and in races, Nurmi carried a stopwatch so that he could precisely regulate his pace. In the 1920 Olympics in Antwerp, he won the 10,000-metre run and the 10,000-metre cross-country race; in 1928, in Amsterdam, he took another gold medal in the 10,000-metre run. Most spectacular were his feats in the 1924 games in Paris. In little more than one hour on July 10, an extremely hot day, he set Olympic records in the 1,500-metre and 5,000-metre runs. Two days later, again in oppressive heat, he repeated his 1920 triumph in

Nurmi, 1931
UPI—EB Inc.

the 10,000-metre cross-country race (an event discontinued after 1924), and the following day he finished first in an unofficial 3,000-metre team race that was won by Finland (no medals were awarded).

On Aug. 23, 1923, in Stockholm, Nurmi, consulting his stopwatch as he set his mile record, ran each of the first three quarters (440 yd) in exactly 63 seconds and then the final quarter in 61.4 seconds. Despite his success, his method of evenly paced quarters was not widely imitated. In 1928 he set a world record for the one-hour run: 19,210 m (11 mi 1,648 yd). In 1932, shortly before the Olympic Games, he lost his international amateur status.

To make the best use of the Britannica, consult the INDEX *first*

Nürnberg, English conventional NUREMBERG, second city (after Munich) of the *Land* (state) of Bavaria in southern Germany. The city is located on the Pegnitz River, where it emerges from the uplands of Franken (Franconia).

The city was first mentioned in official records as Noremberg, in 1050, but had its origin in a castle built about 10 years earlier by the German emperor Henry III, duke of Bavaria. A settlement developed around the castle, and in 1219 the city was granted its first charter. The city soon gained full independence, becoming a free imperial city.

By the latter part of the 13th century Nürnberg was no longer solely a fortified settlement; it had developed into a city of craftsmen and patricians, and manufacturing and commerce had became the foremost sources of income. In 1471 the painter Albrecht Dürer was born in Nürnberg. During the age of Dürer and his contemporaries—the painter Michael Wohlgemuth (his teacher), the wood sculptor Veit Stoss, the brass founder Peter Vischer, the stonecutter and sculptor Adam Kraft, as well as the cobbler-poet Hans Sachs—the arts flourished in Nürnberg as never before or since. In 1525 the tenets of the Reformation were adopted by the city, and in 1526 the scholar and Protestant leader Philipp Melanchthon founded one of Germany's first *Gymnasiums*, an institution that continues to bear his name. Together with the humanist Willibald Pirkheimer, the astronomer Regiomontanus, and the cosmographer Martin Behaim, the designer of the first globe, Melanchthon laid the foundation for Nürnberg's reputation as a centre of learning in the developing Western world.

In the early 17th century Nürnberg was at the height of its economic and cultural development; yet by 1806 it had lost its status as a free imperial city and, much indebted, became part of the kingdom of Bavaria. The shift of world trade routes from the land to the sea, following the discovery of America and of the seaway to India, and the devastations of the Thirty Years' War were the initial causes of this decline. Not until the dawn of the industrial age, when the first German railway (linking Nürnberg and Fürth) was opened, on Dec. 7, 1835, did the city begin to flourish again as a modern industrial centre.

In the 1930s Nürnberg became a centre of the Nazi Party and in 1935 gave its name to the anti-Semitic Nürnberg decrees. The city was severely damaged during World War II. It was captured by U.S. troops and was the scene of the Allied trials of German war criminals. Since then, much of the city has been redeveloped.

The inner city, divided into two parts by the Pegnitz, is encircled by a wall completed in 1452, and the older, inner, line of fortifications, dating from 1140 and 1320, can still be traced. Unfortunately, only a few historic buildings survived the massive bomb damage wrought toward the end of World War II, although some have been restored. The most important are the Gothic churches of St. Sebald and St. Lorenz, and, adjoining the market place, the Frauenkirche (Church of Our Lady). The Heilig Geist Spital (Hospital Church of the Holy Ghost), rising above the Pegnitz, is now home for the elderly. In addition, there are the Mauthalle (customs house) on the Königstrasse, the Weinstadel (wine storage house), the Renaissance city hall, the Schöne Brunnen (a fountain), the Fembohaus (museum of the old city), and towering above them all, the imperial castle and its stables and granary, the latter now a youth hostel.

Nürnberg is a major producer of fine mechanical and optical goods and electrical apparatus. Also important are the motor vehicle, printing, chemical, wood and paper, and textile industries. When the International Toy Fair was established after World War II, the city became the world centre for this industry.

Nürnberg is a focal point for numerous highways and is connected to the Munich–Berlin and Frankfurt–Cologne autobahns. It is situated on the old Ludwigs-Danube-Main Canal, but there is also a modern harbour linked with the Main-Danube-Canal, which, when completed in the early 1990s, will join the Rhine, Main, and Danube rivers. Nürnberg's airport, north of the city, provides connections, particularly to the international airport in Frankfurt am Main.

There are a number of institutions of higher learning in and around the city, including the Ohm Polytechnic Institute for Applied Technology and part of the University of Erlangen-Nürnberg. The Academy of Arts, founded in 1662, is the oldest in Germany. Other institutions are the Pegnesische Blumenorden, a literary society founded in 1644, and the city's public library, which is more than 600 years old. The city is the home of the unique Germanisches Nationalmuseum, chartered in 1852. It features a complete collection of Dürer's printed graphic works. Pop. (1989 est.) 480,078.

Nürnberg, with (foreground) a portion of the medieval wall surrounding the old city

By courtesy of the German Information Center

Nürnberg faience, German tin-glazed earthenware made at Nürnberg between 1712 and 1840. It is among the earliest German faience produced, since Nürnberg was a centre of pottery manufacture as early as the 16th century. The few extant specimens from that early period are in the manner of contemporary Italian maiolica.

Nürnberg Kleinmeister (artists' group): *see* Kleinmeister.

Nürnberg Laws (1935), two measures designed by Adolf Hitler and approved by a Nazi Party convention in Nürnberg (Sept. 15, 1935). The *Reichsbürgergesetz* (Law of the Reich Citizen) deprived Jews of German citizenship, designating them as "subjects of the state." The *Gesetz zum Schutze des Deutschen Blutes und der Deutschen Ehre* (Law for the Protection of German Blood and German Honour), usually called simply *Blutschutzgesetz,* forbade marriage or sexual relations between Jews and "citizens of German or cognate blood."

In the first supplementary decree of Nov. 14, 1935, these laws were made more specific by defining who was a Jew (a person with at least one Jewish grandparent) and by declaring explicitly that "a Jew cannot be a citizen of the Reich. He cannot exercise the right to vote; he cannot occupy public office." Other enactments were designed to complete the process of Jewish segregation. Jews were forbidden "to employ in domestic service female subjects of German or kindred blood who are under the age of 45 years." Before long Jewish passports were stamped with a red "J" (*Jude*), and Jews were compelled to adopt "Jewish" names. Jewish communities were deprived of their legal status by the decree of March 28, 1938, and steps were taken to exclude Jews completely from the practice of medicine.

Nürnberg Rally, German NÜRNBERGER PARTEITAGE (Nürnberg Party Days), any of the massive Nazi Party rallies held in 1923, 1927, and 1929 and annually from 1933 through 1938 in Nürnberg (Nuremberg) in Bavaria. The rallies were primarily propaganda events, carefully staged to reinforce Party enthusiasm and to showcase the power of National Socialism to the rest of Germany and the world.

The first nationwide Party convention was held in Munich in January 1923, but in September of the same year the site was moved to Nürnberg, whose quaint medieval character provided an ideal backdrop for the nationalistic pageantry of the second Party congress. The first truly grand-scale rally was that of 1929 and featured most of the elements that marked all future rallies: blaring Wagnerian overtures, stirring martial songs, banners, goose-step marches, human swastika formations, torchlight processions, bonfires, and magnificent fireworks displays. Adolf Hitler and other Nazi leaders delivered lengthy orations. Buildings were festooned with enormous flags and Nazi insignia. The climax of the rallies was the solemn consecration of the colours, in which new flags were touched to the *Blutfahne* (Blood Banner), a tattered standard said to have been steeped in the blood of those killed in Hitler's abortive Beer Hall Putsch of 1923.

The rallies usually were held in late August or September, lasted several days to a week, and drew hundreds of thousands of Party members and spectators, including hundreds of foreign journalists. The rallies included rousing speeches by the *Führer* which were often the occasion for the announcement of new Nazi directions. In 1935, for example, the racist Nürnberg Laws were promulgated against the Jews.

Something of the emotional power generated by the rallies has been preserved in films, most notably in Leni Riefenstahl's classic *Triumph des Willens* (1935; *Triumph of the Will*), which captures the events of the 1934 rally. The so-called Peace Rally was cancelled for 1939 because of preparations for war against Poland.

Nürnberg trials, Nürnberg also spelled NUREMBERG, a series of trials held in Nürnberg, Ger., in 1945–46, in which former Nazi leaders were indicted and tried as war criminals by the International Military Tribunal. The indictment lodged against them contained four counts: (1) crimes against peace—*i.e.,* the planning, initiating, and waging of wars of aggression in violation of international treaties and agreements; (2) crimes against humanity—*i.e.,* exterminations, deportations, and genocide; (3) war crimes—*i.e.,* violations of the laws of war; and (4) "a common plan or conspiracy to commit" the criminal acts listed in the first three counts.

The authority of the International Military Tribunal to conduct these trials stemmed from the London Agreement of Aug. 8, 1945. On that date, representatives from the United States, Great Britain, the Soviet Union, and the provisional government of France signed an agreement that included a charter for an international military tribunal to conduct trials of major Axis war criminals whose offenses had no particular geographic location. Later, 19 other nations accepted the provisions of this agreement. The tribunal was given the authority to find any individual guilty of the commission of war crimes (counts 1–3 listed above) and to declare any group or organization to be criminal in character. If an organization was found to be criminal, the prosecution could bring individuals to trial for having been members, and the criminal nature of the group or organization could no longer be questioned. A defendant was entitled to receive a copy of the indictment, to offer any relevant explanation to the charges brought against him, and to be represented by counsel and confront and cross-examine the witnesses.

The tribunal consisted of a member plus an alternate selected by each of the four signatory countries. The first session, under the presidency of General I.T. Nikitchenko, the Soviet member, took place on Oct. 18, 1945, in Berlin. At this time, 24 former Nazi leaders were charged with the perpetration of war crimes; and various groups (such as the Gestapo, the Nazi secret police) were charged with being criminal in character. Beginning on Nov. 20, 1945, all sessions of the tribunal were held in Nürnberg under the presidency of Lord Justice Geoffrey Lawrence (later Baron Trevethin and Oaksey), the British member.

After 216 court sessions, on Oct. 1, 1946, the verdict on 22 of the original 24 defendants was handed down. (Robert Ley committed suicide while in prison, and Gustav Krupp von Bohlen und Halbach's mental and physical condition prevented his being tried.) Three of the defendants were acquitted; Hjalmar Schacht, Franz von Papen, and Hans Fritzsche. Four were sentenced to terms of imprisonment ranging from 10 to 20 years: Karl Dönitz, Baldur von Schirach, Albert Speer, and Konstantin von Neurath. Three were sentenced to life imprisonment: Rudolf Hess, Walther Funk, and Erich Raeder. Twelve of the defendants were sentenced to death by hanging. Ten of them, Hans Frank, Wilhelm Frick, Julius Streicher, Alfred Rosenberg, Ernst Kaltenbrunner, Joachim von Ribbentrop, Fritz Sauckel, Alfred Jodl, Wilhelm Keitel, and Arthur Seyss-Inquart, were hanged on Oct. 16, 1946. Martin Bormann was tried and condemned to death in absentia, and Hermann Göring committed suicide before he could be executed.

In rendering these decisions, the tribunal rejected the major defenses offered by the defendants. First, it rejected the contention that only a state, and not individuals, could be found guilty of war crimes; the tribunal held that crimes of international law are committed by individuals and that only by punishing those who commit such crimes can the provisions of international law be enforced. Second, it rejected the argument that the trial and adjudication were ex post facto. The tribunal responded that such acts had been regarded as criminal prior to World War II.

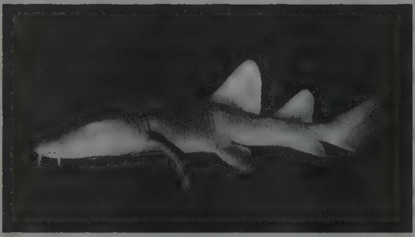
nurse, person who is skilled or trained in nursing (*q.v.*).

Nurse, Sir Paul M. (b. Jan. 25, 1949, Norwich, Norfolk, Eng.), British scientist who, with Leland H. Hartwell and R. Timothy Hunt, won the Nobel Prize for Physiology or Medicine in 2001 for discovering key regulators of the cell cycle.

Nurse earned a Ph.D. from the University of East Anglia in 1973 and was a professor at the University of Oxford from 1987 to 1993. He headed the Cell Cycle Laboratory (1984–87, 1993–) at the Imperial Cancer Research Fund (ICRF; now Cancer Research UK) and in 1996 became director-general of the ICRF.

In the mid-1970s Nurse, using yeast as his model organism, discovered the gene *cdc2*. His research demonstrated that the gene served as a master switch, regulating the timing of the cell-cycle events, such as division. In 1987 Nurse isolated the corresponding gene in humans, which was named cyclin-dependent kinase 1 (*cdk1*). The gene encodes a protein that belongs to a family of key enzymes, the cyclin-dependent kinases (CDKs), which participate in many cell functions. By 2001 about a half dozen other CDKs were identified in humans. Nurse's work aided in the scientific understanding of cancer. He was knighted in 1999.

nurse shark (*Ginglymostoma cirratum*), Atlantic shark of the family Ginglymostomatidae. The nurse shark is yellow-brown or gray-brown, sometimes with dark spots, and may grow to more than 4 m (13 feet) in length. Noted for its sluggishness, the nurse shark can breathe without swimming; it simply opens and closes its mouth to pump water over its gills. The shark has a small mouth and thick lips that create powerful suction, enabling it to inhale its prey, primarily invertebrates and small fish. It rarely attacks swimmers unless provoked. It is not related to the gray nurse (*see* sand shark) of Australia.



Nurse shark (*Ginglymostoma cirratum*)

Tom Myers

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nursery rhyme, verse customarily told or sung to small children. The oral tradition of nursery rhymes is ancient, but new verses have steadily entered the stream. A French poem numbering the days of the month, similar to "Thirty days hath September," was recorded in the 13th century; but such latecomers as "Twinkle, Twinkle, Little Star" (by Ann and Jane Taylor; pub. 1806) and "Mary Had a Little Lamb" (by Sarah Josepha Hale; pub. 1830) seem to be just as firmly established in the repertoire.

Some of the oldest rhymes are probably those accompanying babies' games, such as "Handy, dandy, prickly, pandy, which hand will you have?" (recorded 1598) and its German equivalent, "Windle, wandle, in welchem Handle, oben oder unt?" The existence of numerous European parallels for "Ladybird, ladybird [or, in the United States, "Ladybug, ladybug"], fly away home" and for the singing game "London Bridge is falling down" and for the riddle-rhyme "Humpty-Dumpty" suggests the possibility that these rhymes come down from very ancient sources, since direct translation is unlikely.

Such relics of the past are exceptional. Most nursery rhymes date from the 16th, 17th, and, most frequently, the 18th centuries. Apparently most were originally composed for adult entertainment. Many were popular ballads and songs. "The frog who would a-wooing go" first appeared in 1580 as *A Moste Strange weddinge of the ffrogge and the mowse.* "Oh where, oh where, ish mine little dog gone?" was a popular song written in 1864 by the Philadelphia composer Septimus Winner.

Although many ingenious theories have been advanced attributing hidden significance, especially political allusions, to nursery rhymes, there is no reason to suppose they are any more arcane than the popular songs of the day. Some were inspired by personalities of the time, and occasionally these can be identified. Somerset tradition associates "Little Jack Horner" (recorded 1725) with a Thomas Horner of Mells who did well for himself during the dissolution of the monasteries.

The earliest known published collection of nursery rhymes was *Tommy Thumb's* (*Pretty*) *Song Book,* 2 vol. (London, 1744). It included "Little Tom Tucker," "Sing a Song of Sixpence," and "Who Killed Cock Robin?" The most influential was *Mother Goose's Melody: or Sonnets for the Cradle,* published by the firm of John Newbery in 1781. Among its 51 rhymes were "Jack and Jill," "Ding Dong Bell," and "Hush-a-bye baby on the tree top." An edition was reprinted in the United States in 1785 by Isaiah Thomas. Its popularity is attested by the fact that these verses are still commonly called "Mother Goose rhymes" in the United States. *See also* alphabet rhyme; counting-out rhyme; Mother Goose.

nursery school: *see* day-care centre.

nursing, health care profession concerned with providing physical and emotional care to the sick and disabled and with promoting, maintaining, and restoring health in all individuals. Nurses perform a diverse array of activities, including research, health education, and patient consultation. They often coordinate their services with physicians and other allied health providers.

A brief treatment of nursing follows. For full treatment, *see* MACROPAEDIA: Medicine.

Nursing emerged as a profession in the latter part of the 19th century. Historically women have been the principal caregivers of sick family members, although religious traditions such as Christianity also have contributed to the history of nursing; during the Middle Ages religious orders specifically devoted to caring for the sick and the poor were established. It was not until the 19th century, however, that nursing began to gain recognition as a profession. The British nurse Florence Nightingale was instrumental in effecting this change. In 1860 she established the first scientifically based nurses' training school at St. Thomas's Hospital in London. This school became the foundation of most nursing programs throughout the Western world and marked the beginning of the modern development of nursing through its establishment of objective criteria for determining the profession's qualifications.

In the late 20th century educational programs for nurses in many countries were of two types: those that required a combination of academic study and clinical practice, took between two to four years to complete, and led to either a diploma or a degree; and those that prepared auxiliary nurses (often called aides or practical nurses), who receive less training and perform less complicated tasks. Many nurses choose to specialize in various areas of care such as pediatrics, psychiatry, geriatrics, or critical care. Advanced training for teachers, supervisors, and specialists is also available. Specialized programs for nurse-practitioners, clinical nurse specialists, nurse anesthetists, and nurse midwives prepare nurses to undertake certain tasks traditionally carried out by physicians.

Licensing and registration are important in standardizing and regulating nursing care. In many countries nurses must pass a licensure examination to be able to practice. Professional organizations such as the American Nurses Association, founded in 1896, formulate standards and administer examinations, provide continuing education, and promote desirable legislation for the profession. In the United States, legal designations of nurses include registered nurses, who complete a degree program and pass an examination, and licensed practical nurses, who complete one year of training and assist registered nurses.

Nursing is practiced in many settings, such as hospitals, nursing homes, schools, the military, industry, physicians' offices, clinics, and private homes. In a hospital setting nurses may hold different levels of responsibility, from staff nurse to administrator. Nurses may organize a patient's care after leaving the hospital, providing services through outpatient clinics or home care for the terminally ill through hospice programs. Community, or public health, nursing involves educating the public on such topics as proper nutrition for pregnant women and methods of disease prevention.

Nusa Tenggara Barat, English WEST NUSA TENGGARA, *provinsi* (province) of Indonesia, comprising the western Lesser Sunda Islands of Lombok, Sumbawa, Moyo, and Sangeang. Nusa Tenggara is Indonesian for "southeast islands." The province fronts the Indian Ocean to the south, the Bali Sea to the northwest, the Flores Sea to the northeast, Lombok Strait to the west, and the Sape Strait to the east.

The islands were ruled by the Buddhist kings of Java in the 7th century and passed under the control of the Hindu Majapahit empire of eastern Java in the 14th century. After the arrival of Islām in the 16th century and the subsequent disintegration of Majapahit in neighbouring Java, local Hindu states thrived on the western Lesser Sunda Islands. The area was governed by the Hindu kingdom on Bali (across Lombok Strait to the west) until 1843, when the Bali king accepted the colonial sovereignty of the Dutch. A revolt by the local Sasak Muslims in 1891 provoked active Dutch intervention. In 1894 the Dutch invaded Lombok and, after bitter fighting, captured Mataram, the capital city, and the town of Cakranegara. The rest of the province capitulated in the first decade of the 20th century. The province, occupied by the Japanese during World War II, became part of the Republic of Indonesia in 1950.

Lombok has two parallel rugged mountain chains, the northern volcanic chain rising to Mount Rinjani (12,225 feet [3,726 m]), Indonesia's tallest mountain. Sumbawa is also very mountainous and has active volcanoes; Mount Tambora (9,350 feet) is the highest peak. Narrow coastal plains and rocky and precipitous coasts are common on the islands. Hillsides have scrub vegetation, and occasional streams flow down the hills during the monsoon season. Lombok in particular has a large area in the extreme south of waterless, barren karst country. Sumbawa is divided nearly in half by Teluk Bay.

The principal occupation in the province is agriculture, and the chief crops include rice, coffee, corn (maize), sugarcane, cotton, indigo, and tobacco. Cattle and horses are raised, and deep-sea fishing is important. Industries produce milled rice, beverages, woven cloth, processed tobacco and coffee, pharmaceuticals, transport equipment, and refined sugar. The islands have roads running east-west, mostly parallel to their coasts. Mataram on Lombok is the provincial capital and has an airport; Sumbawa Besar and Raba on Sumbawa also have airports. The population is mostly Sasak, together with some Balinese on Lombok and Sumbawans on Sumbawa. Area 7,790 square miles (20,177 square km). Pop. (1995 est.) 3,654,800.

Nusa Tenggara Timur, English EAST NUSA TENGGARA, *provinsi* (province) of Indonesia that includes the eastern Lesser Sunda Islands of Sumba, Flores, Solor, Alor, Sawu, Roti, Semau, Adonora, Komodo, Rinca, Lomblen, and Pantar and the western half of Timor. The name Nusa Tenggara is Indonesian for "southeast islands." The province fronts the Flores Sea to the northwest, the Banda Sea to the northeast, the Indian Ocean to the south, the Timor Sea and Timor Timur (East Timor) province to the east, and Sumba Strait to the west. Physiographically Nusa Tenggara Timur comprises the islands that encircle the Savu Sea.

The islands that now compose the province formed part of the Majapahit empire of eastern Java in the 14th century and were included in the Muslim Mataram kingdom of Java in the 16th century. In the 17th and 18th centuries the Portuguese and the Dutch were in frequent conflict in the area, and Timor became a Dutch colony in 1859. The Japanese occupied Nusa Tenggara Timur during World War II. It was incorporated into the Republic of Indonesia in 1950.

The islands in the province present a splintered topography of volcanic mountains that reach an elevation of 7,814 feet (2,382 m) at Mount Mandasawu on Flores and 7,962 feet at Mount Mutis on western Timor. The mountain peaks are lower on the islands in the northeastern part of the province. Coral atolls and reefs border much of the narrow coastal lowland. The islands have a long dry season, and there are few perennial streams and no major rivers. Sandalwood and eucalyptus woodlands, scrub, and grasslands are common.

Agriculture is the main source of livelihood; the chief products include rice, corn (maize), coconuts, sandalwood, cotton, and coffee. Horses are raised, and deep-sea fishing is important. Industries include cotton spinning, weaving, dyeing, pharmaceutical production, and tanning. Road transport is confined mostly to the coastal lowlands on all the islands. The population is mostly Papuan and Malay, some of whom on Timor are Christians. Kupang on Timor is the provincial capital, and Ende on Flores is the other major town. Area 18,485 square miles (47,876 square km). Pop. (1995 est.) 3,582,800.

Nusaybin, formerly NĪSĪBĪN, town, southeastern Turkey. The town is situated on the Görgarbonizra River where it passes through a narrow canyon and enters the plain. Nusaybin faces the Syrian town of Al-Qāmishlī and is 32 miles (51 km) south-southeast of Mardin. Strategically commanding the entrance to the upper Syrian plains from the mountain passes of Asia Minor, Nusaybin—then called Nisibis—was a frontier outpost of the Assyrian empire. Captured from the Armenian king Tigranes I the Great by the Roman Lucius Licinius Lucullus in 68 BC, it changed hands intermittently in the Roman-Parthian struggles, was conquered by the Persians in the 5th century, and was then taken by the Arabs about 640. It continued to prosper under the caliphs until the Mongol invasions of the 13th century. It finally declined as a result of invasions and internal troubles. A North African traveler, Ibn Baṭṭūṭah, who passed through in the 14th century, saw it in a state of decline that he attributed to the compulsory substitution of wheat for fruit crops.

Nusaybin was also a major centre of trade in antiquity and retains some significance for its position on the upper trade routes from Mosul, Iraq, 120 miles (190 km) southeast, and its location on the Istanbul-Baghdad railway. Pop. (1990 prelim.) 50,605.

Nusku, in Mesopotamian religion, Sumero-Akkadian god of light and fire. His father was Sin (Sumerian: Nanna), the moon god. Semitic texts describe Nusku as the king of the night, who illuminates the darkness and repels the demons of the dark. On Babylonian boundary stones he is identified by a lamp. He is visible at the new moon and thus is called its son. The last day of the month is sacred to him, so that he is a lunar deity. He figures much in incantations and rituals as the fire.

Nüsslein-Volhard, Christiane (b. Oct. 20, 1942, Magdeburg, Ger.), German developmental geneticist who was jointly awarded the 1995 Nobel Prize for Physiology or Medicine with geneticists Eric F. Wieschaus and Edward B. Lewis (*qq.v.*) for their research concerning the mechanisms of early embryonic development. Nüsslein-Volhard, working in tandem with Wieschaus, expanded upon the pioneering work of Lewis, who used the fruit fly, or vinegar fly (*Drosophila melanogaster*), as an experimental subject. Her work has relevance to the development of all multicellular organisms, including humans.

At Eberhard-Karl University of Tübingen Nüsslein-Volhard received a diploma in biochemistry in 1968 and a doctorate in genetics in 1973. After holding fellowships in Basel and Freiburg, she joined Wieschaus as a group leader at the European Molecular Biology Laboratory in Heidelberg in 1978. In 1981 she returned to Tübingen, where, in 1985, she became director of the Max Planck Institute for Developmental Biology.

At Heidelberg, Nüsslein-Volhard and Wieschaus spent more than a year crossbreeding 40,000 fruit fly families and systematically examining their genetic makeup at a dual microscope. Their trial-and-error methods resulted in the discovery that of the fly's 20,000 genes, about 5,000 are deemed important to early development and about 140 are essential. They divided embryonic development into three genetic categories: gap genes, which lay out the head-to-tail body plan; pair-rule genes, which determine body segmentation; and segment-polarity genes, which establish repeating structures within each segment.

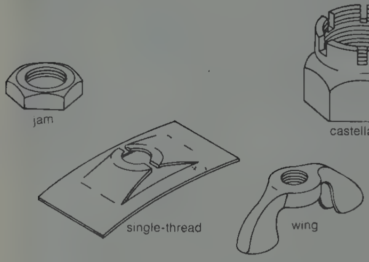
Nut, in Egyptian religion, a goddess of the sky, vault of the heavens, often depicted as a woman arched over the earth god Geb. Most cultures of regions where there is rain personify the sky as masculine, the rain being the seed which fructifies mother Earth. In Egypt, however, rain plays no role in fertility; all the useful water is on the earth (from the Nile). Egyptian religion is unique in the genders of its deities of earth and sky. As the goddess of the sky, Nut swallowed the sun in the evening and gave birth to it again in the morning.

Nut was also represented as a woman wearing a waterpot or pear-shaped vessel on her head, this being the hieroglyph of her name. She was sometimes portrayed as a cow, for this was the form she took in order to carry the sun god Re on her back to the sky. On five special days preceding the New Year, Nut gave birth successively to the deities Osiris, Horus, Seth, Isis (*qq.v.*), and Nephthys. These gods, with the exception of Horus, were commonly referred to as the "children of Nut."

nut, in botany, dry, hard fruit that does not split open at maturity to release its single seed.

A nut resembles an achene but develops from more than one carpel (female reproductive structure), often is larger, and has a tough, woody wall. Examples are the chestnut, hazelnut, and acorn. Although popularly called "nuts," the peanut is a legume, the coconut a drupe, and the Brazil nut a seed. Apart from their importance as food for man and animals, many nuts are processed to obtain a very fine charcoal used for absorption of gases, as in gas masks and industrial filters.

nut, in technology, fastening device consisting of a square or hexagonal block, usually of metal, with a hole in the centre having internal, or female, threads that fit on the male threads of an associated bolt or screw. A bolt or screw with a nut is widely used for fastening machine and structural components.



Several types of nuts

In addition to the standard square and hexagonal nuts, there are many special types. Several are illustrated, including the slotted or castellated nut; when this nut is tightened on the bolt, the slots are aligned with a hole in the bolt and locked in place by a cotter pin or wire lacing to prevent loosening or unscrewing. Locking can also be accomplished by tightening a thin nut called a jam nut against a standard nut. Another locknut contains a fibre or plastic insert near the top of the nut; locking occurs when this insert interferes with the bolt threads as the nut is tightened. The wing nut is used in applications in which frequent adjustment is necessary and hand tightening is sufficient.

Self-retained nuts provide a strong, permanent fastener for many types of thin materials; they are threaded blocks held in special enclosures attached to the part by welding, rivetting, screwing, or snap-on attachments. Single-thread nuts are formed by stamping a thread-engaging impression in a piece of flat metal.

nut-bearing torreya (tree): *see* Japanese torreya.

nut weevil: *see* acorn and nut weevil.

nutation, in astronomy, a small irregularity in the precession of the equinoxes. Precession is the slow, toplike wobbling of the spinning Earth, with a period of about 26,000 years. Nutation (Latin *nutare,* "to nod") superimposes a small oscillation, with a period of 18.6 years and an amplitude of 9.2 seconds of arc, upon this great slow movement. The cause of nutation lies chiefly in the fact that the plane of the Moon's orbit around the Earth is tilted by about 5° from the plane of the Earth's orbit around the Sun. The Moon's orbital plane precesses around the Earth's in 18.6 years, and the effect of the Moon on the precession of the equinoxes varies with this same period. The British astronomer James Bradley announced his discovery of nutation in 1748.

nutcracker, either of two sharp-billed, short-tailed birds belonging to the family Corvidae (*q.v.*; order Passeriformes), found in coniferous forests. The Eurasian nutcracker (*Nucifraga caryocatactes*) ranges from Scandinavia to Japan and has isolated populations in mountains farther south. It is 32 centimetres ($12\frac{1}{2}$ inches) long and brownish, with white streaking and white tail tip. Clark's nutcracker (*N. columbiana*) of western North America is pale gray, with black wings and tail, showing white patches in flight. Both species live chiefly on seeds and nuts, which they often store underground for winter use.

Clark's nutcracker (*Nucifraga columbiana*)
E.R. Degginger—EB Inc.

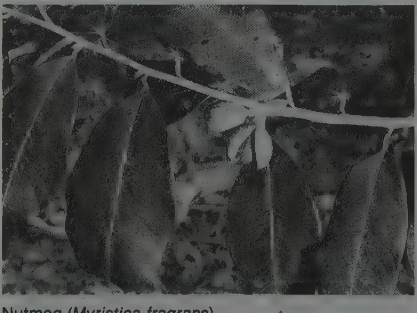
nuthatch, family name SITTIDAE, any of about 22 species of the genus *Sitta*. They are bob-tailed, short-necked little birds that search tree trunks and rocks for food, often descending headfirst. They are primarily insectivorous but also eat seeds, which they may store for winter use. Nuthatches have persistent metallic or nasal calls and tend to be sociable. The usual nest is a cavity lined with grass or hair.

European nuthatch (*Sitta europaea*)
Bruce Coleman Ltd.

Nuthatches are commonest in Eurasia, eastward to Japan, the Philippines, and Sumatra; four species occur in North America. Most are bluish above and white or reddish below, and there may be a black eye stripe or a cap.

The coral-billed nuthatch (*Hypositta corallirostris*), of Madagascar, is considered an aberrant member of the vanga shrike family (Vangidae).

nutmeg, spice consisting of the seed of the *Myristica fragrans,* a tropical, dioecious evergreen tree native to the Moluccas, or Spice Islands, of Indonesia. Nutmeg has a distinctive, pungent fragrance and a warm, slightly sweet taste; it is used to flavour many kinds of baked goods, confections, puddings, meats, sausages, sauces, vegetables, and such beverages as eggnog. Grated nutmeg has been used as a sachet; the Romans used it as incense. Around 1600 it became important as an expensive commercial spice of the Western world and was the subject of Dutch plots to keep prices high and of English and French counterplots to obtain fertile seeds for transplantation. The nutmegs sold whole were dipped in lime to prevent their sprouting.



Nutmeg (*Myristica fragrans*)
G.R. Roberts

The tree is cultivated in the Moluccas and the West Indies principally, and elsewhere with varying success. The trees may reach a height of about 65 feet (20 metres). They yield fruit 8 years after sowing, reach their prime in 25 years, and bear fruit for 60 years or longer. The nutmeg fruit is a pendulous drupe, similar in appearance to an apricot. When fully mature it splits in two, exposing a crimson-coloured aril, the mace, surrounding a single shiny, brown seed, the nutmeg. The pulp of the fruit is eaten locally. After collection, the aril-enveloped nutmegs are conveyed to curing areas where the mace is removed, flattened out, and dried. The nutmegs are dried gradually in the sun and turned twice daily over a period of six to eight weeks. During this time the nutmeg shrinks away from its hard seed coat until the kernels rattle in their shells when shaken. The shell is then broken with a wooden truncheon and the nutmegs are picked out. Dried nutmegs are grayish-brown ovals with furrowed surfaces. Large ones may be about $1\frac{1}{4}$ inches (30 millimetres) long and $\frac{3}{4}$ inch in diameter.

Nutmeg and mace contain 7 to 14 percent essential oil, the principal components of which are pinene, camphene, and dipentene. Nutmeg on expression yields about 24 to 30 percent fixed oil called nutmeg butter, or oil of mace, the principal component of which is trimyristin. The oils are used as condiments and carminatives and to scent soaps and perfumes. An ointment of nutmeg butter has been used as a counter-irritant and in treatment of rheumatism.

The name nutmeg is also applied in different countries to other fruits or seeds: the Jamaica, or calabash, nutmeg derived from *Monodora myristica;* the Brazilian nutmeg from *Cryptocarya moschata;* the Peruvian nutmeg from *Laurelia aromatica;* the Madagascar, or clove, nutmeg from *Ravensara aromatica;* and the California, or stinking, nutmeg from *Torreya californica.*

nutmeg melon: *see* muskmelon.

nutria, also called COYPU (*Myocastor coypus*), semi-aquatic South American rodent usually placed with the hutia in the family Capromyidae (order Rodentia), sometimes classified in a separate family, Myocastoridae. The nutria is a robust, muskrat-like animal with small eyes and ears, a rounded, scaly tail, partially webbed hind feet, and broad, orange incisors. It is about 1 metre (39 inches) long, including the long tail, and may weigh about 8 kilograms ($17\frac{1}{2}$ pounds). Its fur is reddish brown and consists of coarse guard hairs overlying a

Nutria (*Myocastor coypus*) feeding
Douglas Fisher

soft undercoat. The nutria lives in a shallow burrow along a pond or river and feeds mainly on aquatic plants. It produces up to three litters of two to eight young per year; gestation takes about 135 days.

Nutria fur is of some value in the fur trade. Persistent hunting in the 19th and early 20th centuries, however, led to a decline in populations. The animal was subsequently introduced into North America and Europe for breeding purposes. Some nutrias escaped or were turned loose, and in many countries they have become pests that damage crops and compete with other wildlife.

nutriculture: *see* hydroponics.

nutrient, substance that an organism must obtain from its surroundings for growth and the sustainment of life. So-called nonessential nutrients are those that can be synthesized by the cell if they are absent from the food. Essential nutrients cannot be synthesized within the cell and must be present in the food. In most living organisms nutrients provide not only the energy necessary for certain vital processes but also the various materials from which all structural and functional components can be assembled.

nutrient broth: *see* growth medium.

nutrition, the act or process by which living organisms absorb and utilize food substances.

A brief treatment of nutrition follows. For full treatment, *see* MACROPAEDIA: Nutrition.

Food serves three major functions: it generates energy for growth, maintenance, and activity; supplies the reducing agents that help to make enzymes, which carry out cellular processes; and provides the materials for cell building. Some organisms (such as green plants) are autotrophic, requiring only inorganic nutrients, whereas others (such as fungi) are heterotrophic, requiring both inorganic and organic substances. Green plants are lithotrophic (deriving reducing agents from such inorganic sources as water), whereas animals are organotrophic (deriving reducing agents from ingested organic compounds). In addition, green plants are phototrophic (they get their energy for life processes from light), whereas animals are chemotrophic (they get their energy from ingested chemicals). The earliest organisms were probably heterotrophic, and, as the Earth's supply of organic nutrients began to be depleted, certain life forms evolved an ability to synthesize food from inorganic components by photosynthesis. Because these forms were able to replenish the supply of organic nutrients, heterotrophic life forms were able to proliferate.

The essential human nutrients are proteins, minerals, and vitamins; a dietary deficiency or a defect in the body's absorption of any of these will result in malnutrition and disease. Proteins are broken down during digestion into amino acids, which are used for tissue building, as transmitters of genetic information, and for energy. Protein requirements are greater for growing children and adolescents than for adults. In some poor countries, kwashiorkor, a deficiency of amino acids, is a common cause of death among children.

Minerals are important in a number of body processes. Iron is used in the blood to make hemoglobin; iron-deficiency anemia is more common in women than in men, as it may be a consequence of heavy menstrual bleeding or childbirth. Calcium is crucial to the growth of bones and teeth; its deficiency can cause rickets in children and osteomalacia (bone softening) in adults. Both sodium and potassium are primary contributors of ions to the electrolytic extracellular fluid; deficiency of either may upset the homeostatic equilibrium. Loss of potassium through diuresis or diarrhea may result in loss of tissue excitability and muscle paralysis. Excessive sodium levels may bring on high blood pressure, and sodium deficiency may cause low blood pressure and epileptic seizures. Iodine is used to synthesize thyroid hormones. Traces of other minerals are also found in the human body, but the functions that they serve are not all known.

Vitamins are organic substances required by the body but either not synthesized by it or not synthesized in amounts sufficient to meet the body's requirements. Vitamins often serve to help enzymes with cellular reactions. Major nutritional disorders resulting from vitamin deficiencies include beriberi (lack of vitamin B_1, or thiamine), pellagra (lack of niacin), scurvy (lack of vitamin C), xerophthalmia (lack of vitamin A), and rickets and osteomalacia (lack of vitamin D). All these disorders were prevalent in the 19th century, when they were associated with the abandonment of agriculture for urban and industrial occupations. Only xerophthalmia, which leads to keratomalacia and blindness in children, has not been controlled.

Human foods are divided into as many as 17 groups, including cereals, starchy roots, legumes, other vegetables, fruits, sugars, meat, fish, eggs, milk and cheese, fats and oils, alcoholic beverages, nonalcoholic beverages, nuts and seeds, herbs and spices, dietetic preparations, and miscellaneous (salt, vinegar). A basic nutritional goal is to have a balanced diet, with items from all of the major food groups, although certain diets (*e.g.,* for weight loss or for other therapeutic purposes) may require more or less from one group than another.

Several national and international organizations have been founded to assess the nutritional needs of populations and to discover ways in which these needs can be met. These agencies have devised nutritional requirements and recommended standards as well as programs of food inspection and distribution. The provision of an adequate food supply and nutritional education to all people, however, remains a crucial problem.

For international statistical data on nutrition and food supply, *see* BRITANNICA BOOK OF THE YEAR.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

nutritional supplement, in foods, any vitamin or mineral added during processing to improve nutritive value and sometimes to provide specific nutrients in which populations are deficient. Flour and bread products are often enriched with iron and the B vitamins thiamin, riboflavin, and niacin; and citrus-fruit beverages, naturally containing vitamin C, may be fortified with additional vitamin C units. Addition of iodine to salt has eliminated goitre in some areas in which it was formerly common; and vitamin D may be added to baby foods to combat rickets.

nutritional type, category into which an organism may be placed according to the chemical nature of the nutrients it requires. Three separate classification schemes are commonly employed. One scheme is based on the chemical nature of the foods needed. Thus, organisms such as green plants and some bacteria that require only inorganic compounds are called autotrophic organisms, or autotrophs; heterotrophs, such as all animals and fungi and most bacteria, require organic as well as inorganic compounds.

A second scheme is based on the nature of the energy source utilized by the organism. Those that trap radiant energy (light) and convert it to chemical energy in the form of adenosine triphosphate (ATP) are phototrophs, or photosynthetic organisms. Chemotrophs, or chemosynthetic organisms, utilize organic or inorganic compounds, such as oxygen, to satisfy their ATP requirements.

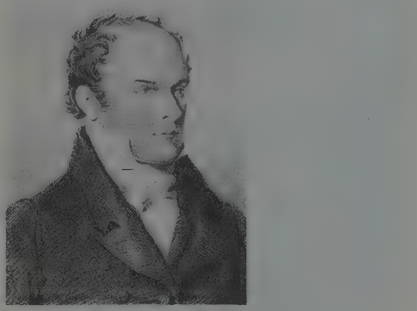
A third scheme is based on the type of electron-donor material utilized to synthesize certain cell constituents. A lithotroph consumes inorganic compounds in this activity (*e.g.,* in most plants, water is the ultimate source of electrons); in an organotroph, organic substances, such as carbohydrates, perform an analogous function.

An organism may be classified according to more than one scheme. Thus, a green plant is photolithotrophic, certain bacteria are photoorganotrophic, and other bacteria are chemolithotrophic. Animals, most bacteria, and yeasts are chemoorganotrophic.

Nuttall, George Henry Falkiner (b. July 5, 1862, San Francisco, Calif., U.S.—d. Dec. 16, 1937, London, Eng.), American-born British biologist and physician who contributed substantially to many branches of biology and founded the Molteno Institute of Biology and Parasitology (1921) at the University of Cambridge.

Educated in the United States (M.D., 1884, from the University of California at Berkeley) and in France, Germany, and Switzerland, Nuttall became a lecturer in bacteriology and preventive medicine at Cambridge in 1900, when he acquired British citizenship. In 1906 he was elected the first Quick Professor of Biology at Cambridge (emeritus 1931). He made significant, innovative discoveries in immunology, on life under aseptic conditions, in blood chemistry, and on diseases transmitted by arthropods, especially ticks. His publications include several books and many papers on bacteriology, serology, hygiene, tropical medicine, and parasitology. He founded the *Journal of Hygiene* (1901) and *Journal of Parasitology* (1908), editing the former until 1937 and the latter until 1933.

Nuttall, Thomas (b. Jan. 5, 1786, Long Preston, near Settle, Yorkshire, Eng.—d. Sept. 10, 1859, Nut Grove Hall, near St. Helens, Lancashire), English naturalist and botanist known for his discoveries of North American plants.



Thomas Nuttall, engraving by Thomson, 1825, after a drawing by W. Derby

The Mansell Collection

Nuttall grew up in Blackburn, Lancashire, and worked as a journeyman printer for his uncle before he left England for the United States at the age of 22 (in 1808). He settled in Philadelphia, where he became a good friend of the botanist Benjamin S. Barton, who instructed him in general principles of botany and encouraged his scientific career. Nuttall supplemented this help with his own studies and, thus prepared, made numerous trips to North Carolina, Virginia, Missouri, and Arkansas, collecting and identifying species of plants. These trips provided the information for his principal work, *The Genera of North American Plants* (1818).

In 1822 Nuttall became lecturer on natural history at Harvard University, where he began a study of ornithology. The first volume of his *Manual of the Ornithology of the United States and of Canada* appeared in 1832 (with further editions in 1840, 1891, 1896, and 1903) and was the first work of moderate size and price on American birds. He resigned from Harvard to accompany an expedition to the Columbia River and Hawaii, where he also collected plants. In 1842 he returned to England. He spent the rest of his life there as a farmer and horticulturist.

Nuuk, also spelled NÛK, also called GODTHÅB, capital and main port of Greenland, on the southwestern coast, near the mouth of the Godthåb Gulf, an inlet of the Davis Strait, and the Hjortetakken (meaning "deer antlers"), a mountain landmark. The modern town dates from 1721, when Hans Egede, a Norwegian missionary, founded a colony near the site of Vesterbygden, a 10th-century Norse settlement. It is the seat of the 21-member Parliament (Landsting) and Supreme Court and has foreign consulates, a teachers' college, hospital, and radio station. Government administrative work and hunting, fishing, fish canning, and reindeer and sheep raising are the main occupations. Most transportation is by boat. Helicopter services link Nuuk with other towns in Greenland and with the airport at Søndre Strømfjord, which has connecting flights to Copenhagen. An airfield was built at Nuuk in the late 1970s. Pop. (1999 est.) 13,566.

Nuuk, Greenland
Pictorial Parade

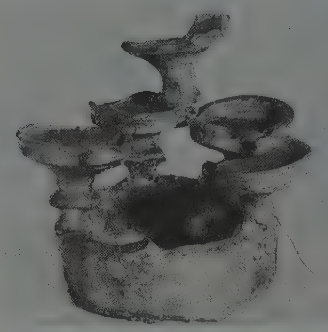
Nuwara Eliya, town, south-central Sri Lanka (Ceylon). It lies at an elevation of 6,199 feet (1,889 m) above sea level, immediately south of the island's highest summit, Pidurutalagala (8,281 feet [2,524 m]), and 25 miles (40 km) southeast of Kandy. From 1830 Nuwara Eliya was a hill station used by the British residents of Ceylon. Because of the elevation, the vegetation is of the temperate sort, and European fruit and vegetables are grown. Although part of a major tea-growing region, the town is also a market centre for rubber, vegetables, rice, and fish. The salubrious climate has led to its development as a hill resort and health spa as well. It is the site of a meteorological observatory. Pop. (1991 est.) 27,000.

Tea picker, Nuwara Eliya, Sri Lanka
Richard Abeles

Nuwe (ancient Egypt): *see* Thebes.

Nuwe Republikeinse Party (South African political party): *see* New Republic Party.

Nuzu, modern YORGHAN TEPE, ancient Mesopotamian city, located southwest of Kirkūk, Iraq. Excavations undertaken there by American archaeologists in 1925–31 revealed material extending from the prehistoric period to Roman, Parthian, and Sāsānian periods. In Akkadian times (2334–2154 BC) the site was called Gasur; but early in the 2nd millennium BC the Hurrians, of northern Mesopotamia, occupied the city, changed its name to Nuzu, and during the 16th and 15th centuries built there a prosperous community and an important administrative centre.



Offering table of Nuzu ware, green glazed terra-cotta; in the Fogg Art Museum, Cambridge, Mass.
By courtesy of the Fogg Art Museum, Harvard University

Excavations uncovered excellent material for a study of Hurrian ceramics and glyptic art. An especially outstanding type of pottery, called Nuzu ware (or Mitanni ware) because of its original discovery there, was characterized by one primary shape—a tall, slender, small-footed goblet—and an intricate black and white painted decoration. In addition to these extraordinary ceramic artifacts, more than 4,000 cuneiform tablets were discovered at the site. Although written mostly in Akkadian, the majority of the personal names are Hurrian, and the Akkadian used often shows strong Hurrian influence. The Nuzu material also made possible an insight into specific Hurrian family law and societal institutions and clarified many difficult passages in the contemporary patriarchal narratives of the Book of Genesis.

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Nyack, village, Rockland county, New York, U.S., on the west bank of the Hudson River (there known as the Tappan Zee). Settled in 1684, it was named for an Algonquin Indian tribe and depended on agriculture, fishing, and stone quarrying. After being connected by a railroad in 1874, it developed light industries, and, with the adjacent villages of Upper Nyack, South Nyack, Central Nyack, and West Nyack, it forms a residential area for New York City. The Tappan Zee Bridge (1956) connects Nyack with Tarrytown on the opposite bank. Pop. (2000) 6,737.

Nyakyusa, also called SOKILE, NGONDE, or NKONDE, Bantu-speaking people living in Mbeya region, Tanzania, immediately north of Lake Nyasa, and in Malaŵi. Their country comprises alluvial flats near the lake and the mountainous country beyond for about 40 miles (65 km). Those living in Malaŵi are called Ngonde (or Nkonde).

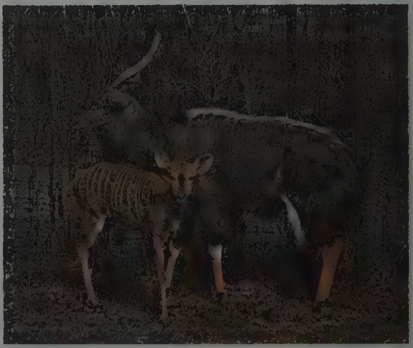
Plantains are the Nyakyusa's traditional staple food, augmented with corn (maize), millet, beans, and some milk. Rice and coffee have become the principal cash crops. Cattle assume exceptional importance in the local economies. Men and women share equally in the field labour; men alone, however, are responsible for tending the herd.

Traditionally the Nyakyusa lived in unique age villages: between the ages of 11 and 13 all the boys of a district left their paternal homes and established a new hamlet of their own, eventually marrying and bringing their wives there. Each hamlet had a headman, or "great commoner," selected by the paramount chief of the district. A village died as its founders died in old age. A number of villages constituted an independent chiefdom of a few thousand people. A district chief was succeeded by two sons, the firstborn of his two "great wives." Succession occurred when the sons were about 35 years old; the chief retired in a great ceremony, dividing his territory between the two sons and assigning definite tracts of land to each recently established village. Old villages might even shift off their land to make room for the villages of their sons. With the modern land shortage the older men are no longer willing to shift, and new age villages seldom become established.

Polygyny was traditional among the Nyakyusa, with a substantial bride-price expected. Slavery was formerly an accepted institution. Ancestor cults were the main feature of traditional religion.

Nyala, city, western Sudan, about 338 miles (544 km) northwest of Kāduqlī and located at an elevation of 2,208 feet (673 m). The city's industries produce textiles, processed food, and leather goods. Nyala is a road and railway terminus and serves as a trading centre for gum arabic. It also has a domestic airport. Branches of the Agricultural Bank of Sudan and the Peoples Cooperative Bank, which extend loans to the different cooperatives composed of farmers, consumers, craftsmen, and fishermen, are located at Nyala. Pop. (latest est.) 59,852.

nyala (species *Tragelaphus angasi*), slender antelope, family Bovidae (order Artiodactyla), found in southeastern Africa and distinguished by vertical white stripes on the sides of the body. Nyalas are found alone or in small groups in forests. They stand as high as 107 cm (3.5 feet) at the shoulder and have a distinguishing crest of hair along the back from head to tail. The male, which has loosely spiraled horns and a long fringe on the throat and underparts, is dark brown with reddish brown on the lower legs, white on the face and neck, and vertical white stripes on the body. The female of the species has reddish brown colouring with more conspicuous white striping.



Nyalas (*Tragelaphus angasi*)
Russ Kinne—Photo Researchers

The related mountain nyala (species *Tragelaphus buxtoni*), a rare antelope found in the mountains near Lake Zwai in central Ethiopia, is grayish brown with white on the head, neck, and body. The male has long, divergent, loosely spiraled horns.

Nyamulagira, Mount, also spelled NYAMLAGIRI, volcano in the Virunga Range of east central Africa, 15 mi (24 km) northeast of Sake, in the volcano region of Virunga National Park, Zaire. It is about 10,023 ft (3,055 m) high, with a central crater that last erupted in 1938, when the southwest slope opened, and the lava flow reached Lake Kivu to the south.

Nyamwezi, also called BANYAMWESI, Bantu-speaking inhabitants of a wide area of the western region of Tanzania. Their language and culture are closely related to those of the Sukuma (*q.v.*).

The Nyamwezi subsist primarily by cereal agriculture, their major crops being sorghum, millet, and corn (maize). Rice is a significant cash crop. The Nyamwezi have long been famous as travellers and workers outside their own country; as porters they became known throughout East Africa.

Though they once lived in compact villages, the Nyamwezi have dispersed since the 19th century, living now in relatively scattered homesteads. Marriage entails both a bride-price and bride service; polygyny is permitted but limited in practice. Descent is through the female line. The Nyamwezi have a number of secret societies that require initiation and other ceremonies.

Chiefdoms were formerly highly developed. Each had a hierarchy of territorial officers culminating in that of the *ntemi* ("chief"). There was a large aristocracy and an even larger slave population.

Ancestor worship is the most important facet of religious activity. High gods and spirits are also recognized. A *mfumi* ("diviner") can interpret a situation for an individual or a group, telling them what forces are impinging on their lives. Christianity and Islām have made only limited inroads.

Nyankole, also spelled NYANKORE (people): *see* Nkole.

Nyanza Province, province, southwestern Kenya, East Africa, occupying 6,240 sq mi (16,162 sq km), including 1,403 sq mi (3,636 sq km) of Lake Victoria, and with a population density of nearly 440 per sq mi. The principal cash crop is cotton, with coffee and tea production in the northeast. The western districts are populated primarily by the Luo, with the Gusii dominating the eastern districts. Kisumu (*q.v.*), the provincial capital, is the major urban centre in western Kenya. Small amounts of copper and gold are mined at Macalder in the southwest. The province supports some light industry and agricultural processing plants. Pop. (1993 est.) 4,041,000.

Kuja River near Lake Victoria, Nyanza Province, Kenya
Camera Press

Nyasa, Lake, also called LAKE MALAŴI, lake, southernmost and third largest of the East African Rift Valley lakes of East Africa, lying in a deep trough mainly within Malaŵi.

The lake's middle line and its northern and eastern shores form much of Malaŵi's boundary with Tanzania and Mozambique. Its north-south length is 363 mi (584 km), its width varies from 10 to 50 mi, and its area is 11,430 sq mi (29,604 sq km). The surface of the lake is 1,550 ft (472 m) above sea level, and the depth increases to 2,310 ft toward the northern end, where the forested Livingstone Mountains to the east and the Nyika Plateau and Viphya Highlands to the west fall precipitously down to the lakeshore.

Cormorants nesting inshore, Lake Nyasa
Gerald Cubitt

A fresh southeasterly wind (the *mwera*) prevails from May to August, causing short gales and restless waters; the coastline offers little shelter. Halfway up the lake is Likoma Island, a mission headquarters and site of an imposing Anglican cathedral (completed 1911). On the heavily populated Malaŵi shore there are government stations at Mangochi, Nkhotakota, Nkhata Bay, and Karonga.

Nyasa (meaning "lake") is fed by 14 perennial rivers, the largest being the Ruhuhu; the sole outlet is the Shire River, a tributary of the Zambezi. Of about 200 recorded species of fish, about 80 percent are endemic, being isolated from the Zambezi fauna by the Kabalega Falls. Commercial fisheries exist at the southern end of the lake, based chiefly on the freshwater fish *Tilapia;* fly hatches on the lake occur in clouds large enough to obscure the horizon.

Passenger and cargo vessels are operated by the Malaŵi Railways company. Cotton, rubber, rice, tung oil, and peanuts (groundnuts) are shipped to the railhead at Chipoka in the south, from which point the railway connects through the city of Limbe with Beira, Mozambique.

The existence of the lake was reported by a Portuguese, Caspar Boccaro, in 1616. David Livingstone, the British explorer-missionary, reached it from the south in 1859.

Nyasaland: *see* Malaŵi.

Nyāya (Sanskrit: Rule, or Method), one of the six orthodox systems (*darśana*) of Indian philosophy, important for its analysis of logic and epistemology. The major contribution of the Nyāya system is its working out in profound detail the reasoning method of inference (*see* anumāna).

Like the other systems, Nyāya is both a philosophy and a religion; its ultimate concern is to bring an end to man's suffering, which results from ignorance of reality. Liberation is brought about through right knowledge. Nyāya is thus concerned with the means of right knowledge.

In its metaphysics, Nyāya is allied to the Vaiśeṣika system, and the two schools were often combined from about the 10th century. Its principal text is the *Nyāya-sūtra*s, ascribed to Gautama (*c.* 2nd century BC).

The Nyāya system—from Gautama through his important early commentator Vātsyāyana (c. AD 450) until Udayanācārya (Udayana; 10th century)—became qualified as the Old Nyāya (Prācina-Nyāya) in the 11th century when a new school of Nyāya (Navya-Nyāya, or New Nyāya) arose in Bengal. The best known philosopher of the Navya-Nyāya, and the founder of the modern school of Indian logic, was Gaṅgeśa (13th century).

The Nyāya school holds that there are four valid means of knowledge: perception (*pratyakṣa*), inference (*anumāna*), comparison (*upamāna*), and testimony (*śabda*). Invalid knowledge involves memory, doubt, error, and hypothetical argument.

The Nyāya theory of causation defines a cause as an unconditional and invariable antecedent of an effect. In its emphasis on sequence—an effect does not preexist in its cause—the Nyāya theory is at variance with the Sāṃkhya-Yoga and Vedantist views, but it is not unlike modern Western inductive logic in this respect.

Three kinds of causes are distinguished: inherent, or material cause (the substance out of which an effect is produced); non-inherent cause (which helps in the production of a cause); and efficient cause (the power that helps the material cause produce the effect). God is not the material cause of the universe, since atoms and souls are also eternal, but is rather the efficient cause.

Nyborg, city and port, Fyns *amtskommune* (county), eastern Fyn (Funen) Island, Denmark, on the Great Belt (strait) and Nyborg Fjord. Named for the castle (*borg*) built in 1170 to protect the Great Belt and chartered in 1292, it was the favourite meeting place of the Danehof (assembly of nobles and clergy) from 1282 to 1413. The Great Charter, Denmark's first constitution, was issued there in the former year. A large Swedish army surrendered outside the city in 1659. The castle, birthplace (1481) of King Christian II, was restored in 1923 as a museum. Nyborg is the terminus for the ferry to Sjælland (Zealand). The city has a large oil storage plant, and shipbuilding and textile industries are economically important. Pop. (2000 est.) city, 15,792; mun., 18,765.

Nyctaginaceae, the four-o'clock family of flowering plants, in the pink order (Caryophyllales), containing about 30 genera with 300 species of herbs, shrubs, and trees, native to tropical and warm temperate areas of the world. Members of the family have smooth-edged leaves and petalless flowers; the flowers have coloured bracts (leaflike structures) that fuse together and resemble petals. The small dry fruit bears grooves or is winged. Four-o'clocks (*Mirabilis jalapa*), sand verbena (*Abronia umbellata*), and a showy vine of the South American genus *Bougainvillea* are widely cultivated as ornamentals. Small yellow *Bougainvillea* flowers have bright coloured bracts and hang from long, drooping branchlets. The stem of *B. glabra* may be 18 to 30 m (about 60 to 100 feet) long in warm climates, and the plant is in flower throughout most of the year. The stem of *B. spectabilis* is covered with many short hairs, and the flowers are relatively short-lived.

Bougainvillea glabra
F.K. Anderson—EB Inc.

nyctalopia: *see* night blindness.

Nye, Bill, pseudonym of EDGAR WILSON NYE (b. Aug. 25, 1850, Shirley, Maine, U.S.—d. Feb. 22, 1896, Arden, N.C.), journalist and one of the major American humorists in the last half of the 19th century.

In 1852 Nye's family moved to Wisconsin, where he later taught school and read law. Settling in Laramie, Wyo., in 1876, he served as postmaster and justice of the peace and contributed to the *Denver Tribune* and *Cheyenne Sun*. His humorous squibs and tales in the *Laramie Boomerang,* which he helped found in 1881, were widely read and reprinted. Collected, they form the substance of numerous published volumes, from *Bill Nye and Boomerang* (1881) to *Bill Nye's History of the U.S.* (1894). Later Nye returned to Wisconsin and for several years wrote for the *New York World*. In 1886 he lectured with James Whitcomb Riley, the combination of Nye's wit and Riley's sentiment proving extremely popular. Writing in his own person, rather than in the guise of a foolish character, Nye reveals his own kindly but droll nature.

Nye, 1889
By courtesy of the Library of Congress, Washington, D.C.

Nyerere, Julius (Kambarage) (b. March 1922, Butiama, Tanganyika—d. Oct. 14, 1999, London, Eng.), first prime minister of independent Tanganyika (1961), who became the first president of the new state of Tanzania (1964). Nyerere was also the major force behind the Organization of African Unity (OAU).

Nyerere was a son of the chief of the small Zanaki tribe. He was educated at Tabora Secondary School and Makerere College, Uganda. A convert to Roman Catholicism, he taught in several Roman Catholic schools before going to Edinburgh University, where he was the first Tanganyikan to study at a British university. He graduated with an M.A. in history and economics in 1952 and returned to Tanganyika to teach. In 1953 he married Maria Magige, by whom he had five sons and two daughters.

By the time Nyerere entered politics, the old League of Nations mandate that Britain had exercised in Tanganyika had been converted into a United Nations trusteeship, with independence the ultimate goal. Seeking to hasten the process of emancipation, Nyerere joined the Tanganyika African Association, quickly becoming its president in 1953. In 1954 he converted the organization into the politically oriented Tanganyika African National Union (TANU). Under Nyerere's leadership the organization espoused peaceful change, social equality, and racial harmony and rejected tribalism and all forms of racial and ethnic discrimination.

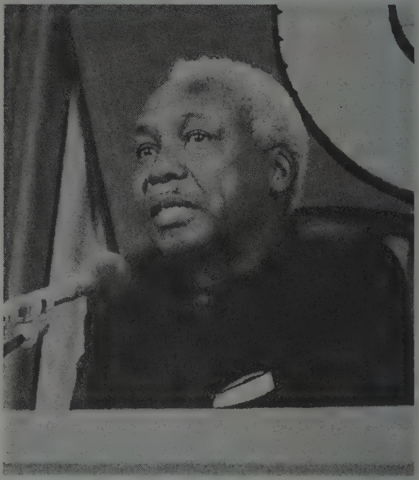
In 1955 and 1956 he journeyed to the United Nations in New York City as a petitioner to the Trusteeship Council and the Fourth Committee on trusts and non-self-governing territories. After a debate that ended in his being granted a hearing, he asked for a target date for the independence of Tanganyika. The British administration rejected the demand, but a dialogue was begun that established Nyerere as the preeminent nationalist spokesman for his country.

The British administration nominated him a member of the Tanganyikan Legislative Council, but he resigned in 1957 in protest against the slowness of progress toward independence. In elections held in 1958–59 Nyerere and TANU won a large number of seats on the Legislative Council. In a subsequent election in August 1960, his organization managed to win 70 of 71 seats in Tanganyika's new Legislative Assembly. Progress toward independence owed much to the understanding and mutual trust that developed during the course of negotiations between Nyerere and the British governor, Sir Richard Turnbull. Tanganyika finally gained responsible self-government in September 1960, and Nyerere became chief minister at this time. He became prime minister in May 1961, and in December 1961 Tanganyika gained complete independence. A year later when Tanganyika became a republic, he was elected president, and in 1964 he became president of the United Republic of Tanzania (Tanganyika and Zanzibar).

Nyerere was reelected president of Tanzania in 1965 and was returned to serve three more successive five-year terms before he resigned as president in 1985 and handed over his office to a successor. From independence on he also headed Tanzania's only political party, Chama Cha Mapinduzi.

As outlined in his political program, the Arusha Declaration (1967), Nyerere was committed to the creation in Tanzania of an egalitarian socialist society based on cooperative agriculture. He collectivized village farmlands, carried out mass literacy campaigns, and instituted free and universal education. He also emphasized that Tanzania must become economically self-sufficient rather than depend on foreign aid and foreign investment. Nyerere termed his socialist experimentation *ujamaa* (Swahili: "familyhood"), a name which emphasized the blend of economic cooperation, racial and tribal harmony, and moralistic self-sacrifice that he sought to achieve. Tanzania became a one-party state, though certain democratic opportunities were permitted within that framework.

As a major force behind the modern Pan-African movement and one of the founders in 1963 of the OAU, Nyerere was a key figure in African events in the 1970s. He was a strong advocate of economic and political measures in dealing with the apartheid policies of South Africa. Nyerere was chairman of a group of five front-line African presidents who advocated the overthrow of white supremacy in Rhodesia (now Zimbabwe), South Africa, and South West Africa/Namibia (now Namibia).


Nyerere, 1981
Hanos—Liaison Agency

Nyerere's concerns on the domestic front were dominated by economic hardships and by difficulties between Nyerere and Idi Amin of Uganda. In 1972 Nyerere denounced Amin when the latter announced the expulsion of all Asians from Uganda. When Ugandan troops occupied a small border area of Tanzania in 1978, Nyerere pledged to bring about the downfall of Amin, and in 1979 the Tanzanian army invaded Uganda in support of a local movement to overthrow Amin. Nyerere's intervention helped to overthrow Amin and brought about the eventual return to power in Uganda of Milton Obote in 1980.

Though enthusiastically adopted by his countrymen and steadfastly supported by sympathetic western European nations, Nyerere's socialist policies largely failed to achieve economic development in Tanzania. By the time he resigned in 1985, Tanzania was still one of the world's poorest countries, with a per capita income of about U.S. $250. Agriculture remained at the subsistence level, food was scarce, and the country's industrial and transportation infrastructures were chronically neglected. One-third of the national budget was supplied by foreign aid. Tanzania had one of the highest literacy rates in Africa, however, and the society was both politically stable and notably free of economic inequalities. Nyerere himself remained steadfastly committed to socialist policies of development throughout his political career.

Soft-spoken, unpretentious, small of stature, and quick to laugh, Julius Nyerere was widely credited with impressive oratorical skills and unusual powers of political perception. His thoughts, essays, and speeches may be found in his books, *Uhuru na Umoja* (1967; *Free-*

dom and Unity), *Uhuru na Ujamaa* (1968; *Freedom and Socialism*), and *Uhuru na Maendeleo* (1973; *Freedom and Development*). He also translated two plays by William Shakespeare, *The Merchant of Venice* and *Julius Caesar*, into Swahili.

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Nyeri, town, south-central Kenya. Nyeri lies at an elevation of about 5,750 feet (1,750 m) and is linked by road and rail with Nanyuki, about 36 miles (58 km) to the northeast, and Nairobi, about 60 miles (96 km) to the southwest. Nyeri is a pleasingly arranged town in the Aberdare foothills with extensive green meadows and gardens. The foothills are covered by a dense eucalyptus forest and afford a magnificient view of Mount Kenya to the northeast. The town's major industries include production of leather goods, soap, wood and furniture, processed food, soft drinks, cord, rope, twine, clay and concrete products, agricultural implements, and fabrics. There is an airfield nearby. Pop. (1983 est.) 39,200.

Nyika, also called MIJIKENDA, or NIKA, any of several Northeast Bantu-speaking peoples including the Digo, who live along the coast of Kenya and Tanzania south from Mombasa to Pangani; the Giryama, who live north of Mombasa; and the Duruma, Jibana, Rabai, Ribe, Chonyi, Kaura, and Kambe, who live in the arid bush steppe (Swahili: *nyika*) west of the Digo and Giryama. All Nyika speak a Bantu language; some have taken over Swahili, once their second language, as a first language. Nyika society shows evidence of significant Arab influence.

The Nyika subsist primarily by means of agriculture, growing a variety of crops. Animal husbandry is of considerable importance, especially among the Duruma. Fishing holds a prominent place in the economy of the Digo. All Nyika peoples engage extensively in trade.

Polygyny is general, and a substantial brideprice is expected. Most of these peoples trace their descent through the male line, although the Digo, the Duruma, and the Rabai trace descent through both the male and the female lines. They are organized into a number of clans, and the men in the clans into a system of age grades. Position in this system—a cycling type—determines a man's responsibilities. Traditionally the Nyika were ruled by elders deriving authority from their age grade and their rank in secret societies.

Many Nyika are Muslims, some are Christian, and perhaps a quarter retain traditional beliefs. There is widespread belief in ancestral spirits who are thought to require ritual pacification.

Nyika Plateau, high grassy tableland in northern Malaŵi. It is a tilted block extending from the Mzimba Plain northeast to the edge of the Great Rift Valley and Lake Nyasa. Its undulating surface is covered with montane grassland and patches of evergreen forest (including the southernmost occurrence of the Mulanje tree [*Juniperus procera*]) and is marked by occasional peaks and ridges (Nganda, 8,551 feet [2,606 m]; Vitumbi, 8,291 feet [2,527 m]). A beveled surface at 5,500 feet (1,676 m) rings the plateau. High rainfall generates the formation of perennial rivers in *madambo* (broad grass-covered depressions) and their flow through deep erosional valleys. The main streams include the North Rumphi, Chelinda (Rumphi), Runyina, and North Rukuru rivers. The higher soils are too poor for cultivation and the plateau is virtually uninhabited. Nyika National Park (founded 1965) covers 1,210 square miles (3,134 square km) of the plateau surface and supports antelope, zebra, lion, and trout.

Nyilaskeresztes Párt (Hungarian fascists): *see* Arrow Cross Party.

Nyingmapa (Buddhist sect): *see* Rnying-ma-pa.

Nyiragongo, Mount, active volcano in the Virunga Mountains of east-central Africa. It lies in the volcano region of Virunga National Park, Zaire, near the border with Rwanda, 12 miles (19 km) north of Goma. It is 11,385 feet (3,470 m) high, with a main crater 1.3 miles (2 km) wide and 820 feet (250 m) deep containing a liquid lava pool. Some older craters on the mountain are noted for their plant life.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Nyíregyháza, town and county seat of Szabolcs-Szatmár-Bereg *megye* (county), northeastern Hungary. It is a principal settlement of the upper Tisza River region, which coincides approximately with the traditional Nyírség, an area that was for centuries a wilderness of dunes and swamps and from which the land was gradually reclaimed. More recently, the discovery of natural gas and the possibilities of irrigation have improved the region's economic prospects. The original settlement was virtually destroyed during the Turkish occupation. The history of the modern town really begins with the colonization of the Nyírség in the mid-18th century when Count Ferenc Károlyi, the prime mover behind the program, brought in many Slovak immigrants. The region is thickly settled with scores of *tanya* (small, isolated farms or groups of farmsteads). The sandy soils are well suited to the raising of potatoes and tobacco. In addition, sunflowers, poppy seeds, melons, apricots, grapes, and especially apples are produced. There are large numbers of pigs and cattle. Nyíregyháza is still chiefly a market centre for the area's agricultural products. Light industry, including canneries, distilleries, and an apple-processing combine, developed after World War II, and the town became an important road and rail junction leading to the town of Záhony in the extreme north of the county. Nyíregyháza is also a health resort (Sóstó Spa is a medicinal salt lake) and a notable recreation centre. Pop. (1991 est.) 114,596.

Nyiri Desert, also called THE NYIKA, or TARUDESERT, desert, south-central Kenya. It lies about 50 miles (80 km) east of Lake Magadi and near the northern border of Tanzania. The desert encompasses the Amboseli National Park, including the northern half of Lake Amboseli. Nairobi National Park lies at its northern extremity and Tsavo West National Park at its southern extremity. Parts of the desert have dense growths of small trees, many of them thorny and some of them poisonous. Game trails are marked among them. During the brief rainy season the trees have green leaves and flowers, but during the dry season they are bare and entwined by grayish green creepers and the hornlike fronds of prickly euphorbia. Water is scarce except in a few large springs and widely spaced riverbeds. Rocky hills, which overlie much older rocks, dot the plain. Baobab trees are found in the desert, some as old as two thousand years, their gray boles often as much as 10 feet (3 m) in diameter. Fauna includes elephant, giraffe, rhinoceros, lion, leopard, lesser kudu, and impala.

Nyitra (Slovakia): *see* Nitra.

Nykøbing Falster, city, seat of Storstrøm *amtskommune* (county commune), western Falster Island, Denmark, on Guldborg Sound. It was founded around a 12th-century castle where Christopher II died (1332) and where Christian V was married (1667), and it was chartered in 1539. The city is now a commercial and industrial centre with sugar refineries, tobacco factories, shipbuilding yards, and fisheries. Medieval remains include ruins of the castle (destroyed 1767) and a 15th-century Gothic church that was part of a monastery until 1532. The house where Peter the Great lived in 1716 is now a local museum. Pop. (1990 est.) 18,937.

Nyköping, town and port, capital of the administrative *län* (county) of Södermanland, southeastern Sweden. It lies along the Baltic Sea, at the mouth of the Nyköping River. The town originated before 1250 as a marketplace near the heights where Nyköping Castle was built about 1260. With time this became one of Sweden's principal strongholds, especially during the time of Gustav I Vasa and Charles IX; the latter lived there as duke from 1568. The town's industry originated with ironworks and brass works powered by falls; flour and textile mills and furniture factories appeared later. As a shipping centre Nyköping has been supplanted by Oxelösund. Its historic buildings include the 12th-century St. Nicolai Church and the restored ruins of Nyköping Castle, which now houses the Södermanland Museum. Pop. (1992 est.) mun., 47,754.

Nykvist, Sven (b. Dec. 3, 1922, Moheda, Sweden), Swedish cinematographer best known for his subtle, luminous camera work in the films of Ingmar Bergman.

Nykvist studied photography, worked as an assistant cameraman, and spent a year at the Italian Cinecitta studios before joining the Swedish production company Sandrews in 1941. He shot his first film in 1945 and his first for Bergman, *Gycklarnas afton* (*The Naked Night*, or *Sawdust and Tinsel*), in 1953. In 1960 he worked on Bergman's *Jungfrukällen* (*Virgin Spring*), after which he became Bergman's regular director of photography at Svensk Filmindustri. He worked on more than a dozen Bergman films, including *Viskingar och rop* (1972; *Cries and Whispers*) and *Fanny och Alexander* (1983; *Fanny and Alexander*), for both of which he won Oscars in cinematography from the Academy of Motion Picture Arts and Sciences.

In working with Bergman, Nykvist typically operated the camera himself in order to be in close touch with the director's instructions. He shared Bergman's passion for light, eschewing technical gloss in favour of an expressive simplicity that directly conveys the bleak beauty of the Swedish landscape. Nykvist also worked with most of the other important Swedish directors and on some international productions, including *Siddhartha* (1972), *Black Moon* (1975), *Pretty Baby* (1978), *Starting Over* (1979), and *The Postman Always Rings Twice* (1981).

Nylands län (Finland): *see* Uusimaa.

nylon, any synthetic plastic material composed of polyamides of high molecular weight and usually, but not always, manufactured as a fibre. Nylons were developed in the 1930s by a research team headed by an American chemist, Wallace H. Carothers, working for E.I. du Pont de Nemours & Company. The successful production of a useful fibre by chemical synthesis from compounds readily available from air, water, and coal or petroleum stimulated expansion of research on polymers, leading to a rapidly proliferating family of synthetics.

Nylon can be drawn, cast, or extruded through spinnerets from a melt or solution to form fibres, filaments, bristles, or sheets to be manufactured into yarn, fabric, and cordage;

and it can be formed into molded products. It has high resistance to wear, heat, and chemicals.

When cold-drawn, it is tough, elastic, and strong. Most generally known in the form of fine and coarse filaments in such articles as hosiery, parachutes, and bristles, nylon is also used in the molding trade, particularly in injection molding, where its toughness and ability to flow around complicated inserts are prime advantages.

Polyamides may be made from a dicarboxylic acid and a diamine or from an amino acid that is able to undergo self-condensation, or its lactam, characterized by the functional group $-CONH-$ in a ring, such as ε-caprolactam. By varying the acid and the amine, it is possible to make products that are hard and tough or soft and rubbery. Whether made as filaments or as moldings, polyamides are characterized by a high degree of crystallinity, particularly those derived from primary amines. Under tension, orientation of molecules continues until the specimen is drawn to about four times its initial length, a property of particular importance in filaments.

Two of the ingredients that are used to synthesize the most common nylon, adipic acid and hexamethylenediamine, each contain six carbon atoms, and the product has been named nylon-6,6. When caprolactam is the starting material, nylon-6 is obtained, so-named because it has six carbon atoms in the basic unit.

nymph, in Greek mythology, any of a large class of inferior female divinities. The nymphs were usually associated with fertile, growing things, such as trees, or with water. They were not immortal but were extremely long-lived and were on the whole kindly disposed toward men. They were distinguished according to the sphere of nature with which they were connected. The Oceanids, for example, were sea nymphs; the Nereids inhabited both saltwater and freshwater; the Naiads presided over springs, rivers, and lakes. The Oreads (*oros,* "mountain") were nymphs of mountains and grottoes; the Napaeae (*nape,* "dell") and the Alseids (*alsos,* "grove") were nymphs of glens and groves; the Dryads or Hamadryads presided over forests and trees.

Italy had native divinities of springs and streams and water goddesses (called Lymphae) with whom the Greek nymphs tended to become identified.

nymph, in entomology, sexually immature form usually similar to the adult and found in such insects as grasshoppers and cockroaches, which have incomplete, or hemimetabolic, metamorphosis (*see* metamorphosis). Wings, if present, develop from external wing buds after the first few molts. The body proportions of the first nymphal stages are quite different from those of the adult. During each successive growing stage (instar) the nymph begins to resemble the adult more closely.

In contrast to nymphs that develop on land, the aquatic young of dragonflies, stoneflies, and mayflies are sometimes called naiads. Their metamorphosis is more complicated, involving a change to a different environment. The aquatic nymph has gills and other modifications for an aquatic existence. Nymphs are an important element in the food of trout and are imitated by the artificial flies and nymphs of anglers. The aquatic nymph at maturity floats to the surface or crawls out of the water, goes through its last molt and emerges as a winged adult.

Nymphaeales, the water-lily order of flowering plants, belonging to the class called dicotyledon (characterized by two seed leaves). The order is composed of eight genera and 70 species in five families, all being herbaceous (nonwoody) perennials. The order's members are found in quiet freshwater habitats throughout most of the world. The aesthetic appeal of the water lilies, especially those of the genera *Nymphaea* and *Victoria,* has led to their worldwide cultivation.

The Nymphaeaceae, or water-lily family, has about 50 species. The other families in the order are the related Barclayaceae; the Cabombaceae, or fanworts; the Ceratophyllaceae, or hornworts; and the Nelumbonaceae.

All plants of the Nymphaeales order are aquatic. In the genus *Ceratophyllum,* the plants are either rooted or free-floating but submerged; in the other genera, they are attached to pond or stream bottoms, but their leaves and flowers may be either submerged, floating, or standing above the water. They range in size from the small, fragile fanwort (*Cabomba*), which has floating leaves less than 0.3 cm (1 inch) in diameter, to the hornwort (*Ceratophyllum*), with richly branched stems reaching 3.5–4.5 m (12–15 feet) in length, to *Victoria,* which has floating circular, shield-like leaves 2 m (6.5 feet) across and flowers 40 cm (about 15 inches) in diameter. Some water lilies (*Nymphaea*) produce leaves 50 cm (about 18 inches) wide that, in one summer, can cover an area 2.5 m (8 feet) in diameter.

Many species of water lilies are suited for pools, aquatic gardens, and aquariums, where they are prized for their attractive foliage and showy flowers. The submerged leaves, the starchy, horizontal creeping rhizomes, and the protein-rich seeds of the larger species have been used as food by humans throughout history. The petioles (leaf stalks) serve as cover for fish and holdfasts for their spawn, and hoofed wildlife also browse on the plant parts. The emergent leaves provide cover for aquatic birds, and the seeds of many species are food for fish and fowl. Several members of Nymphaeales provide an essential link in plant succession—from pond to swamp to wet prairie. Some species of water lilies may grow so rankly as to clog lakes and irrigation ditches.

Some Nymphaeales genera have extensive, buried or surficial, creeping rhizomes (rootlike horizontal stem structures). Others have short, erect, buried stems, either with or without associated floating horizontal branches. The blades of variously shaped leaves that emerge from the submerged rhizomes may spread over the surface of the water or stand above the water by means of elongate petioles.

Most of the 35 species and many hybrids of *Nymphaea* of the Nymphaeaceae are cultivated; their flowers are the most showy of the Nymphaeales. The fragrant *N. odorata,* native to the eastern United States, with 13-centimetre (5-inch) white flowers, and its cultivars (horticultural varieties) are widely grown in parks, gardens, and natural ponds in warm temperate regions. The yellow water lily (*Nuphar*), also of the Nymphaeaceae, is noted for conspicuous sepals and tall-stemmed flowers.

The genus *Barclaya,* with four species, constitutes the Barclayaceae. It is distinguished from the Nymphaeaceae by an extended perianth tube (combined sepals and petals) arising from the top of the ovary and by stamens that are joined basally. Barclayaceae is native to tropical Asia and Indonesia.

The water shield (*Brasenia schreberi*) and the seven species of *Cabomba,* the fanworts, constitute the Cabombaceae. Several species of *Cabomba* are distributed in eastern and southeastern North America and in much of northern South America. The family Nelumbonaceae consists of just two species, the sacred lotus and the American lotus, and is considered by some authorities to be a separate order called Nelumbonales.

The Ceratophyllaceae, consisting of the genus *Ceratophyllum,* differs from other families in the Nymphaeales in that the plants' ferny leaves are borne at intervals on the submerged stem. Flowers of *Ceratophyllum* not only lack sepals and petals, but stamens (male) and the pistil (female) are borne in separate flowers and on separate plants—a feature that is unique in this order. Pollen, liberated by higher-placed male flowers, settles in water to reach a channel in the female flower, facilitating pollen germination.

All the genera in the order are perennial—*i.e.,* they live through more than one growing season. Among members of Nymphaeales, forms of vegetative reproduction occur in *Nymphaea mexicana,* which spreads by runners, and *N. micrantha* of western Africa, which produces detachable plantlets at the junction of the petiole and blade. Sexual reproduction, however, is the dominant means of propagation.

Flowers arise singly from submerged nodes. Except for *Ceratophyllum* (in which flowers are water-pollinated) and *Euryale* of the Nymphaeaceae (which is self-pollinated in closed flowers), flowers rise to the surface of the water or higher and are insect-pollinated. All flowers of this order are radially symmetrical.

Three types of fruits are produced in this order. A spiny nutlet is formed in *Ceratophyllum,* while in the Cabombaceae the single carpel matures into a follicle (opening along one side). Leathery, several-chambered berries, which eventually shed their seeds, are produced by the Nymphaeaceae and the Barclayaceae; they mature under water. The seeds of all genera are distributed passively, with most being released to float in water until they become anchored in the soil substratum. *See also* fanwort; hornwort; water lily.

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nymphaeum, ancient Greek and Roman sanctuary consecrated to water nymphs. The name—though originally denoting a natural grotto with springs and streams, traditionally considered the habitat of nymphs—later referred to an artificial grotto or a building filled with plants and flowers, sculpture, fountains, and paintings. The nymphaeum served as a sanctuary, a reservoir, and an assembly chamber where weddings were held. The rotunda nymphaeum, common in the Roman period, was borrowed from such Hellenistic structures as the Great Nymphaeum of Ephesus. Nymphaea existed at Corinth, Antioch, and Constantinople (now Istanbul); the remains of about 20 have been found in Rome; and others exist as ruins in Asia Minor, Syria, and North Africa. The word nymphaeum was also used in ancient Rome to refer to a bordello and also to the fountain in the atrium of the Christian basilica.

In the 16th century the nymphaeum became a feature of Italian gardens. The typical garden nymphaeum was associated with freshwater and usually with springs. The site of a spring was usually enclosed in a formal building, as at the Villa Giulia at Rome, but sometimes in a natural or seminatural cave. The line of demarcation between a nymphaeum and a grotto (*q.v.*) is not always clear, but the nymphaeum puts greater emphasis on the presence of a supposed semideity.

Nymphenburg, palace, formerly the summer residence outside Munich of the Wittelsbachs, the former ruling family of Bavaria. The late Baroque structure was begun in 1664 by the Prince Elector Maximilian II Emanuel. It was enlarged and annexes were built through the reign of Maximilian III Joseph (1745–77).

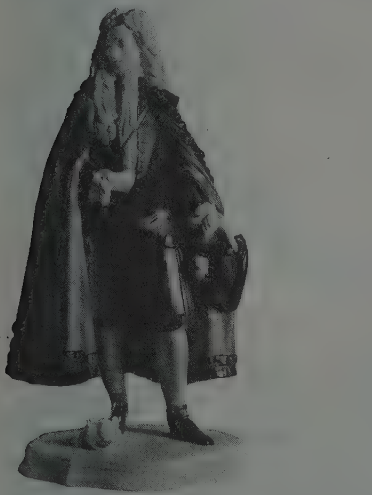
The renowned gardens were designed in 1701 by Carbonet, a pupil of Le Nôtre, who had laid

Nymphenburg Palace near Munich, Ger.
Fritz Eschen

out the gardens of Versailles for Louis XIV. Distributed throughout the garden are many late Baroque garden pavilions of note, including the Pagodenburg (1716–19), the Badenburg (1718–21), and the Amalienburg (1734–39), whose interior by François de Cuvilliés the Elder is one of the masterpieces of Rococo decoration.

Nymphenburg porcelain, German hard-paste, or true, porcelain produced in Bavaria from around the middle of the 18th century until the present day. The first factory was established in 1747 at the castle of Neudeck, outside Munich, by Maximilian III Joseph, elector of Bavaria. The wares produced here are sometimes called "Neudeck–Nymphenburg." In 1761 the factory was moved to Nymphenburg, on the outskirts of Munich, where it still operates. The tableware and vases produced by Nymphenburg are often reminiscent of Meissen, even to their use of the ozier, or basketwork, pattern borders. Nymphenburg's most original contribution in this kind of ware was a *réchaud,* or food warmer.

The fame of Nymphenburg rests on its figures, particularly those in the Rococo style modeled between 1754 and 1763 by Franz Anton Bustelli. Bustelli is perhaps best known for his figures from the commedia dell'arte, although he also made singers and instrumentalists and cavaliers and ladies, the latter sometimes on a common base. Characteristic of Bustelli's figures are their elegant bodies and delicate faces; their heightened, theatrical gestures, often emphasized by the dramatic modeling of drapery; and their movement and rhythm, which are accentuated by Bustelli's treatment of Rococo scrollwork.



"Augsburg Patrician," Nymphenburg porcelain by Resl Lechner
By courtesy of Staatliche Porzellan-Manufaktur, Nymphenburg

Bustelli was succeeded as *Modellmeister* by Dominikus Auliczek, who introduced the Neoclassical style at Nymphenburg; his most interesting works are models of animals and hunting groups. In 1797 Auliczek was succeeded by Johann Peter Melchior, another exponent of Neoclassicism, who had worked at the Höchst and Frankenthal factories before joining Nymphenburg; he is known for the excellent figures he modeled there between 1800 and 1810. The Nymphenburg factory mark, adopted in 1754, is the Bavarian shield of arms.

Nynia, SAINT: *see* Ninian, Saint.

Nyong River, stream in southwestern Cameroon, west central Africa. It rises 25 mi (40 km) east of Abong Mbang, in the northern rain forest. Its 400-mi (640-km) course, which roughly parallels that of the lower Sanaga River, follows a westerly direction, emptying into the Gulf of Guinea of the Atlantic Ocean at Petit Batanga, 40 mi south-southwest of Edéa. Rapids break the flow of the river at Mbalmayo and Déhané. Navigation is possible for about 155 mi for small steamboats from April to November between Abong Mbang and Mbalmayo.

Nyoro, also called BANYORO, BUNYORO, or KITARA, an Interlacustrine Bantu people living just east of Lake Albert (also called Lake Mobutu Sese Seko), west of the Victoria Nile, in west central Uganda.

In precolonial times, the Nyoro formed one of the most powerful of a number of kingdoms in the area. Until the 18th century the Bunyoro kingdom, as it is called, dominated the surrounding peoples, holding an empire over much of what is now Uganda. In the 18th and 19th centuries, however, the kingdom declined owing to several wars of succession and other internal conflicts, and it surrendered its preeminence to the neighbouring Ganda (Buganda) kingdom.

The ethnic heritage of the Nyoro is complex and includes the descendants of several peoples. Among them are the short, dark-skinned, agricultural Iru, who are in the vast majority; the tall, slender, lighter skinned, pastoral Hima, who historically dominated the Iru in the southern part of the Bunyoro area; and the Bito, a Luo-speaking Nilotic people who held a similarly privileged position in the north and also provided the ruler of the state, the *mukama.*

In the 1890s, after the defeat of the Nyoro king Mukama Kabarega, British troops subdued the Bunyoro (or Banyoro) kingdom and brought it into the Uganda Protectorate. Bito kings then continued to reign in the Bunoro kingdom until it was abolished in 1966 by the Ugandan government.

The Nyoro live in scattered settlements on a well-watered, fertile plateau. Their population density is considerably less than that of neighbouring peoples, in part because the Murchison Falls (now Kabarega) National Park that was created in the north of their land is an area of large numbers of tsetse flies—hence, the incidence of sleeping sickness is much higher. Nyoro observe patrilineal descent and are divided into a number of exogamous clans.

Many Nyoro are small-scale rural farmers whose crops include millet, sorghum, plantains, yams, squash, cassava, and peanuts (groundnuts). Cotton and tobacco are also grown in lower areas as cash crops, and property rights for land have been a significant local issue since late colonial years. The waters of Lake Albert are fished, and prior to the colonial period Nyoro were great hunters of elephant and other game and used a complex system of pits, nets, and snares. Hunting was restricted by the British, and the large herds of game were decimated during Uganda's political instability of the 1970s and '80s. Early Nyoro blacksmiths fashioned a variety of tools and weapons from locally obtained iron ore smelted in pit furnaces. Cowry shells and other currency items were used by the Nyoro in an elaborate exchange system. Many of these skills and organizational forms have now been lost.

nyout, also called NYOUT-NOL-KI, ancient Korean cross-and-circle board game. The *nyout* board, usually made of paper, consists of 29 marks representing a cross circumscribed by a circle. The pieces, called *mal,* or horses, are made of wood, stone, or paper.

Players advance their pieces according to three throws of four wooden dice, called *pam-nyout.* These are black and white on opposing sides. The number of moves allowed depends on the number of black sides up. The object of the game is to get a predetermined number of horses around the circle and out at a specified point. The cross operates as a shortcut to be taken if a horse lands on one of four special marks.

Games similar to *nyout* have been played in Korea since the 3rd century AD. The contemporary version is popular as a gambling game in Korean public houses.

Nyphus SUESSANUS, also called AUGUSTINUS NYPHUS: *see* Nifo, Agostino.

NYSE: *see* New York Stock Exchange.

nystagmus, involuntary back and forth, up and down, or circular movement of the eyes. There are two types of nystagmus with respect to movement. In one type, called pendular nystagmus, the movements are even and rhythmical; in the other, called jerk nystagmus, the movements are jerky and quicker in one direction than in the other. Pendular nystagmus may result from loss of central vision early in life. A subtype of pendular nystagmus, called spasmus nutans, occurs in infants. It is associated with nodding of the head and with holding the neck in a twisted position. Affected infants usually recover in a few months. Jerk nystagmus, the more common type, may occur normally when one is dizzy from being rotated or when one is watching from the window of a moving vehicle: the slow phase of the nystagmus occurs while the gaze is fixed on a particular object; the quick phase, when the eyes return to their original position. Jerk nystagmus may also result from intoxication with barbiturate drugs or from disease of those portions of the inner ear the function of which is concerned with balance. Disease of the brainstem may also result in jerk nystagmus. Pulses of electric energy generated by the eye movements of nystagmus can be recorded by the electronystagmograph, thus giving a precise record of such movements.

Nyuserre (Egyptian king): *see* Neuserre.

Nyx, in Greek mythology, female personification of night but also a great cosmogonical figure, feared even by Zeus, the king of the gods.

According to one tradition, she was the daughter of Chaos and the mother of numerous primordial powers, including Sleep and Death. Another tradition made her the daughter and successor of Phanes, a creator god; she continued to advise her own successors (Uranus, her son by Phanes; Cronus, youngest son of Uranus; and Zeus) by means of her oracular gifts. Throughout antiquity she caught the imagination of poets and artists but was seldom worshiped.

Nzekwu, Onuora (b. Feb. 19, 1928, Kafanchan, Nigeria), Nigerian teacher, writer, and editor who explored the internal conflicts inherent in the relationship of the educated Ibo to his traditional culture.

His first novel, *Wand of Noble Wood* (1961), portrays in moving terms the futility of a Western pragmatic approach to the problems created by an African's traditional religious beliefs. In the hero of *Blade Among the Boys* (1962), traditional practices and beliefs ultimately take precedence over half-absorbed European and Christian values.

Nzekwu wrote a third novel, *Highlife for Lizards* (1965), and a children's book, *Eze Goes to School* (1963; with Michael Crowder). After obtaining a teacher's higher education certificate in 1946, Nzekwu taught for nine years, subsequently becoming editorial assistant and then editor of *Nigeria Magazine* in 1962. Foundation grants that he received from the Rockefeller Foundation and UNESCO enabled him to travel in Europe and America. In 1970 he returned to federal public service, becoming deputy director with the Federal Ministry of Information, located in Lagos, Nigeria.

Nzérékoré, town, southeastern Guinea, western Africa. It lies at the intersection of roads from Ganta (in Liberia), Danané (Côte d'Ivoire), Kankan, and Macenta. It is the chief trading centre for the surrounding area's agricultural products—including rice, cassava, pepper, tobacco, kola nuts, and palm oil and kernels—grown by the Guerze (Kpelle), Mano (Manon), and Kono (Konon) peoples of the forested Guinea Highlands. It ships wood, palm products, and coffee to the Liberian port of Monrovia (165 miles [265 km] southwest) for export. Nzérékoré has a sawmill and plywood factory and is the site of a hospital and a Roman Catholic mission. Pop. (1983 prelim.) 55,356.

Nzinga Mbemba: *see* Afonso I *under* Afonso (Kongo).

O Canada, national anthem of Canada. It was proclaimed the official national anthem on July 1, 1980. *God Save the Queen* (*q.v.*) remains the royal anthem of Canada.

The music, written by Calixa Lavallée (1842–91), a concert pianist and native of Verchères, Que., was commissioned in 1880 on the occasion of a visit to Quebec by Lord Lorne (later Duke of Argyll), then governor-general of Canada, and his wife, Queen Victoria's daughter Princess Louise. The original French lyrics were written by Sir Adolphe Basile Routhier (1839–1920), later chief justice of Quebec. The English lyrics (which are not a translation or rendering of the French) were written in 1908 by Robert Stanley Weir (1856–1926), a lawyer and recorder of Montreal.

O Canada! Our home and native land!
True patriot-love in all thy sons command.
With glowing hearts we see thee rise,
The True North strong and free;
And stand on guard, O Canada,
We stand on guard for thee.
O Canada! Glorious and free!
We stand on guard, we stand
on guard for thee,
O Canada! We stand on guard for thee.
O Canada! Where pines and maples grow,
Great prairies spread and lordly rivers flow,
How dear to us thy broad domain,
From East to Western sea!
Thou land of hope for all who toil!
Thou True North strong and free!
O Canada! Glorious and free! [etc.]
O Canada! Beneath thy shining skies
May stalwart sons and gentle maidens rise
To keep thee steadfast thro' the years
From East to Western sea,
Our own beloved native land,
Our True North strong and free!
O Canada! Glorious and free! [etc.]
Ruler supreme, Who hearest humble pray'r,
Hold our Dominion in Thy loving care.
Help us to find, O God, in Thee
A lasting rich reward,
As waiting for the better day,
We ever stand on guard.
O Canada! Glorious and free! [etc.]

O Canada! Terre de nos aïeux,
Ton front est ceint de fleurons glorieux!
Car ton bras sait porter l'épée,
Il sait porter la croix!
Ton histoire est une épopée
Des plus brillants exploits.
Et ta valeur, de foi trempée,
Protégera nos foyers et nos droits,
Protégera nos foyers et nos droits.
Sous l'oeil de Dieu, près du fleuve géant,
Le Canadien grandit en espérant.
Il est né d'une race fière,
Béni fut son berceau.
Le ciel a marqué sa carrière
Dans ce monde nouveau.
Toujours guidé par sa lumière,
Il gardera l'honneur de son drapeau,
Il gardera l'honneur de son drapeau.
De son patron, précurseur du vrai Dieu,
Il porte au front l'auréole de feu.
Ennemi de la tyrannie
Mais plein de loyauté,
Il veut garder dans l'harmonie,
Sa fière liberté;
Et par l'effort de son génie,
Sur notre sol asseoir la vérité,
Sur notre sol asseoir la vérité.
Amour sacré du trône et de l'autel,
Remplis nos coeurs de ton souffle immortel!
Parmi les races étrangères,
Notre guide est la loi:
Sachons être un peuple de frères,
Sous le joug de la foi.
Et répétons, comme nos pères,
Le cri vainqueur: "Pour le Christ et le roi,"
Le cri vainqueur: "Pour le Christ et le roi."

O Ceallaigh, Sean Thomas: *see* O'Kelly, Sean Thomas.

O Dalaigh, Cearbhall (Irish), English CARROLL O'DALY (b. Feb. 12, 1911, Bray, near Dublin, Ire.—d. March 21, 1978, Sneem, County Kerry), chief justice of the Irish Supreme Court (1961–74) and fifth president of Ireland (1974–76).

Son of parents active in the struggle for Irish independence, O Dalaigh studied at University College, Dublin, earning a degree in Celtic studies in 1931. He was an Irish-language editor on *The Irish Press* (1931–42), meanwhile becoming a lawyer (1935). In 1945 he became Ireland's youngest attorney general, serving at that post in 1945–48 and 1951–53. In 1953 he became a judge on the Supreme Court and was elevated to chief justice in 1961.

When Erskine H. Childers died in 1974, O Dalaigh succeeded him as president of Ireland, but he resigned three years later in a clash with Defense Minister Patrick S. Donegan, who called him "a thundering disgrace" for using his presidential powers to delay legislation designed to thwart the terrorist activities of the Irish Republican Army; O Dalaigh considered the legislation unconstitutional.

O-erh-ku-na Ho (Asia): *see* Argun River.

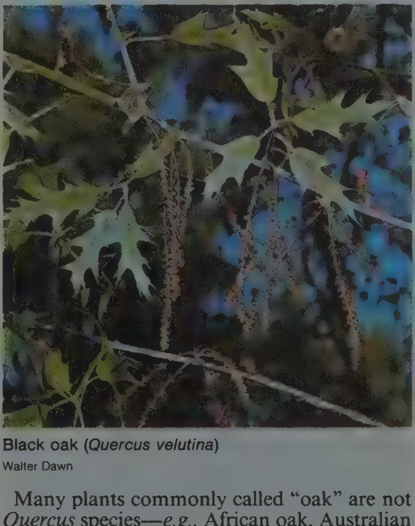
O-mi-t'o (in Buddhism): *see* Amitābha.

Ó Nuallain, Brian: *see* O'Brien, Flann.

Oadby and Wigston, district and borough, county of Leicestershire, England. Both Oadby and Wigston, formerly villages lying outside the city of Leicester, have in recent years been engulfed by the outward spread of the city's suburbs. They lie to the southeast and south, respectively, of the city's centre. Oadby is almost entirely residential, while Wigston is both residential and industrial, lying close to canal, rail, and river routes. The area of the district is 9 square miles (24 square km). Pop. (1991 prelim.) 51,500.

Oahu, island, Honolulu county, Hawaii, U.S., separated from the islands of Kauai (northwest) and Molokai (southeast) by the Kauai and Kaiwi channels. Of volcanic origin with an area of 607 square miles (1,574 square km), Oahu is third in size and the most populated of the Hawaiian Islands. Two parallel mountain groups, the Koolau Range and Waianae Ranges, are connected by a central plateau. Oahu is the site of Honolulu (the state capital), Pearl Harbor, and Waikiki. Other important cities are Aiea, Kailua, Kaneohe, and Wahiawa. Military installations, tourism, pineapples, and sugar are economically significant. Pop. (1990) 836,207.

oak, any of about 450 species of ornamental and timber trees and shrubs constituting the genus *Quercus* in the beech family (Fagaceae), distributed throughout the North Temperate Zone and at high altitudes in the tropics.



Black oak (*Quercus velutina*)
Walter Dawn

Many plants commonly called "oak" are not *Quercus* species—*e.g.,* African oak, Australian oak, bull oak, Jerusalem oak, poison oak, river oak, she-oak, silky oak, tanbark oak, Tasmanian oak, and tulip oak.

Quercus species are characterized by alternate, simple, deciduous or evergreen leaves with lobed, toothed, or entire margins. The male flowers are borne in pendent yellow catkins, appearing with or after the leaves. Female flowers occur on the same tree, singly or in two- to many-flowered spikes; each flower has a husk of overlapping scales that enlarges to hold the fruit, or acorn, which matures in one to two seasons.

Oaks can be separated into three groups, sometimes considered subgenera: white oaks (*Leucobalanus*) and red or black oaks (*Erythrobalanus*) have the scales of the acorn cups spirally arranged; in the third group (*Cyclobalanus*) the scales are fused into concentric rings. White oaks have smooth, non-bristle-tipped leaves, occasionally with glandular margins. Their acorns mature in one season, have sweet-tasting seeds, and germinate within a few days after their fall. Red or black oaks have bristle-tipped leaves, hairy-lined acorn shells, and bitter fruits, which mature at the end of the second growing season.

In North America several oaks are of ornamental landscape value, including pin oak (*q.v.; Q. palustris*) and northern red oak (*Q. rubra*). White oak (*q.v.; Q. alba*) and bur oak (*q.v.; Q. macrocarpa*) form picturesque oak groves locally in the Midwest. Many oaks native to the Mediterranean area have economic value: galls produced on the twigs of the Aleppo oak (*Q. infectoria*) are a source of Aleppo tannin, used in ink manufacture; commercial cork is obtained from the bark of the cork oak (*Q. suber*), and the tannin-rich kermes oak (*Q. coccifera*) is the host of the kermes insect, once harvested for a dye contained in its body fluids.

Two eastern Asian oaks also are economically valuable: the Mongolian oak (*Q. mongolica*) provides useful timber, and the Oriental oak (*Q. variabilis*) is the source of a black dye as well as a popular ornamental. Other cultivated ornamentals are the Armenian, or pontic, oak (*Q. pontica*), chestnut-leaved oak (*Q. castaneaefolia*), golden oak (*Q. alnifolia*), Holm, or holly, oak (*Q. ilex*), Italian oak (*Q. frainetto*), Lebanon oak (*Q. libani*), Macedonian oak (*Q. trojana*), and Portuguese oak (*Q. lusitanica*). Popular Asian ornamentals include the blue Japanese oak (*Q. glauca*), daimyo oak (*Q. dentata*), Japanese evergreen oak (*Q. acuta*), and sawtooth oak (*Q. acutissima*). The English oak, a timber tree native to Eurasia and northern Africa, is cultivated in other areas of the world as an ornamental.

Acorns provide food for small game animals and are used to fatten swine and poultry. Red- and white-oak lumber is used in construction, flooring, furniture, millwork, cooperage, and the production of crossties, structural timbers, and mine props.

Oaks can be propagated easily from acorns and grow well in rich, moderately moist soil or dry, sandy soil. Many grow again from stump sprouts. They are hardy and long-lived but are not shade-tolerant and may be injured by leaf-eating organisms or oak wilt fungus.

The taxonomy of the genus *Quercus* is confusing because of the many natural hybrids.

oak moss (*Evernia prunastri*), species of fruticose (branched, bushy) lichen valued in perfumery for its heavy, oriental fragrance and as a fixative base. It grows in mountainous areas throughout much of the Northern Hemisphere. The pale greenish gray thallus, 3 to 8 cm (1.2 to 3 inches) long, is palmately branched, ending in pointed tips. The upper surface is green and warty with pale gray reproductive bodies (soredia). The undersurface is whitish with a faint netlike pattern. A less common species (*E. furfuracea*), having similar properties, is often included under the same common name, which is a translation of the French *mousse de chêne.*

Oak moss was used in perfumery as early as the 16th century. Baskets filled with it have been found in the ancient royal tombs of Egypt, but whether it was intended for perfume or for food is not known. A mixture of acids extracted from it is used in drugs for treating external wounds and infections.

Oak moss (*Evernia prunastri*)
Vernon Ahmadjian

Oak Park, village, Cook county, northeastern Illinois, U.S. It is a western suburb of Chicago. Settled in 1833 by Joseph Kettlestrings, who operated a sawmill on the east bank of the Des Plaines River, it was originally called Oak Ridge and served as a stopping place for farmers taking their produce into Chicago. In 1871, after the Chicago fire, the population grew rapidly. The village, primarily residential with some light industry, has many buildings designed by architect Frank Lloyd Wright, who once lived and maintained his studio there. The novelist Ernest Hemingway was born and grew up in Oak Park. Inc. 1901. Pop. (1992 est.) 54,587.

Oak Ridge, city on the Anderson-Roane county line, eastern Tennessee, U.S. It lies in a high valley along the southern slope of Black Oak Ridge, between the Cumberland and the Great Smoky mountains; it is a part of the Knoxville metropolitan area. The site was selected in 1942 as the headquarters for the U.S. wartime atomic energy program known as the Manhattan Project. The town, built by the U.S. Army Corps of Engineers behind security fences, reached a peak population of 75,000 in 1945. Oak Ridge now bears only slight resemblance to the war boomtown. In 1949 the fences were removed; in 1953 roads through the plant areas were opened, and for the first time land was leased for private construction. In 1955 the U.S. Congress provided for the sale of property in Oak Ridge. The community voted to incorporate as a city in 1959.

The city's economy depends mainly on production and research in the nuclear energy field. A number of nuclear-related and electronic industries specialize in radioactive pharmaceuticals, electronic instrumentation, and machine making and toolmaking. The city is the site of the American Museum of Atomic Energy and the Oak Ridge National Laboratory's Graphite Reactor, which is a national historic landmark. Melton Hill Dam, a Tennessee Valley Authority river-control project, is at the southwest edge of Oak Ridge. Pop. (1992 est.) 28,130.

Oakland, city, seat (1873) of Alameda county, California, U.S., on the eastern shore of the San Francisco Bay. Its site was once part of Rancho San Antonio, where Moses Chase leased farmland and laid out the town of Clinton (later named Brooklyn). In 1851 Horace W. Carpentier started a transbay ferry service to San Francisco and acquired a town site (1852) to the west of Brooklyn, naming it Oakland for the oak trees on the grassy coastal plain. In 1854 Carpentier and his associates extended the area and incorporated it as a city. Oakland and Brooklyn—separated by a slough that had been bridged in 1853—became amalgamated in 1872.

Chosen as the terminus of the first transcontinental railroad (1869), Oakland developed its harbour. After the 1906 San Francisco earthquake it received an influx of refugees. The 8.25-mile- (13-kilometre-) long San Francisco–Oakland Bay Bridge to San Francisco (opened 1936) and military and naval installations (built in the 1940s) stimulated expansion; industrial growth has been heavy and diversified. A deepwater port (on an estuary between Alameda Island and the bay shore) covers 19 miles (31 km) of waterfront in the outer, middle, and inner harbours. On Oct. 17, 1989, an earthquake that measured 7.1 on the Richter scale caused major damage to the Bay Bridge and also caused a mile-long section of Interstate 880 highway (double-deck in some sections) to collapse.

Metropolitan Oakland International Airport fronts the bay to the southwest. Lake Merritt, a saltwater lagoon near the central business district, is a wildfowl refuge surrounded by parkland. Jack London Square honours the author who spent his boyhood years in the city. Oakland is the site of Mills College (1852), Holy Names College (1868), California College of Arts and Crafts (1907), and Merritt College (1953). The Oakland–Alameda County Coliseum complex is the home of the Golden State Warriors (basketball) and Athletics (baseball) teams. Pop. (1992 est.) city, 386,086; Oakland PMSA, 2,160,350.

Oakley, Annie, original name PHOEBE ANNE OAKLEY MOSES (b. Aug. 13, 1860, Darke county, Ohio, U.S.—d. Nov. 3, 1926, Greenville, Ohio), American markswoman who starred in Buffalo Bill's Wild West show, where she was often called "Little Sure Shot."

Young Annie Moses won acclaim for marksmanship and, after winning a shooting match in Cincinnati with ranking marksman Frank E. Butler, became nationally known. Later the two were married, and together they toured the vaudeville circuits and circuses until 1885, when the "Butler and Oakley" team joined the Wild West show; they remained with it for 17 years. So startling were "Little Missy's" performances and so enthusiastic her audiences that she was given top billing as "Miss Annie Oakley [a name she selected], the Peerless Lady Wing-Shot," while her husband served as manager and attendant. At 30 paces, she could hit the thin edge of a playing card, a dime tossed in the air, and the end of a cigarette held in Butler's lips. Once, when performing in Berlin, she obliged Crown Prince William (later Emperor William II) by performing the cigarette act while the prince held the cigarette.

Annie Oakley
The Bettmann Archive

For many years a reminder of Annie's exploits was the use of the term "Annie Oakley" to denote a complimentary ticket. The hole customarily punched in such a free pass recalled the bullet holes that she fired into small cards during her theatrical performances.

BIBLIOGRAPHY. Walter Havighurst, *Annie Oakley of the Wild West* (1954), is reliable. Isabelle S. Sayers, *Annie Oakley and Buffalo Bill's Wild West* (1981), contains many contemporary photographs.

Oakley, Kenneth (Page) (b. April 7, 1911, Amersham, Buckinghamshire, Eng.—d. Nov. 2, 1981, Amersham), English physical anthropologist, geologist, and paleontologist best known for his work in the relative dating of fossils by fluorine content.

Oakley received a B.S. in geology with first-class honours from University College, London, in 1933, and a Ph.D. from the same institution in 1938. He was long associated with the British Museum of Natural History (1935–69), from which he retired in 1969. He won renown in 1953 when he played a decisive role in the exposure of the Piltdown hoax. The famous Piltdown man, remains of a skull found in a ditch in Sussex, England, had been unchallenged as the missing link between man and ape since its discovery in 1912. By applying his fluorine-dating method, Oakley confirmed that the remains were fraudulent. His other interests were archaeology and folklore, with a chief focus on the culture of fossil man from the paleontological viewpoint.

Oaks, one of the English Classic horse races (along with the Derby, Saint Leger, Two Thousand Guineas, and One Thousand Guineas), an event for three-year-old fillies, established in 1779, and run over a 1.5-mile (about 2,400-metre) course at Epsom Downs, Surrey, also the site of the Derby. The Oaks was named for the nearby residence of the 12th Earl of Derby, whose horse Bridget won the first running.

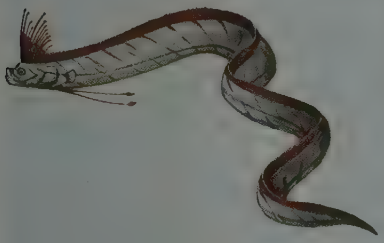
Oakville, town, regional municipality of Halton, southeastern Ontario, Canada, 20 miles (32 km) southwest of Toronto. Oakville is situated on Lake Ontario at the mouth of Oakville Creek. It was founded in 1830 by Colonel William K. Chisholm. It was originally incorporated in 1857, and in 1962 it amalgamated with Trafalgar Township to form the new town of Oakville, which, occupying 69,000 acres (28,900 hectares) and spreading northward for some 14 miles (22.5 km) from Lake Ontario, claims to be Canada's largest town in area. An industrial community, it is the site of one of Canada's largest automobile plants. Pop. (1991) 114,670.

Oamaru, town and port, Otago local government region, southeastern South Island, New Zealand. Its name comes from a Maori term meaning "place of sheltered fire." It was established as a grazing run in 1853. Situated on a small bay, the town began to improve its harbour in 1872. It is a commercial fishing centre and the chief port for the neighbouring coastal plain and the Waitaki River valley—

areas of sheep, cattle, grain, and fruit farming. Its industries include dairy factories, freezing works, woolen and flour mills, and plants manufacturing concrete products, motor bodies, coal tar and gas, appliances, and furniture.

Oamaru lies on the highway between Christchurch and Dunedin and on the South Island Main Trunk Railway. It is the place of origin of the Corriedale sheep and was the site where, in 1852, Walter B.D. Mantell discovered the remains of the moa, an extinct giant flightless bird. Pop. (1992 est.) 13,750.

oarfish (species *Regalecus glesne*), large, long, sinuous fish of the family Regalecidae (order Lampridiformes), found throughout the tropics and subtropics in rather deep water. A ribbon-shaped fish, very thin from side to side, the oarfish may grow to a length of about 9 m (30.5 feet) and a weight of 300 kg (660 pounds). It is shiny silver in colour, with long, red, oarlike pelvic fins and a long, red dorsal fin that rises as a manelike crest on top of the head. Seldom seen at the surface, it is credited as the "sea serpent" of some reported sightings.



Oarfish (*Regalecus glesne*)
Painting by Richard Ellis

OAS (America): *see* American States, Organization of.

oasis, fertile tract of land that occurs in a desert wherever a perennial supply of fresh water is available. Oases vary in size, ranging from about 1 hectare (2.5 acres) around small springs to vast areas of naturally watered or irrigated land. Underground water sources account for most oases; their springs and wells, some of them artesian, are supplied from sandstone aquifers whose intake areas may be more than 800 km (500 miles) away, as at al-Khārijah Oasis (Kharga) and ad-Dākhilah Oasis (Dakhla) in the Libyan Desert. Two-thirds of the total population of the Sahara are sedentary peoples living in oases and depending on irrigation; these areas have temperatures conducive to rapid vegetative growth. In all Saharan oases the date palm constitutes the main source of food, while in its shade are grown citrus fruits, figs, peaches, apricots, vegetables, and cereals such as wheat, barley, and millet.

Oastler, Richard (b. Dec. 20, 1789, Leeds, Yorkshire, Eng.—d. Aug. 22, 1861, Harrogate, Yorkshire), industrial reformer who from 1831 conducted a campaign for shorter working hours that was in part responsible for the Ten Hours Act of 1847.

In 1830 Oastler, who was managing a large Yorkshire agricultural estate, learned of the evils of child labour in factories and immediately began a journalistic attack on the employment of young children. The next year he started his agitation for the 10-hour day. Although he was essentially conservative on other issues and never opposed industrialism as such, he considered the existing factory system inimical to what he called the "natural right to live well." He found allies in the House of Commons, especially Lord Ashley and Michael Thomas Sadler. After many rejections, a 10-hour law (sometimes known as Lord Ashley's Act) was passed in 1847.

For his opposition to the Poor Law Amendment Act of 1834 (under which indigent farm labourers could be compelled to work in factories for substandard wages), his employer dismissed him (May 1838) and had him imprisoned for debt (December 1840–February 1844). While in jail, Oastler elaborated his social theories in the *Fleet Papers,* 3 vol. (1841–43; named for the prison). Afterward, he edited a weekly newspaper.

oat grass, any of the perennial plants of two genera of grasses, *Arrhenatherum* and *Danthonia* (family Poaceae). Approximately six species of tall grasses, native to temperate Europe and Asia, constitute the genus *Arrhenatherum.* Tall oat grass (*A. elatius*), which has been introduced into various countries as a pasture grass, grows wild in many areas and is considered a weed, especially *A. elatius* variety *bulbosum,* commonly called onion couch for its bulblike basal stems. Most of the more than 100 species of the genus *Danthonia* are native to temperate regions of the Southern Hemisphere. They are important forage grasses in Australia, New Zealand, and South America. Australian species are commonly called wallaby grasses. Poverty oat grass (*D. spicata*) is a grayish green, mat-forming species and grows on dry, poor soil in many parts of North America.

Tall oat grass (*Arrhenatherum elatius*)
Syndication International—Photo Trends

Oates, Joyce Carol (b. June 16, 1938, Lockport, N.Y., U.S.), American novelist, short-story writer, and essayist noted for her depictions of violence and evil in modern society.

Oates studied English at Syracuse University (B.A., 1960) and the University of Wisconsin (M.A., 1961). Her first collection of short stories, *By the North Gate,* was published in 1963, and her first novel, *With Shuddering Fall,* appeared in 1964. She wrote prolifically thereafter, averaging about two books (chiefly short stories and novels) per year. Her more important novels include *A Garden of Earthly Delights* (1967), *Them* (1969; winner of a National Book Award), and *Do With Me What You Will* (1973). Also significant were several parodist Gothic novels, including *Bellefleur* (1980), *A Bloodsmoor Romance* (1982), and *Mysteries of Winterthurn* (1984). Some of her books were written under the pseudonym Rosamond Smith. She also wrote plays, essays, poetry, and literary criticism. She taught English at the University of Detroit, Mich., from 1961 to 1967 and at the University of Windsor, Ontario, Can., from 1967 to 1978. From 1978 she taught at Princeton University.

Oates's novels encompass a variety of historical settings and literary genres. She typically portrays American individuals whose intensely experienced and obsessive lives end in bloodshed and self-destruction owing to larger forces beyond their control. Her books blend a realistic treatment of everyday life with horrific and even sensational depictions of violence.

Oates, Titus (b. Sept. 15, 1649, Oakham, Rutland, Eng.—d. July 12/13, 1705, London), renegade Anglican priest who fabricated the Popish Plot of 1678. Oates's allegations that Roman Catholics were plotting to seize power caused a reign of terror in London and strengthened the anti-Catholic Whig Party.

The son of a Baptist preacher, Oates was expelled from the Merchant Taylors School, London, in 1665. Although he managed to be ordained into the Church of England, he was imprisoned for perjury while serving as a curate in Hastings in 1674. He escaped and joined the navy as a chaplain but was soon dismissed for misconduct.

Nevertheless, early in 1677 Oates became chaplain to the Protestants in the household of the Roman Catholic Henry Howard, 6th Duke of Norfolk. There he had his first extensive contacts with Catholic circles. At the same time, his new acquaintance, the fanatical anti-Jesuit Israel Tonge, urged him to profit by betraying Catholics to the government. Oates, therefore, set out to gather information about them and their activities. He joined the Roman Catholic church in March 1677, but before long he was expelled from seminaries at Valladolid in Spain and at Saint-Omer in France. Returning to London in 1678 he rejoined Tonge, and the pair invented an account of a vast Jesuit conspiracy to assassinate King Charles II and place his Roman Catholic brother James, Duke of York, on the throne. They publicized the tale through a prominent justice of the peace, Sir Edmund Berry Godfrey, and their revelations seemed even more plausible after Godfrey was found murdered in October 1678.

In the wave of terror that swept London, Oates was hailed as the saviour of his country, though Charles himself examined Oates and found his story unconvincing. His testimony was responsible for the execution of some 35 persons, but, as the frenzy subsided, inconsistencies were discovered in his story. In June 1684 the Duke of York was awarded damages of £100,000 in a libel suit against Oates. After the Duke of York came to the throne as King James II in 1685, Oates was convicted of perjury, pilloried, flogged, and imprisoned. But when James was deposed in 1688, Oates was released and granted a pension. He became a Baptist in 1693 but was expelled from that church eight years later. He died in obscurity.

oath, sacred or solemn voluntary promise usually involving the penalty of divine retribution for intentional falsity and often used in legal procedures. It is not certain that the oath was always considered a religious act; such ancient peoples as the Germanic tribes, Greeks, Romans, and Scythians swore by their swords or other weapons. These peoples, however, were actually invoking a symbol of the power of a war god as a guarantee of their trustworthiness.

The oath, which thus has its origins in religious customs, has become an accepted practice in modern nonreligious areas, such as in secular legal procedures. A person serving as a witness in court proceedings, such as in Anglo-American legal systems, often has to swear by the following oath: "I do solemnly swear that the testimony I am about to give will be the truth, the whole truth, and nothing but the truth. So help me God."

The swearing of an oath before divine symbols reaches back at least to the Sumerian civilization (4th–3rd millennia BC) of the ancient Middle East and to ancient Egypt, where one often swore by his life, or *ankh* ("oath"), which literally means "an utterance of life." In the Hittite Empire of the 14th–13th centuries

BC, various oath gods (*e.g.,* Indra and Mithra) were appealed to in agreements between states. Mithra, an Iranian god who became the main deity of a Hellenistic mystery (salvatory) religion, was viewed as the god of the contract (*i.e.,* the guardian of oaths and truth).

In Eastern religions (*e.g.,* Hinduism), an Indian, for example, might swear an oath while holding water from the holy river Ganges, which is a positive symbol of the divine.

In Judaism, Christianity, and Islām oaths have been used widely. In Judaism, two kinds of oaths are forbidden: (1) a vain oath, in which one attempts to do something that is impossible to accomplish, denies self-evident facts, or attempts to negate the fulfillment of a religious precept, and (2) a false oath, in which one uses the name of God to swear falsely, thus committing a sacrilege. At the time of Jesus in the 1st century, oaths were often misused and, for that reason, were often rebuked in early Christianity. In Islām, a Muslim may make a *qasam* ("oath"), in which he swears, for example, upon his life, soul, honour, or faith. Because the *qasam* is primarily a pledge to God, a false oath is considered a danger to one's soul.

The most frequent contemporary use of the oath occurs when a witness in an authorized legal inquiry states an intention to give all pertinent information and to tell only the truth in relating it. The precise formula varies, usually being prescribed by statute. In Anglo-American legal practice, testimony will not be received unless the witness is subject to some sanction for falsity, either by taking an oath or giving affirmation. The law provides that false testimony under oath constitutes the crime of perjury. Civil-law nations generally do not permit parties to the case to testify under oath, and they make the oath voluntary with many others. In these countries, the oath is often administered after testimony. *Compare* affirmation; vow.

oats, edible starchy grain of the oat plant (species *Avena sativa*), a cereal widely cultivated in the temperate regions of the world. The flowering and fruiting structure, or inflorescence, of the plant is made up of numerous branches bearing florets that produce the caryopsis, or one-seeded fruit.

The wild oat was first found in western Europe, apparently as a weed mixed with barley. Wild oats spread from there to other parts of the world. Common oats are grown in cool, temperate regions; red oats, more heat tolerant, are grown mainly in warmer climates. Among cereals, oats are second only to rye in ability to survive in poor soils. With sufficient moisture, oats will grow on soils that are sandy, low in fertility, or highly acidic.

Although oats are used chiefly as livestock feed, some are processed for human consumption, especially as breakfast foods. Rolled oats, flattened kernels with the hulls removed, are used mostly for oatmeal; other breakfast foods are made from the groats, kernels with husks removed, but unflattened. Oat flour is not generally considered suitable for bread but is used to make cookies and puddings. Oat grains are high in carbohydrates and contain about 13 percent protein and 7.5 percent fat. They are a source of calcium, iron, vitamin B_1, and nicotinic acid. The grain is used as livestock feed in both pure form and in mixtures. The straw is used for animal feed and bedding. Oat plants provide good hay and, under proper conditions, furnish excellent grazing and make good silage (stalk feed preserved by fermentation). In industry oat hulls are a source of furfural, a chemical used in various types of solvents.

Leading oat-producing countries include the United States, Belarus, Russia, Kazakhstan, Canada, France, Poland, Finland, Germany, and Australia. The demand for oats has been somewhat reduced by competition from hybrid corn and alfalfa.

Mature oats (*Avena sativa*)
Grant Heilman/Grant Heilman Photography, Inc.

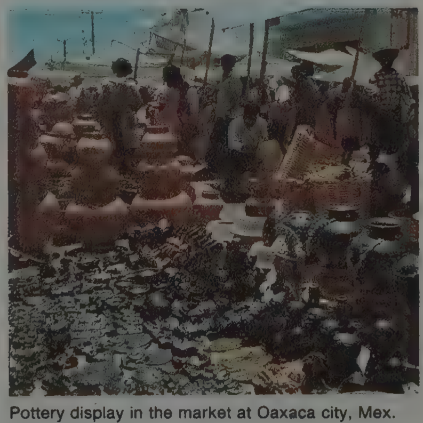
OATUU: *see* African Trade Union Unity, Organization of.

OAU: *see* African Unity, Organization of.

Oaxaca, *estado* ("state"), southern Mexico, bounded south by the Pacific Ocean, west by Guerrero, north by Puebla, northeast by Veracruz, and east by Chiapas. The state's territory, with an area of 36,275 square miles (93,952 square km), includes most of the Isthmus of Tehuantepec on its Pacific side. The Sierra Madre del Sur ends at the isthmus, which is low, hot, and arid. The Atlantic lowlands near Veracruz are hot and humid, but most of the state enjoys mild, healthful conditions.

Remains of pre-Columbian Zapotec and Mixtec edifices are found at Mitla and Monte Albán. Descendants of these Indians, divided into more than 15 major tribes, form the majority of the population and the largest Indian community in Mexico. Oaxaca is an agricultural and mining area, the varied products of which include corn (maize), wheat, coffee, sugarcane, tobacco, fibres, and tropical fruits. Cigarettes, soap, and Indian blankets are manufactured for local consumption. Its mountains are veined with gold, silver, uranium, diamonds, onyx, and other deposits. Although the rail network is incomplete in Oaxaca, air connections are good, there are several Pacific ports, and the Pan-American Highway traverses the state, passing through Oaxaca city, the state capital. Pop. (2000 prelim.) 3,432,180.

Oaxaca, in full OAXACA DE JUÁREZ, city, capital of Oaxaca *estado* ("state"), southern Mexico, lying in the fertile Oaxaca valley, 5,085 feet (1,550 m) above sea level. Founded in 1486 as an Aztec garrison and conquered by the Spaniards in 1521, Oaxaca has played an important role in Mexican history, being also the home of Benito Juárez and Porfirio Díaz, two of Mexico's most famous presidents.


Pottery display in the market at Oaxaca city, Mex.
Plessner International

Oaxaca is noted for its 16th-century art and architecture, for the nearby Mixtec ruins of Mitla and the Zapotec ruins of Monte Albán, and for its colourful handicraft (especially local handwoven textiles) market. The Benito Juárez Autonomous University of Oaxaca was founded there in 1827. Oaxaca is accessible by highway, railroad, and air. Pop. (2000 prelim.) 252,586.

Ob, Gulf of, Russian OBSKAYA GUBA, large inlet of the Kara Sea indenting northwestern Siberia, between the peninsulas of Yamal and Gyda, in north-central Russia. The gulf forms the outlet for the Ob River, the delta of which is choked by a huge sandbar. The gulf is about 500 miles (800 km) in length and has a breadth varying between 20 and 60 miles (32 and 97 km). The depth of the sea at this point is 33–40 feet (10–12 m). Its eastern coastline is steep and rugged; the west is low-lying and marshy. Novy Port is the main port of the gulf.

Ob River, great river of Russia, flowing across western Siberia in a winding course northwestward from its sources in the Altai Mountains of Central Asia to its outlet through the Gulf of Ob into the Kara Sea of the Arctic Ocean.

A brief treatment of the Ob River follows. For full treatment, *see* MACROPAEDIA: Asia.

The length of the Ob is calculated at 2,268 miles (3,650 km), from the source of the Ob proper (the confluence of the Biya and Katun rivers) to the head of its gulf on the Kara Sea, or as 3,362 miles (5,410 km), from the source of its greatest tributary, the Black Irtysh, to the end of the gulf. The river's other major tributaries include the Chulym, Ket, Vakh, Vasyugan, Kazym, and Northern (Severnaya) Sosva. Together they drain a basin of approximately 1,150,000 square miles (about 2,975,-000 square km); there are more than 1,900 rivers within the drainage basin.

The West Siberian Plain covers about 85 percent of the Ob basin, the rest of which is occupied in the south by the terraced plains of Turgay and the small hills of northernmost Kazakhstan, and in the southeast by the Kuznetsky Alatau, the Salair Range, the Mountains of Shoria, and, behind them, the Altai Mountains. From south to north the basin represents a geographic cross section of central and northern Asia; in the far south, around Lake Zaysan, there is arid semidesert; in the central regions of the West Siberian Plain swampy coniferous forest known as taiga, with very large expanses of marshland, dominates; and in the north there are vast stretches of icy, treeless plains known as tundra.

The average annual discharge of the Ob River is 448,500 cubic feet (12,700 cubic m) per second. Most of the water comes from the melting of seasonal snow and from rainfall; along the middle and lower Ob spring and summer floods may last four or five months. The entire length of the river is generally frozen solid by the end of November, with the upper reaches remaining so for some 150 days, the lower reaches for 220 days. The Ob provides one of western Siberia's principal means of communication and is navigable during iceless months, serving as both an import and export route. The Ob's total hydroelectric potential is large, estimated at some 250 billion kW-hr.

Ob-Ugric languages, division of the Finno-Ugric branch of the Uralic language family, comprising the Mansi (Vogul) and Khanty (Ostyak) languages; they are most closely related to Hungarian, with which they make up the Ugric branch of Finno-Ugric. The Ob-Ugric languages are spoken in the region of the Ob and Irtysh rivers in central Russia. They had no written tradition or literary language until 1930; since 1937 they have been written in a modified Cyrillic alphabet but have developed no important literature and are little used in government or education. *See also* Finno-Ugric languages.

Oba (Vanuatu): *see* Aoba.

Obadiah, Book of, also spelled ABDIAS, the fourth of 12 Old Testament books that bear the names of the Minor Prophets, in the Jewish canon treated as one book, The Twelve. Obadiah, with only one chapter consisting of 21 verses, is the shortest of all Old Testament books and purports to be a record of "the vision of Obadiah." Nothing is known of the prophet except for his name, which means "servant of Yahweh."

In the book, Edom, a long-time enemy of Israel, is castigated for its refusal to help Israel repel foreigners who invaded and conquered Jerusalem. To many scholars this reference suggests a date of composition after the Babylonian conquest of 586 BC. Others, noting the anti-Edomite sentiments in II Kings 8:20–22, consider a date as early as the 9th century BC also probable.

The book announces that the Day of Judgment is near for all nations, when all evil will be punished and the righteous renewed. The final verses prophesy the restoration of the Jews to their native land.

Consult the INDEX *first*

Ōbaku, Chinese HUANG-PO, one of the three Zen sects in Japan, founded in 1654 by the Chinese priest Yin-yüan (Japanese Ingen); it continues to preserve elements of the Chinese tradition in its architecture, religious ceremonies, and teachings. Although the methods of achieving sudden insight as developed by the Rinzai sect are practiced by Ōbaku monks, invocation of the name of the Buddha Amida (*nembutsu*) is also used. The head temple of the sect is the Mampuku-ji in Kyōto.

O'Bannion, (Charles) Dion (b. 1892, Aurora, Ill., U.S.—d. Nov. 10, 1924, Chicago), bootlegger of the early 1920s, boss of the most feared Chicago gang next to that of his arch rivals, Johnny Torrio and Al Capone.

From a life of petty crime O'Bannion rose during Prohibition to command the best distilleries and breweries in Chicago and dominated bootleg distribution on the North Side, including the elegant Gold Coast, and among Chicago's fashionable clubs and restaurants. His office was in a flower shop at 738 North State Street. It was there that he was murdered by agents of Al Capone. Some 15,000 persons attended his lavish funeral, including Torrio and Capone.

Obasanjo, Olusegun (b. March 5, 1937, Abeokuta, Nigeria), Nigerian general, politician, and diplomat who was the first military leader (1976–79) in Africa to hand over power to civilian rule. In 1999 he was elected president of Nigeria.

Obasanjo joined the army in 1958 and quickly rose through the ranks. During the Nigerian civil war (Biafra secession, 1967–79) he headed a commando unit that was instrumental in ending the fighting. After the assassination of Brigadier General Murtala Ramat Mohammed in 1976, Obasanjo, his deputy, became the country's leader. As president, he emerged as an influential statesman and continued to push forward Mohammed's timetable for civilian rule. Elections were held in 1979, but Obasanjo chose not to run.

Over the next several years, Obasanjo worked as a diplomat, holding positions in the United Nations and other organizations. A vocal critic of General Sani Abacha, who seized control of Nigeria in 1993, Obasanjo was imprisoned in 1995 for allegedly organizing a coup against Abacha. Following Abacha's death in 1998, Obasanjo was released, and he joined the dominant People's Democratic Party. Democratic elections were held in 1999, and Obasanjo was voted president. Nigeria's first civilian ruler in 15 years, he sought to alleviate poverty, reduce state corruption, and reform the army. Religious and ethnic strife, however, became a central concern during his presidency as incidents of violence mounted.

obbligato (Italian: "obligatory"), in music, essential but subordinate instrumental part. For example, in an 18th-century aria with trumpet obbligato, the trumpet part, although serving as accompaniment to the voice, may be as brilliant in its writing as that of the voice itself. The term obbligato accompaniment has a more specialized meaning in some 18th-century music (*see* accompaniment).

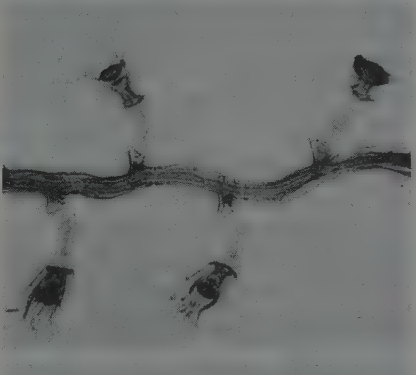
O.B.E., officer of the British Empire, member of a British order of knighthood, although this rank does not confer knighthood. *See* British Empire, The Most Excellent Order of the.

obeah (in folklore): *see* obia.

O'Beel, John (Seneca Indian leader): *see* Cornplanter.

Obeid, el- (The Sudan): *see* Ubayyiḍ, al-.

Obelia, genus of invertebrate marine animals of the class Hydrozoa (phylum Cnidaria). Present in all oceans, the animal begins life as a polyp—a stalklike form attached to the ocean bottom or some other solid surface. The polyp produces medusae, or jellyfish, which in turn, produce polyps. Rootlike filaments sent out by the polyp serve as organs of attachment. The stalk lengthens and develops a mouth encircled by tentacles. Buds arise from the stalk, developing into additional polyps, until a treelike colony forms. Specialized polyps (blastostyles), lacking mouth or tentacles, develop buds that separate as medusae and swim away. Eggs and sperm produced by the medusae unite and give rise to ciliated larvae (planulae) that swim freely for a time, then settle onto a surface and develop into new polyps.

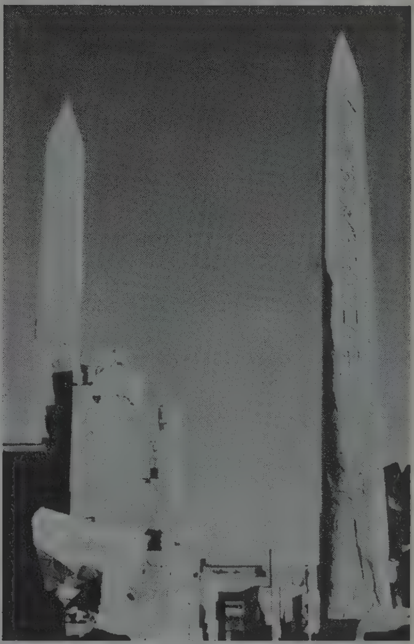


Polyp magnified 40 times (top) and medusoid (bottom) stages of Obelia

Grant Heilman

obelisk, tapered monolithic pillar, originally erected in pairs at the entrances of ancient Egyptian temples. Many were calendrical and even horological in nature, indicating hours as a sundial, by the casting of shadows.

The Egyptian obelisk was carved from a single piece of stone, usually red granite from the quarries at Aswān. It was designed to be wider at its square or rectangular base than at its pyramidal top, which was often covered with an alloy of gold and silver called electrum. All four sides of the obelisk's shaft are embellished with hieroglyphs that characteristically include religious dedications, usually to the Sun god, and commemorations of the lives of rulers. While obelisks are known to have been erected as early as the 4th dynasty (*c.* 2613–2494 BC), no examples from that era have survived. Obelisks of the 5th dynasty's Sun temples were comparatively squat (no more than 10 feet [3.3 metres] tall). The earliest surviving obelisk dates from the reign of Sesostris I (1908–1875 BC) and stands at Heliopolis, a suburb of Cairo, where once stood a temple to Re. One of a pair of obelisks erected at Karnak by Thutmose I (*c.* 1525–12 BC) is 80 feet (24 metres) high, square at the base, with sides of 6 feet (1.8 metres), and 143 tons in weight.



(Left) Obelisk of Queen Hatshepsut and (right) obelisk of King Thutmose I, Temple of Amon, Karnak, Egypt, both *c.* 1500 BC, New Kingdom, 18th dynasty

H. Roger-Viollet

An inscription on the base of Hatshepsut's obelisk at Karnak indicates that the work of cutting that particular monolith out of the quarry took seven months. In the Temple of Hatshepsut at Thebes are scenes of the transport of the obelisk down the Nile by barge. At its destination workmen put the shaft into place upon its detached base by hauling it up a ramp made of earth and tilting it.

Other peoples, including the Phoenicians and the Canaanites, produced obelisks after Egyptian models, although not generally carved from a single block of stone.

During the time of the Roman emperors, many obelisks were transported from Egypt to what is now Italy. At least a dozen went to the city of Rome itself, including one now in the Piazza San Giovanni in Laterano that was originally erected by Thutmose III (reigned 1504–1450 BC) at Karnak. With a height of 105 feet (32 m) and a square base with sides of 9 feet (2.7 m) that tapers to a square top with sides of 6 feet, 2 inches (1.88 m), it weighs approximately 230 tons and is the largest ancient obelisk extant.

Late in the 19th century the government of Egypt divided a pair of obelisks, giving one to the United States and the other to Great Britain. One now stands in Central Park, New York City, and the other on the Thames embankment in London. Although known as Cleopatra's Needles, they have no historic connection with the Egyptian queen. They were dedicated at Heliopolis by Thutmose III about 1500 BC and bear inscriptions to him and to Ramses II (*c.* 1304–*c.* 1237 BC). Carved from the typical red granite, they stand 69 feet, 6 inches (21.2 m) high, have a rectangular base that is 7 feet, 9 inches by 7 feet, 8 inches (2.36 m by 2.33 m), and weigh 180 tons. The quarrying and erecting of these pillars is a measure of the mechanical genius and the unlimited manpower available to the ancient Egyptians.

A well-known example of a modern obelisk is the Washington Monument, which was completed in Washington, D.C., in 1884. It towers 555 feet (169 m) and contains an observatory and interior elevator and stairs.

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Oberbayern, English UPPER BAVARIA, *Regierungsbezirk* (administrative district), southeastern Bavaria *Land* (state), southern Germany. Oberbayern is bordered by Austria to the east and south and the *Regierungsbezirke* of Schwaben (Swabia) to the west, Mittelfranken (Middle Franconia) and Oberpfalz (Upper Palatinate) to the north, and Niederbayern (Lower Bavaria) to the northeast. It is the largest of seven districts in Bavaria, and together with Niederbayern and Oberpfalz it comprises most of the historic region of Bavaria (*q.v.*). The district derives its name from that of the Baiuvarii, or Baiuwarii, a mixture of Germanic people who moved up the Danube valley between AD 488 to 520 to an area bounded by the Alps and the Lech, Danube, and Enns rivers. The region, ruled by the house of Wittelsbach from 1180 to 1918, experienced frequent territorial division, expansion, and conflict until Napoleon's reorganization of Germany in 1806. Despite the conflicts, Munich—located in central Oberbayern—emerged as a strong political and cultural centre, becoming capital of the united duchy of Bavaria in 1506 and capital of the kingdom of Bavaria in 1806. Today Munich is the capital and largest city of Bavaria *Land* and the administrative seat of Oberbayern *Regierungsbezirk*.

The Bavarian Alps extend from the extreme southwestern corner of Oberbayern to the Inn River, forming a section of the district's southern border with Austria. Beautiful scenery and easy access to the glaciated limestone mountains by way of deeply cut U-shaped valleys have made Garmisch-Partenkirchen, located at the foot of Germany's highest mountain, the Zugspitze (9,718 feet [2,962 m]), one of Europe's most popular mountain resorts. Farther east along the Austrian border are the Chiemgauer Alps and the Berchtesgadener Alps. In the Berchtesgaden National Park (80 square miles [208 square km]) flat-topped mountains fall steeply down to Königs Lake, a beautiful glacial lake and popular tourist stop.

A large part of Oberbayern lies in southern Germany's Alpine Foreland east of the Lech River, a plateau region with diversified landscapes. North of the Alps in the Upper Bavarian Morainic Uplands, the Isar, Inn, and Salzach rivers flow northeast toward the Danube through morainic hills covered with forests, lakes, and bogs. Embedded between the hills the large glacial lakes Ammer, Starnberger, and Chiem offer ideal recreation escapes from the congested urban area of Munich. Although the soil in this area is fertile, agriculture is limited to dairy farming because of harsh climatic conditions found at high elevations. Near the capital city the Munich Plain, formed from glacial outwash gravels, dips below the water table, creating marshland and large peat bogs including the Dachauer Moor and Erdinger Moor. The Lower Bavarian Uplands, a region of low, hilly relief and broad valleys, is located north of the Munich Plain. The most productive agricultural land here is Hallertau, Germany's largest hop-growing region. Near Ingolstadt on the Danube River, the Alpine Foreland falls away to the Danube Moor, fertile farmland lying on raised alluvium river deposits. The chief crops produced in the Danube River basin are sugar beets, wheat, rye, and potatoes. In the extreme northwest, Oberbayern extends into the Franconian Jura.

Industry in Oberbayern is concentrated around the cities of Munich and Ingolstadt and in smaller cities along the Inn, Mangfall, Isar, and Danube rivers. Munich, the largest industrial centre in Bavaria and a major transportation junction, produces precision optical and electrical equipment, machinery, motor vehicles, aircraft, clothing, and beer. Ingolstadt's industries manufacture motor vehicles and machinery. Bavaria's chemical industry is centred near the junction of the Inn and Salzach rivers and along the Danube between Ingolstadt, Vohburg, and Neustadt.

The people of Oberbayern speak Bavarian, one of three main German dialects in Bavaria. They are famous for their traditional Upper Bavarian-Alpine costumes of leather knee breeches and padded jackets, developed from the dress of the huntsman. The predominant rural housing pattern in the hills of southern Oberbayern is one of dispersed farmsteads, while in the north farms stand singly or grouped into hamlets. Houses in the highlands are built in the chalet form and usually have wooden balconies and elaborately painted facades. Many beautiful examples of Rococo architecture can be seen in Oberbayern, one of the art style's strongest areas of development outside France. Higher education in the *Regierungsbezirk* is centred in Munich and includes the Ludwig Maximilian University of Munich (1472), the Munich Technical University (1868), and many specialized academies. In autumn Munich celebrates Oktoberfest, the world's largest popular folk festival, with beer, music, and traditional costumes. The population of Oberbayern is predominantly Roman Catholic. Area 6,768 square miles (17,529 square km). Pop. (1991 est.) 3,801,448.

Oberfranken, English UPPER FRANCONIA, *Regierungsbezirk* (administrative district), northeastern Bavaria *Land* (state), east-central Germany. Oberfranken is bordered by Thuringia and Saxony *Länder* to the north, the Czech Republic to the east, and the *Regierungsbezirke* of Oberpfalz (Upper Palatinate) to the southeast, Mittelfranken (Middle Franconia) to the south, and Unterfranken (Lower Franconia) to the west. The district occupies an area of 2,792 square miles (7,231 square km) and is coextensive with the larger historic region of Franconia (*q.v.*). The region derives its name from that of the Franks, a Germanic people who forcibly settled territory extending from the Rhineland eastward along the Main River as far as the Fichtel Hills (a mountainous plateau) from the early 6th century AD. These lands were split into East Franconia and West or Rhenish Franconia. By the 12th century, following further territorial changes, the name Franconia had come to refer only to the eastern division. In Napoleon's 1806 reorganization of Germany, East Franconia was divided between the kingdoms of Bavaria and Württemberg and the grand duchy of Baden. The current Bavarian *Regierungsbezirke* of Oberfranken, Mittelfranken, and Unterfranken were first created as provinces of the kingdom of Bavaria in 1837 by King Louis I.

The northern Middle Franconian Basin, predominantly cultivated land mixed with forest, extends along the Regnitz and Main river valleys in western Oberfranken. Among the leading agricultural areas of the basin is the fruit-growing Bamberger Region, located near Bamberg, the largest city. Rising to the east is the Franconian Jura, a sparsely populated plateau of Jurassic limestones and dolomites (those that are 144 million to 208 million years old) covered with conifer and beech forests, juniper heath, and stretches of marginal agricultural land. A special attraction for tourists is Franconian Switzerland, a scenic region of karst landscape characterized by sinkholes, caves, and krags dominated by medieval castle ruins. The Upper Main Upland, a wide and relatively fertile valley drained by the Roter (Red) and Weisser (White) Main rivers, lies east of the Franconian Jura at the base of the East Bavarian border hills. Bayreuth, which is the administrative seat of Oberfranken, and Kulmbach are the principal cities of the region.

The Franconian Forest, a hilly highland plateau of gneiss and schists, occupies northeastern Oberfranken between the Thuringian Forest and the Fichtel Hills. The plateau is drained by the Hasslach and Rodach rivers, tributaries of the Main, and by the north-flowing Selbitz and Saale rivers. Interspersed within the coniferous forest of the plateau are meadow and areas of heath and bog. Franconia's traditional industries produce textiles, ceramics, and wood products. Developing new industries include the production of electrical equipment and fine machinery. Hof, the industrial and commercial centre of the Franconian Forest, manufactures textiles and clothing, metal products, and beer. Situated at the convergence of the Franconian Forest, the Oberpfalz part of the Bohemian Forest, and the Erzgebirge (Ore Mountains, of eastern Germany and the Czech Republic) is the Fichtel Hills, a rectangular plateau. Highland masses, including Schnee Hill, which rises to a height of 3,448 feet (1,051 m), form a horseshoe periphery around the lower plateau platform. Gneiss and granite rock formations, spruce forests, and bogs characterize the highlands. The more densely populated interior has been cleared of forest and is dominated by a pastoral economy supplemented with ceramics, wood, and granite-quarrying industries and, more recently, the tourist trade. Selb is the chief town of the Fichtel Hills and the centre of the porcelain industry in Germany.

Bamberg, the leading industrial city of Oberfranken, also serves as an important transportation junction, given its location on the Main-Danube Canal paralleling the Regnitz River. The city manufactures electrical equipment, textiles and clothing, machinery, and rubber products and has numerous breweries. In the Upper Main Upland, Bayreuth produces textiles, machinery, and electrical products, while Kulmbach specializes in textiles, machinery, and the brewing industry.

The people of Oberfranken speak Franconian, one of three main German dialects in Bavaria. The rural housing pattern in the Middle Franconian Basin is one of large irregular villages. Village farmsteads consist of two or more buildings set around a rectangular courtyard entered through a gateway. The houses face the street and are generally a two-story, half-timbered design with steep roofs. In the highlands to the east, separate farms and small hamlets are commonly found. Higher education in the *Regierungsbezirk* is centred at the Universität Bayreuth, founded in 1972, and at the Gesamthochschule Bamberg, a university-level institution for advanced technical training. Bayreuth is best known as the home of composer Richard Wagner's Festspielhaus (Festival Theatre), built in 1872–76, and as the site of the Wagner Festival held annually from late July through August. The population of Oberfranken is predominantly Protestant. Pop. (1989 est.) 1,039,232.

Oberhausen, city, North Rhine-Westphalia *Land* (state), western Germany. It is situated on the Rhine-Herne-Kanal, within the densely developed Ruhr industrial belt, and it adjoins Essen (east), Mülheim (south), and Duisberg (southwest). Oberhausen is an important rail junction on the main line between Hanover and Berlin, and the city also has good autobahn connections with The Netherlands. It is the centre of a network of lines radiating into the Westphalian coal and limonite iron-ore fields that were the foundation for its rapid industrial development; this began in the mid-19th century with the establishment of a railway station (named after the old Oberhausen Castle on the banks of the Emscher River) on the uninhabited but mineral-rich Lipperheide (heath).

Oberhausen was chartered in 1874, and in 1929 it incorporated the older neighbouring towns of Sterkrade and Osterfeld. The city's heavy industries are based on the production of steel and bituminous coal. The St. Anthony Iron Works (1758–1876) was the first to be built in the Ruhr. Oberhausen also has zinc-smelting refineries, dye works, railway workshops, and a large thermoelectric plant, and its manufactures include steam boilers, wire rope, glass, chemicals, sugar, porcelain, and cigars.

Historic landmarks include Sterkrade Abbey (1150), Holten Fortress (1307), and the 16th-century moated castle of Vondern. Among the notable modern buildings are the Rathaus (1930), the main railway station (1938), Euripahaus (1956–57), and a notable modern Stadthalle (city hall; 1962). Oberhausen has several technical schools as well as a civic theatre and an art museum. Pop. (1989 est.) 221,017.

Oberlin, city, Lorain county, northern Ohio, U.S., 35 mi (56 km) west-southwest of Cleveland. In 1833 the Rev. John L. Shipherd, a Presbyterian minister, and Philo P. Steward, a former missionary to the Choctaw Indians, founded the community and established the Oberlin Collegiate Institute (1833; designated a college after 1850) to train ministers and teachers for the West. The name was chosen to honour Johann Friedrich Oberlin, an Alsatian pastor and philanthropist. In 1886 Charles Martin Hall, an Oberlin alumnus, developed there the electrolytic process for producing aluminum cheaply. Oberlin College pioneered various reform movements, including coeducation and integration, and the city was a station on the Underground Railroad by which fugitive slaves escaped to freedom in Canada. The Anti-Saloon League was founded in Oberlin in 1893. The city is nestled amidst fertile farmlands; its economic and cultural life centres on the college and its famous music conservatory. Inc. village, 1846; city, 1950. Pop. (1990) 8,191.

Oberlin, Johann Friedrich (b. Aug. 31, 1740, Strasbourg, Fr.—d. June 1, 1826, Walderbach, Bavaria), Lutheran pastor and philanthropist, who spent his life transforming desperately poor parishes in the Vosges region of France into materially as well as spiritually flourishing communities.

Born into a middle-class family, Oberlin studied theology and graduated from the University of Strasbourg in 1758. He was a teacher until he became a pastor in 1767 at the Vosges village of Walderbach, which became the centre of his life's work.

Johann Friedrich Oberlin, engraving by Henri Charles Müller (1784–1846)

By courtesy of the Bibliotheque Nationale, Paris; photograph, J.P. Ziolo

Seeking to raise his parishioners' living standards, Oberlin provided village schools and thus began one of the first systems for supervising and instructing very young children while their parents were working. His teaching methods related instruction closely to practical needs and in many ways foreshadowed the work of the German educator Friedrich Froebel, the originator of the kindergarten. Oberlin's methods won him the respect of adults, who also came to him for instruction. Among them he found men to build roads and bridges to end the isolation of their region. To promote better crop production, he encouraged experiments in improving crops and started regular meetings for the exchange of agricultural information. He also made possible the purchase of modern farm implements, bought in bulk and sold at cost, and financed their purchase through a bank that he founded. After subsidizing young men to learn crafts in Strasbourg, he established factories for local industries.

Interdenominational in outlook, Oberlin welcomed Calvinists and Roman Catholics to his communion services. His admiration of the French philosopher Jean-Jacques Rousseau and the Swedish mystic Emanuel Swedenborg was reflected in his sermons, which combined rationalism with mysticism. His humanism was expressed in his enthusiastic welcome of the French Revolution, and he was honoured by both revolutionary and imperial governments of France. Oberlin's name was given to the town and college in Ohio, U.S., as well as to the Oberlinhaus, a German centre for treatment of the deaf, mute, and blind.

Oberlin College, private coeducational institution of higher learning at Oberlin, Ohio, offering programs in liberal arts and music. It was founded in 1833 as the Oberlin Collegiate Institute to educate ministers and schoolteachers for the West. It was named for the Alsatian pastor Johann Friedrich Oberlin. The college undertook several innovations; it was coeducational from the outset and offered an optional "ladies' course," which included the natural sciences, literature, and philosophy drawn from the regular curriculum, plus French and drawing, omitting Greek and Latin. By 1838 women were admitted to the degree program. Oberlin also admitted blacks on an equal footing with whites, and it became a station on the Underground Railroad by which fugitive slaves escaped to freedom in Canada. Charles Martin Hall, an alumnus who had in 1886 developed a cheap method of making aluminum commercially, bequeathed to the college several million dollars for the endowment and the construction of Hall Auditorium.

Oberlin's modern faculties include science, communications, arts (including music), foreign languages, law, letters, mathematics, psychology, public service studies, and social sciences.

Oberon, French ALBERON, German ALBERICH, king of the elves, or of the "faerie," in the French medieval poem *Huon de Bordeaux.* In this poem Oberon is a dwarf-king, living in the woodland, who by magic powers helps the hero to accomplish a seemingly impossible task. In the legendary history of the Merovingian dynasty Oberon is a magician, the brother of Merowech (Mérovée). In the medieval German epic the *Nibelungenlied* he is the dwarf who guards the underground treasure of the Nibelungen and is overcome by Siegfried and forced to yield the "cloak of darkness" (the Tarn-kappe). In another Middle High German epic, entitled *Ortnit,* Alberich appears as the king of the dwarfs and the titular hero's father.

Oberon (lower right) with Puck and Titania, illustration by J. Moyer Smith to a 1906 edition of *A Midsummer Night's Dream*

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Huon de Bordeaux, through the prose translation of John Bouchier (Lord Berners), furnished the name Oberon and the fairy element for Shakespeare's *Midsummer Night's Dream* (first performed 1595–96), Ben Jonson's court masque *Oberon, the Faery Prince* (1611), and Christoph Martin Wieland's verse romance *Oberon* (1780). The character is treated again in Carl Maria von Weber's opera *Oberon* (1826). In the musical dramas of Richard Wagner, Alberich is the Nibelung who steals the magic gold from the Rhine maidens; he is a darker character than his predecessors.

Oberon, outermost of the five major satellites of Uranus. It was discovered in 1787 by the English astronomer Sir William Herschel, who had found Uranus in 1781. The mean distance of the satellite from the centre of Uranus is about 583,520 kilometres (361,780 miles), and its orbital period is 13.46 days. Oberon's estimated diameter is 1,630 km (1,010 mi), and its mass is about 6.9×10^{-5} that of Uranus. The satellite is thought to consist of water ice and possibly a small amount of frozen methane and rocky material. Photographic images transmitted by the U.S. Voyager 2 spacecraft in 1986 revealed that Oberon's surface is heavily cratered like that of the Moon. A few of the numerous bright craters appear to have been flooded by some kind of dark lavalike material.

Oberon, Merle (b. Feb. 19, 1911, Bombay, India—d. Nov. 23, 1979, Los Angeles, Calif., U.S.), British and American film actress who appeared in more than 30 motion pictures. Her most notable portrayal was that of the beautiful Cathy, who tormented and rejected Heathcliff (Laurence Olivier) in the 1939 classic *Wuthering Heights*.

The daughter of an Indian mother and a British army officer, Arthur Thompson, stationed in India, she was christened Estelle Merle. Moving to England, she played bit parts on stage and in films until discovered by the producer Alexander Korda, whose protégée and wife she became. Early in her career she created a fictional autobiography, claiming to have been born in Tasmania of Irish, French, and Dutch descent and christened Estelle Merle O'Brien Thompson.

Working in both England and Hollywood, she achieved stardom as a hauntingly beautiful, dark-eyed woman of grace and spirit. She first starred as Anne Boleyn in *The Private Life of Henry VIII* (1933), opposite Charles Laughton. She played opposite Douglas Fairbanks, Sr., in *The Private Life of Don Juan* (1934), Leslie Howard in *The Scarlet Pimpernel* (1934), and Maurice Chevalier in *Folies Bergère* (1935). She was cast as George Sand in the movie *A Song to Remember* (1945) and Napoleon's Josephine in *Désirée* (1954). Her last screen appearances were in *Hotel* (1967) and *Interval* (1973).

Oberösterreich, English UPPER AUSTRIA, *Bundesland* (federal state), northern Austria. It borders Germany and the Czech Republic on the west and north and is bounded by *Bundesländer* Niederösterreich (Lower Austria) on the east and Steiermark (Styria) and Salzburg on the south. Oberösterreich lies between the Inn and the Enns rivers and is traversed by the Danube River.

Part of the Austrian granite plateau, called the Mühlviertel (Mühl District, after its main river), occupies the northeastern portion of the state, north of the Danube. Sloping gently from northwest to southeast, this plateau's undulating surface has poor soil and is extensively wooded, with grassland at lower elevations. The southern part of the state is Alpine, comprising limestone mountains and the Flysch foothills and including most of the Salzkammergut (*q.v.*) resort region with its many lakes and high peaks. The upland areas of the state are barren, with extensive forests on the lower slopes and meadows and some arable land in the valleys. Although the Salzkammergut has long been settled because of its salt resources, Bad Ischl, Gmunden, and Ebensee are the only towns of any size in it. The most economically important part of the state lies between the Danube and the Alps to the south. The forested slopes of the Hausruck Mountains and the Kobernausser Forest in the centre have deposits of brown coal (lignite). Loess cover on the upper terraces provides fertile soil.

Salt deposits attracted settlement in prehistoric times, especially at Hallstatt, and later in the Roman period. In 1192 the Traungau (the nucleus of modern Oberösterreich) became an appendage of the duchy of Austria, and the 10th-century name Ostarichi ("Eastern Region") was extended to areas west of the Enns River. Oberösterreich was divided from Niederösterreich in about 1450, and Linz became its capital in 1490 (following Enns, Steyr, and Wels). The official name until 1918 was Österreich ober der Enns, but it was popularly called Oberösterreich. During the *Anschluss*, or incorporation of Austria into Germany (1938–45), Oberösterreich became the larger Reichsgau Oberdonau ("Upper Danube Reich District").

After World War II the population was increased by more than 100,000 refugees, and the density is now one of the highest of all the *Bundesländer*. Ethnically the people are German, and about 90 percent are Roman Catholic. The principal towns are Linz, Wels, Steyr, Traun, Braunau, Bad Ischl, Gmunden, Ried, Vöcklabruck, Enns, Leonding, and Ansfelden.

Farming occupies more than half of the land, and forestry about one-third. More than half of the agricultural land is pasture, mainly in the highest regions. The most intensive stock farming is done in the Alpine foreland, where grain (wheat, rye), sugar beets, potatoes, and fruit are also raised. Large tracts of forest, especially in the Alps, are state-owned.

Salt is mined in the Salzkammergut and brown coal (lignite) in the Hausruck; farther west, granite and limestone are quarried. After 1959 oil wells near Ried came in production.

There was massive industrial development in Oberösterreich during the *Anschluss* and after World War II. The important Linz chemical industry (nitrogen) and ironworks and steelworks, the Lenzing staple-fibre plant, and the aluminum plant at Ranshofen all date from that period. Other activities include dairying, food processing, beet-sugar refining, brewing, the manufacture of agricultural machinery and textiles, tanning, and sawmilling (with a timber industry and paper and cellulose plants). The Danube has retained its medieval role in commerce and trade, and Oberösterreich is well served by rail and road. Air traffic at Linz airport is of minor importance. Area 4,626 square miles (11,980 square km). Pop. (1991) 1,340,076.

Oberpfalz, English UPPER PALATINATE, *Regierungsbezirk* (administrative district), east-central Bavaria (or Bayern) *Land* (state), southern Germany. Oberpfalz is bordered by the Czech Republic to the east and the *Regierungsbezirke* of Niederbayern (Lower Bavaria) and Oberbayern (Upper Bavaria) to the south, Mittelfranken (Middle Franconia) to the west, and Oberfranken (Upper Franconia) to the north. The district's current boundaries were first established as a Bavarian province in 1838 and include the historic Upper Palatinate region, the former free imperial city of Regensburg and its territories, and several small principalities. The region received the name Oberpfalz (Upper Palatinate) as a result of dynastic relationship. In 1329 the Compact of Pavia divided German lands under the rule of the house of Wittelsbach into Bavarian and Palatinate branches. The latter branch comprised the Rhenish Palatinate (Rheinische Pfalz), lands extending east and west of the middle Rhine River, together with the Bavarian North Mark farther east along the Naab River. In order to differentiate them from the Rhenish, or Lower, Palatinate, the eastern lands became known as the Upper Palatinate. The Upper Palatinate was not reunited with Bavaria until 1628, when the ruler Maximilian I (1597–1651) secured the territory as a reward for his victories in the Thirty Years' War.

The Naab River rises in the Fichtel Hills and the northern Oberpfalz part of the Bohemian Forest and drains the district southward through a valley of varying width. The river joins the Danube River above Regensburg, the district's administrative seat. Some 100 late medieval castles remain along the Naab valley, which was once a major traffic route between central Germany and Bohemia. Situated in the wider valley basins are larger towns such as Weiden, important for its production of fine china and industrial ceramics. The old walled town of Amberg, the former capital (until 1810) of the Upper Palatinate, lies in the fertile valley of the Vils River, a western tributary of the Naab. The western portion of Oberpfalz comprises the Franconian Jura, an extensive plateau of Jurassic limestones and dolomites. Its steep scarp slope faces east and southeast toward the Naab and Danube valleys, while its rear slope dips imperceptibly into the Mittelfranken area to the west. The low hills and dry valleys of the plateau are covered with short grasses interspersed with stretches of fir forests. The population density in much of this area is among the lowest in Bavaria.

East of the Naab River valley, the graduated gneiss ridges of the Oberpfälzerwald Mountains rise to between 2,300 and 3,000 feet (700 and 900 m) in elevation along the Czech frontier. The forest extends south some 55 miles (90 km) from the Fichtel Hills at the district's northern border to the Furth Depression. The thinly populated region is dotted by meadows, hamlets, and isolated farmsteads, but agricultural output is limited because of thin, poor soils and the short growing season. Lumbering, glassblowing, and the ceramics industry, based on local kaolin and china clays, have developed as a means of economic support. The Furth Depression, a natural gap 9 miles (15 km) wide, provides the main transportation route across the eastern Bavarian border hills between Bavaria and the Czech Republic.

Industry in Oberpfalz is concentrated in the cities of Regensburg and Amberg and in a few smaller cities along the Naab and Vils rivers. Regensburg, a major transportation junction, produces electrical equipment, steel, motor vehicles, textiles and clothing, and wood. Amberg's industries include electrical engineering, iron-ore mining, steelworking, glass grinding, and the manufacture of machinery. Sulzbach-Rosenberg, Maxhütte-Haidhof, and Schwandorf are minor ironworking and steelworking centres.

The people of Oberpfalz speak Bavarian, one of three main German dialects in Bavaria. Higher education in the *Regierungsbezirk* is centred in Regensburg and includes the University of Regensburg, founded in 1962, and a state technical college. Regensburg is regarded as the centre of Gothic-style architecture in Bavaria, with its famous Cathedral of St. Peter (1275–1524) and two mendicant-order churches. More than three-quarters of the population of Oberpfalz are Roman Catholics. Area 3,742 square miles (9,691 square km). Pop. (1991 est.) 1,008,999.

Oberth, Hermann (Julius) (b. June 25, 1894, Nagyszeben, Austria-Hungary [now Sibiu, Rom.]—d. Dec. 29, 1989, Nürnberg, W.Ger.), German scientist who is considered to be one of the founders of modern astronautics.

The son of a prosperous physician, Oberth studied medicine in Munich, but his education was interrupted by service in the Austro-Hungarian army during World War I. After being wounded in the war, he found time to pursue his studies in astronautics. He performed experiments to simulate weightlessness and worked out a design for a long-range, liquid-propellant rocket that his commanding officer sent to the War Ministry. The design was rejected as a fantasy. After the war Oberth sought a Ph.D. degree at the University of Heidelberg with a dissertation based on his rocket design. It was rejected by the university in 1922, but Oberth partially underwrote publishing expenses, and it appeared as *Die Rakete zu den Planetenräumen* (1923; "The Rocket into Interplanetary Space"). The book, which explained mathematically how rockets could achieve a speed that would allow them to escape Earth's gravitational pull, gained Oberth widespread recognition.

Until 1922 he was unfamiliar with the work of Robert Goddard in the United States and, until 1925, with that of Konstantin Tsiolkovsky in the Soviet Union. After corresponding with both men, he acknowledged their precedence in deriving the equations asso-

Oberth

By courtesy of the National Air & Space Museum, Smithsonian Institution, Washington, D.C.

ciated with space flight. Oberth's *Wege zur Raumschiffahrt* (1929; *Ways to Spaceflight*) won the first annual Robert Esnault-Pelterie–André Hirsch Prize of 10,000 francs, enabling him to finance his research on liquid-propellant rocket motors. The book anticipated by 30 years the development of electric propulsion and of the ion rocket. In 1931 Oberth received a patent for a liquid-propellant rocket from the Romanian Patent Office, and the first rocket was launched on May 7, 1931, near Berlin.

In 1938 Oberth joined the faculty of the Technical University of Vienna. He became a German citizen in 1940 and in 1941 transferred to the German rocket development centre at Peenemünde, where he worked for Wernher von Braun, his former assistant.

In 1943 he was sent to another location to work on solid-propellant antiaircraft rockets. He spent a year in Switzerland after the war as a rocket consultant, and in 1950 he moved to Italy, where he worked on solid-propellant antiaircraft rockets for the Italian navy. In the United States from 1955, he did advanced space research for the army until he retired to West Germany in 1958.

Residing permanently in the town of Fencht, near Nürnberg, from 1962, Oberth spent his retirement engaged in theoretical studies. In 1959 he published *Stoff und Leben* ("Material and Life"). Oberth posited in this work that materialism, the philosophy on which communism is based, is incorrect and further that aspects of human life such as the soul could not be explained by material reason.

Oberto I (d. Oct. 15, 975), marquis of eastern Liguria and count of Luni, powerful feudal lord of 10th-century Italy under King Berengar II and the Holy Roman emperor Otto I. His descendants, the Obertinghi, founded several famous Italian feudal clans.

Oberto was of a family that apparently arrived in Italy in the 9th century with Charlemagne, perhaps from Bavaria. Oberto acquired Genoa and Luni (east of Genoa) in 951, when Berengar seized Liguria and gave the eastern section to Oberto. Nine years later Oberto, dissatisfied with Berengar's rule, went to Germany with the bishop of Como and the archbishop of Milan to ask Otto to intervene in Italy. After Otto's conquest and coronation as Holy Roman emperor (962), he made Oberto count palatine, second only to himself in Italy. Four great families, the Este, Malaspina, Pallavicini, and Massa Parodi, are believed to have descended from Oberto's sons.

obesity, also called CORPULENCE, or FATNESS, excessive accumulation of body fat, usually caused by the consumption of more calories than the body can use. The excess calories are then stored as fat, or adipose tissue. Overweight, if moderate, is not necessarily obesity, particularly in muscular or large-boned individuals. In general, however, a body weight 20 percent or more over the optimum tends to be associated with obesity. (*See* nutrition.)

The body's ability to adjust food intake to body needs can be disturbed by numerous factors. Of these, hormone imbalances and glandular defects are believed to be of least importance, being demonstrable in only about 5 percent of all obese individuals. Although obesity may be familial, suggestive of a genetic predisposition to fat accumulation, there is also evidence that early feeding patterns imposed by the obese mother upon her offspring may play a major role in a cultural, rather than genetic, transmission of obesity from one generation to the next. More generally, the distinctive way of life of a nation and the individual's behavioral and emotional reaction to it may contribute significantly to widespread obesity. Among the affluent populations, an abundant supply of readily available high-calorie foods and beverages, coupled with increasingly sedentary living habits that markedly reduce caloric needs, can easily lead to overeating. The stresses and tensions of modern living also cause some individuals to turn to foods and alcoholic drinks for "relief."

Obesity may be undesirable from an aesthetic sense, especially in parts of the world where slimness is the popular preference; it is also a serious medical problem. Generally, obese persons have a shorter life expectancy; they suffer earlier, more often, and more severely from a large number of diseases than do their normal-weight counterparts. They are also more likely to die prematurely of degenerative diseases of the heart, arteries, and kidneys. More die of accidents and diabetes, and more constitute poor surgical risks than persons with normal weight. Mental health is also affected; behavioral consequences of an obese appearance, ranging from shyness and withdrawal to overly bold self-assertion, may be rooted in neuroses and psychoses.

The treatment of obesity has two main objectives: removal of the causative factors, which may be difficult if the causes are of emotional or psychological origin; and removal of surplus fat by reducing food intake. Return to normal body weight by reducing calorie intake is best done under medical supervision. Dietary fads and reducing diets that produce quick results without effort are of doubtful effectiveness in reducing body weight and keeping it down, and most are actually deleterious to health. (*See* dieting.)

Obesity is to be distinguished from overweight caused by edema (excess retention of fluids) stemming from various diseases.

obi, wide sash or belt made of satin or a stiff silk material, worn since ancient times in Japan to secure the kimono. A woman's obi is about 12 feet (370 cm) long and 10 inches (25 cm) wide; a man's obi is about three-fourths as long and one-sixth as wide. The obi is wound around the waist over the kimono and tied at the back.

Women wearing obis, woodblock from the series, "The Ten Views of Tea Houses," by Tórii Kiyonaga, 1789; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, Bigelow, Ross Collections and Francis Gardner Curtis Fund

The contemporary, wide obi evolved in the early 18th century. It is frequently brocaded or embroidered.

Obi Islands, also called OMBI ISLANDS, group of the northern Moluccas, Maluku *provinsi* ("province"), Indonesia. They lie south of the island of Halmahera, north of the island of Ceram, and east of the Sula Islands. The principal island of the group is Obi Island, 52 miles (84 km) long and 28 miles (47 km) wide, which contains the only major village, Laiwuí, located on the northeastern coast opposite Bisa Island. Obi Island is mountainous, with a peak of 5,285 feet (1,611 m) and a coastal plain around most of the island. Other major islands in the group are Bisa, Obilatu, and Tobalai. Claimed by the Dutch in 1682, the islands produce some sago, a starchy substance obtained from the pith of sago palms, and forest products. Pop. (latest est.) 12,437.

obia, also spelled OBEAH, in west African folklore, a gigantic animal that steals into villages and kidnaps girls on the behalf of witches. In certain cultures of the Caribbean, the term denotes forms of sorcery and witchcraft, usually overpowering and extremely evil. Potent or bewitched objects buried for the purpose of bringing misfortune upon a particular party are sometimes known as obia, and use of the word itself has in some areas been prohibited by law. A specialist using the power of obia is called an obiama or obiaman.

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Óbidos, town, west-central Pará *estado* ("state"), northern Brazil. It was founded in 1697 as a fortified town. Óbidos overlooks the left (north) bank of the Amazon River 70 miles (110 km) upstream from Santarém near the confluence of the Trombetas River, where the Amazon narrows to a width of 1.25 miles (2 km). River steamers and hydroplanes utilize the facilities at the town, which ships tobacco, cacao, coffee, sugar, lumber, and cattle. Óbidos also has plants that process preserved fruits (oranges, mangoes, papayas) and jute products. Its airfield serves the Belém-Manaus air route. Pop. (2000 prelim.) 22,977.

Obihiro, city, southern Hokkaido, Japan, on the Tokachi River. Founded in 1883, it became the administrative capital of Tokachi subprefecture in 1897. The arrival of two railway lines in the early 1900s made Obihiro a trade centre of agricultural products grown in the surrounding Tokachi Plain. Obihiro's industries are based on food processing; the city contains one of the largest beet-sugar factories in Japan, and the Obihiro College of Stock Raising is located there. Pop. (1995 prelim.) 171,714.

object constancy (psychology): *see* perceptual constancy.

object language, in semantics and logic, the ordinary language used to talk about things or objects in the world—as contrasted with metalanguage, an artificial language used by linguists and others to analyze or describe the sentences or elements of object language itself. The concept was developed by such 20th-century logical positivists as Polish-American Alfred Tarski and German-American Rudolf Carnap.

object reading (parapsychology): *see* psychometry.

oblate (from Latin *oblatus,* "one offered up"), in Roman Catholicism, a lay person connected with a religious order or institution and living according to its regulations; a minor dedicated by his parents to become a monk according to the Benedictine Rule; or a member of either the Oblates of Mary Immaculate (O.M.I.) or the Oblates of St. Francis de Sales (O.S.F.S.).

Obodrite, member of a people of the Polab group, the northwesternmost of the Slavs in medieval Europe. The Obodrites (sometimes called the Bodryci, from *bodry,* "brave") inhabited the lowland country between the lower Elbe River and the Baltic Sea, the area north and northeast of Hamburg in what is now Schleswig-Holstein *Land* (state), Germany. The Obodrites' independent principality, which had developed by the early 9th century, was conquered in the middle of the 12th century by Henry the Lion, duke of Saxony, after a long resistance directed by its last pagan prince, Niklot (d. 1160). Niklot's son Przybysław (Přibislav; d. 1178) accepted Christianity, acknowledged German suzerainty, and was recognized in 1170 as a prince of the Holy Roman Empire. Both his descendants, who became the dukes of Mecklenburg, and the Obodrite people eventually became Germanized.

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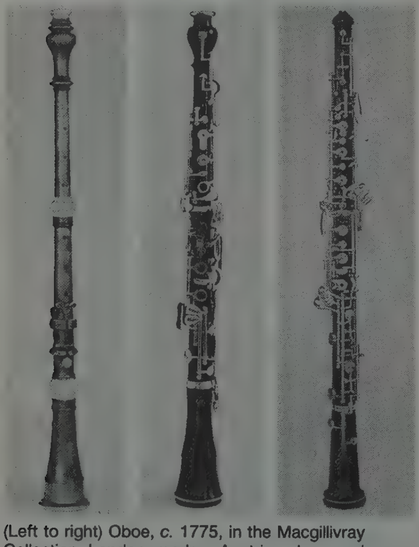
oboe, French HAUTBOIS, German OBOE, treble woodwind instrument with a conical bore and double reed. Though used chiefly as an orchestral instrument, it also has a considerable solo repertoire.

Hautbois (French: "high [*i.e.,* loud] wood"), or oboe, was originally one of the names of the shawm, the violently powerful instrument of outdoor ceremonial. The oboe proper (*i.e.,* the orchestral instrument), however, was the mid-17th-century invention of two French court musicians, Jean Hotteterre and Michel Philidor. It was intended to be played indoors with stringed instruments and was softer and less brilliant in tone quality than is the modern oboe. By the end of the 17th century it was the principal wind instrument of the orchestra and military band and, after the violin, the leading solo instrument of the time.


(Left to right) Oboe, *c.* 1775, in the Macgillivray Collection, London; modern Austrian oboe; and modern Gillet system oboe (all shown without reeds)
(Left and centre) L.G. Aubin, (right) T.W. Howarth & Co. Ltd.

The early oboe had only two keys. Its compass, at first two octaves upward from middle C, was soon extended as high as the next F. In the early 19th century several improvements occurred in the manufacture of wind-instrument keywork, particularly the introduction of metal pillars in place of the wooden ridges on which the keys had been mounted. This change greatly reduced the threat to the oboe's airtightness formerly associated with additional keys. In France by 1839 the number of keys had gradually increased to 10.

French players before 1800 had also adopted the narrow modern type of reed. By the 1860s Guillaume Triébert and his son Frédéric had developed an instrument that was almost identical with the expressive, flexible, and specifically French oboe of the 20th century. The instrument in which the finger holes are covered by perforated plates, now the style of oboe that is widely used in the United States and France, was first produced by François Lorée and Georges Gillet in 1906.

Outside France, the decline of patronage and the public enthusiasm for military bands resulted in radically different traditions of playing and manufacture. In Germany and Austria the many-keyed oboe had appeared earlier than in France, and the bore and reed had developed so as to produce an increased loudness that was clearly of military inspiration. This resulted, after Ludwig van Beethoven, in a long period of neglect for the oboe until it was revived in the late 19th century, largely through the efforts of the composer Richard Strauss. Germany and Austria generally adopted the French oboe by about 1925.

The history of the oboe in Italy is comparable. The German instrument (with a tiny reed) survives in Russia; though capable of a certain refinement of tone, it lacks the piquancy and sparkle of the French oboe. In Vienna an oboe resembling the German instrument but more antique in character is played by the Philharmonic Orchestra and the Akademie. Its rather reticent and blending quality is perhaps caused more by the highly specialized reed than by the instrument's inherent qualities.

The chief factor in playing the oboe is the making of the reed and its control by the lips and the mouth. Most serious players make their own reeds, although ready-made reeds can be purchased. The raw material for the device is the plant *Arundo donax,* which resembles bamboo in appearance. It grows in warm temperate or subtropical regions, but only the crops of the southern French *départements* of Var and Vaucluse are satisfactory for reed making.

There are several large varieties of oboe. The English horn (*q.v.*), or cor anglais, is pitched in F, a fifth below the oboe, and is believed to closely resemble J.S. Bach's oboe da caccia. The oboe d'amore, in A, pitched a minor third below the oboe, is made with a globular bell like that of the cor anglais. It was much employed by Bach and is also used in several 20th-century works. Instruments pitched an octave below the oboe are rarer. The *hautbois baryton,* or baritone oboe, resembles a larger, lower voiced cor anglais in tone quality and proportions. The heckelphone (*q.v.*), with a larger reed and bore than the *hautbois baryton,* has a distinctive tone that is rather heavy in the low register. Instruments in other sizes and pitches occur occasionally. Any folk or non-European double-reed woodwind may also be generically called an oboe.

Obote, Milton, in full APOLLO MILTON OBOTE (b. Dec. 28, 1924, Akoroko village, Lango, Uganda), politician who was prime minister (1962–70) and twice president (1966–71, 1980–85) of Uganda. He led his country to independence in 1962, but his two terms in office (both of which were ended by military coups) were consumed by struggles between Uganda's northern and southern ethnic groups.

The third of nine children in a farming family in north-central Uganda, Obote first attended Busoga College in Mwiri and then Makerere College in Kampala from 1948 to 1949, but he was expelled from the latter for his political activities before he could graduate. The British colonial government also prevented him from accepting scholarships offered to him by the United States and West Germany, and in 1950 Obote went to Kenya. There, while working as a labourer, clerk, and salesman, he became involved in the independence movement and joined the Kenya African Union.

Obote returned to Uganda in 1957 and became a member of the Uganda National Congress Party. In 1958 he was elected to represent his home district in the Legislative Council, where, despite the small number of African delegates, he did not hesitate to criticize the British government. When the National Congress Party split, he formed the Uganda People's Congress (UPC), which drew its support mainly from the northern Acholi and Lango people. The UPC's main political focus was opposition to the powerful southern kingdom of Buganda under King Mutesa II. Having become prime minister in 1962, Obote accepted a constitution that granted federal status within Uganda to five traditional kingdoms, including Buganda. He was thus able to form a governing coalition between his UPC and Buganda's Kabaka Yekka ("King Alone") Party. In 1963 Mutesa was elected to the (largely ceremonial) post of president with Obote's encouragement.

Obote
Marion Kaplan

In 1966, however, the conflict between Obote and Buganda reached a head. Obote sent troops led by Idi Amin, an officer from a northern district, to attack Mutesa's palace, and Mutesa fled to Great Britain. In an effort to solidify his rule, Obote introduced a new constitution that abolished all the kingdoms and other remnants of federalism in the country. The new constitution also established an executive presidency, which Obote assumed while continuing to serve as prime minister. But Obote's increasing reliance on the military and police to terrorize his political opponents aroused the resentment of southern Ugandans, and it allowed Amin to build a following based on recruits from among his own Kakwa people. Early in 1971 Obote was overthrown in a coup led by Amin.

Obote settled in neighbouring Tanzania, where he maintained a small emigré army under the generalship of Tito Okello, an Acholi. This army aided Tanzanian forces in deposing Amin in 1979, and Okello was able to secure Obote's election to the presidency after Obote's return from exile in May 1980. As president, Obote solicited foreign aid in an attempt to raise Uganda's economy from the ruin of the Amin years, but he did nothing to prevent Acholi and Lango soldiers from conducting a campaign of murder and pillage in the south and in Amin's home district. In

1985 Obote was forced out of office by Okello. He eventually settled in Zambia.

Obraztsov, Sergey Vladimirovich (b. June 22 [July 5, New Style], 1901, Moscow, Russia—d. May 8, 1992, Moscow), puppet master who established puppetry as an art form in the Soviet Union and who is considered to be one of the greatest puppeteers of the 20th century.

Obraztsov
By courtesy of the Puppentheatermuseum, Munich

The son of a schoolteacher and a railroad engineer, Obraztsov studied painting at the Higher Art and Technical Studios. He became an actor at the Moscow Nemirovich-Danchenko Music Theatre (1922–30) and then at the Moscow Art Theatre (1930–31). During this time he also gave independent vaudeville-style puppet shows and in 1931 was chosen by the Soviet government as the first director of the State Central Puppet Theatre, Moscow.

Obraztsov's performances displayed marked technical excellence and stylistic discipline. In dozens of tours outside the Soviet Union, notably the 1953 tour of Great Britain and the 1963 tour of the United States, his shows enchanted audiences with classic figures such as the dancing couple whose tango movements require the skill of seven puppeteers, and the female gypsy who sings bass. A number of rod-puppet theatres were founded as a result of Obraztsov's tours. His *Meobyknovenny kontsert* (1946; "An Unusual Concert"), a satire of inept performers, and *Volshebnaya lampa Aladina* (1940; "Aladdin's Magic Lamp") became popular throughout the world. His *Don Zhuan* ("Don Juan") was produced in 1976. He also gained renown for his work with a kind of finger puppet called a ball puppet and for demonstrating puppeteering with his bare hands.

Obraztsov's *Moya professiya* (1950; "My Profession") is a description of his craft that was translated into several languages. His *Teatr kitayskogo naroda* (1957) appeared in a translation by J.T. McDermott as the *Chinese Puppet Theatre* (1961).

Obrecht, Jakob, Obrecht also spelled HOBRECHT (b. Nov. 22, 1452, Bergen-op-Zoom, Brabant [now in The Netherlands]—d. 1505, Ferrara [Italy]), composer who, with Jean d'Ockeghem and Josquin des Prez, was one of the leading composers in the preeminently vocal and contrapuntal Franco-Flemish, or Franco-Netherlandish, style that dominated Renaissance music.

He was the son of Willem Obrecht, a trumpeter. His first known appointment was in 1484 as instructor of choirboys at Cambrai cathedral, where he was criticized for negligence in caring for the boys. In 1485 he became assistant choirmaster of the cathedral at Brugge. According to Henricus Glareanus, Desiderius Erasmus was among the choirboys at one of Obrecht's positions. In 1487 Obrecht visited Italy, where he met Ercole I, Duke of Ferrara, an admirer of his music. The duke installed Obrecht in Ferrara and sought a papal appointment for him there. The appointment was not forthcoming, and Obrecht returned to Bergen-op-Zoom in 1488. In 1504 he again traveled to Ferrara, where he died of plague.

Obrecht's compositional style is notable for its warm, graceful melodies and its clear harmonies that approach a modern feeling for tonality. His surviving works include 27 masses, 19 motets, and 31 secular pieces.

His masses are largely for four voices. Most employ a cantus firmus taken from plainchant or from a secular song. His use of the cantus firmus varies from the customary statement of it in the tenor to fragments of it in each movement and in voices other than the tenor. Some of his late masses employ parody technique—using all voices of a preexistent chanson or motet, rather than a single borrowed melody, as a unifying device.

His motets are largely to texts in honour of the Virgin Mary (*e.g., Salve Regina; Alma Redemptoris Mater*). They characteristically have the cantus firmus melody placed in the tenor in long notes. Some of the motets are polytextual, a rather outdated practice. More progressive is his use of melodic imitation and his frequent consecutive tenths.

Obregón, Álvaro (b. Feb. 19, 1880, Alamos, Mex.—d. July 17, 1928, Mexico City), soldier, statesman, and reformer who as president restored order to Mexico after a decade of political upheavals and civil war that followed the revolution of 1910.

Though Obregón had little formal education, he learned a great deal about the needs and desires of poor Mexicans from his work as a farmer and labourer. He did not take part in the revolution (1910–11) that overthrew the dictator Porfirio Díaz, but in 1912 he led a group of volunteers in support of President Francisco Madero against the rebellion led by Pascual Orozco. When Madero was overthrown and assassinated by Victoriano Huerta in February 1913, Obregón joined Venustiano Carranza against Huerta. Obregón's military skill was in constant display as he defeated Huerta's forces; he occupied Mexico City on Aug. 15, 1914.

Obregón continued to support Carranza against the challenges of the rebel leaders Pancho Villa and Emiliano Zapata. He lost his right arm in battle in 1915. During the campaign against Villa, Obregón issued decrees instituting anticlerical policies and labour regulations in the areas he conquered. In addition, he dominated the constitutional convention of 1917, and he was largely responsible for the radical emphasis of the resulting document. After serving for a short time in Carranza's cabinet (1917), he retired to his farm in Sonora and for two years was politically inactive. In April 1920, however, in response to Carranza's increasingly reactionary policies and his attempt to impose a puppet successor, Obregón took a leading role in the uprising that quickly overthrew the president. On Dec. 1, 1920, Obregón was elected as Mexico's new president.

Obregón managed to impose relative peace and prosperity on his nation, which had gone through 10 years of savage civil war. He gave official sanction to organizations of labourers and peasants. Moreover, his appointment of José Vasconcelos as minister of education heralded an era of significant reform in Mexican schooling. Because he appeared too radical, however, the United States refused to recognize his government until the Bucareli Conference (1923), in which Obregón promised not to expropriate the Mexican holdings of American oil companies.

Obregón, c. 1910
Archivo Casasola

After suppressing a barracks revolt, Obregón retired on Dec. 1, 1924, and was succeeded by Plutarco Elías Calles. During retirement he increased his vast landholdings in northern Mexico and established a monopoly in the production of garbanzos (chick-peas). Again a candidate for the presidency in 1928, Obregón was elected despite another armed revolt, which was quickly suppressed. Shortly after his reelection he returned from Sonora to Mexico City, where he attended a small victory celebration. While dining with his friends, he was shot and killed by José de León Toral, a Roman Catholic who held Obregón responsible for religious persecutions.

Obrenović DYNASTY, also spelled OBRENOVICH, family that provided Serbia with five rulers between 1815 and 1903. Their succession was broken by a rival dynasty, the Karageorgević. Miloš, who founded the dynasty, was prince of Serbia from 1815 to 1839 and again from 1858 to 1860; his elder son, Milan III, reigned for only 26 days before his death in 1839; Miloš' second son, Michael III, was prince from 1839 to 1842 and again from 1860 to 1868. His successor was a first cousin once removed, Milan IV, who became prince in 1868 and served as king of Serbia from 1882 until his abdication in 1889. His son Alexander followed him to the throne and reigned as king from 1889 until his assassination in 1903, when the dynasty became extinct.

O'Brien, Edna (b. Dec. 15, 1932?, Twamgraney, County Clare, Ire.), Irish novelist, short-story writer, and screenwriter whose work has been noted for its portrayal of women, evocative description, and sexual candour. Like the works of her predecessors James Joyce and Frank O'Connor, her books have been banned in Ireland.

O'Brien began to produce sketches and tales during childhood. She received a strict Irish Catholic convent education and went on to study pharmacy in Dublin, where she received a license in 1950. In 1952 she married the novelist Ernest Gebler, with whom she had two sons. In 1959 the couple moved to London, where O'Brien turned to writing as a full-time occupation. She was divorced from Gebler in the mid-1960s.

O'Brien's popular first novel, *The Country Girls* (1960), was the first volume of the *Country Girls Trilogy.* It had as its main characters two Irish girls who leave their strict homes and convent school for the excitement and romantic opportunities of Dublin. The girls' subsequent lives are traced in *The Lonely Girl* (1962) and *Girls in Their Married Bliss* (1964), by which time both have settled in London and have become disillusioned with marriage and men in general. O'Brien's subsequent novels include *August Is a Wicked Month* (1965), *Casualties of Peace* (1966), *A Pagan Place* (1971), *Night* (1972), *Johnny I Hardly Knew You* (1977; also published as *I Hardly Knew You*), *The High Road* (1988), and *Time and Tide* (1992).

O'Brien's novels express her despair over the condition of women in contemporary society and, in particular, attack women's repressive upbringing. Her heroines search unsuccessfully for fulfillment in relationships with men, typically engaging in doomed love trysts as a remedy for their loneliness and emotional isolation. The bleak tone of O'Brien's novels is, however, broken by flights of lyrical description and by the heroines' attainment of brief periods of happiness.

Collections of O'Brien's short stories appeared as *The Love Object* (1968), *A Scandalous Woman and Other Stories* (1974), *A Fanatic Heart* (1984), and *Lantern Slides* (1990). She also wrote plays, screenplays for film and television, and nonfiction about Ireland.

O'Brien, Fitz-James (b. *c.* 1828, County Limerick, Ire.—d. April 6, 1862, Cumberland, Md., U.S.), Irish-born American journalist, playwright, and author whose psychologically penetrating tales of pseudoscience and the uncanny made him one of the forerunners of modern science fiction.

O'Brien was the son of a lawyer. He ran through his inheritance in two years in London, where he began to work in journalism. In 1852 he moved to New York City to earn his living by writing and soon became an important figure in that city's bohemia. But his work, though published in the leading periodicals of the day, won him neither the reputation he thought he merited nor the financial security he desired. At the outbreak of the American Civil War, he volunteered with the Union forces and died from wounds received during the first year of the fighting.

His best-known stories include "The Diamond Lens," about a man who falls in love with a being he sees through a microscope in a drop of water; "What Was It?" in which a man is attacked by a thing he apprehends with every sense but sight; and "The Wondersmith," in which robots are fashioned only to turn upon their creators. These three stories appeared in periodicals in 1858 and 1859.

O'Brien, Flann, pseudonym of BRIAN Ó NUALLAIN, also known as MYLES NA GCOPALEEN (b. Oct. 5, 1911, Strabane, County Tyrone, Ire.—d. April 1, 1966, Dublin), Irish novelist, dramatist, and, as Myles na gCopaleen, a columnist for the *Irish Times* newspaper for 26 years.

O'Brien was educated in Dublin and later became a civil servant while also pursuing his writing career. He is most celebrated for his unusual novel *At Swim-Two-Birds,* which, though it was first published in 1939, achieved fame only after its republication in 1960. *At Swim-Two-Birds* is a rich literary experiment that combines Irish folklore, heroic legend, humour, and poetry in a style replete with linguistic games. O'Brien's novels *The Hard Life* (1961) and *The Dalkey Archive* (1964; adapted as a play, *When the Saints Go Cycling In,* performed 1965), though written on a smaller scale than his masterpiece, are thought equally amusing. Another novel, *The Third Policeman* (1967), is more sombre in tone.

O'Brien, James Bronterre (b. 1805, Granard, County Longford, Ire.—d. Dec. 23, 1864, London, Eng.), Irish-born British radical, a leader of the Chartist working-class movement, sometimes known as the "Chartist schoolmaster."

O'Brien was educated at Trinity College, Dublin, and moved to London in 1829, intending to practice at the English bar. In London he was quickly drawn into radical activities and later into working-class journalism, being editor of the radical *Poor Man's Guardian* (1831–35) and working on the *Northern Star* (1838–40). He was one of the most important and influential Chartists at that movement's convention in 1839. In 1850 he was joint founder of the National Reform League, which advocated socialist objectives. In his later years he wrote political poetry.

O'Brien, Parry, in full WILLIAM PARRY O'BRIEN (b. Jan. 28, 1932, Santa Monica, Calif., U.S.), American shot-putter who developed a style that revolutionized the event. He held the world record from 1953 to 1959, increasing the distance from 18 m (59 feet $^3/_4$ inches) to 19.30 m (63 feet 4 inches) in that period.

O'Brien began putting the shot in high school at Santa Monica, where he also threw the discus, was a sprinter, and played football. In his freshman year at the University of Southern California (Los Angeles), he surpassed all other shot-putters in the school and late in that year toured Europe with a selected American team, competing in the discus and on the relay team as well as putting the shot.

O'Brien developed the new style by himself, and it was ultimately adopted by all shot-putters. It called for the putter to start with his back to the shot's eventual line of flight, thus turning 180° before the release.

In the Olympic Games at Helsinki in 1952, he won the gold medal, setting an Olympic record of 17.41 m. He won 116 straight meet events in the 1950s, including the Pan-American titles in 1955 and 1959. In 1956 he became the first shot-putter to break 19 m. He broke the world record 16 times between 1953 and 1959. He won another gold medal in the Olympic Games in 1956 at Melbourne, won a silver medal in the games at Rome in 1960, and placed fourth in the games at Tokyo in 1964. In 1966, in his 19th season, he improved his distance to 19.69 m. After graduating from the university, he went into mortgage banking in Los Angeles and did occasional television sports commentary. In 1971 at the Senior Sports International competition, O'Brien won both the shot and discus events.

O'Brien, William (b. Oct. 2, 1852, Mallow, County Cork, Ire.—d. Feb. 25, 1928, London, Eng.), Irish journalist and politician who was for several years second only to Charles Stewart Parnell (1846–91) among Irish Nationalist leaders. He was perhaps most important for his "plan of campaign" (1886), by which Irish tenant farmers would withhold all rent payments from landlords who refused to lower their rents and would pay the money instead into a mutual defense fund on which evicted tenants could draw.

A journalist from 1869, O'Brien was appointed editor of the Irish Land League's weekly *United Ireland* by Parnell in 1881. In October of that year the British authorities suppressed the paper and put O'Brien in Kilmainham jail, Dublin, along with Parnell and others. There he drew up a "No Rent Manifesto," which, when read at a Land League meeting, resulted in the outlawing of the League. Released in 1882, he resumed the editorship of *United Ireland,* and in 1883 he was elected to the British House of Commons (remaining there until 1895). His "plan of campaign" was disavowed by Parnell but nonetheless stirred up fierce agitation. To suppress the movement, the British government passed the Coercion Act of 1887, under which O'Brien was jailed again.

For some time following the O'Shea divorce case (1889–90), in which Parnell was corespondent, O'Brien attempted to mediate between the Parnellites and their opponents, although he sided with the majority in rejecting Parnell's continued leadership of the Irish Home Rule struggle. In 1902 he supported the Land Conference, which secured agreement between landlords and tenants' representatives and resulted in the Wyndham Land Purchase Act of 1903, which was designed to turn Irish tenant farmers into occupying owners.

In 1898 O'Brien had founded the United Irish League, and in 1910, after control of that group had passed to the Parnellite John Redmond, he established the All-for-Ireland League in opposition to the older organization. Most of his personal following, however, had joined Arthur Griffith's Sinn Féin Party by the end of World War I.

O'Brien, William Smith (b. Oct. 17, 1803, Dromoland, County Clare, Ire.—d. June 18, 1864, Bangor, Caernarvonshire, Wales), Irish patriot who was a leader of the literary-political Young Ireland movement along with Thomas Osborne Davis, Charles Gavan Duffy, and John Dillon.

William Smith O'Brien, lithograph by H. O'Neill after a daguerreotype by Glukman, 1848

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

O'Brien sat in the British House of Commons from 1828 to 1848. Although he was a Protestant, he actively favoured Roman Catholic emancipation, but he also wished to maintain the Anglo-Irish legislative union (in force from Aug. 1, 1800). In 1828, therefore, he opposed the parliamentary candidacy in County Clare of Daniel O'Connell, who was the leading advocate of Catholic political rights and Irish self-government. He continued to support the union until 1843, when he was angered by the British imprisonment of O'Connell. In October of that year O'Brien joined the anti-union Repeal Association, serving as deputy leader while O'Connell was in jail.

On July 27, 1846, after O'Connell had advised against the use of force, O'Brien led the Young Irelanders in withdrawing from the association. In January 1847 they formed the Irish Confederation to press for more effective famine relief. In May 1848, after traveling to Paris to congratulate the leaders of the new French republic, O'Brien was tried for sedition, but the proceedings ended in a hung jury. He then joined his political colleague Thomas Francis Meagher in advocating a violent revolution. On July 29, 1848, he led a futile rising of peasants against police at Ballingarry, County Tipperary. Arrested and convicted of high treason, he received a death sentence, which was commuted to life exile to Tasmania. Following his release in February 1854, he lived in Brussels until he was granted a full pardon in May 1856.

Obscene Publications Act, in British law, either of two codifications of prohibitions against obscene literature adopted in 1857 and in much revised form in 1959. The earlier act, also called Lord Campbell's Act (one of several laws named after chief justice and chancellor John Campbell, 1st Baron Campbell), not only outlawed obscene publications but empowered police to search premises on which obscene publications were kept for sale or distribution. It also empowered post office and customs authorities to seize mailings or shipments containing such matter and to prosecute their senders and provided for the destruction of obscene publications.

The 1857 law was under more or less constant attack, for it was widely felt that it often compelled authors to falsify social realities. The law was also criticized for reducing literary standards to the level of what was morally proper for the young. The application of the law in specific cases was also attacked, for judges frequently permitted prosecutions on the basis of isolated passages. Judges also refused to permit evidence of the author's intent or purpose or of his literary reputation, or to hear the testimony of recognized literary critics. The law was also criticized because the prosecutions were often directed against booksellers, who were indifferent to the fate of the book in question.

In one significant case (*Regina* v. *Hicklin,* 1868) the test of literary morality was put as what a father could read aloud in his own home. While there were many successful prosecutions for outright pornography, the law was also invoked against works of literary merit and works with a social or moral purpose.

In 1954 an effort was begun in Parliament to amend Lord Campbell's Act, resulting in 1959 in a new Obscene Publications Act, whose most important provisions are (1) that a person shall not be convicted if publication was "in the interests of science, literature, art or learning," (2) that the opinion of experts as to the literary, artistic, scientific, or other merits of the publication may be admitted as evidence, (3) that the work is to be read as a whole, and (4) that authors and book publishers may speak in defense of the work though they have not been summoned in the case. It was amended in 1964 to affect the wholesaler or anyone merely "having an obscene article for publication for gain," unless he can prove "that he had not examined the article and had no reasonable cause to suspect that it was such that his having it could make him liable to be convicted of an offence."

The Obscene Publications Act was further broadened in 1977 to include the distribution of pornographic films.

obscenity, in general, that which offends the public sense of decency. Its social importance lies in the history of censorship and legislation for the suppression of obscene acts, especially the publication of sexually explicit or indecent matter. That obscenity, like beauty, is in the eye of the beholder is evidenced by the elusiveness of a satisfactory definition.

In most modern nations the criminality of producing or disseminating obscene materials of a sexual nature is a relatively late phenomenon. In England, for example, except for the Puritan suppression of theatres in the first half of the 17th century, restrictions were applied almost exclusively to antireligious or seditious acts or publications. In 1727, however, there was a successful prosecution in a temporal court for the publication of indecent matter, and thereafter it became recognized as an indictable misdemeanour by common law.

The prohibition of purely sexual material became statutory in Great Britain for the first time with the Obscene Publications Act (*q.v.*) of 1857. This act, however, did not contain a definition of obscenity. Such a definition was forthcoming in 1868, in *Regina* v. *Hicklin,* in which the test of what was obscene was its tendency "to deprave and corrupt those whose minds are open to such immoral influences," and it was understood that this test need apply only to isolated passages of a work. This view was a precedent for antiobscenity legislation in the United States, beginning with the Comstock Law of 1873, which broadened the 1865 Mail Act essentially to its present form by providing fine and imprisonment of any person mailing or receiving "obscene," "lewd," or "lascivious" publications.

The variability of definitions is well illustrated by cases in the United States. Until the middle of the 20th century, the British *Regina* v. *Hicklin* definition of obscenity was used. In 1934 in *U.S.* v. *One Book Entitled "Ulysses,"* a New York circuit court of appeals held that the criterion for obscenity was not the content of isolated obscene passages but rather "whether a publication taken as a whole has a libidinous effect." In 1957, in *Roth* v. *U.S.,* the U.S. Supreme Court tendered a basic redefinition of obscenity: "whether, to the average person, applying contemporary community standards, the dominant theme of the material taken as a whole appeals to prurient interest." In 1966, however, the Supreme Court, in a ruling on the book *Fanny Hill,* declared a work pornographic only if it was "utterly without redeeming social value." In *Miller* v. *California* (1973) the court abandoned the 1966 ruling and declared that it would be no defense for a work to have "some redeeming social value" and that the states might therefore prohibit the printing or sale of works "which portray sexual conduct in a patently offensive way, and which, taken as a whole, do not have serious literary, artistic, political or scientific value."

Many nations have adopted legislation banning obscene materials. Thus, the basic legal control has been through the criminal law, but many countries also provide for administrative regulation by the customs, postal service, and national or local boards for the licensing of motion-picture or stage performances. Also, more than 50 nations are parties to an international agreement for the control of obscene publications. Interestingly, this convention operates without any definition of obscenity because it was agreed that this would vary from country to country.

observatory, astronomical: *see* astronomical observatory.

Observer, The, Sunday newspaper established in 1791, the first Sunday paper published in Britain. It is one of England's quality newspapers, long noted for its emphasis on foreign coverage. The paper devotes extensive space to the arts, government, education, and politics, and it has a worldwide reputation for responsible journalism. *The Observer* is considered by other editors to be among the world's best papers. For many years it has maintained a substantial staff of foreign correspondents that supplies news and background pieces for the paper's generally well-educated readers, including a large international audience. *The Observer* briefly passed out of British ownership in 1976, when it was sold to an American conglomerate, the Atlantic Richfield Company. In 1981 it was returned to British hands when an industrialist, Roland Rowland, bought control.

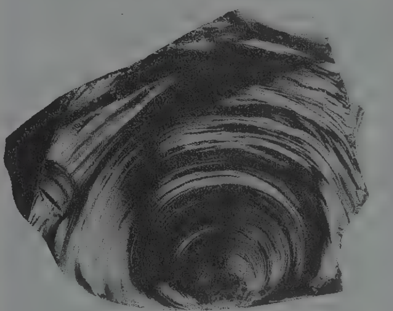
obsessive-compulsive disorder (OCD), also called OBSESSIVE-COMPULSIVE NEUROSIS, a type of mental disorder in which an individual experiences obsessions or compulsions or both. Either the obsessive thought or the compulsive act may occur singly, or both may appear in sequence.

Obsessions are recurring or persistent thoughts, images, or impulses that, rather than being voluntarily produced, seem to invade a person's consciousness despite his attempts to ignore, suppress, or control them. Obsessional thoughts are frequently morbid, shameful, repugnant, or merely tedious; they are usually experienced as being meaningless and are accompanied by anxiety to a varying degree. Common obsessions include thoughts about committing violent acts, worries about contamination (as by shaking hands with someone), and doubt (as in wondering whether one had turned off the stove before leaving the house).

Obsessions are accompanied by compulsions in approximately 80 percent of cases. Compulsions are urges or impulses to commit repetitive acts that are apparently meaningless, stereotyped, or ritualistic. The compulsive person may be driven to perform the act not as an end in itself but as a means to produce or prevent some other situation, although he is usually aware that the two bear no logical causal relation to each other. Most compulsive acts are rather simple—such as persistent hand washing, counting, checking (*e.g.,* the turned-off stove), touching, or the repetition of stereotyped words or phrases. Occasionally, however, elaborately formalized and time-consuming ceremonials are necessary. The compulsive person usually knows the act to be performed is meaningless, but his failure or refusal to execute it brings on a mounting anxiety that is relieved once the act is performed. Should the sufferer be forcibly or externally prevented from performing the compulsive act, he may experience an overwhelming anxiety.

Obsessive-compulsive disorders affect from two to three percent of the general population, occur equally in males and females, and can first appear at any age. The antidepressant drugs clomipramine (Anafranil) and fluoxetine (Prozac) have been found to markedly reduce the symptoms in about 60 percent of cases and have thus become the treatment of choice. Both drugs affect the brain's metabolism of the neurotransmitter serotonin, and this had led researchers to suspect that obsessive-compulsive disorders arise primarily from defects in the brain's neurochemical functioning rather than from purely psychological causes. However, the highest rates of the condition occur in high-stress groups, such as those who are young, divorced, or unemployed.

obsidian, natural glass of volcanic origin that is formed by the rapid cooling of viscous lava. Obsidian is extremely rich in silica (about 35 to 80 percent), is low in water, and has a chemical composition similar to rhyolite. Obsidian has a glassy lustre and is slightly harder than window glass. Though obsidian is typically jet-black in colour, the presence of hematite (iron oxide) produces red and brown varieties, and the inclusion of tiny gas bubbles may create a golden sheen. Other types with dark bands or mottling in gray, green, or yellow are also known.



Conchoidal fracture in obsidian; from Yellowstone National Park

Brian J. Skinner

Obsidian generally contains less than 1 percent water by weight. Under high pressure at depth, rhyolitic lavas may contain up to 10 percent water, which helps to keep them fluid even at a low temperature. Eruption to the surface, where pressure is low, permits rapid escape of this volatile water and increases the viscosity of the melt. Increased viscosity impedes crystallization, and the lava solidifies as a glass.

Different obsidians are composed of a variety of crystalline materials. Their abundant, closely spaced crystallites (microscopic embryonic crystal growths) are so numerous that the glass is opaque except on thin edges. Many samples of obsidian contain spherical clusters of radially arranged, needlelike crystals called spherulites. Microlites (tiny polarizing crystals) of feldspar and phenocrysts (large, well-formed crystals) of quartz may also be present.

Most obsidian is associated with volcanic rocks and forms the upper portion of rhyolitic lava flows. It occurs less abundantly as thin edges of dikes and sills. The obsidians of Mount Hekla in Iceland, the Eolie Islands off the coast of Italy, and Obsidian Cliff in Yellowstone National Park, Wyoming, U.S., are all well-known occurrences.

Obsidian was used by American Indians and many other primitive peoples for weapons, implements, tools, and ornaments and by the ancient Aztecs and Greeks for mirrors. Because of its conchoidal fracture (smooth curved surfaces and sharp edges), the sharpest stone artifacts were fashioned from obsidian; some of these, mostly arrowheads, have been dated by means of the hydration rinds that form on their exposed surfaces through time. Obsidian in attractive and variegated colours is sometimes used as a semiprecious stone.

See also volcanic glass.

obstetrics and gynecology, medical/surgical specialty concerned with the care of women from pregnancy until after delivery and with the diagnosis and treatment of disorders of the female reproductive tract.

The medical care of pregnant women (obstetrics) and of female genital diseases (gynecology) developed along different historical paths. Obstetrics had for a long time been the province of female midwives (*see* midwifery), but in the 17th century, European physicians began to attend on normal deliveries of royal and aristocratic families; from this beginning, the practice grew and spread to the middle classes. The invention of the forceps used in delivery, the introduction of anesthesia, and Ignaz Semmelweis' discovery of the cause of puerperal ("childbed") fever and his introduction of antiseptic methods in the delivery room were all major advances in obstetrical practice. Asepsis in turn made cesarean section, in which the infant is delivered through an incision in the mother's uterus and abdominal wall, a feasible surgical alternative to natural childbirth. By the early 19th century, obstetrics had become established as a recognized medical discipline in Europe and the United States.

In the 20th century, obstetrics developed chiefly in the areas of fertility control and the promotion of healthy births. The prenatal care and instruction of pregnant mothers to reduce birth defects and problem deliveries was introduced about 1900 and was thereafter rapidly adopted throughout the world. Beginning with the development of hormonal contraceptive pills in the 1950s, obstetrician-gynecologists have also become increasingly responsible for regulating women's fertility and fecundity. With the development of amniocentesis, ultrasound, and other methods for the prenatal diagnosis of birth defects, obstetrician-gynecologists have been able to abort defective fetuses and unwanted pregnancies. At the same time, new methods for artificially implanting fertilized embryos within the uterus have enabled obstetrician-gynecologists to help previously infertile couples to have children.

The obstetrician's main tasks are to diagnose and bring a woman through pregnancy, deliver her child, and give the new mother adequate postnatal care. The most important surgical operation performed by obstetricians is cesarean section. Episiotomy, a surgical procedure in which an incision is used to enlarge the vaginal opening to facilitate childbirth, is also common.

Gynecology as a branch of medicine dates back to Greco-Roman civilization, if not earlier. The renewal of interest in diseases of women is shown in the huge encyclopaedia of gynecology issued in 1566 by Caspar Wolf of Zürich. In the early and mid-19th century, physicians became able to successfully perform a limited variety of surgical operations on the ovaries and uterus. The American surgeon James Marion Sims and other pioneers of operative gynecology also had to combat the violent prejudice of the public against any exposure or examination of the female sexual organs. The two great advances that finally overcame such opposition and made gynecologic surgery generally available were the use of anesthesia and antiseptic methods. The separate specialty of gynecology had become fairly well established by 1880; its union with the specialty of obstetrics, arising from an overlap of natural concerns, began late in the century and has continued to the present day.

Gynecologists make routine examinations of cervical and vaginal secretions to detect cancer of the uterus and cervix. They perform two main types of surgical operations: repairing any significant injuries caused to the vagina, uterus, and bladder in the course of childbirth; and removing cysts and benign or malignant tumours from the uterus, cervix, and ovaries. The modern practice of gynecology requires skill in pelvic surgery; a knowledge of female urologic conditions, because the symptoms of diseases of the urinary tract and the genital tract are often similar; and skill in dealing with the minor psychiatric problems that often arise among gynecologic patients.

The diagnosis and treatment of infertility are a combined obstetric-gynecologic effort.

Obstfelder, Sigbjørn (b. Nov. 21, 1866, Stavanger, Norway—d. July 29, 1900, Copenhagen, Den.), Norwegian Symbolist poet whose unrhymed verse and atmospheric, unfocused imagery marked Norwegian poets' decisive break with naturalistic verse.

Most of Obstfelder's works appeared in the 1890s: his first volume of poetry, *Digte* (1893; *Poems*); a play, *De røde draaber* (1897; "The Red Drops"); several novellas; and the posthumously published fragment *En praests dagbog* (1900; "A Pastor's Diary"). His view is that of a solitary outsider who looks beyond the material world in a search for existential certainty and union with an external spiritual reality. Obstfelder was the model for the diarist hero in the German poet Rainer Maria Rilke's famous *Notebook of Malte Laurids Brigge.*

Obuasi, town, southern Ghana. Its growth was stimulated by the discovery of a large gold deposit (1897) and the building of the railway from Sekondi (1902). The Ashanti gold mine at Obuasi has continued as the country's major producer while others have become depleted. It is one of the world's richest gold mines in terms of yield per ton of ore. Although mining is dominant, the town's economy has become diversified through commerce and cocoa production. Migrant labour from northern Ghana and neighbouring countries has swelled the town's population. In the surrounding area, agriculture is dominated by cash crops, and thus food and other basic commodities must be imported for the primarily industrial population of the town. A mosque serves the Muslim population. Pop. (1984) 60,617.

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obversion, in syllogistic, or traditional, logic, transformation of a categorical proposition (*q.v.*), or statement, into a new proposition in which (1) the subject term is unchanged, (2) the predicate is replaced by its contradictory, and (3) the quality of the proposition is changed from affirmative to negative or vice versa. Thus the obverse of "Every man is mortal" is "No man is immortal." Because the obverse of any categorical proposition is logically equivalent to it, obversion is a form of immediate inference. *See also* conversion.

Obwalden, half canton, central Switzerland, formerly part of the canton of Unterwalden. The half canton is drained by the Sarner River and occupies the western part of former Unterwalden canton. Obwalden means "above the forest" and refers to the great forest of Kerns that divided the two half cantons in the Middle Ages. Obwalden acted independently of Nidwalden in its acquisition, with Uri canton, of the Valle Leventina in 1403 and of Bellinzona in 1419 (losing both in 1422). After Nidwalden refused to accept the federal constitution of 1815, Obwalden received the abbey lands of Engelberg that now form a completely detached commune. A sovereign half canton since 1803, Obwalden is administratively independent of Nidwalden. Its capital is Sarnen (*q.v.*). A dairying region with Alpine pastures, it has several resorts, notably Engelberg. The population is German speaking and Roman Catholic. Area 189 square miles (491 square km). Pop. (1993 est.) 30,200.

Ocala, city, seat (1846) of Marion county, north-central Florida, U.S. Ocala lies 38 miles (61 km) south of Gainesville. It developed around Fort King, established in 1827. The place-name was derived from Ocali, an obscure Indian word possibly referring to an ancient Timucuan province or the middle part of Florida. After the Seminole Wars, Ocala evolved as a mixed farming centre. It was reconstructed after the American Civil War, and many of its streets are lined with moss-draped oaks and stately Southern homes. Local deposits of pure limestone are economically important. Local agricultural activities include the breeding of thoroughbred horses, cultivation of citrus and vegetables, and cattle raising. Other economic factors are food processing, tourism, and the manufacture of mobile homes.

Thoroughbred horse farm, Ocala, Fla.
Eric Carle—Shostal

Ocala lies just west of the Ocala National Forest and is a regional headquarters of the U.S. and Florida forest services. It is also the home of Central Florida Community College (1957). At nearby Silver Springs (east) and Rainbow Springs (west), marine life can be viewed through glass-bottomed boats. Other local attractions include an art museum and a museum exhibiting vintage cars from the sport of drag racing. Inc. 1885. Pop. (1992 est.) city, 43,918; Ocala MSA, 203,112.

Ocaña, city, Norte de Santander *departamento,* northern Colombia, in the Hacarí valley. Founded (*c.* 1570) as Nueva Madrid by Francisco Fernández, the city was renamed for Ocaña in New Castile, Spain. An independence convention that was held there in 1828 is commemorated by a triumphal arch. Barium mining and onion growing are basic economic activities. Ocaña is the superior court of a judicial district and is the seat of a diocese. The Palacio de Bellas

Artes is associated with the National University of Colombia in Bogotá. Pop. (1985) 51,443.

ocarina (Italian: "little goose"), also called SWEET POTATO, globular flute, a late 19th-century musical development of traditional Italian carnival whistles of earthenware, often bird-shaped and sounding only one or two notes. It is an egg-shaped vessel of clay or metal or, as a toy, of plastic and is sounded on the flageolet, or fipple flute, principle. It usually has eight finger holes and two thumbholes and may have a tuning plunger.

Painted clay ocarina from Italy, 20th century; in the Horniman Museum, London

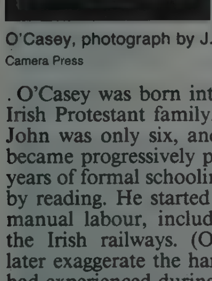
By courtesy of the Horniman Museum, London

In the 1930s it won professional popularity when "sweet potatoes" of different sizes were played in harmony in American popular music. The ocarina is a well-known European example of the globular flute, a form that occurs in many ancient and modern cultures.

O'Carolan, Turlough, also called TERENCE CAROLAN (b. 1670, near Nobber, County Meath, Ire.—d. March 25, 1738, Alderford, County Roscommon), one of the last Irish harpist-composers and the only one whose songs survive in both words and music in significant number (about 220 are extant).

The son of an iron founder, O'Carolan became blind from smallpox at the age of 18. He was befriended by Mrs. MacDermott Roe, the wife of his father's employer, who apprenticed him to a harper and supported him for the three years of his training, then gave him money, a guide, and a horse. As an itinerant harper, he traveled widely in Ireland. Although never considered a master performer, he was highly regarded as a composer of songs and improvised verse. His tunes appeared widely in 18th-century collections.

O'Casey, Sean, original name JOHN CASEY (b. March 30, 1880, Dublin, Ire.—d. Sept. 18, 1964, Torquay, Devon, Eng.), Irish playwright renowned for realistic dramas of the Dublin slums in war and revolution, in which tragedy and comedy are juxtaposed in a way new to the theatre of his time.



O'Casey, photograph by J. Bown

Camera Press

. O'Casey was born into a lower middle-class Irish Protestant family. His father died when John was only six, and thereafter the family became progressively poorer. With only three years of formal schooling, he educated himself by reading. He started work at 14, mostly at manual labour, including several years with the Irish railways. (O'Casey himself would later exaggerate the hardships and poverty he had experienced during childhood.)

O'Casey became caught up in the cause of Irish nationalism, and he changed his name to its Irish form and learned Irish Gaelic. His attitudes were greatly influenced by the poverty and squalor he witnessed in Dublin's slums and by the teachings of the Irish labour leader Jim Larkin. O'Casey became active in the labour movement and wrote for the *Irish Worker*. He also joined the Irish Citizen Army, a paramilitary arm of the Irish labour unions, and drew up its constitution in 1914. At this time he became disillusioned with the Irish nationalist movement because its leaders put nationalist ideals before socialist ones. O'Casey did not take part in the 1916 Easter Rising against the British authorities.

Disgusted with the existing political parties, he turned his energies to drama. His tragicomedies reflect in part his mixed feelings about his fellow slum dwellers, seeing them as incapable of giving a socialist direction to the Irish cause, but at the same time admirable for their unconquerable spirit.

After several of his plays had been rejected, the Abbey Theatre, Dublin, produced *The Shadow of a Gunman* (1923), set during the guerrilla strife between the Irish Republican Army and British forces. In 1924 the Abbey staged *Juno and the Paycock*, his most popular play, set during the period of civil war over the terms of Irish independence. *The Plough and the Stars* (1926), with the 1916 Easter Rising as its background, caused riots at the Abbey by patriots who thought the play denigrated Irish heroes. When first produced in the 1920s, these plays had an explosive effect on the audiences at the Abbey and helped to enlarge that theatre's reputation.

O'Casey went to England in 1926, met the Irish actress Eileen Carey Reynolds, married her, and henceforth made England his home. His decision to live outside Ireland was motivated in part by the Abbey's rejection of *The Silver Tassie*, a partly Expressionist antiwar drama produced in England in 1929. Another Expressionist play, *Within the Gates* (1934), followed, in which the modern world is symbolized by the happenings in a public park. *The Star Turns Red* (1940) is an antifascist play, and the semiautobiographical *Red Roses for Me* (1946) is set in Dublin at the time of the Irish railways strike of 1911.

His later plays, given to fantasy and ritual and directed against the life-denying puritanism he thought had beset Ireland, include *Cock-a-Doodle Dandy* (1949), *The Bishop's Bonfire* (1955), and *The Drums of Father Ned* (1958). His last full-length play was a satire on Dublin intellectuals, *Behind the Green Curtains* (published 1961).

O'Casey's three indisputably great plays are *The Shadow of a Gunman, Juno and the Paycock*, and *The Plough and the Stars*. All of these are tragicomedies set in the slums of Dublin during times of war and revolution in Ireland. In the plays, violent death and the everyday realities of tenement life throw into relief the blustering rhetoric and patriotic swagger of men caught up in the struggle for Irish independence. The resulting ironic juxtapositions of the comic and tragic reveal the waste of war and the corrosive effects of poverty. O'Casey's gifts were for vivid characterization and working-class language, and though he portrayed war and poverty, he wrote some of the funniest scenes in modern drama. O'Casey's later plays are not considered as powerful or moving as his earlier realistic plays. In his later plays he tended to abandon vigorous characterization in favour of expressionism and symbolism, and sometimes the drama is marred by didacticism.

Six volumes of O'Casey's autobiography appeared from 1939 to 1956; they were later collected as *Mirror in My House* (1956) in the United States and as *Autobiographies* (1963) in Great Britain. O'Casey's letters from 1910 to 1941 were edited by David Krause in two volumes (1975, 1980).

BIBLIOGRAPHY. C. Desmond Greaves, *Sean O'Casey: Politics and Art* (1979), traces O'Casey's social thought. Garry O'Connor, *Sean O'Casey: A Life* (1988), is a corrective on biographical points.

Occam, William of (theologian): *see* Ockham, William of.

occasionalism, a version of Cartesian metaphysics that flourished in the last half of the 17th century, in which all interaction between mind and body is mediated by God. It is posited that unextended mind and extended body do not interact directly. The appearance of direct interaction is maintained by God, who moves the body on the occasion of the mind's willing and who puts ideas in the mind on the occasion of the body's encountering other material objects. For example, when a person actualizes his desire to pick up an apple, his mind does not act on his body directly, but his willing of the action is the occasion for God to make his arm reach out; and when his hand grasps the apple, the apple does not act on his mind directly, but the contact is the occasion for God to give him ideas of the apple's coolness and softness.

Occasionalism was developed primarily by Arnold Geulincx and Nicolas Malebranche, 17th-century Dutch and 17th–18th-century French philosophers, respectively, to solve a specific problem in Cartesian metaphysics. For René Descartes, mind is active, unextended thinking, whereas body is passive, unthinking extension. But these two created substances, the bases of Cartesian dualism, are combined as a third, compound substance—living man. The problem is that the essential unlikeness of mind and body in the Cartesian view makes it difficult to conceive how they can interact—*i.e.*, how unextended mental ideas can push the body around and how bodily bumpings can yield ideas. Descartes's opinion that direct interaction takes place in the pineal gland deep within the brain does not answer the question of how. The orthodox view of the French Cartesians Pierre-Sylvain Régis and Jacques Rohault was simply that God has made mind and body so that they interact directly even if scientists do not know how. The occasionalist's answer to the question is to show how interaction appears to be direct when in fact it is mediated by the fourth, uncreated Cartesian substance, God.

Occasionalism was criticized by Simon Foucher, a 17th-century French Platonist, and others who pointed out that the problem remains of how God—a mental substance—can himself interact with the material substance, body. One answer is that he created it. Foucher believed that Gottfried Wilhelm Leibniz, the 17th–18th-century German philosopher and mathematician, took this way out in saying that monads, the units of reality, do not interact but only appear to do so, because God has created them in preestablished harmony. The apparent interaction of mind and body would also be preestablished. This reduction of the occasions of God's mediation to the single occasion of creation was then seen to be both a logical outcome of occasionalism and a *reductio ad absurdum* argument against it.

Occidental Petroleum Corporation, major American oil- and gas-producing company. Headquarters are in Los Angeles.

Founded in 1920, Occidental Petroleum was for many years a small, largely unprofitable California driller. It was precisely its bleak prospects that first attracted the attention of Armand Hammer, a successful international businessman who hoped to use the ailing company as a tax shelter. Hammer had formed ties with the new Soviet government and had thus made his fortune trading American wheat for Russian furs in the 1920s.

In 1957 Hammer bought a controlling interest in Occidental but quickly abandoned his tax shelter plan when its rigs struck a rich oil deposit in southern California. Hammer thereupon acquired a number of oil-related companies and in 1961 won an oil concession from Libya following a major oil discovery in that country, a deal that propelled the growth of "Oxy," as the firm came to be called, into a major international oil company. Libya nationalized its oil production in the 1970s, however, and in 1982 Occidental acquired Cities Service Company to help replenish its dwindling domestic oil and natural gas reserves. In 1986 Occidental acquired the Midcon Corporation, which had one of the largest natural gas pipelines in the United States. The move marked the decisive shift of Occidental to domestic, rather than foreign, energy ventures. The company is also involved in coal mining and the manufacture of chemicals and plastics, agricultural chemicals, fertilizers, and the processing and marketing of meat.

occipital, bone forming the back and back part of the base of the cranium, the part of the skull that encloses the brain. It has a large oval opening, the foramen magnum, through which the medulla oblongata passes, linking the spinal cord and brain. The occipital adjoins five of the other seven bones forming the cranium: at the back of the head, the two parietal bones; at the side, the temporal bones; and in front, the sphenoid bone, which also forms part of the base of the cranium. The occipital is concave internally to hold the back of the brain and is marked externally by nuchal (neck) lines where the neck musculature attaches. The occipital forms both in membrane and in cartilage; these parts fuse in early childhood. The seam, or suture, between the occipital and the sphenoid closes between ages 18 and 25, that with the parietals between ages 26 and 40.

In four-footed animals the head hangs from the end of the vertebral column, and the foramen magnum is placed posteriorly. The nuchal musculature is strongly developed to support the head, and the occipital markings are heavy.

In apes, with the assumption of semierect posture, the foramen has moved partially downward and forward. The nuchal muscles are powerful and attached high up on the occipital near the suture with the parietals, where a crest (lambdoidal crest) sometimes forms. In human evolution, the foramen magnum has continued to move forward as an aspect of adaptation to walking on two legs, until the head is now balanced vertically on top of the vertebral column. Concurrently, the line of attachment of the nuchal musculature has moved downward from the lambdoidal suture to a point low on the back of the head. In such precursors of man as *Australopithecus* and *Homo erectus,* the nuchal markings, often heavy enough to form a protuberance, or torus, were intermediate in position between those in apes and those in modern man.

Occitan language, also called LANGUEDOC, or PROVENÇAL, a Romance language spoken by about 1,500,000 people in southern France. All Occitan speakers use French as their official and cultural language, but Occitan dialects are used for everyday purposes and show no signs of extinction. The name Occitan is derived from the geographical name Occitania, which is itself patterned after Aquitania and includes the regions of Limousin, Languedoc, the old Aquitaine, and the southern part of the French Alps, all of the populations of which are Occitan-speaking.

The name Languedoc comes from the term *langue d 'oc,* which denoted a language using *oc* for "yes" (from Latin *hoc*), in contrast to the French language, the *langue d 'oïl,* which used *oil* (modern *oui*) for "yes" (from Latin *hoc ille*). Languedoc refers to a linguistic and political–geographical region of the southern Massif Central in France. The name Provençal originally referred to the Occitan dialects of the Provence region and is used also to refer to the standardized medieval literary language based on the dialect of Provence.

Literature in Occitan is plentiful, for Provençal was a standard and literary language in France and northern Spain in the 12th to 14th century and was widely used as a vehicle for poetry; it was the primary language of the medieval troubadours. The earliest written material in Occitan is a refrain attached to a Latin poem said to date from the 10th century.

The modern dialects of Occitan are little changed from the speech of the Middle Ages, although they are being affected by their constant exposure to French. The major dialects are those of Limousin, Auvergnat, Provence, and Languedoc. Gascon, a Romance dialect of southwestern France, is usually classified as a dialect of Occitan, although it is sometimes considered a distinct language because it differs a great deal from the other, more or less uniform, Occitan dialects. Occitan is closely related to Catalan, and, although strongly influenced in the recent past by French, its phonology and grammar are more closely related to Spanish than to French.

Occleve, Thomas: *see* Hoccleve, Thomas.

occultation, obscuring of the light of an astronomical body, most commonly a star, by another astronomical body, such as a planet or a satellite. Hence, a solar eclipse is the occultation of the Sun by the Moon. By carefully measuring the decrease in the intensity of large stars as they disappear behind the Moon, astronomers can determine their diameters (in angle) and ascertain whether they are binary systems (a pair of stars in orbit around their common centre of gravity). From occultations of stars by planets, asteroids, and satellites, astronomers are able to determine the precise sizes and shapes of the latter bodies in addition to the temperatures of planetary atmospheres. Astronomers unexpectedly discovered the rings of Uranus during a stellar occultation on March 10, 1977. *Compare* eclipse.

occultism, various theories, practices, and rituals based on an alleged or esoteric knowledge of the world of spirits and unknown forces.

A brief treatment of occultism follows. For full treatment, *see* MACROPAEDIA: Occultism.

The wide range of beliefs and practices that are generally held to be occult includes alchemy, a medieval chemical science and speculative philosophy aiming to achieve the transmutation of the base metals into gold, the discovery of a universal cure for disease, and the discovery of a means of indefinitely prolonging life; divination, the art or practice that seeks to foresee or foretell future events or discover hidden knowledge usually by the interpretation of omens or by the aid of supernatural powers; magic, the ritual performance or activity believed to influence human or natural events through access to an external mystical force beyond the ordinary human sphere; and witchcraft, the human exercise of alleged supernatural powers for antisocial, evil purposes. The Western tradition of occultism is that of an ancient "secret philosophy," which has its roots in Hellenistic magic and alchemy—the principal source of which is the *Corpus Hermeticum* associated with Hermes Trismegistos, thus the "Hermetic" tradition—and in Jewish mysticism, associated with the Kabbala (the doctrine of a secret, mystical interpretation of the Torah). *See* alchemy; astrology; divination; magic; witchcraft.

occupational disease, any illness associated with a particular occupation or industry.

A brief treatment of occupational diseases follows. For full treatment, *see* MACROPAEDIA: Occupational Diseases and Disorders.

Historically, the study of such diseases can be traced to the 16th-century writings of the metallurgist Georgius Agricola on the problems of improper ventilation in the metal-ore mines of Saxony. His contemporary, the physician Paracelsus, reported in 1567 that the so-called miners' disease was not, as was commonly believed, a punishment for sins but rather a malady caused by the inhalation of metal vapours. The publication in 1700 of Bernardino Ramazzini's treatise on diseases of workers (*De morbis artificum diatriba*) established industrial health as a concern of medicine. Ramazzini himself was later considered the founder of industrial medicine.

During the 19th century the Industrial Revolution provoked the first serious awareness of diseases associated with the workplace. Long working hours, dim light, lack of fresh air, and potentially dangerous machinery took their toll in physical injuries and decreased resistance to such diseases as tuberculosis. The entrance into the industrial work force of women and children heightened society's awareness of the health hazards faced by all workers. In the late 18th and early 19th centuries, observers began to associate certain diseases with specific occupations; scrotal cancer among workers exposed to copper smelting, mercury poisoning in hat makers, and lung disease among textile workers were among the first such cause-and-effect relationships to be convincingly established.

In the 20th century, innovations in manufacturing and the introduction of new and more toxic raw materials and chemicals compounded the problems of occupational health. Particular dangers, undreamed of by workers of the 19th century, were associated with exposure to radioactive materials; to the wide range of chemicals used in the manufacture of paints, plastics, herbicides, and building materials; and to electromagnetic radiation, notably in the form of X rays, ultraviolet light, microwaves, and infrared radiation.

Many human cancers were shown to be related to occupational exposure: bladder cancer by exposure to aniline dye; lung cancers by inhalation of chromium compounds, radioactive ores, asbestos, arsenic, and iron; skin cancer by regular handling of certain products of coal, oil, shale, lignite, and petroleum; and skin cancer, leukemia, and bone cancer by exposure to radium and X rays.

Pneumoconioses—lung diseases associated with the inhalation of physical or chemical irritants—were also strongly linked to occupational exposure: asbestosis among mine and quarry workers; anthracosis, or black lung disease, in coal miners; byssinosis, or brown lung disease, in textile workers; berylliosis in persons working in the aerospace industry.

Physical conditions in the workplace, such as extreme heat or cold, prolonged loud or high-pitched noise, and vibrations caused by tools and machinery, have also come to be recognized as contributing to the development of specific diseases or chronic health problems. Finally, emotional and psychological stresses associated with work, and their medical consequences, have taken their place in the growing list of diseases labeled as occupational. *See also* industrial medicine.

occupational psychology: *see* industrial psychology.

occupational therapy, use of self-care and work and play activities to promote and maintain health, prevent disability, increase independent function, and enhance development. This form of therapy evolved from the recognition that work helps to restore the mentally and physically ill, particularly after the acute phase of illness has passed. Because any form of therapy must be dependent on others, any treatment program designed by an occupational therapist is coordinated with the work of doctors, nurses, and other related professional personnel in setting up a specific program for a patient.

History. Patients have long been employed in the utility services of mental hospitals. In the late 19th and early 20th centuries, experiments were made in the use of craft activities to occupy mental patients. This practice gave rise to the first occupational therapy workshops and later to schools for the training of occupational therapists. Later developments included problem-solving techniques, crafts, and work procedures for young people and industrial programs and activity programs of jobs for patients within the hospital. In 1952 a World Federation of Occupational Therapists was formed, and in 1954 the first international congress of occupational therapists was held at Edinburgh.

Modern activities. Occupational therapy is designed as specific treatment to restore physical function and to establish self-help methods in such simple functions as eating, dressing, and writing, as far as permanent limitations of the patient permit. The occupational therapist, in order to carry out the treatment prescribed by the physician, must have adequate knowledge of anatomy, physiology, medicine, surgery, psychiatry, and psychology, as well as knowledge of the skills used in treatment. A period of supervised clinical experience is usually required.

To rehabilitate and resettle the disabled, either for return to work or for home employment, it is essential to assess their ability to work. Methods vary from simple activity tests to full-scale work tests and psychiatric assessment. After assessment some prevocational training or practice may be necessary, and many occupational therapy departments have units in which the patient may be taught, or gain experience in, the use of tools for trades (*e.g.,* woodwork), light industrial work (*e.g.,* light assembly work), and clerical duties (*e.g.,* typing). After initial training many patients are transferred to further training centres or direct to industry, others to employment in sheltered workshops maintained by government or voluntary agencies, and some to work at home. Occupational therapy is vital for reorienting patients hospitalized or unemployed for long periods.

An equally important phase of therapy is rehabilitation for daily living. An equipped kitchen unit is a standard part of most modern occupational therapy departments, and many centres have model living quarters so that practice in home care can be provided for the housewife before she resumes her duties after a serious accident or long illness. The difficulty of caring for the chronically sick is also minimized when the patient is made able to care for himself. Occupational therapy provides not only training in daily living activities but also aids that make eating, dressing, and toilet less fatiguing for the sick or elderly. *See also* physical medicine and rehabilitation.

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occupational training: *see* employee training.

ocean, continuous body of salt water that is contained in enormous basins on the Earth's surface. It covers about 362,000,000 square km (140,000,000 square miles)—nearly 71 percent of the terrestrial surface. This world ocean is commonly divided into a number of major oceans and smaller seas. The three principal oceans, the Pacific, Atlantic, and Indian, are largely delimited by land and submarine topographic boundaries. All are in open connection with what is sometimes called the Southern Ocean, the stretch of water encircling the Antarctic continent. By convention, the Southern Ocean has been divided into three portions, one for each of the three main oceans. Including the appropriate sectors of the Southern Ocean, the Pacific accounts for 46 percent of the total area of marine waters, and the Atlantic and the Indian for 24 and 20 percent, respectively. Important marginal seas exist, primarily in the Northern Hemisphere. They are partially enclosed by landmasses or island arcs. The largest are the Arctic and adjacent seas, Asiatic Mediterranean (between Australia and Southeast Asia), Caribbean and adjacent waters, Mediterranean (European), Bering Sea, Sea of Okhotsk, Yellow and East China seas, and Sea of Japan.

A brief treatment of oceans follows. For detailed treatment of the physical and chemical oceanography and marine geology of oceans, *see* MACROPAEDIA: Oceans. For treatment of marine life, *see* Biosphere. For discussions of individual oceans, *see* Arctic: *The Arctic Ocean;* Atlantic Ocean; Indian Ocean; Pacific Ocean.

The average depth of the ocean is 3.7 km (2.3 miles). From the continental shelf break, which commonly lies at depths between 100 and 200 m (330 to 660 feet), the continental slope descends to extensive abyssal plains. Approximately 75 percent of the ocean floor falls within the depth range of 3 to 6 km, and only about 1 percent lies deeper. The deepest waters occur in relatively narrow trenches, mostly associated with Pacific island arcs, the maximum depth recorded being 11,034 m in the Mariana Trench.

Substantial areas of the seabed are covered by unconsolidated sediment that overlies consolidated sediment and crustal igneous rocks. While large areas of the ocean floor are notably flat, various mountainous features occur, such as seamounts. A major feature is the so-called midocean ridge, which extends with many branches through the major oceans. Ridge crests rise 2 to 3 km above the deep ocean floor. Volcanically active ridge areas are sites for the formation of new oceanic basaltic crust and play a central role in seafloor spreading (*see* plate tectonics). Recent discoveries on the Pacific Ocean ridge have shown that in regions of active formation of new crust, seawater is circulated through the basaltic rock and greatly altered by reactions at high temperatures. Solutions that have undergone these hydrothermal interactions are returned to the ocean through vents in the crust. Temperatures up to 350° C (660° F) have been recorded at certain vents.

The general circulation of water throughout the ocean occurs rapidly in terms of geologic time scales, with mean lifetimes for water molecules in the deep ocean of a few hundred to approximately 1,000 years. At the surface, currents are created by the frictional effects of wind stress on the upper ocean layer. The major wind systems determine the initial directions of the major currents, which can be modified by effects of the Earth's rotation and by topographic boundaries. An example is the clockwise gyre in the tropical and temperate parts of the North Atlantic Ocean, which includes the intensified western boundary currents that feed into the Gulf Stream. Somewhat similar gyre circulations are set up in other regions. Adjacent to the eastern continental margins of the major oceans, surface waters commonly move away from the coast and are replaced by colder and nutrient-richer water from intermediate depths. Such areas of coastal upwelling are often biologically productive and support fisheries. The wind-driven circulation affects the ocean to variable depths. The characteristics of most intermediate and all deep waters are, however, established by the thermosaline circulation. This is created by the sinking of waters that become denser from cooling in high-latitude regions and then sink until they reach a depth at which there is water of the same density, where they flow laterally. A limited number of water types with characteristic temperatures and salinities are formed, and their mixing produces distinguishable water masses occupying particular depth ranges in different parts of the ocean. Most flows uninfluenced by surface circulation are broadly from south to north or vice versa, but there are significant exceptions, such as water of Mediterranean origin that occurs at intermediate depths in parts of the Atlantic Ocean.

Many important characteristics of the ocean are determined by the temperature and salinity of seawater, which, together with pressure, determine its density. The major heating of the ocean occurs by absorption of solar energy at the surface, and the surface temperature shows a pronounced variation with latitude. The distribution of surface temperature is, however, influenced appreciably by heat transport in surface currents and by other regional features such as upwelling. The temperature range for the open ocean is from less than −1° to 28° C (30° to 82° F). In tropical and temperate latitudes the temperature of ocean waters decreases markedly in the thermocline zone below the well-mixed upper layer, which typically extends to about 100 m. Changes below 1 km are gradual, leading to bottom temperatures normally below 2° C. About 50 percent of the total volume of the ocean has temperatures between 1.3° and 3.8° C. Salinity, a measure of the proportion of dissolved salt in seawater, varies in surface waters mainly according to the local balance between evaporative loss of water and input in the form of rainfall. The average oceanic salinity is 34.7 parts per thousand. Areas with a significant influx of fresh water from many large rivers or of meltwater from icebergs have a slightly lower salinity, while those with unusually high evaporation have a slightly higher salt content.

Seawater contains a wide variety of dissolved inorganic substances, gases, and organic substances. In addition to these dissolved components, it contains suspended particulate matter (*e.g.,* plankton). The most abundant inorganic constituents, excluding water, are, in order, chloride, sodium, sulfate, magnesium, calcium, potassium, and bicarbonate. These major constituents, unlike many of the materials that occur in trace amounts, vary in concentration in nearly constant proportions to the salinity. Ocean water is slightly alkaline, with a pH close to 8. Geochemists consider that the major compositional features of seawater have been more or less constant for at least the past 600,000,000 years, despite the continuous input and removal of material.

The oceans appear to have been formed early in the Earth's history. As the planet heated up and became differentiated into three major zones (core, mantle, and crust), large amounts of water vapour, along with other excess volatile materials, were released from the interior by volcanism and carried to the surface in lava. The water vapour escaped from the lava as hot clouds, which subsequently condensed to yield enough water to form the oceans.

Ocean City, resort, Worcester county, southeastern Maryland, U.S. Ocean City lies along a 10-mile (16-kilometre) barrier beach that forms a chain of bays (including Sinepuxent and Assawoman) along the Atlantic shore, 28 miles (45 km) east of Salisbury. It is the state's largest seaside resort with a summer population of 150,000, and the Ocean City Inlet (long silted up but opened by a great storm in 1933) connects the bays with the ocean. The bays offer safe harbourage for boats and amenities for deep-sea fishing, bathing, and surfing. The site was promoted after the building of the Atlantic Hotel in 1872, and the sandy beaches became popular for summer vacations after the arrival of the railroad in 1878 and highways from the Baltimore-Washington, D.C., area. Ocean Downs Raceway is noted for harness racing. The Assateague Island National Seashore (*q.v.*), a narrow barrier island, is a southern extension of Ocean City's barrier beach. Stephen Decatur, the naval hero, was born (1779) on a farm near Berlin, a few miles west on the mainland. Inc. 1880. Pop. (1990) 5,146.

Ocean City, resort, Cape May county, southeastern New Jersey, U.S., on a barrier island between Great Egg Harbor (bridged to Somers Point and Longport) and the Atlantic Ocean, 12 mi (19 km) southwest of Atlantic City. Laid out in 1879 by Methodist ministers as a Christian seaside resort, it has remained faithful (by public vote) to its founders' stipulation that no liquor be sold; this has made it a popular place for religious conventions and family vacations. It has developed as a fishing and summer resort with marinas and boatyards, 8½ mi of public beaches, and a 2½-mi boardwalk. A number of impressive mansions, built by wealthy Philadelphians at the turn of the century, has left a Victorian imprint on the city. The nearby Richard Somers House (1720), home of the U.S. naval hero of Barbary Coast fame, is a state historic site. The Ocean City Historical Museum contains Oriental salvage relics from the ship "Sindia," which was wrecked offshore in 1901. To the south lie the Marmora Coastal Wetlands and across the harbour to the east is the Tuckahoe-Corbin City Fish and Wildlife Management Area. Aside from tourism, boatbuilding and the manufacture of canvas goods are the city's economic mainstays. Inc. 1897. Pop. (1990) 15,512.

ocean current, horizontal and vertical circulation system of ocean waters produced by gravity, wind friction, and water density variation in different parts of the ocean.

A brief treatment of ocean currents follows. For full treatment, *see* MACROPAEDIA: Oceans.

The direction and form of oceanic currents is governed by a number of natural forces, including principally horizontal pressure gradient forces; forces generated by variable density of seawater, which is a product of temperature and salinity variables; the Coriolis forces, exerted by the rotating Earth on all moving objects at or near the Earth's surface; and friction, caused by winds blowing over the ocean's surface as well as the friction between different layers of water. The Coriolis forces cause ocean currents to move clockwise (anticyclonically) in the Northern Hemisphere and counterclockwise (cyclonically) in the Southern Hemisphere and deflect them about 45° from the wind direction. This movement creates distinctive current cells called gyres. The rotational pattern causes the anticyclonic gyres to displace their centres westward, forming strong western boundary currents against the eastern coasts of the continents, such as the Gulf Stream–North Atlantic–Norway Current in the Atlantic Ocean and the Kuroshio–North Pacific Current in the Pacific Ocean. In the Southern Hemisphere the counterclockwise circulation creates strong eastern boundary currents against the western coasts of continents, such as the Peru (Humboldt) Current off South America, the Benguela Current off western Africa, and the Western Australia Current. The Southern Hemisphere currents are influenced by the powerful eastward flowing, circumpolar Antarctic Current. It is a very deep, cold, and relatively slow-flowing current, but it carries a vast mass of water, about twice the volume of the Gulf Stream current. The Peru and Benguela currents draw water from this Antarctic current and, hence, are cold. The Northern Hemisphere lacks continuous open water bordering the Arctic and so has no corresponding powerful circumpolar current, but there are small, cold currents flowing south through the Bering Strait to form the Oya and Anadyr currents off eastern Russia and the California Current off western North America; others flow south around Greenland to form the cold Labrador and East Greenland currents. The Kuroshio–North Pacific and Gulf Stream–North Atlantic–Norway currents move warmer water into the Arctic Ocean via the Bering, Cape, and West Spitsbergen currents.

In the tropics the great clockwise and counterclockwise gyres flow westward as the Pacific North and South Equatorial currents, Atlantic North and South Equatorial currents, and the Indian South equatorial current. Because of the alternating monsoon climate of the northern Indian Ocean, the current in the northern Indian Ocean and Arabian Sea alternates. Between these massive currents are narrow eastward flowing countercurrents.

Vertical oceanic circulation is far less dramatic but is important because it brings up deep ocean waters and moves down surface waters. The wind-driven currents are confined to the Ekman Layer, the upper 100 m (330 ft) of the ocean; below this the deep currents are much slower. They are generated by the convection pattern caused by the surface currents. Where the surface currents converge because of meeting coastlines or encountering winds from the opposite direction, water tends to pile up but is also pulled down by gravity. Where waters diverge, the sea surface loses water, and deep ocean waters well up to the surface to replace the diverging waters. This pattern generates the convection that powers the undercurrents.

Vertical circulation also occurs because of variations in salinity, as saline water is denser than less saline water, and because warm water tends to rise and cold water tends to sink. Saline input comes from the Mediterranean Sea and to a lesser extent from the Red Sea and Persian Gulf. These seas lie in regions where evaporation exceeds precipitation and inflow. The more highly saline water produced by the net evaporation sinks in the eastern Mediterranean and flows in a deep bottom current, termed the Upper Deep Water, through the Straits of Gibraltar westward into the Atlantic Ocean, while at the surface, less saline Atlantic water flows eastward into the Mediterranean. A similar principle operates in the Red Sea and Persian Gulf. The Pacific Ocean lacks a similar input but acquires its salinity from the Upper Deep Water, which enters the Antarctic circumpolar current and thereby gradually reaches the Pacific Ocean. Other deep currents are generated by the cold Greenland and Bering Strait currents, which sink to form the Middle and Lower Deep water masses; in the Antarctic, very cold water from near the ice cap sinks to form the Antarctic Intermediate Water, which spreads northward at depths of 700–1,000 m. These Arctic and Antarctic currents are very cold and much less saline because of the input of melting fresh ice-shelf and glacial water.

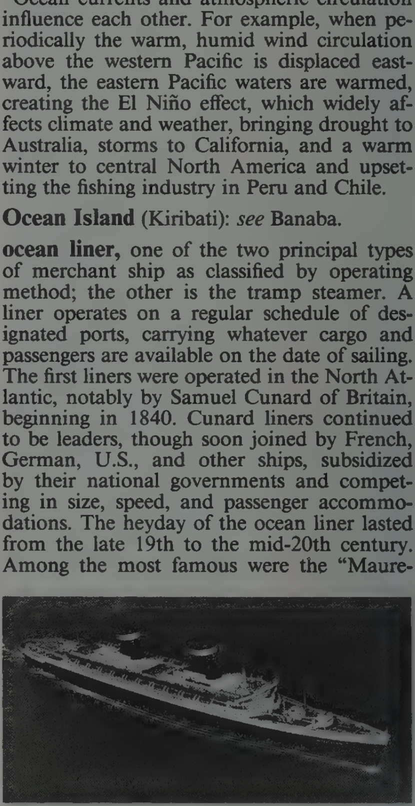
Besides the large oceanic gyres, there are smaller current systems found in certain enclosed seas or ocean areas. Their circulation patterns are influenced more by the direction of water inflow than by the Coriolis forces. Such currents are found in the Tasmanian Sea, where the southward flowing East Australian Current generates counterclockwise circulation, in the northwestern Pacific, where the eastward flowing Kuroshio–North Pacific current causes counterclockwise circulation in the Alaska and Subarctic currents, in the Bay of Bengal, and in the Arabian Sea.

The study of oceanic currents developed as oceanic voyages became common in the 18th century, in the interests of navigation. Subsequent studies occurred because ocean currents were found to profoundly affect weather and climate. Thus, the Gulf Stream–North Atlantic–Norway Current brings warm tropical waters northward, warming the climates of eastern North America, the British Isles and Ireland, and the Atlantic coast of Norway in winter, and the Kuroshio–North Pacific Current does the same for Japan and western North America, where warmer winter climates also occur. The warmer waters also evaporate more readily in the warmer temperatures they help generate, increasing precipitation along these coasts. In the Southern Hemisphere, by contrast, the cold Peru and Benguela currents hinder evaporation and, as they flow along the warmer coasts of South America and southwest Africa, generate fogs but no precipitation, thereby generating the hyper-arid deserts of Peru, Chile, and Namibia; yet as these cold currents also well up from the deep ocean, they are rich in nutrients, and some of the world's best fishing grounds are found in them.

Ocean currents and atmospheric circulation influence each other. For example, when periodically the warm, humid wind circulation above the western Pacific is displaced eastward, the eastern Pacific waters are warmed, creating the El Niño effect, which widely affects climate and weather, bringing drought to Australia, storms to California, and a warm winter to central North America and upsetting the fishing industry in Peru and Chile.

Ocean Island (Kiribati): *see* Banaba.

ocean liner, one of the two principal types of merchant ship as classified by operating method; the other is the tramp steamer. A liner operates on a regular schedule of designated ports, carrying whatever cargo and passengers are available on the date of sailing. The first liners were operated in the North Atlantic, notably by Samuel Cunard of Britain, beginning in 1840. Cunard liners continued to be leaders, though soon joined by French, German, U.S., and other ships, subsidized by their national governments and competing in size, speed, and passenger accommodations. The heyday of the ocean liner lasted from the late 19th to the mid-20th century. Among the most famous were the "Mauretania," sister ship of the ill-fated "Lusitania" and for 23 years holder of the blue ribbon for transatlantic speed; the "Aquitania," also a Cunarder, the last four-funnelled vessel; the German "Vaterland," seized in New York in 1917 and renamed "Leviathan," for many years the largest ship afloat; the 80,000-ton "Queen Mary" and "Queen Elizabeth," giant Cunarders of the 1940s and 1950s; the French Line's "Normandie," which set a new transatlantic speed record of just over four days but which was destroyed by a fire in New York harbour in 1942; and the "United States," which set a new transatlantic record of three days, ten hours, averaging 35 knots, or 41 land miles per hour, in 1952.



SS "United States"

By courtesy of the United States Line

The reign of the transatlantic liners as glamour ships of the world was gradually ended by the rise of air travel. A vast fleet of liners, ranging from passenger-cruise vessels to refrigerated cargo ships, continued to cover the world.

ocean perch, economically important food fish of the family Scorpaenidae, also known as the redfish (*q.v.*).

ocean ranching, the rearing of fish and shellfish under artificially controlled conditions to restock the sea. *See* aquaculture.

Consult the INDEX *first*

Ocean Springs, resort city, Jackson county, southeastern Mississippi, U.S., on Biloxi Bay across from Biloxi. It developed around the site of Old Biloxi, where Pierre Le Moyne d'Iberville, established, in 1699 for France, Fort Maurepas, the first permanent European settlement in the lower Mississippi River valley. Its name was changed to Lynchburg (1853), and in 1854 its present name was coined by Dr. George W. Austin, who established a sanitarium to utilize its spring waters. It was a fishing village until the 1880s, when it became a popular Gulf Coast resort for cotton planters. The Gulf Islands National Seashore is now headquartered there. The huge Ruskin Oak on the Many Oaks Estate was named after John Ruskin, the English writer and artist, who is said to have visited the spot in 1885. Inc. town, 1892; city, 1947. Pop. (1990) 14,658.

ocean sunfish: *see* mola.

oceanarium, saltwater aquarium for displaying marine animals and plants, particularly oceanic, or pelagic, fishes and mammals. It serves as a centre for public entertainment and education and scientific study. Most oceanariums are located in coastal areas. The world's first large oceanarium, now known as Marineland (*q.v.*), was completed in 1938 near St. Augustine, Fla., U.S.

Dolphin show at Marineland, an oceanarium near St. Augustine, Fla., U.S.

James P. Rowan

Oceanariums are more difficult to maintain than freshwater aquariums. Changes in salinity conditions confound the relationships between temperature, acidity, and oxygen levels of an aquatic system and create complex maintenance problems that require constant attention if sensitive fishes and other organisms are to be kept in a healthy state. Oceanariums, however, have certain advantages. Many more different species of fish live in marine environments than in freshwater systems, so that a greater diversity of displays is possible. In addition, a saltwater environment permits the holding of such large and impressive animals as sharks, rays, and marine turtles, as well as seagoing mammals (*e.g.,* dolphins, whales, and manatees). Many oceanariums make full use of the ability of whales and dolphins to be trained, devising special acrobatic shows for the public. A number of oceanariums are associated with research or educational programs of universities, biological stations, and marine institutes. Arrangements may be reciprocal in that oceanariums can provide facilities for student training or experiments while the academic or research units can contribute specimens and professional advice about the care of marine organisms. *Compare* aquarium.

Oceania, collective name for the islands scattered throughout most of the Pacific Ocean. The term, in its widest sense, embraces the entire insular region between Asia and the Americas. A more common definition excludes the Ryukyu, Kuril, and Aleutian islands and the Japan archipelago. The most popular usage delimits Oceania further by eliminating Indonesia, Taiwan, and the Philippines, because the peoples and cultures of those islands are more closely related historically to the Asian mainland. Oceania then, in its most restricted meaning, includes more than 10,000 islands, with a total land area (excluding Australia, but including Papua New Guinea and New Zealand) of approximately 317,000 square miles (821,000 square km).

Oceania has traditionally been divided into four parts: Australasia (Australia and New Zealand), Melanesia, Micronesia, and Polynesia. As recently as 33,000 years ago no human beings lived in the region, except in Australasia. Although disagreeing on details, scientists generally support a theory that calls for a Southeast Asian origin of island peoples. By 1990 about 9,400,000 islanders lived in Oceania (excluding Australia), and many indigenous cultures were revolutionized by intensive contact with non-Oceanic groups who had intruded from various parts of the Western world. Pop. (1990 est.) including Australia, 26,500,000.

Oceanic arts, the literary, performing, and visual arts of the islands of the Pacific, including Australia, Polynesia, Melanesia, and Micronesia. Many of these island clusters are separated by vast stretches of ocean; and the resultant isolation, together with the wide range of environmental conditions present, has led to the development of a rich variety of artistic styles.

A brief treatment of Oceanic arts follows. For full treatment, *see* MACROPAEDIA: Oceanic Arts.

A tentative postulate of Indonesian affinities with Oceania has been based on the penetration of Melanesia about 2000 BC by a maritime cum agricultural people identified by Lapita pottery, which is stylistically similar to early Moluccan ceramics. These people settled farther east on Tonga and Samoa, where a millennium of isolation bred a distinct Polynesian culture. When Samoan seafarers arrived on Marquesas, it became the dispersal centre for Polynesian culture. By the end of the 1st millennium AD, the culture area embraced New Zealand, but the Marquesan settlers, who had lost many plants and animals en route, were forced by an alien climate and land to abandon cultivation and take up hunting. The break was complete by AD 1400, and the warrior bands typical of New Zealand ventured inland in search of game. Australian Aborigines have retained a similar mode of life in sharp contrast to the agricultural subsistence prevalent among most Oceanic islanders. Divergent cultural developments were the inevitable by-product of centuries of demographic isolation; Oceania is little more than a name of geographic convenience. The baffling array of discrete culture groups is paralleled by great linguistic diversity. It is difficult to establish any constant Oceanic features or patterns of behaviour and belief that have a universal distribution. It is hardly surprising that the artistic traditions of Oceania should be extensively varied—even at a local level. Intercultural exchange is not unknown, but borrowed artifacts invariably gain new functions and value in their new setting. New aesthetic elements are absorbed and diffused with such rapidity that any scheme of distribution of themes and techniques would be subject to constant review. Nevertheless, some symbols do appear to have supralocal significance; the bird is a universal motif symbolizing virility and power. Indigenous traits are sometimes discarded and then resumed at will.

Fruitful study of Oceanic arts is hampered by paucity of research materials. European domination was only one factor accounting for this. In Polynesia in particular, drastic cultural change from the 1850s onward resulted in the present-day predominance of Western cultural traits on a far greater scale than the nominal suzerainty of the church. Traditional music has been usurped by the secular styles of the West. The Hawaiian ukulele is an adaptation of the Portuguese *bragha* and is quite unsuited to indigenous musical forms. Editing and translation have perverted the oral traditions, and it is virtually impossible to reconstruct pre-19th-century representational art, much of which was fragile and made of perishable materials, since those objects that were not ritually destroyed as a matter of course were burnt by Christian converts; what little does remain was saved by missionaries.

The arts of Oceania are often called "primitive," which is accurate and nonpejorative in that the region as a whole knows only rudimentary forms of writing and its peoples are technologically unsophisticated. Yet the mythological and cosmogonic systems underlying the arts are often highly complex. Religion and ritual strongly influence every aspect of Oceanic life, and their association with the arts is especially close. Religious symbolism infuses not only the objects, dances, and speeches used in ritual but also the materials and tools used to create them. The individual who creates or commissions a work is similarly esteemed, and the craftsman's skill—whether applied to ritual or to secular, utilitarian works—is highly valued. Craftsmanship, in fact, is the main criterion by which a work is judged. Art, moreover, is produced for particular functions: reinforcing social ranking or political influence; propitiating gods, spirits, and ancestors; encouraging good harvests or successful hunting trips; and celebrating important community events.

Oceanic literature includes both complex oral traditions and a more modern body of works written primarily in English. The traditional oral transmission of literature necessitated rhythmic cadences and stock formulas to aid memory. Favoured subjects are tales of the gods and spirits and creation myths. Nature and place-names provide a multitude of images that are highly confusing to the outsider but possess identifiable symbolism for the island peoples, who can easily spot the social, political, religious, and even erotic meanings intended. Some public recitations are fixed according to rigid formulas and are therefore suitable for dance accompaniment. Political and ceremonial speeches are handed down as rough frameworks, allowing a degree of leeway for the inserting of original material. Polynesian and Micronesian literature contains the legendary cycles of mythological figures who have general and local symbolism. Such a character is the trickster Mani-tiki-tiki, a fisherman who discovered fire but also a fertility god in various local contexts.

Musical styles are multitudinous, though all regions, with some Melanesian exceptions, emphasize vocals using instruments to produce supranormal voices. Consequently most instruments are technically crude though often elaborately decorated in keeping with their extramusical function as gifts and cult objects. Orchestras such as the Solomon Islanders' panpipes ensembles generally accompany song and dance. Polynesian song and dance is rooted in societal structure, and chants praise chiefs or high-ranking guests while the dancers' movements narrate rather than act out the meaning. Women's dancing is intrinsically similar but assessed according to its gracefulness rather than interpretive force. In Melanesia the art of tattooing arose with the dance. Australian and Melanesian dance has a historical function describing the activities of gods and ancestors—in the latter instance, dancers don elaborate costumes and masks. The "big man" is at the apex of Melanesian society, and sponsorship of huge ceremonies is one of the ways in which he maintains his position by displaying his wealth. The competitive element ensures more inventive and dynamic performances than those achieved in hierarchial chiefdom societies. In all the islands the significant movements are made with the upper half of the body while the feet merely keep time.

The visual arts display ingenious use of environmental possibilities: a staggering range of materials are used, often in collage-style combination. The common predeliction for the symbolic ordering of nature does not, of course, result in similarities of style, and this is equally true of the manufacture and decoration of artifacts. Identical materials are fashioned into hugely different objects, while common motifs are often scarcely recognizable from one society to another. Monumental sculptures in stone and wood are found alongside relief panels of astounding delicacy; the extraordinary versatility of local craftsmen can be seen in the Hanai wickerwork of New Zealand, in which both masks and cloaks are fashioned. Given the basic nature of their tools, the New Zealanders reveal great skill and manual dexterity. Similarly, the delicacy of the decorative arts of Marquesas suggests a long and fruitful tradition of craftsmanship. It is possible that islanders were aware of a number of technological advances that they deliberately eschewed, presumably as unsuitable to their environment. This may well be the case with metallurgy, if the swift utilization of iron after its "introduction" in the 18th century can rightly be interpreted as reflecting previous experience. That the islanders took full advantage of all the mediums of artistic creation available to them is best illustrated in the great effort required to shape the Easter Island figures from the local volcanic tufa.

Oceanic languages, also called EASTERN AUSTRONESIAN, widespread, highly varied, and controversial language group of the Austronesian language family. Spoken on the islands of Oceania from New Guinea to Hawaii to Easter Island, certain of these languages share so little basic vocabulary that some scholars prefer to classify them in smaller, more cohesive groups.

The features shared include a tendency toward use of separate words rather than affixes to express grammatical relationships, a basic five-vowel system, and several common phonetic simplifications of the original Austronesian sound system. The Oceanic group contains about 450 languages, of which more than 400 are spoken in Melanesia and the rest in Polynesia and Micronesia.

oceanic plateau, also called SUBMARINE PLATEAU, large submarine elevation rising sharply at least 200 m (660 feet) above the surrounding deep-sea floor and characterized principally by an extensive, relatively flat or gently tilted summit. Most oceanic plateaus were named early in the 20th century prior to the invention of sonic sounding, and many of these features have been shown by modern bathymetric data to be portions of the oceanic ridges. Thus, the Albatross Plateau of the eastern equatorial Pacific now is recognized as belonging to the East Pacific Rise and has been shown to possess a much more irregular summit than early data indicated.

Most plateaus are steplike interruptions of the continental slopes and appear to be downwarped or downfaulted blocks of former continental shelves. These marginal plateaus are exemplified by the Blake Plateau off the southeastern United States. This plateau's flat surface lies between 700 and 1,000 m (2,300 and 3,300 feet) below sea level, is more than 300 km (185 miles) wide, and covers approximately 130,000 square km (50,000 square miles) of seafloor. The crust underlying the plateau, although relatively thin and veneered by flat-lying marine sediments, is otherwise continental in character.

Other plateaus, such as the coral-capped plateaus of the South China Sea, occur in the ocean well beyond the continental margins. They stand above the surrounding deep-sea floor as isolated topographic highs and are believed to be composed of continental rock cores overlain by flat-lying marine sediments. Presumably, these mid-ocean plateaus are minor fragments of continent that have been isolated during continental drift and seafloor spreading.

oceanic ridge, continuous submarine mountain chain extending approximately 80,000 km (50,000 miles) through all the world's oceans. Ridges separate the oceans into distinct basins and may or may not be seismically active.

A brief treatment of oceanic ridges follows. For full treatment, *see* MACROPAEDIA: Oceans.

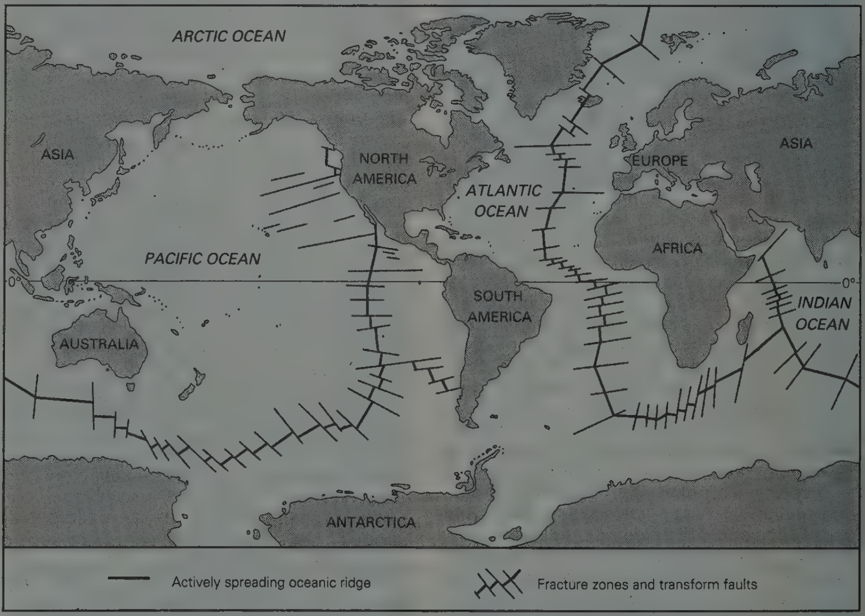
The seismically active oceanic ridge is approximately 60,000 km (37,000 miles) long and extends down the axis of the entire Atlantic Ocean, passing midway between Africa and Antarctica and turning north to the centre of the Indian Ocean, where it branches, the main ridge continuing midway between Australia, New Zealand, and Antarctica to cross the east side of the Pacific Basin, running all the way to the mouth of the Gulf of California. The ridge is essentially a broad, enormous uplift sloping up from depths of more than 6,000 m (20,000 feet) in marginal basins to the crest of the ridge, which is almost everywhere less than 4,000 m (13,100 feet) in elevation, with crest mountains commonly rising to depths of 2,000 to 3,000 m (6,600 to 9,800 feet) but sometimes reaching above sea level. At intervals the ridge is crossed, usually at right angles, by large topographic disturbances called fracture zones that offset, or displace, the crest. These offsets are called transform faults. Shallow earthquake foci follow the crest: those along the axis of the ridge are caused by normal faulting, those on fracture zones by shearing. The oceanic ridge system is the largest feature of the Earth's surface after the continents and the ocean basins themselves; its volume exceeds 100,000,000 cubic km (25,000,000 cubic miles).

Aseismic ridges (those having very few earthquakes or none at all) that extend wholly or partly from uplifted islands on the axis of the oceanic ridge to coasts of adjacent continents are called lateral ridges. Nearly straight ridges that terminate at one end in a young or active volcanic island are called linear chains.

The pattern of ridges is so regular and their properties so constant that these features cannot be caused by chance. The only theory that satisfactorily explains their characteristics is that of plate tectonics. According to this theory, the outer 50 to 100 km (31 to 62 miles) of the Earth consists of a brittle shell that is broken into about 12 large plates and several small ones. Convection currents within the molten mantle (the next deeper layer within the Earth) cause these lithospheric plates to move slowly about relative to one another, and these motions generate the ridges. The oceanic ridge system and its branches mark boundaries along which magmatic upwelling (the rising of molten rock from deep beneath the crust) is splitting the ridge's crest and creating new ocean floor along the trailing edges of both plates. Particularly active upwellings at some places under the oceanic ridges are marked by active volcanoes, from which such islands as Iceland have formed.

Lateral ridges are thought to have formed where this localized activity has been of long duration. They have been formed by the outpouring of lava throughout the time of expansion of an ocean basin and thus mark the locus of movement of the two plates away from the ridge crests. Linear ridges are considered to have a similar origin, except that in their case the source of the lava does not lie on the axis of a spreading ridge. Instead, if a single plate is driven over a hot spot (*i.e.,* a magma-generating centre fixed in the deep mantle) from which the molten rock materials can penetrate to the surface, then those materials generate a single chain of progressively older volcanoes, which mark the direction of past motion of the plate over the hot spot.

oceanic trench: *see* deep-sea trench.



Oceanic ridges

oceanic trough, an elongate depression in the seafloor that is characteristically shallower, shorter, narrower, and topographically gentler than oceanic trenches. Maximal depths of oceanic troughs range between 2,300 m (7,500 feet) in the Papuan Trough and 7,440 m in the Banda Trough. More typical maximum depths lie between 4 and 5 km (2.5 and 3 miles) below sea level. Lengths of the 25 best-known troughs range between 270 and 2,300 km and average about 700 km; their widths are from 20 to 100 km and average about 50 km. Unlike trenches, oceanic troughs probably owe their origins to a wide variety of geologic mechanisms.

oceanography, scientific discipline concerned with all aspects of the world's oceans and seas, including their physical and chemical properties, their origin and geologic framework, and the life forms that inhabit the marine environment.

A brief treatment of oceanography follows. For full treatment, *see* MACROPAEDIA: Earth Sciences; Exploration.

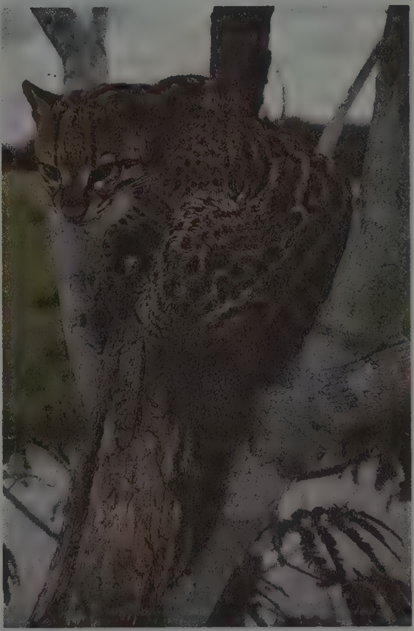
Traditionally, oceanography has been divided into four separate but related branches: physical oceanography, chemical oceanography, marine geology, and marine ecology. Physical oceanography deals with the properties of seawater (temperature, density, pressure, and so on), its movement (waves, currents, and tides), and the interactions between the ocean waters and the atmosphere. Chemical oceanography has to do with the composition of seawater and the biogeochemical cycles that affect it. Marine geology focuses on the structure, features, and evolution of the ocean basins. Marine ecology, also called biological oceanography, involves the study of the plants and animals of the sea, including life cycles and food production.

Oceanography is the sum of these several branches. Oceanographic research entails the sampling of seawater and marine life for close study, the remote sensing of oceanic processes with aircraft and Earth-orbiting satellites, and the exploration of the seafloor by means of deep-sea drilling and seismic profiling of the terrestrial crust below the ocean bottom. Greater knowledge of the world's oceans enables scientists to more accurately predict, for example, long-term weather and climatic changes and also leads to more efficient exploitation of the Earth's resources. Oceanography also is vital to understanding the effect of pollutants on ocean waters and to the preservation of the quality of the oceans' waters in the face of increasing human demands made on them.

Oceanside, city, San Diego county, southern California, U.S. Oceanside lies along the Pacific coast, at the mouth of the San Luis Rey River. Bounded to the south by Carlsbad and to the east by Vista, it developed as a beach resort and an agricultural-trade centre after the arrival of the Southern Pacific Railroad in 1883. The city's growth was boosted after the establishment in 1942 of Camp Pendleton (U.S. Marine Corps base) to the north. The nearby Mission San Luis Rey de Francia (founded in 1798 by Father Fermín Francisco de Lasuén, and the 18th in the California chain of 21 missions) has been restored. MiraCosta (junior) College was established in Oceanside in 1934. Inc. city, 1888. Pop. (1992 est.) 133,173.

Oceanus, in Greek mythology, the river that flowed around the Earth (conceived as flat). Beyond it, to the west, were the sunless land of the Cimmerii, the country of dreams, and the entrance to the underworld. In Hesiod's *Theogony,* Oceanus was the son of Uranus (Heaven) and Gaea (Earth), the husband of the Titan Tethys, and father of 3,000 stream spirits and 3,000 ocean nymphs. In Homer's works he was the origin of the gods. As a common noun the word received almost the modern sense of ocean.

ocelot (species *Felis,* or *Leopardis, pardalis*), American cat, family Felidae, found from Texas southward to northern Argentina. The adult ocelot is from 90 to 130 cm (36 to 52 inches) long, excluding the 30–40-centimetre (12–16-inch) tail. It stands about 45 cm (18 inches) at the shoulder; and weighs 11–16 kg (24–35 pounds). Females are generally smaller than males. The colour of the cat's upper parts varies from whitish or tawny yellow to gray. There are small black spots on the head, two black stripes on each cheek, and four or five longitudinal black stripes on the neck. The ocelot's body is patterned with elongate, black-edged spots arranged in chainlike bands. The cat's underparts are whitish, spotted with black, and the tail is marked on the upper surface with dark bars or blotches.



Ocelot (*Felis,* or *Leopardis, pardalis*)
Warren Garst—Tom Stack and Associates

The ocelot climbs well and inhabits forests, grasslands, or brush-covered regions. It hunts chiefly at night, feeding upon small- to medium-sized mammals, birds, reptiles, and fish. Breeding is believed to occur at any season. The gestation period is 70 days. A litter usually contains two or three young, which, although darker, resemble the adult in coat pattern. The ocelot is frequently maintained in captivity. Some individuals are readily tamed, but they may become unreliable in temperament as adults.

The ocelot is declining in numbers throughout most of its range, and one subspecies, the Texas ocelot (*F. p. albescens*), is endangered. Hunting of ocelots and trading in their pelts is prohibited in the United States and most other countries in the animal's range.

The margay (*q.v.*) closely resembles the ocelot in general appearance and range but differs in coloration.

ochetus (music): *see* hocket.

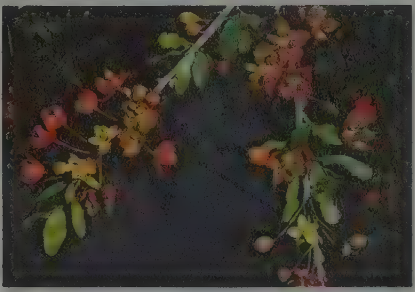
Ochino, Bernardino (b. 1487, Siena [Italy]—d. 1564, Austerlitz, Moravia [now Slavkov u Brna, Czech Republic]), Protestant convert from Roman Catholicism who became an itinerant Reformer and influenced other radical Reformers by his controversial anti-Catholic views.

Taking his surname from the Sienese district dell'Oca, Ochino joined the Franciscan order in the Roman Catholic church about 1504, but in 1534 he left for the stricter Capuchin order, of which he became vicar-general (1538–42). His renown as a preacher soon prompted papal regulation of his appearances.

After being commissioned to read and refute works by Protestant Reformers, and after meeting the Spanish religious writer Juan de Valdés in Naples in 1536, Ochino was converted to Protestantism. At first he withheld his open support because he hoped that Italy would embrace the Protestant cause for reform, but in 1542, when the Roman Inquisition summoned him, he fled over the Alps to the community of John Calvin at Geneva. There he demonstrated his Protestantism by marrying, and in 1545 he was made a pastor in the German community of youthful bankers at Augsburg. Fleeing Augsburg after its fall in the Schmalkaldic War (1546–47), Ochino went to England. There he played a prominent part in the Reformation under King Edward VI, praising the reforms of Edward and Henry VIII in his *Tragoedie or Dialoge of the Unjuste Usurped Primacie of the Bishop of Rome* (1549).

When the Catholic queen Mary I ascended the English throne in 1553, Ochino returned to Europe to become a pastor to Italian refugees at Zürich. He antagonized city officials, however, by strident tracts against the Roman Catholic doctrine of purgatory and by minimizing the differences between Calvinist and Lutheran views concerning the Lord's Supper. Attempting to avoid local censorship, he issued at Basel his *Dialogi XXX* (1563), in one of which he appeared to advocate polygamy. For this and for alleged anti-Trinitarian attitudes he was banished, and in December 1563 he left for Poland, where his *Tragoedie* was published in Polish in an edition adapted to the local situation. Polish Catholics managed to have him banished, and he died from the plague while traveling in Moravia.

Ochnaceae, the most primitive family of the tea order (Theales), comprising some 30 genera and 430 species of tropical trees and shrubs, with a few genera of herbs. Many species are native to Brazil. The largest genus is *Ouratea,* with about 200 species. The tropical African and Asian genus *Ochna* has nearly 90 species. Members of the family usually have alternate, simple leaves with parallel lateral veins. They have clustered flowers, usually with five petals and sepals. Some species of *Ochna* and *Ouratea* are planted as ornamentals.



Ochna atropurpurea
G.R. Roberts

Ochoa, Severo (b. Sept. 24, 1905, Luarca, Spain—d. Nov. 1, 1993, Madrid), molecular biologist who received (with the American biochemist Arthur Kornberg) the 1959 Nobel Prize for Physiology or Medicine for discovery of an enzyme in bacteria that enabled him to synthesize ribonucleic acid (RNA), a substance of central importance to the synthesis of proteins by the cell.

Ochoa was educated at the University of Madrid, where he received his M.D. in 1929.

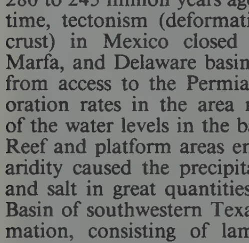
He then spent two years studying the biochemistry and physiology of muscle under the German biochemist Otto Meyerhof at the University of Heidelberg. He also served as head of the physiology division, Institute for Medical Research, at the University of Madrid (1935). He investigated the function in the body of thiamine (vitamin B_1) at the University of Oxford (1938–41) and became a research associate in medicine (1942) and professor of pharmacology (1946) at New York University, New York City, where he became professor of biochemistry and chairman of the department in 1954. From 1974 to 1985 he was associated with the Roche Institute of Molecular Biology; thereafter he taught at the Autonomous University of Madrid. Ochoa became a U.S. citizen in 1956.

Ochoa made the discovery for which he received the Nobel Prize in 1955, while conducting research on high-energy phosphates. He named the enzyme he discovered polynucleotide phosphorylase. It was subsequently determined that the enzyme's function is to degrade RNA, not synthesize it; under test-tube conditions, however, it runs its natural reaction in reverse. The enzyme has been singularly valuable in enabling scientists to understand and re-create the process whereby the hereditary information contained in genes is translated, through RNA intermediaries, into enzymes that determine the functions and character of each cell.

Ochoan Stage, post-Guadalupian time of deposition of the Upper Permian Series of rock strata in the United States, characterized by the development of extensive evaporite deposits (the Permian Period lasted from about 286 to 245 million years ago). During Ochoan time, tectonism (deformation of the Earth's crust) in Mexico closed off the Midland, Marfa, and Delaware basins in the southwest from access to the Permian sea. High evaporation rates in the area resulted in a drop of the water levels in the basins, and Capitan Reef and platform areas emerged. Continued aridity caused the precipitation of anhydrite and salt in great quantities. In the Delaware Basin of southwestern Texas, the Castile Formation, consisting of laminated anhydrite, reaches a thickness of as much as 600 m (2,000 feet), whereas in the eastern portions of the basin, the Salado Formation consists of approximately 720 m (2,400 feet) of salt and interbedded anhydrite.

Ochotskoje More: *see* Okhotsk, Sea of.

Ochs, Adolph Simon (b. March 12, 1858, Cincinnati, Ohio, U.S.—d. April 8, 1935, Chattanooga, Tenn.), American newspaper publisher under whose ownership (from 1896) *The New York Times* became one of the world's outstanding newspapers. Despising "yellow [sensational] journalism," he emphasized comprehensive and trustworthy news gathering.



Adolph Ochs

The New York Times

A son of cultured Jewish immigrants, Ochs delivered newspapers while a schoolboy in Knoxville, Tenn. He became a printer's devil on the Knoxville *Chronicle* in 1872 and later a compositor on the Louisville (Kentucky) *Courier-Journal.* In 1877 he helped to establish the Chattanooga *Dispatch,* and in July 1878, only 20, he borrowed $250 to buy a controlling interest in the moribund *Chattanooga Times,* which he developed into one of the leading newspapers in the South. He was a founder of the Southern Associated Press and was its chairman from 1891 to 1894; from 1900 until his death he was a director of the Associated Press.

On Aug. 18, 1896, Ochs acquired control of the financially faltering *New York Times,* again with borrowed money ($75,000). In competition with the most powerful representatives of the "yellow press," he adopted the slogan "All the News That's Fit to Print" (first used Oct. 25, 1896) and insisted on reportage that lived up to that promise. Despite an early shortage of capital, he refused advertisements that he considered dishonest or in poor taste. In 1898, when sales were low and expenses unusually high, he probably saved *The Times* by cutting its price from three cents to one cent. He thereby attracted many readers who previously had bought the more sensational penny papers, especially the *World* and the *Journal.* By 1900 Ochs was able to purchase controlling interest in *The Times.*

Ochs was responsible for such innovations as a book review supplement and rotogravure printing of pictures. To make accurate source material available to the public, he began in 1913 to publish *The New York Times Index,* the only complete U.S. newspaper index.

Ochs, Peter (b. Aug. 20, 1752, Nantes, France—d. June 19, 1821, Basel, Switz.), Swiss revolutionary who wrote most of the constitution of the unitary Helvetic Republic (1798).

Born in France of a family that claimed roots in the Basel aristocracy, Ochs in 1769 settled in Basel, where, after becoming doctor of laws (1776), he entered into political affairs. Won to the ideas of the Enlightenment, he became an opponent of the "decayed Confederation" and, with the outbreak of the French Revolution, joined the partisans of revolutionary reform in Switzerland. He championed French intervention in the old confederation and urged acceptance of the French Directory's demands for curtailing traditional rights of asylum and expelling émigrés.

In Paris (1796–97) Ochs plotted with Bonaparte the establishment of a Swiss revolutionary government and produced a constitutional draft for the proposed state modeled closely upon the French constitution of 1795. With few emendations, his document was accepted as the charter of the Helvetic Republic (April 12, 1798). In the new regime, Ochs served as first president of the Helvetic Senate and, later, as president of the state executive organ, the Directory. Deposed by the party of Frédéric-César de La Harpe (June 25, 1799), he played a diminishing role in national politics. In Basel, however, he achieved local prominence for his part in devising new governmental and penal codes (1813, 1821) and reorganizing the city university.

Ochsenbein, Ulrich, in full JOHANN ULRICH OCHSENBEIN (b. Nov. 24, 1811, Schwarzenegg, Switz.—d. Nov. 3, 1890, Bellevue, Bern), Swiss politician and military leader who headed the confederation government during the Sonderbund War (1847) and presided over the constitutional reform committee of 1848.

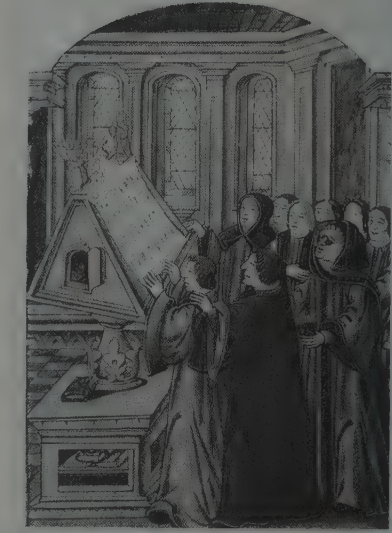
An ardent Bernese radical, Ochsenbein organized and directed an abortive military coup against the clerical government of Luzern (March 1845), precipitating the formation by Roman Catholic cantons of a conservative defense league, the Sonderbund. At Bern he championed the revision of the cantonal constitution (1846) and headed the department of the army. As president of the Bernese government (1847), he simultaneously presided over the confederation Diet during the proscription of the Sonderbund (July 1847) and the initial phase of the subsequent civil war.

Through February–April 1848 Ochsenbein headed the committee of constitutional revision that directed the reorganization of the federal system, and later that year, in the new bicameral Diet, he presided over the Nationalrat (national assembly). Failing subsequent reelection to the Diet (1851, 1854), he retired briefly to France (1855), to which he was to return again in 1870 to command a French contingent in the Franco-Prussian War.

Ochus: *see* Artaxerxes III; Darius II Ochus.

Ockeghem, Jean d', Ockeghem also spelled OKEGHEM (b. *c.* 1410—d. Feb. 6, 1497, Tours, France[?]), composer of sacred and secular music, one of the great masters of the Franco-Flemish style that dominated European music of the Renaissance.

Ockeghem's earliest recorded appointment was as a singer at Antwerp Cathedral (1443–44). He served similarly in the chapel of Charles, Duke de Bourbon (1446–48), and later in the royal chapel. He was chaplain and composer to three successive French kings, Charles VII, Louis XI, and Charles VIII. As treasurer of the wealthy Abbey of Saint-Martin at Tours, he received a handsome salary. Like many of his Flemish contemporaries he traveled widely and used his visits to distant cities to extend his musical knowledge. As a teacher he had great influence on the following generation of composers. His death was mourned in writing by Desiderius Erasmus, whose text was set to music by Johannes Lupi; a *Déploration* by Molinet was set by Josquin des Prez.



Ockeghem (with glasses), detail of a manuscript miniature, late 15th century; in the Bibliothèque Nationale, Paris (MS. Fr. 1537)

By courtesy of the Bibliotheque Nationale, Paris

Ockeghem's surviving works include 14 masses, 10 motets, and 20 chansons. His work sounds richer than that of his predecessors Guillaume Dufay and John Dunstable; during Ockeghem's era the instrumentally supported vocal lines of earlier music were gradually modified to make way for sonorous choral harmony. The bass range in Ockeghem's compositions extends lower than in his predecessors' music, and the tenor and countertenor voices cross in and out of each other, creating a heavier texture. The long melodic lines of the different voices cadence in different places, so that a continuous flow of music results. Melodic imitation occurs here and there but is not prominent. His *Missa prolationum* and *Missa cuiusvis toni* are examples of his highly developed contrapuntal and canonic technique, but the strict device of canon, of which he was a master, is subtly used and is rarely apparent to the listener. He frequently used preexistent material as a device for musical unity.

Ockeghem's ten motets include Marian texts, such as *Ave Maria, Salve regina,* and *Alma redemptoris mater,* and a complete setting of the responsory *Gaude Maria.* Unlike other composers of the early 15th century, he wrote his masses in a style more solemn than that of his secular music. They are normally in four parts (two are in five parts), in contrast to the three parts commonly used in chansons. The melodic lines in the masses are longer than those of the chansons. Melodic imitation is more frequent in the chansons, and the rhythms of the chansons are more straightforward than those of the masses.

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Ockham, William of, also called WILLIAM OCKHAM, Ockham also spelled OCCAM, byname VENERABILIS INCEPTOR (Latin: "Venerable Enterpriser"), or DOCTOR INVINCIBILIS ("Invincible Doctor"), (b. *c.* 1285, Ockham, Surrey?, Eng.—d. 1347/49, Munich, Bavaria [now in Germany]), Franciscan philosopher, theologian, and political writer, a late scholastic thinker regarded as the founder of a form of nominalism—the school of thought that denies that universal concepts such as "father" have any reality apart from the individual things signified by the universal or general term.

Early life. Little is known of Ockham's childhood. It seems that he was still a youngster when he entered the Franciscan order. At that time a central issue of concern in the order and a main topic of debate in the church was the interpretation of the rule of life composed by St. Francis of Assisi concerning the strictness of the poverty that should be practiced within the order. Ockham's early schooling in a Franciscan convent concentrated on the study of logic; throughout his career, his interest in logic never waned, because he regarded the science of terms as fundamental and indispensable for practicing all the sciences of things, including God, the world, and ecclesiastical or civil institutions; in all his disputes logic was destined to serve as his chief weapon against adversaries.

After his early training, Ockham took the traditional course of theological studies at the University of Oxford and apparently between 1317 and 1319 lectured on the *Sentences* of Peter Lombard—a 12th-century theologian whose work was the official textbook of theology in the universities until the 16th century. His lectures were also set down in written commentaries, of which the commentary on Book I of the *Sentences* (a commentary known as *Ordinatio*) was actually written by Ockham himself. His opinions aroused strong opposition from members of the theological faculty of Oxford, however, and he left the university without obtaining his master's degree in theology. Ockham thus remained, academically speaking, an undergraduate—known as an *inceptor* ("beginner") in Oxonian language or, to use a Parisian equivalent, a *baccalaureus formatus.*

Ockham continued his academic career, apparently in English convents, simultaneously studying points of logic in natural philosophy and participating in theological debates. When he left his country for Avignon, Fr., in the autumn of 1324 at the pope's request, he was acquainted with a university environment shaken not only by disputes but also by the challenging of authority: that of the bishops in doctrinal matters and that of the chancellor of the university, John Lutterell, who was dismissed from his post in 1322 at the demand of the teaching staff.

However abstract and impersonal the style of Ockham's writings may be, they reveal at least two aspects of Ockham's intellectual and spiritual attitude: he was a theologian-logician (*theologicus logicus* is Luther's term). On the one hand, with his passion for logic he insisted on evaluations that are severely rational, on distinctions between the necessary and the incidental and differentiation between evidence and degrees of probability—an insistence that places great trust in man's natural reason and his human nature. On the other hand, as a theologian he referred to the primary importance of the God of the creed whose omnipotence determines the gratuitous salvation of men; God's saving action consists of giving without any obligation and is already profusely demonstrated in the creation of nature. The medieval rule of economy, that "plurality should not be assumed without necessity," has come to be known as "Ockham's razor"; the principle was used by Ockham to eliminate many entities that had been devised, especially by the scholastic philosophers, to explain reality.

Treatise to John XXII. Ockham met John Lutterell again at Avignon; in a treatise addressed to Pope John XXII, the former chancellor of Oxford denounced Ockham's teaching on the *Sentences,* extracting from it 56 propositions that he showed to be in serious error. Lutterell then became a member of a committee of six theologians that produced two successive reports based on extracts from Ockham's commentary, of which the second was more severely critical. Ockham, however, presented to the pope another copy of the *Ordinatio* in which he had made some corrections. It appeared that he would be condemned for his teaching, but the condemnation never came.

At the convent where he resided in Avignon, Ockham met Bonagratia of Bergamo, a doctor of civil and canon law who was being persecuted for his opposition to John XXII on the problem of Franciscan poverty. On Dec. 1, 1327, the Franciscan general Michael of Cesena arrived in Avignon and stayed at the same convent; he, too, had been summoned by the pope in connection with the dispute over the holding of property. They were at odds over the theoretical problem of whether Christ and his Apostles had owned the goods they used; that is, whether they had renounced all ownership (both private and corporate), the right of property and the right to the use of property. Michael maintained that because Christ and his Apostles had renounced all ownership and all rights to property, the Franciscans were justified in attempting to do the same thing.

The relations between John and Michael grew steadily worse, to such an extent that, on May 26, 1328, Michael fled from Avignon accompanied by Bonagratia and William. Ockham, who was already a witness in an appeal secretly drafted by Michael on April 13, publicly endorsed the appeal in September at Pisa, where the three Franciscans were staying under the protection of Emperor Louis IV the Bavarian, who had been excommunicated in 1324 and proclaimed by John XXII to have forfeited all rights to the empire. They followed him to Munich in 1330, and thereafter Ockham wrote fervently against the papacy in defense of both the strict Franciscan notion of poverty and the empire.

Instructed by his superior general in 1328 to study three papal bulls on poverty, Ockham found that they contained many errors that showed John XXII to be a heretic who had forfeited his mandate by reason of his heresy. His status of pseudo-pope was confirmed in Ockham's view in 1330–31 by his sermons proposing that the souls of the saved did not enjoy the vision of God immediately after death but only after they were rejoined with the body at the Last Judgment, an opinion that contradicted tradition and was ultimately rejected.

Nevertheless, his principal dispute remained the question of poverty, which he believed was so important for religious perfection that it required the discipline of a theory: whoever chooses to live under the evangelical rule of St. Francis follows in the footsteps of Christ who is God and therefore king of the universe but who appeared as a poor man, renouncing the right of ownership, submitting to the temporal power, and desiring to reign on this earth only through the faith vested in him. This reign expresses itself in the form of a church that is organized but has no infallible authority—either on the part of a pope or a council—and is essentially a community of the faithful that has lasted over the centuries and is sure to last for more, even though temporarily reduced to a few, or even to one; everyone, regardless of status or sex, has to defend in the church the faith that is common to all.

For Ockham the power of the pope is limited by the freedom of Christians that is established by the gospel and the natural law. It is therefore legitimate and in keeping with the gospel to side with the empire against the papacy or to defend, as Ockham did in 1339, the right of the king of England to tax church property. From 1330 to 1338, in the heat of this dispute, Ockham wrote 15 or 16 more or less political works; some of them were written in collaboration, but *Opus nonaginta dierum* ("Work of 90 Days"), the most voluminous, was written alone.

Excommunication. Excommunicated after his flight from Avignon, Ockham maintained the same basic position after the death of John XXII in 1334, during the reign of Benedict XII (1334–42), and after the election of Clement VI. In these final years he found time to write two treatises on logic, which bear witness to the leading role that he consistently assigned to that discipline, and he discussed the submission procedures proposed to him by Pope Clement. Ockham was long thought to have died at a convent in Munich in 1349 during the Black Death, but he may actually have died there in 1347. (P.D.V.)

BIBLIOGRAPHY. Arthur Stephen McGrade, *The Political Thought of William of Ockham: Personal and Institutional Principles* (1974), focuses on Ockham as a political theorist and activist. Gordon Leff, *William of Ockham: The Metamorphosis of Scholastic Discourse* (1975), examines his system of thought. Marilyn McCord Adams, *William Ockham,* 2 vol. (1987), discusses in detail his thinking on a variety of complex topics.

Ockham's razor, also spelled OCCAM'S RAZOR, also called LAW OF ECONOMY, or LAW OF PARSIMONY, principle stated by William of Ockham (1285–1347/49), a scholastic, that *non sunt multiplicanda entia praeter necessitatem; i.e.,* entities are not to be multiplied beyond necessity.

The principle was, in fact, invoked before Ockham by Durand de Saint-Pourçain, a French Dominican theologian and philosopher of dubious orthodoxy, who used it to explain that abstraction is the apprehension of some real entity, such as an Aristotelian cognitive species, an active intellect, or a disposition, all of which he spurned as unnecessary. Likewise, in science, Nicole d'Oresme, a 14th-century French physicist, invoked the law of economy, as did Galileo later, in defending the simplest hypothesis of the heavens. Other later scientists stated similar simplifying laws and principles.

Ockham, however, mentioned the principle so frequently and employed it so sharply that it was called "Ockham's razor." He used it, for instance, to dispense with relations, which he held to be nothing distinct from their foundation in things; with efficient causality, which he tended to view merely as regular succession; with motion, which is merely the reappearance of a thing in a different place; with psychological powers distinct for each mode of sense; and with the presence of ideas in the mind of the Creator, which are merely the creatures themselves.

O'Clery, Michael (b. 1575, Kilbarron, County Donegal, Ire.—d. 1643, Louvain, Brabant), Irish chronicler who directed the compilation of the *Annála Ríoghachta Éireann* (*Annals of the Four Masters,* 1636), a chronicle of Irish history from antiquity to 1616, a work of incalculable importance to Irish scholarship.

He was baptized Tadhg but took the name Michael when he entered the Franciscan convent at Louvain. As he was learned in Irish history and literature, Hugh Macanward, the warden of the college, sent him back to Ireland in 1620 to collect manuscripts. Assisted by other Irish scholars, he began to collect and to transcribe everything of importance he could find. The results were the *Réim Rioghroidhe* (1630; *The Royal List*), a list of kings, their successions, and their pedigrees, with lives and genealogies of saints; the *Leabhar Gabhála* (1631; *Book of Invasions*), an account of the successive settlements of Ireland; and the famous *Annals.* At first a mere record of names, dates, and battles, with occasional quotations from ancient sources, the *Annals* begin to take on the character of modern literary history as they approach the author's own time. O'Clery also produced a martyrology of Irish saints, an Irish glossary, and other works.

Ocoee River, river rising in the Blue Ridge Mountains, 9 mi (14 km) southeast of Blue Ridge city, Ga., U.S., and flowing northwest through Fannin County into Tennessee, past Copperhill, through Polk County, and north to the Hiwassee River, just north of Benton. Along its 90-mi course are four dams—all part of the Tennessee Valley Authority. In northern Georgia (where the river is called the Toccoa) is the Blue Ridge Dam, forming Lake Toccoa; in Tennessee are Ocoee Dam No. 1 (completed 1912), forming Lake Ocoee just south of Benton, Ocoee Dam No. 2 (1913), upstream just north of Copperhill, and Ocoee Dam No. 3 (1943), at Copperhill near the Georgia line. The river's name is probably derived from a Cherokee word meaning "apricot vine place."

O'Connell, Daniel, byname THE LIBERATOR (b. Aug. 6, 1775, near Cahirciveen, County Kerry, Ire.—d. May 15, 1847, Genoa, Kingdom of Sardinia), first of the great 19th-century Irish leaders in the British House of Commons.

Compelled to leave the Catholic college at Douai, Fr., when the French Revolution broke out, O'Connell went to London to study law, and in 1798 he was called to the Irish bar. His forensic skill enabled him to use the courts as nationalist forums. Although he had joined the United Irishmen, a revolutionary society, as early as 1797, he refused to participate in the Irish rebellion of the following year. When the Act of Union (Aug. 1, 1800) abolished the Irish Parliament, he insisted that the British Parliament repeal the anti-Catholic laws in order to justify its claim to represent the people of Ireland. From 1813, however, he opposed various Catholic relief proposals because the government, with the acquiescence of the papacy, would have had the right to veto nominations to Catholic bishoprics in Great Britain and Ireland. Although permanent political organizations of Catholics were illegal, O'Connell set up a nationwide series of "aggregate meetings" to petition for strictly legal purposes.

On May 12, 1823, O'Connell and Richard Lalor Sheil (1791–1851) founded the Catholic Association, which quickly attracted the support of the Irish priesthood and of lawyers and other educated Catholic laymen and which eventually comprised so many members that the government could not suppress it. In 1826, when it was reorganized as the New Catholic Association, it caused the defeat of several parliamentary candidates sponsored by large landowners. In County Clare in July 1828, O'Connell himself, although (as a Catholic) ineligible to sit in the House of Commons, defeated a man who tried to support both the British government and Catholic emancipation. This result impressed on the British prime minister, Arthur Wellesley, 1st duke of Wellington, the need for making a major concession to the Irish Catholics. Following the passage of the 1829 Emancipation Act, O'Connell, after going through the formality of an uncontested reelection, took his seat at Westminster. In April 1835 he helped to overthrow Sir Robert Peel's Conservative ministry, and in the same year he entered into the "Lichfield House compact," whereby he promised the Whig Party leaders a period of "perfect calm" in Ireland while the government enacted reform measures. O'Connell and his Irish adherents (known as "O'Connell's tail") then aided in keeping the weak Whig administration of William Lamb, 2nd viscount Melbourne, in office from 1835 to 1841. By 1839, however, O'Connell realized that the Whigs would do little more than the Conservatives for Ireland, and he founded the Repeal Association to dissolve the Anglo-Irish legislative union. A series of mass meetings in all parts of Ireland led to O'Connell's arrest for seditious conspiracy, but he was released on appeal after three months' imprisonment (June–September 1844). Afterward, his health failed rapidly, and the nationalist leadership fell to the radical Young Ireland group.

O'Connell, portrait miniature by B. Mulrenin, 1836; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Among the lives of O'Connell are those by his son John O'Connell, *The Life and Speeches of Daniel O'Connell, M.P.* (1846), and Denis Rolleston Gwynn, *Daniel O'Connell, The Irish Liberator* (1930).

O'Connor, Feargus Edward (b. *c.* July 18, 1796, Connorville, County Cork, Ire.—d. Aug. 30, 1855, London), prominent Chartist leader who succeeded in making Chartism the first specifically working class national movement in Great Britain.

O'Connor, who claimed royal descent from the ancient kings of Ireland, practiced law but exchanged law for politics when he entered the British Parliament in 1832 as a member for County Cork. Unseated in 1835, O'Connor turned to radical agitation in England, although he continued to press Irish grievances and to seek Irish support. As a result of his humour, invective, and energy, O'Connor became the best known Chartist leader and the movement's most popular speaker. His journal, the *Northern Star* (founded in 1837), gained a wide circulation.

O'Connor's methods and views alienated other Chartist leaders, particularly William Lovett, but in 1841, after spending a year in prison for seditious libel, O'Connor acquired undisputed leadership of the Chartists. Failing to lead the movement to victory and vacillating in his attitude toward the middle class and toward the Charter (a six-point bill drafted and published in May 1838), O'Connor began to lose power, although he was elected to Parliament for Nottingham (1847). The failure of the Charter in 1848 marked the beginning of the end for O'Connor, whose egocentricity was already bordering on madness. Declared insane in 1852, he died three years later.

Feargus O'Connor, detail of an engraving
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Where the same name may denote a person, place, or thing, the articles will be found in that order

O'Connor, (Mary) Flannery (b. March 25, 1925, Savannah, Ga., U.S.—d. Aug. 3, 1964, Milledgeville, Ga.), U.S. novelist and short-story writer whose works, usually set in the rural South and often treating of human alienation, are concerned with the relationship between the individual and God.

After graduating from Georgia State College for Women, Milledgeville, O'Connor studied creative writing at the University of Iowa. Her first published work, a short story, appeared in *Accent* in 1946. Her first novel, *Wise Blood* (1952), explored, in O'Connor's own words, the "religious consciousness without a religion." The work combines the keen ear for common speech, caustic religious imagination, and flair for the absurd that were to characterize her subsequent work. With the publication of further short stories, first collected in *A Good Man Is Hard To Find, and Other Stories* (1955), she came to be regarded as a master of the form. Her other works of fiction are a novel, *The Violent Bear It Away* (1960), and the short-story collection *Everything That Rises Must Converge* (1965). A collection of occasional prose pieces, *Mystery and Manners*, appeared in 1969. *The Complete Stories*, published posthumously in 1971, contained several stories that had not previously appeared in book form.

Crippled for more than a decade by lupus erythematosus, which eventually proved fatal, O'Connor lived modestly, writing and raising peafowl on her mother's ancestral farm. The posthumous publication of her letters, under the title *The Habit of Being*, in 1979, provided valuable insight into the life and mind of a writer whose works defy conventional categorization.

O'Connor, Frank, pseudonym of MICHAEL O'DONOVAN (b. 1903, Cork, County Cork, Ire.—d. March 10, 1966, Dublin), Irish playwright, novelist, and short-story writer who, as a critic and as a translator of Gaelic works from the 9th to the 20th century, served as an interpreter of Irish life and literature to the English-speaking world.

Raised in poverty, a childhood he recounted in *An Only Child* (1961), O'Connor received little formal education before going to work as a librarian in Cork and later in Dublin. As a young man he was briefly imprisoned for his activities with the Irish Republican Army. O'Connor served as a director of the Abbey Theatre, Dublin, in the 1930s, collaborating on many of its productions. During World War II he was a broadcaster for the British Ministry of Information in London. He won popularity in the United States for his short stories, which appeared in *The New Yorker* magazine from 1945 to 1961, and he was a visiting professor at several American universities in the 1950s.

Notable among his numerous volumes of short stories, in which he effectively made use of apparently trivial incidents to illuminate Irish life, are *Guests of the Nation* (1931) and *Crab Apple Jelly* (1944). Other collections of tales were published in 1953, 1954, and 1956. *Collected Stories,* including 67 stories, was published in 1981. He also wrote critical studies of Ivan Turgenev and of Michael Collins and the latter's role in the Irish Revolution. O'Connor's English translations from the Gaelic include one of the 17th-century satire by Brian Merriman, *The Midnight Court* (1945), which is considered by many to be the finest single poem written in Irish. It was included in O'Connor's later collection of translations, *Kings, Lords, and Commons* (1959).

O'Connor, Rory, O'Connor also spelled O'CONOR (high king of Ireland): *see* Roderic O'Connor.

O'Connor, Sandra Day, *née* SANDRA DAY (b. March 26, 1930, El Paso, Texas, U.S.), first woman to become a U.S. Supreme Court justice. She was known as a moderate conservative.

Day grew up on a 160,000-acre family ranch near Duncan, Ariz., and graduated from Stanford University in 1950 and Stanford Law School in 1952, marrying a classmate, John Jay O'Connor III, upon graduation. After pursuing private practice in Maryville, Ariz., she became an assistant attorney general for the state (1965–69) and then a Republican member of the Arizona Senate (1969–74), in which she became the majority leader, the first woman in the United States to hold such a position. Her election as a Superior Court judge in Maricopa County (1974–79) was followed by her appointment to the Arizona Court of Appeals in Phoenix (1979–81). In July 1981 President Ronald Reagan chose her as his first appointee to the U.S. Supreme Court, and, after her confirmation by the Senate, she was sworn in as an associate justice on Sept. 25, 1981. O'Connor proved to be a moderate and pragmatic conservative who sometimes sided with the Court's liberal minority on social issues. She became known for her dispassionate and meticulously researched opinions on the bench.

O'Conor, Rory (high king of Ireland): *see* Roderic O'Connor.

Oconto, city, seat (1851) of Oconto county, northeastern Wisconsin, U.S. It lies on the west shore of Green Bay, at the mouth of the Oconto River, 31 miles (50 km) north-northeast of the city of Green Bay. In 1669 the Jesuit Claude-Jean Allouez established a mission at the site, which was then an Indian village (commemorated by a large rough-hewn cross). The locality was given a Menominee name, meaning "place of the pike fish." The world's first Christian Science Church was erected (1886) in Oconto, which had developed as a lumbering community, and a letter of commendation from Mary Baker Eddy, the founder of Christian Science, has been preserved. The city is now a summer resort with lumber, paper, and dairying interests and some manufacturing (small boats and gloves) and food processing (notably pickles). An Indian burial ground in Oconto was authenticated in the 1960s, and artifacts dating to earlier than 5500 BC are displayed in the Beyer House Museum. Inc. 1869. Pop. (2000) 4,708.

Ocotal, city, northwestern Nicaragua. It lies on a sandy plain near the Cordillera Entre Ríos and the Coco River, at an elevation of 1,987 feet (606 m). Ocotal serves as a manufacturing and commercial centre. Shoes, furniture, and beverages are among its manufactures. Ocotal is accessible by roads leading south to the Pan-American Highway and north to the Honduras border. It was a scene of heavy fighting in 1979 between Sandinista guerrillas and government troops. Pop. (1995) 25,264.

Ocotepeque (city, Honduras): *see* Nueva Ocotepeque.

ocotillo, also called COACHWHIP, JACOB'S STAFF, or VINE CACTUS (*Fouquieria splendens*), flowering spiny shrub characteristic of rocky deserts from western Texas to southern California and southward into Mexico. It is a member of the candlewood family (Fouquieriaceae), which belongs to the order Tamaricales. Near the plant's base the stem divides into several slender, erect, widespreading, intensely spiny branches, usually about 2.5 to 6 m (8 to 20 feet) long. The branches bear small, rounded leaves, which fall soon after the end of the winter rainy season, leaving behind the leaf stalks, which harden and develop into stout spines. The bright scarlet flowers are in showy branched terminal clusters 15 to 25 cm (6 to 10 inches) long. Ocotillo is grown as a hedge plant and occasional ornamental in its native range. *See also* Tamaricales.

Ocotillo (*Fouquieria splendens*)
Alan Pitcairn from Grant Heilman—EB Inc.

Ocotlán, city, east-central Jalisco *estado* ("state"), west-central Mexico. It lies near the northeastern shore of Lake Chapala, at the confluence of the Zula (or Atotonilco) and Santiago rivers, and is most important as a transportation hub. As the gateway to the Chapala resort district, it has considerable tourist traffic. A railroad and a highway from Mexico City to Guadalajara, the state capital, to the northwest, pass through Ocotlán, which is also the terminus of a branch rail line to the town of Atotonilco el Alto (northeast). The city has an airfield. The economy is based on industries, agriculture, fishing, and aviculture, making Ocotlán the major settlement on the lake. Pop. (2000 prelim.) 76,000.

octachlor (insecticide): *see* chlordane.

octahedrite, any iron meteorite containing between 6 and 11 percent nickel and having an eight-sided crystal structure. Etching a polished surface brings out an unusual design called the Widmanstätten pattern, which results from the presence of a system of lamellae parallel to the faces of an octahedron. The classification of the octahedrites is based on the width of the lamellae. Besides nickel-iron, major minerals in octahedrites are troilite and schreibersite.

octane number, also called ANTIKNOCK RATING, measure of the ability of a fuel to resist knocking when ignited in a mixture with air in the cylinder of an internal-combustion engine. The octane number is determined by comparing, under standard conditions, the knock intensity of the fuel with that of blends of two reference fuels: iso-octane, which resists knocking, and heptane, which knocks readily. The octane number is the percentage by volume of iso-octane in the iso-octane–heptane mixture that matches the fuel being tested in a standard test engine. *See also* knocking.

octave, in music, an interval whose higher note has a sound-wave frequency of vibration double that of its lower note. Thus, the note a vibrates at 220 hertz [cycles per second], while its octave, a′, vibrates at 440 hertz.

Because of the close acoustical relation between the two notes, the second is perceived by the listener as identical with the first at a higher pitch. The octave encompasses a variety of musical scales, including the church modes and major and minor scales of Western music. The octave encompasses eight notes of a scale in Western music. It is the only interval to appear as a constant in the musical scales of nearly every culture.

octave species, in early Greek music theory, any of the various arrangements of tones (T) and semitones (S) within an octave (series of eight consecutive notes) in the scale system. The basic Greek scale ranged two octaves and was called the Greater Perfect System. Central to the scale system was the octave E above middle C to the E below (conventionally denoted e′–e), the interval arrangement (descending, T–T–S–T–T–T–S) of which made up the Dorian octave species. The series of notes from d′–d, with the arrangement T–S–T–T–T–S–T, was the Phrygian octave species. Other species were: a′–a, Hypodorian; g′–g, Hypophrygian; f′–f, Hypolydian; c′–c, Lydian; and b–B, Mixolydian. All of these different arrangements of tones and semitones could be transposed to the octave e′–e, which was central to the performance of Greek music (*tonos*).

The name mode has been applied by some modern writers to the octave species as well as to other concepts in Greek music, such as *harmonia* and *tonos* (*qq.v.*).

octaves, law of, in chemistry, the generalization made by the English chemist J.A.R. Newlands in 1865 that, if the chemical elements are arranged according to increasing atomic weight, those with similar physical and chemical properties occur after each interval of seven elements. Newlands was one of the first to detect a periodic pattern in the properties of the elements and anticipated later developments of the periodic law.

Octavia, byname OCTAVIA MINOR (b. *c.* 69 BC—d. 11 BC), full sister of Octavian (later the emperor Augustus) and wife of Mark Antony.

Octavia was the daughter of Gaius Octavius and his second wife, Atia. Before 54 BC Octavia was married to Gaius Marcellus, by whom she had two daughters and a son. On the death of Marcellus in 40 she was married to Marcus Antonius (Mark Antony), who at the time was ruling the Roman state with Octavian and Marcus Aemilius Lepidus. At first this marriage helped to reduce tensions between Antony and Octavian, and, when the two rulers quarreled in 37, Octavia brought about peace between them, which resulted in the Treaty of Tarentum. But in 36 Antony left Italy to command troops in Parthia and while in the East resumed his liaison with the Egyptian queen Cleopatra. Although Octavia brought troops and money to him (35), he refused to see her, and in 32 he obtained a divorce. Octavia was a faithful wife and mother who raised Antony's children by Cleopatra along with her own children. After the death of her son Marcellus in 23, she withdrew from public life.

Octavian, Latin in full GAIUS OCTAVIUS (Roman emperor): *see* Augustus Caesar *under* Augustus (Roman Empire).

octet, in chemistry, the eight-electron arrangement in the outer electron shell of the noble-gas atoms. This structure is held responsible for the relative inertness of the noble gases and the chemical behaviour of certain other elements. The chemical elements with atomic numbers close to those of the noble-gas elements tend to combine with other such elements by losing, gaining, or sharing electrons; as a result of these processes their atoms attain the eight-outer-electron configuration of the noble-gas atoms. This observation, published in separate papers (1916) by the German chemist Walther Kossel and the American chemist Gilbert Newton Lewis, is known as the rule of eight, or octet rule, and is used to determine the valence, or combining capacity, of several chemical elements.

October, 10th month of the Gregorian calendar. *See* month.

October Manifesto, Russian OKTYABRSKY MANIFEST (Oct. 30 [Oct. 17, Old Style], 1905), in Russian history, document issued by the emperor Nicholas II that in effect marked the end of unlimited autocracy in Russia and ushered in an era of constitutional monarchy. Threatened by the events of the Russian Revolution of 1905 (*q.v.*), Nicholas faced the choice of establishing a military dictatorship or granting a constitution. On the advice of Sergey Yulevich Witte, he issued the October Manifesto, which promised to guarantee civil liberties (*e.g.,* freedom of speech, press, and assembly), to establish a broad franchise, and to create a legislative body (the Duma [*q.v.*]) whose members would be popularly elected and whose approval would be necessary before the enactment of any legislation.

The manifesto satisfied enough of the moderate participants in the revolution to weaken the forces against the government and allow the revolution to be crushed. Only then did the government formally fulfill the promises of the manifesto. On April 23, 1906, the Fundamental Laws, which were to serve as a constitution, were promulgated. The Duma that was created had two houses rather than one, however, and members of only one of them were to be popularly elected. Further, the Duma had only limited control over the budget and none at all over the executive branch of the government. In addition, the civil rights and suffrage rights granted by the Fundamental Laws were far more limited than those promised by the manifesto.

October Revolution, also called BOLSHEVIK REVOLUTION (Oct. 24–25 [Nov. 6–7, New Style], 1917), the second and last major phase of the Russian Revolution of 1917, in which the Bolshevik Party seized power in Russia, inaugurating the Soviet regime. *See* Russian Revolution of 1917.

Octobrist, Russian OKTYABRIST, also called UNION OF OCTOBER 17, member of a conservative-liberal Russian political party whose program of moderate constitutionalism called for the fulfillment of the emperor Nicholas II's October Manifesto (*q.v.*). Founded in November 1905, the party was led by the industrialist Aleksandr Ivanovich Guchkov and drew support from liberal gentry, businessmen, and some bureaucrats. As the majority party in the third and fourth Dumas (1907–17), the Octobrists favoured a legislature with real power but insisted that the executive be responsible to the emperor only. The Octobrists, increasingly alienated from the government, finally joined the Kadets (Constitutional Democrats) in the Progressive Bloc (*q.v.*) of 1915, which called for more representative leadership and new reforms.

octopus, plural OCTOPUSES, or OCTOPI, in general, any eight-armed cephalopod (octopod) mollusk of the order Octopoda; the true octopuses are members of the genus *Octopus,* a large group of widely distributed, shallow-water cephalopods. (*See* cephalopod.)

Octopuses vary greatly in size; the smallest, *O. arborescens,* is about 5 cm (2 inches) long, while the largest species may grow to 5.4 m (18 feet) in length and have an armspan of almost 9 m (30 feet). The typical octopus has a saccular body: the head is only slightly demarcated from the body and has large, complex eyes and eight contractile arms. Each arm bears two rows of fleshy suckers that are capable of great holding power. The arms are joined at their bases by a web of tissue known as the skirt, at the centre of which lies the mouth. The latter organ has a pair of sharp, horny beaks and a filelike organ, the radula, for drilling shells and rasping away flesh.

The octopus takes water into its mantle and expels the water after respiration through a short funnel called a siphon. Most octopuses move by crawling along the bottom with their suckers, though when alarmed they may shoot swiftly backward by ejecting a jet of water from the siphon. When endangered, they eject an inky substance, which is used as a screen; the substance produced by some species paralyzes the sensory organs of the attacker.

Octopus granulatus, a South African species

Anthony Bannister from the Natural History Photographic Agency—EB Inc.

The best-known octopus is the common octopus, *O. vulgaris,* a medium-sized species that is widely distributed in tropical and temperate seas throughout the world. It lives in holes or crevices along the rocky bottom and is secretive and retiring by nature. It feeds mainly on crabs and other crustaceans. This species is thought to be the most intelligent of all invertebrate animals. *O. vulgaris* also has highly developed pigment-bearing cells and can change its skin colours to an astonishing degree with great rapidity.

Octopuses have separate sexes, and the male has a specially modified arm, called a hectocotylus, by means of which it inserts spermatophores, or packets of sperm, directly into the mantle cavity of the female. *O. vulgaris* mates during the winter, and the eggs, about 0.3 cm (⅛ inch) long, are laid under rocks or in holes, the total number of eggs amounting to more than 100,000. During the four to eight weeks required for the larvae to hatch, the female guards the eggs, cleaning them with her suckers and agitating them with water. Upon hatching, the tiny octopods, which closely resemble their parents, must spend several weeks in the drifting plankton before taking refuge on the bottom.

Octopuses feed mainly upon crabs and lobsters, although some are plankton feeders, and they are fed upon by a number of marine fishes. They have long been considered a culinary delicacy by peoples of the Mediterranean, the Orient, and other parts of the world.

octroi, tax levied by a local political unit, normally the commune or municipal authority, on certain categories of goods as they enter the area. The tax was first instituted in Italy in Roman times, when it bore the title of *vectigal,* or *portorium.* Octrois were still in existence in France, Italy, Spain, Portugal, and Austria after World War II, but there has been a marked tendency toward reduction of their area of operation, and in some cases they have been completely suppressed. The cost of tax collection is unduly high in relation to the yield, the levy process sometimes absorbing 50 percent of tax revenues.

Oculi, Okello (b. 1942, Dokolo county, Lango district, Northern Uganda), Ugandan novelist, poet, and chronicler of African rural village life. His writing is filled with authentic snatches of conversation, proverbs, and folk wisdom that confirm African values and denounce European imitations.

Oculi was educated locally at Soroti College and at St. Peter's College in Tororo, St. Mary's College in Kisubi, and Makerere University in Kampala, where he edited the university journal, *The Makererean.* He also studied abroad at Stanford University in California and at the University of Essex in England. At the latter, Oculi wrote *Prostitute* (1968), a novel dealing with the plight of the uprooted who have left home for the lure of the city, and *Orphan* (1968), a dramatic, symbolic tale in lively free verse about modern urbanized Africa. His later books include *Kanti Riti* (1974), *Malak* (1977), and *Kookolem* (1978).

oculus (Latin: "eye"), in architecture, any of several structural elements resembling an eye. A small window that is circular or oval in shape, such as an oeil-de-boeuf window (*q.v.*), is an oculus. The round opening at the top of some domes, or cupolas, is also an oculus; one example of this kind is found in the Pantheon, in Rome.

The capital of every Ionic column features a characteristic pair of volutes, or spiral scrolls, at the centre of each of which is an eye, or disk, also known as an oculus.

O'Curry, Eugene (b. 1796, Dunaha, County Clare, Ire.—d. July 30, 1862, Dublin), Irish Gaelic scholar and industrious copyist and translator of Old Irish manuscripts whose works had an important influence on the revival of the Gaelic language and literature and contributed to the late 19th-century Irish literary renaissance.

O'Curry examined and arranged many of the Irish manuscripts in the Royal Irish Academy and Trinity College library and compiled the catalog of those in the British Museum. In 1854 he was appointed professor of Irish history and archaeology in the new Catholic University of Ireland. His lectures, which give a full account of the medieval chronicles, historical romances, tales, and poems, were published in 1861. Subsequent volumes entitled *On the Manners and Customs of the Ancient Irish* appeared in 1873.

Oda Nobunaga, original name KICHIHŌSHI, later SABURŌ (b. 1534, Owari Province, Japan—d. June 21, 1582, Kyōto), Japanese warrior, member of the Fujiwara family, who overthrew the Ashikaga shogunate and ended a long period of feudal wars by unifying half of Japan's provinces under his rule. As virtual dictator, Nobunaga restored stable government and established the conditions that led to the unification of the country.

Oda Nobunaga, portrait by Kano Munehide, 1583; in the collection of the Chōkō-ji, Aichi Prefecture

By courtesy of the International Society for Educational Information, Tokyo, Inc.

Nobunaga was the son of a government official who had amassed wealth and a respectable force of military retainers. In 1549 Nobunaga succeeded to his father's estate and soon overpowered his relatives and the principal family of the province. By 1560 he had proved his brilliant strategic gifts by bringing all of Owari under his sway; and in the same year he astonished all of Japan by defeating the huge forces of Imagawa Yoshimoto, one of the overlords of his neighbourhood provinces. This was his first step toward unification of the country.

Stout-hearted, audacious, and autocratic, Nobunaga was quick to seize on any promising new invention. He was the first of the daimyo (feudal barons) to organize units equipped with muskets. He also brought under his control the agricultural production of the fertile Owari plain, as well as the rising merchant class of the city of Nagoya in the centre of the plain. With an economic base thus assured, he planned to advance on the Kinki district, the prosperous area surrounding Kyōto, long the centre of Japanese power.

In 1562 he entered into an alliance with Tokugawa Ieyasu, a capable feudal lord of the neighbouring province of Mikawa, and in 1567 Nobunaga, feeling that he had secured his rear flank, moved his base of operations north to the city of Gifu. In the following year he supported Ashikaga Yoshiaki, who hoped to become shogun after the assassination of his elder brother, the former shogun Ashikaga Yoshiteru. Nobunaga marched on Kyōto, the capital, and made Yoshiaki shogun. Soon, however, he fell out with Yoshiaki, and at last in 1573 he deposed him. This marked the end of the Ashikaga shogunate, even though it nominally lasted until Yoshiaki's death in 1597. In 1576, in order to consolidate his hold on the area, Nobunaga built for his headquarters a magnificent castle at Azuchi on the shore of Lake Biwa near the capital.

Meanwhile, Nobunaga promoted a new economic policy by abolishing the collection of tolls on the roads and from the guilds, both of which had been privileged sources of income for the local daimyo. He also strengthened his military forces, and in 1571 he destroyed the monastaries of the Enryaku-ji, the headquarters of the Tendai sect of Japanese Buddhism; the sect had been a traditional power in politics and religion since the beginning of the Heian period in the 8th century. In the meantime, the fanatically religious Ikkō sect held out against Nobunaga's attempts to unify the country by retaining the loyalty of minor local lords, extending its secular power, by aiding Yoshiaki, and by allying its members with the powerful daimyo of many provinces. In all, Nobunaga fought the Ikkō sect directly and indirectly for more than 10 years. It was only through the mediation of the Imperial court that Nobunaga in 1580 finally achieved the surrender of the fortress-monastery of Honganji at Ōsaka, the most important political and military centre of the Ikkō. After capturing a great number of manors and temple estates, Nobunaga established his hold on the samurai and the wealthier farmers by investing them with the newly won estates. He thus gained a firm political and economic basis, which he strengthened by reducing even further the traditional influence of the Buddhist temples.

Once established in Kyōto, he extended his protection to the Jesuit missionaries and assisted them in building a church in the capital and a seminary in Azuchi. He did so not only because of his interest in European culture but because he regarded the encouragement of Christianity as a further means of restraining the influence of the Buddhist temples. Nobunaga was a non-believer; his attitude toward Christianity was frankly political.

By the spring of 1582 he had conquered central Japan and was attempting to extend his hegemony over western Japan. In June of that year, however, he was wounded during the rebellion of a discontented vassal and committed suicide. By the time of his death Nobunaga had succeeded in bringing nearly half of the provinces of Japan under his control. He had overthrown the old order of fractionized power held by the daimyo and had paved the way for the political and economic unification of the country. (A.Eb.)

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Odaenathus, Septimius, Odaenathus also spelled ODENATHUS, or ODAINATH (d. 267/268), prince of the Roman colony of Palmyra (*q.v.*), in what is now Syria, who prevented the Sāsānian Persians from permanently conquering the eastern provinces of the Roman Empire.

A Roman citizen and a member of Palmyra's ruling family, Odaenathus had by 258 attained consular rank and become ruler of Palmyra. When the Roman emperor Valerian was captured by the Sāsānian king Shāpūr I (260), Odaenathus remained loyal to the Romans in order to prevent his city from falling under Sāsānian control. In 260 he inflicted a severe defeat on Shāpūr's army as it was returning home after sacking Antioch. When he then defeated the usurping emperor Quietus at Emesa (now Homs, Syria), Valerian's son and successor, Gallienus, rewarded the Palmyrene ruler with the title *corrector totius Orientis* ("governor of all the East"); in addition, Odaenathus styled himself king of Palmyra and, eventually, king of kings. Beginning in 262 he drove the Persians from the Roman provinces of Mesopotamia and Osroëne, and he probably also brought Armenia back into the empire. Although he failed to seize the Sāsānian capital of Ctesiphon, he had managed to restore Roman rule in the East. Odaenathus was preparing to drive Gothic invaders from the Roman province of Cappadocia in eastern Asia Minor when he and his eldest son, Herodes, were assassinated. After his death, his wife, Zenobia (*q.v.*), made Palmyra an independent kingdom before she was subjugated by the Romans in 272.

odalisque, in painting, type of female figure, nude or clothed, distinguished by a Middle Eastern setting and dress and a markedly voluptuous characterization; the word odalisque is a French corruption of the Turkish word for a concubine in a sultan's harem. The subject first became popular in Western painting in France in the early 19th century and was particularly favoured by the French painters J.-A.-D. Ingres, Eugène Delacroix, Pierre-Auguste Renoir, and Henri Matisse.

"La Grande Odalisque," oil painting by Jean-Auguste-Dominique Ingres, 1814; in the Louvre, Paris

Giraudon—Art Resource

O'Daly, Carroll: *see* O Dalaigh, Cearbhall.

Odantapurī, also spelled UḌḌANDAPURA, in ancient times a celebrated Buddhist centre of learning (*vihāra*) in India, identified with modern Bihār town in the Patna district of Bihār state. It was founded in the 7th century AD by Gopāla, the first ruler of the Pāla dynasty, no doubt in emulation of its neighbour Nālandā, another distinguished centre of Buddhist learning.

Odantapurī served as a model and inspiration for Tibetan Buddhists. Tibetan sources indicate that in 749 the Sam-Ye (Bsam-Yas) monastery was modelled upon it and that several distinguished Tibetan scholars studied there. It fell into decline during the 11th century, and it was probably sacked and destroyed, along with Nālandā, *c.* 1200, when Muslims under Ikhtiyār-ud-Dīn Muḥammad Bakhtiyār Khaljī invaded Bihār.

Ōdate, city, Akita *ken* (prefecture), Honshu, Japan, on the Yoneshiro-gawa (Yoneshiro River). As a castle town during the Tokugawa era (1603–1867), it served as a market for the surrounding agricultural region. The city is now a lumbering centre and is known for the production of wood products. Iron ore was discovered in the vicinity in 1962, and the city serves as a trade centre for the copper, lead, and zinc mined along the upper Yoneshirogawa. Ōdate is the home of a breed of domestic dog known as Akita. Pop. (1995 prelim.) 67,214.

Odawara, city, Kanagawa *ken* (prefecture), Honshu, Japan, on the coast of Sagami Bay, between the Sakawa and Haya rivers. The city was a local political centre during the Kamakura era (1192–1333), and in the early 15th century a castle was built there. Consequently, Odawara grew to be an economic and cultural hub of the southern Kantō region. It served as a post town on the Tōkaidō (Eastern Sea Highway) during the Tokugawa era (1603–1867). Since the late 19th century the traditional manufacture of foods and textiles has been industrialized, particularly in the Sakawa-gawa (Sakawa River) area, and the city has become a residential suburb of the Tokyo–Yokohama Metropolitan Area.

The castle at Odawara, Japan
FPG—EB Inc.

Odawara is a gateway to the Hakone resort area. Its castle, restored in 1960, lies in a public park renowned for its apricot and cherry trees. At the entrance to the park is the Hotoku Ninomiya Shrine, dedicated to the agronomist Ninomiya Sontoku, who was born in the Odawara area. Pop. (1995 prelim.) 200,092.

ode, ceremonious poem on an occasion of public or private dignity in which personal emotion and general meditation are united. The Greek word *ōdē,* which has been accepted in most modern European languages, meant a choric song, usually accompanied by a dance. Alcman (7th century BC) originated the strophic arrangement of the ode, which is a rhythmic system composed of two or more lines repeated as a unit; and Stesichorus (7th–6th centuries BC) invented the triadic, or three-part, structure (strophic lines followed by antistrophic lines in the same metre, concluding with a summary line, called an epode, in a different metre) that characterizes the odes of Pindar and Bacchylides. Choral odes were also an integral part of the Greek drama. In Latin the word was not used until about the time of Horace, in the 1st century BC. His carmina ("songs"), written in stanzas of two or four lines of polished Greek metres, are now universally called odes, although the implication that they were to be sung to the accompaniment of a lyre is probably only a literary convention. Both Pindaric and Horatian ode forms were revived during the Renaissance and continued to influence lyric poetry into the 20th century. The first version of Allen Tate's widely acclaimed "Ode to the Confederate Dead," for example, was published in 1926.

In pre-Islāmic Arabic poetry, the ode flourished in the form of the *qaṣīdah.* Two great collections date from the 8th and 9th centuries. The *qaṣīdah* was also used in Persian poetry for panegyric and elegies in the 10th century, gradually being replaced by the shorter *ghazal* for bacchic odes and love poetry. In the hands of Indian poets from the 14th century onward, Persian forms became increasingly obscure and artificial.

Odeca: *see* Central American States, Organization of.

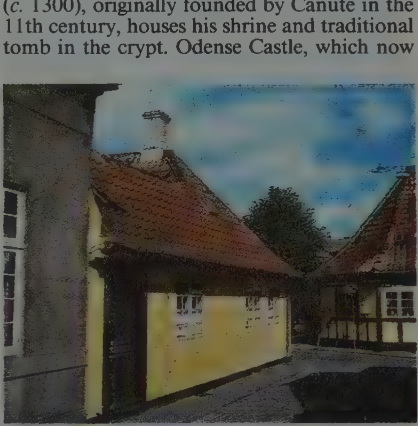
Odenathus, Septimius: *see* Odaenathus, Septimius.

Ödenburg (Hungary): *see* Sopron.

Odendaalsrus, town and mining centre of the Free State goldfields, north central Orange Free State, South Africa, at 4,411 ft (1,344 m) above sea level. Although it obtained municipal status in 1912, Odendaalsrus remained little more than a village until 1946, when a highly profitable goldfield was discovered 2 mi (3 km) away. It grew rapidly and is now a modern planned town. Its population is predominantly black. Pop. (latest est.) mun., 21,249.

Odense, city, seat of Fyns *amtskommune* (county), northern Fyn (Funen) Island, Denmark, on the Odense Å (river). The site was sacred in pagan times as the *vi,* or sanctuary, of Odin, the Norse god of war, but was first recorded in history *c.* AD 1000. A bishop's seat from the 10th century, it became a centre for religious pilgrimages in the Middle Ages after the canonization of Canute (Knud) II, who was murdered before the high altar in St. Alban's Church in 1086. Odense was burned (1247) during a royal rivalry but recovered to thrive as a commercial centre in the 16th and 17th centuries (it had been chartered in 1335). Growth and trade were stimulated when it became a port with the construction of the harbour and the opening of the Odense Canal (1804). Industries include manufacturing (tobacco, textiles, sugar), iron foundries, shipbuilding yards, and meat and fish canneries.

The Gothic St. Canute's (Knud's) Cathedral (*c.* 1300), originally founded by Canute in the 11th century, houses his shrine and traditional tomb in the crypt. Odense Castle, which now houses the county administrative offices, was rebuilt by Frederick IV in 1720, partly on the foundations of St. Hans's Monastery (13th century), which was built together with St. Hans's Church by the Knights Hospitallers. Other notable remains in the city include a Franciscan monastery (founded 1279, now an almshouse) and a 12th-century Benedictine monastery.


Hans Christian Andersen's house (centre), Odense, Den.
Harrison Forman

The home of the writer Hans Christian Andersen (born in Odense in 1805), famous for his fairy tales, is now a museum. There are also an open-air museum (Funen Village) and museums of art, archaeology, railway lore, and history. The University of Odense, Denmark's third, was founded in 1964; medical and humanities facilities were added later. Pop. (2000 est.) city, 145,062; mun., 183,912.

Odenwald, wooded upland region in Germany, about 50 mi (80 km) long and 25 mi wide, situated mainly in Hesse *Land* (state) with small portions extending into the states of Bavaria and Baden-Württemberg. A popular tourist area, it extends between the Neckar and the Main rivers and overlooks the Rhine Valley. The highest points are Katzenbuckel (2,054 ft [626 m]), Neunkircher Höhe (1,985 ft), and Krähberg (1,821 ft). The range is bounded against the Rhine by a rich and densely settled ancient migration route called the Bergstrasse (literally "mountain street"), along which Bensheim, Heppenheim, and Weinheim are the major towns. The wooded heights overlooking the Bergstrasse are studded with castles and medieval ruins. Orchards and vineyards lie along the western slope, and much of the range is contained within the Bergstrasse-Odenwald Naturpark.

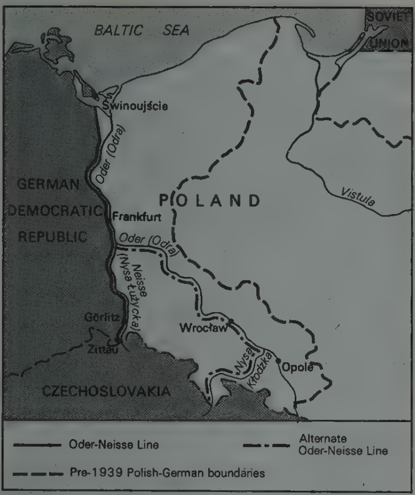
The Odenwald, ancient hunting ground of the Nibelungen (Burgundians), was the background for the 13th-century epic poem *Nibelungenlied.* The Nibelungenstrasse, a road from west to east between Worms and Würzburg, is marked for tourists according to the events of the poem, though they probably occurred elsewhere in the Odenwald. Another legendary figure, popularized in the 19th century by Victor von Scheffel, was the "Wild Huntsman of Rodenstein," who supposedly galloped with fearful din to Schnellerts castle, which now lies in ruins northwest of the village of Reichelsheim.

Oder–Havel Canal, German waterway northeast of Berlin, linking the Havel and Oder rivers. It is 52 mi (83 km) long, 108 ft (33 m) wide, and 6½ ft deep, and is navigable for vessels of up to 1,000 tons. Originally called the Hohenzollern Canal, it was built in 1908–14 to carry traffic between Berlin on the Havel and the Baltic Sea port of Stettin (Szczecin, Pol.) at the mouth of the Oder. It declined in importance until 1945 but then revived with the growth of a chemical industry at Schwedt, on the eastern part of the canal near the Polish border.

Oder–Neisse Line, Polish–German border devised by the Allied powers at the end of World War II; it transferred a large section of German territory to Poland and was a matter of contention between the Federal Republic of Germany (West Germany) and the Soviet bloc for 15 years.

At the Yalta Conference (February 1945) the three major Allied powers—Great Britain, the Soviet Union, and the United States—moved back Poland's eastern boundary with the Soviet Union to the west, placing it approximately along the Curzon Line. Because this settlement involved a substantial loss of territory for Poland, the Allies also agreed to compensate the reestablished Polish state by moving its western frontier farther west at the expense of Germany.

But the western Allies and the Soviet Union



The Oder-Neisse Line, 1945

sharply disagreed over the exact location of the new border. The Soviets pressed for the adoption of the Oder-Neisse Line—*i.e.,* a line extending southward from Świnoujście on the Baltic Sea, passing west of Szczecin, then following the Oder (Polish: Odra) River to the point south of Frankfurt where it is joined by the Lusatian Neisse (Polish: Nysa Łużycka) River, and proceeding along the Neisse to the Czechoslovakian border, near Zittau. The United States and Great Britain warned that such a territorial settlement not only would involve the displacement of too many Germans but also would turn Germany into a dissatisfied state anxious to recover its losses, thereby endangering the possibilities of a long-lasting peace. Consequently, the western Allies proposed an alternate border, which extended along the Oder River and then followed another Neisse River (the Glatzer Neisse, or Nysa Kłodzka), which joined the Oder at a point between Wrocław (Breslau) and Opole. No decision on the German-Polish border was reached at Yalta.

By the time the Allied leaders assembled again at the Potsdam Conference in July–August 1945, the Soviet Red Army had occupied all the lands east of the Soviet-proposed Oder-Neisse Line, and the Soviet authorities had transferred the administration of the lands to a pro-Soviet Polish provisional government. Although the United States and Great Britain strenuously protested the unilateral action, they accepted it and agreed to the placement of all the territory east of the Oder-Neisse Line under Polish administrative control (except the northern part of East Prussia, which was incorporated into the Soviet Union). The Potsdam conferees also allowed the Poles to deport the German inhabitants of the area to Germany. But they left the drawing of the final Polish-German border to be determined by a future peace conference.

The German Democratic Republic (East Germany) signed a treaty with Poland at Zgorzelec (German: Görlitz) on July 6, 1950, that recognized the Oder-Neisse Line as its permanent eastern boundary. West Germany insisted, however, that the line was only a temporary administrative border and was subject to revision by a final peace treaty. West Germany continued to refuse to recognize the line until 1970. At that time, the West German government, which for several years had been striving to improve its relations with the eastern European states, signed treaties with the Soviet Union (Aug. 12, 1970) and Poland (Dec. 7, 1970) acknowledging the Oder-Neisse Line as Poland's legitimate and inviolable border. This recognition was confirmed in the negotiations leading to German reunification in 1990.

Oder River, Polish and Czech ODRA, major river of northern Europe, flowing some 531 miles (854 km) from its source in the Oder Mountains of the Hrubý Jeseník Range in the Czech Republic northwestward to the Baltic Sea.

A brief treatment of the Oder River follows. For full treatment, *see* MACROPAEDIA: Europe.

Known in ancient times as the Viadua, the river has played an important role in many ages and cultures. From the origin of the Polish state in the 9th and 10th centuries, the Oder formed its boundary with the Germanic states to the west. From the German expansion of the 13th century until the Potsdam settlement of August 1945, the Oder was essentially a German river. Following Germany's defeat in World War II, however, it was formally recognized as the Polish-German border by East Germany in 1950 and by West Germany in 1970 (*see also* Oder-Neisse Line).

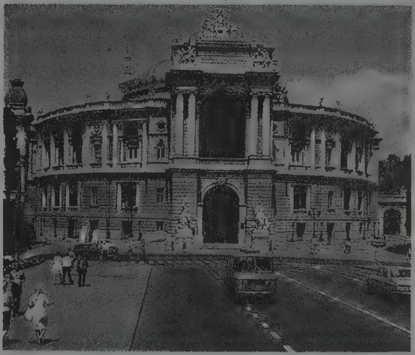
As the second largest river emptying into the Baltic (after the Vistula), the Oder is of considerable economic importance as a transportation route. It is navigable for 475 miles (765 km) from its mouth, and it is connected by canal with the Vistula and with the western European waterway system. It serves chiefly the major Polish industrial region of Silesia (Śląsk). In its lower reaches the Oder is heavily channelized and served by systems of locks. Reservoirs in higher regions help maintain the river's flow in dry seasons.

Oderhaff (Baltic Sea): *see* Szczeciński Lagoon.

Odessa, *oblast* (province) in southwestern Ukraine. The *oblast* is bordered by the Black Sea on the east and southeast, by Moldova on the west, and by the Romanian frontier on the Danube River delta on the southwest. The *oblast* is divided by the Dniester River estuary, which lies across its narrow "waist." The southwestern part of the *oblast* is a coastal plain that slopes gently to the Black Sea. In the northwest the *oblast* extends inland to the southern hills of the Volyn-Podolsk Upland. The Black Sea coast is low, with rapidly silting lagoons and estuaries enclosed by long sandbars. The entire *oblast* lies in the steppe on fertile soils, and little land remains unplowed. The climate is dry, and there is little surface water; all but the largest rivers tend to dry out in summer. Agriculture is intensive in Odessa and is dominated by winter wheat, corn (maize), and barley; sunflowers and sugar beets constitute the main industrial crops. Intensive market gardening is carried on throughout the *oblast,* and there are many orchards and vineyards in the southwest. Livestock husbandry is well developed. Towns serve as small centres of food processing, with the notable exception of the great industrial port of Odessa, the *oblast*'s administrative centre, in which nearly two-thirds of the region's urban population is located. Area 12,850 square miles (33,300 square km). Pop. (1991 est.) 2,635,300.

Odessa, seaport and administrative centre of Odessa *oblast* (province), southwestern Ukraine. It stands on a shallow indentation of the Black Sea coast at a point approximately 19 miles (31 km) north of the Dniester River estuary and about 275 miles (443 km) south of Kiev. Although a settlement existed on the site in ancient times, the history of the modern city began in the 14th century when the Tatar fortress of Khadzhibey was established there; it later passed to Lithuania-Poland and in 1764 to Turkey. The fortress was stormed by the Russians in 1789 and ceded to Russia in 1791. A new fortress was built in 1792–93, and in 1794 a naval base and commercial quay were added. In 1795 the new port was named Odessa for the ancient Greek colony of Odessos, the site of which was believed to be in the vicinity.

During the 19th century Odessa's growth was rapid, especially after the coming of railways in 1866. Odessa became the third city of Russia and the country's second most important port, after St. Petersburg; grain was its principal export. The city was one of the chief centres of the Russian Revolution of 1905 and was the scene of the mutiny on the warship *Potemkin;* Sergey Eisenstein's classic film *Potemkin* was made there in 1925. Odessa suffered heavy damage in World War II during its prolonged and unsuccessful defense against German and Romanian forces.



The State Academic Theatre of Opera and Ballet, Odessa city, Ukraine

Shostal

The city remains a major port, the largest in Ukraine, with well-equipped docks and ship-repair yards. After 1857 a new outport was built at Ilichevsk, 12 miles (20 km) to the south. Odessa is the base of a fishing fleet. The city's rail communications are good to all parts of Ukraine, Moldova, and Romania. Odessa is also a large industrial centre, with a wide range of engineering industries, including the production of machine tools, cranes, and plows. The chemical industry makes fertilizers, paints, dyes, and other materials. Odessa also has an oil refinery, a large jute mill, and a number of consumer goods and food-processing factories. Most factories lie north of the port along the waterfront, with newer plants on the western outskirts.

Odessa is also an important cultural and educational centre. It has a university, founded in 1865, and numerous other institutions of higher education. Its many research establishments are headed by the Filatov Institute of Eye Diseases. There are a number of museums and theatres, including the opera house and ballet theatre, dating from 1809. The seashore south of the harbour is a popular resort area, with numerous sanatoriums and holiday camps. Pop. (1991 est.) 1,100,700.

Odessa, city, seat (1891) of Ector county, western Texas, U.S. It lies on the southern High Plains, just southwest of Midland. The site was presumably named in 1881 by Russian railroad construction workers who noted the similarity of the prairie region to their Odessa steppe homeland. Founded in 1886, it became a rail-shipping point for livestock. After local oil discoveries of the 1920s, Odessa expanded rapidly. Located in the centre of the oil-rich Permian Basin, it developed as a major distribution-processing-servicing point for a petrochemical complex. Ranching augments its economy. One of the largest meteor craters in the United States is 9 miles (14 km) west. The city is the seat of Odessa College (1946), where meteorite specimens are displayed, and of the University of Texas of the Permian Basin (1969). The Globe Theatre, a replica of the London original situated on the college campus, is the site of an annual (summer) Shakespeare Festival. Inc.

1927. Pop. (1992 est.) city, 93,234; Odessa-Midland MSA, 234,431.

Odessa, abbreviation of ORGANISATION DER EHEMALIGEN SS-ANGEHÖRIGEN (German: "Organization of Former SS Members"), clandestine escape organization of the SS (*q.v.*) underground, founded probably in early 1947 in Germany. A large organizational network was set up to help former SS and Gestapo members and other high Nazi functionaries to avoid arrest, to acquire legal aid if arrested, to escape from prison, or to be smuggled out of the country. The main escape routes were (1) through Austria and Italy, then to Franco's Spain, (2) to Arab countries of the Middle East, and (3) to South America, especially Argentina and Paraguay, then under the right-wing regimes of Juan Perón and Alfredo Stroessner. The war criminal Adolf Eichmann was apparently aided by Odessa in traveling to the Middle East and then to South America in the immediate postwar years.

Odessa ceased to exist about 1952 and was replaced by an organization called Kameradenwerke ("Comrade Workshop"), which over the following decades sought to aid former Nazis overseas in avoiding capture and maintaining concealment. Whereas Odessa's work was centred in Germany, Kameradenwerke's operations were conducted in foreign lands, especially where governments were sympathetic to ultra-right-wing causes, as in Argentina, Paraguay, and Chile.

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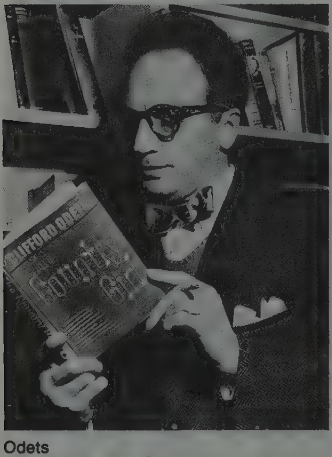
Odessa Crater, shallow, bowl-shaped pit in the high plains just south of Odessa, Texas, U.S., produced by a meteorite. It is about 17 feet (5 m) deep and 560 feet (170 m) in diameter; its rim rises only 2–3 feet (less than a metre) above the surrounding area. In 1939 nearly 1,500 iron meteorite fragments were collected from the ground around the crater and on its rim. The original crater bottom was determined to have been 90 feet (27 m) below the level of the surrounding land. The crater was discovered in 1921, and, because its rim has almost been eroded away, it is considered quite ancient. Three smaller impact-crater sites were found nearby in 1939.

Odets, Clifford (b. July 18, 1906, Philadelphia, Pa., U.S.—d. Aug. 14, 1963, Hollywood, Calif.), leading dramatist of the theatre of social protest in the United States during the 1930s. His important affiliation with the celebrated Group Theatre (*q.v.*) contributed to that company's considerable influence on the American stage.



Odets
EB Inc.

From 1923 to 1928 Odets learned his profession as an actor in repertory companies; in 1931 he joined the newly founded Group Theatre as one of its original members. Odets' *Waiting for Lefty* (1935), his first great success, used both auditorium and stage for action and was an effective plea for labour unionism; *Awake and Sing* (1935) was a naturalistic family situation drama; and *Golden Boy* (1937) was about an Italian youth who became a professional prizefighter. *Paradise Lost* (1935) deals with the tragic life of a middle-class family. In 1936 he married the Austrian actress Luise Rainer.

Odets moved to Hollywood in the late '30s to write for motion pictures and became a successful director. His later plays include *The Big Knife* (1949), *The Country Girl* (1950; British title *Winter Journey*), and *The Flowering Peach* (1954). A musical based on *Golden Boy* was made in 1964.

odeum (Greek: "singing place"), comparatively small theatre of ancient Greece and Rome, in which musicians and orators performed and competed. It has been suggested that these theatres were originated because early Greek musical instruments could not be heard in the vast open amphitheatres in which dramatic performances were held.

According to the Greek biographer Plutarch, of the 1st and 2nd century AD, the first odeum was built at Athens by the statesman Pericles about 435 BC. Adjacent to the Theatre of Dionysus, it was used for rehearsals. It differed from later odeums in its square shape and pointed roof. The Roman architectural historian Vitruvius, of the 1st century BC, states that it was burned during the Mithradatic wars of the 1st century BC.

In AD 161 Herodes Atticus, a Greek scholar and philanthropist, built a new odeum at the base of the Acropolis, in memory of his wife, Regilla. In plan it was much like the semicircular Theatre of Dionysus, to which it was connected by an arcade. With 33 rows of seats, it accommodated approximately 6,000 spectators. It probably had a roof over the playing area. Largely rebuilt, it is still in use. Another odeum was built at Corinth, also by Herodes Atticus. Odeums were also constructed in most cities of the Roman Empire for use as assembly halls as well as for performances and contests.

Odeum of Herodes Atticus, Athens, *c.* AD 161
H. Roger-Viollet

Odienné, town, northwestern Côte d'Ivoire, at the intersection of roads from Mali, Guinea, and the Ivorian towns of Korhogo and Man. A traditional trading centre (yams, cassava, cattle, and sheep) among the Muslim Malinke people, it was part of the greater Mali (Malinke) Empire in the 14th century. The town is the site of a rice-processing plant and still the chief agricultural market centre for a hilly savanna region that produces manganese and dah (a jute substitute used for making sacks) for export. Pop. (1988) 28,266.

Odin, also called WODAN, WODEN, or WOTAN, one of the principal gods in Norse mythology. His exact nature and role, however, are difficult to determine because of the complex picture of him given by the wealth of archaeological and literary sources. The Roman historian Tacitus stated that the Teutons worshiped Mercury; and because *dies Mercurii* ("Mercury's day") was identified with Wednesday ("Woden's day"), there is little doubt that the god Woden (the earlier form of Odin) was meant. Though Woden was worshiped preeminently, there is not sufficient evidence of his cult to show whether it was practiced by all the Teutonic tribes or to enable conclusions to be drawn about the nature of the god. Later literary sources, however, indicate that at the end of the pre-Christian period Odin was the principal god in Scandinavia.

From earliest times Odin was a war god, and he appeared in heroic literature as the protector of heroes; fallen warriors joined him in Valhalla. The wolf and the raven were dedicated to him. His magical horse, Sleipnir, had eight legs, teeth inscribed with runes, and the ability to gallop through the air and over the sea. Odin was the great magician among the gods and was associated with runes. He was also the god of poets. In outward appearance he was a tall, old man, with flowing beard and only one eye (the other he gave in exchange for wisdom). He was usually depicted wearing a cloak and a wide-brimmed hat and carrying a spear.

Odin riding his eight-legged horse, Sleipnir, detail of a funerary stone from Gotland, Swed., *c.* 800
By courtesy of the Riksantikvarieambetets Bildarkiv, Stockholm

Odinga, Oginga, in full JARAMOGI AJUMA OGINGA ODINGA (b. October 1911[?], Sakwa, Central Nyanza, East African Protectorate [now in Kenya]—d. Jan. 20, 1994, Kisumu, Kenya), African nationalist politician who was a leader in the opposition against the single-party rule of Jomo Kenyatta and his successor Daniel arap Moi.

Odinga was a member of the Kenya's second largest ethnic group, the Luo. Like many other prominent East Africans, he was educated at Makerere University College and was originally a teacher.

From the late 1940s Odinga was an associate of Kenyatta's in the campaign for Kenya's independence from Britain; he was active in recruiting Luo support for the movement. From 1952 to 1957 he was president of the Luo Union, a political and social organization, and in 1957 he was elected to the Legislative Council as member for Central Nyanza. In 1960 he became vice president of the newly formed Kenya African National Union (KANU).

Odinga was elected a member of the House of Representatives in 1963, and when Kenya became independent in December of that year, he became minister for home affairs (1963–64) and then vice president. His socialist views conflicted with Kenyatta's more centrist ideology, however, and in 1966 he broke away from KANU to form a left-wing opposition party, the Kenya People's Union (KPU). The KPU was outlawed by Kenyatta in 1969, and some of its members, including Odinga, were placed under government detention. After his release in 1971, Odinga rejoined KANU, but he never regained Kenyatta's confidence, and he was not permitted to run for parliament.

Odinga's exclusion from parliament continued under Moi, who became president in 1978. Odinga continued to criticize government corruption and to press for improved human rights and a multiparty political system. He was expelled from KANU in 1982 and imprisoned for several months. In 1991 he helped found the Forum for the Restoration of Democracy (FORD), and later that year Moi, under pressure at home and from the international community, legalized opposition parties. Ethnic and personal rivalries split FORD, however, and Odinga came in fourth in multiparty presidential elections held in 1992.

Odinga published an autobiography, *Not Yet Uhuru*, in 1967.

Odlum, Jacqueline Cochran (flyer): *see* Cochran, Jacqueline.

Odo (personal name): *see under* Eudes, except as below.

Odo OF BAYEUX, French ODON DE BAYEUX, also called EARL OF KENT (b. *c.* 1036—d. February 1097, Palermo), half brother of William the Conqueror and bishop of Bayeux, Normandy. He probably commissioned the famed Bayeux tapestry, which pictures the Norman Conquest of England, for the dedication of his cathedral (1077).

Odo was the son of Herluin of Conteville by Arlette, who had previously been the mistress of Duke Robert I of Normandy, William's father. Although scandalously immoral, he was made bishop of Bayeux in 1049 by his half brother. Odo typified Norman churchmen before the Cluniac reform. They were essentially scions of great families placed in possession of the church's wealth.

Odo took part in the Norman invasion of England (1066) and fought in the Battle of Hastings. The following year he was made earl of Kent and assigned to guard southeast England. With two other men he ruled England during William's frequent absences from the country. In 1082 he was imprisoned by William on a charge of raising troops without royal permission, probably to defend the pope against the Holy Roman emperor Henry IV. He was released on the accession of William II, in 1087, against whom he rebelled in support of William's brother, Robert Curthose, duke of Normandy. Though the revolt was quelled, Odo was allowed to become Robert's aide. He was active in organizing the First Crusade and was on his way to the Holy Land when he died.

Odo OF CHÂTILLON-SUR-MARNE, also called ODO OF LAGERY, or OF LAGNY (pope): *see* Urban II.

Odo OF CLUNY, SAINT, French SAINT ODON, OR EUDES, DE CLUNY (b. *c.* 879, Maine [France]—d. Nov. 18, 942, Tours, Touraine [France]; feast day November 18), second abbot of Cluny (France), who gained for Cluniac monasteries exemption from all but papal authority and whom Pope John XI authorized to reform monasteries in Gaul and Italy, thereby contributing to the great influence of Cluny during the 10th and 11th centuries.

Born into a noble family, Odo was brought up in the household of William of Aquitaine and educated in Paris and Tours. He was elected abbot of Cluny in 927. He traveled widely, frequently participating in secular diplomatic negotiations, as exemplified in his arbitration for Pope Leo VII to end the struggle in Italy between King Hugo of Italy and the Roman aristocrat Alberic II. Although probably spurious, several music-theory writings are traditionally attributed to him, most notably the standard medieval method of designating pitches by letters.

Odoacer, also called ODOVACAR, or ODOVAKAR (b. *c.* 433—d. March 15, 493, Ravenna), first barbarian king of Italy. The date on which he assumed power, 476, is traditionally considered the end of the Western Roman Empire.

Odoacer was a German warrior, the son of Idico (Edeco) and a member of either the Sciri or Rugian tribe. About 470 he entered Italy with the Sciri; he joined the Roman army and rose to a position of command. After the overthrow of the Western emperor Julius Nepos by the Roman general Orestes (475), Odoacer led his tribesmen in a revolt against Orestes, who had reneged on his promise to give the tribal leaders land in Italy. On Aug. 23, 476, Odoacer was proclaimed king by his troops, and five days later Orestes was captured and executed in Placentia (now Piacenza), Italy. Odoacer then deposed and exiled Orestes' young son, the emperor Romulus Augustulus.

Odoacer's aim was to keep the administration of Italy in his own hands while recognizing the overlordship of the Eastern emperor, Zeno. Zeno granted him the rank of patrician, but Odoacer styled himself "King." He refused to acknowledge Julius Nepos, Zeno's candidate, as Western emperor.

Odoacer introduced few important changes into the administrative system of Italy. He had the support of the Senate at Rome and, apparently without serious opposition from the Romans, was able to distribute land to his followers. Unrest among the German tribesmen led to violence in 477–478, but evidently no such disturbances occurred during the later period of his reign. Although Odoacer was an Arian Christian, he rarely intervened in the affairs of the Roman Catholic church.

In 480 Odoacer invaded Dalmatia (in present Croatia) and within two years conquered the region. When Illus, master of soldiers of the Eastern Empire, begged Odoacer's help (484) in his struggle to depose Zeno, Odoacer attacked Zeno's westernmost provinces. The emperor responded by inciting the Rugi (of present Austria) to attack Italy. During the winter of 487–488 Odoacer crossed the Danube and defeated the Rugi in their own territory. Although he lost some land to the Visigothic king Euric, who overran northwest Italy, Odoacer recovered Sicily (apart from Lilybaeum) from the Vandals. Nevertheless, he proved to be no match for the Ostrogothic king Theodoric, who was appointed king of Italy by Zeno in 488 in order to prevent the Ostrogoths from raiding in the Eastern Empire. Theodoric invaded Italy in 489 and by August 490 had captured almost the entire peninsula, forcing Odoacer to take refuge in Ravenna. The city surrendered on March 5, 493; Theodoric invited Odoacer to a banquet and there killed him.

Odon (French personal name): *see under* Eudes, or Odo.

odonate, a member of the insect order Odonata, which comprises the dragonflies and the damselflies. These large winged insects are usually found near water, and they are voracious predators on other insects while, folklore to the contrary, entirely harmless to humans.

A brief treatment of odonates follows. For full treatment, *see* MACROPAEDIA: Insects.

The order Odonata is divided into three suborders: the Zygoptera, consisting of 17 living families of damselflies; the Anisoptera, consisting of eight living families of dragonflies; and the Anisozygoptera, forms intermediate between the other two, consisting of only two species found in Japan and Nepal. In all, there are some 5,000 living species.

Dragonflies and damselflies are very similar in structure, the chief differences between them being that damselflies are generally more delicate in form and weaker fliers. Sizes of individuals range from 1.8 to 15 cm (0.7 to 5.8 inches) in body length and from 1.8 to 19.3 cm in wingspan. They are worldwide in distribution but more concentrated in warmer climates.

The body of an odonate is divided into head, thorax, and abdomen. The head contains the large, bulging eyes, small antennae, and the mouth. The thorax consists of three segments that bear three pairs of legs below and two pairs of wings above. The legs are displaced forward, giving odonates great flexibility in perching and clinging. The wings are narrow, thin, and transparent and are strongly veined and often strikingly coloured. The wings are operated by contractions of the thoracic muscles, sometimes at a rate of a hundred or more times a second. The two pairs of wings are unusual in that when the insect is perched they cannot be laid flat down the length of the abdomen but must be angled outwards or upwards—on some species, even vertically. The abdomen has 10 segments and is usually narrow and needlelike in Zygoptera but somewhat stouter in Anisoptera.

Odonates hunt in the air, holding their feet forward of the mouth to form a basket to trap flying insects. The unique mating process is performed in flight, with the male ahead of the female. The male is equipped with special claspers at the tip of the abdomen with which he grasps the head of the female. She loops her abdomen forward and places its tip against the male's copulatory organ at the base of his abdomen. The female later lays her eggs in one of two ways, depending upon the species. In species with developed ovipositors (special organs near the end of the abdomen used to lay eggs), the eggs are deposited on or in aquatic plants, above or below water. Species without developed ovipositors scatter them in the water while in flight.

Except for one species of damselfly (*Megalagrion oahuense*), the odonate larva remains in the water throughout its entire period of development. It breathes through a set of gills at the tip of the abdomen. Odonate larvae may live in fresh or brackish water; a few live in mud. Larvae can move quickly in emergencies by jet propulsion; they admit water into the gills and forcefully eject it, driving themselves forward. Like the adult forms, the larval forms are predators, consuming, in their early stages, microorganisms and, later, worms, insect larvae, and finally even small snails and fish. There are from 8 to 15 larval stages separated by molts, depending upon the species. The development of these stages may take one to five years to complete. Eventually the larva climbs out of the water and undergoes a final molt, from which emerges the adult form. There is no pupal stage. While in the adult form odonates have virtually no natural enemies—their flight is too rapid and agile for most predators—odonate larvae are an important source of food for fish.

O'Donnell, Calvagh (d. Oct. 26?, 1566, near Derry, County Londonderry, Ire.), Irish lord of Tyrconnell, foe and captive of the celebrated Shane O'Neill.

The son of Manus O'Donnell, Calvagh quarreled with his father and his half-brother Hugh and sought aid in Scotland from the MacDonnells, who assisted him in deposing Manus and securing the lordship of Tyrconnell for himself. Hugh then appealed to Shane O'Neill, who invaded Tyrconnell at the head of a large army in 1557 to secure supremacy over Ulster and encamped on the shore of Lough Swilly. Calvagh surprised the O'Neills in their camp at night and routed them.

Calvagh was then recognized by the English government as lord of Tyrconnell; but in

1561 he and his wife were captured by Shane O'Neill in the monastery of Kildonnell. His wife, Catherine Maclean, who had previously been the wife of the Earl of Argyll, was kept by Shane O'Neill as his mistress and bore him several children, though grossly ill-treated by her savage captor; Calvagh himself was subjected to atrocious torture during the three years that he remained O'Neill's prisoner. He was released in 1564 on conditions that he had no intention of fulfilling; and, crossing to England, he appealed to Queen Elizabeth I. In 1566 Sir Henry Sidney marched to Tyrconnell, and restored Calvagh to his rights. Calvagh, however, died in the same year; and because his son Conn was a prisoner in the hands of Shane O'Neill, his half-brother Hugh MacManus was inaugurated The O'Donnell in his place.

O'Donnell, Hugh (fl. 1557–92), lord of Tyrconnell, Irish chieftain of the O'Donnells.

Son of Manus O'Donnell and half brother of Calvagh O'Donnell, he at first allied himself with the O'Neills in his family feud with Calvagh (1557); but he then turned round and combined with the English to crush the O'Neills, the hereditary enemy of his family. In 1567 he utterly routed Shane O'Neill at Letterkenny with the loss of 1,300 men, compelling O'Neill to seek refuge with the MacDonnells of Antrim, by whom he was treacherously put to death. In 1592 Hugh abdicated in favour of his son Hugh Roe O'Donnell (*q.v.*).

O'Donnell, Hugh Roe, also called RED HUGH (b. *c.* 1572—d. Sept. 10, 1602, Simancas, Spain), last of the old Gaelic kings of Ireland.

When he became chieftain of the O'Donnells, he was only 20 years old and his previous experiences helped to make him an inveterate enemy of the English. When less than 16 years old he had been kidnapped by Sir John Perrot, the English lord deputy, who, conscious of the O'Donnell family's connections with the O'Neills, feared a dangerous combination against the English government. He was long imprisoned in Dublin Castle, made an abortive attempt to escape in 1590, and was finally successful in January 1592.

Red Hugh's first concern was to drive out the English sheriff and his company of undisciplined marauders who, despite promises, had come to Tyrconnell and occupied the monastery of Donegal, after expelling the friars. This he accomplished successfully. Two expeditions against the O'Neills followed. Red Hugh's exploits in 1594 have been exaggerated; but in 1595 and 1597 he certainly turned his attention again to the west, making good his control of Connaught from Sligo to Leitrim. These, however, were minor operations compared with the war which followed, famous for the great Irish victory of the Yellow Ford in 1598, where O'Donnell played a major part, and for the disaster of Kinsale (December 1601). O'Donnell's march to join Tyrone at Kinsale was remarkable; in 24 hours he and his men covered no less than 40 miles, including the almost impassable Slieve Phelim Mountains. Red Hugh's support of the Spanish commander, Juan del Aquila, who counselled an immediate attack against the advice of the more cautious O'Neill, may well have brought about the crushing defeat that may be regarded as the death blow of the old Gaelic Ireland. O'Donnell then went to Spain where he died, said to have been poisoned by an English agent, though this has never been fully proved.

O'Donnell, Leopoldo, DUQUE (duke) DE TETUÁN (b. Jan. 12, 1809, Santa Cruz de Tenerife, Canary Islands, Spain—d. Nov. 6, 1867, Biarritz, Fr.), Spanish soldier-politician who played a prominent role in the successful Spanish military insurrections of 1843 and 1854 and headed the Spanish government three times between 1856 and 1866. Though he lacked a coherent political program, he was a staunch supporter of Queen Isabella II (reigned 1833–68) and pursued conservative policies while in office.

A descendant of the O'Donnells who left Ireland after the Battle of the Boyne (1690), O'Donnell gained fame and high rank during the First Carlist War (1833–39). He went into exile in France in 1840 but returned three years later to help overthrow the government of Gen. Baldomero Espartero. He was rewarded with the captain generalship of Cuba (1844–48). In 1854, espousing liberal sentiments, he headed a successful military revolt that brought him to power as minister of war. In this post he shared control of affairs with Espartero, whom he displaced as premier in July 1856. His first administration lasted only until October, but, as head of the moderately conservative Liberal Union, he again held power from 1858 to 1863.

This politically stable period, during which O'Donnell governed under a conservative constitution of 1845, witnessed economic expansion, a compromise solution to the problem of church property, and O'Donnell's opportunistic interventions in Morocco, Santo Domingo, and Mexico. In the Moroccan War (1859–60) he himself commanded the victorious expeditionary force and greatly increased his popularity, afterward receiving his dukedom. O'Donnell resumed office as premier briefly in 1865–66. He at first attempted a conciliatory policy but had to suppress two insurrections in 1866, and Queen Isabella replaced him with the more repressive Gen. Ramón Narváez. His death not long after his dismissal deprived the Queen of one of her strongest allies, and a year later Isabella was deposed.

O'Donnell, Manus (d. Feb. 9, 1564, Lifford, County Donegal, Ire.), the first great Irish lord of Tyrconnell, whose career was marked by wars with the O'Neills and by family quarrels with his father and his son.

The son of Hugh Dubh O'Donnell, he was left to rule Tyrconnell during his father's pilgrimage to Rome about 1511 and retained the chief authority when Hugh Dubh returned. A family quarrel ensued, but, with the help of the O'Neills, Manus established his hold over Tyrconnell. In 1522, however, the O'Neills and O'Donnells were again at war. Conn Bacach O'Neill, 1st earl of Tyrone, determined to subjugate the O'Donnells. Supported by several clans of Munster and Connaught and assisted by English contingents and the MacDonnells of Antrim, O'Neill devastated a large part of Tyrconnell but was surprised at night by Hugh Dubh and Manus O'Donnell and severely defeated. The war continued, however, and in 1531 O'Donnell applied to the English government for protection, giving assurances of allegiance to Henry VIII.

In 1537 Lord Thomas Fitzgerald and his five uncles were executed for rebellion in Munster, and the English government made every effort to lay hands also on Gerald, the youthful heir to the earldom of Kildare, a boy of 12 years of age who was in the secret custody of his aunt Lady Eleanor McCarthy. This lady, in order to secure a powerful protector for the boy, accepted an offer of marriage by Manus O'Donnell, who on the death of Hugh Dubh in July 1537 was inaugurated The O'Donnell. Conn O'Neill was a relative of Gerald Fitzgerald, and this event accordingly led to the formation of the Geraldine League, a federation which combined the O'Neills, the O'Donnells, the O'Briens of Thomond, and other powerful clans; its primary object was to restore Gerald to the earldom of Kildare, but it afterward aimed at the complete overthrow of English rule in Ireland. In August 1539 Manus O'Donnell and Conn O'Neill were heavily defeated by the English lord deputy at Lake Bellahoe, in Monaghan.

In the west Manus continued to assert the supremacy of the O'Donnells in north Connaught, where he compelled O'Conor Sligo to acknowledge his overlordship in 1539. In 1542 he went to England and presented himself, together with Conn O'Neill and other Irish chiefs, before Henry VIII. In his later years Manus was harassed by his son Calvagh, who imprisoned him in 1555 and deposed him from all authority in Tyrconnell.

O'Donnell, Sir Niall Garve (b. 1569—d. 1626, London), Irish chieftain, alternately an ally of and rebel against the English.

Grandson of Calvagh O'Donnell (through his son Conn), he was incensed at the elevation of his cousin Hugh Roe O'Donnell (*q.v.*) to the chieftainship of the O'Donnells in 1592 and was further alienated when Hugh Roe deprived him of his castle of Lifford; a bitter feud between the two O'Donnells was the result. Niall Garve made terms with the English government, to which he rendered valuable service both against the O'Neills and against his cousin. But in 1601 he quarrelled with the lord deputy, who, though willing to establish Niall Garve in the lordship of Tyrconnell, would not permit him to enforce his supremacy in Inishowen. After the departure of Hugh Roe from Ireland in 1602, Niall Garve and Hugh Roe's brother Rory went to London, where the privy council endeavoured to arrange the family quarrel, but failed to satisfy Niall. Charged with complicity in Cahir O'Dogherty's rebellion in 1608, Niall Garve was sent to the Tower of London, where he remained until his death in 1626.

O'Donnell, Rory: *see* Tyrconnell, Rory O'Donnell, 1st earl of.

O'Donovan, Michael: *see* O'Connor, Frank.

Odontoglossum, genus embracing as many as 300 species of orchids, family Orchidaceae, that are primarily native to mountainous areas of tropical America. Many orchids of other genera have been crossed with species of *Odontoglossum* to obtain beautiful hybrid flowers. Hundreds of hybrids also have been obtained by crossing species within the genus.

Each large pseudobulb (swollen stem) of an *Odontoglossum* bears one or more leaves. The flowers are borne on a spike that arises from the base of the pseudobulbs and vary greatly in colour and marking. The sepals of the tiger, or baby, orchid (*O. grande*) have yellow- and brown-striped markings.

Odontoglossum

G. Tomsich—Photo Researchers

odontolite, also called BONE TURQUOISE, or FOSSIL TURQUOISE, fossil bone or tooth that consists of the phosphate mineral apatite (*q.v.*) coloured blue by vivianite. It resembles turquoise but may be distinguished chemically.

odontostome, any member of the protistan order Odontostomatida. These small, wedge-shaped, ciliated protozoans were called Ctenostomatida until the name was found also to designate a bryozoan order. Odontostomes are usually found solely in fresh water with a high rate of organic decomposition. Their semicircular, or arc-shaped, back and the sides are covered with firm plates that form a carapace. These organisms are sparsely ciliated and have eight membranelles (cilia fused into flat plates) in the pouchlike buccal (oral) cavity. The genus *Epalxella,* with the pointed anterior end typical of odontostomes, is atypical in containing species from both freshwater and marine habitats.

odor: *see* odour.

Odoric OF PORDENONE (b. *c.* 1286, Villanova, near Pordenone, Aquileia [Italy]—d. Jan. 14, 1331, Udine), Franciscan friar and traveler whose account of his journey to China enjoyed wide popularity and appears to have been plagiarized in the 14th-century English work *The Voyage and Travels of Sir John Mandeville, Knight,* generally known as *Mandeville's Travels.*

After taking his vows at Udine, Odoric was sent to Asia (*c.* 1316–18), where he remained until 1329. Passing through Asia Minor, he visited Franciscan houses at Trabzon and Erzurum, now in Turkey. He circled through Persia, stopping at the Franciscan house at Tabriz and continuing on to Kashan, Yazd, Persepolis, and Shīrāz before touring the Baghdad region of Mesopotamia. He then went to Hormuz (now in Iran) at the southern end of the Persian Gulf and eventually embarked for India.

After landing at Thāna, near Bombay, about 1322, Odoric visited many parts of India and possibly Ceylon. He sailed in a junk for the north coast of Sumatra, touching on Java and perhaps Borneo before reaching the south China coast. He traveled extensively in China and visited Hangchow (Hang-chou), renowned as the greatest city in the world, whose splendour he described in detail. After three years at Peking, he set out for home, probably by way of Tibet (including Lhasa) and northern Persia. By the time he reached Italy, he had baptized more than 20,000 persons. At Padua the story of his travels was taken down in simple Latin by another friar. Several months later Odoric died while on the way to the papal court at Avignon.

The story of his journeys seems to have made a greater impression on the laity of Udine than on Odoric's Franciscan brethren. The latter were about to bury him when the chief magistrate (*gastaldi*) of the city interfered and ordered a public funeral. Popular acclamation made Odoric an object of devotion, and the municipality erected a shrine for his body. Although his fame was widespread before the middle of the 14th century, he was not formally beatified until 1755.

Odoru Shūkyō: *see* Tenshō Kōtai Jingū-kyō.

odour, also spelled ODOR, the property of certain substances, in very small concentrations, to stimulate chemical sense receptors that sample the air or water surrounding an animal. In insects and other invertebrates and in aquatic animals, the perception of small chemical concentrations often merges with perception via contact of heavy concentrations (taste), and with other chemoreceptive specializations. *See also* smell.

Odovacar, also spelled ODOVAKAR (German king of Italy): *see* Odoacer.

O'Dowd, Bernard Patrick (b. April 11, 1866, Beaufort, Vic., Australia—d. Sept. 2, 1953, Melbourne, Vic.), poet who gave Australian poetry a more philosophical tone, supplanting the old bush ballads that had dominated for many years.

Educated in the arts and law at the University of Melbourne, O'Dowd taught for a while, worked as a librarian, then made a successful career as a parliamentary draftsman for the Australian Parliament. In *Dawnward?* (1903), his first book of verse, he expressed strong political convictions. *The Silent Land* followed in 1906, and the philosophical *Dominions of the Boundary* in 1907. In an important prose pamphlet "Poetry Militant" (1909), O'Dowd, a political and philosophical radical, argued that the poet should educate, propagandize, and indoctrinate. His later work included *The Bush* (1912), a long poem about the Australian nation; *Alma Venus! and Other Verses* (1921), social satire in verse; and *The Poems: Collected Edition* (1941).

Odra River (Europe): *see* Oder River.

Odría, Manuel A., in full MANUEL APOLINARIO ODRÍA AMORETTI (b. Nov. 26, 1897, Tarma, Peru—d. Feb. 18, 1974, Lima), president of Peru from 1948 to 1956.

A career army officer, Odría graduated from military school in 1919 and from the War College in 1930. Promoted to brigadier general in 1946, he was named army chief of staff and, in 1947, minister of the interior and chief of police under President José Bustamente. In October 1948 he headed a military junta which deposed Bustamente and was proclaimed provisional president. Odría promptly dissolved the legislature, declared military rule, and proceeded to take measures to restore the Peruvian economy and political stability, seeking technical assistance and private investment from the United States. He resigned temporarily on June 1, 1950, to run unopposed for election and was inaugurated July 28. His administration was characterized by repressive political tactics to silence the opposition. The economy initially expanded under his laissez-faire economic policies, but by the end of his term Odría found himself unable to cope with a mounting trade deficit and rapid inflation. Labour unrest and public protests against the regime's authoritarianism forced Odría to allow a free election in 1956. Odría, who did not run for reelection, went into self-imposed exile, spending much of his time in the United States. In 1962 and 1963 he ran again for president, placing third in the balloting.

Oduber Quirós, Daniel (b. Aug. 25, 1921, San José, Costa Rica—d. Oct. 13, 1991, San José), president of Costa Rica (1974–78), member of the founding junta of its Second Republic (1948), and a founder of the National Liberation Party (PLN).

Oduber worked his way through law school in San José and then opened a law firm there. Later he studied at McGill University in Montreal and at the Sorbonne in Paris. He served as Costa Rica's minister of foreign relations in 1962–64, cultivating good relations with the United States. In 1966 Oduber was narrowly defeated in his bid for the presidency by the moderate conservative José Joaquín Trejos. Oduber became president of the PLN in 1970 and was elected president of the Legislative Assembly in 1970, 1971, and 1972. In this role he successfully promoted reforms in social welfare, electoral and banking regulations, and education.

Elected president in 1974 in the midst of economic difficulties, he took measures to restore the economy by reducing inflation and improving the balance of trade. He continued to expand social-welfare programs, instituted a land-reform policy, and championed environmental-protection measures. Oduber restored legal status to the Communist Party in 1975 and in 1977 reopened diplomatic relations with Cuba.

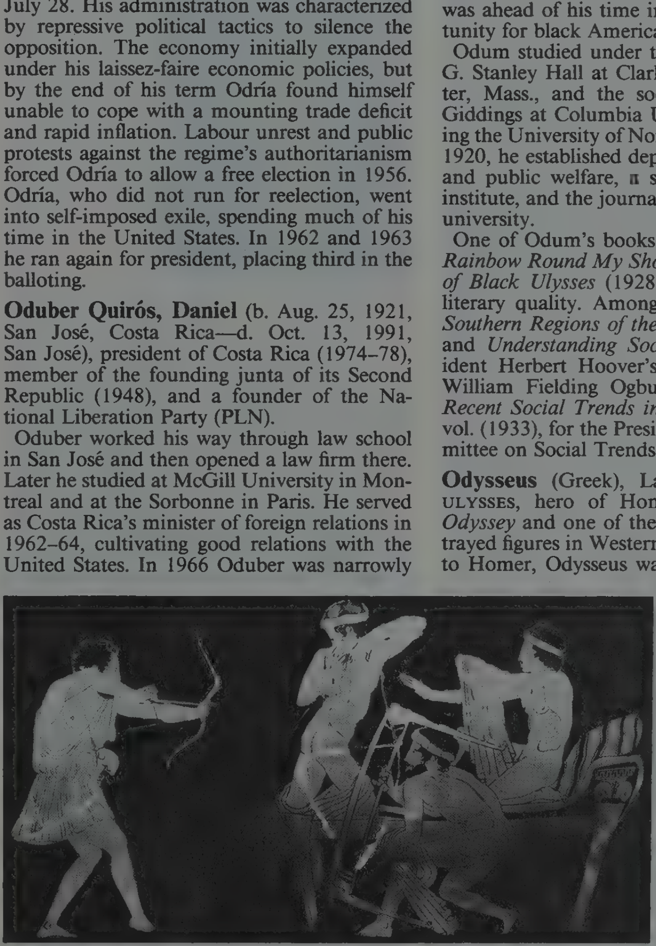
Oduber's presidency was shaken by major scandal when he was accused of having won his 1974 campaign with money contributed by the fugitive American financier Robert Lee Vesco. He admitted that the PLN had borrowed funds from Vesco but repaid them when their source became known.

Odum, Howard W., in full HOWARD WASHINGTON ODUM (b. May 24, 1884, near Bethlehem, Ga., U.S.—d. Nov. 8, 1954, Chapel Hill, N.C.), American sociologist, a specialist in the social problems of the southern United States and a pioneer of sociological education in the South. He worked to replace the sectionalism of that area with a sophisticated regionalism in social planning, race relations, and the arts, especially literature. A student of folk sociology, particularly that of Southern blacks, he was ahead of his time in urging equal opportunity for black Americans.

Odum studied under the noted psychologist G. Stanley Hall at Clark University, Worcester, Mass., and the sociologist Franklin H. Giddings at Columbia University. After joining the University of North Carolina faculty in 1920, he established departments of sociology and public welfare, a social-science research institute, and the journal *Social Forces* at that university.

One of Odum's books on black Americans, *Rainbow Round My Shoulder: The Blue Trail of Black Ulysses* (1928), was praised for its literary quality. Among his other works are *Southern Regions of the United States* (1936) and *Understanding Society* (1947). At President Herbert Hoover's request, Odum and William Fielding Ogburn edited the report *Recent Social Trends in the United States,* 2 vol. (1933), for the President's Research Committee on Social Trends.

Odysseus (Greek), Latin ULIXES, English ULYSSES, hero of Homer's epic poem the *Odyssey* and one of the most frequently portrayed figures in Western literature. According to Homer, Odysseus was king of Ithaca, son



Odysseus slaying the suitors, detail of a red-figure skyphos from Tarquinii, *c.* 450 BC; in the Staatliche Museen zu Berlin, Ger.

By courtesy of the Staatliche Museen zu Berlin, Ger.

of Laertes and Anticleia (the daughter of Autolycus of Parnassus), and father, by his wife, Penelope, of Telemachus. (In later tradition, Odysseus was the son of Sisyphus and fathered sons by Circe, Calypso, and others.)

Homer portrayed Odysseus as a man of outstanding wisdom and shrewdness, eloquence, resourcefulness, courage, and endurance. In the *Iliad* Odysseus appears as the man best suited to cope with crises in personal relations among the Greeks, and he plays a leading part in achieving the reconciliation between Agamemnon and Achilles. His bravery and skill in fighting are demonstrated repeatedly, and his wiliness is shown most notably in the night expedition he undertakes with Diomedes against the Trojans.

Odysseus' wanderings and the recovery of his house and kingdom are the central theme of the *Odyssey,* an epic in 24 books that also relates how he accomplished the capture of Troy by means of the wooden horse. Books VI–XIII describe his wanderings between Troy and Ithaca: he first comes to the land of the Lotus-Eaters (*q.v.*) and only with difficulty rescues some of his companions from their *lōtos*-induced lethargy; he encounters and blinds Polyphemus the Cyclops, a son of Poseidon, escaping from his cave by clinging to the belly of a ram; he loses 11 of his 12 ships to the cannibalistic Laistrygones and reaches the island of the enchantress Circe (*q.v.*), where he has to rescue some of his companions whom she had turned into swine. Next he visits the Land of Departed Spirits, where he learns from the Theban seer Tiresias how he can expiate Poseidon's wrath. He then encounters the Sirens, Scylla and Charybdis (*q.v.*), and the Cattle of the Sun, which his companions, despite warnings, plunder for food. He alone survives the ensuing storm and reaches the idyllic island of the nymph Calypso.

After almost nine years, Odysseus finally leaves Calypso and at last arrives in Ithaca, where his wife, Penelope, and son, Telemachus, have been struggling to maintain their authority during his prolonged absence (*see* Penelope). Recognized at first only by his faithful dog and a nurse, Odysseus proves his identity—with the aid of Athena—by accomplishing Penelope's test of stringing and shooting with his old bow. He then, with the help of Telemachus, slays Penelope's suitors and is accepted as her long-lost husband and the king of Ithaca.

In the *Odyssey* Odysseus has many opportunities to display his talent for ruses and deceptions; but at the same time, his courage, loyalty, and magnanimity are constantly attested. Classical Greek writers presented him sometimes as an unscrupulous politician, sometimes as a wise and honourable statesman. Philosophers usually admired his intelligence and wisdom. In fact, each era has reinterpreted "the man of many turns" in its own way, without destroying the archetypal figure.

Ōe Kenzaburō (b. Jan. 31, 1935, Ehime prefecture, Shikoku, Japan), Japanese novelist whose works express the disillusionment and rebellion of his post-World War II generation. He was awarded the Nobel Prize for Literature in 1994.

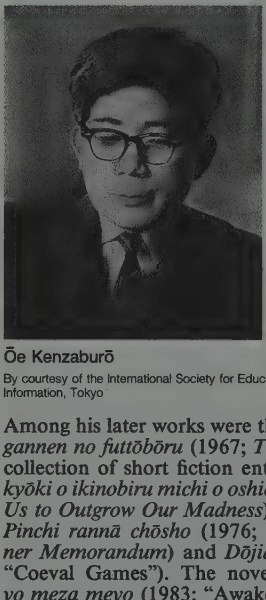
Ōe came from a family of wealthy landowners, who lost most of their property with the occupation-imposed land reform following the war. He entered the University of Tokyo in 1954, graduating in 1959, and the brilliance of his writing while he was still a student caused him to be hailed the most promising young writer since Mishima Yukio.

Ōe first attracted attention on the literary scene with *Shisha no ogori* (1957; *Lavish Are the Dead*), published in the magazine *Bungakukai.* His literary output was, however, uneven. His first novel, *Memushiri kouchi* (1958; *Nip the Buds, Shoot the Kids*), was highly praised, and he won a major literary award, the Akutagawa Prize, for *Shiiku* (1958; *The Catch*). But his second novel, *Warera no jidai* (1959; "Our Age"), was poorly received, as his contemporaries felt that Ōe was becoming increasingly preoccupied with social and political criticism.

Ōe became deeply involved in the politics of the New Left. The murder in 1960 of Chairman Asanuma Inejirō of the Japanese Socialist Party by a right-wing youth inspired Ōe to write two short stories in 1961, "Sebuntin" ("Seventeen") and "Seiji shōnen shisu," the latter of which drew heavy criticism from right-wing organizations.

Married in 1960, Ōe entered a further stage of development in his writing when his son was born in 1963 with an abnormality of the skull. This event inspired his finest novel, *Kojinteki-na taiken* (1964; *A Personal Matter*), a darkly humorous account of a new father's struggle to accept the birth of his brain-damaged child. A visit to Hiroshima resulted in the work *Hiroshima nōto* (1965; "Hiroshima Notes"), which deals with the survivors of the atomic bombing of that city. In the early 1970s Ōe's writing, particularly his essays, reflected a growing concern for power politics in the nuclear age and with questions involving the Third World.

Ōe continued to investigate the problems of characters who feel alienated from establishment conformity and the materialism of postwar Japan's consumer-oriented society.



Ōe Kenzaburō

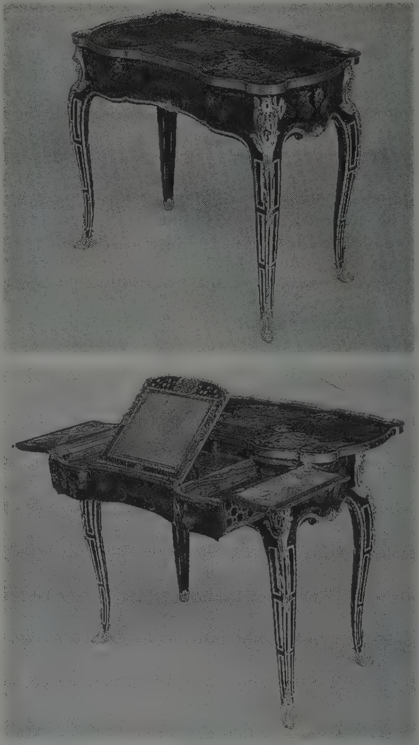
By courtesy of the International Society for Educational Information, Tokyo

Among his later works were the novel *Man'en gannen no futtōbōru* (1967; *The Silent Cry*); a collection of short fiction entitled *Warera no kyōki o ikinobiru michi o oshieyo* (1969; *Teach Us to Outgrow Our Madness*); and the novels *Pinchi rannā chōsho* (1976; *The Pinch Runner Memorandum*) and *Dōjidai gēmu* (1979; "Coeval Games"). The novel *Atarashii hito yo meza meyo* (1983; "Awake, New Man") is distinguished by a highly sophisticated literary technique and by the author's frankness in personal confession; it concerns the growing up of a mentally retarded boy and the tension and anxiety he arouses in his family.

BIBLIOGRAPHY. Michiko N. Wilson, *The Marginal World of Ōe Kenzaburō: A Study in Themes and Techniques* (1986); Susan J. Napier, *Escape from the Wasteland: Romanticism and Realism in the Fiction of Mishima Yukio and Oe Kenzaburo* (1991).

Oeben, Jean-François (b. *c.* 1715, Germany—d. Jan. 21, 1763, Paris, France), influential French cabinetmaker noted for his outstanding marquetry and for his ingenious mechanical devices.

Oeben came to France at an unknown date and in 1751 entered the workshop of André-Charles Boulle in the Louvre. He was soon patronized by the king's mistress Mme de Pompadour and in 1754 was appointed *ébéniste du roi* ("royal cabinetmaker"). Much of his work was done for the royal household. His royal warrant gave him the privilege of a workshop in the Gobelins factory, although he later moved to the Arsenal. His masterpiece, now in the Louvre, is the *bureau du roi,* a desk for the king that he began in 1760 and was working on at the time of his death; it was finished by his younger associate, Jean-Henri Riesener, who also married his widow.



Writing table (closed and open) made for Mme de Pompadour by Oeben, *c.* 1761–63, oak, mahogany, and various woods with gilt-bronze mounts; now in the Metropolitan Museum of Art, New York City

All rights reserved, The Metropolitan Museum of Art, The Jack and Belle Linsky Collection, 1982 (1982.60.61)

OECD: *see* Economic Co-operation and Development, Organisation for.

Oecolampadius, John, German JOHANNES HUSZGEN (b. 1482, Weinsberg, Württemberg [now in Germany]—d. Nov. 23, 1531, Basel, Switz.), German humanist, preacher, and patristic scholar who, as a close friend of the Swiss Reformer Huldrych Zwingli, led the Reformation in Basel.

A student at Heidelberg, Oecolampadius left in 1506 to become tutor to the sons of the Palatinate's elector and in 1510 became preacher at Weinsberg. In 1513 he went to Tübingen for further study; he became versatile in Greek, Latin, and Hebrew and came

Oecolampadius, a contemporary copy of an original portrait attributed to Hans Holbein the Younger; in the collection of Carl J. Burckhardt, Switzerland

By courtesy of Carl J. Burckhardt, Switzerland into contact with Humanism. In 1515 Oecolampadius moved to Basel, where he assisted the Humanist scholar Desiderius Erasmus (*c.* 1466–1536) in preparing his edition of the Greek New Testament. Over the next several years, Oecolampadius produced translations of works by various Greek Fathers of the church, including Gregory of Nazianzus, Basil, John of Damascus, Chrysostom, and Theophylact. In 1518 he became cathedral preacher at Augsburg. His mystical leanings and scholarly temperament led him to enter the Brigittine monastery at Altomünster in 1520, but his growing disillusionment with the Roman Catholic view that the bread and wine of the Eucharist are transubstantiated into the body and blood of Christ and his increasing admiration for Martin Luther caused him to leave in 1522. After serving briefly as chaplain at Ebernburg castle at the invitation of the German nobleman Franz von Sickingen, he returned to Basel, and in 1523 he became lecturer and professor at the university, where he had earned a doctorate in 1518.

Lecturing in three languages to large audiences and preaching at Saint-Martin's Church, Oecolampadius soon became the dominant figure in the city. At Baden in 1526, he debated for the Reformation against Roman Catholicism, and again in 1528 he supported the Reformers at the disputation at Bern. During this period Oecolampadius became renowned as a preacher. In a series of writings, particularly in *De genuina verborum domini expositione* (1526; "On the Correct Interpretation of the Words of the Lord"), he supported Zwingli's view that the Eucharist was only a remembrance and not a reenactment of Christ's sacrifice on the cross. After helping to shape the local ordinances promulgated at Easter in 1529 to establish the Reformation in Basel, Oecolampadius defended Zwingli's position again at the Colloquy of Marburg (October 1529), where he debated Luther. Returning to Basel, in 1530 he opposed the dominant role of local authorities in church affairs and preached in favour of a church discipline in which pastors and lay elders shared in church government. When, in 1531, Zwingli was slain in the Battle of Kappel, the result of political divisiveness over efforts to expand the Reformation, Oecolampadius was overwhelmed by shock and died soon afterward.

Oeconomus: *see* Hofmeister, Sebastian.

OED: *see* Oxford English Dictionary, The.

oedemerid beetle, also called FALSE TIGER BEETLE, or FALSE BLISTER BEETLE, any member of the approximately 1,500 widely distributed species of the insect family Oedemeridae (order Coleoptera). The oedemerids, slender and soft bodied, are usually pale, although some species have blue, yellow, orange, or red markings.

They range from 5 to 20 millimetres (up to $^4/_5$ inch) in length and have long antennae. The adults are usually found around flowers, the larvae in decaying wood.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Oedipus, in Greek mythology, the king of Thebes who unwittingly killed his father and married his mother. Homer related that Oedipus' mother hanged herself when the truth of their relationship became known, though Oedipus apparently continued to rule at Thebes until his death. In the post-Homeric tradition, most familiar from Sophocles' *Oedipus Rex* and *Oedipus Coloneus,* there are notable differences in emphasis and detail.

Oedipus and the Sphinx, interior of an Attic cup, *c.* 430–470 BC; in the Vatican Museum

Alinari—Art Resource/EB Inc.

Traditionally, Laius, king of Thebes, was warned by an oracle that his son would slay him. Accordingly, when his wife, Jocasta (Iocaste; in Homer, Epicaste), bore a son, he exposed the baby on Mt. Cithaeron, first pinning his ankles together (hence the name Oedipus, meaning Swell-Foot). A shepherd took pity on the infant, who was adopted by King Polybus of Corinth and his wife and was brought up as their son. In early manhood Oedipus visited Delphi and upon learning that he was fated to kill his father and marry his mother, he resolved never to return to Corinth.

Travelling toward Thebes, he encountered Laius, who provoked a quarrel in which Oedipus killed him. Continuing on his way, Oedipus found Thebes plagued by the Sphinx (*q.v.*), who put a riddle to all passersby and destroyed those who could not answer. Oedipus solved the riddle, and the Sphinx killed herself. In reward, he received the throne of Thebes and the hand of the widowed queen, his mother, Jocasta. They had four children: Eteocles, Polyneices, Antigone, and Ismene. Later, when the truth became known, Jocasta committed suicide, and Oedipus (according to another version), after blinding himself, went into exile, accompanied by Antigone and Ismene, leaving his brother-in-law Creon as regent. Oedipus died at Colonus near Athens, where he was swallowed into the earth and became a guardian hero of the land.

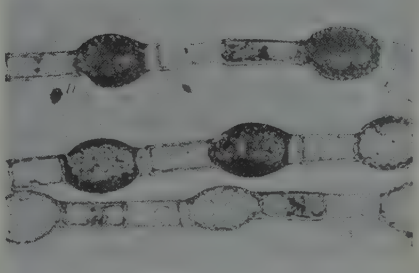
Although the Oedipus legend may have been based on a core of historical truth, it is impossible to isolate it from its folktale elements. Oedipus appears in the folk traditions of Albania, Finland, Cyprus, and Greece. The ancient story has intense dramatic appeal; through Seneca the theme was transmitted to a long succession of playwrights, including Pierre Corneille, John Dryden, and Voltaire. It has had a special attraction in the 20th century, motivating Igor Stravinsky's secular oratorio *Oedipus Rex,* André Gide's *Oedipe,* and Jean Cocteau's *La Machine infernale.* Sigmund Freud chose the term Oedipus complex to designate a son's feeling of love toward his mother and jealousy and hate toward his father, although these were not emotions that motivated Oedipus' actions or determined his character in any ancient version of the story.

Oedipus complex, in psychoanalytic theory, a desire for sexual involvement with the parent of the opposite sex and a concomitant sense of rivalry with the parent of the same sex; a crucial stage in the normal developmental process. Sigmund Freud introduced the concept in his *Interpretation of Dreams* (1899). The term derives from the Theban hero Oedipus of Greek legend, who unknowingly slew his father and married his mother; its female analogue, the Electra complex, is named for another mythological figure, who helped slay her mother.

Freud attributed the Oedipus complex to children of about the ages three to five. He said the stage usually ended when the child identified with the parent of the same sex and repressed its sexual instincts. If previous relationships with the parents were relatively loving and nontraumatic, and if parental attitudes were neither excessively prohibitive nor excessively stimulating, the stage is passed through harmoniously. In the presence of trauma, however, there occurs an "infantile neurosis" that is an important forerunner of similar reactions during the child's adult life. The superego, the moral factor that dominates the conscious adult mind, also has its origin in the process of overcoming the Oedipus complex. Freud considered the reactions against the Oedipus complex the most important social achievements of the human mind.

Oedipus Rex, also called OEDIPUS TYRANNUS (5th century BC), tragedy of Sophocles, judged his greatest by Aristotle in the *Poetics* (4th century BC) and by far the most highly regarded and popular of Sophocles' tragedies in the 20th century. In the play, the tragic hero, Oedipus, king of Thebes, by attempting to flee from his fate, rushes headlong to meet it. Aristotle praises it as a model of the tragic form. Its tight construction, mounting tension, and perfect use of the dramatic devices of recognition and discovery make this play the most powerful and haunting of Greek tragedies.

Oedogonium, genus of filamentous green algae, commonly found in quiet waters, either attached to other plants or as a free-floating mass. Each cylindrical cell, with the exception of the basal cell that serves as a holdfast, contains a netlike chloroplast and a large central vacuole. The motile reproductive bodies are characterized by a ring of cilia at the anterior end. Vegetative reproduction results in a ringlike scar at the top of the cylindrical cell (apical cap). Asexual reproduction is by motile and nonmotile spores, formed only in cells with an apical cap. Sexual reproduction is oogamous; the male filament, producing sperm that resemble small spores with long flagella, is either the same size as the female filament or a few cells long, in which case it is attached to the female filament. After fertilization and a resting stage occur, the zygote divides into four motile spores (zoospores) that germinate into new filaments.



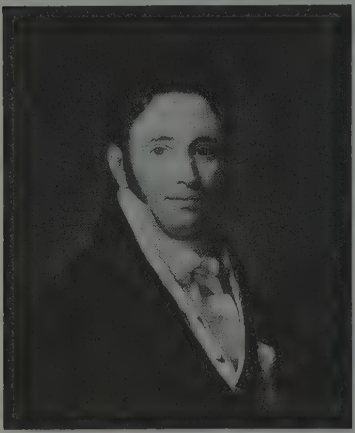
Oedogonium

Hugh Spencer

OEEC: *see* European Economic Cooperation, Organisation for.

Oehlenschläger, Adam Gottlob (b. Nov. 14, 1779, Vesterbro, Den.—d. Jan. 20, 1850, Copenhagen), poet and dramatist who was a leader of the Romantic movement in Denmark and is considered the great Danish national poet.

Oehlenschläger attended a school under the poet Edward Storm. After a short career as an actor, he entered the University of Copenhagen to study law, but turned to writing. Oehlenschläger wrote his famous poem *Guldhornene* (1802; *The Golden Horns,* 1913), after his meeting with the Norwegian scientist and philosopher Henrik Steffens, who was eager to spread the doctrine of German Romanticism in Denmark. The ideals of Steffens gave Oehlenschläger the courage to break with 18th-century literary traditions, and *Guldhornene* marks this turning point in Danish literature. Oehlenschläger's first volume of poetry, *Digte* ("Poems"), appeared in 1802 and contained not only *Guldhornene* but also *Sanct Hansaften-spil* ("A Midsummer Night's Play"); this latter work is a lyrical drama combining literary satire with poetic discourses on love and nature. His *Poetiske skrifter* (1805; "Poetic Writings") contains two long cycles of lyric poems and *Aladdin,* a poetic drama on the writer's own life, with the lamp of the story symbolizing intuitive poetic genius. Oehlenschläger was by now recognized as an important poet, and in 1805 he received a government grant to study and travel in Germany and other countries, where he visited J.W. von Goethe and the leaders of the Romantic movement.



Oehlenschläger, oil painting by F.C. Gröger, 1815; in the Nationalhistoriske Museum, Frederiksborg, Denmark

By courtesy of the Nationalhistoriske Museum, Frederiksborg, Denmark

In the historical plays published in *Nordiske Digte* (1807; "Nordic Poems"), Oehlenschläger broke somewhat with the Romantic school and turned to Nordic history and mythology for his materials. In this collection are the historical tragedy *Hakon Jarl hin Rige* ("Earl Haakon the Great"), based on that Danish national hero, and *Baldur hin Gode* ("Baldur the Good"), based on Norse mythology.

Oehlenschläger returned to Copenhagen in 1809 and became a professor of aesthetics at the university there in 1810. He subsequently wrote many other plays, but these are generally thought to be inferior to his earlier plays. His lyric poetry has in general outlived his dramatic verse. Oehlenschläger's most significant later work is the poetic epic *Nordens guder* (1819; *The Gods of the North*), which is a sort of modern Edda.

oeil-de-boeuf window, also called BULL'S-EYE WINDOW, in architecture, a small circular or oval window, usually resembling a wheel, with glazing bars (bars framing the panes of glass) as spokes radiating outward from an empty hub, or circular centre. In French, oeil-de-boeuf means "eye of the steer," and, in the French Renaissance Palace of Versailles, erected for Louis XIV between 1661 and 1708, there is a small antechamber called the oeil-de-boeuf room, which is lighted by such a small, round window. This type of window is also frequently featured in the Jacobean manor houses of 17th-century England.

Oeiras, Sebastião de Carvalho, conde de (count of): *see* Pombal, Sebastião de Carvalho, marquês de.

Oeneus, in Greek legend, king of Calydon, husband of Althaea, and father of Meleager—the leader of the Calydonian boar hunt. He was also independently connected with the Greek hero Heracles as the father of Heracles' bride Deianeira, whom he won from the river god Achelous. Oeneus may have been originally a wine god; his name is derived from the Greek word for wine. According to one story, Dionysus, the great god of wine, was the real father of Deianeira.

Oenone, in Greek mythology, a fountain nymph of Mount Ida, the daughter of the River Oeneus, and the beloved of Paris, a son of King Priam of Troy. Oenone and Paris had a son, Corythus, but Paris soon deserted her for Helen. Bitterly jealous, Oenone refused to aid the wounded Paris during the Trojan War, even though she was the only one who could cure him. She at last relented but arrived at Troy too late to save him. Overcome with grief, she committed suicide.

oersted, unit of magnetic-field strength, in the centimetre-gram-second system of physical units. Named for the 19th-century Danish physicist Hans Christian Ørsted, it is defined as the intensity of a magnetic field in a vacuum in which a unit magnetic pole (one that repels a similar pole at a distance of one centimetre with a force of one dyne) experiences a mechanical force of one dyne in the direction of the field. Before 1932 the oersted was known as the gauss, a name sometimes still applied, though now more properly used for the unit of magnetic induction.

Oersted, Hans Christian: *see* Ørsted, Hans Christian.

Oerter, Al, byname of ALFRED OERTER (b. Sept. 19, 1936, Astoria, New York, N.Y., U.S.), American discus thrower who won four consecutive Olympic Games gold medals (1956, 1960, 1964, and 1968). During his career he set new world records four times (1962–64). He was the first to throw the discus more than 200 feet with his first world record of 61.10 m (200 feet 5 inches). His best throw in setting a world record was 62.94 m in 1964; his best Olympic throw was 64.78 m in 1968.

After taking up weightlifting in his teens to fill out his slender body build, Oerter was a football player and sprinter in high school. He discovered his discus ability when he idly picked up the discus and threw it farther than anyone else on the track team could. He attended the University of Kansas (Lawrence) on a track scholarship (1954–58).

Oerter went into data-communication work after graduating from college. Although his original goal was to win five gold medals, he retired from Olympic competition after the 1968 games owing to the sacrifices and pressures of being an Olympic champion. He resumed training, however, in 1976. Although he failed to qualify in the 1980 and 1984 U.S. Olympic tryouts (the United States boycotted the 1980 games at Moscow), he was the world record holder in Masters track and field competition in the early 1980s.

Oescus (ancient Europe): *see* Iskŭr River.

Oeser, Adam Friedrich (b. Feb. 17, 1717, Pozsowy, Hung.—d. March 18, 1799, Leipzig [Germany]), painter, sculptor, and engraver who opposed Mannerism in art. He allied himself with the Neoclassical archaeologist and art historian Johann Winckelmann in advocating art reform through the study of ancient masterpieces, although his own work shows little Greek influence.

Trained in the art of modeling by a sculptor, Raphael Donner, Oeser attended the Vienna Academy (1730–39) as a pupil of the German portrait painter Anton Mengs. He then went to Dresden, where he did decorations for the court theatre and, later, mural painting in the Hubertusburg (1749). Named successively professor at the academy at Dresden and the newly founded art school at Leipzig (1764), he painted many works for public buildings and private collections both in oil and frescoes; he remained in Leipzig for the rest of his life.

Among Oeser's most important works are frescoes in the Church of St. Nicholas, a monument of the elector Friedrich August, and small sculptures of the poet Christian Gellert and the Danish queen Mathilde, all in Leipzig. He also left many original engravings modeled after Rembrandt.

oesophagus: *see* esophagus.

Oeuvre, Théâtre de l', French Symbolist theatre founded in Paris in 1893 by Aurélien-François-Marie Lugné-Poe and directed by him until 1929. An actor and stage manager with André Antoine's Théâtre Libre, Lugné-Poe was introduced to Symbolist theatre at Paul Fort's Théâtre d'Art in the 1890s. When Fort retired from the theatre, Lugné-Poe assumed leadership in Symbolist production by opening what would become the Théâtre de l'Oeuvre with Maurice Maeterlinck's *Pelléas et Mélisande* on May 17, 1892. Assisted by the poet and critic Camille Mauclair and the painter Édouard Vuillard, Lugné-Poe dedicated the Théâtre de l'Oeuvre to presenting the work of the young French Symbolist playwrights and introducing major foreign dramas. Besides those of Maeterlinck, he produced works by Oscar Wilde, Gerhart Hauptmann, and Gabriele D'Annunzio and was instrumental in introducing Henrik Ibsen's plays to France. Alfred Jarry's nihilistic farce *Ubu Roi* premiered there in 1896.

Lugné-Poe sought to create a unified nonrealistic theatre of poetry and dreams through atmospheric staging and stylized acting. Scenery was reduced to simple, abstract backdrops; the stage was darkened or lighted from above; gestures were stylized and speeches were chanted; and costumes were usually simple and "timeless." By 1899 the Théâtre de l'Oeuvre had presented 51 programs and toured England, Norway, The Netherlands, Denmark, and Belgium. Lugné-Poe closed the Théâtre de l'Oeuvre in 1899 but revived it in 1912 and again for a time after World War I. He continued to produce the works of new French playwrights, such as Paul Claudel, and those of Dadaist and Surrealist writers.

Consult the INDEX *first*

O'Faolain, Sean, original name JOHN FRANCIS WHELAN (b. Feb. 22, 1900, Cork, County Cork, Ire.—d. April 20, 1991, Dublin), Irish writer best known for his short stories about Ireland's lower and middle classes. He often examined the decline of the nationalist struggle or the failings of Irish Roman Catholicism. His work reflects the reawakening of interest in Irish culture stimulated by the Irish literary renaissance of the early 20th century.

Disturbed by the brutality of the British repression of the Easter Rising of 1916, O'Faolain changed his name, studied Gaelic, and became involved in anti-British activities during the Irish insurrection (1918–21). He received M.A. degrees from the National University of Ireland in Dublin and Harvard University in Cambridge, Mass., and was a Commonwealth Fellow from 1926 to 1928 and a Harvard Fellow from 1928 to 1929.

From 1926 to 1933 O'Faolain taught Gaelic, Anglo-Irish literature, and English in universities and high schools in Great Britain and the United States. Returning to Ireland, he taught briefly until the success of *Midsummer Night Madness and Other Stories* (1932), his first collection of stories, and *A Nest of Simple Folk* (1933), a novel set in the period between the Easter Rising (1916) and the establishment of the Irish Free State (1921), allowed him to write full-time. O'Faolain produced only four novels, including *Bird Alone* (1936) and *Come Back to Erin* (1940), each portraying a central character who attempts to rebel against and rise above the lower-middle class. He later wrote short stories, essays, biography, and travel works that gave unflattering yet sympathetic and realistic portraits of modern Irish life. His criticisms of church-inspired censorship, the narrowness of the Irish clergy, and restrictive family traditions aroused considerable discussion. His well-known works include *A Life of Daniel O'Connell* (1938) and *Vive moi!* (1964), his autobiography. Historical views of the Irish people are contained in *The Irish, a Character Study* (1949; rev. ed. 1969) and *An Irish Journey* (1940). *Selected Stories* was published in 1978 and the novel *And Again?* in 1979. *The Collected Stories of Sean O'Faolain I* appeared in 1980.

O'Faolain served as director of the Arts Council of Ireland from 1957 to 1959, and from 1940 to 1946 he was editor in Dublin of the Irish literary periodical *The Bell.*

Off-Broadway, in the theatre of the United States, small professional productions that have served for years as New York City's alternative to the commercially oriented theatres of Broadway. The plays, usually produced on low budgets in small theatres, have tended to be freer in style and more imaginative than those on Broadway, where high production costs often oblige producers to rely on commercially safe attractions to the neglect of the more serious or experimental drama. The lower costs are permitted in part by more lenient union regulations governing minimum wages and number of personnel. The designations Broadway and Off-Broadway refer not so much to the location of the theatre as to its size and the scale of production; most Broadway theatres are not located on Broadway itself but on the side streets adjacent to it. Some Off-Broadway theatres also are within the Broadway theatre district, although most are remote from midtown Manhattan. Off-Broadway theatres enjoyed a surge of growth in quality and importance after 1952, with the success of the director José Quintero's productions at the Circle in the Square theatre in Greenwich Village. In two decades of remarkable vitality, Off-Broadway introduced many important theatrical talents, such as the director Joseph Papp, whose later productions included free performances of Shakespeare in Central Park and who formed the Public Theatre, a multitheatre complex dedicated to experimental works. The works of such prizewinning American playwrights as Edward Albee, Charles Gordone, Paul Zindel, Sam Shepard, Lanford Wilson, and John Guare were first produced off Broadway, along with the unconventional works of European avant-garde dramatists such as Eugène Ionesco, Ugo Betti, Jean Genet, Samuel Beckett, and Harold Pinter and revivals of Bertolt Brecht and Eugene O'Neill. The small theatres also trained many noted performers and experts in lighting, costume, and set design.

Like Broadway, Off-Broadway theatres began to suffer from soaring costs; this stimulated the emergence of still less expensive and more daring productions, quickly labeled off-Off-Broadway. The most successful of these have included such groups as The Negro Ensemble Company, La Mama Experimental Theatre Company, the Open Theatre, Manhattan Theatre Club, Ensemble Studio Theatre, and Roundabout.

Offa (d. July 796), one of the most powerful kings in early Anglo-Saxon England. As ruler of Mercia from 757 to 796, Offa brought southern England to the highest level of political unification it had yet achieved in the Anglo-Saxon period (5th–11th century AD). He also formed ties with rulers on the European continent.

A member of an ancient Mercian ruling family, Offa seized power in the civil war that followed the murder of his cousin, King Aethelbald (reigned 716–757). By ruthlessly suppressing resistance from several small kingdoms in and around Mercia, he created a single state covering most of England south of modern Yorkshire. The lesser kings of this region paid him homage, and he married his daughters to the rulers of Wessex and Northumbria.

Offa, silver penny, *c.* 787; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London; photograph, Royal Academy of Arts, London

Offa appears to have aspired to be accepted as an equal by continental monarchs. Charlemagne, king of the Franks, quarreled with Offa, but the two rulers concluded a commercial treaty in 796. In addition, Offa maintained a friendly relationship with Pope Adrian I, who was allowed to increase his control over the English church, while acceding to Offa's request for the creation of an archbishopric of Lichfield. This remarkable, if temporary, change in church organization freed the Mercian church from the authority of the archbishop of Canterbury, who was seated among Offa's enemies in the kingdom of Kent.

An impressive memorial to Offa's power survives in the great earthwork known as Offa's Dyke (*q.v.*), which he had constructed between Mercia and the Welsh settlements to the west. Perhaps the most enduring achievement of his reign was the establishment of a new form of coinage bearing the king's name and title and the name of the moneyer responsible for the quality of the coins. The principles governing his coinage were employed in England for centuries afterward.

Offa, town, Kwara state, southwestern Nigeria. It lies along the railroad from Lagos and at the intersection of roads from Ilorin town, Lafiagi, and Ikirun. A traditional settlement of the Yoruba people in a savanna area, it now serves as a collecting point for the yams, cassava, corn (maize), sorghum, and shea nuts grown in the surrounding area. Cotton weaving and dyeing (with locally grown indigo) are important activities in the town. Offa is served by a hospital and by secondary schools. Pop. (1989 est.) 165,000.

Offa OF ANGEL (fl. 4th century AD), continental Anglian ruler from whom the royal house of Anglo-Saxon Mercia claimed descent.

According to the Old English poem "Widsith," Offa saved his aged father, King Wermund, from falling under Saxon domination by defeating a Saxon king's son in single combat. Later Offa became ruler of the large kingdom of Angel, and he is said to have established Fifldor (probably the Eider River in the northernmost part of modern Germany) as the boundary between his domains and those of the neighbouring Myrgings. This legend inspired his namesake, the great 8th-century Mercian ruler Offa, to build a long earthwork, called Offa's Dyke—parts of which are still in existence—separating the Mercian and Welsh kingdoms. Offa of Angel is probably the same Offa mentioned in the Old English poem *Beowulf.*

offal, also called VARIETY MEATS, any of various nonmuscular parts of the carcasses of beef and veal, mutton and lamb, and pork, which are either consumed directly as food or used in the production of other foods. Variety meats have been a part of the human diet since the invention of cooking, which rendered the otherwise indigestible animal parts edible. In nutritional terms, several variety meats are richer in certain vitamins, minerals, and forms of protein than muscle tissue; calf's liver, for example, is a major dietary source of iron, and sweetbread (thymus) is considerably higher in the water-soluble protein albumin than is beef.

Beef offal includes the stomachs, tripe, or large stomach, brains, heart, liver, tongue, and kidneys. For young beef, or veal, a number of additional parts, such as spinal marrow, trotters (feet), mesentery, and the sweetbread, are counted among the variety meats. Mutton and lamb offal includes the kidneys, tongue, brains, feet, stomach, heart, liver, and lights, or lungs. In pork, the designation includes the liver, kidneys, brains, trotters, and head. Pigs' intestines are used as containers in the manufacture of sausages, and pigs' blood is an ingredient in black pudding.

The variety meats figure prominently across the full spectrum of Western cuisine. Some offal, notably the brains, liver, tripe, lights, and trotters, have long been associated in the United States with rural cookery, with pork intestines, or chitterlings, being considered perhaps an archetypal fare of the rural poor. In this context, the parts are typically prepared by boiling or frying and served highly seasoned. Several of the same foods, such as calf's liver for frying and jellied tripe and pickled beef tongue for use as cold cuts, are routinely stocked in the average urban food store; other variety meats are generally available by special order. In the haute cuisine of Europe, variety meats form the basis of numerous classic dishes, such as *tripe à la mode de Caen* and grilled sweetbreads.

Offaly, Irish UIBH FHAILAÍ, county in the province of Leinster, Ireland. With an area of 771 square miles (1,998 square km), it is bounded by Counties Westmeath and Meath (north), Kildare (east), Laoighis and Tipperary (south), and Galway and Roscommon (west). The River Shannon forms its western boundary. Offaly consists mainly of a large section of the central lowland, though its southwestern boundary runs along the crest of the Slieve Bloom. Its terrain is primarily a mixture of peat bogs and cultivable land composed of glacial drift. A notable geologic feature is the fine series of eskers (long ridges of postglacial gravel), notably at Clonmacnois, an ancient monastic site near the Shannon. Seven-tenths of the county is improved agricultural land. Peat bogs supply fuel for electric-power stations. Offaly has many raths (prehistoric hill forts) and a chain of mottes, commanding passes of the bogs.

Offaly formed part of the ancient kingdom of Offaly and was inhabited by O'Connors. Following the rebellion of Brian O'Connor, it was annexed to the English crown during the reign of Edward VI. Offaly was shired as King's County in 1556. A plan for colonizing Laoighis and Offaly was adopted by the government under Mary I, but the inhabitants resisted for the rest of the century, being subdued only at the beginning of the reign of James I (1603).

Offaly is united with Laoighis under a county manager but has its own county council. Birr and Tullamore are urban districts; more than two-fifths of the population live in villages and towns, the largest of which is Tullamore, the assize and county town (seat), which has a worsted mill, malting plant, distillery, and a bacon and sausage factory. Birr (*q.v.*) and Edenderry have footwear factories, Clara a jute mill, and Edenderry a furniture factory. Other smaller places serve as market towns with monthly livestock fairs. Two-thirds of the county's improved farmland is permanent pasture, one-fifth is under crops, and the rest is used as meadow. Wheat is prominent, and barley is sold to maltsters. Tullamore and Clara are on a branch railway line from Athlone to Portarlington, and a canal still carries cargo. Pop. (1996) 59,000.

Offaly, Thomas Fitzgerald, Lord: *see* Kildare, Thomas Fitzgerald, 10th earl of.

Offa's Dyke, great English earthwork extending linearly, with some gaps, from the River Severn near Chepstow to the seaward end of the Dee estuary, passing for 169 miles (270 kilometres) through the counties of Gloucestershire, Herefordshire, Radnorshire, Montgomeryshire, Shropshire, Denbighshire, and Flintshire. It was built at the orders of Offa, the great Mercian king of the second half of the 8th century, who sought to define the boundary between his kingdom and the lands of the Welsh, many of whom he had dispossessed. For centuries the dyke marked the boundary between England and Wales, the place names to the east being English and those to the west largely Welsh. However, only in a few places does it follow the English–Welsh boundary as it is now fixed.

The dyke was not so much a fortification as a demarcation line, consisting as it did of a plain bank (sometimes 60 feet [18 metres] high) and a ditch (12 feet deep) facing Wales. Many sections are still visible, and a modern long-distance path for touring walkers runs its length, through beautiful country.

An earlier, shorter earthwork to the east, Wat's Dyke, runs parallel to Offa's Dyke—extending from Basingwerk on the Dee estuary to the Morda Brook, south of Oswestry.

Offenbach, in full OFFENBACH AM MAIN, city, Hesse *Land* (Hesse state), west-central Germany, a river port (coal and oil) on the left bank of the canalized Main. First mentioned in 977, it was part of the imperial forest of Dreieich, and a mint was established there in 1407. Acquired by Count (later prince) von Isenburg-Birstein in 1486, it began its prosperity with an influx of Huguenot craftsmen in 1698–1703. Annexed to Hesse in 1816, it grew steadily until the proximity (downstream to the west) of metropolitan Frankfurt am Main checked further development after World War I. The city was rebuilt after heavy damage in World War II. New buildings include the city hall and several federal offices, including those for meteorological services and customs. Notable landmarks include the Isenburg Castle (1564–78); the alkaline Kaiser-Friedrich-Spring, feeding a well of 787 ft (240 m); and the Klingspor Museum of modern calligraphy and book printing. Offenbach has a noted tanning and leather goods industry and is the site of a leather museum and of leather-trade exhibitions. Other important industries include the manufacture of machinery and electrical products, chemicals, and textiles. Pop. (1998 est.) 116,214.

Offenbach, Jacques, original name JACOB OFFENBACH (b. June 20, 1819, Cologne [Ger.]—d. Oct. 5, 1880, Paris, France), composer who created a type of light burlesque French comic opera known as the *opérette,* which became one of the most characteristic artistic products of the period.

He was the son of a cantor at the Cologne Synagogue, Isaac Juda Eberst, who had been born at Offenbach am Main. The father was known as "Der Offenbacher," and the composer was known only by his assumed name, Offenbach. Attracted by the more tolerant attitude in Paris to the Jews, Offenbach's father took him there in his youth, and in 1833 he was enrolled as a cello student at the Paris Conservatoire. In 1844, having been converted to Catholicism, he married Herminie d'Alcain, the daughter of a Spanish Carlist. In 1849, after playing the cello in the orchestra of the Opéra-Comique, he became conductor at the Théâtre Français. In 1855 he opened a theatre of his own, the Bouffes-Parisiens, which he directed until 1866 and where he gave many of his celebrated operettas, among them *Orphée aux enfers* (1859; *Orpheus in the Underworld*). He then produced operettas at Ems in Germany and an *opéra-ballet* in Vienna, *Die Rheinnixen* (1864; *Rhine Spirits*). Returning in 1864 to Paris, he produced at the Variétés his successful operetta *La Belle Hélène* (1864). Other successes followed, including *La Vie Parisienne* (1866), *La Grande-Duchesse de Gérolstein* (1867), and *La Périchole* (1868). From 1872 to 1876 he directed the Théâtre de la Gaîté, and in 1874 he produced there a revised version of *Orphée aux enfers.* Described then as an *opéra-féerique* ("a fairy-like opera"), this venture was a financial failure. In 1876 he made a tour of the United States. The remaining years of his life were devoted to composition.

His only grand opera, *Les Contes d'Hoffmann* (*The Tales of Hoffmann*), remained unfinished at his death. It was orchestrated and provided with recitatives by Ernest Guiraud, who also introduced the famous barcarole taken from *Die Rheinnixen.* Described as an *opéra-fantastique,* it was first produced at the Opéra-Comique on Feb. 10, 1881. *Gaîté Parisienne,* a suite of Offenbach's music arranged by Manuel Rosenthal, remains a popular orchestral work as well as ballet score.

Offenbach is credited with writing in a fluent, elegant style and with a highly developed sense of both characterization and satire (particularly in his irreverent treatment of mythological subjects); he was called by Rossini "our little Mozart of the Champs-Elysées." Indeed, he was almost as prolific as Mozart. He wrote more than 100 stage works, many of which, transcending topical associations, were maintained in the repertory through the 20th century.

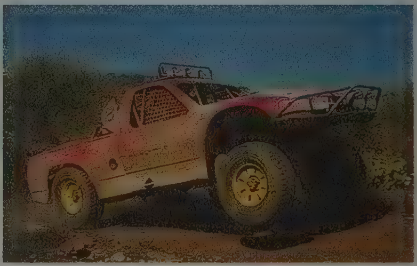
Offenburg, city, Baden-Württemberg *Land* (state), southwestern Germany, in the Kinzig River Valley, at the western edge of the Schwarzwald (Black Forest). First mentioned in 1101, it was founded by the Zähringen margraves on the site of a Roman settlement and was an imperial free city from 1289 to 1802. In 1846–49 it was a centre of the revolutionary movement in Baden. There are Gothic and Baroque buildings and remains of the old fortifications. From the nearby Staufenberg Castle, atop the Durbach (1,257 ft [383 m]), the cathedral at Strasbourg, France, 10 mi (16 km) northwest, can be seen. The principal town of the Ortenau wine- and fruit-growing district, it is also a road and rail junction with printing, structural steel, machinery, electrical, and textile industries. Tourism is important. Pop. (1998 est.) 56,781.

Öffentliche Kunstmuseum: *see* Kunstmuseum-Öffentliche Kunstsammlung Basel.

offerings of the five senses (in Tibetan Buddhism): *see* nang-mchod.

offroad racing, form of motor racing conducted over rough, unmarked, often desert terrain. An outgrowth of the post-World War II popularity of motorcycle trail racing, offroad racing involves contestants racing from checkpoint to checkpoint along improvised routes.

Numerous offroad race circuits have developed, notably Score International Off Road Racing, which hosts the Baja 1000 (extended to the Baja 2000 [miles] for the 2000 race), run annually in the deserts of Baja California. Offroad races are typically organized by vehicle type—motorcycle, car, truck, and all-terrain vehicle (ATV)—into various stock and custom classes. Such circuits usually recognize annual winners in each class based on points accumulated in individual races.



Driven by Dan Smith and Dave Ashley, this trophy truck finished first among four-wheel vehicles in the Baja 2000 offroad race

Photo courtesy of Truckworld.com/BFGoodrich

Still primarily a North American sport, offroad racing has also become popular in Japan and Australia.

offset, dry (printing): *see* dry offset.

offset printing, also called OFFSET LITHOGRAPHY, or LITHO-OFFSET, in commercial printing, widely used printing technique in which the inked image on a printing plate is printed on a rubber cylinder and then transferred (*i.e.,* offset) to paper or other material. The rubber cylinder gives great flexibility, permitting printing on wood, cloth, metal, leather, and rough paper. An American printer, Ira W. Rubel, of Nutley, N.J., accidentally discovered the process in 1904 and soon built a press to exploit it.

In offset printing the matter to be printed is neither raised above the surface of the printing plate (as in letterpress) nor sunk below it (as in intaglio, or gravure, printing). Instead, it is flush with the surface of the plate; thus offset is classified as a planographic method of printing.

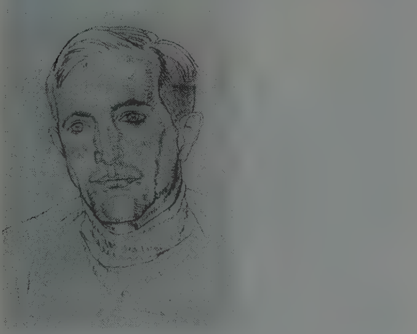
Offset printing, as a development of lithography (*q.v.*), is based on the principle that water and grease do not mix, so that a greasy ink can be deposited on grease-treated printing areas of the plate, while nonprinting areas, which hold water, reject the ink. The offset plate is usually of zinc or aluminum or a combination of metals, with the surface treated to render it porous and then coated with a photosensitive material. Exposure to an image hardens the coating on printing areas; the coating on nonprinting areas is washed away, leaving wetted metal that will reject ink.

Modern offset printing is done on a press composed basically of three rotating cylinders: a plate cylinder, to which the metal plate is fastened; a blanket cylinder covered by a sheet of rubber; and an impression cylinder that presses the paper into contact with the blanket cylinder. The plate cylinder first comes in contact with a series of moistening rollers that deposit moisture in the granulations of the metal. A series of inking rollers then pass over the plate, and the ink is rejected by the water-holding areas and accepted by the greasy image. The inked image is transferred to the rubber blanket and is then offset to the paper traveling around the impression cylinder.

offshore bar: *see* sandbar.

O'Flaherty, Liam (b. Aug. 28, 1896, Inishmore, Aran Islands, County Galway, Ire.—d. Sept. 7, 1984, Dublin), Irish novelist and short-story writer whose works combine brutal naturalism, psychological analysis, poetry, and biting satire with an abiding respect for the courage and persistence of the Irish people. He was considered to be a leading figure of the Irish Renaissance.

O'Flaherty abandoned his training for the priesthood and embarked on a varied career as a soldier in World War I and an international wanderer in South America, Canada, the United States, and the Middle East. He laboured in such occupations as lumberjack, hotel porter, miner, factory worker, dishwasher, bank clerk, and deckhand. After taking part in revolutionary activities in Ireland, O'Flaherty settled in England in 1922; he returned to Dublin in the mid-1920s. His books include *Thy Neighbour's Wife* (1923), his successful first novel; *The Black Soul* (1924), the story of a tormented former soldier who seeks tranquillity on a remote western isle; *The Informer* (1925; filmed 1935), about a confused revolutionary who betrays his friend during the Irish "troubles"; *Skerrett* (1932), a critically acclaimed story of conflict between a parish priest and a teacher; *Famine* (1937), a re-creation of the effect of the Irish famine of the 1840s on the individuals of a small community; *Short Stories* (1937; rev. ed., 1956); *Insurrection* (1950), a novel dealing with the Easter Rising of 1916; *The Pedlar's Revenge and Other Stories* (1976); as well as several other novels and collections of short stories. His autobiography, *Shame the Devil,* was published in 1934.


O'Flaherty, ink drawing by F.A. Coventry, 1930
National Library of Ireland

Ofonius Tigellinus: *see* Tigellinus, Ofonius.

og clock: *see* ogee clock.

Ogadai (Mongol ruler): *see* Ögödei.

Ogaden, arid region of eastern Ethiopia. It occupies the barren plain between the Somalia-Ethiopia border and the Ethiopian Eastern Highlands (on which Harer and Dire Dawa are situated). The major stream of the region is the Shebeli, fed by ephemeral streams. At the southwestern edge of the Ogaden are the headwaters of the Juba River.

The region is sparsely populated with Somali-speaking nomadic pastoralists. Their ancestors migrated there in the 16th century, displacing the Oromo (Galla) who previously lived there. The Ogaden has no large towns.

In the late 19th century the Ogaden was claimed by both Ethiopia and the Italian protectorate of Somaliland. The Ethiopian emperor Menelik II, having defeated the Italians at Adowa in the north in 1896, forestalled them in the east by occupying the Ogaden with his army. Disagreement about the boundary remained, however. Italy occupied the Walwal oasis in the early 1930s and launched a full-scale invasion of the Ogaden from Somaliland in 1935. The next year Ethiopia, including the Ogaden, was proclaimed part of Italian East Africa. Although Ethiopia was liberated by Free French and British forces in 1941, the Ogaden remained under British administration until 1948.

Border conflict and internal unrest in the Ogaden resumed after Somalia became independent in 1960. The Western Somalia Liberation Front, spurred by Muktal Dahir, used guerrilla tactics to resist Ethiopian rule. The army of Somalia invaded and occupied the region in the second half of 1977, with encouragement from some of the Somali-speaking residents. In February and March 1978 Ethiopia, helped by Cuba and the Soviet Union, drove the Somali army out and proceeded to bomb and strafe Ogaden villages as reprisal for their complicity in the invasion. Villagers fled, and by the early 1980s the number of refugees in Somalia from the Ogaden exceeded 1,500,000, most of them women and children. The issue of effective control over the Ogaden remained unresolved.

Ōgaki, city, Gifu *ken* (prefecture), Honshu, Japan, on the Ibi River. The site was settled in prehistoric times, but the present city developed around the castle built in 1535. Since the end of the Meiji period (1868–1912), Ōgaki has become a textile and chemical centre aided by abundant groundwater. Machinery is also produced, and rice is grown in the environs. In Ōgaki Park are the reconstructed castle, the Tokiwa Shrine, a museum, and a gymnasium. Pop. (1990) 148,281.

ogam writing: *see* ogham writing.

Ogasawara-guntō: *see* Bonin Islands.

Ogata Kenzan, original name OGATA SHINSEI, also called KENZAN (b. 1663, Kyōto, Japan—d. June 3, 1743, Edo [now Tokyo]), Japanese potter and painter, brother to the artist Ogata Kōrin. He signed himself Kenzan, Shisui, Tōin, Shōkosai, Shuseidō, or Shinshō.

Kenzan received a classical Chinese and Japanese education and pursued Zen Buddhism. At the age of 27 he began studying with the potter Ninsei and in 1699 established his own kiln in Narutaki. Encountering financial difficulties, he moved in 1712 to Nijō, near Kyōto, where he established another kiln. But difficulties pursued him there, and in 1731 he moved to Edo and built still another kiln.

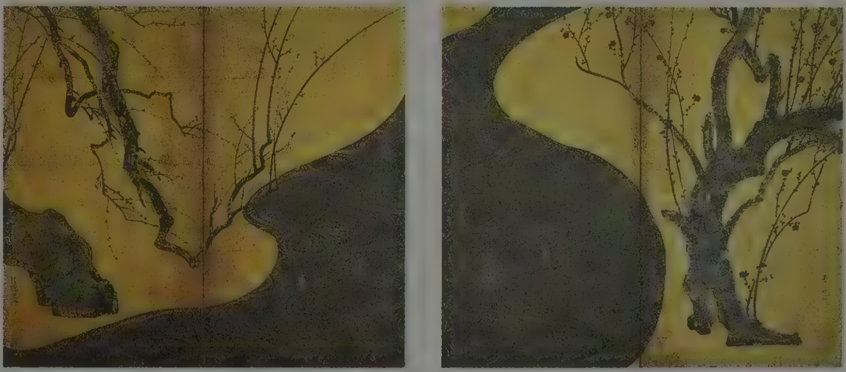
In the 40 years of his working life, Kenzan produced quantities of pottery. His output included raku ware (pottery covered with a lead glaze and fired at a comparatively low temperature), *toki* ("ceramics"), and *jiki* ("porcelain"). He used various techniques in ornamentation, his *iro-e* ("colour painting") being especially good. Many of his designs reflect his classical Chinese and Japanese education. He also produced many paintings, especially in the last five years of his life. His calligraphy, as seen in his wares and his paintings, was distinctive in style. His best-known works include a hexagonal plate with a design of Jurōjin, the god of longevity, a joint work with his brother Kōrin; a plate with a picture of a cedar grove; the "Hana-kago" ("Flower Baskets," a watercolour hanging scroll); and the "Yatsuhashi" ("Eight Bridges," a painting of a scenic attraction in Mikawa province [modern Aichi prefecture]).

Square dish, pottery by Ogata Kenzan, painting by Ogata Kōrin, late 17th–early 18th century; in the Tokyo National Museum
By courtesy of the Tokyo National Museum

Ogata Kōrin, original name OGATA KORETOMI, also called OGATA ICHINOJŌ, or KŌRIN (b. 1658, Kyōto, Japan—d. July 20, 1716, Kyōto), Japanese artist of the Tokugawa period (1603–1868), regarded, along with Sōtatsu, as one of the masters of the Sōtatsu-Kōetsu school of decorative painting. He is particularly famous for his screen paintings, lacquerwork, and textile designs.

Kōrin was descended from a samurai (warrior aristocrat) who had served under the Ashikaga rulers and was related to a famous calligrapher and swordsmith, Honami Kōetsu. Kōrin's grandfather and father owned Kariganeya, a prosperous store dealing in fabrics for kimonos that was patronized by some of the most powerful ladies of the capital. Members of his family were also keenly interested in the arts. Kōrin's grandfather, Sōhaku, spent the later years of his life in Takagamine, an art colony established at the outskirts of Kyōto by Kōetsu, and Kōrin's father, Sōken, was an accomplished calligrapher of the Kōetsu school, as well as a lover of Nō drama.

Kōrin grew up in an environment of luxury and aesthetic refinement. Having received a considerable inheritance from his father, the artist spent his youth leading a carefree life filled with the pursuit of pleasure. He was not married until 1697, when he was almost 40.


"Red and White Plum Trees" by Ogata Kōrin, pair of screens painted with colour over gilded paper; in the MOA Museum of Art, Atami, Japan
By courtesy of the MOA Museum of Art, Atami, Japan

The extravagance of Kōrin's life-style is best illustrated by a story of a lavish picnic party that Kōrin and his friends gave at Arashiyama outside of Kyōto. As each of the participants showed off his splendid dishes, Kōrin provided the climax by producing his food wrapped in bamboo leaves decorated with gold. When the meal was over, the artist tossed the leaves into the river, an action for which he was banished for a time from Kyōto because it violated the law forbidding the use of gold and silver among the common people.

Because of such extravagances, Kōrin lost the fortune he had inherited and had to turn to art for a living. Earlier in his life, he had studied painting for many years, at first probably under the tutelage of his father, who was an accomplished painter, and later under Yamamoto Sōken, a member of the officially recognized Kanō school. Sōken, who was skillful in both Chinese-style ink painting and the traditional Tosa school painting, which employed Japanese subject matter and a colourful decorative style, instructed his pupil in both these manners. Other influences on his early work were paintings of Kanō Yasunobu and especially the work of Sōtatsu, who were the two most outstanding decorative painters of the early 17th century. Few of Kōrin's early paintings have been identified, and those works that can be attributed to this phase of his career appear to have been painted in ink in the traditional Kanō style.

Kōrin's artistic maturity began in 1697, when he established himself as a professional painter. In 1701, at the age of 43, he was given the rank of *hokkyō,* indicating that he was an accomplished artist; after that, virtually all his work bears the signature Hokkyō Kōrin. Because almost none of his paintings bears a date, it is difficult to determine the chronology of his artistic output, but it appears that all his important work was produced in the 20-year period after 1697. These years may be divided into three parts: the formative Kyōto period, from 1697 to 1703, when he gained recognition as an artist; the period from 1704 to 1710, when he lived in Edo (present-day Tokyo); and the years 1711 to 1716, when he reached his artistic climax.

Kōrin's first masterpiece was a screen representing autumn grasses and flowers, which combined his two most outstanding characteristics: a fine sense of abstract decorative design and a close study of nature. The culmination of this phase was in a famous iris screen, a work that is believed to date from 1701. After moving to Edo in 1704, he enjoyed the patronage of wealthy merchants and some of the great lords of feudal Japan. Among the works attributed to this period are a hand scroll depicting the flowers of the four seasons that has been handed down in the Tsugaru family of Tokyo, a charming hanging scroll of red and white azaleas, and a twofold screen representing waves. After his return to Kyōto in 1711, the work of Sōtatsu became the overwhelming influence on his art. In fact, he based the compositions of two of his most famous screens on the painting of this master. These are the two sixfold screens depicting the waves at Matsushima and the twofold screen "God of Thunder and God of Wind." The work that is usually regarded as the supreme achievement of this period is the screen "Red and White Plum Trees." In this work, Kōrin's sense of flat, decorative design and his feeling for nature, combined with an emphasis on an abstract colour pattern, are seen at their very best. Although he died at the age of 59, he left many pupils and followers. The most outstanding of these was Sakai Hōitsu, who was active during the early years of the 19th century.

In addition to the splendid, colourful screen paintings for which he is primarily famous, Kōrin was an expert lacquer artist whose work has had a tremendous influence on craftsmen working in this field. He is also famous for his textile designs and the pictorial decorations that he supplied for the ceramics of his brother, Ogata Kenzan, who is regarded by many critics as Japan's greatest potter.

(H.Mu.)

BIBLIOGRAPHY. Shiichi Tajima, *Masterpieces Selected from the Kōrin School,* 5 vol. (1903–06), is still the most complete study of Kōrin and his school, although outdated and not always reliable. Bernard Leach, *Kenzan and His Tradition* (1962); and Hiroshi Mizuo, *Edo Painting* (1972), consider the work of Kenzan, Kōetsu, Sōtatsu, and Kōrin.

Ogbomosho, town, Oyo state, southwestern Nigeria. It lies on the Plateau of Yorubaland (elevation 1,200 feet [366 m]) in an area of savanna and farmland and at the intersection of roads from Oyo, Ilorin, Oshogbo, and Ikoyi. Founded in the mid-17th century, it remained a minor outpost of the Yoruba Oyo empire until the beginning of the Muslim Fulani conquests of Oyo in the early 19th century. By surviving the Fulani onslaught, the walled town attracted many Oyo refugees and became one of the largest Yoruba settlements. Ogbomosho's traditional rulers retained control over the refugee population, which, though the new majority, was not given political power. Following Ibadan's victory in 1840 over the Fulani at Oshogbo, 32 miles (51 km) southeast, the town shifted its allegiance from Oyo to Ibadan.

Now one of the nation's largest urban centres, Ogbomosho is inhabited mainly by Yoruba farmers, traders, and artisans. Yams, cassava, corn (maize), and sorghum are grown for export to the cocoa-producing areas of Yorubaland to the south; teak is also exported, and tobacco is cultivated for the cigarette factory at Ibadan, 58 miles (93 km) south-southeast. Locally grown cotton is used for weaving *aso oke,* the traditional Yoruba cloth; Ogbomosho weavers also make *sanyan,* a cloth woven from silk brought from Ilorin (32 miles northeast). The indigo dyeing of the cloth is performed exclusively by women. Although the craft of wood carving has declined, the town is known for its early wood artifacts and for its unique *koso* drums. Ogbomosho serves as a staging point and market for cattle, and it has a government livestock station. The town also has a shoe and rubber factory. Local trade is primarily in staple crops, palm oil, kola nuts, beans, fruits, and cotton.

The Oyo-Ilorin road is the main street of the town. A prominent landmark is the great square tower of the central mosque, which rises above the traditional walled compounds of private houses and the parts of the old wall that remain. Ogbomosho has other mosques and several churches and is the headquarters of the American Baptist Church of Nigeria and its theological seminary. Pop. (1995 est.) 711,900.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Ogburn, William Fielding (b. June 29, 1886, Butler, Ga., U.S.—d. April 27, 1959, Tallahassee, Fla.), American sociologist known for his application of statistical methods to the problems of the social sciences and for his idea of "cultural lag."

Ogburn was a professor at Columbia University (1919–27) and the University of Chicago (1927–51). He frequently served as a labour mediator and was research director of President Herbert Hoover's committee on U.S. social trends (1930–33).

Ogburn's insistence on the verification of social theories by quantitative methods helped to shift the emphasis in sociology from social philosophy and reform programs toward the development of a more nearly exact science of social phenomena. Ogburn considered what he termed invention—a new combination of existing cultural elements—to be the fundamental cause of cultural evolution. He noted that an invention directly affecting one aspect of culture may require adjustments in other cultural areas; he introduced the term cultural lag to describe delays in adjustment. Although lags are generally imperceptible when long periods of history are considered, they may be so acute at a given moment as to threaten complete disintegration of a society. For example, a major innovation in industrial processes may disrupt economics, government, and the social philosophy of a nation. From these disturbances a new equilibrium will be realized.

Among Ogburn's writings are *Social Change* (1922) and *Sociology* (with Meyer F. Nimkoff, 1940).

Ogdai (Mongol ruler): *see* Ögödei.

Ogden, city, seat (1852) of Weber county, northern Utah, U.S. It lies at the confluence of the Weber and Ogden rivers, just west of the Wasatch Mountains and east of the Great Salt Lake. The community began as a settlement developed around Fort Buenaventura, a log stockade with an irrigated garden built (*c.* 1844) by Miles M. Goodyear and purchased by the Mormons in 1847; Goodyear's cabin is preserved. First known as Brownsville, it was laid out in 1850 by the Mormon leader Brigham Young and renamed for Peter Skene Ogden, the fur trader. After the arrival of the Union Pacific Railroad (1869), Ogden became a distribution point for the agricultural produce of the intermountain region.

Transportation, income-tax processing, light manufacturing (pharmaceuticals, clothing, and transportation equipment), and aircraft industries (located at nearby Hill Air Force Base) are the city's economic mainstays. Weber State University was founded in 1889 as a Mormon academy. The John M. Browning Firearms Museum has a collection of the inventor's firearms. The Snowbasin winter sports area, on the east slope of Mount Ogden, is 18 miles (29 km) east. Inc. 1851. Pop. (1994 est.) city, 67,763; (1995 est.) Salt Lake City–Ogden MSA, 1,199,323.

Ogden, C.K., in full CHARLES KAY OGDEN (b. June 1, 1889, Fleetwood, Lancashire, Eng.—d. March 20, 1957, London), British writer and linguist who originated Basic English (*q.v.*), a simplified system of the English language intended as a uniform, standardized means of international communication.

In 1912 Ogden founded an intellectual weekly, *The Cambridge Magazine,* to which Thomas Hardy, George Bernard Shaw, H.G. Wells, and other noted literary figures contributed. In 1919 he turned it into a quarterly and, with the literary scholar I.A. Richards, began publishing preliminary sketches for a book on the theory of language, *The Meaning of Meaning* (1923). In this work he attempted to draw insights from modern psychological research to bear on the linguistic problem of word meaning. The chapter on definition contained the germ of Basic English, which took its final form in 1928. His *Basic Vocabulary* (1930) and *Basic English* (1930) were followed by *The System of Basic English* (1934). General interest in Basic English did not develop until after 1943, however, when Winston Churchill, with the support of Franklin D. Roosevelt, appointed a committee to study the extension of its use. Ogden's efforts resulted in conceptions of language learning that are still productive.

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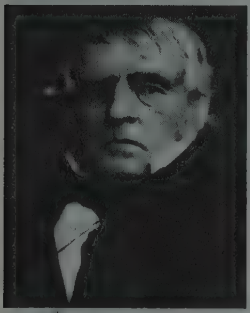
Ogden, Peter Skene (b. 1794, Quebec—d. Sept. 27, 1854, Oregon City, Oregon Territory), Canadian fur trader and a major explorer of the American West—the Great Basin, Oregon and northern California, and the Snake River country. He was the first to traverse the intermountain West from north to south.


Peter Skene Ogden
By courtesy of the Oregon Historical Society

Ogden's parents were American Loyalists who had fled to Canada (via England) during the Revolutionary War. In his youth Ogden left his home in eastern Canada to embark on the adventurous life of a fur trader with the North West Company and was stationed at Isle-à-la-Crosse during the period of the company's murderous rivalry with the Hudson's Bay Company. During this period he acquired his reputation as a tough, ruthless trader. The two companies merged in 1821, and Ogden was admitted as a chief trader two years later; he remained working for the company in the area west of the Rockies.

As a fur trader Ogden automatically became an explorer of new territory. For many years he led annual trading expeditions to deal with the Indians in competition with American traders operating out of St. Louis, Mo. In 1825 he reached the river in Utah that now bears his name; he explored southern Oregon and northeastern California in 1826–27, discovered the Humboldt River in northern Nevada in 1828, and made the first reconnaissance of the eastern face of the Sierra Nevada in 1829, discovering Carson and Owens Lakes.

From 1831 to 1844 Ogden superintended trade in the British Columbia area, becoming a chief factor (agent) in 1835 and principal officer in the Columbia Department of the Hudson's Bay Company from 1845 on. He was warmly remembered for having rescued the survivors of the Whitman Massacre, in which the missionary Marcus Whitman, his wife, and 12 others were slain in 1847 by Cayuse Indians.

Ogden knew a number of Indian languages and was twice married to Indian women, by each of whom he had children. He always remained a British subject. He spoke French as fluently as English and was known to traders as "Monsieur Pete." His *Traits of American-Indian Life and Character* (1853) was published anonymously in London.

Ogdensburg, city and port, St. Lawrence county, northern New York, U.S., on the St. Lawrence River, at the mouth of the Oswegatchie River, linked to Ontario, Canada, by the Ogdensburg-Prescott International Bridge (1960). The site was settled in 1749 when Abbé François Picquet established Fort-La Présentation as an Indian mission, which was destroyed (1760) by the French in the face of a British advance. The British then built Ft. Oswegatchie, occupying it until 1796; the ensuing settlement was named for Col. Samuel Ogden, a landowner.

Ogdensburg was captured by the British during the War of 1812, and the Battle of the Windmill (Nov. 12–16, 1838) took place across the river during the Patriot War, an abortive attempt by Canadian-American groups to free Canada from the "English yoke." A plaque commemorates the meeting (Aug. 17–18, 1940) there between U.S. Pres. Franklin D. Roosevelt and Canadian Prime Minister W.L. Mackenzie King, from which issued the Ogdensburg Declaration, in which the two countries agreed to cooperate in the defense of the North American continent through the creation of a Permanent Joint Board on Defense–United States and Canada.

The Remington Art Museum in Ogdensburg houses works of Frederic Remington, artist-sculptor of the Old West. The city's St. Lawrence Psychiatric Center was opened in 1890 as a state hospital. Ogdensburg, the site of St. Lawrence Seaway projects, is a major distributor of oil, gas, and coal and has varied industries including the manufacture of paper and wood products and the manufacture of office equipment and supplies. The Custom House (1809–10) was officially designated (1964) as the oldest U.S. federal government building. Ogdensburg is the seat of Mater Dei (1960) and Wadhams Hall (1924) colleges. Inc. village, 1817; city, 1868. Pop. (1990) 13,521.

ogee clock, also called OG CLOCK, clock design that originated in the United States in the 1830s, distinguished by a case the outer edges of which are curved into an S-shape (ogee). This shape is formed by the union of a convex and a concave line. A mass-produced variant of the shelf clock, the ogee clock stood about 30 inches (75 centimetres) high, was weight-driven, and was operated by gears. The earlier version of the clock used wooden gears, and the clock ran for 30 hours. The later versions used brass gears, and the running time was extended to eight days.

ogham writing, ogham also spelled OGAM, or OGUM, alphabetic script dating from the 4th century AD, used for writing the Irish and Pictish languages on stone monuments; according to Irish tradition, it was also used for writing on pieces of wood, but there is no material evidence for this. In its simplest form, ogham consists of four sets of strokes, or notches, each set containing five letters composed of from one to five strokes, thus giving 20 letters. These were incised along the edge of a stone, often vertically or from right to left. A fifth set of five symbols, called in Irish tradition *forfeda* ("extra letters"), is seemingly a later development. The origin of ogham is in dispute; some scholars see a connection with the runic and, ultimately, Etruscan alphabets, while others maintain that it is simply a transformation of the Latin alphabet. The fact that it has signs for *h* and *z,* which are not used in Irish, speaks against a purely Irish origin. The inscriptions in ogham are very short, usually consisting of a name and patronymic in the genitive case; they are of linguistic interest because they show an earlier state of the Irish language than can be attested by any other source and probably date from the 4th century AD. Of the more than 375 ogham inscriptions known, about 300 are from Ireland. Most of those found in Wales are accompanied by Latin transliterations or equivalents.

Ogier THE DANE, French OGIER DE DANEMARCHE, Danish HOLGER DANSKE, an important character in the French medieval epic poems called chansons de geste. His story is told in a cycle of these poems known as *Geste de Doon de Mayence,* which deals with the wars of the feudal barons against the emperor Charlemagne. The character of Ogier has a historical prototype in Autcharius, a follower of Carloman, Charlemagne's younger brother, whose kingdom Charlemagne invaded in 771 after Carloman's death. Although Ogier is referred to in the chansons as the son of the Danish king Gaufrey and later became a national hero celebrated in Danish folk song, the surname "of Danemarche" probably originally signified the marches of the Ardennes and not Denmark.

Ogier was the hero of another chanson of the early 12th century, called *La Chevalerie Ogier de Danemarche,* which told of his reconciliation with Charlemagne. Later in the century, *Les Enfances Ogier* places him at Charlemagne's court, highly esteemed for his military prowess, and ends with him leading the Franks to victory over the Saracens.

Stories about Ogier appeared in Icelandic, Castilian, Catalonian, and Italian.

Ogilby, John (b. November 1600, in or near Edinburgh—d. Sept. 4, 1676, London), British printer who was a pioneer in the making of road atlases; as a poet and translator he is chiefly remembered for being ridiculed by Dryden in *MacFlecknoe* and by Pope in the *Dunciad.*

Ogilby's early career as a dancing master and theatre owner in Ireland, crowned by the success of a theatre he built in Dublin, ended in 1641 with his finances ruined by the outbreak of the English Civil War. Returning destitute to England, he learned Greek and Latin and published translations of Virgil and Homer. At the Restoration, Charles II entrusted him with "the poetical part" of the coronation. Back in Ireland, Ogilby opened another theatre but subsequently settled in London.

Ogilby, engraving by William Camden Edwards, 1820, after a drawing by J. Thurston
The Mansell Collection

After the Great Fire of 1666, he surveyed disputed London property. He set himself up as the "king's cosmographer and geographical printer" and produced many volumes notable for their typography and illustrations. His *Britannia . . . a Geographical and Historical Description of the Principal Roads thereof . . .* (1675), was part of a projected world atlas and a landmark in accurate road description.

Ogilvy, David M(ackenzie) (b. June 23, 1911, West Horsley, Surrey, Eng.—d. July 21, 1999, near Bonnes, France), British advertising executive known for his emphasis on creative copy and campaign themes, founder of the agency of Ogilvy & Mather.

Ogilvy was the son of a classics scholar and broker, but financial reverses left the family in straitened circumstance when he was a boy. Nonetheless, his parents managed to send him to be educated at Edinburgh and Christ Church, Oxford. After graduation during the Great Depression, Ogilvy found work as an apprentice chef and a stove salesman. Then, a brother in the British advertising agency of Mather & Crowther offered him a job. He soon became an account executive and spent a year in the United States learning American advertising techniques.

During World War II Ogilvy served in British Intelligence in Washington, D.C., and for a time was second secretary at the British Embassy there. In 1948 Ogilvy and Anderson Hewitt formed Hewitt, Ogilvy, Benson & Mather, with some financial help from his former English employers and another English advertising agency. They started out with British clients, for example, the manufacturers of Wedgwood china. Ogilvy's most famous advertising campaigns bear his personal imprint: a distinguished-looking man wearing an eyepatch and a Hathaway shirt; the elegant Commander Whitehead for Schweppes tonic; and the claim that "At sixty miles an hour the loudest noise in this new Rolls-Royce comes from the electric clock."

Oglasa (Italy): *see* Montecristo Island.

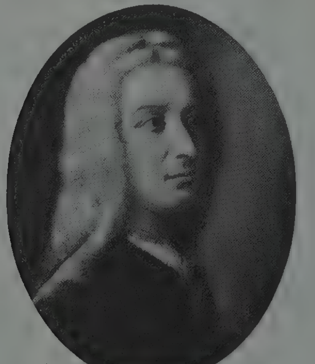
Oglesby, Richard (James) (b. July 25, 1824, Oldham County, Ky., U.S.—d. April 24, 1899, Elkhart, Ill.), governor of Illinois (1865–69, 1873, 1885–89) and U.S. senator (1873–79).

Oglesby was born into a farming family, and his father was a member of the Kentucky legislature. Orphaned in 1833, he was taken to Decatur, Ill., by an uncle. In 1845 Oglesby was admitted to the bar; he practiced law until the Mexican War (April 1846–February 1848) broke out, at which time he served with the 4th Illinois Volunteers. In 1849 he was drawn to California by the gold rush; he returned to law practice in 1851. Elected to the Illinois state Senate in 1860, Oglesby served only one term before resigning to serve in the Civil War as colonel of the 8th Illinois Volunteers. He was promoted to major general in 1863 and was elected governor of Illinois in 1864. He returned to law practice in 1869 but was once again elected governor in 1872. Shortly after taking office in 1873, he was elected to the U.S. Senate, in which he served until 1879. He served an unprecedented third term as governor of Illinois from 1885 to 1889. The town of Oglesby, Illinois, was named for him.

Oglethorpe, James Edward (b. Dec. 22, 1696, London—d. June 30/July 1, 1785, Cranham Hall, Essex, Eng.), English army officer, philanthropist, and founder of the British colony of Georgia in America.

Educated at the University of Oxford, he entered the army in 1712 and joined the Austrian army fighting the Turks in 1717. On his return to England in 1722, he entered Parliament. In 1729 he presided over a committee that brought about prison reforms. This experience gave him the idea of founding a new colony in North America as a place where the poor and destitute could start afresh and where persecuted Protestant sects could find refuge.

In 1732 Oglethorpe secured a charter for his colony in what became Georgia. In 1733 he accompanied the first settlers and founded Savannah. On the outbreak of the war between England and Spain in 1739, he led a vigorous defense of the territory. He was foiled in an attempt to capture the Spanish town of St. Augustine, Fla., but was able to repel an attack on Fort Frederica, Georgia (1742). Oglethorpe's popularity, not only with his hurriedly raised and imperfectly trained troops but also with all classes of the population, helped to assure the safety of the colony.



Oglethorpe, panel by A.E. Dyer after a portrait by W. Verelst; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Oglethorpe returned to England in 1743, where he resumed his parliamentary career.

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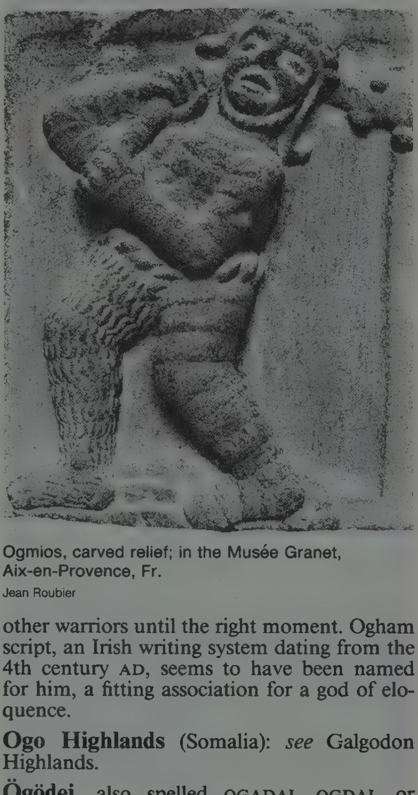
Ogmios, Celtic god of Gaul identified with the Roman Hercules. He was portrayed as an old man with swarthy skin and armed with a bow and club. He was also a god of eloquence, and in that aspect he was represented as drawing along a company of men whose ears were chained to his tongue.

Ogmios' Irish equivalent was Ogma, whose Herculean, warlike aspect was also stressed. In Irish tradition he was portrayed as a swarthy man whose battle ardour was so great that he had to be controlled by chains held by other warriors until the right moment. Ogham script, an Irish writing system dating from the 4th century AD, seems to have been named for him, a fitting association for a god of eloquence.



Ogmios, carved relief; in the Musée Granet, Aix-en-Provence, Fr.

Jean Roubier

Ogo Highlands (Somalia): *see* Galgodon Highlands.

Ögödei, also spelled OGADAI, OGDAI, or UGEDEI (b. 1185, Mongolia—d. 1241, Karakorum, Mongolia), son and successor of the Mongol ruler Genghis Khan (d. 1227), who greatly expanded the Mongol Empire.

The third son of Genghis, Ögödei succeeded his father in 1229. He was the first ruler of the Mongols to call himself *khagan* ("great khan"); his father used only the title *khan.* He made his headquarters on the Orhon River in central Mongolia, where he built the capital city of Karakorum on the site laid out by his father. Like his father, he carried out several simultaneous campaigns, using generals in the field who acted independently but who were subject to his orders. The orders were transmitted by a messenger system that covered almost all of Asia.

In the East, Ögödei launched an attack on the Chin (Juchen) dynasty of North China. The Sung dynasty in South China wished to regain territory lost to the Chin and therefore allied itself with the Mongols, helping Ögödei take the Chin capital at K'ai-feng in 1234.

Ögödei's Chinese adviser, Yeh-lü Ch'u-ts'ai, convinced him to reverse previous Mongol policy. Instead of leveling North China and all its inhabitants in the usual Mongol manner, he preserved the country in order to utilize the wealth and skills of its inhabitants. That decision not only saved Chinese culture in North China but it also gave the Mongols access to the Chinese weapons that later enabled them to conquer the technologically superior Sung. Knowledge of governmental techniques gained from the people of North China made it possible for the Mongols to be rulers as well as conquerors of China.

In the western part of his empire, Ögödei sent Mongol armies into Iran, Iraq, and Russia. With the sacking of Kiev in 1240, the Mongols finally crushed Russian resistance. In the next year Mongol forces defeated a joint army of German and Polish troops and then marched through Hungary and reached the Adriatic Sea. Thereafter for more than 200 years Russia remained tributary to the Mongols of the Golden Horde.

Ögödei died during a drinking bout, and his troops called off their intended invasion of western Europe. His widow, Töregene, ruled as regent until 1246 when she handed over the throne to Güyük, her eldest son by Ögödei. Ögödei is described in contemporary sources as a stern, energetic man given to drinking and lasciviousness.

Ogoja, town, Cross River state, southeastern Nigeria, on the road from Abakaliki. A major trade centre (yams, cassava, corn [maize], rice, palm oil and kernels, kola nuts), it is mainly inhabited by the Ekoi peoples. Ogoja is the headquarters of a local government council and the site of a teacher-training college, a secondary school, and several hospitals and clinics. Pop. (1982 est.) 22,020.

Ogooué River, also spelled OGOWE, stream of west-central Africa, flowing in Gabon for almost its entire course and draining an area of almost 86,000 square miles (222,700 square km). It rises in the Congo on the eastern slopes of the Massif du Chaillu and flows northwest through Gabon past Franceville and Lastoursville; it then turns west and southwest past Booué, Ndjolé, and Lambaréné, collecting water from numerous lakes above Lambaréné. It forms a delta and empties into the Atlantic Ocean south of Port-Gentil, after a course of 750 miles (1,200 km).

The navigable parts of the river are heavily used for shipping goods, especially lumber, to the coast. Although interrupted by rapids and waterfalls along its upper course, the Ogooué is navigable as far as Lambaréné (114 miles [183 km] upstream) throughout the year. Its tributaries include the Ngounié, the Ivindo, the Mpassa, the Sébé, the Djadié, the Okano, the Abanga, the Lolo, and the Offoué. Between the Ngounié and the Ogooué rivers, the Chaillu Massif, the country's main watershed, rises to more than 3,000 feet (900 m). Pierre Savorgnan de Brazza navigated the entire course of the upper Ogooué (1875–83), locating its source in 1877.

O'Gorman, Juan (b. July 6, 1905, Coyoacán, Mex.—found dead Jan. 18, 1982, Mexico City), Mexican architect and muralist who created imaginative mosaic designs that adorned the facades of buildings.

The most elaborate example of O'Gorman's work is the exterior of the Library of the National Autonomous University of Mexico, which he planned and built in 1950. The windowless library featured a tower containing book stacks and covered with mosaics, constructed of natural minerals, which symbolically present a history of Mexican culture.

O'Gorman gained an early exposure to draw-

Library of the National Autonomous University of Mexico, Mexico City, with mosaics by Juan O'Gorman, 1951–53
Norman Tomalin—Bruce Coleman Inc.

ing and composition through his father, Cecil Crawford O'Gorman, a well-known painter who settled in Mexico. After graduating in 1927 from the school of architecture of the National University of Mexico, Mexico City, the younger O'Gorman began designing houses and buildings in Mexico in the International Style of the functionalist architect Le Corbusier. Included among these designs were, in 1928, the house and studio of muralist Diego Rivera, a close associate.

O'Gorman worked as chief draftsman for Carlos Santacilia and other architects in Mexico City until 1932, at which time he became head of the Department of Building Construction for Mexico City and professor of architecture at the National Polytechnic Institute. At this time he founded a study group for workers' housing and was responsible for the design and construction for the Ministry of Education of some 30 schools along functionalist lines.

Some of O'Gorman's major works in Mexico City included murals and frescoes at the National Museum of Anthropology, the airport, and the Museum of National History in Chapultepec Castle. (The important murals at the airport were removed in 1939 because of their anticlerical and antifascist character.) His mosaics appear on the Secretaría de Comunicaciones y Obras Públicas (1952) and on the facade of the Posada de la Misión Hotel in Taxco. These works feature complex and imaginative subject matter depicted in meticulous brushstrokes. O'Gorman's own house outside Mexico City (1953–56, demolished 1969) was considered his most extraordinary work. It marked his eventual rejection of functionalism in favour of an approach uniting modern structural designs and forms with indigenous Mexican decorative motifs. His home was in part a natural cave in rocks and was designed to harmonize with the lava formations of the landscape. It was also decorated with mosaic symbols and images from Aztec mythology.

Ōgosho period (Japanese history): *see* Bunka-Bunsei period.

Ogot, Grace, *née* GRACE EMILY AKINYI (b. May 15, 1930, Butere, near Kisumu, central Nyanza Region, Kenya), Kenyan author of widely anthologized short stories and novels.

One of the few well-known woman writers in Kenya, Ogot was the first woman to have fiction published by the East African Publishing House. Her stories—which appeared in European and African journals such as *Black Orpheus* and *Transition* and in collections such as *Land Without Thunder* (1968), *The Other Woman* (1976), and *The Island of Tears* (1980)—give an inside view of traditional Luo life and society and the conflict of traditional with colonial and modern cultures. Her novel *The Promised Land* (1966) tells of Luo pioneers in Tanzania and western Kenya.

A nurse by profession, Ogot was educated at the Nursing Training Hospital in Uganda from 1949 to 1953. She served at the St. Thomas Hospital for Mothers and Babies in London and from 1958 to 1959 as a midwifery tutor and nursing sister at Maseno Hospital in Kenya. Ogot's fiction drew upon her experience as a nurse; several of her works focus on the conflict between traditional and Western medicine.

Ogot also worked as a scriptwriter and an announcer for the British Broadcasting Corporation's East African Service, as a headmistress, as a community development officer in Kisumu, and as an Air India public relations officer. She appeared on Voice of Kenya radio and television and as a columnist in *View Point* in the *East African Standard*. In 1959 Grace Akinyi married the historian Bethwell Ogot of Kenya.

OGPU, early security and political police of the Soviet Union and a forerunner of the KGB (*q.v.*).

O'Grady, Standish James (b. Sept. 18, 1846, Castletown, County Cork, Ire.—d. May 18, 1928, Shanklin, Isle of Wight, Hampshire, Eng.), historical novelist and literary historian whose popular English versions of the Irish heroic sagas earned him the title of "father of the Irish literary revival."

O'Grady graduated from Trinity College, Dublin, in 1868. Introduced to the ancient heroic and romantic literature of Ireland through the translations of the Gaelic scholar Eugene O'Curry, O'Grady devoted his career to the study of Irish antiquities. In 1878 he published *History of Ireland: The Heroic Period;* this work was followed in 1880 by *History of Ireland: Cuculain and His Contemporaries.*

The enthusiasm of William Butler Yeats and other young Irish writers eventually brought O'Grady a wider audience and a London publisher, and in 1892 he published *Finn and His Companions,* following it two years later with *The Coming of Cuculain.* He also wrote several works of historical fiction, of which *The Bog of Stars* (1893) and *The Flight of the Eagle* (1897) are probably the best. O'Grady's versions of Irish epics have great narrative vigour and imaginative power and had a profound influence on Yeats and other writers of the Irish literary renaissance at the turn of the century.

ogre-faced spider, any member of the family Dinopidae (or Deinopidae; order Araneida). One pair of eyes is unusually large, producing an ogrelike appearance. The spiders occur throughout the tropics. One genus, *Dinopis,* the net-casting spider, carries a web that is thrown over prey.

Ogre-faced, or net-casting, spider (*Dinopis subrufa*) in web, ready to throw net over prey
R.J. Allingham/Australasian Nature Transparencies

ogum writing: *see* ogham writing.

Ogun, state, western Nigeria, created in 1976 and comprising former Abeokuta and Ijebu provinces of former Western state, the latter carved out of former Western region in 1967. Ogun is bounded by Oyo and Osun states to the north, Lagos state to the south, Ondo state to the east, and the Republic of Benin to the west. It is covered predominantly by tropical rain forest and has wooded savanna in the northwest.

Sodeke (Shodeke), a hunter and leader of the Egba refugees who fled from the disintegrating Oyo empire, founded about 1830 a principality at Abeokuta in what is now the north-central part of the state. Most of the inhabitants of Ogun state are members of the Egba and Egbado subgroups of the Yoruba people.

Agriculture, the economic mainstay of Ogun, produces rice, corn (maize), cassava, yams, plantains, and bananas. Cocoa, kola nuts, rubber, palm oil and palm kernels, tobacco, cotton, and timber are the main cash crops. The Aro granite quarries near Abeokuta, the state capital, provide building material for much of southern Nigeria. Mineral resources include limestone, chalk, phosphates, and clay. Industries produce cement, canned foods, foam rubber, paint, tires, carpets, aluminum products, and plastics. Abeokuta, an important market centre, is a terminus of the roads and railways coming from Lagos and other parts of the country. Major tourist attractions are Olumo rock, which according to tradition provided refuge for early Egba settlers; the Ake, the residence of the *alake* (the traditional ruler of Egbaland), built in 1854 and noted for its collection of antiquities and relics; and the Centenary Hall, all in Abeokuta. There are teacher training colleges in the state and a university of agriculture at Abeokuta. Area 6,472 square miles (16,762 square km). Pop. (1991) 2,338,570.

Ogunde, Hubert (b. 1916, Ososa, near Ijebu-Ode, Nigeria), Nigerian playwright, actor, theatre manager, and musician who was a pioneer in the field of Nigerian folk opera (drama in which music and dancing play a significant role). He was the founder of the Ogunde Concert Party (1945), the first professional theatrical company in Nigeria. Often regarded as the father of Nigerian theatre, Ogunde sought to reawaken interest in his country's indigenous culture.

Ogunde's first folk opera, *The Garden of Eden and the Throne of God,* was performed with success in 1944 while he was still a member of the Nigerian Police Force. It was produced under the patronage of an African Protestant sect, and it mixed biblical themes with the traditions of Yoruba dance-drama. His popularity was established throughout Nigeria by his timely play *Strike and Hunger* (performed 1946), which dramatized the general strike of 1945. In 1946 the name of Ogunde's group was changed to the African Music Research Party, and in 1947 it became the Ogunde Theatre Company. Many of Ogunde's early plays were attacks on colonialism, while those of his later works with political themes deplored interparty strife and government corruption within Nigeria. Yoruba theatre became secularized through his careful blending of astute political or social satire with elements of music hall routines and slapstick.

Ogunde's most famous play, *Yoruba Ronu* (performed 1964; "Yorubas, Think!"), was such a biting attack on the premier of Nigeria's Western region that his company was banned from the region—the first instance in post-independence Nigeria of literary censorship. The ban was lifted in 1966 by Nigeria's new military government, and in that same year the Ogunde Dance Company was formed. *Otito Koro* (performed 1965; "Truth is Bitter") also satirizes political events in western Nigeria in 1963. An earlier play produced in 1946, *The Tiger's Empire,* also marked the first instance in Yoruban theatre that women were billed to appear in a play as professional artists in their own right.

Ogunde's technique was to sketch out the basic situation and plot, and then write down and rehearse only the songs of his plays. The dialogue was improvised, thus allowing the actors to adjust to their audience. The plays produced by his company usually reflected the prevailing political climate and interpreted for audiences the major issues and the aspirations of those in power. His company performed with equal ease in remote villages and in metropolitan centres of Nigeria (as well as throughout West Africa). Many of Ogunde's later folk operas were basically popular musicals featuring jazzy rhythms, fashionable dance routines, and contemporary satire. Through this format, he set an example for a successful commercial theatre and prepared audiences all over Nigeria for his followers. During the 1960s and '70s his plays became an important part of the urban pop culture of West Africa.

Ogunmola, Kola, original name ELIJAH KOLAWOLE OGUNMOLA (b. Nov. 11, 1925, Okemesi, Nigeria—d. 1973), Nigerian actor, mime, director, and playwright who took Yoruba folk opera and developed it into a serious theatre form. He was also widely regarded as one of the most brilliant actors in Africa in the 1950s and '60s.

Ogunmola refined the techniques of his fellow Nigerian playwright Hubert Ogunde by eliminating the comic buffoonery typical of the latter's work and by writing more tightly constructed plays, usually gentle social satires in which he laughs at, without passing judgment on, human folly and weakness. Ogunmola's folk operas, like Ogunde's, utilized biblical themes and Yoruba folklore, but Ogunmola developed these materials in a more overtly Christian and moralizing context. A typical play is *Ife Owo* (performed *c.* 1950 and widely played under its English title, *Love of Money,* published 1965), which depicts the sufferings of a polygamous husband who tries to satisfy the greed of his second wife. Ogunmola's greatest fame, however, came from *Omuti Apa Kini* (performed 1963), a dramatic adaptation in the Yoruba language of Amos Tutuola's well-known novel *The Palmwine Drunkard.* Although there were some claims that the adaptation lost much of the story's original meaning, *Omuti Apa Kini* was immensely popular. *Conscience* was another moralistic social satire that showed refinement in its use of music and dancing.

Ogunmola suffered a stroke in 1970 and was hospitalized for a time. He returned to the stage in May 1972, but he never fully recovered and died a year later.

Oğuz, also spelled OGHUZ, or GHUZZ, confederation of Turkic peoples whose homeland, until at least the 11th century AD, was the steppes of central Asia and Mongolia. The Orhon inscriptions (*q.v.*), describing an early Turkic people, probably refer to the Oğuz. The Seljuqs, who comprised one branch of the Oğuz, controlled an empire stretching from the Amu Darya to the Persian Gulf and from the Indus to the Mediterranean Sea by the end of the 11th century. Speakers of the southwestern branch of the Turkic language subfamily are also sometimes referred to as Oğuz Turks.

Ogwr, former district (1974–96) of the former Mid Glamorgan county, southern Wales. The region now forms parts of the unitary councils of Bridgend and Vale of Glamorgan.

Ogyū Sorai (b. March 21, 1666, Edo, Japan—d. Feb. 28, 1728, Edo), one of the foremost Japanese scholars of Chinese culture and a leading Confucianist. Ogyū stressed the pragmatic application of Confucianism to promote social and political reforms by means of uniform, rational laws. He is also noted for his appreciative commentary on the revered shogunate ruler and administrative reformer Tokugawa Ieyasu (1543–1616).

Oh, Sadaharu (b. May 20, 1940, Tokyo, Japan), Japanese professional baseball player. The left-handed throwing and batting Oh played first base for the Tokyo Yomiuri Giants for 22 seasons between 1959 and 1980. Oh holds the world record for most career home runs (HR) with 868.

Oh first garnered national attention as a pitcher for Waseda High School, which won Japan's 1957 National Invitational High School Tournament. At the end of the 1958 season he was drafted by the Yomiuri Giants as a pitcher-first baseman, with a signing bonus of ¥13,000,000 (then about $60,000). Like Babe Ruth before him, the club recognized his power and switched him full-time to first base in 1960. To improve his batting skill, Oh practiced the martial arts of aikido and kendo. However, his big breakthrough occurred in 1962 when he adopted a one-legged ("flamingo") stance to eliminate a hitch in his swing. From that point on he never hit less than 30 home runs in a season and finished with a lifetime .301 batting average (Avg.).

Oh led the Giants to 11 Japan Series championships, including a remarkable 9 in a row. His career highlights include: 13 consecutive HR championship seasons; leading the league in runs batted in (RBI) 13 times; winning the Triple Crown (HR, RBI, and Avg.) in 1974 and 1975; and earning 9 Diamond Glove awards (for defense).

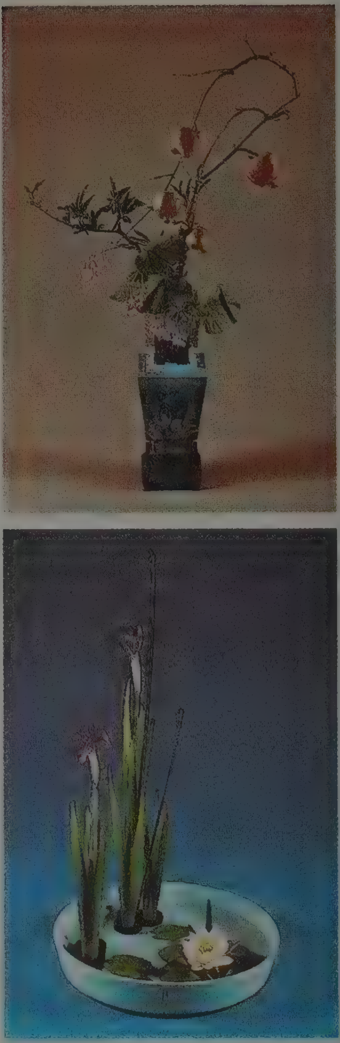
After retiring, Oh became the Giants manager and led them to a Central Division title in 1987. He soon switched clubs and led the Fukuoka Hawks to two division pennants and a series championship in 1999.

Ohain, Hans Joachim Pabst von (b. Dec. 14, 1911, Dessau, Ger.—d. March 13, 1998, Melbourne, Fla., U.S.), German designer of the first operational jet engine.

After obtaining his doctorate at the University of Göttingen, he became a junior assistant to Hugo von Pohl, director of the Physical Institute there. When the German aircraft builder Ernst Heinkel asked the university for assistance in design, Pohl recommended Ohain, who joined Heinkel's manufacturing firm in 1936. Ohain's experiments, carried out in secret at Heinkel's factory, resulted in a bench test by 1937 and a fully operational jet aircraft, the He178, by 1939. The first jet aircraft flight took place in the early morning hours of Aug. 27, 1939; Ohain's centrifugal flow turbojet engine, the HeS3b, performed perfectly, though the landing gear of the plane failed to retract, preventing the test pilot from accelerating to planned speed.

Ohain continued his work, developing an improved engine, the HeS8-A, which was first flown on April 2, 1941. Although the German High Command was kept informed of these developments, it was more interested in rocketry; as a result, Ohain's engines saw little use in World War II.

Ohara, Japanese school of floral art founded by Ohara Unshin in the early 20th century; it introduced the *moribana* style of naturalistic landscapes in shallow, dishlike vases. The *moribana* style, while retaining a basic triangular structure in its floral arrangements, is in the *nageire* (fresh and spontaneous) mood. The Ohara school's use of taller, narrow-mouthed vases is of the *shōka* (free and informal) style, but it is known as *heika.* The styles of this school grew in popularity throughout the 20th century, superseding the traditional and formalistic *rikka* style. *See also* moribana.



Floral arrangements of the Ohara school
(Top) *Heika* arrangement of begonia flowers, leaves, and pomegranate branch in the *nageire* mood; (bottom) *moribana* arrangement of water lily, irises, and bulrushes

By courtesy of the International Society for Educational Information, Tokyo

O'Hara, Frank (b. June 27, 1926, Baltimore—d. July 25, 1966, Fire Island, N.Y., U.S.), American poet who gathered images from an urban environment to represent personal experience.

O'Hara was drawn to both poetry and the visual arts for much of his life. During the 1960s, as an assistant curator at the Museum of Modern Art in New York City, O'Hara sent his fine criticism of current painting and sculpture to such periodicals as *Art News,* and he wrote catalogs for exhibits that he arranged. Meanwhile, local theatres were producing many of his experimental one-act plays, including *Try! Try!* (1960), about a soldier's return to his wife and her new lover.

O'Hara, however, considered himself primarily a poet. His pieces, which mark him as a member of the New York school of poets, are a mixture of quotations, gossip, phone numbers, commercials—any mote of experience that he found appealing. He related what was happening to him rather than trying to clarify experiences for the reader. The results vary from the merely idiosyncratic to the dynamic and humorous.

O'Hara's first volume of poetry was *A City Winter, and Other Poems* (1952); *The Col-*

lected Poems of Frank O'Hara (1971) was published posthumously.

O'Hara, John (Henry) (b. Jan. 31, 1905, Pottsville, Pa., U.S.—d. April 11, 1970, Princeton, N.J.), American novelist and short-story writer whose fiction stands as a social history of upwardly mobile Americans from the 1920s through the 1940s.

O'Hara was raised in Pottsville, Pa., which appears in his fiction as Gibbsville, a typical small town in the United States. He planned to enter Yale after high school but instead left home following the death of his father. After travelling extensively, O'Hara worked as a critic and reporter in New York City. The influence of this journalistic experience is seen in the objective and nonexperimental style of his fiction.

O'Hara was fascinated by the effect of class, money, and sexuality on Americans, and his fictional representations of Hollywood and Broadway are thick with the snobbery of social structure. His first novel, *Appointment in Samarra* (1934), explored the disintegration and death of an upper-class inhabitant of a small city; the book was highly acclaimed. In 1956 he received a National Book Award for *Ten North Frederick* (1955; film version, 1958). Although awarded few honours for his fiction, O'Hara was very successful as an author. He wrote prolifically, and his work was consistently popular despite continuing mixed critical reviews. Many of his bestselling novels were adapted for stage and screen, including *Butterfield 8* (1935; film version, 1960) and *From the Terrace* (1958; film version, 1960). O'Hara's short-story collections include *Waiting for Winter* (1966) and *And Other Stories* (1968).

Critics generally agree that O'Hara's lasting accomplishment is his duplication of a social era by recording dialogue and detail in a spare style.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

O'Higgins, in full LIBERTADOR GENERAL BERNARDO O'HIGGINS, region, central Chile, bordered by Argentina to the east and facing the Pacific Ocean on the west. Since 1974 it has comprised the provinces of Cachapoal and Colchagua. It has an area of 6,327 sq mi (16,393 sq km) and was named after the nation's first president, Bernardo O'Higgins.

Most of the population is concentrated on the alluvial plains of the north–south Central Valley, where, because of the long, dry summer season, irrigation is required for the cultivation of wheat, rice, legumes, grapes, barley, forage crops, and corn (maize). Water is supplied by streams that rise in the Andes to the east. Numerous sheep and cattle are pastured in the highland areas, including the lower slopes of the Andes, and in the nonirrigated lowlands. Irrigated pastures support dairy herds and ready beef cattle for market. Rancagua (*q.v.*), the regional capital, and San Fernando are the major marketing centres. There is some wheat and rice milling, tanning, and manufacture of shoes, glass, and cigarettes. Mining, also important to the economy, is centered on El Teniente, the second largest producer of copper in Chile. The region also contains a copper foundry, some sulfur deposits, and evaporation ponds along the coast for the production of salt. The Pan-American Highway and the main north–south railway run the length of O'Higgins region, and there is a railroad branching from San Fernando to the popular beach resort of Pichilemu, 60 mi (100 km) west. Pop. (1982 prelim.) 584,989.

O'Higgins, Bernardo (b. probably Aug. 20, 1776/78, Chillán, Chile, Viceroyalty of La Plata—d. October 1842, Peru), South American revolutionary leader and first Chilean head of state ("supreme director," 1817–23), who commanded the military forces that won independence from Spain.

Bernardo O'Higgins was born in Chillán, a town in southern Chile, then a colony of Spain. As noted in his certificate of Baptism, he was the illegitimate son of Ambrosio O'Higgins, a Spanish officer of Irish origin, who became governor of Chile and later viceroy of Peru; his mother was Isabel Riquelme, a prominent lady of Chillán.

Bernardo's father had only indirect contact with his son, who used his maternal surname until his father's death. At 12, Bernardo was sent to Lima for his secondary education. Four years later he went to Spain. At 17 he was sent to England for further education. In London he became imbued with a sense of nationalist pride in Chile, a pride largely fostered by his contact with several political activists, of whom Francisco Miranda, the Venezuelan champion of Latin-American independence, exerted the greatest influence on him. Along with several other future revolutionary leaders, he belonged to a secret Masonic lodge, established in London by Miranda, the members of which were dedicated to the independence of Latin America. In 1799 he left England for Spain, where he came into contact with Latin-American clerics who also favoured independence and doubtless further strengthened his views. His political position was remarkable in view of the fact that his father was viceroy of Peru.

Bernardo's father died in 1801, leaving him a large hacienda near Chillán; by 1803 he was working the estate. This interlude may have been the most satisfying period of his life. The hacienda began to prosper almost immediately, and Bernardo was soon maintaining a house in Chillán. In 1806 he became a member of the local town council.

Before O'Higgins had time to settle into his agrarian way of life, however, the foundations of Chilean society were threatened. In 1808 Napoleon I invaded Spain, which, occupied with its own defense, left its colonies, including Chile, largely uncontrolled; the first steps toward national independence began to be taken throughout Spanish America. On Sept. 18, 1810, a national junta, composed of local leaders who replaced the governor general, was established in Santiago, and by 1811 Chile had its own congress. O'Higgins was a member, and during the next two years he played a key role in the country's turbulent political affairs.

By early 1813 Chile had a constitution and a junta that seemed able to control the country and to avert the threat of civil war. In 1814, however, the Viceroy of Peru sponsored an invasion to reestablish royal authority. Within a few months, O'Higgins rose from the rank of colonel of militia to general in chief of the defensive forces. Soon, he was also appointed governor of the province of Concepción, in which the fighting took place. But the war went badly, and O'Higgins was superseded in command. In October 1814, at Rancagua, the Chilean patriots lost decisively to the Peruvian-led forces. For the next three years the country was occupied by the royalists.

Several thousand Chileans, including O'Higgins, crossed the Andes into Argentina in flight from the royalists. O'Higgins spent the next three years preparing for the reconquest of Chile. In January 1817 O'Higgins returned to Chile with the Argentine general José de San Martín and a combined army of the Andes consisting of Argentine troops and Chilean exiles. At Chacabuco, on Feb. 12, 1817, they decisively defeated the Spanish, and, with Chile largely reconquered, O'Higgins was elected interim supreme director.

For the next six years, as supreme director, O'Higgins maintained, on balance, a successful administration. He created a working governmental organization and provided the essentials of the new nation—peace and order. Under adverse circumstances he succeeded in building a national navy and in mounting a major military expedition against Peru to fight the royalists.

O'Higgins, however, was not politically astute: by 1820 he had antagonized the conservative church and the aristocracy with his reforms. Later he alienated the business community. He did not perceive the importance of a solid political base, and, because his support was based on his prestige as a war leader in a threatened country, his fall was assured once the danger of war had disappeared. O'Higgins was associated with a grand scheme of continental independence that was essentially Argentine in its conception; by the time of his resignation—under pressure—in January 1823, a growing Chilean nationalism had rendered him and his Argentine colleagues much less attractive than they had been in 1817.

In 1809, at the age of 31, O'Higgins had observed: "The career to which I seem inclined by instinct and character, is that of labourer"; in rural life, he would have come to be "a good *campesino* and a useful citizen." As supreme director, O'Higgins had the positive attributes of solid moral principles, an eagerness to work hard, and singular honesty. In the countryside, as he himself understood, these virtues would have been ample, but in public administration they were not enough.

From 1823 until his death, O'Higgins lived in exile in Peru, dividing his time between his hacienda and Lima. His last years were poignantly similar to his first: in his youth circumstances required that he live away from home; now in maturity circumstances again conspired to keep him abroad. In both periods he longed to return home.

Little is known of O'Higgins' personal life. Though he never married, he managed to acquire a family, in the same manner as his father had. His natural son Pedro Demetrio O'Higgins was his companion in exile.

O'Higgins was a liberal in the 19th-century sense of the term and an admirer of the British constitutional system. Although not as conservative as some contemporary Chilean leaders, he was not a democrat either. While his reputation since his death has fluctuated with the political predilections of governments and historians, his leading role in establishing Chile as a republic remains unquestioned. (J.Ki.)

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O'Higgins, Kevin Christopher (b. June 7, 1892, Stradbally, County Leix, Ire.—d. July 10, 1927, Booterstown, County Dublin), Irish statesman who attempted severe repression of

Kevin O'Higgins

BBC Hulton Picture Library

the Irish Republican Army (IRA) in the years of the Irish "Troubles" following the Anglo-Irish treaty of 1921. A man of intellectual power, he was described as "a soul incapable of remorse or rest" and (by William Butler Yeats) "a great man in his pride confronting murderous men." He was in fact murdered by political enemies while on his way to church.

Educated at University College, Dublin, O'Higgins was apprenticed to his uncle, a lawyer. Following the Easter Rising in 1916, he joined the Sinn Féin ("We Ourselves") nationalist movement and was imprisoned. In 1918, while still in jail, he was elected to Parliament from County Leix (now County Laoighis), and in the next year he became assistant to the minister of local government, William T. Cosgrave.

O'Higgins supported the treaty (Dec. 6, 1921) with Great Britain that created the Irish Free State. In 1922 he was appointed minister of the interior and vice president of the State Executive Council. In 1923 he was named minister for home affairs and justice. He helped draft the Irish Free State constitution and secured its passage through the Dáil Éireann (lower house of the legislature). Working for a united Ireland within the British Commonwealth, he played an important part in the Imperial Conference of 1926. He also prominently represented the Free State in the League of Nations.

As minister for justice, O'Higgins organized an unarmed police force known as the Civic Guards and took summary measures to restore order following the conflict between the Free State forces and the IRA. His part in the execution of 77 republicans in 1922–23 made him many enemies, as did his sardonic wit, his inflammatory speeches during the civil war, and his curtailment of the liquor trade. The assassination of O'Higgins was denounced as treason by Cosgrave, who was then the Irish prime minister.

O'Higgins, Tierra de (Antarctica): *see* Antarctic Peninsula.

Ohio, constituent state of the United States of America, located in the Midwest, bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania and West Virginia, on the south by Kentucky, and on the west by Indiana. The capital is Columbus. Area 44,828 square miles (116,104 square km). Pop. (2000) 11,353,140.

A brief treatment of Ohio follows. For full treatment, *see* MACROPAEDIA: United States of America: *Ohio.*

Ohio was originally inhabited by the Hopewell mound builders, who disappeared about AD 400. The earliest European explorers found the area occupied largely by Miami, Shawnee, Wyandot, and Delaware Indians. Marietta, at the confluence of the Ohio and Muskingum rivers, was established in 1788 by New England Revolutionary War veterans and was the first permanent white settlement. Ohio was the first state to be carved out of the Northwest Territory. It was admitted to the Union in 1803 as the 17th state; by 1850 Ohio was the third most populous state in the nation. The American Civil War hastened its industrialization.

Running practically through the centre of Ohio is the dividing line between two major physiographic subregions of the U.S. Interior Lowlands. The Appalachian Plateau in the east was only partly glaciated. It is dissected by rivers winding among steep hills whose elevations reach 1,300 feet (395 m) above sea level. The Central Lowlands in the west contain the level to slightly rolling lands of the Lake Plains, which were once underwater, and the Central, or Till, Plains of western and southwestern Ohio. The Central Plains are known for their deep, fertile soil and also contain Ohio's highest and lowest points. About 20 percent of Ohio drains into Lake Erie, the remainder into the Ohio–Mississippi river system.

Ohio's climate is influenced by cold, dry fronts from Canada and warm, moist fronts from the Gulf of Mexico. The frequent meeting of such fronts causes much of Ohio's precipitation, which totals about 38 inches (965 mm) annually. The normal average temperature for the state ranges from 56° F (13° C) at Portsmouth in the south to 47° F (8° C) at Dorset in the northeast.

Ohio attracted immigrants early in the 19th century. The Germans were the largest group, but there were also large numbers of Swiss, Irish, and Welsh. Later waves of immigrants from eastern and southeastern Europe were attracted to Ohio's large cities, as were blacks from the U.S. South. African Americans make up about one-tenth of the state's population, but half of the city of Cleveland. Ohio's growth rate in the late 20th century was well below the national average.

A good physical location, a rich store of natural resources, productive soils, and ample transportation facilities made Ohio one of the first great industrial states. Much of the raw materials processed in Ohio factories comes from its own mineral, agricultural, and forest resources. Nearly two-thirds of the state is still farmland. It produces corn (maize), wheat, oats, and hay, and it maintains large marketing inventories of fruit, feed, and vegetables, as well as livestock and poultry.

Ohio is rich in natural resources. Coal, petroleum, and natural gas are the most important mineral fuels. Other minerals include limestone, sandstone, clays, shales, gypsum, peat, and salt.

Manufacturing is the most important economic activity and represents the largest single segment of the state's employment. Ohio is active in all industrial classes, particularly in rubber products and porcelain, electrical machinery and apparatus, and pumps and plumbing equipment.

Ohio has long been a national transportation hub. The shipping to and from its Lake Erie ports is worldwide, and the Ohio River carries significantly more tonnage than the Panama Canal. The state's railroad mileage is one of the nation's largest, and the road and highway system is extensive.

Ohio's cultural contributions to the country have been significant. Eight U.S. presidents have called Ohio home, as have such writers as William Dean Howells, Ambrose Bierce, Paul Laurence Dunbar, Sherwood Anderson, and James Thurber. Cleveland and Cincinnati boast excellent orchestras and theatrical organizations. Statewide, there are more than 200 museums of art, science, and history. Ethnic and regional festivals are many and include the Apple Festival in Jackson and the Ohio Hills Folk Festival in Quaker City. In the field of education, Ohio had two state-supported universities by 1809. Among many outstanding institutions of higher education are Ohio State and Ohio Wesleyan universities and Oberlin and Antioch colleges.

Ohio Company, in U.S. colonial history, organization of Englishmen and Virginians, established in 1748, to promote trade with groups of American Indians and to secure English control of the Ohio River valley. Its activities in an area also claimed by France led to the outbreak of the last French and Indian War (1754). A separate organization, the Ohio Company of Associates (1786), founded Marietta, the first systematic settlement in the region north of the Ohio River.

Ohio Gang, in U.S. history, a group of politicians who achieved high office during the presidential administration of Warren G. Harding and who betrayed their public trust through a number of scandals. Leader of the Ohio Gang was Harry M. Daugherty, a long-time political operative who was the principal manager of Harding's political ascendancy and who was named attorney general of the United States. Other members of the gang included Albert B. Fall, secretary of the interior; Will H. Hays, postmaster general; Charles R. Forbes, head of the Veteran's Bureau; and Jess Smith, an official of the Justice Department.

Early in 1924, shortly after Harding's death, congressional committees began investigating reports of graft and corruption during the Harding administration. As a result of those investigations, Forbes was indicted and later convicted for fraud, conspiracy, and bribery in operating the Veteran's Bureau. Fall was indicted, convicted, and imprisoned for his role in the Teapot Dome scandal and the Elk Hills oil-reserves scandal, becoming the first member of a president's Cabinet to be convicted of a felony while in office. Daugherty was tried for conspiracy on charges of selling illegal liquor permits and pardons. He was acquitted but was forced to resign by President Calvin Coolidge. Jess Smith committed suicide.

Ohio Idea, in U.S. history, proposal first presented in the *Cincinnati Enquirer* in 1867 and later sponsored by Senator George H. Pendleton of Ohio to redeem American Civil War bonds in paper money instead of gold.

The Ohio Idea was part of the struggle between hard-money (specie) and soft-money (greenback) advocates during the post-Civil War era. Backers of the Ohio Idea were people who would benefit from inflation, and the proposal was endorsed in the Democratic platform of 1868. It was especially popular in the Midwest.

Once Ulysses S. Grant was inaugurated as president, however, the Ohio Idea quickly died. The Public Credit Act of March 18, 1869, provided for payment of government obligations in gold.

Ohio River, major river artery of the east-central United States. Formed by the confluence of the Allegheny and Monongahela rivers at Pittsburgh, it flows northwest out of Pennsylvania, then in a general southwesterly direction to join the Mississippi River at Cairo, Ill., after a course of 981 miles (1,579 km). It marks several state boundaries: the Ohio–West Virginia, Ohio–Kentucky, Indiana–Kentucky, and Illinois–Kentucky. The Ohio River contributes more water to the Mississippi than does any other tributary and drains an area of 203,900 square miles (528,100 square km). The river's valley is narrow, with an average width of less than 0.5 mile (0.8 km) between Pittsburgh and Wheeling (W.Va.), a little more than 1 mile (1.6 km) from Cincinnati (Ohio) to Louisville (Ky.) and somewhat greater below Louisville.

The Ohio is navigable, and, despite seasonal fluctuations that occasionally reach flood proportions, its fairly uniform flow has supported important commerce since settlement first began. Following destructive floods at Johnstown, Pa., in 1889 and Portsmouth, Ohio, in 1937, the federal government built a series of flood-control dams. While not developed for hydropower in Ohio, the river, kept at a navigable depth of 9 feet (3 m), carries cargoes of coal, oil, steel, and manufactured articles. It has a total fall of only 429 feet (130 m), the one major hazard to navigation being the Falls of the Ohio at Louisville, where locks control a descent of about 24 feet (7 m) within a distance of 2.5 miles (4 km).

The Ohio's tributaries include the Tennessee, Cumberland, Kanawha, Big Sandy, Licking, Kentucky, and Green rivers from the south and the Muskingum, Miami, Wabash, and Scioto rivers from the north. Chief cities along the river, in addition to Pittsburgh, Cairo, Wheeling, and Louisville, are Steubenville, Marietta, Gallipolis, Portsmouth, and Cincinnati in Ohio; Madison, New Albany, Evansville, and Mount Vernon in Indiana; Parkersburg and Huntington in West Virginia; and Ashland, Covington, Owensboro, and Paducah in Kentucky.

Robert Cavelier, Sieur de La Salle, is said to have been the first white man to see the Ohio, in 1669, and he descended it until obstructed by a fall (presumably the Falls at Louisville). In the 1750s the river's strategic importance (especially the fork at Pittsburgh) in the struggle between the French and the English for possession of the interior of the continent became fully recognized. By the treaty of 1763 ending the French and Indian Wars, the English finally gained undisputed control of the territory along its banks. When (by an ordinance of 1787) the area was opened to settlement, most of the settlers entered the region down the headwaters of the Ohio.

Ōhira Masayoshi (b. March 12, 1910, Toyohama, Kagawa prefecture, Shikoku, Japan—d. June 12, 1980, Tokyo), prime minister of Japan from 1978 to 1980.

Ōhira was a converted Christian who rose from rural poverty and worked his way through what is now Hitosubashi University. After graduation (1936), he pursued a career in the Finance Ministry and later (1952) was elected to the House of Representatives, holding his seat for 10 terms.

Ōhira became well known for his negotiating abilities. In 1960, as Ikeda Hayato's chief cabinet secretary, he helped stabilize the country after the anti-American confusion in the late 1950s. As minister of foreign affairs in the second Ikeda cabinet (1962), he prepared for restoration of relations with South Korea. Later, as foreign minister in the Tanaka cabinet, he paved the way for normalization of relations with the People's Republic of China. In 1978, as a result of having won the presidency of the Liberal-Democratic Party (LDP), Ōhira was elected prime minister. Less than two years later, however, he called a general election after a number of LDP members joined the opposition in a vote of no confidence. Ōhira unexpectedly died during the election campaign.

Ohlin, Bertil (Gotthard) (b. April 23, 1899, Klippan, Sweden—d. Aug. 3, 1979, Vålådalen), Swedish economist and political leader who is known as the founder of the modern theory of the dynamics of trade. In 1977 he shared the Nobel Prize for Economics with James Meade.

Ohlin studied at the University of Lund and at Stockholm University under Eli Heckscher. His interest in international trade developed early, and he presented in 1922 a thesis on trade theory. Ohlin studied for a period at both the University of Oxford and Harvard University; at the latter institution he was influenced by Frank Taussig and John H. Williams. He obtained his doctorate from Stockholm University in 1924 and the following year became a professor at the University of Copenhagen. In 1930 he succeeded Heckscher at Stockholm University. At this time Ohlin became engaged in a controversy with John Maynard Keynes, contradicting the latter's view that Germany could not pay war reparations. This debate over reparations had much influence on the modern theory of unilateral international payments.

In 1933 Ohlin published a work that won him world renown, *Interregional and International Trade.* In this Ohlin built upon earlier work by Heckscher and on the approach in his own doctoral thesis to provide a theory of the basis of international trade; it is now known as the Heckscher-Ohlin theory and has become standard. It also provided the basis for later work on the effects of protection on real wages. As a member of the "Stockholm school" of economists, Ohlin developed, from the foundations laid by Knut Wicksell, a theoretical treatment of macroeconomic policy and the importance of aggregate demand which anticipated that of Keynes.

Ohlin served as head of the Liberal Party in Sweden from 1944 to 1967, but he had only a brief stint in public office. He was a member of the Riksdag (parliament) from 1938 to 1970 and was minister of commerce (1944–45) in Sweden's wartime government.

ohm, abbreviation Ω, unit of electrical resistance in the metre-kilogram-second system, named in honour of the 19th-century German physicist Georg Simon Ohm. It is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere ($1\Omega = 1\ V/A$); or, the resistance in which one watt of power is dissipated when one ampere flows through it. Ohm's law (*q.v.*) states that resistance equals the ratio of the potential difference to current, and the ohm, volt, and ampere are the respective fundamental units used universally for expressing quantities.

Impedance, the apparent resistance to an alternating current, and reactance, the part of impedance resulting from capacitance or inductance, are circuit characteristics that are measured in ohms. The acoustic ohm and the mechanical ohm are analogous units sometimes used in the study of acoustic and mechanical systems, respectively.

Ohm, Georg Simon (b. March 16, 1789, Erlangen, Bavaria [Germany]—d. July 6, 1854, Munich), German physicist who discovered the law, named after him, which states that the current flow through a conductor is directly proportional to the potential difference (voltage) and inversely proportional to the resistance.

Ohm became professor of mathematics at the Jesuits' College at Cologne in 1817. The most important aspect of Ohm's law is summarized in his pamphlet *Die galvanische Kette, mathematisch bearbeitet* (1827; *The Galvanic Circuit Investigated Mathematically*). While his work greatly influenced the theory and applications of current electricity, it was so coldly received that Ohm resigned his post at Cologne. He accepted a position at the Polytechnic School of Nürnberg in 1833. Finally his work began to be recognized; in 1841 he was awarded the Copley Medal of the Royal Society of London and was made a foreign member a year later. The physical unit measuring electrical resistance was given his name.

Ohm, detail of a lithograph
Historia-Photo

ohmmeter, instrument for measuring electrical resistance, which is expressed in ohms. In the simplest ohmmeters, the resistance to be measured may be connected to the instrument in parallel or in series. If in parallel (parallel ohmmeter), the instrument will draw more current as resistance increases. If in series (series ohmmeter), current will decrease as resistance rises. Ratio meters measure the ratio of the voltage across the resistance to the current flowing through it. For high resistances, the scale is usually graduated in megohms (10^6 ohms), and the instrument is called a megohmmeter, or "megger."

Ohm's law, in electricity, experimentally discovered relationship that the amount of steady current through a large number of materials is directly proportional to the potential difference, or voltage, across the materials. Thus, if the voltage V (in units of volts) between two ends of a wire made from one of these materials is tripled, the current I (amperes) also triples; and the quotient V/I remains constant. The quotient V/I for a given piece of material is called its resistance, R, measured in units named ohms. The resistance of materials for which Ohm's law is valid does not change over enormous ranges of voltage and current. Ohm's law may be expressed mathematically as $V/I = R$. That the resistance, or the ratio of voltage to current, for all or part of an electric circuit at a fixed temperature is generally constant had been established by 1827 as a result of the investigations of the German physicist Georg Simon Ohm.

Alternate statements of Ohm's law are that the current I in a conductor equals the potential difference V across the conductor divided by the resistance of the conductor, or simply $I = V/R$, and that the potential difference across a conductor equals the product of the current in the conductor and its resistance, $V = IR$. In a circuit in which the potential difference, or voltage, is constant, the current may be decreased by adding more resistance or increased by removing some resistance. Ohm's law may also be expressed in terms of the electromotive force, or voltage, E, of the source of electric energy, such as a battery. For example, $I = E/R$.

With modifications, Ohm's law also applies to alternating-current circuits, in which the relation between the voltage and the current is more complicated than for direct currents. Precisely because the current is varying, besides resistance, other forms of opposition to the current arise, called reactance. The combination of resistance and reactance is called impedance, Z. When the impedance, equivalent to the ratio of voltage to current, in an alternating current circuit is constant, a common occurrence, Ohm's law is applicable. For example, $V/I = Z$.

With further modifications Ohm's law has been extended to the constant ratio of the magnetomotive force to the magnetic flux in a magnetic circuit (*q.v.*).

Ohře River, German EGER, tributary of the Elbe River, rising in the Fichtel Mountains (Fichtelgebirge) of Germany and flowing generally east and northeastward into the Czech Republic past Cheb, Karlovy Vary, Žatec, and Louny until it reaches the Elbe (Labe) River opposite Litoměřice. The river is 196 miles (316 km) long, and it receives the Teplá and Blšanka rivers from the south and the Chomutovka River from the north.

Ohrid, town, Macedonia, on the northeastern shore of Lake Ohrid (Ohridsko Jezero). The chief resort of Macedonia, Ohrid is linked by rail, road, and air to Skopje. Agriculture, fishing, and tourism provide a livelihood for the population.

A Greek colony called Lychnidos, Ohrid was by the 2nd century a post on the Via Aegnatia to Bitola and Greece. It was rebuilt by the Romans after a devastating earthquake in 518. Ohrid derives its name from the crag (Serbo-Croatian *hrid*) on which the old town stands. At the summit is the ruined fortress dating chiefly from the late 10th and early 11th centuries, when Ohrid was the capital of a Bulgarian tsar.

Among the churches in the town are St. Sophia's, with 11th–14th-century frescoes, and St. Clement's (1295), also with medieval frescoes uncovered in the 1950s. On a nearby hilltop is a quadrangular building, the Imaret, a Turkish mosque and inn, built on the foundations of the Monastery of St. Panteleimon (9th century), associated with St. Clement, the first Slav bishop of Ohrid. St. Clement opened the first Slavic school of higher learning, wrote the earliest works of Slavic literature, and, with St. Naum, translated the Scriptures from Greek into Slavonic. The 10th-century monastery of Sveti Naum (St. Naum), about 19 miles (31 km) south, crowns a prominent crag on the Macedonia-Albania frontier and overlooks Lake Ohrid. Pop. (1991 prelim.) mun., 65,531.

Ohrid, resort town in Macedonia
Ricatto/Superstock

Ohrid, Lake, lake on the Macedonia-Albania border, southeastern Europe. It has an area of 134 square miles (347 square km). At 938 feet (286 m), it is the deepest lake in the Balkans. It is connected by underground channels to Lake Prespa to the southeast. Lake Ohrid is known for its beauty and its fishing, and there are several beaches. Interesting historic buildings are found in the towns that lie along its shores.

Oiapoque, Rio (South America): *see* Oyapock River.

oidium, in fungi (division Mycota), a single-celled asexual spore (arthrospore) produced by fragmentation of fungal filaments (hyphae) in lower fungi; the asexual stage of Erysiphaceae (powdery mildew fungi); or, in Basidiomycetes, both an asexual spore (microconidium) and a male cell (spermatium).

oil, any greasy substance that is liquid at room temperature and insoluble in water. It may be fixed, or nonvolatile, oil; essential oil (*q.v.*); or mineral oil (*see* petroleum).

A brief treatment of fixed oils follows. For full treatment of edible oils, *see* MACROPAEDIA: Food Processing.

Fixed oils and fats have the same chemical composition: they consist chiefly of glycerides, resulting from a reaction between an alcohol called glycerol and certain members of a group of compounds known as fatty acids. Along with proteins and carbohydrates, the glyceride oils and fats constitute the three main classes of food. Besides their nutritive importance, these oils have a variety of industrial uses. Linseed, tung, and other drying oils (*i.e.,* those that are highly unsaturated) and large quantities of soybean, sunflower, and safflower oils are used in paints, varnishes, and alkyd resins. Such oils are particularly well suited for this application because, when exposed to air, they absorb oxygen and polymerize readily, forming thin layers as a skin or protective film. Considerable quantities of specialty oils and sulfonated oils are used in leather dressing and textile manufacture. Some other glyceride oils have properties of medicinal value. Castor oil, for example, has a strong purgative action; fish-liver oils are sources of vitamins A and D; and others such as lard, olive oil, and almond oil serve as vehicles in pharmaceutical preparations. Chaulmoogra oil, which contains unique fatty acids with a cyclic (cyclopentenyl) structure, has been used in the treatment of Hansen's disease (leprosy). *See also* fat.

oil burner, heating device in which fuel oil is mixed with air under controlled conditions. In most burners oil is supplied under pressure to an atomizing nozzle to produce a fine spray, to which air is added by a motor-driven fan. As the cone-shaped spray emerges from the nozzle, ignition is usually supplied by an electric spark to start the burner. Starting and shut-off are normally controlled by thermostat. In commercial-industrial types of burners, heavier fuel oil is used, requiring mechanical atomization.

oil cake, coarse residue obtained after oil is removed from various oilseeds, rich in protein and minerals and valuable as poultry and other animal feed. It may be broken up and sold or be ground into oil meal. Oil cakes from certain seeds such as castor beans and tung nuts are toxic and are used as fertilizers rather than feed.

Oilseeds from which oil cake used as feed is produced include soybeans, peanuts, flaxseed (linseed), rapeseed, cottonseed, coconuts (copra), oil palm, and sunflower seeds. Cottonseed and peanuts have woody hulls and shells, which are generally removed before processing. The pressed cake from the production of cottonseed oil must also be processed to remove a toxic pigment, gossypol, before it can be used as feed for nonruminant livestock such as pigs and poultry. *See also* cottonseed; linseed; copra.

Oil City, city, Venango county, northwestern Pennsylvania, U.S., on a bend of the Allegheny River at the mouth of Oil Creek, 70 miles (113 km) north of Pittsburgh. Founded in 1860 on the site of a Seneca Indian village, it burgeoned as an oil centre after the drilling of the world's first oil well (Aug. 27, 1859) at Titusville, 16 miles up Oil Creek. Incorporated as a borough in 1862, it became a city in 1871 after merging with Venango City. Oil City was the shipping point for crude oil from Oil Creek fields and reached a high point between 1860 and 1870 with riverboats transporting millions of barrels to Pittsburgh. The production, refining, and distribution of oil and its products remains the leading industry. Natural-gas fields are nearby. Manufactures include steel, glass, and metal products, paints, gas engines, and drilling supplies. Cook Forest State Park, Kinzua Dam, Drake Well Park, and Pithole (a ghost oil town) are nearby. Pop. (1992 est.) 12,076.

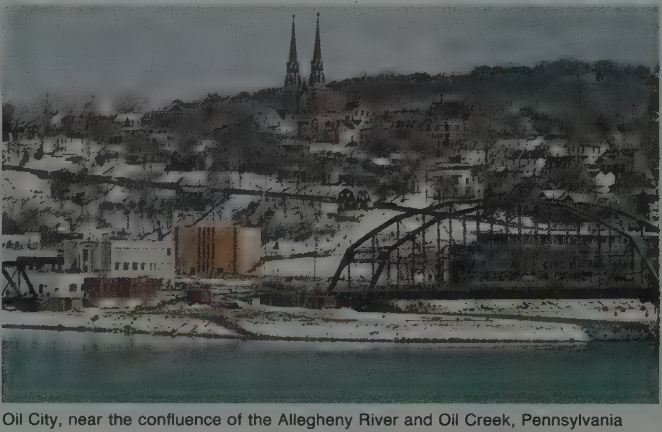
oil-drop experiment (physics): *see* Millikan oil-drop experiment.

oil extraction, isolation of oil from animal by-products, fleshy fruits such as the olive and palm, and oilseeds such as cottonseed, sesame seed, soybeans, and peanuts. Oil is extracted by three general methods: rendering, used with animal products and oleaginous fruits; mechanical pressing, for oil-bearing seeds and nuts; and extracting with volatile solvents, employed in large-scale operations for a more complete extraction than is possible with pressing.

Rendering originally implied the application of heat; in its most primitive form, it is practiced by heaping fruits such as olives in piles exposed to the sun and collecting the oil that exudes. A similar, somewhat more advanced process is used to extract oil from palm fruits by boiling in water, then skimming the oil from the surface. Whale blubber is cut into small pieces and heated in vats (tryworks) or cooked in steam digesters; the oil is collected by draining or skimming.

Many oil-bearing seeds and nuts are broken up by grinding, flaking, or rolling, then subjected to mechanical pressing to liberate the oil. The modern continuous screw press exerts pressures as high as 30,000 pounds per square inch. In modern press extraction, oilseeds or nuts are cleaned, and the shells or hulls removed; the kernels or meats are ground to a coarse meal that is pressed with or without preliminary heating. Cold-pressed oil, also called cold-drawn, or virgin, oil, is purer and has a better flavour than oil expressed with the aid of heat. After pressing the meals made from oily seeds or nuts, the remaining cake contains about 5 to 15 percent oil. Most of the oil present in these residues, and in meals made from seeds and nuts that naturally contain little oil, can be removed by extraction with volatile solvents, especially petroleum benzin (also known as petroleum ether, commercial hexane, or heptane). The solvent is percolated through the meal, dissolving the oil, which is finally recovered from the solution by evaporating the solvent. The solvent is also recovered and used over again.

oil gland, any of a variety of skin structures that secrete oily or greasy substances of various functions. In birds, the preen gland, or uropygial gland, located on the back at the


Oil City, near the confluence of the Allegheny River and Oil Creek, Pennsylvania
Milt and Joan Mann from CameraMann

base of the tail, supplies oil that is spread upon the feathers during preening. In mammals, sebaceous glands provide a grease that serves as a protectant and lubricant for hair and skin. Scent glands of certain mammals secrete an often oily material of distinctive odour that serves to mark territorial boundaries.

In some plants the fragrance of flowers is due to essential oils secreted in specialized glands called osmophors. *See also* preen gland.

oil grass, any of the 40 species of the genus *Cymbopogon* (family Poaceae), aromatic, oil-containing grasses cultivated in the tropics of Asia and Africa and introduced into tropical America. Most species are densely tufted, with long, narrow, flexible leaves.

Citronella grass (*Cymbopogon nardus*)
Douglas David Dawn

Lemon-oil grass or sweet rush (*Cymbopogon citratus*) contains citral, obtained by steam distillation of the leaves and used in scented cosmetics, food flavouring, and medicine. Citronella grass (*C. nardus*) contains geraniol (citronella oil), used in cosmetics and insect repellents.

oil of rose: *see* attar of roses.

oil of turpentine: *see* turpentine oil.

oil painting, painting in oil colours, a medium consisting of pigments suspended in drying oils. The outstanding facility with which fusion of tones or colour is achieved makes it unique among fluid painting mediums; at the same time, satisfactory linear treatment and crisp effects are easily obtained. Opaque, transparent, and translucent painting all lie within its range, and it is unsurpassed for textural variation.

Artists' oil colours are made by mixing dry powder pigments with selected refined linseed oil to a stiff paste consistency and grinding it by strong friction in steel roller mills. The consistency of the colour is important. The standard is a smooth, buttery paste, not stringy or long or tacky. When a more flowing or mobile quality is required by the artist, a liquid painting medium such as pure gum turpentine must be mixed with it. In order to accelerate drying, a siccative, or liquid drier, is sometimes used.

Top-grade brushes are made in two types: red sable and bleached hog's bristles. Both come in numbered sizes in each of four regular shapes: round (pointed), flat, bright (flat shape but shorter and less supple), and oval (flat but bluntly pointed). Red sable brushes are widely used for the smoother, less robust type of brush stroking. The painting knife, a finely tempered, thin, limber version of the artist's palette knife, is a convenient tool for applying oil colours in a robust manner.

The standard support for oil painting is a canvas made of pure European linen of strong close weave. This canvas is cut to the desired size and stretched over a frame, usually wooden, to which it is secured by tacks or, in the 20th century, by staples. To reduce the absorbency of the canvas fabric and to achieve a smooth surface, a primer or ground is applied and is allowed to dry before painting begins. The most commonly used primers have been gesso (*q.v.*), rabbit-skin glue, and lead white. If rigidity and smoothness are preferred to springiness and texture, a wooden or processed paperboard panel, sized or primed, may be used. Many other supports, such as paper and various textiles and metals, have been tried.

A coat of picture varnish is usually given to a finished oil painting to protect it from atmospheric attacks, minor abrasions, and an injurious accumulation of dirt. This varnish film can be removed safely by experts using isopropyl alcohol and other common solvents. Varnishing also brings the surface to a uniform lustre and brings the tonal depth and colour intensity virtually to the levels originally created by the artist in wet paint. Some 20th-century painters, especially those who do not favour deep, intense colouring, have preferred a mat, or lustreless, finish in oil paintings.

Most oil paintings made before the 19th century were built up in layers. The first layer was a blank, uniform field of thinned paint called a ground. The ground subdued the glaring white of the primer and provided a base of gentle colour on which to build images. The shapes and objects in the painting were then roughly blocked in using shades of white, along with gray or neutral green, red, or brown. The resulting masses of monochromatic light and dark were called the underpainting. Forms were further defined using either solid paint or scumbles, which are irregular, thinly applied layers of opaque pigment that can impart a variety of pictorial effects. In the final stage, transparent layers of pure colour called glazes were used to impart luminosity, depth, and brilliance to the forms, and highlights were defined with thick, textured patches of paint called impastos.

Oil as a painting medium is recorded as early as the 11th century. The practice of easel painting with oil colours, however, stems directly from 15th-century tempera-painting techniques. Basic improvements in the refining of linseed oil and the availability of volatile solvents after 1400 coincided with a need for some other medium than pure egg-yolk tempera to meet the changing requirements of the Renaissance (*see* tempera painting). At first, oil paints and varnishes were used to glaze tempera panels, painted with their traditional linear draftsmanship. The technically brilliant, jewel-like portraits of the 15th-century Flemish painter Jan van Eyck, for example, were done in this way.

In the 16th century, oil colour emerged as the basic painting material in Venice. By the end of the century, Venetian artists had become proficient in the exploitation of the basic characteristics of oil painting, particularly in their use of successive layers of glazes. Linen canvas, after a long period of development, replaced wooden panels as the most popular support.

One of the 17th-century masters of the oil technique was Velázquez, a Spanish painter in the Venetian tradition, whose highly economical but informative brushstrokes have frequently been emulated, especially in portraiture. The Flemish painter Peter Paul Rubens influenced later painters in the manner in which he loaded his light colours, opaquely, in juxtaposition to thin, transparent darks and shadows. A third great 17th-century master of oil painting was the Dutch painter Rembrandt. In his work a single brushstroke can effectively depict form; cumulative strokes give great textural depth, combining the rough and the smooth, the thick and the thin. A system of loaded whites and transparent darks is further enhanced by glazed effects, blendings, and highly controlled impestos.

Other basic influences on the techniques of later easel painting are the smooth, thinly painted, deliberately planned, tight styles of painting. A great many admired works (*e.g.,* those of Jan Vermeer) were executed with smooth gradations and blends of tones to achieve subtly modelled forms and delicate colour variations.

The technical requirements of some schools of modern painting cannot be realized by traditional genres and techniques, however, and some abstract painters, and to some extent contemporary painters in traditional styles, have expressed a need for an entirely different plastic flow or viscosity that cannot be had with oil paint and its conventional additives. Some require a greater range of thick and thin applications and a more rapid rate of drying. Some artists have mixed coarsely grained materials with their colours to create new textures, some have used oil paints in much heavier thicknesses than before, and many have turned to the use of acrylic paints, which are more versatile and dry rapidly.

oil palm, African tree, *Elaeis guineensis,* cultivated as a source of oil in West and Central Africa, where it originated, and in Malaysia and Indonesia, and as an ornamental tree in many subtropical areas; or, the American oil palm, *Corozo oleifera,* originating in Central and South America and sometimes cultivated under the erroneous name *Elaeis melanococca,* the oil of which was probably used for making candles by the early American colonizers.

Oil palm (*Elaeis guineensis*)
W.H. Hodge

The African tree is the more important commercially. It has many tiny flowers crowded on short branches that develop into a large cluster of oval fruits 1½ inches (4 centimetres) long, black when ripe, and red at the base. The outer fleshy portion of the fruit is steamed to destroy the lipolytic enzymes and then pressed to recover the palm oil, which is highly coloured from the presence of carotenes. The kernels of the fruit are also pressed in mechanical screw presses to recover palm-kernel oil, which is chemically quite different from the oil from the flesh of the fruit.

Palm oil is used in making soaps, candles, and lubricating greases and in processing tinplate and coating iron plates. Palm-kernel oil is used in manufacturing such edible products as margarine, chocolate confections, and pharmaceuticals. The cake residue after kernel oil is extracted is a cattle feed.

The American oil palm resembles the African in flowers and fruit, causing certain botanists to place it in the same genus, although the *Corozo* has a quite different appearance. The trunk of the *Corozo* creeps along the ground, and its leaves are flat, while the African tree has a straight trunk and leaflets attached at various angles.

oil plant, any of the numerous plants, either under cultivation or growing wild, used as sources of oil. Oil plants include trees such as palm, herbaceous plants such as flax, and even fungi (*Fusarium*).

Vegetable oils are used principally for food (mostly as shortening, margarines, and salad and cooking oils) and in the manufacture of soap and detergents, in paints and varnishes, and for a variety of other industrial items.

Oil is found in large amounts usually in the seeds of the plants and occasionally in the fleshy part of the fruit, as in the olive and the oil palm. Seeds may contain from 1 percent to more than 60 percent oil. The oil is a reserve of high-energy food for use by the germinating seed, and large amounts of oil are associated with large amounts of protein. After the oil is extracted from the oilseeds, the residual meal, or cake, remaining is so important a by-product that it frequently determines the value of an oil crop. Usually this meal is used as a protein concentrate to feed livestock and poultry; if it is poisonous, as with castor beans and tung nuts, it is used as fertilizer.

Most of the important oil crops, including the oil palm, the castor bean, and the coconut palm, grow in tropical and semitropical areas, particularly the tropical areas of West and Central Africa, Indonesia, the Philippines, and Malaysia. In cool, temperate regions, the oil crops are soybean, flax, sunflower, and plants of the mustard family. Most oil plants, with the exception of herbs such as mint, are not readily adaptable to mechanical cultivation. The oil palm produces the most oil per acre of any crop.

Several oils, such as cottonseed oil and corn oil, are by-products of other industries. Even weed seeds removed from cereal grain in large terminal elevators may be processed for their oil, particularly wild radish and wild mustard.

Oil has been obtained from plants since the beginning of recorded history for oil-burning lamps and for anointing and cooking. Castor oil was used as a lubricant for wheels of carts and wagons before the petroleum era. In the 19th century, margarine was developed in France as a substitute for butter. During the 20th century, the production of vegetable oils has grown to more than 100 billion pounds annually. Edible oils that are high in polyunsaturated fatty acids such as linoleic acid have become popular, particularly in the United States, since the 1950s, and this has stimulated interest in sunflower, safflower, and corn oils. *See also* oil extraction.

Oil Reserves Scandal (U.S., 1921–22): *see* Teapot Dome Scandal.

Oil Rivers, area comprising the delta of the Niger River in modern Nigeria, West Africa. The Oil Rivers Protectorate was established by the British in 1885. It was renamed the Niger Coast Protectorate in 1893 and in 1900 was joined to the Nigerian territories administered by the British government. Its name derives from the palm oil that was the chief product of the area.

oil seal (machinery): *see* shaft seal.

oil shale, any fine-grained sedimentary rock containing solid organic matter that yields significant quantities of oil when heated. This shale oil, commonly called syncrude, is a potentially valuable fossil fuel.

A brief treatment of oil shales follows. For full treatment, *see* MACROPAEDIA: Fuels, Fossil.

Oil shales vary in their mineral composition. For example, clay minerals predominate in true shales, while other minerals (*e.g.,* dolomite and calcite) occur in appreciable but subordinate amounts in the carbonates. In all shale types, layers of the constituent minerals alternate with layers of darker organic matter. This organic material consists chiefly of kerogen, an insoluble product of bacterially altered plant and animal detritus. Oil shales occur in certain types of geologic environments. Thick deposits are commonly found in the basins of former large lakes, especially those of tectonic origin. Thinner but more extensive deposits tend to occur in shallow marine environments. Some oil shales also can be found in former bogs and lagoons; these are generally associated with coal seams.

To be of commercial significance, an oil shale must have a large amount of kerogen, sufficient to provide more energy than is required to process the rock. If the kerogen content of a shale is 2.5 percent by weight, its total calorific value will be consumed during processing. Accordingly, oil shales with a kerogen content below the threshold value of 2.5 percent cannot be used as a source of energy. In the United States, only oil shales that yield 42 litres of oil per metric ton (10 gallons per short ton) are considered commercial grade.

The production of shale oil begins with the mining of the shale. The shale is then crushed and fed into a retorting unit in which the rock is heated to roughly 500° C (930° F). The intense heat breaks the chemical bonds of the kerogen macromolecule, thereby liberating small molecules of liquid and gaseous hydrocarbons, along with various compounds of nitrogen, sulfur, and oxygen. In another method, the retorting occurs undergound (in situ). The shale is fractured below the surface with explosives and subsequently set afire. The hydrocarbons released by the rock are pumped to the surface and collected.

Recovering oil from shale is much more expensive than producing light-to-medium and heavy oils. There are also serious drawbacks to current methods of extraction and refining. Vast amounts of water are required, rendering refining impracticable in arid lands where water is at a premium. Also, large amounts of carcinogenic wastes are produced during the refining process, and the mining process itself has deleterious environmental effects. Thus, exploitation of shale oil on a wide scale will probably not occur until other petroleum resources have been nearly depleted. Very few countries have oil-shale processing plants. Estonia, China, and Brazil have refinery facilities for producing relatively limited quantities of syncrude, while the U.S. government operates an experimental plant in Parachute Creek, Colo.

oil spill, leakage of petroleum onto the surface of a large body of water. Oceanic oil spills became a major environmental problem in the 1960s, chiefly as a result of intensified petroleum exploration on the continental shelf and the use of supertankers capable of transporting more than 450,000 metric tons (500,000 tons) of oil. Thousands of minor and several major oil spills related to well discharges and tanker operations are reported each year, with the total quantity of oil released annually into the world's oceans exceeding 1,000,000 tons (907,000 metric tons). The costs of such accidental oil spills are considerable in both economic and ecological terms. Oil on ocean surfaces is harmful to many forms of aquatic life because it prevents sufficient amounts of sunlight from penetrating and also reduces the level of dissolved oxygen. Moreover, crude oil renders feathers and gills ineffective, so that birds and fish may die from direct contact with the oil itself. Accidents to supertankers and to underwater wells and pipelines may be the cause of major oil spills, but the unintentional or negligent release of used gasoline solvents and crankcase lubricants by industries and individuals greatly aggravates the overall environmental problem. Combined with natural seepage from the ocean floor, these sources add oil to the world's waterways at the rate of from 3,900,000 to 6,600,000 tons (3,500,000 to 6,000,000 metric tons) a year.

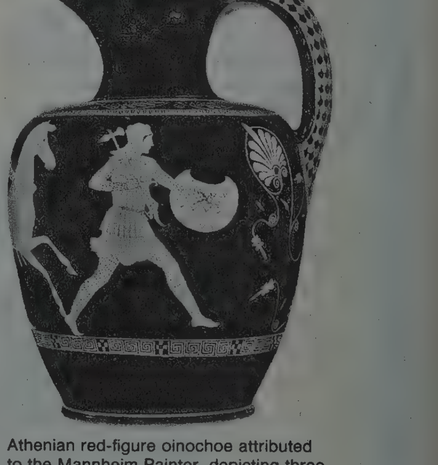
As yet no thoroughly satisfactory method has been developed for cleaning up major oil spills. Skimming, a technique effective only in calm waters, involves various mechanisms that physically separate the oil from water and place the oil into collection tanks. Another approach is to use various sorbents (*e.g.,* straw, volcanic ash, and shavings of polyester-derived plastic) that absorb the oil from the water. A negative aspect of this technique is the problem of disposing of oil sorbents after use. The immediate environmental effects of oil spills have been readily identified, but their long-term impact on the ecological system of an affected area is more difficult to assess.

oilbird, also called GUÁCHARO (*Steatornis caripensis*), nocturnal bird of South America that lives in caves and feeds on fruit, mainly the nuts of oil palms. The oilbird is an aberrant member of the order Caprimulgiformes; it comprises the family Steatornithidae. About 30 centimetres (12 inches) long, with fanlike tail and long broad wings, it is dark reddish brown, barred with black and spotted with white. It has a strong hook-tipped bill, long bristles around the wide gape, and large dark eyes.

The oilbird uses echolocation, like a bat, to find its way within the caves where it roosts and nests from Trinidad and Guyana to Bolivia. The sounds the bird emits are within the range of human hearing: bursts of astonishingly rapid clicks (as many as 250 per second). It also utters hair-raising squawks and shrieks that suggested its Spanish name, *guácharo* ("wailer"). At night it flies out to feed, hovering while it plucks fruit from trees.

Two to four white eggs are laid on a pad of organic matter on a ledge high up in the cave. The young, which may remain in the nest for 120 days, are fed by regurgitation until they are 70 to 100 percent heavier than adults. Indians render the squabs for an odourless oil for cooking and light; hence the bird's popular and scientific names.

oinochoe, also spelled OENOCHOE, wine jug from the classical period of Greek pottery. A



Athenian red-figure oinochoe attributed to the Mannheim Painter, depicting three Amazons leaving for battle, *c.* 450 BC; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, Rogers Fund, 1906 graceful vessel with delicately curved handle and trefoil-shaped mouth, the oinochoe was revived during the Renaissance and again during the Neoclassical period of the 18th century.

Oirat (people): *see* Oyrat.

Oise, *département,* Picardie *région,* France, to the north of Paris, created from part of the historic province of Île-de-France and a small part of Picardy. The eastern half of the *département* is bisected by the Oise River, a tributary of the Seine River that flows slowly northeast-southwest through Noyon, Compiègne, and Creil along a forested valley. It receives the Aisne River from the east above Compiègne. The cathedral city of Beauvais, the departmental capital, in the centre of western Oise, is situated on the Thérain River, which joins the Oise at Creil on the border of a forested region northeast of Senlis. Chantilly, with its château and racecourse, lies in the forest west of Senlis.

The *département,* consisting of undulating plateaus and gentle valleys, enjoys a mild climate. Cattle are raised, cereals and sugar beets are grown, and market gardening is prevalent in the valleys. Clay and sandstone are quarried. Metallurgical, cement, glass, and chemical industries, which employ most of the active population, are concentrated in the Oise valley around Creil and Compiègne. Light industries and housing developments are expanding as a result of improved communications with Paris. The Autoroute du Nord, the motorway linking Paris and Lille, passes through Oise.

Two of the finest Romanesque churches in northern France are in Saint-Leu-d'Esserent and Morienval. Other places of interest include the ruins of the 13th-century Chaalis abbey church, near the "Sea of Sand," a small sand desert; the Gallo-Roman ruins at Champlieu; the reconstructed feudal castle of Pierrefonds; and Royaumont abbey. The *département* has four *arrondissements:* Beauvais, Clermont, Compiègne, and Senlis. Area 2,263 square miles (5,860 square km). Pop. (1990) 725,603.

Oise River, river, rising in Belgium in the Ardennes mountains southeast of Chimay. It enters France northeast of Hirson, 9 miles (15 km) from its source, and flows generally southwestward, watering the Paris Basin, to join the Seine River at Conflans, after a course of 188 miles (302 km). It traverses the Thiérache Hills, where it collects its important left-bank tributary, the Serre, and flows through a flat alluvial valley below Guise. It then cuts through the northern part of the limestone platform of the Île-de-France and on through a valley flanked by the forests of Saint-Gobain, Compiègne, Hallatte, and Chantilly. Near Compiègne it receives its main tributary, the Aisne; and below the industrial town of Creil, it is joined by the Thérain. Other towns along the river include La Fère and Pontoise. The Oise is a link in the canal system between the navigable waterways of the Seine system and the canals of the north of France, which connect the centre of the Paris Basin with the coal basin (the Saint-Quentin and Nord canals) and the longest, leading to Dunkirk and Belgium. Its drainage basin is about 7,700 square miles (20,000 square km) in area.

Several battles of World War I were fought along the riverbanks.

Oisín (legendary warrior): *see* Ossian.

Oistrakh, David, in full DAVID FYODOROVICH OISTRAKH (b. Sept. 17 [Sept. 30, New Style], 1908, Odessa, Ukraine, Russian Empire—d. Oct. 24, 1974, Amsterdam, Neth.), world-renowned Soviet violin virtuoso acclaimed for his exceptional technique and tone production.

A violin student from the age of five, Oistrakh graduated from the Odessa Conservatory in 1926 and made his Moscow debut in 1933. He gave recitals throughout the Soviet Union and eastern Europe and in 1937 won first prize in the Eugène Ysaÿe violin competition. From 1934 he taught violin at the Moscow Conservatory. In 1942 he received the Stalin Prize.

Oistrakh was first heard in western Europe and the United States through his recordings of 20th-century Russian works as well as the classical violin repertory. From 1951 he toured extensively in Europe and from 1955 in the United States.

Oistrakh, Igor, in full IGOR DAVIDOVICH OISTRAKH (b. April 27, 1931, Odessa, Ukraine, U.S.S.R.), Russian violinist, noted for his lean, modernist interpretations.

Oistrakh studied with his father, the famous violinist David Oistrakh, and also attended the Central Music School in Moscow, making his concert debut in 1948. He then studied at the Moscow Conservatory (1949–55), winning first prizes, while still a student, at international competitions in Budapest, Hung., and Poznań, Pol. He joined the faculty of the Moscow Conservatory in 1958, initially assisting his father and later, in 1965, becoming a lecturer.

Oistrakh performed abroad frequently in Europe and America, occasionally performing in joint recitals with his father or performing as a soloist with his father as conductor.

Ōita, *ken* (prefecture), northeastern Kyushu, Japan, facing the Suō Sea and Bungo Strait of the Pacific Ocean. Its interior is dominated by a complex mountain system, and most human activity centres on small coastal plains. The long, irregular coastline is marked by deep-cut Beppu Bay and the rounded Cape Kuni. Ōita city, the prefectural capital, is located on the southern coast of Beppu Bay. It reached its greatest fame in the 16th century but declined during the Tokugawa period (1603–1867). Most of the population of the *ken* are farmers who raise subsistence and some cash crops (tobacco, reeds, citrus fruit) and cattle. Forestry flourishes in the mountains, and some industry (textiles, metals, cement, chemicals) is found in the main coastal cities. Beppu, on Beppu Bay, is one of Japan's best-known hot-spring resorts. Ōita city, now a port for the Inland Sea trade, is a major centre of heavy industry on Kyushu. Oil refineries and petrochemical plants operate on reclaimed land. Area 2,447 square miles (6,338 square km). Pop. (1990) 1,236,924.

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Ojai, city, Ventura county, southern California, 12 miles (19 km) north of Ventura, in the Ojai Valley flanked by mountains.

The site originated under Spanish rule as an outpost rancheria of the San Buenaventura Mission (now in Ventura). When the settlement was first laid out in 1874, it was named Nordhoff after Charles Nordhoff, a California booster and author of *California for Health, Pleasure and Residence* (1872). In 1916 the community was renamed Ojai, after the valley, and citizens were encouraged to remodel or maintain their structures in the Spanish-mission style. Ojai later attracted artists and crafts people as residents, as well as various spiritualists and religionists advocating meditation, yoga, theosophy, naturalism, astrology, holism, and so on. Tourists and vacationists are attracted not only by the scenic valley but also by an abundance of pottery studios, antique stores, galleries, shops, and boutiques in and around Ojai city. The Ojai Valley Tennis Tournament is held annually in April; the Ojai Festival featuring music is held in May. The classic film *Lost Horizon* (1937) was partly shot in the "Shangri-La" of Ojai Valley. Pop. (1990) 7,613.

Ojibwa, also called CHIPPEWA, Algonquian-speaking Indians who formerly lived along the northern shore of Lake Huron and both shores of Lake Superior from what is now Minnesota to the Turtle Mountains of North Dakota. In Canada those Ojibwa who lived west of Lake Winnipeg are called the Saulteaux. When first reported in the *Jesuit Relations* (1640), the Ojibwa occupied a comparatively restricted region near the St. Mary's River and in the upper peninsula of Michigan, but they moved west as the fur trade expanded. They fought the Sioux with firearms obtained from the French, driving them from Mille Lacs and occupying the northern part of Minnesota.

Charlie Assiniboin (left) and his brother, sons of Assiniboin, a Saulteaux (Ojibwa) chief; photograph by J.F. Rowe, Portage-la-Prairie, Manitoba, 1890s

Provincial Archives of Manitoba, Winnipeg; collection, Indians–Long Plain 4 (Neg. No. N261)

Each Ojibwa tribe was divided into migratory bands. In the autumn bands separated into family units, which dispersed to individual hunting areas; in summer families gathered together, usually at fishing sites. A few bands also cultivated corn (maize), and the Ojibwa also relied on the collection of wild rice for a major part of their diet. Birch bark was used extensively for canoes, dome-shaped wigwams, and utensils. Exogamous clans, distributed among the bands, served to offset the lack of overall tribal or national chiefs. Chieftainship of the band was originally not a powerful office, but dealings with European fur traders strengthened the position, which became hereditary through the paternal line. The Midewiwin, the annual celebration of the Grand Medicine Society, a secret religious organization open to men and women, was the major Ojibwa ceremonial. Membership was believed to provide supernatural assistance and conferred prestige on its members.

The Ojibwa were not prominent in history because of their remoteness from the frontier during the colonial wars. In the United States they constitute one of the largest remnants of the native population. During the late 20th century there were about 30,000 members of the tribe (most of mixed ancestry) on reservations in the states of Michigan, Minnesota, Montana, North Dakota, and Wisconsin; there were also approximately 50,000 Ojibwa in Canadian reservations in the provinces of Ontario, Manitoba, and Saskatchewan.

Ōjin, in full ŌJIN TENNŌ, personal name HONDAWAKE NO MIKOTO (fl. 4th–5th century AD), semilegendary 15th emperor of Japan, who according to tradition flourished in the 3rd–4th century. Ōjin is believed to have consolidated imperial power, spearheaded land reform, and actively promoted cultural exchanges with Korea and China. It is said that highly skilled weaving techniques were brought from Korea during his reign. Chinese scholars introduced Confucianism and the Chinese writing system into the country, thus marking the beginning of Japanese cultural growth.

Ōjin's mausoleum, at Habikino, near Ōsaka, is the second largest in Japan and is noted for its splendour and historical value. Ōjin was deified as Hachiman, god of war.

Ojukwu, Odumegwu, in full CHUKWUEMEKA ODUMEGWU OJUKWU (b. Nov. 4, 1933, Nnewi, Nigeria), military governor of the Eastern Region of Nigeria (1966–67) and head of the secessionist state of Biafra (1967–70) during the Nigerian civil war.

The son of a successful Igbo (Ibo) businessman, Ojukwu graduated from the University of Oxford in 1955. He returned to Nigeria to serve in the administration but after two years joined the army and was rapidly promoted thereafter. In January 1966 a group of junior army officers, many of them Igbo tribesmen, overthrew Nigeria's civilian government. Lieutenant Colonel Ojukwu was appointed military governor of the Igbos' homeland, the Eastern Region, under the new military government. But army officers belonging to the country's other two main tribal groups, the Hausas (concentrated in the Northern Region) and the Yorubas (in the Western Region), feared the preponderance of Igbos in the new government, and in July 1966 Northern officers staged a successful countercoup in which Colonel Yakubu Gowon became the new head of state. Ojukwu retained his command of the Eastern region under Gowon's rule. But the rising tide of feeling against Igbos, especially in the Northern Region, led to large massacres of Igbo civilians by Northern soldiers in September 1966. The Eastern Region felt increasingly isolated and alienated from the federal military government under Gowon. Ojukwu's main proposal to end the intertribal strife was the creation in Nigeria of a weak federation-type government, which would permit the Igbo and the other main tribes substantial political autonomy. The federal government tentatively agreed to this solution at a conference in January 1967, but then rejected it soon afterward. Ojukwu responded in March–April 1967 by separating the Eastern regional government's administration and revenues from those of the federal government. Mounting secessionist pressures from his fellow Igbos compelled Ojukwu on May 30, 1967, to finally declare the Eastern Region an independent state, under the name of the Republic of Biafra. Federal troops soon afterward invaded Biafra, and civil war broke out in July 1967. Ojukwu led Biafra's unsuccessful struggle to survive as an independent nation throughout the civil war (1967–70), and on the eve of Biafra's surrender he fled to the Côte d'Ivoire (Ivory Coast), where he was granted asylum.

Ojukwu remained in the Côte d'Ivoire until 1982, when he returned to Nigeria. He joined the National Party of Nigeria (NPN) in January 1983 and subsequently attempted to reenter politics by standing as an NPN candidate for the Senate in Onitsha, but he was unsuccessful.

Oka-Akoko, also called OKA, town, Ondo state, southwestern Nigeria, in the Yoruba Hills, on roads from Owo and Ikare. An agricultural market centre (yams, cassava, corn [maize], rice, palm oil and kernels, okra, and pumpkins) for the local Yoruba people, it is also a collecting point for cocoa, palm produce, tobacco, and cotton. Pop. (1991 est.) 126,400.

Oka River, river in western Russia. It is the largest right-bank tributary of the Volga. Rising in the Central Russian Upland, it flows 932 miles (1,500 km), first north in a rather narrow, winding valley to Kaluga, then sharply eastward across a broad lowland to join the Volga at Nizhny Novgorod. The area of its drainage basin is 94,600 square miles (245,000 square km). Freeze-up lasts from early December to late March or early May.

Okada Beisanjin, also called HIKOBĒ (b. 1744, Ōsaka, Japan—d. Oct. 15, 1820, Ōsaka), Japanese painter who worked in the *bunjinga,* or literati, style that originated in China and appealed to intellectuals.

"Landscape with Pine Groves," hanging scroll painting by Okada Beisanjin, 1807, ink and light colour on silk; in the collection of Matsushita Ichiyo, Takarazuka, Japan

By courtesy of Matsushita Ichiyo; photograph, the Asia House Gallery, New York

The son of a prosperous rice merchant, Okada enjoyed reading and was fond of the books of paintings that had been collected by his family for generations. He came under the influence of the painter-musician Uragami Gyokudō and other artists who were family friends. Later he became a retainer of a lord and was his official Confucian teacher. He excelled in painting landscapes in the *bunjinga* style that he mastered by studying illustrated books of Chinese paintings. Okada's technique was rather crude, but he drew with an impressive economy of strokes. His works were original and serene, a good example being "Picture Album of Landscape."

Okada Keisuke (b. Jan. 20, 1868, Fukui, Japan—d. Oct. 17, 1952, Tokyo), Japanese admiral and prime minister who attempted to moderate extremist military influence in the government.

Okada graduated from the Naval War College in 1901 and became a full admiral in 1924. After serving as the commander in chief of the combined fleet, he was appointed minister of the navy in the Tanaka cabinet in 1927 and also in the Saitō cabinet in 1932.

In 1934 Okada became prime minister. During his ministry, Minobe Tatsukichi, a professor at Tokyo University, advocated a controversial theory interpreting the position of the emperor as an "organ of the state." Right-wing extremists in the military—who asserted the doctrine of the emperor's divinity—held the prime minister responsible for Minobe's theory and censured Okada. Okada escaped assassination in the mutiny by young army rebels on Feb. 26, 1936, but he resigned from the ministry, taking responsibility for a series of incidents that occurred during his administration. In 1937 he joined a group of senior statesmen and remained a major figure in Japan's politics until after the war. In the latter stage of World War II, when Japan was near defeat, he supported efforts to end the war by seeking to overthrow the Tōjō government and to make peace overtures to the Allies.

Okada Tamechika, original name REIZEI TAMECHIKAI, also called SHINZŌ, or SABURŌ (b. 1823, Kyōto—d. 1864), Japanese painter of the late Tokugawa period (1603–1867) whose talent and efforts contributed a great deal to the revival of the traditional *Yamato-e* (paintings stressing Japanese themes and techniques as against the *Kara-e,* a style under strong Chinese influence).

Okada improved his artistry by copying old *Yamato-e* masterpieces and became a courtier of the Imperial court in Kyōto in order to study firsthand the traditional practices of the court, which he considered important subject matter. He even frequented the house of a prominent official of the Tokugawa shogunate in order to look at a famous three-scroll *Yamato-e* in the official's possession, although he was an ardent supporter of the Imperial cause. These visits, however, caused the pro-emperor faction to suspect him of disloyalty, and he had to flee Kyōto and hide himself by be-

"Tadanori shutsujin-zu" ("Going to Battle"), painting by Okada Tamechika; in the Tokyo National Museum

By courtesy of the Tokyo National Museum coming a monk. He was finally tracked down, lured out of his hideaway, and murdered. The mural and screen paintings at Daiju temple are representative works and show his mastery of the Buddhistic art as well as *Yamato-e.* He was also skilled at calligraphy and well read in Japanese classics.

Okakura Kakuzō, pseudonym OKAKURA TENSHIN (b. Feb. 14, 1863, Yokohama, Japan—d. Sept. 2, 1913, Akakura), art critic who had great influence upon modern Japanese art.

Okakura graduated (1880) from Tokyo Imperial University. Soon thereafter he met Ernest Fenollosa (*q.v.*), an American art critic and amateur painter who, while teaching at Tokyo University, had become the preeminent voice in defending Japan's traditional art forms against the drive to modernization and westernization of the early Meiji Restoration. Under his influence Okakura worked toward reeducating the Japanese people to appreciate their own cultural heritage. He was one of the principal founders of the Tokyo Fine Arts School, opened in 1887, and a year later became its head. He and Fenollosa, also teaching there, intentionally omitted Western painting and sculpture from the new school's curriculum. In 1898 Okakura was ousted from the school in an administrative struggle. He next established the Nippon Bijutsu-in (Japan Academy of Fine Arts) with the help of such followers as Hishida Shunsō and Yokoyama Taikan.

A frequent traveler abroad, at the turn of the century Okakura became curator of the Oriental art division of the Boston Museum of Fine Arts. His enthusiasm for traditional Japanese art often led him to assert the superiority of Oriental over Western art. Many of his works, such as *The Ideals of the East* (1903), *The Awakening of Japan* (1904), and *The Book of Tea* (1906), were written in English in order to spread abroad his ideas.

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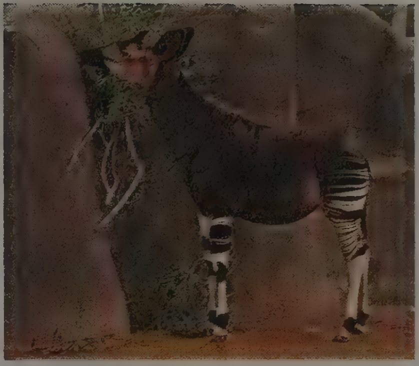
Okamoto Kidō, original name OKAMOTO KEIJI (b. Oct. 15, 1872, Tokyo, Japan—d. March 1, 1939, Japan), Japanese dramatist and drama critic who wrote nearly 200 historical Kabuki dramas.

While working for the Tokyo newspaper *Nichinichi* in 1908, Okamoto wrote his first play, *Ishin Zengo,* for the actor Ichikawa Sadanji II and his Kabuki group. He continued writing historical dramas (*jidaimono*), which were noted for their historical accuracy and poetic expression. Some of the best remembered are *Shuzenji monogatari, Muromachi gosho, Sasaki Takatsuna, Toribeyama shinjū,* and *Banchō Sarayashiki.* In his later years he wrote plays with situations taken from daily life (*sewamono*), such as the popular *Sōma no Kinsan.*

In 1937 Okamoto became the first dramatist to be made a member of the Art Academy and has since been considered the representative writer of what has been called the New Kabuki (Shin Kabuki). He also wrote more than 100 short stories and several novels, the most popular being *Hanshichi torimono-chō,* a recounting of cases handled by a detective Hanshichi, of the Tokugawa shogunate.

okapi (species *Okapia johnstoni*), cud-chewing hoofed mammal that is placed along with the giraffe (*q.v.*) in the family Giraffidae (order Artiodactyla). Found in the rain forests of the Congo, the okapi was unknown to science until about 1900. Its neck and legs are shorter than those of the giraffe, and the shoulder height of females, which are larger than males, is about 1.5 m (5 feet). The coat is sleek and deep brown, almost purple, with the sides of the face dull reddish; the buttocks, thighs, and tops of the forelegs are horizontally striped with black and white, and the lower parts of the legs are white with black rings above the hooves. The eyes and ears are large, and the tongue is long and prehensile. The male has short horns covered with skin except at the tips.



Okapi (*Okapia johnstoni*)
Kenneth W. Fink—Root Resources

The okapi is a shy, elusive animal that lives among dense cover and browses on leaves and fruit. It appears to be solitary. It has been exhibited in many zoological gardens and has been successfully bred in captivity. Gestation is about 14–15 months.

Okāra, city, Punjab province, east-central Pakistan. In 1869 it became the headquarters of the *tahsil* (subdivision) of Okāra, supplanting Gugera as headquarters. A flourishing industrial and commercial trade centre, Okāra is situated on the Sāhiwāl-Lahore road and railway 24 miles (39 km) northeast of Sāhiwāl. There are several textile, hosiery, carpet, and grain mills located there. Okāra is also the site of a national military dairy farm and Livestock Research Centre and has a government college affiliated with the University of Punjab. Because of industrial growth, Okāra has developed into a modern city with paved roads, small gardens, and an up-to-date drainage system. Pop. (1981) 153,483.

Okara, Gabriel (Imomotimi Gbaingbain) (b. April 21, 1921, Bumodi, Nigeria), Nigerian poet and novelist with an acute perception of Africa's basic problems, whose verse was sufficiently popular in his own country to be translated into several languages by the early 1960s. His novel *The Voice* (1964) is a remarkable linguistic experiment, in which Okara translated directly from the Ijaw language, imposing Ijaw syntax onto the English, in order to give literal expression to African ideas and imagery.

A largely self-educated man, Okara became a bookbinder after leaving school and soon began writing plays and features for radio. In 1953 his poem "The Call of the River Nun" won an award at the Nigerian Festival of Arts, and by 1960 he was recognized as an accomplished literary craftsman.

Okara tends to develop his poems through series of contrasts in which symbols are neatly balanced against each other. The need to reconcile the extremes of experience (life and death are common themes) preoccupies his verse, and a typical poem has a circular movement from everyday reality to a moment of joy and back to reality again.

Okara incorporated African thought, religion, folklore, and imagery into both his verse and prose. His method of composition involved translating his ideas as literally as possible from his native Ijaw into English. Thus in *The Voice* the physical quality of his prose reflects the idiom, cadence, and word order of his native tongue.

The Voice creates a symbolic landscape in which the forces of traditional African culture and Western materialism contend. The hero, Okolo, is both an individual and a universal figure, and the ephemeral "it" that he is searching for could represent any number of transcendent moral values. The novel ends tragically, but Okara's skilled portrayal of the inner tensions of his hero placed him above many of his fellow Nigerian novelists, who often resorted to stereotyped characters.

During much of the 1960s Okara served as information officer for the Eastern Nigeria Government Service in Enugu and during the Nigerian civil war as Biafran information officer from 1967 to 1969. From 1972 to 1980 he was director of the Rivers State Publishing House in Port Harcourt. A collection of his poems, *The Fisherman's Invocation,* appeared in 1978 and was awarded the Commonwealth Prize in 1979.

Okavango (Namibia): *see* Kavango.

Okavango River, also called KUBANGO RIVER, fourth longest river system in southern Africa, running basically southeastward for 1,000 miles (1,600 km) from central Angola, where it is known as the Kubango, to the Kalahari (desert) in northern Botswana, where the river terminates in an immense inland delta known as the Okavango Swamp. The river—formerly sometimes called the Okovango—takes its name from the Okavango (Kavango) people of northern Namibia. David Livingstone, the Scottish missionary and explorer, and the first European known to have seen the Okavango, reached its swampy delta in 1849.

The Okavango River rises as the Kubango just south of Vila Nova, Angola, on the Bié Plateau, at an elevation of 5,840 feet (1,780 m). It flows south and then southeastward through Angola in a course that is initially broken by rapids. Along its middle course the Okavango forms part of the Angola-Namibia border. After being joined by its largest tributary, the Kwito River, the Okavango River then crosses Namibia's narrow Caprivi Strip to enter Botswana.

Soon after entering Botswana the Okavango begins to widen as it enters the flat, swampy tract in which it terminates. About 70 miles inside Botswana, the river spreads out to form a triangular-shaped delta, the base of which extends for about 150 miles (240 km). This delta region, less than half of which is swamp year-round, covers an area of about 6,500 square miles (16,800 square km). Most of the delta's area is inundated during the rainy season. The river is subject to drastic changes in flow along its length because of seasonal variations, the reception of tributaries, evaporation, and absorption into the riverbed.

In its uppermost course, the Okavango flows through woodland country that becomes less densely forested as the river progresses southward. Further to the southeast, the river passes through areas occupied by dry savanna, *i.e.,* grassland with scattered acacia trees. In the Okavango Swamp itself, the vegetation falls into two main types—dense clumps of papyrus reeds and other aquatic plants in the river and floodplain channels; and patches of woodland and savanna occupying the slightly higher parts of the delta. In the delta the dense growth of papyrus reeds is continually blocking the river's channels, thus changing the pattern of flow.

Although the Okavango brings water to a parched land, the river's resources remain largely unused, and its banks are only sparsely settled. Except for small craft, the Okavango is virtually unnavigable. A major problem for the Tswana (Batswana) people, the main inhabitants of the Okavango delta, has been control of the tsetse fly.

The Moremi Wildlife Reserve covers 1,463 sq mi (3,788 sq km) of the northeastern corner of the Okavango Swamp. Its teeming wildlife includes lions, cheetahs, buffalo, wildebeests, hippopotamuses, zebras, wild dogs, crocodiles, and other species. Birds include storks, ibis, herons, egrets, cranes, and weaver birds. There are also numbers of ducks, geese, and quail. Varieties of fish include bream, pike, barbels, and tiger fish.

Ōkawa, city, Fukuoka Prefecture (*ken*), Kyushu, Japan, on the mouth of the Chikugo-gawa (Chikugo River). It was a fishing port known as Wakatsu during the Tokugawa era (1603–1867), when it also served as a market for agricultural produce and lumber. In the mid-19th century Dutch techniques of woodworking and cabinetmaking were introduced, and woodworking had become the city's major industry by 1949. Since then, modernization and mechanization have progressed, using wood imported from the Philippines and Alaska. Pop. (1995 prelim.) 43,341.

Ōkawa Shūmei (b. Dec. 6, 1886, Yamagata Prefecture, Japan—d. Dec. 24, 1957, Tokyo), ultranationalistic Japanese political theorist whose writings inspired many of the right-wing extremist groups that dominated Japanese politics during the 1930s. Ōkawa personally organized and participated in many of the major rightist attempts at direct action, and during World War II he helped shape much of the Japanese government's domestic propaganda.

Ōkawa was graduated in philosophy from the University of Tokyo in 1911 and became an early associate of the other famous right-wing advocate of the period, Kita Ikki. Together they founded the influential nationalistic Yūzonsha (Society for the Preservation of the National Essence) in 1919. Through its magazine, *Otakebi* ("War Cry"), the Yūzonsha advocated the return of Japan to the simpler military values of its feudal past as well as the institution of a national socialist government. Yūzonsha gained a tremendous following, especially among the military forces. Ōkawa soon fell out with Kita, however, and in 1924 he began to publish his own magazine, *Nippon,* which advocated the creation of a Japanese military government at home and the extension of Japanese rule to Manchuria (Northeast Provinces). His popularity continued to grow, as did his identification with the Japanese economic penetration of Manchuria; in 1929 he was appointed chairman of the government's new East Asian Economic Investigation Bureau as well as special lecturer to the army and navy academies.

In early 1931 Ōkawa, together with a group of young army officers, organized a plan for a military takeover of the government. Although the coup was aborted, it was the first direct attempt against the government by a right-wing group. A second attempted coup the following October also failed. In 1932, however, Ōkawa was arrested and sentenced to nine years' imprisonment for his involvement in the assassination (May 15) of Prime Minister Inukai Tsuyoshi.

Paroled in 1937, Ōkawa rejoined the East Asian Economic Investigation Bureau two years later, serving simultaneously as head of a special program created at Hōsei University in Tokyo to foster ultranationalist sentiments among the Japanese people. So famous did his broadcasts and announcements become that he was popularly known as *Tōyō no ronkaku* ("Voice of the Orient").

In 1945 Ōkawa was arrested as a Class A category war criminal suspect, but charges against him were dropped on the grounds of insanity. After two years of confinement, he devoted the rest of his life to writing, completing a Japanese translation of the Qur'ān.

Okaya, city, Nagano Prefecture (*ken*), Honshu, Japan, on the western shore of Suwa-ko (*Ko*, "lake"). Okaya was a small village until the establishment of its first large silk-reeling factory in 1875. After World War II many of the war-damaged silk mills were converted to factories producing precision machinery and processed foods. Products include watches, clocks, cameras, and music boxes. Pop. (1980) 62,210.

Okayama, city and prefecture (*ken*), western Honshu, Japan, bordering the Inland Sea. Its area of 2,736 sq mi (7,086 sq km) includes numerous offshore islands. Okayama Prefecture has a predominantly agricultural economy. Rice, grapes, peaches, *igusa* (rush for tatami mats), cotton, and other cash crops are grown in the south, where farm techniques and mechanization are among the most advanced in Japan. The economy in the interior mountains, however, is poor and largely dependent upon forestry and small-scale cattle raising. Manufacturing is concentrated in such southern cities as Okayama, Kurashiki, and Tamanoi. Mizushima district in Okayama Prefecture developed extensively during the 1960s. Oil refineries and automobile, petrochemical, and steel factories were built on reclaimed land.

The castle in Okayama city, Japan

Camera Tokyo Service

Okayama city, the prefectural capital, lies in the central Okayama plain, astride the Asahi-gawa (*gawa,* "river"). An old castle town of the Ikeda daimyo family, it dominates prefectural life. It is a major marketing centre with excellent rail connections to cities on the Inland Sea, Sea of Japan, and Shikoku. Because its river port is shallow, Tamanoi serves as its outport. Industry includes the manufacture of machinery, textiles, and rubber goods. Okayama University (1949) is noted for its medical college. Kōraku-en, laid out in 1786, is one of Japan's most celebrated public gardens. The town of Bizen, to the northeast, has been a centre of pottery making since the 8th century. Pop. (1995 prelim.) city, 616,056; prefecture, 1,951,159.

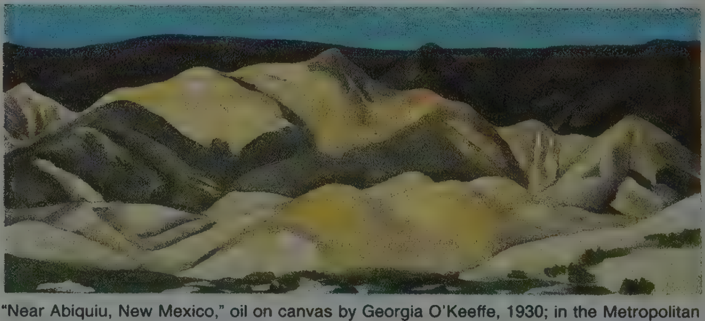
Okazaki, city, Aichi Prefecture (*ken*), central Honshu, Japan, in the Mikawa plain, on the Yahagi-gawa (*gawa,* "river"). It developed around Okazaki Castle after its construction in 1455. During the Tokugawa period (1603–1867) it prospered as one of the post towns on the Tōkaidō (Eastern Sea Highway) route.

Okazaki refused to allow the Tōkaidō Line (railway) to pass through the city in 1888. The town then declined until it was connected with Nagoya and Toyohashi by rapid-transit lines. Now an industrial centre, it produces textiles, foods, machinery, chemicals, and fabricated metals. Pop. (1995 prelim.) 322,615.

Okazaki Genshichi: *see* Kaigetsudō Ando.

Okeechobee, Lake, third largest freshwater lake wholly within the U.S. (after Lake Michigan and Iliamna Lake, Alaska). The lake lies 40 mi (65 km) northwest of West Palm Beach, Fla., at the northern edge of the Everglades. A remnant of the prehistoric Pamlico Sea, which once occupied the entire basin including the Everglades, it bears the Seminole Indian name for "Big Water." The lake is 35 mi long with a shoreline of 135 mi and, including three small islands, covers an area of 700 sq mi (1,813 sq km). The surface is 12.5 to 15.5 ft (4 to 5 m) above mean sea level, depending upon the water level in the lake; the mean depth is 7 ft, and the maximum depth is 15 ft. The chief source is the Kissimmee Valley watershed, immediately to the north, which drains into a chain of lakes that in turn empties into the Kissimmee River as it flows 100 mi southward to Lake Okeechobee. Before the construction of adequate levees and a regulatory outlet system, the overflow produced by the rainy season flooded surrounding areas and spilled over southward into the Everglades. Private and state drainage attempts, all unsuccessful, date from 1881. The last effort failed when hurricane winds flooded the area in 1928. State and federal flood control and reclamation projects were subsequently begun, and a levee more than 80 mi long was constructed along the southern shore and at other low stretches. In 1937 a 155-mi cross-state waterway, from Stuart on the Atlantic Ocean via the St. Lucie Canal across Lake Okeechobee and down the Caloosahatchee River to the Gulf of Mexico, was completed. Lake communities include Pahokee, Belle Glade, Lake Harbor, Clewiston, Okeechobee, and Canal Point. Seminole Indians still dwell on the northwest shore of the lake.

O'Keeffe, Georgia (b. Nov. 15, 1887, near Sun Prairie, Wis., U.S.—d. March 6, 1986, Santa Fe, N.M.), one of the foremost painters in 20th-century American art.



"Near Abiquiu, New Mexico," oil on canvas by Georgia O'Keeffe, 1930; in the Metropolitan Museum of Art, New York City

The Metropolitan Museum of Art, New York City, Alfred Stieglitz Collection, 1963 (63.204), reproduced by permission of the estate of Georgia O'Keeffe, copyright © 1984/85 by The Metropolitan Museum of Art; photograph by Malcolm Varon

After a childhood spent on her family's Wisconsin farm, O'Keeffe decided she wanted to be an artist. She studied at the Art Institute of Chicago (1904–05) and the Art Students League of New York (1907–08), and afterward she supported herself by doing commercial art. She then taught art at various schools and colleges in Texas and other Southern states from 1912 to 1916, and in the latter year her drawings were discovered and exhibited by the American photographer Alfred Stieglitz. Stieglitz praised and promoted her work, and the two artists began a lifelong relationship, marrying in 1924. The hundreds of photographs Stieglitz took of her form a notable and extended portrait series. O'Keeffe moved to New York City after meeting Stieglitz; she later spent periods in New Mexico, to which she moved after her husband's death in 1946.

O'Keeffe's early pictures were basically imitative, but by the early 1920s her own highly individualistic style of painting had emerged. Frequently her subjects were enlarged views of skulls and other animal bones, flowers and plant organs, shells, rocks, mountains, and other natural forms. O'Keeffe delineated these forms with probing and subtly rhythmic outlines and delicately modulated washes of clear colour. Her mysteriously suggestive images of bones and flowers set against a perspectiveless space inspired a variety of erotic, psychologic, and symbolic interpretations. The precision and austerity of her works owe something to the Precisionist paintings of Charles Sheeler and Charles Demuth, but her ability to invest biomorphic forms with an abstract beauty was entirely her own. Her style is typified in such paintings as "Cow's Skull, Red, White and Blue" (1931) and "Black Iris" (1926).

Georgia O'Keeffe painted her best-known works in the 1920s, '30s, and '40s, but she remained an active painter until the 1980s. Her later works frequently celebrate the clear skies and desert landscapes of New Mexico. A retrospective exhibition of her art held at the Whitney Museum of American Art in 1970 assured her reputation as one of the most original and important artists in modern American painting.

Her autobiography, *Georgia O'Keeffe,* was published in 1976.

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Okefenokee Swamp, also spelled OKEFINOKEE, swamp and wildlife refuge in southeastern Georgia and northern Florida, U.S. It is a shallow, saucer-shaped depression approximately 25 miles (40 km) wide and 40 miles (65 km) long and covers an area of more than 600 square miles (1,550 square km). Lying about 50 miles (80 km) inland from the Atlantic coast, the Okefenokee Swamp is bounded on the east by the low, sandy Trail Ridge, which prevents direct drainage into the Atlantic. The swamp is partially drained southward into the Atlantic by the Suwannee and St. Mary's rivers.

The Okefenokee Swamp includes low, sandy ridges, wet, grassy savannas, small islands (called hummocks) surrounded by marshes, and extensive "prairies," or dark water areas covered by undergrowth and trees. Vegetation is dense in the swamp and includes giant tupelo and bald cypress trees festooned with Spanish moss, brush, and vines; where sandy soil is above the water, pine trees predominate. Meandering channels of open water form an intricate maze. Exotic flowers, among them floating hearts, lilies, and rare orchids, abound. The swamp is populated with diverse and abundant wildlife, with about 175 species of birds and at least 40 species of mammals, which include raccoons, black bear, white-tailed deer, bobcats, fox, and otter. Alligators are also present.

In 1937, 371,445 acres (150,319 hectares) of swampland, almost all in Georgia, were set aside as the Okefenokee National Wildlife Refuge, with headquarters at Waycross, Ga. The swamp's name probably is derived from the Seminole Indian word for "trembling earth," so-called because of the floating islands of the swamp.

Okeghem, Jean d' (Flemish composer): *see* Ockeghem, Jean d'.

Okehampton, town ("parish"), West Devon district, county of Devon, England. It lies on the northern edge of the wild heathland known as Dartmoor. There was originally a Saxon settlement on the site, but this was abandoned after the Norman Conquest in 1066, when a castle was built, the keep of which remains. The town received its first charter of incorporation during the reign of Edward I (1272–1307). Okehampton is now a small rural service centre. Pop. (1991) 4,841.

O'Kelly, Sean T., in full SEAN THOMAS O'KELLY, Irish SEAN THOMAS O CEALLAIGH (b. Aug. 25, 1882, Dublin, Ire.—d. Nov. 23, 1966, Dublin), one of the early leaders of the Irish nationalist Sinn Féin ("We Ourselves") Party. He served two terms as president of Ireland, from June 1945 to June 1959.

For some years O'Kelly worked in the National Library, Dublin. In 1905 he became a journalistic associate of Arthur Griffith, principal founder of Sinn Féin. O'Kelly served as honorary secretary of Sinn Féin (1908–10) and general secretary of the Gaelic League (1915–20). From 1913 he helped to raise the Irish Volunteers, and he was imprisoned for a year for fighting against the British in the Easter Rising of 1916 in Dublin.

In the election of 1918 in which Sinn Féin swept away the old Irish Nationalist Party, O'Kelly was elected a representative of part of Dublin. From then on and intermittently to 1945, O'Kelly was the representative of various divisions of Dublin in Dáil Éireann (the Irish assembly), and for a time he was that body's speaker. In 1919 he represented the Irish Republic at the World War I peace conference, Paris, and later he was envoy to Italy and the United States. In the government formed by Eamon De Valera in 1932, O'Kelly became vice president of the executive council and minister of local government. Succeeding Douglas Hyde as president in 1945 and reelected in 1952 without opposition, he retired from public life after his second term.

Okene, town, Kogi state, south-central Nigeria. It lies at the intersection of roads from Lokoja, Kabba, Ikare, Ajaokuta, and Anchi. Originally founded on a hill near the present site, it now lies in the valley of the Ubo River, which is a minor tributary of the Niger River. The town is a major trade centre for the yams, cassava, corn (maize), sorghum, beans, peanuts (groundnuts), palm oil and kernels, and cotton grown in the surrounding area by the Igbira people. The town is also the site of the Igbira *ata*'s ("king's") palace. Cotton weaving is a traditional craft, and Okene women are known for their weaving of imported silk. Iron ore from deposits in the area is shipped to the iron and steel complex at Ajaokuta.

The area around Okene is densely populated, primarily by Yoruba and Igbira peoples. Islām is the predominant religion. Pop. (latest est.) 8,298.

Okha, city, western Gujarāt state, west-central India. It is a port at the western tip of the Kāthiāwār Peninsula, between the Gulf of Kutch and the Arabian Sea. The city contains an automobile-assembly plant, and a large chemical plant is located at Mithāpur, 5 miles (8 km) southwest. Fishing and salt manufacture are important. Okha is a railway terminus and is served by a highway. Pop. (1991 prelim.) 13,342.

Okhlopkov, Nikolay Pavlovich (b. May 2 [May 15, New Style], 1900, Irkutsk, Siberia, Russia—d. Jan. 8, 1967, Moscow, U.S.S.R.), Soviet experimental-theatrical director and producer. He was one of the first modern directors to introduce productions in the round on an arena stage in an effort to restore intimacy between the actors and the audience.

Okhlopkov studied fine arts and music before enrolling in the Meyerhold State Theatrical Workshops in Moscow (1922). An actor in the Meyerhold Theatre from 1923, he was director (1931–36) of the Realistic Theatre in Moscow (formerly the Moscow Art Theatre Studio). Drawing on the principles of Greek, Chinese, Japanese, and Shakespearean theatre, he designed an elaborate stage in the centre of the house and often placed the seated spectators inside the field of action. Although he produced chiefly political and proletarian dramas tailored to Soviet ideology, his experimentalism eventually led the government to close the Realistic Theatre (1938). From 1938 to 1943, Okhlopkov was a producer at the Vakhtangov Theatre and from 1943 to 1966 at the Moscow Drama (after 1954 called the Mayakovsky Theatre). He also produced and acted in a number of Soviet films.

Okhlopkov
Sovfoto

Okhotsk, Sea of, Russian OKHOTSKOYE MORE, or OCHOTSKOJE MORE, a northwestern arm of the Pacific Ocean that is largely enclosed by various landforms of northeastern Asia.

A brief treatment of the Sea of Okhotsk follows. For full treatment, *see* MACROPAEDIA: Pacific Ocean.

The Sea of Okhotsk is bounded on the west by the Siberian coast of Russia from the Amur River estuary on the south to the mouth of the Penzhina River in the north. The sea is enclosed by the Kamchatka Peninsula and the Kuril Islands on the east and is bounded by the Japanese island of Hokkaido to the south and the Russian island of Sakhalin to the southwest. The shores of both Japan and Russia are washed by the Sea of Okhotsk, which covers 611,000 square miles (1,583,000 square km) and has an average depth of 2,549 feet (777 m).

For the most part, the continental shores of the sea are high and rocky and are interspersed with the mouths of large, regional rivers that flow into the sea—the Amur, Uda, Okhota, Gizhiga, and Penzhina. The sea bottom slopes downward from north to south and southwest. The northern and northwestern parts constitute a continental shallow up to 650 feet (200 m) in depth, while the remaining area (about 70 percent of the total) is a continental slope from 650 to 5,000 feet (1,500 m) deep.

The northeastern, northern, and western regions of the Okhotsk experience severe weather during the winter, because of the influence of Asian continental weather extremes. From October through April these areas experience very cold air temperatures and are constantly covered with ice. To the south and southeast, the proximity of the Pacific results in a milder marine climate. In the northern part of the sea, the average monthly air temperature during February is −4° F (−20° C), while in August the average is 54° F (12° C). In the sea's southern parts, the average monthly air temperature is 19° F (−7° C) in February and 64° F (18° C) in August. Ice cover appears in the sea at the end of October and reaches its greatest extent in March.

The water of the Sea of Okhotsk consists of continental drainage, precipitation, and waters flowing westward from the Pacific Ocean through the numerous straits in the Kuril Islands and northward from the Sea of Japan (East Sea) through the La Perouse (Sōya) Strait. Because of the influence of these oceanic currents, the waters of the eastern half of the sea are warmer than those of the western part. The general movement of water in the Okhotsk is counterclockwise. The influx of waters from the Pacific, especially between the eastern and central Kurils, forms a powerful north-flowing current in several branches in the east, while in the west a similar, south-flowing current is supplemented by river drainage from the Siberian mainland.

The Sea of Okhotsk's waters are quite favourable to marine life during the warmer months of the year. The sea's flora includes algae and seaweed, and its fauna includes crayfish, mussels, crabs, sea urchins, polyps, and various types of fish. Salmon, herring, pollack, flounder, cod, capelin, and smelts (or frostfish), as well as crab and shrimp, are all commercially important. The Okhotsk is also inhabited by marine mammals—whales, seals, sea lions, and fur seals.

Regular navigation connecting the ports of the Russian Far East is conducted through the Okhotsk. On the continental coast the main ports are Magadan in Nagayevo Bay and Okhotsk. Korsakov on the island of Sakhalin and Severo-Kurilsk and Yuzhno-Kurilsk on the Kuril Islands are also important. In winter, ice floes impede sea navigation, and dense fog is a hindrance during the summer.

Okhranka, acronym from Russian OTDELENIYE PO OKHRANENIYU OBSHCHESTVENNOY BEZOPASNOSTI I PORYADKA, English DEPARTMENT FOR DEFENSE OF PUBLIC SECURITY AND ORDER (1881–1917), prerevolutionary Russian secret-police organization that was founded to combat political terrorism and left-wing revolutionary activity. The group's principal mode of operation was through infiltration of labour unions, political parties, and, in at least two cases, newspapers: police agents were editors of the Marxist journals *Nachalo* (1899, "The Beginning") and, in 1912–13, of *Pravda.* The Okhranka was particularly active following the unsuccessful Russian Revolution of 1905. After the February 1917 Revolution the organization was abolished by the Provisional Government.

Okhwangsangje, deity of the Korean religion known as Poch'ŏngyo (*q.v.*).

Oki Islands, Japanese OKI-SHOTŌ, archipelago, Shimane *ken* (prefecture), Japan, lying in the Sea of Japan off the coast of Honshu. The largest island is Dōgo; the three smaller isles (Chiburi, Nishino, Nakano) are collectively known as Dōzen. The four islands have a combined coastline of 223 miles (359 km) and an area of 134 square miles (348 square km). The chief town is Saigō, on the island of Dōgo, about 50 miles (80 km) from the Honshu port of Sakaiminato. Fishing is the main economic activity.

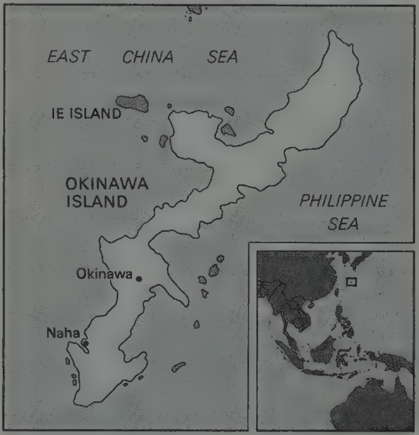
The archipelago is celebrated in Japanese history because its possession was much disputed during the feudal period and because two emperors were banished there by the Hōjō regents in the 13th and 14th centuries. The islands now form part of Daisen-Oki National Park. Pop. (1990) 27,493.

Okigbo, Christopher (b. Aug. 16, 1932, Ojoto, Nigeria—d. August 1967, Nigeria), Nigerian poet who is one of the best and most widely anthologized African poets.

After receiving a bachelor's degree in Western classics at the University of Ibadan in 1956, Okigbo held positions as a teacher, librarian at the University of Nigeria, private secretary to Nigeria's federal minister of research and information, and West African editor of *Transition,* an African literary magazine. He was awarded first prize for poetry in the 1966 Festival of the Negro Arts in Dakar but declined the prize because he felt that writing must be judged as good or bad, not as a product of a specific ethnic group or race. In 1967 Okigbo's efforts to launch a publishing company in Enugu with the novelist Chinua Achebe came to an abrupt end after his death while fighting in the war for Biafran independence from Nigeria.

Okigbo published three volumes of poetry during his short lifetime: *Heavensgate* (1962), *Limits* (1964), and *Silences* (1965). His collected poems appeared posthumously in 1971 under the title *Labyrinths, with Path of Thunder*. Okigbo had a deep familiarity with ancient Greek and Latin writers and with modern poets such as T.S. Eliot and Ezra Pound, as well as with Igbo (Ibo) mythology. His poems are highly personal, richly symbolic renderings of his experiences, his thoughts on the role of the poet, and other themes. He weaves images of the forests, animals, and streams of his native Igbo landscape into works that are often obscure, allusive, or difficult. Despite this, his verse is intensely evocative and shows careful craftsmanship. Okigbo became the most widely translated of all Nigerian poets. A volume entitled *Collected Poems* was published in 1986.

Okinawa, *ken* (prefecture), Japan, in the East China Sea. The prefecture is composed of the Ryukyu Islands (*q.v.*). Okinawa Island is the largest in the Ryukyu Islands archipelago, being about 70 miles (112 km) long and 7 miles (11 km) wide. Okinawa Island has an area of 463 square miles (1,199 square km). Before Okinawa became a prefecture during the early part of the Meiji period (1868–1912), it was a semi-independent kingdom under the influence of both Japan and China. Tuna fishing, cattle raising, sugar refining, and pineapple canning constitute Okinawa's main economic activities. Sweet potatoes, rice, and soybeans are also grown on the island, and textiles, sake (rice wine), and lacquerware are manufactured. Offshore wells yield petroleum. Naha is the prefectural capital.



Okinawa Island

Okinawa Island was the site of one of the bloodiest campaigns in the Pacific theatre during World War II. In April 1945 U.S. troops made an amphibious landing on Okinawa, which was heavily defended by the Japanese. In the resulting three-month-long campaign, U.S. forces sustained about 12,000 dead and 36,000 wounded before they were able to establish complete control of the island. The Japanese sustained about 100,000 dead.

In 1972 the United States returned Okinawa Island to Japan, although the extensive U.S. military installations there remained operative. Area prefecture, 871 square miles (2,255 square km). Pop. (1995 prelim.) 1,273,508.

Okinawa, formerly KOZA, city, Okinawa *ken* (prefecture), Japan. It is situated in the central part of Okinawa Island and was designated as a new city in 1974. Originally occupying a region of agriculture and forestry, the city, after World War II, became the location for the U.S. Kadena military base, which continued to exist after the American occupation of Japan was ended. Okinawa city has the Southeast Botanical Garden displaying tropical plants, an aquarium, an amusement park, a zoo, and the Moromi Folkcraft Museum. Pop. (1995 prelim.) 115,342.

Southeast Botanical Garden, Okinawa
Photri

Ōkita Saburo (b. Nov. 3, 1914, Dairen [now Lü-ta], Manchuria, China—d. Feb 9, 1993, Tokyo, Japan), Japanese economist and government official who was instrumental in developing the plan that doubled Japan's national income in less than 10 years during the 1960s.

After graduating from Tokyo Imperial University (now the University of Tokyo), Ōkita in 1937 joined the Ministry of Posts as an engineer. He became chief of the research section of the Economic Stabilization Board in 1947, chief of the economic cooperation unit of the Economic Planning Agency (EPA) in 1953, director general of the EPA's planning bureau in 1957, and director general of the EPA's development bureau in 1962. In these posts Ōkita was instrumental in developing the theoretical framework for the economic plan of Prime Minister Ikeda Hayato's government (1960–64) that greatly accelerated the economic growth of postwar Japan.

Ōkita became president of the Japan Economic Research Centre in 1964 and served as its chairman from 1973 to 1979. He served as minister of foreign affairs from 1979 to 1980 and subsequently continued to act as one of the leading academic spokesmen for Japan. Among his numerous books on economic planning and development are *The Future of Japan's Economy* (1960), *Economic Planning* (1962), *Future Vision for the Japanese Econ-*

omy (1968), and *Japan and the World Economy* (1975).

Oklahoma, constituent state of the United States of America, lying in the south-central United States. It is bounded on the north by Kansas and Colorado, on the east by Missouri and Arkansas, on the south by Texas, and on the west by Texas and New Mexico. The capital is Oklahoma City.

A brief treatment of Oklahoma follows. For full treatment, *see* MACROPAEDIA: United States of America: *Oklahoma.*

There is evidence of habitation in Oklahoma by hunters of the Clovis and Folsom American Indian cultures as much as 15,000 years ago. Between AD 500 and 1300 a sophisticated culture that produced pottery, textiles, sculpture, and metalware existed. A period of decline set in that was followed by the expedition of Francisco Vázquez de Coronado into the area in 1541. Spanish control lasted until 1800, when the area passed to the French, then, three years later, to the United States as part of the Louisiana Purchase. In 1828 the U.S. Congress reserved Oklahoma for Indians, and by 1880 more than 60 tribes had joined the local ones in what was known as Indian Territory. Treaties of annexation to the Confederate States of America that had been signed by the Five Civilized Tribes led to increased federal intervention in the Indian Territory after 1865. In 1889 in recognition of an unstoppable migration of whites there, Congress opened up parts of the Indian Territory to non-Indian settlement. In 1907 what was left of the Indian Territory joined with the Oklahoma Territory (established 1890) to become the state of Oklahoma, entering the Union as the 46th state.

Three of the nation's large physical features extend into or across the state: the Interior Highlands in the east, the Coastal Plain (a northward extension from Texas and the Gulf of Mexico) in the south, and the Interior Plains elsewhere. A mountainous subregion in the south of the state is characterized by rough topography and thin soils. To the northeast is the Ozark Plateau with its scenic but rough terrain. Central Oklahoma alternates between hill and plain, and in the west the hills are capped by layers of white gypsum. The drainage pattern slopes from an elevation of 5,000 feet (1,500 m) in the northwest to 500 feet (150 m) in the southeast. The northern and central parts of the state are drained principally by the Arkansas River and its tributaries; the Red River drains the state along its southern border. Rainfall varies from more than 45 inches (1,140 mm) in the southeast to less than 20 inches (510 mm) in the western Panhandle. Oklahoma's weather is normally pleasant with an average annual temperature of about 60° F (15.5° C). No region is free from wind, and the entire state is subject to thunderstorms, blizzards, and tornadoes.

Oklahoma's population is extremely diverse. American Indians, though only 8 percent of the total population, are, in absolute numbers, the second largest Indian population in all the states. Blacks are about 7 percent of the population. The mining boom of the 1870s brought Italians, Greeks, Welsh, Poles, and Russians into the area. Immigrants have also come from China, Japan, Mexico, England, France, Canada, and Vietnam. Most of these groups have assimilated into a typically south-central American culture, where Southern Baptists and United Methodists predominate. Oklahoma's population is two-thirds urban. Its vital statistics follow closely the national averages, but its population growth of 18 percent between 1970 and 1980 was well above the national average, largely owing to immigration from other areas of the country. Its population growth rate was well below the national average between 1980 and 1990, however.

Oklahoma's receipts from livestock (mostly cattle) and livestock products are double that of crops. The major crops include wheat, hay, cotton, sorghum, and peanuts (groundnuts). Oklahoma ranks high nationally in the value of mineral production, with natural gas, petroleum, coal, and stone its major products. Timber resources are also important. In other respects, however, Oklahoma remains an economic satellite of the industrial North and East. Only about one-tenth of the labour force is engaged in manufacturing. Machinery, fabricated metal products, rubber, and plastic are the main manufactured products.

Oklahoma is well served by road and rail. Intricate networks of pipelines transport the state's petroleum products. A relatively new addition to the transportation system is a barge system linking the state's second largest city, Tulsa, to the Gulf of Mexico by way of locks and dams on the Arkansas River.

In recognition of its Indian and Wild West heritage, Oklahoma boasts the National Hall of Fame for Famous American Indians, the Southern Plains Indian Museum and Crafts Center, and the National Cowboy Hall of Fame and Western Heritage Center. The state has numerous daily newspapers, radio stations, and television stations. The leading state-sponsored universities of Oklahoma are located at Norman and Stillwater. Area 69,903 square miles (181,049 square km). Pop. (2000) 3,450,654.

Oklahoma City, city, capital of Oklahoma, U.S., and seat of Oklahoma county. It lies along the North Canadian River near the state's centre. Through annexations it has become one of the nation's largest cities in land area (more than 600 square miles [1,550 square km]).

Born of the "Run of '89," it came into being on April 22, 1889, when approximately 10,000 homesteaders congregated at Oklahoma Station (a stop established in 1887 on the Santa Fe Railway) to stake out land claims in central Oklahoma. A provisional town government was organized at a mass meeting in May 1889, but it was not until May 2, 1890, with the organization of the Oklahoma Territory, that official incorporation came. While the name Oklahoma City was in popular use from the city's beginning, the U.S. Post Office did not adopt the name until 1923. The city developed as a distribution point for crops and cattle; its designation as the state capital in 1910 stimulated its growth. Meat-packing plants were established, and, with the arrival of more railroads, wholesale trade increased. Now a major transportation centre, it is the chief marketing and processing point for the state's vast livestock industry and a shipping point for cotton, wheat, and cattle. The first oil well in the Oklahoma City pool came in on Dec. 4, 1928. At one time about 1,400 wells were producing oil within the city limits, including some on the state capitol grounds. By the late 20th century the number had dropped to a few hundred.

The city has become one of the nation's foremost aviation centres with Tinker Air Force Base (a large logistics and communications base) and the Federal Aviation Administration's Aeronautical Center for training in air safety and airport administration. The city's highly diversified manufactures include petroleum products, executive aircraft, oil-field machinery, electronic equipment, and fabricated steel. Oklahoma City University was founded in 1904, Oklahoma Christian University of Science and Arts in 1950, and Oklahoma State University–Oklahoma City in 1961.

Myriad Botanical Gardens, Oklahoma City, Okla.

Steve Vidler/SuperStock

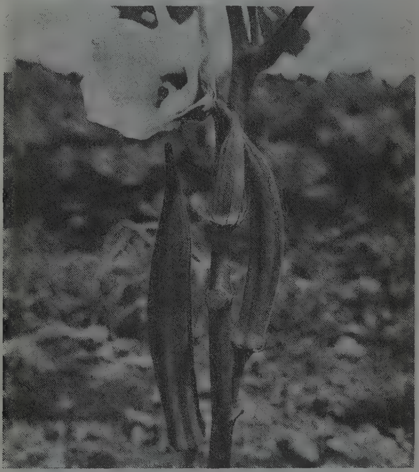
Oklahoma City is the home of the National Cowboy Hall of Fame and Western Heritage Center and the National Softball Hall of Fame and Museum. The Oklahoma State Museum of History has an outstanding collection of American Indian archives. The State Fair of Oklahoma is held in the city each September, and the State Fair Park is the scene of the International Finals Rodeo in January. The Tunnel, built in the 1970s as part of a program to revive the downtown area, is a broad subterranean concourse, four blocks long, connecting downtown buildings and lined with shops and restaurants. The downtown revitalization program continued with the creation of Myriad Gardens, a 12-acre (5-hectare) recreational park with gardens, an amphitheatre, and the seven-story Crystal Bridge Tropical Conservatory. Oklahoma City became the site of one of the deadliest terrorist incidents ever to occur in the United States on April 19, 1995, when a truck bomb destroyed part of the Alfred P. Murrah Federal Building in the downtown area, leaving 168 people dead and more than 500 injured. Pop. (2000) city, 506,132; Oklahoma City MSA, 1,083,346.

Oklahoma City Zoo, zoo opened in 1908 in Oklahoma City, Okla., U.S., which maintains one of the finest collections of antelopes and other horned ungulates in North America. The National Antivenin Index for snakebite emergencies is also based there. The 110-acre (46-hectare) zoo has about 2,800 specimens of more than 500 species, among which are found a herd of rare markhor goats and breeding colonies of golden lion marmosets.

Okmulgee, city, seat (1907) of Okmulgee county, east-central Oklahoma, U.S. It lies near the Deep Fork of the North Canadian River, south of Tulsa. Its name (meaning "bubbling water") comes from a Creek Indian town in Alabama. It was the capital of the Creek Nation from 1868 until Oklahoma achieved statehood in 1907.

Settled by whites about 1889, Okmulgee boomed after the discovery of oil in 1904 and is now a commercial and industrial centre for oil and gas production and agriculture (pecans, cotton, corn [maize], cattle). The manufacture of oil-field equipment and glass is also important. The Oklahoma State University—Okmulgee (1946) is one of the largest U.S. technical colleges. Okmulgee–Dripping Springs State Park is to the west. Inc. 1908. Pop. (2000) 13,022.

okra (*Hibiscus,* or *Abelmoschus, esculentus*), herbaceous, hairy, annual plant of the mallow family (Malvaceae). It is native to the tropics of the Eastern Hemisphere and is widely cultivated or naturalized in the tropics and subtropics of the Western Hemisphere for its edible fruit. The leaves are heart-shaped and three- to five-lobed; the flowers are yellow with a crimson centre. The fruit or pod, hairy at the base, is a tapering, 10-angled capsule, 10–25 cm (4–10 inches) in length (except in the dwarf varieties), that contains numerous oval, dark-coloured seeds. Only the tender, unripe fruit is eaten. It may be prepared like asparagus, sauteed, or pickled, and it is also an ingredient in various stews and in the gumbos of the southern United States; the large amount of mucilage (gelatinous substance) it contains makes it useful as a thickener for broths and soups. The fruit is grown on a large scale in the vicinity of Istanbul. In some countries the seeds are used as a substitute for coffee. The leaves and immature fruit long have been popular in the East for use in poultices to relieve pain.


Okra (*Hibiscus esculentus*, or *Abelmoschus esculentus*)
Derek Fell

Okrika, town and port, Rivers State, southern Nigeria. It lies on the north bank of the Bonny River and on Okrika Island. Okrika lies 35 miles (56 km) upstream from the Bight of Bonny and can be reached by vessels of a draft of 29 feet (9 m) or less. Formerly a small fishing village of the Ijaw (Ijo) people in the mangrove swamps of the eastern Niger River delta, it became the capital of the Okrika kingdom in the early 17th century and actively dealt in slaves. Although it served as a palm-oil port after the abolition of the slave trade in the 1830s, it was less important than either Bonny (18 miles south) or Opobo (32 miles east-southeast). Completely eclipsed in 1912 by Port Harcourt, Okrika was not revived as a commercial port until 1965, when the nearby Alesa-Eleme oil refinery was completed and pipelines were built to a jetty on Okrika Island. Refined petroleum products are Okrika's only significant exports. The town has considerable local trade in fish, oil-palm produce, locally processed salt, cassava, taro, plantains, and yams. Pop. (1991 est.) 48,610.

Oktoberfest, annual festival held in Munich, Ger., lasting two weeks and ending on the first Sunday in October. The festival originated as a horse race celebrating the marriage of the crown prince of Bavaria, who later became King Louis I, to Princess Therese von Sachsen-Hildburghausen on Oct. 12, 1810. The following year, the race was combined with the state agricultural fair, and in 1818 booths serving food and drink were first introduced. By the late 20th century these "booths" had developed into large temporary beer halls, complete with interior balconies, central bandstands, and seating capacities of about 3,000–5,000 each. Munich breweries each erect one of these plywood structures, where they serve a beer containing 4.5 percent alcohol, brewed specially for the occasion. Total beer consumption during the festival exceeds 44,500 hectolitres (1,175,000 gallons).

oktōēchos (music), group of eight melody types associated with early Byzantine liturgical chant. *See* ēchos.

Oktyabrsky, city, Bashkiriya, western Russia, on the right bank of the Ik River. Founded as a settlement in 1937, when extraction of oil began nearby in the Volga-Ural oil and natural-gas region, it was incorporated in 1946. A decline in petroleum production since the 1950s has resulted in a switch in the local economy to the manufacture of consumer goods, including low-voltage electrical equipment, clothing, footware, and ceramic tiles and pottery. There are several petroleum-related scientific institutes in the city, as well as a music school. Pop. (1993 est.) 107,000.

Ōkubo Toshimichi (b. Sept. 26, 1830, Kagoshima, Japan—d. May 14, 1878, Tokyo), Japanese politician and one of the samurai leaders who in 1868 overthrew the Tokugawa family, which had ruled Japan for 264 years, and restored the government of the emperor. After the Meiji Restoration he spent much of his career helping to establish Japan as a progressive nation.

Ōkubo early showed great political acumen and became one of the leading figures in the government of Satsuma, one of the largest and most powerful Japanese feudal domains and a hotbed of anti-Tokugawa sentiment. Although Chōshū, another powerful domain, shared the anti-Tokugawa stand of Satsuma, they were on unfriendly terms with each other. This situation was remedied in 1866, when Ōkubo and Saigō Takamori, another leading figure in the Satsuma government, agreed to an alliance with Chōshū in which both domains determined to cooperate against the Tokugawa.

Shortly thereafter the Tokugawa family was overthrown and Ōkubo became a dominant member of the new imperial government. After a tour of the West, he returned convinced of Japan's need for rapid economic development. To this end he supported the establishment of technical schools, the granting of government loans and subsidies to private business, and the building and managing of factories by the government.

In 1873 he broke with Saigō Takamori over policy toward Korea. Saigō supported a plan of conquest; Ōkubo argued that priority be given to internal Japanese reform and development. Ōkubo's views prevailed and were adhered to until 1894, long after his death. Saigō left the government and returned to his native Satsuma, where he led a short-lived rebellion of dissatisfied samurai. The rebellion was suppressed, but in 1878 Ōkubo was assassinated by discontented samurai.

Ōkuma Shigenobu, MARQUESS (Kōshaku) (b. March 11, 1838, Saga, Japan—d. Jan. 10, 1922, Tokyo), politician who twice served as prime minister of Japan (1898; 1914–16). He organized the Rikken Kaishintō ("Progressive Party") and founded Waseda University.

After receiving a conventional education, Ōkuma turned to Western studies and took the then-unusual step of learning English. After the Meiji Restoration, which reestablished the power of the emperor, leaders of the Meiji government broadened their base of support by adding representation from Saga. Ōkuma's ability and courage soon brought him an important role in government, at first specializing in finance. From 1869 to 1881 he was chiefly responsible for the modernization and reorganization of Japan's fiscal system.

When members of the government were asked to propose provisions of a new Japanese constitution, Ōkuma astounded his colleagues by the radical nature of his proposals. He suggested that elections be held the next year, that a parliament be convened, and that the British system of a cabinet responsible to parliament be established. Later that year he exposed corruption in proposed sales of government property in Hokkaido, one of the northernmost Japanese islands.

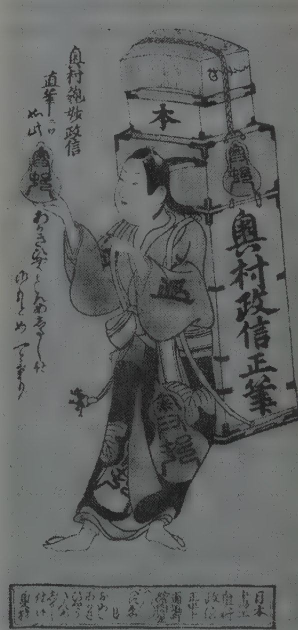
As a result of his opinions and actions Ōkuma was forced out of the government. But the movement for a constitution gained great impetus, and in response to popular pressure, the emperor promised that a constitution would be readied by 1890. The document was completed and promulgated a year earlier, on Feb. 1, 1889. Ōkuma formed a political party, the Kaishintō, that was oriented toward English parliamentary concepts.

After rejoining the government in 1888, Ōkuma twice served as foreign minister. In 1898 he and Itagaki Taisuke, the founder of Japan's first political party, the Jiyūtō ("Liberal Party"), joined forces and formed the Kenseitō ("Constitutional Party"). They formed a government in 1898 with Ōkuma as prime minister, but it foundered a few months later over patronage disputes.

Earlier, in 1882, Ōkuma had founded in Tokyo what soon after became known as Waseda University, one of the two leading private universities in Japan. He retired from politics in 1907 to devote all his time to Waseda, only to be recalled as prime minister in 1914. During this term Japan experienced a great economic boom, partly as a result of the increased trade brought by World War I. Japanese demands also led to a deterioration of relations with China. Ōkuma resigned in 1916 and retired from politics because of ill health.

Okumura Masanobu, original name OKUMURA SHINMYŌ, also called GENPACHI (b. 1686, Edo [now Tokyo], Japan—d. 1764/68, Edo), painter and publisher of illustrated books who introduced innovations in woodblock printing and print-design technique in Japan.

Masanobu taught himself painting and print designs by studying the works of Torii Kiyonobu (died 1729), thus starting his career as Torii's imitator. About 1724 Masanobu became a publisher of illustrated books and brought out his own works. He was one of the first to adopt Western perspective through the Chinese prints available in Edo at that time. He produced large-scale prints depicting such scenes as the inside of theatres, stores, and sumptuous living quarters. Such prints were called *uki-e* ("looming picture") prints for the foreshortening perspective effects they produced. He is also said to have founded the format of *habahiro hashira-e,* or wide, verti-



"Bookseller," woodblock print by Okumura Masanobu; in the Sakai Collection, Tokyo
By courtesy of the Sakai Collection, Tokyo

cal prints. His style was noted for its vividness with gentle and graceful lines, which also showed restraint and dignity.

Among Masanobu's numerous works dealing with diverse subject matters are the print "Inside the Theatre" and the paintings "Sound of the Koto" and "Oshichi Kichisaburō."

Okuni, also called IZUMO NO OKUNI (fl. early 17th century), Japanese dancer who is credited as being the founder of the Kabuki art form.

Okuni is said to have been an attendant at the Grand Shrine of Izumo in western Japan. She formed a troupe of female dancers who in 1603 gave a highly popular performance of dances and light sketches on a dry riverbed in Kyōto. The company's lusty and unrestrained dance dramas soon became known throughout Japan—the style acquiring the name Okuni Kabuki—and other troupes of female dancers were formed.

Okuni's company and the newer groups normally had the patronage of the nobility; but their appeal was directed toward ordinary townspeople, and the themes of their dramas and dances were taken from everyday life. The popularity of *onna* ("women's") Kabuki remained high until it was officially banned in 1629 by the shogun (military ruler), who thought that the prostitution practiced by many of the dancers was becoming too widespread.

Ōkuninushi, in full ŌKUNINUSHI NO MIKOTA, in the mythology of the Izumo branch of Shintō in Japan, the central hero, a son-in-law of the storm god, Susanoo.

Before becoming "Master of the Great Land," Ōkuninushi underwent a series of ordeals, mainly at the hands of his many mischievous brothers. His compassionate advice to the suffering white hare of Inaba (who had been stripped of his fur by a crocodile) was rewarded by the hare, who helped to arrange his marriage with Yakami, the princess of Inaba. His chief consort was Princess Suseri, the daughter of Susanoo. They made their escape from Susanoo's palace in the netherworld when Ōkuninushi tied the storm god's hair to the rafters while he slept. Ōkuninushi took with him the storm god's most precious possessions: his sword, lute, and bow and arrows. The lute brushed against a tree as it was being carried away and woke Susanoo, who followed in pursuit as far as the pass between the land of light and the land of darkness, then relented and forgave the couple.

Ōkuninushi then commenced to build the world with the help of the dwarf deity Sukunahikona. The two together formulated the arts of medicine and means of controlling disasters caused by birds and insects. He continued to rule Izumo until the appearance of the divine grandchild, Ninigi, when he turned over political rule to him while retaining control of "secret," or religious, affairs. In modern Japanese folk belief he is venerated as a god who heals and who makes marriages happy.

Ōkura Kihachirō (b. Oct. 23, 1837, Shibata, Japan—d. April 5, 1928, Tokyo), founder of one of the largest *zaibatsu,* or gigantic industrial-financial combines that dominated the Japanese economy throughout the late 19th and early 20th centuries.

Abandoning his traditional family business, Ōkura became a weapons dealer in the turbulent period preceding the Meiji Restoration, the 1868 coup d'etat that overthrew the feudal Tokugawa regime in Japan. He then formed the Ōkura Company, which became one of the first businesses to engage in foreign trade. Under Ōkura's leadership the company later branched out into mining and industrial enterprises. In his later years Ōkura, who had extended his enterprises to the mainland, became a philanthropist and a promoter of Sino-Japanese friendship.

Olaf, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Danish	Olav
Norwegian	Olav
Swedish	Olav
Old Swedish	Olof

DENMARK

•**Olaf III** HAAKONSSON: *see* Olaf IV Haakonsson (Norway).

NORTHUMBRIA

•**Olaf** GUTHFRITHSON, also called OLAF GODFREYSON, Olaf also spelled ANLAF (d. 941, Tyningham, Scot.), king of Northumbria and of Dublin. Olaf was the son of Guthfrith (or Godfrey), king of Dublin. He is often confused with Olaf Sihtricson.

Olaf Guthfrithson became king of Dublin in 934 and was in England in 937, where he took part in the Battle of Brunanburh against Aethelstan. After this event he returned to Ireland, but he appears to have acted for a very short time as joint king of Northumbria with Olaf Sihtricson. It is possible that he was the "Olaf of Ireland" who was recalled to England by the Northumbrians after Aethelstan's death, but both the Olafs appear to have accepted the invitation. He was killed at Tyningham near Dunbar.

•**Olaf** SIHTRICSON, byname (in sagas) OLAF THE RED, or OLAF CUARAN, Olaf also spelled ANLAF (d. 981?, Iona?), king of the Danish kingdoms of Northumbria and of Dublin.

He was the son of Sihtric, king of Deira, and was related to the English king Aethelstan. When Sihtric died about 927 Aethelstan annexed Deira, and Olaf took refuge in Scotland and in Ireland until 937, when he was one of the leaders of the formidable league of princes that was destroyed by Aethelstan at the famous Battle of Brunanburh. Again he sought a home among his kinsfolk in Ireland, but just after Aethelstan's death in 940 he or Olaf Guthfrithson (*q.v.*) was recalled to England by the Northumbrians. Both crossed over, and in 941 the new English king, Edmund, gave up Deira to the former. The peace between the English and Danes did not, however, last long. Wulfstan, archbishop of York, sided with Olaf; but in 944 Olaf was driven from Northumbria by Edmund, and crossing to Ireland, Olaf ruled over the Danish kingdom of Dublin. From 949 to 952 he was again king of Northumbria, until he was expelled once more (this time by Erik Bloodaxe), and he passed the remainder of his active life in warfare in Ireland. But in 980 his dominion was shattered by the defeat of the Danes at the Battle of Tara. He went to Iona, where he died probably in 981, although one dubious account says he was in Dublin in 994.

NORWAY

•**Olaf I** TRYGGVASON (b. *c.* 964—d. *c.* 1000), Viking king of Norway (995–*c.* 1000), much celebrated in Scandinavian literature, who made the first effective effort to Christianize Norway.

Olaf, the great-grandson of the Norwegian king Harald I Fairhair and the son of Tryggvi Olafsson, a chieftain in southeastern Norway, was born soon after his father was killed by the Norwegian ruler Harald II Graycloak. According to legend, Olaf fled with his mother, Astrid, to the court of St. Vladimir, grand prince of Kiev and of all Russia, and was trained as a Viking warrior. In 991 he joined in the Viking attacks on England, which were resumed with the accession of Ethelred II the Unready to the English throne in 978. Ethelred sued for peace in 991, agreeing to pay large sums in tribute, and again when Olaf invaded with the Danish king Sweyn I Forkbeard in 994.

Already a Christian, Olaf was confirmed at Andover (in modern Hampshire) in 994, with Ethelred, with whom he had been reconciled, as his godfather. Learning of the growing revolt against the Norwegian king Haakon the Great, Olaf returned to Norway and was accepted as king on Haakon's death in 995. He forcefully imposed Christianity on the areas under his control, the coast and the western islands, but had little influence in the interior. By commissioning missionaries and baptizing visiting dignitaries, Olaf was able to introduce Christianity to the Shetland, Faroe, and Orkney islands and to Iceland and Greenland. (Christianity was adopted by the Icelandic parliament [Althing] about 1000). Despite his religious zeal, however, he failed to establish lasting religious (or administrative) institutions in Norway.

Olaf met his death in the Battle of Svolder (*c.* 1000) at the hands of the Danish king Sweyn I, the Swedish king Olaf Skötkonung, and Eric the Norwegian, earl of Lade. The battle is often retold in medieval Scandinavian poems. After his death large portions of Norway reverted to foreign rule.

Olaf II HARALDSSON, also called SAINT OLAF, Norwegian HELLIG-OLAV (b. *c.* 995—d. July 29, 1030, Stiklestad, Norway; feast day July 29), the first effective king of all Norway and the country's patron saint, who achieved a 12-year respite from Danish domination and extensively increased the acceptance of Christianity. His religious code of 1024 is considered to represent Norway's first national legislation.

The son of the lord Harald Grenske and a descendant of the Norwegian ruler Harald I Fairhair, Olaf was reared as a pagan and became a Viking warrior in the Baltic region. He fought against the English in 1009–11 but assisted the English ruler Ethelred (Aethelred) II the Unready against the Danes in 1013. When the Danish king Sweyn (Svein) I gained the advantage in England, Olaf went to Spain and also to France, where he was baptized (1013).

Returning to Norway in 1015, Olaf conquered territory that had previously been held by Denmark, Sweden, and the Norwegian earl Haakon of Lade; by 1016 he had consolidated his rule in all Norway. In the succeeding 12 years he built his base of support among the aristocracy in the interior and pressed relentlessly for the acceptance of Christianity, using missionaries he brought from England. The Church of Norway may be dated from 1024, when Olaf and his ecclesiastical adviser, Bishop Grimkell, presented a religious code at Moster.

Olaf resolved his conflict with the Swedish king Olaf Skötkonung by 1019 and joined forces with the king's son Anund Jakob when Canute, king of England and Denmark, threatened to conquer Norway. Canute's control of the trade routes to the west of Norway, and the prospect of his ruling more indirectly than Olaf had done, won the support of leading Norwegian chieftains. Canute forced Olaf to flee to Russia (1028), where the Norwegian ruler took refuge with his Swedish wife's relatives at Kiev.

Olaf attempted to reconquer Norway in 1030 with help from Anund Jakob but was defeated by a superior Norwegian peasant and Danish army in the Battle of Stiklestad (1030), one of the most celebrated battles in ancient Norse history. Olaf's popularity, his church work, and the aura of legend that surrounded his death, which was supposedly accompanied by miracles, led to his canonization in 1031. His popularity spread rapidly; churches and shrines were constructed in his honour in England, Sweden, and Rome. He was the last

Western saint accepted by the Eastern Orthodox church.

• **Olaf III** HARALDSSON, byname OLAF THE QUIET, Norwegian OLAV KYRRE (d. 1093, Norway), king of Norway (1066–93) who guided the nation through one of its most prosperous periods, maintaining an extended peace rare in medieval Norwegian history. He also strengthened the organization of the Norwegian church.

A son of King Harald III Hardraade, Olaf fought in the unsuccessful Norwegian invasion of England (1066) in which his father was killed. He subsequently sued for peace with the English king Harold II and returned to Norway to rule jointly with his brother, Magnus II; he became sole monarch on Magnus' death in 1069. In 1068 he concluded a peace treaty with the Danish king Sweyn (Svein) II, by which the Danish king gave up his plan to conquer Norway, and initiated a 25-year period of peace.

Olaf worked to give the Norwegian church a more stable organization, making peace with Pope Gregory VII and Adalbert (Adelbert), archbishop of Bremen and vicar for the Scandinavian countries, who had been an enemy of Olaf's father. Although he attempted to follow the organizational model of the continental churches, the Norwegian church was less influenced by Rome, and Olaf maintained personal control over the nation's clergy.

Olaf's granting of permanent areas to the four dioceses of the country encouraged urban growth. He built a number of churches and founded several towns, including the city of Bergen (*c.* 1070–75), which soon became an important trading centre. His reign also saw the introduction to Norway of the manners and culture of the continental aristocracy.

• **Olaf (IV)** MAGNUSSON (b. *c.* 1099—d. 1115), king of Norway (1103–15), illegitimate son of King Magnus III Barefoot.

On the death of his father in 1103, he was proclaimed king jointly with his elder brothers, Eystein I and Sigurd, who administered the young Olaf's share of the kingdom until his early death. He is sometimes not counted in regnal lists of Norway.

• **Olaf IV** HAAKONSSON, Norwegian OLAV HÅKONSSON (b. 1370—d. Aug. 3, 1387), king of Denmark (as Olaf III, 1376–87) and of Norway (1380–87). He was the son of Haakon VI and of Margaret (Margrete), daughter of Valdemar IV, king of Denmark.

After Valdemar's death in 1375, Olaf was elected (1376) king of Denmark and succeeded his father as king of Norway in 1380. The government of Norway was conducted by a state council, but power was largely in the hands of Olaf's mother, who planned to unite Norway, Sweden, and Denmark. Olaf attained his majority in 1385 but died two years later.

• **Olaf V,** Norwegian in full OLAV ALEXANDER EDWARD CHRISTIAN FREDERIK (b. July 2, 1903, Appleton House, near Sandringham, Norfolk, Eng.—d. Jan. 17, 1991, Oslo, Norway), king of Norway (1957–91), succeeding his father, King Haakon VII.

Olaf was educated at the Norwegian military academy and at the University of Oxford in England. As crown prince he was a celebrated athlete and sportsman, excelling at ski jumping and yachting. He won the gold medal in yachting in the 1928 Olympic Games in Amsterdam. In 1929 Olaf was married to Princess Martha of Sweden, who died in 1954. They had three children.

Olaf fled to England with the king and the government when Germany invaded Norway in 1940, and he was named head of the Norwegian armed forces in 1944. He returned a few months before the king in 1945, serving briefly as regent. He again became regent in 1955 when his father suffered an accident, serving in that capacity until Haakon's death in 1957. Like other constitutional monarchs, Olaf's duties were largely ceremonial.

Olaf V, 1973

Knudsens Fotosenter

SWEDEN

• **Olaf,** byname OLAF THE TAX KING, Old Swedish OLOF SKÖTKONUNG (d. 1022, Sweden), king of Sweden (990–1022) whose efforts to impose Christianity were frustrated by the leading non-Christian Swedish chieftains.

The son of King Erik the Victorious, Olaf opposed the development of a strong Norwegian state and joined Sweyn I Forkbeard, king of Denmark, and his allies in a victorious war against Norway in 1000. Olaf subsequently married his illegitimate daughter Holmfrith to the earl Sweyn, one of the Danish viceroys in Norway. Initially opposed to Olaf II Haraldsson, king of Norway, he later made peace with him and married his other illegitimate daughter, Astrid, to the Norwegian ruler. His legitimate daughter, Ingigerth, married Yaroslav I the Wise, grand prince of Kiev.

A committed Christian, Olaf was prevented by advocates of the native Norse religion, based at the temple at Uppsala, from personally enforcing conversion. Missionaries from many European countries, however, carried out the work of conversion. Olaf's life is described extensively in Icelandic sagas of the 13th century.

Ólafsfjördhur, town, northern Iceland. It lies on Ólafs Fjord, a small inlet indenting the western coastline of Eyja Fjord. Ólafsfjördhur is situated 39 miles (63 km) north of Akureyri, the largest northern city of Iceland, and 160 miles (257 km) northeast of Reykjavík, the country's capital. Ólafsfjördhur is a fishing port and herring-canning centre. Its houses and swimming pools are heated by local hot springs. The town is linked to other parts of the island by air and road. In nearby Karlsá is a memorial to the shipwright Eyvindur Jónsson (1678–1746), who is believed to have been the first Icelander to build seagoing vessels. Ólafsfjördhur received its municipal charter in 1944. Pop. (1992 est.) 1,205.

Ólafsson, Eggert (b. 1726, Snaefellsnes, Iceland—d. May 1768, at sea in Breida Bay off the northwest coast of Iceland), Icelandic poet and antiquarian, an outstanding figure in the history of Iceland's fight to preserve and revivify its language and culture.

Ólafsson was of an old farming family and took his bachelor's degree at the University of Copenhagen. His major interests lay in natural history. His great work *Reise igiennem Island,* 2 vol. (1772; *Travels in Iceland*), recorded a scientific and cultural survey he carried out in 1752–57.

His poetry, of historical rather than of literary interest, voices his burning zeal for a cultural and political renaissance of Iceland. His writing had a strong emotional appeal to his countrymen, heightened when he and his bride were drowned on their honeymoon journey home. He became an idealized father figure for later generations of young Icelandic patriots.

Olah, George A., in full GEORGE ANDREW OLAH (b. May 22, 1927, Budapest, Hung.), Hungarian-American chemist who won the 1994 Nobel Prize in Chemistry for work conducted in the early 1960s that isolated carbocations, which are positively charged, electron-deficient fragments of hydrocarbons.

In 1949 Olah received a doctorate from the Technical University of Budapest, where he taught until 1954. He worked at the Hungarian Academy of Sciences for two years before emigrating from Hungary during the revolution of 1956. He became a research scientist at the Dow Chemical Company in Canada (1957–64) and in Framingham, Mass., U.S. (1964–65). He was a professor at Case Western Reserve University, Cleveland, Ohio (1965–1977), before joining the faculty of the University of Southern California at Los Angeles, where he became director of the Loker Hydrocarbon Research Institute in 1980.

Although theoretically recognized for several decades as a common intermediate in many organic reactions, carbocations were unobservable because they were a short-lived, unstable class of compound. Olah was able to successfully disassemble, examine, and then recombine carbocations through the use of superacids and ultracold solvents. His breakthrough, announced in 1962, initiated a new branch of organic chemistry and led to the development of innovative carbon-based fuels and higher-octane gasoline.

ʿolam ha-ba (Hebrew: "the world to come"), in Jewish theology, either "the world after death" or the new creation or restoration of the world that is to follow the messianic millennium. Because this latter interpretation stemmed from the teachings and exhortations of the prophets, it was especially prevalent during the period of the Second Temple of Jerusalem (516 BC–AD 70). Whatever the interpretation of *ʿolam ha-ba,* it meant for Jews the end of uncertainty, miseries, and strife.

Jewish literature contrasts *ʿolam ha-ba* with *ʿolam ha-ze* ("this world"). The latter is a time to prove oneself worthy of participating in "the world to come."

ʿolam ha-ze (Hebrew: "this world"), in Jewish theology, present life on earth, as opposed to *ʿolam ha-ba* ("the world to come"). Though *ʿolam ha-ze* is full of misery and injustice, one's view of life is transformed by realizing—as the Mishna (code of Jewish law) explains—that "this life" is but an antechamber where one prepares oneself to be admitted to the banquet hall that is "the world to come."

Öland, island and *landskap* (province) in the Baltic Sea, *län* (county) of Kalmar, Sweden. It is connected to Kalmar on the Swedish mainland by a road bridge across Kalmar Sound. With an area of 519 square miles (1,344 square km), it is the largest Swedish island after Gotland. Administratively, Öland, together with the surrounding islets, forms the smallest of Sweden's traditional provinces. Its periphery of limestone and sand ridges encloses an almost barren tract of land. There are a few small streams and one lake, Hornsjön.

On the narrow, alluvial coastland, sugar beets, rye, and potatoes are grown, and there is some cattle raising. Local industries include quarrying, cement making, and sugar refining.

Beginning in 775, Öland frequently played a role in Scandinavian history, especially as a battleground in the wars between Denmark and Sweden. The island's only large town, Borgholm, contains the ruins of one of the finest castles and strongest fortresses in Sweden, dating from the 13th century or before. Pop. (1994 est.) *landskap,* 25,781.

Olathe, city, seat of Johnson county, northeastern Kansas, U.S., southwest of Kansas City. Founded in 1857 on the old Santa Fe Trail, its name probably comes from the Shawnee word for "beautiful." The town was raided by the guerrilla leader William C. Quantrill in 1862. Cowboy boots, electronic devices for aircraft, batteries, and machinery are the chief manufactures. Olathe is the site of the Kansas State School for the Deaf (1866) and of Mid-America Nazarene College (1966). Inc. 1868. Pop. (1991 est.) 63,797.

Olav (Danish, Norwegian, Swedish, etc., personal name): *see under* Olaf.

Olbers, Wilhelm, in full HEINRICH WILHELM MATTHÄUS OLBERS (b. Oct. 11, 1758, Arbergen, near Bremen, Ger.—d. March 2, 1840, Bremen), German astronomer and physician who discovered the asteroids (minor planets) Pallas and Vesta as well as five comets.

Olbers, detail from an engraving

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

In 1779 Olbers devised a new method of calculating the orbits of comets. Two years later he opened his medical practice in Bremen, where he equipped the upper portion of his house for use as an observatory and devoted the greater part of each night to astronomy.

He took a leading role in the search for a planet between Mars and Jupiter. In March 1802 he discovered Pallas and became convinced that asteroids are the broken-up remnants of a medium-sized planet that once orbited in the asteroid belt region.

In 1811 Olbers formed the theory that the tail of a comet always points away from the Sun because of pressure from the Sun's radiation. (In the 20th century, radiation pressure from light was demonstrated in the laboratory.) Four years later he discovered the object now known as Olbers' Comet. In 1832 he predicted from observations of Biela's Comet that the Earth would pass through its tail. The prediction caused much tumult in Europe, but no catastrophic effects were noticed during the passage.

Olbers also proposed what is known as Olbers' paradox.

Olbers' paradox, in cosmology, paradox relating to the problem of why the sky is dark at night. If the universe is endless and uniformly populated with luminous stars, then every line of sight must eventually terminate at the surface of a star. Hence, contrary to observation, this argument implies that the night sky should everywhere be bright, with no dark spaces between the stars. This paradox was discussed in 1823 by the German astronomer Heinrich Wilhelm Olbers, and its discovery is widely attributed to him. The problem was considered by earlier investigators and can be traced back to Johannes Kepler, who, in 1610, advanced it as an argument against the notion of a limitless universe containing an infinite number of stars. Various resolutions have been proposed at different times. If the assumptions are accepted, then the simplest resolution is that the average luminous lifetime of stars is far too short for light to have yet reached the Earth from very distant stars. In the context of an expanding universe, it can be argued similarly: the universe is too young for light to have reached the Earth from very distant regions.

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Olbia, town, Sassari *provincia,* northeastern Sardinia, Italy, on the Gulf of Olbia, an inlet of the Tyrrhenian Sea. Originating as the Greek colony of Olbia, it later passed to the Romans and was the scene in 259 BC of a Roman victory over the Carthaginian general Hanno. Largely rebuilt in 1198 by Pisan colonists, who called it Terranova Pausania (a name it retained until 1939), it was an important centre of the medieval *giudicato* (judiciary circuit, a territorial division) of Gallura, the capital of which, Tempio Pausania, lies inland. There are traces of Phoenician and Roman tombs, and the Pisan Romanesque Church of San Simplicio is notable.

Olbia is the principal Sardinian passenger port for connections with the Italian mainland at Civitavecchia, and trade, fishing, and cork working are important. The town is growing with the development of tourism on Sardinia's northeast coast. Pop. (1991 prelim.) mun., 40,600.

Olbrich, Joseph (Maria) (b. Nov. 22, 1867, Troppau, Silesia [modern Opava, Czech Republic]—d. Aug. 8, 1908, Düsseldorf, Ger.), German architect who was a cofounder of the Wiener Sezession, the Austrian manifestation of the Art Nouveau movement. Olbrich was a student of Otto Wagner, one of the founders of the modern architecture movement in Europe.

Olbrich, 1901

By courtesy of the Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

Olbrich designed the building in Vienna to house the exhibitions of the Sezession (1898–99). It has a blocklike simplicity, but floral Art Nouveau decoration was used on the metal cupola. In 1899 Olbrich was invited to join the artists' colony at Darmstadt established by Grand Duke Ernest Louis. He designed six of the houses there, as well as a central hall for meetings and studios, which shows the influence of the Scottish architect Charles Rennie Mackintosh. He also designed the Hochzeitsturm (1907; Marriage Tower) at Darmstadt, which had rounded, fingerlike projections on its roof suggestive of Art Nouveau but also had bands of windows denoting a distinctly modern trend.

Among Olbrich's last works were a house at Cologne-Marienburg (1908–09) and a department store in Düsseldorf (designed in 1906 and completed after his death).

Ol'chon Island (Russia): *see* Olkhon Island.

Olcott, Henry Steel (b. Aug. 2, 1832, Orange, N.J., U.S.—d. Feb. 17, 1907, Adyar, Madras, India), American author, attorney, philosopher, and cofounder of the Theosophical Society, a religious sect incorporating aspects of Buddhism, Brahmanism, and Christian esotericism.

Olcott was agricultural editor of the *New York Tribune* (1858–60), and with the rank of colonel he was special commissioner in the U.S. War and Navy departments (1863–66). He was admitted to the bar in 1866. With Helena Petrovna Blavatsky, William Q. Judge, and others he founded the Theosophical Society in 1875 and became its president. In 1878 he and Blavatsky visited India. The two settled there in 1879 and in 1882 established the permanent headquarters of the Theosophical Society of Adyar, Madras. He assisted Annie Besant in establishing the Central Hindu College at Vārānasi (Benares). With her, he expounded their Theosophist ideas in appearances in India and Ceylon. Urging educational advancement upon Ceylon Buddhists, he saw three colleges and 250 schools established as a result of his efforts. His acceptance by and influence on the Buddhists was far-reaching. Identified with Eastern philosophical thought, he also helped revive Hindu philosophy; a pandit conferred on him the sacred thread of the Brahman caste.

Olcott edited the *Theosophist* (1888–1907). His *Buddhist Catechism* (1881) was translated into many languages.

old age, also called SENESCENCE, in human beings, the final stage of the normal life span. Definitions of old age are not consistent with reference to biology, demography (conditions of mortality and morbidity), employment and retirement, and sociology. For statistical and public administrative purposes, however, old age is frequently defined as 60 or 65 years of age or older.

Old age has a dual definition. It is the last stage in the life processes of an individual, and it is an age group or generation comprising a segment of the oldest members of a population. The social aspects of old age are influenced by the relationship of the physiological effects of aging and the collective experiences and shared values of that generation to the particular organization of the society in which it exists.

There is no universally accepted age that is considered old among or within societies. Often discrepancies exist as to what age a society may consider old and what members in that society of that age and older may consider old. Moreover, biologists are not in agreement about the existence of an inherent biological cause for aging. However, presently in most Western countries, 60 or 65 is the age of eligibility for retirement and old-age social programs, although many countries and societies regard old age as occurring anywhere from the mid-40s to the 70s.

Social programs. State institutions to aid the elderly have existed in varying degrees since the time of the ancient Roman Empire. England in 1601 enacted the Poor Law, which recognized the state's responsibility to the aged, although programs were carried out by local church parishes. An amendment to this law in 1834 instituted workhouses for the poor and aged, and in 1925 England introduced social insurance for the aged regulated by statistical evaluations. In 1940 programs for the aged came under England's welfare state system.

In the 1880s Otto von Bismark in Germany introduced old-age pensions whose model was followed by most other western European countries. Today more than 100 nations have some form of social security program for the aged. The United States was one of the last countries to institute such programs. Not until the Social Security Act of 1935 was formulated to relieve hardships caused by the Great Depression were the elderly granted old-age pensions. For the most part, these state programs, while alleviating some burdens of aging, still do not bring older people to a level of income comparable to that of younger people.

Physiological effects. The physiological effects of aging differ widely among individuals. However, chronic ailments, especially aches and pains, are more prevalent than acute ailments, requiring older people to spend more time and money for medical problems than younger people. The rising cost of medical care has caused a growing concern among older people and societies, in general resulting in constant reevaluation and reform of institutions and programs designed to aid the elderly with these expenses.

In ancient Rome and medieval Europe the average life span is estimated to have been between 20 and 30 years. Life expectancy today has expanded in historically unprecedented proportions, greatly increasing the numbers of people who survive over the age of 65. Therefore, the instances of medical problems associated with aging, such as certain kinds of cancer and heart disease, have increased, giving rise to greater consideration, both in research and in programs, for accommodating this increase.

Certain aspects of sensory and perceptual skills, muscular strength, and certain kinds of memory tend to diminish with age, rendering older people unsuitable for some activities. There is, however, no conclusive evidence that intelligence deteriorates with age, but rather that it is more closely associated with education and standard of living. Sexual activity tends to decrease with age, but if an individual is healthy there is no age limit for its continuance.

Many of the myths surrounding the process of aging are being invalidated by increased studies in gerontology, but there still is not sufficient information to provide adequate conclusions.

Demographic and socioeconomic influences. In general the social status of an age group is related to its effective influence in its society, which is associated with that group's function in productivity. In agrarian societies the elderly have a status of respectability. Their life experiences and knowledge are regarded as valuable, especially in preliterate societies where knowledge is orally transmitted. The range of activities in these societies allows the elderly to continue to be productive members of their communities.

In industrialized nations the status of the elderly has altered as the socioeconomic conditions have changed, tending to reduce the status of the elderly as a society becomes more technologically oriented. Since physical disability is less a factor in productive capability in industrialized countries, this reduction in social status is thought to have been generated by several interrelated factors: the numbers of still able-bodied older workers outstripping the number of available employment opportunities, the decline in self-employment which allows a worker to gradually decrease activity with age, and the continual introduction of new technology requiring special training and education.

Although in certain fields old age is still considered an asset, particularly in the political arena, older people are increasingly being forced into retirement before their productive years are over, causing problems in their psychological adaptations to old age. Retirement is not regarded unfavourably in all instances, but its economic limitations tend to further remove older people from the realm of influence and raise problems in the extended use of leisure time and housing. As a consequence, financial preparation for retirement has become an increased concern for individuals and society.

Familial relationships tend to be the focus of the elderly's attention. However, as the family structure in industrialized countries has changed in the past 100 years from a unit encompassing several generations living in close proximity to self-contained nuclear families of only parents and young children, older people have become isolated from younger people and each other. Studies have shown that as a person ages he or she prefers to remain in the same locale. However, the tendency for young people in industrialized countries to be highly mobile has forced older people to decide whether to move to keep up with their families or to remain in neighbourhoods which also change, altering their familiar patterns of activity. Although most older people do live within an hour from their closest child, industrialized societies are faced with formulating programs to accommodate increasing numbers of older people who function independently of their families.

A significant factor in the social aspects of old age concerns the values and education of the generation itself. In industrialized countries especially, where changes occur more rapidly than in agrarian societies, a generation born 65 years ago may find that the dominant mores, expectations, definitions of the quality of life, and roles of older people have changed considerably by the time it reaches old age. Formal education, which usually takes place in the early years and forms collective opinions and mores, tends to enhance the difficulties in adapting to old age. However, resistance to change, which is often associated with the elderly, is being shown to be less an inability to change than a trend in older people to regard life with a tolerant attitude. Apparent passivity may actually be a choice based on experience, which has taught older people to perceive certain aspects of life as unchangeable. Adult education programs are beginning to close the generation gap; however, as each successive generation reaches old age, bringing with it its particular biases and preferences, new problems arise requiring new social accommodations.

Old Believer, Russian STAROVER, member of a group of Russian religious dissenters who refused to accept the liturgical reforms imposed upon the Russian Orthodox Church by the patriarch of Moscow Nikon (1652–58). Numbering millions of faithful in the 17th century, the Old Believers split into a number of different sects, of which several survived into modern times.

Patriarch Nikon faced the difficult problem of deciding on an authoritative source for the correction of the liturgical books in use in Russia. These books, used since the conversion of Rus to Christianity in 988, were literal translations from the Greek into Old Slavic. In the course of centuries, manuscript copies of the translations, which were sometimes inaccurate and obscure at the start, were further mutilated by the mistakes of the scribes. Reform was difficult, for there was no agreement as to where the "ideal" or "original" text was to be found. The option taken by Patriarch Nikon was to follow exactly the texts and practices of the Greek Church as they existed in 1652, the beginning of his reign, and to this effect he ordered the printing of new liturgical books following the Greek pattern. His decree also required the adoption in Russia of Greek usages, Greek forms of clerical dress, and a change in the manner of crossing oneself: three fingers were to be used instead of two. The reform, obligatory for all, was considered "necessary for salvation" and was supported by Tsar Alexis Romanov.

Opposition to Nikon's reforms was led by a group of Muscovite priests, notably the archpriest Avvakum Petrovich. Even after the deposition of Nikon (1658), who broached too strong a challenge to the Tsar's authority, a series of church councils culminating in that of 1666–67 officially endorsed the liturgical reforms and anathematized the dissenters. Several of them, including Avvakum, were executed.

The dissenters, sometimes called Raskolniki, were most numerous in the inaccessible regions of northern and eastern Russia (but later also in Moscow itself) and were important in the colonization of these remote areas. Opposed to all change, they strongly resisted the Western innovations introduced by Peter I, whom they regarded as Antichrist. Having no episcopal hierarchy, they split into two groups. One group, the Popovtsy (priestly sects), sought to attract ordained priests and were able to set up an episcopate in the 19th century. The other, the Bezpopovtsy (priestless sects), renounced priests and all sacraments, except Baptism. Many other sects developed out of these groups, some with practices considered extravagant.

The Old Believers benefitted from the edict of toleration (April 17, 1905), and most groups survived the Russian Revolution of 1917. Numerous branches of both the Popovtsy and the Bezpopovtsy succeeded in becoming registered and thus officially recognized by the Soviet state. The membership of one Moscow-centred Popovtsy group, the convention of Belaya Krinitsa, was estimated in the early 1970s at 800,000. Little is known, however, of the Old Believer settlements supposed to exist in Siberia, the Urals, Kazakhstan, and the Altai. Some groups exist elsewhere in Asia and in Brazil and the United States.

In 1971 the Council of the Russian Orthodox Church completely rescinded all the anathemas of the 17th century and recognized the full validity of the old rites.

Old Bones (racehorse): *see* Exterminator.

Old Calabar (Nigeria): *see* Calabar.

Old Castile, Spanish CASTILLA LA VIEJA, historic provincial region, north central Spain, generally including the limits reached by the kingdom of Castile in the 11th century. Touching the Bay of Biscay on the north, it is separated from New Castile (Castilla la Nueva), to the south, by the ranges of the Sierra de Guadarrama. In modern Spanish geographic terminology, Old Castile included the provinces of Ávila, Burgos, Logroño, Palencia, Santander, Segovia, Soria, and Valladolid. Its area was 25,523 sq mi (66,107 sq km). After 1979 about half the region was taken into the Castile-Leon (*q.v.*) autonomous community (region). *See also* entries on the individual provinces. For the region's history, *see* Castile.

Old Catholic church, any of the groups of Western Christians who believe themselves to maintain in complete loyalty the doctrine and traditions of the undivided church but who separated from the see of Rome after the first Vatican council of 1869–70.

Origins. The steady process of centralization in the see of Rome and in the person of the pope, which has marked the later history of the Christian church in the West, has naturally led to recurrent opposition. This has taken a variety of forms—for instance, conciliarism in the 15th century and Jansenism in the 17th. A new wave of opposition was released by the plans for the first Vatican Council and the promulgation of the doctrine of the infallibility of the pope in 1870 (*see* Vatican Council, First). There was widespread hostility to these plans, the most notable figure being the church historian J.J.I. von Döllinger (*q.v.*), who was one of the most outstanding Roman Catholic scholars of the period.

After the council, all the bishops of the opposition one by one gave in their adhesion to the new dogma. Döllinger remained obdurate and in time was excommunicated by name. He himself took no part in forming separatist churches, but it was largely as a result of his advice and guidance that Old Catholic churches came into being in a number of countries—Germany, Switzerland, Austria, and elsewhere. As no bishop had joined any of these groups, recourse was had to the Jansenist church in Holland, which had maintained a somewhat precarious existence in separation from Rome since the 18th century but had preserved an episcopal succession recognized by Rome as valid though irregular.

The first consecration of the new order was that of Joseph H. Reinkens, who was made bishop in Germany by a sympathetic bishop of the Jansenist Church of Holland, Bishop Heykamp of Deventer, on Aug. 11, 1873. Rather later and for similar reasons, though with a certain national emphasis, the Polish National Catholic Church came into being in the United States and Canada. The episcopal succession was transmitted to this church in 1897 by Bishop E. Herzog of Switzerland.

Organization. In 1889 the Union of Utrecht was formed, and the declaration of Utrecht, issued in that year by the Old Catholic bishops, is the charter of Old Catholic doctrine and polity. Adherents to this union are the Old Catholic Church of The Netherlands, the Old Catholic Church of Germany, the Christian Catholic Church of Switzerland, the Old Catholic Church of Austria, and the Polish National Catholic Church (largely Polish-American in membership). The Old Catholic churches in Poland, Czechoslovakia, and Yugoslavia suffered severely during and after World War II. The name "Old Catholic" is sometimes used of other small sects directed by *episcopi vagantes* (*see* episcopus vagans), or unrecognized bishops; but this is an inaccuracy.

The chief authority in the Old Catholic churches is the conference of bishops. The archbishop of Utrecht exercises a kind of honorary primacy. Each diocese has its synod, with full participation of both clergy and laity in every aspect of the life of the church, including the election of bishops.

Theological position. Döllinger at the start laid down the vocation of the Old Catholic churches in three propositions: (1) "to bear witness *for* the truth and *against* new-fangled errors, especially the disastrous and arbitrary development of new articles of the faith; (2) gradually to bring into being a Church which will be more closely conformed to the ancient undivided Church; (3) to serve as an instrument for a future great reunion of separated Christians and Churches."

Taking these principles as their basis, the Old Catholics deny that they teach anything which is contrary to the doctrine and traditions of the Roman Catholic Church. They accept the Scriptures, the Apostles' and Nicene creeds, and the dogmatic decisions of the first seven ecumenical councils. They uphold the conciliar basis of the church and accord a high place to tradition. They accept seven sacraments as of permanent obligation in the life of the church. The episcopate is accepted as a gift given by God to the church, in which all Catholic bishops share equally, having been admitted thereto by bishops who themselves stand in unbroken historical succession from the time of the Apostles.

Nevertheless, many differences in practice separate Old Catholics from Roman Catholics. By adopting in all countries the use of the vernacular in public worship, the Old Catholics accepted what at the time was regarded as one of the fundamental principles of the Protestant Reformation. Confession to God in the presence of a priest is not obligatory, and celibacy of the clergy was made optional in some Old Catholic churches.

Ecumenical relationships. The third of Döllinger's principles pledged the Old Catholics from the start to work persistently for Christian union. This was stressed at the first Bonn conference on Christian union, held in 1874, and was repeated at all the international Old Catholic congresses, held at intervals of roughly five years. The *Internationale Kirchliche Zeitschrift* (founded in 1893 as the *Internationale Theologische Zeitschrift*) renders unique service as a reliable and unprejudiced sourcebook on interchurch relationships throughout the world. In 1931, by the agreement of Bonn, full intercommunion was established between the Church of England and the Old Catholic churches; this was followed in 1946 by a similar agreement between the Polish National Catholic Church and the Protestant Episcopal Church in the United States. Most of the Anglican churches have accepted these agreements; through mutual participation in episcopal consecrations, rather more than half the Anglican episcopate in the world has the Old Catholic as well as the Anglican episcopal succession.

Old Catholic Church of The Netherlands, also called JANSENIST CHURCH OF HOLLAND, Dutch OUD-KATHOLIEKE KERK VAN NEDERLAND, small, independent Roman Catholic church in The Netherlands that dates from the early 18th century. A schism developed in the Roman Catholic church in Holland in 1702 when Petrus Codde, archbishop of Utrecht, was accused of heresy for suspected sympathy with Jansenism, a heresy emphasizing God's grace and predestination, which was condemned by Pope Alexander VII in 1656. Many of the Dutch clergy and laity remained loyal to Codde and left the Roman Catholic church. Several French Jansenists subsequently settled in Holland and joined the small group of Dutch Jansenists. In 1723 the church elected Cornelius Steenhoven as its bishop. He was subsequently consecrated by the missionary bishop of Babylon, Dominique-Marie Varlet, and thus the apostolic succession was maintained in the church.

Though never large, the church continued in Holland and became important in the Old Catholic movement after 1870, when many Roman Catholics disagreed with the decision concerning papal infallibility reached by the first Vatican Council. Groups that left the Roman Catholic church organized national Catholic churches in several countries and received consecration of their bishops from a bishop of the Jansenist Church of Holland.

In the 20th century the Old Catholic Church of The Netherlands has an archbishop (at Utrecht) and two bishops (at Deventer and Haarlem). The liturgy has been in the Dutch language since 1910, and in 1922 the requirement of clerical celibacy was discontinued. The archbishop of Utrecht presides at meetings of the Union of Utrecht, an organization formed in 1889 of all Old Catholic bishops, which is accepted as the highest authority for Old Catholics. In the late 20th century the Old Catholic Church of The Netherlands reported 12,000 members.

Old Church Slavonic language, also called OLD CHURCH SLAVIC, Slavic language based primarily on the Macedonian (South Slavic) dialects around Thessalonica (Thessaloníki). It was used in the 9th century by the missionaries Saints Cyril (Constantine) and Methodius, who were natives of Thessalonica, for preaching to the Moravian Slavs and for translating the Bible into Slavic. Old Church Slavonic was the first Slavic literary language and was written in two alphabets known as Glagolitic and Cyrillic (the invention of Glagolitic has been traditionally ascribed to St. Cyril). Old Church Slavonic was readily adopted in other Slavic regions, where, with local modifications, it remained the religious and literary language of Orthodox Slavs throughout the European Middle Ages.

The language as it appeared after the 12th century in its various local forms is known as Church Slavonic; this language has continued as a liturgical language into modern times. It continued to be written by the Serbs and Bulgarians until the 19th century and had significant influence on the modern Slavic languages, especially on the Russian literary language that grew out of a compromise style incorporating many Church Slavonic elements into the native Russian vernacular.

Old Comedy, initial phase of ancient Greek comedy (*c.* 5th century BC), known through the works of Aristophanes. Old Comedy plays are characterized by an exuberant and high-spirited satire of public persons and affairs. Composed of song, dance, personal invective, and buffoonery, the plays also include outspoken political criticism and comment on literary and philosophical topics. The plays, consisting of loosely related episodes, were first performed in Athens for the religious festival of Dionysus. They gradually took on a six-part structure: an introduction, in which the basic fantasy is explained and developed; the *parodos,* entry of the chorus; the contest, or *agon,* a ritualized debate between opposing principals, usually stock characters; the *parabasis,* in which the chorus addresses the audience on the topics of the day and hurls scurrilous criticism at prominent citizens; a series of farcical scenes; and a final banquet or wedding. The chorus often were dressed as animals, while the characters wore street dress and masks with grotesque features.

Old Comedy sometimes is called Aristophanic comedy, after its most famous exponent, whose 11 surviving plays include *The Clouds* (423 BC), a satire on the misuse of philosophical argument directed chiefly against Socrates, and *The Frogs* (405 BC), a satire on Greek drama directed chiefly against Euripides. Other Old Comedy writers include Cratinus, Crates, Pherecrates, and Eupolis.

Athens' defeat in the Peloponnesian War signaled the end of Old Comedy, because a sense of disillusionment with the heroes and gods who had played a prominent role in Old Comedy became marked.

Old Cordilleran culture, ancient North American culture of the Pacific Northwest that appeared about 9000 or 10,000 BC and persisted until about 5000 BC in some areas. Subsistence was based on hunting, fishing, and gathering. Simple willow-leaf-shaped, bipointed projectile points are characteristic artifacts.

Old Delhi, city that comprises part of the union territory of Delhi (*q.v.*).

Old English language, also called ANGLO-SAXON, language spoken and written in England before 1100; it is the ancestor of Middle English and Modern English. Scholars place Old English in the Anglo-Frisian group of West Germanic languages.

Four dialects of the Old English language are known: Northumbrian in northern England and southeastern Scotland; Mercian in central

England; Kentish in southeastern England; and West Saxon in southern and southwestern England. Mercian and Northumbrian are often classed together as the Anglian dialects. Most extant Old English writings are in the West Saxon dialect; the first great period of literary activity occurred during the reign of King Alfred the Great in the 9th century.

In contrast to Modern English, Old English had three genders (masculine, feminine, neuter) in the noun and adjective, and nouns, pronouns, and adjectives were inflected for case. Noun and adjective paradigms contained four cases—nominative, genitive, dative, and accusative—while pronouns also had forms for the instrumental case. Old English had a greater proportion of strong verbs (sometimes called irregular verbs in contemporary grammars) than does Modern English. Many verbs that were strong in Old English are weak (regular) verbs in Modern English (*e.g.,* Old English *helpan,* present infinitive of the verb *help; healp,* past singular; *hulpon,* past plural; *holpen,* past participle versus Modern English *help, helped, helped, helped,* respectively).

Old English script: *see* black letter.

Old English sheep dog, shaggy working dog developed in early 18th-century England and used primarily in driving sheep and cattle to market. A compact dog with a shuffling, bearlike gait, the dog stands 53 to 66 cm (21 to 26 inches) tall and generally weighs over 25 kg (55 pounds). Its dense coat is weather-resistant and long enough to cover the eyes, though it does not obscure vision. The coat may be gray or blue-gray, with or without white markings. The dog is often called "bobtail" because its tail is usually removed soon after birth.

Old English sheep dog
Sally Anne Thompson

Old Faithful, most famous, though not the highest, of all North American geysers, at the head of the Upper Geyser Basin in Yellowstone National Park, Wyoming, U.S. It was so named in 1870 by the Washburn-Langford-Doane Expedition because it seemed to spout "faithfully" every 65–70 minutes. Under continuous observation, however, it has been found that the eruptions occur quite irregularly, with intervals varying from as much as 33 to 148 minutes. About 10,000 gallons (45,000 litres) of hot water plus billowing steam are ejected at one eruption. Its fountainlike columns reach heights of about 170 feet (52 m) on calm, windless days and stand for approximately four minutes. Geologists place the age of the geyser at 200–300 years.

Old Farmer's Almanac: *see* Farmer's Almanac.

Old Glory (U.S. flag): *see* Stars and Stripes.

Old High German, any of the West Germanic dialects spoken in the highlands of southern Germany, Switzerland, and Austria until the end of the 11th century. High German differs most noticeably from the other West Germanic languages in its shift of the *p, t,* and *k* sounds to *ff, ss,* and *hh,* respectively, after vowels and to *pf, tz,* and, in Upper German, *kh* under most other conditions.

In addition to Alemannic (Swiss German) and Bavarian, which were the Upper German dialects of Old High German, a number of Franconian (Frankish) dialects also existed. Among them were East Franconian and Rhenish Franconian, spoken just north of the Upper German area, and the Central Franconian dialects, spoken along the Moselle and Rhine rivers to the northern borders of the High German speech area.

Important literary works in Old High German include Otfrid's 9th-century poem *Evangelienbuch* ("Book of the Gospels") in the South Rhenish Franconian dialect and the fragmentary 9th-century eschatological poem *Muspilli* in the Bavarian dialect. The *Hildebrandslied* ("Song of Hildebrand") fragment from the 8th century is written in an Upper German dialect but also includes Old Saxon elements. The language of Middle High German literature was descended mostly from Upper German dialects, while modern standard High German is descended mostly from the East Franconian dialect.

Old Kingdom, period of Egyptian history encompassing the 4th to the 8th dynasties and lasting from about 2575 to about 2130 BC. The Old Kingdom was the first of the three great periods of Egyptian civilization and was especially notable for the building of the pyramids, which served as royal burial places. The best-known archeological remains in Egypt are the 4th-dynasty Pyramids of Giza. These large structures symbolized the absolute sovereignty of Egypt's kings, but the decreasing size of later pyramids evinces the gradual lessening of the kings' power and the growth of a powerful provincial nobility. With the end of the 8th dynasty the Old Kingdom state collapsed. The period that followed is known as the First Intermediate Period (*c.* 2130–1938 BC).

Old Mālda (India): *see* Mālda.

old-man cactus, usually *Cephalocereus senilis,* a columnar species of cactus (family Cactaceae), native to central Mexico. Because of the wisps of whitish hair along its stem, it is a popular potted plant and grows well outdoors in Mediterranean climates. It usually attains 6 m (about 20 feet) before flowering and can grow to twice that height. Other attractive forms such as yellow old man, or woolly torch (*C. palmeri*), flower at about 60 cm (2 feet). The flat-faced flowers are produced from a mass of long wool and bristles capping the stem or bearding one side of it, depending on the species. Flowers are night-blooming in *C. senilis,* pink outside and white within.

Old-man cactus (*Cephalocereus senilis*); each plant has been bound around the middle to emphasize its human appearance.
Annan Photo Features

Other hairy cacti in cultivation include: golden old man (*C. chrysacanthus*), old woman (*Mammillaria hahniana*), Chilean old lady (*Neoporteria senilis*), and old man of the mountain (*Borzicactus trollii*).

Old Norse language, classical North Germanic language used from roughly 1150 to 1350. It is the literary language of the Icelandic sagas, skaldic poems, and *Edda*s. The term Old Norse embraces Old Norwegian as well as Old Icelandic, but it is sometimes used interchangeably with the latter term because Icelandic records of this period are more plentiful and of greater literary value than those in the other Scandinavian languages. In a wider sense, Old Norse is distinguishable from the other old Scandinavian languages of this period only by minor differences in the writing traditions.

Grammatically, the Old Norse language remained remarkably stable for 200 years. Like other older Germanic languages, it had a relatively free word order, although certain basic principles were adhered to, such as the finite verb in first or second position, and the object mostly following the verb. Nouns, pronouns, and adjectives were inflected for four cases, and verbs were inflected for tense, mood, person, and number. There were separate dual forms for pronouns only. Stress was placed on the first syllable of a word, and stressed syllables could be short, long, or "overlong."

Old Norse is the parent language of the three modern languages, Icelandic, Faroese, and Norwegian.

Old Point Comfort, historic spit and point, part of the city of Hampton (*q.v.*), southeastern Virginia, U.S. It lies at the southeast end of the peninsula between the James and York rivers and is at the entrance to Hampton Roads harbour, opposite Norfolk. Named Poynt Comfort by the colonists of Jamestown (1607) in thanks for the sheltered anchorage it furnished, it has been the site of fortifications since 1609. Fort George (built 1727–30) was destroyed by hurricane in 1749. Fort Monroe (completed 1834), a moated stone-walled structure, served during the American Civil War as a Union base of operations for General George B. McClellan's Peninsular Campaign (1862) and for expeditions against Confederate ports. Following the war, Jefferson Davis, former president of the Confederate States, was imprisoned there for two years. Old Point Comfort was a popular seaside resort in the 19th and early 20th centuries.

Old Pretender, the: *see* James Edward, the Old Pretender.

Old Prussian language, West Baltic language extinct since the 17th century; it was spoken in the former German area of East Prussia (now in Poland and Russia). The poorly attested Yotvingian dialect was closely related to Old Prussian.

Old Prussian preserved many archaic Baltic features that do not occur in the related East Baltic languages (Latvian, Lithuanian), among them the preservation of the final *-n* of the Proto-Baltic language (the ancestor of Old Prussian, Latvian, Lithuanian, and the other Baltic languages), the Proto-Baltic diphthongs *ai* and *ei,* and the use of neuter gender in nouns (East Baltic languages have only masculine and feminine gender). Old Prussian also contained many inflectional forms and vocabulary items unknown in East Baltic. Old Prussian had a position intermediate between East Baltic and the Slavic group.

Modern knowledge of Old Prussian is based primarily on a German-Prussian vocabulary, known as the Elbing vocabulary and compiled about 1300, and the three Old Prussian catechisms dating from the 16th century.

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Old Red Sandstone, thick sequence of Devonian rocks (formed from 408 to 360 million years ago) that are continental rather than marine in origin and occur in northwestern Europe. They have been extensively studied in Great Britain. The rocks were deposited in structural basins between the ranges of the Caledonian Mountains, which are also of the Devonian Period; great thicknesses, 11,000 m (37,000 feet) of sands and muds, slowly accumulated in these sinking basins. The sediments are poorly sorted and quite variable; sandstones that are cross-bedded, siltstones and shales that have mud cracks, and even raindrop impressions all occur. The sandstones are red, green, and gray, and the shales are gray. Plant fossils occur, and the fossil fauna is characterized by primitive, fishlike vertebrates, which are thought to have inhabited freshwater streams and rivers.

Old River (Belize): *see* Belize River.

Old Roman chant, repertory of liturgical melodies written in Rome between the 11th and the 13th century and discovered about 1890.

The earliest of the five manuscripts containing the chants (three graduals and two antiphonaries) dates from 1071, although the Roman tradition of worship can be traced at least as far back as the 8th century. The relationship between this repertory and the Gregorian poses some complicated and, as yet, unresolved problems. Liturgically, the two traditions are almost identical; the structure of the mass and the office are similar, and the texts given for the various services rarely disagree. It is the musical settings that are obviously different, although, in some cases, the Old Roman melody shares the same general contour of the corresponding Gregorian melody and may even be regarded as a variation of that chant. When the melodies of the Old Roman tradition were first published (*Paléographie Musicale,* 1891), they were described as a deteriorated and distorted Roman version of the Gregorian melodies. Dom Andoyer held an opposite view, however, writing (in 1912) that they were actually older than Gregorian and were simply preserved in the Old Roman tradition. The question was again raised in 1950 by Bruno Stäblein, a German musicologist, who held that the Old Roman tradition was sung at the time of Pope Gregory the Great (reigned 590–604) and was therefore the authentic Gregorian chant, whereas the so-called Gregorian body of song dated from the second half of the 7th century.

According to most recent theories, the two repertories represent variant rites developed in different locales, rather than coming from different historical periods. Helmut Hucke of Frankfurt University maintained that the Old Roman chant was the Roman rendition of Gregorian chant and that the latter originated in the Frankish kingdom with the introduction of the Roman liturgy during the empire of Pepin and Charlemagne. Hucke's position was supported by the late—and incomplete—adoption of the system of eight psalm tones into Old Roman chant. This system, related directly to the eight church modes, was first demonstrated in the Frankish empire (*c.* 800) and is considered to be one of the achievements of the Carolingian Renaissance. Thus, it is very probable that the Old Roman tradition, subjected to the powerful spread of Frankish culture, was replaced by Gregorian chant in Rome during the High Middle Ages.

Old Saint Peter's Basilica, first basilica of St. Peter's in Rome, a five-aisled basilican-plan church with apsed transept at the west end that was begun between 326 and 333 at the order of the Roman emperor Constantine and finished about 30 years later. The church was entered through an atrium called Paradise that enclosed a garden with fountains. From the atrium there were five doors into the body of the church. The nave was terminated by an arch with a mosaic of Constantine, accompanied by St. Peter, presenting a model of his church to Christ. On the clerestory walls, each pierced by 11 windows, were frescoes of the patriarchs, prophets, and Apostles and scenes from the Old and New Testaments. Old St. Peter's was torn down in the early 16th century and replaced by New St. Peter's (*see* Saint Peter's Basilica).

Old Saxon language, also called OLD LOW GERMAN, earliest recorded form of Low German, spoken by the Saxon tribes between the Rhine and Elbe rivers and between the North Sea and the Harz Mountains from the 9th until the 12th century. A distinctive characteristic of Old Saxon, shared with Old Frisian and Old English, is its preservation of the voiceless stops (*p, t, k*) common to all Germanic languages; in High German these stops were affricates (*pf, tz, kh*) or long fricatives (*ff, ss, hh*). The *Heliand,* a life of Christ in alliterative verse written about 830, and a fragment of a translation of Genesis are the most significant Old Saxon literary works that have survived, although a number of minor fragments also exist. The modern Low German dialects developed from Old Saxon. *See also* German language.

Old Stone Age: *see* Paleolithic Period.

Old Testament, also called HEBREW BIBLE, the set of sacred writings shared by Judaism and Christianity. The term Old Testament implies the Christian addition of a subsequent New Testament.

A brief treatment of the Old Testament follows. For a full treatment, *see* MACROPAEDIA: Biblical Literature.

In its general framework, the Old Testament is the account of God's dealing with the Jews as his chosen people. The first six books of the Old Testament narrate how the Israelites became a people and settled in the Promised Land. The following seven books continue their story in the Promised Land, describing the establishment and development of the monarchy and the messages of the prophets. The last 11 books contain poetry, theology, and some additional historical works. Throughout the Old Testament, the Jews' historical relation to God is conceived in reference to the ultimate redemption of all humanity. The Old Testament's profoundly monotheistic interpretation of human life and the universe as creations of God provides the basic structure of ideas in which both Judaism and Christianity exist. The term Old Testament was devised by a Christian, Melito of Sardis, about AD 170 to distinguish this part of the Bible from the New Testament. Except for a few passages in Aramaic, the Old Testament was written originally in Hebrew during the period from 1200 to 100 BC.

The Hebrew canon recognizes the following subdivisions of its three main divisions: (1) the Torah (*q.v.*), or Pentateuch, contains narratives combined with rules and instructions in Genesis, Exodus, Leviticus, Numbers, and Deuteronomy; (2) the Nevi'im (*q.v.*), or Prophets, is subdivided into the Former Prophets, with anecdotes about major Hebrew persons in the books of Joshua, Judges, Samuel, and Kings, and stories of the Latter Prophets exhorting Israel to return to God in Isaiah, Jeremiah, Ezekiel, and the Twelve Minor Prophets; and (3) the Ketuvim (*q.v.*), or Writings, with poetry—devotional and erotic—and theology and drama to be found in Psalms, Proverbs, Job, Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra-Nehemiah, and Chronicles.

The total number of books in the Hebrew canon is 24, the number of scrolls on which these works were written in ancient times. The Old Testament as adopted by Christianity numbers more works for the following reasons. The Roman Catholic canon, derived initially from the Greek-language Septuagint (*q.v.*) translation of the Hebrew Bible, absorbed a number of books that Jews and Protestants later determined were not canonical (*see* apocrypha); and Christians divided some of the original Hebrew works into two or more parts, specifically, Samuel, Kings, and Chronicles (two parts each), Ezra-Nehemiah (two separate books), and the Minor Prophets (12 separate books).

Old Vic, London theatre company, specializing in productions of Shakespeare, that eventually became the nucleus of the National Theatre.

The company's theatre building opened in 1818 as the Royal Coburg and produced mostly popular melodramas. In 1833 it was redecorated and renamed the Royal Victoria and became popularly known as the Old Vic. Under the management (1880–1912) of Emma Cons, a social reformer, the Old Vic was transformed into a temperance amusement hall known as the Royal Victoria Hall and Coffee Tavern, where musical concerts and scenes from Shakespeare and opera were performed. Lilian Baylis, Emma Cons's niece, assumed management of the theatre in 1912 and two years later presented the initial regular Shakespeare season. By 1918 the Old Vic was established as the only permanent Shakespearean theatre in London, and by 1923 all of Shakespeare's plays had been performed there. The Old Vic grew in stature during the 1920s and '30s under directors such as Andrew Leigh, Harcourt Williams, and Tyrone Guthrie.

The Old Vic theatre building was badly damaged during World War II, and when the company returned to London from wartime touring in 1944, it was housed in the New Theatre. Under the combined direction of Laurence Olivier, Ralph Richardson, and John Burrell, the Old Vic company presented memorable productions of Shakespeare's plays and other classics, including *Cyrano de Bergerac, Oedipus Rex, Love for Love,* and *Peer Gynt.* In 1946 the Old Vic School and the Young Vic, a company that performed for children, were established and housed in the Old Vic theatre. The company returned to its repaired original home in 1950, but the lack of space and adequate funds caused the school and the Young Vic to close in 1952. In 1963 the Old Vic company was dissolved, and the Old Vic theatre became the temporary home of the new National Theatre. The Young Vic was reconstituted in 1970, and by 1976 it had become an independent company.

Old World monkey, also called CATARRHINE, any of certain anthropoid primates of Africa and Asia, as distinguished from the New World monkeys (platyrrhines), which are found in Central and South America. The term may be used only for members of the family Cercopithecidae (guenons, baboons, and others), or it may also cover the families Hylobatidae (gibbons), Pongidae (apes), and Hominidae (human beings). Characteristics that generally distinguish the Old World monkeys from New World ones include close-set nostrils directed forward or down, bony ear passages, a nonprehensile tail, if any, and two premolars in each half of each jaw.

Oldcastle, Sir John (b. *c.* 1378, Herefordshire, Eng.—d. Dec. 14, 1417, London), distinguished soldier and martyred leader of the Lollards, a late medieval English sect derived from the teachings of John Wycliffe. He was an approximate model for 16th-century English dramatic characters, including Shakespeare's Falstaff.

The son of Sir Richard Oldcastle, he fought for England in the Scottish campaign of 1400 and during the Welsh wars gained the friendship of King Henry IV's son Henry, prince of Wales. By his marriage in 1408 to Joan, heiress of John, 3rd Lord Cobham, Oldcastle entered nobility and in 1409 was summoned to the House of Lords as a baron.

In 1413 he was indicted by a convocation, presided over by Archbishop Thomas Arundel of Canterbury, for maintaining both Lollard preachers and their opinions. His amicable relationship with the prince of Wales, now Henry V, earned him special consideration, but he failed to honour the king's appeals to submit and was brought to trial the same year. Unyielding in his views, he was convicted as a heretic but was granted a stay of execution by the king for 40 days and was imprisoned in the Tower of London. Within a month he escaped to find refuge with the Lollard bookseller William Fisher at Smithfield, where he conspired to kidnap the king at Kent while Lollards answered a summons to assemble at St. Giles's Fields, near London, the night of Jan. 9, 1414. The king was warned by his agents, and the small group of Lollards in assembly were captured or dispersed. Oldcastle again escaped, evading capture until November 1417. Parliament then reiterated his condemnation and penalty, and on December 14 he was hanged over a fire that consumed the gallows.

In *The Famous Victories of Henry the Fifth,* the anonymous source play for Shakespeare's *Henry IV,* Sir John appears briefly as a friend of Prince Hal (or Henry). Shakespeare kept the name Oldcastle for the first version of his play but later changed it to Falstaff. Shakespeare's Falstaff is considered to be more boisterous than Oldcastle had been in real life.

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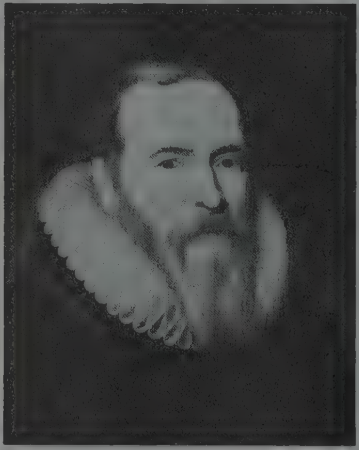
Oldenbarnevelt, Johan van (b. Sept. 14, 1547, Amersfoort, Spanish Netherlands [now in The Netherlands]—d. May 13, 1619, The Hague, Neth.), lawyer, statesman, and, after William I the Silent, the second founding father of an independent Netherlands. He mobilized Dutch forces under William's son Maurice and devised the anti-Spanish triple alliance with France and England (1596). In the Twelve Years' Truce (1609) he reaffirmed Holland's dominant role in the Dutch republic.

Early career. Oldenbarnevelt studied law at Louvain, Bourges, and Heidelberg (where his ultimate conversion to Protestantism first germinated) and, probably, Padua. After his return to the Netherlands he settled down as an *advocaat* ("counsel") at the Hof van Holland, roughly speaking, the court of appeal for the province of that name, established at The Hague.

When, in 1572, two of the Netherlands provinces, Holland and Zeeland, succeeded in shaking off the Spanish rule from Brussels, Oldenbarnevelt did not follow the Court of Appeal, which fled to Utrecht, but decided to throw in his lot with the movement of national liberation. He even took part in an attempt to relieve the besieged towns of Haarlem and Leiden. In 1576 he was appointed pensionary (strictly, legal adviser, but as a full-time job) of Rotterdam, an office that automatically implied membership of the provincial states (assemblies), and, when the national revolt had spread to the other provinces, frequent attendance at the States-General in Brussels or Antwerp. In 1578, when a total reconquest by the Spanish armies under the leadership of Alessandro Farnese, duke of Parma, threatened, Oldenbarnevelt was one of the negotiators of the Union of Utrecht (concluded January 1579), which was to serve as a kind of makeshift constitution for the United Provinces until 1795. During the negotiations, it became apparent that Oldenbarnevelt was aiming at securing for Holland the politically unassailable position to which the strategically all-but-unassailable province considered itself entitled after having borne the brunt of the revolt alone with Zeeland for nearly seven years. These activities also brought him into fairly close contact with William the Silent.



Oldenbarnevelt, detail of a painting by M.J. van Mierevelt; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

Political leadership. In 1586, two years after William's assassination, Oldenbarnevelt accepted the appointment by the States of Holland as the province's *landsadvocaat—i.e.,* the office that, after his downfall, was renamed *raadpensionaris* ("great pensionary"); in this office he became the real trustee of William the Silent's political inheritance. While the latter's son, Maurice of Nassau, a brilliant military commander, was in charge of the actual warfare in the field, it was Oldenbarnevelt who, at first in close collaboration with him, mobilized and coordinated the country's available energy and resources, thus making warfare possible. As one of these activities, he took an active part in the founding of the Dutch East India Company.

Although theoretically a servant of only one out of seven sovereign provinces, Oldenbarnevelt, who himself undertook several diplomatic missions to France and England, was virtually the union's foreign secretary. In this capacity, too, it was he who continued the work of William the Silent and succeeded in integrating the somewhat suspicious, politically unorthodox new commonwealth of rebels against their lawful overlord. In this respect, his greatest triumph was the conclusion of a full-fledged triple alliance with France and England in 1596.

Oldenbarnevelt's main achievement in the field of foreign policy was, however, the so-called Twelve Years' Truce, concluded in 1609 after long-protracted negotiations, by which the original national program of ousting the Spaniards from the whole of the Netherlands was virtually abandoned and the northern commonwealth of the seven provinces established as such.

On the other hand, it was also in this achievement that the all-pervading flaw in Oldenbarnevelt's position as the union's leading statesman became apparent—*i.e.,* the very circumstance that he was pledged by oath to only one out of those seven provinces of the ancient Netherlands that, as the saying was, "remained with the union," the province of Holland. Filling a vacuum created by the fact that the formerly predominant provinces, Brabant and Flanders, had been reconquered by the Spanish arms, Holland, a hitherto peripheral county, had become preeminent; it contributed close to 59 percent of the federal budget. Under those conditions, a large degree of "Hollandocentrism" or even of "Hollandism" appeared more or less inevitable, and the land advocate was its chief exponent and advocate within the union setup.

In the same way, the princes of Orange found themselves almost automatically cast in the role of prime exponents of the union conception, and it is in the light of this that the ensuing conflict between Oldenbarnevelt and Maurice becomes fundamentally understandable, even without a detailed examination of its multiple origins. In this context it is utterly irrelevant that, after his father's death, Maurice had been made stadtholder of Holland by Oldenbarnevelt and his political friends, with the express purpose of safeguarding the province's individuality and special position in the days (1586) when Robert Dudley, earl of Leicester, as governor-general, tried to impose his conception of centralized government on the various provinces.

Religious conflicts. During the Twelve Years' Truce, the latent conflict crystallized around its religious facets. The astonishing success of the Netherlands' independence movement was indissolubly connected with the fact that, sooner or later, all the provinces "remaining with the union" came to be ruled by Calvinist minorities for whom, short of renouncing their faith, there existed no possibility of reconciliation with the abjured ruler, Philip II of Spain. As for Oldenbarnevelt, like William the Silent, he too had accepted membership of the Reformed Church, but he and his fellow "regents" in Holland cherished the ideal of a church that was, though based on the Reformation in its Calvinist shape, sufficiently latitudinarian in its dogma to attract and satisfy all those who were willing to relinquish the Roman obedience. According to these rulers of Holland, the nation had rebelled against the centralizing and tyrannical tendencies of its Hispanicized overlord for the sake of freedom, including the freedom from inquisitorial practices, of which they were equally unwilling to accept the Calvinist Genevan as the Roman or Spanish brand. As seen by many theologians and preachers, on the other hand, the revolt had taken place for the sake of the Reformed religion in its most uncompromisingly strict dogmatic variety. When, on the perilous issue of predestination, the antithesis became polarized in a conflict between two professors of theology at Leiden—the strict Gomarus and the more moderate Arminius—Oldenbarnevelt and the majority of the voting towns in Holland, though not Amsterdam, favoured the Arminians against the bulk of the Calvinized masses, who were staunchly Gomarist or, as they were commonly called, Counter-Remonstrant. Paradoxically, Oldenbarnevelt and his adherents even had to safeguard the principle of tolerance by somewhat intolerant measures; those preachers who, in spite of various decrees to the purpose, remained stubbornly unwilling to refrain from preaching controversial sermons were dismissed and sometimes exiled.

The religious controversy was, moreover, inextricably interwoven with the antithesis of province versus union, the Counter-Remonstrant preachers consistently referring to their religion as the God-given "cement" that kept the union together. Translated into terms of actual politics, this meant that they wanted to convoke a "national"—*i.e.*, an interprovincial—synod trusting (as it turned out, wrongly) that it would establish a church triumphant on the Genevan model, completely independent from all civil authorities whose worthiness and consequently whose right to govern would be judged by the churchmen. For obvious reasons, the States of Holland, led by Oldenbarnevelt, considered a synod of this kind far too risky and withheld their consent to its meeting.

Disputes with Prince Maurice. Seen in retrospect, the climax announced itself when in July 1617 Prince Maurice sided openly, not to say defiantly, with the Counter-Remonstrants. This veiled declaration of war on Oldenbarnevelt and the Holland regents' party was answered by the so-called Sharp Resolution voted by the States of Holland on Aug. 4, 1617, which, among other things, encouraged the various towns in the province to recruit armed units of their own, not integrated in the federal army and not even subject to Maurice's command as the province's captain general. The states remained within their rights in taking such measures. It is understandable that a man like Maurice considered such measures as an intolerable violation of the union statute. Slow-moving tactician that he was, the prince spent no less than a whole year in reinforcing his position throughout the union, until suddenly, on Aug. 29, 1618, he took Oldenbarnevelt prisoner, together with some of his closest collaborators, chief among whom was his informal "crown prince," Hugo Grotius, then pensionary of Rotterdam.

Never in the course of Dutch history was the problem of union versus province more crudely manifest than when it materialized in the vexing question of how and by whom Oldenbarnevelt was to be tried for his life. His own thesis, unassailable at least in theory, was that, having exclusively acted as a civil servant of the sovereign province of Holland, he was responsible only to the judiciary of the province of Holland; his enemies, on the other hand, wanted to have him tried for felony against the union. As, however, no federal judiciary existed, the only possible expedient was to summon an extraordinary tribunal ad hoc; it consisted of 24 judges, by no means all of whom were qualified lawyers, and not a few of whom, besides being political opponents, were also personally antagonistic to Oldenbarnevelt. Even so, after more than half a year's imprisonment and interrogation, he was condemned to death not for high treason, for which public opinion had been carefully propagandized, but for the "subversion" of the country's religion and policy. In May 1619 he was beheaded on the Binnenhof, at The Hague. More than any other event in the country's history, his execution has continued to haunt Dutch historiography and even Dutch politics. (J.J.P.)

BIBLIOGRAPHY. J.L. Motley, *Life and Death of John of Barneveld, Advocate of Holland,* 2 vol. (1874), although it has enduring literary merits, displays extreme partiality. The book written against Motley by the Dutch historian and politician Groen van Prinsterer, *Maurice et Barnevelt* (1875), displays an equal but opposite bias. The authoritative biography is Jan den Tex, *Oldenbarnevelt,* 2 vol. (1973; originally published in Dutch, 5 vol., 1960–72).

Oldenburg, former German state, successively a countship, a duchy, a grand duchy, and a *Land* (state) before it became a *Regierungsbezirk* (administrative district) of Lower Saxony *Land* in West Germany in 1946. As a result of the administrative reorganization in 1977, Oldenburg became part of the Weser-Ems administrative district.

At its greatest extent, between 1854 and 1937, Oldenburg had an area of 2,480 square miles (6,423 square km), comprising the main body of the territory and two exclaves, Lübeck-Eutin (209 square miles [541 square km]) and Birkenfeld (194 square miles [502 square km]). At this time the main body of Oldenburg lay on the lowlands of the North Sea and was encircled landward by Hanover (Prussian from 1866), except for a short frontier in the east with Bremen. Its capital was Oldenburg on the lower Hunte River. Wilhelmshaven, bought by Prussia in 1853, was restored to Oldenburg in 1937, and Lübeck-Eutin and Birkenfeld were transferred to Schleswig-Holstein and the Prussian Rhine province, respectively.

From the early 12th century, a line of counts established themselves at Oldenburg, which developed into a city. Count Christian of Oldenburg was elected to the Danish throne in 1448; he was also king of Norway from 1450 and king of Sweden for a few years from 1457, and he acquired the duchy of Schleswig and the county of Holstein in 1460. In 1454 he ceded Oldenburg to his brother Gerhard, whose descendants acquired nearby lordships. For his neutrality in the Thirty Years' War, Count Anton Günther received from Emperor Ferdinand II the right to collect tolls from ships passing Elsfleth on the Weser. When Gerhard's line died out in 1667, the territory passed to the Danish crown. In 1773 Christian VII of Denmark ceded Oldenburg to his distant cousin Paul, the future emperor of Russia, in exchange for the latter's title to Holstein-Gottorp. Paul soon ceded it to his cousin Frederick Augustus, who held the bishopric of Lübeck and who was then created duke of Oldenburg by the Holy Roman emperor Joseph II. The principality of Birkenfeld was ceded to Oldenburg in 1817. Oldenburg became a grand duchy in the 19th century. It joined the Zollverein (German Customs Union) in 1853, favoured Prussia in the Seven Weeks' War (1866), and joined the North German Confederation in 1867 and the German Reich in 1871. With the adoption of the Weimar Constitution in 1919, the grand ducal regime was replaced by an elected *Land* government. In 1933 Adolf Hitler made Oldenburg the centre of a large *Gau* (administrative district). After World War II, Oldenburg was merged with Lower Saxony *Land.*

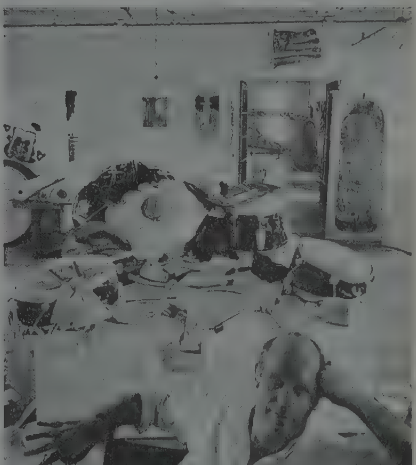
Oldenburg, city, Lower Saxony *Land* (state), northwestern Germany. It lies at the junction of the Hunte River and the Küsten Canal, which links the Hunte and Ems rivers. The city is located at the eastern approach to the North Sea coastal district of Leer (Ostfriesland [East Friesland]). First mentioned in 1108 and chartered in 1345, it became the seat of the counts and dukes of Oldenburg in the 17th century. From 1918 to 1946 the city was the capital of the *Land* of Oldenburg. Notable landmarks include the grand-ducal palace (1607–15), which now houses a state museum of art and culture, and the Lamberti Church (1270; rebuilt 1790–97). It has other museums, a state theatre, art galleries, and botanical gardens. The Carl V. Ossietzky University of Oldenburg was founded in 1974, and there are several academies and institutes. As an agricultural market centre for Leer, it has important cattle and horse auctions and large meat-processing factories. Other industries include shipbuilding, glassmaking, and textile manufacturing. It has shipping with Bremerhaven at the Weser estuary and with the Ruhr. Pop. (1994 est.) 147,701.

Oldenburg, Claes, in full CLAES THURE OLDENBURG (b. Jan. 28, 1929, Stockholm, Sweden), Swedish-born American Pop-art sculptor, best known for his giant soft sculptures of everyday objects.

Much of Oldenburg's early life was spent in the United States, Sweden, and Norway, a result of moves his father made as a Swedish consular official. He was educated at Yale University (1946–50), where writing was his main interest, and he worked from 1950 to 1952 as an apprentice reporter for the City News Bureau in Chicago. In 1952–54 he attended the school of the Art Institute of Chicago and in 1953 he opened a studio, doing freelance illustrating for magazines. Oldenburg also gained U.S. citizenship in 1953. In 1956 he moved to New York City, where he became fascinated with the elements of street life: store windows, graffiti, advertisements, and trash. An awareness of the sculptural possibilities of these objects led to a shift in interest from painting to sculpture. In 1960–61 he created "The Store," a collection of painted plaster copies of food, clothing, jewelry, and other items. Renting an actual store, he stocked it with his constructions. In 1962 he began creating a series of happenings, *i.e.,* experimental presentations involving sound, movement, objects, and people. For some of his happenings Oldenburg created giant objects made of cloth stuffed with paper or rags. In 1962 he exhibited a version of his store in which there were huge canvas-covered, foam-rubber sculptures of an ice-cream cone, a hamburger, and a slice of cake.

These interests led to the work for which Oldenburg is best known: soft sculptures. Like other artists of the Pop-art movement, he chose as his subjects the banal products of consumer life. He was careful, however, to choose objects with close human associations, such as bathtubs, typewriters, light switches, and electric fans. In addition, his use of soft, yielding vinyl gave the objects human, often sexual, overtones. Oldenburg's "Giant Soft Fan" was installed in the U.S. Pavilion at Expo 67 in Montreal, and his work was also exhibited at Expo 70 in Ōsaka, Japan.

An exhibition of Oldenburg's work in 1966 in New York City included, in addition to his soft sculptures, a series of drawings and watercolours that he called "Colossal Monuments." His early monumental proposals remained unbuilt (such as the giant vacuum cleaner for the Battery in New York City, 1965; "Bat Spinning at the Speed of Light" for his alma mater, the Latin School of Chicago, 1967; and a colossal "Windshield Wiper" for



Oldenburg, photograph by Arnold Newman, 1967

© Arnold Newman

Chicago's Grant Park, 1967); but in 1969 his "Lipstick (Ascending) on Caterpillar Tracks" was placed surreptitiously on the Yale University campus, remaining there until 1970, when it was removed to be rebuilt for its permanent home at Morse College, elsewhere on the campus. This began a series of successes, such as "Clothespin" (1976) in Philadelphia, "Colossal Ashtray with Fagends" at Pompidou Centre in Paris, and "Batcolumn" (1977), provided by the art-in-architecture program of the federal government for its Social Security Administration office building in Chicago.

In 1977 Oldenburg married Coosje van Bruggen, his second wife. The couple began to collaborate on commissions, and from 1981 her signature also appeared on their work. They worked with architect Frank Gehry on the Main Street Project (1975–84) in Venice, Calif., and Camp Good Times (1984–85) in the Santa Monica Mountains. With van Bruggen, Oldenburg created a soft sculpture of an oversized shuttlecock specially for a 1995 retrospective of his work at the Guggenheim Museum in New York City.

Oldfield, Barney, byname of BERNA ELI OLDFIELD (b. Jan. 29, 1878, near Wauseon, Ohio, U.S.—d. Oct. 4, 1946, Beverly Hills, Calif.), American automobile-racing driver, whose name was synonymous with speed in the first two decades of the 20th century.

A bicycle racer from 1894, and briefly a professional boxer, Oldfield was hired in 1902 as chief mechanic for Henry Ford's racing team. He soon became the team's driver and achieved fame by guiding the Ford-Cooper *999* to two victories over Alexander Winton's supposedly invincible *Bullet.* On June 15, 1903, at Indianapolis, he accomplished the first mile-a-minute performance in an automobile (59.6 seconds); in August 1903 he drove five miles in 4 minutes 55 seconds. At Daytona Beach, Fla., March 16, 1910, in his *Blitzen Benz,* he set a world speed record of 131.724 miles per hour. Despite his success he came to dislike auto racing, calling the sport a "Roman circus"; he was disgusted at the great publicity accorded him following two racing accidents in which spectators were killed. After his retirement in 1918, he became a well-known advocate of driving safety.

Oldham, borough and district, metropolitan area of Greater Manchester, England. It lies on the northeastern periphery of the area on the western edge of the Pennines near the source of the River Medlock. The county is named for the Oldham family, who lived in Werneth Hall during the Middle Ages.

Oldham was the centre for an agricultural district with a woolen industry until the 19th century, when it became a major cotton-spinning and weaving town. Today industries are more diversified and range from vehicle building to electronics. Much of the borough is still open countryside.

Notable buildings include Oldham parish church, built in 1933, and the old Town Hall, built in 1841–42. Foxdenton Hall, Chadderton, a brick manor house dating from about 1700, was one of the homes of the de Trafford family. William Cobbett and Sir Winston Churchill were both members of Parliament from Oldham, and the composer Sir William Walton was born there. Area 54 square miles (141 square km). Pop. (1992 est.) 220,300.

Oldham, John (b. Aug. 9, 1653, Shipton Moyne, Gloucestershire, Eng.—d. Dec. 9, 1683, Holm Pierrepont, near Nottingham), pioneer of the imitation of classical satire in English.

Oldham took a B.A. degree at the University of Oxford in 1674 and in 1676 became an usher at Croydon School. His poems attracted the attention of the Earl of Rochester, who visited him at Croydon and is said to have "much delighted" in his poetry. Oldham's imitation of Moschus' elegy on Bion, written at Rochester's death, contains a touching expression of his gratitude to him. In 1677 he attempted, apparently unsuccessfully, to win recognition at court by writing a poem on the marriage of the Princess Mary to William of Orange. While a resident of London, he was on the fringe of the "court wits" and met John Dryden, who mourned him in a noble elegy.

Oldham has a notable place in the development of Augustan poetry. The four *Satyrs Upon the Jesuits* (1681), including "Garnet's Ghost," previously published as a broadsheet in 1679, constitute his most widely known work. They are forceful but melodramatic, crowded with coarse images and uneven versification, an attempt to imitate the invective of Juvenal. His satires have the novelty of being directed toward general subjects rather than being personal lampoons.

Oldham, Richard Dixon (b. July 31, 1858, Dublin, Ire.—d. July 15, 1936, Llandrindod, Wales), British geologist and seismologist who discovered evidence for the existence of the Earth's core.

After training at the Royal School of Mines, Oldham joined the Geological Survey of India in 1879, eventually serving as superintendent (until 1903). His study of the Assam earthquake in 1897 revealed three separate kinds of earthquake waves on seismographic records and established that these waves traveled along different paths and at different speeds through the Earth. He also documented for the first time the vertical displacement of strata as a result of earthquake motion. To explain that earthquake waves that propagated directly through the Earth traveled slower than waves that passed through obliquely, Oldham hypothesized a core that slowed the waves observed 180° from the earthquake epicentre.

Oldman River, river in southern Alberta, Canada, one of the major headstreams of the South Saskatchewan River. Rising in the Canadian Rocky Mountains from several sources, it flows eastward through Lethbridge, past Taber Provincial Park, and joins the Bow River to form the South Saskatchewan River, 44 miles (70 km) west of Medicine Hat. The Oldman, 250 miles (402 km) long from the head of the Crowsnest River (its chief headstream), was an important coal transport route in the 19th century. The valley of the river and its three main feeder streams—the Belly, St. Mary, and Little Bow—now form a major irrigation district of more than 1,000,000 acres (400,000 hectares).

Oldowan industry, toolmaking tradition characterized by crudely worked pebble (chopping) tools from the early Paleolithic, dating to about 2 million years ago and not formed after a standardized pattern. The tools are made of pebbles of quartz, quartzite, or basalt and are chipped in two directions to form simple, rough, all-purpose tools capable of chopping, scraping, or cutting. Flakes remaining from such work were also employed as tools. Such implements were made by early hominids (probably *Homo habilis* at Olduvai Gorge, Tanzania; Omo, Ethiopia; and East Turkana, Kenya). Robust australopithecines were present at the same time and at the same sites, however. Some scholars believe the tools were made by more advanced forms living nearby; they base this argument on the observations that the robust australopithecines may have been vegetarians for whom tool using would not have been of great advantage and that more advanced forms have several times been found sharing the site with the robust hominid. Oldowan tools appear to have spread outside of Africa, perhaps carried by an early species of *Homo.* Tools of similar type have been found at sites including Vértesszőllős, Hung., and Chou-k'ou-tien, China. Tools of other materials, such as wood or bone, probably were also used by the makers of the Oldowan implements; wood has not been preserved, but bone tools have been recognized at Olduvai Gorge (a lissoir in Bed I) and Sterkfontein, S.Af. Stones arranged in a circle found in Bed I at Olduvai Gorge may have served as weights to hold down the edges of a windbreak used by early hominids. Oldowan tools were made for nearly 1 million years before gradual improvement in technique resulted in a standardized industry known as the Acheulian.

Olds, Ransom Eli (b. June 3, 1864, Geneva, Ohio, U.S.—d. Aug. 26, 1950, Lansing, Mich.), American inventor and automobile manufacturer, designer of the three-horsepower, curved-dash Oldsmobile, the first commercially successful American-made automobile and the first to use a progressive assembly system, which foreshadowed modern mass-production methods.

In 1899 Olds formed the Olds Motor Works with financial backing from Samuel L. Smith, a wealthy lumberman, in Lansing, Mich. The first Oldsmobiles were marketed in 1901, and sales reached 5,000 in 1904. In 1904, after an argument with Smith over the latter's plans to substitute a large touring car for the popular Oldsmobile, Olds left the company and formed the Reo Motor Car Company. By 1907 he had built Reo into one of the industry's leaders, but after 1908 the company steadily lost ground to its competitors. After 1915 Olds turned most of his attention from the automobile business to other activities, including the marketing of a lawn mower he had invented and land speculation in Florida.

Olduvai Gorge, Olduvai also spelled OLDUWAI, archaeological site in the eastern Serengeti Plains, northern Tanzania; it is a steep-sided ravine about 30 miles (48 km) long and 295 feet (90 m) deep, with subsidiary valleys. Deposits exposed in the sides of the gorge cover a time span from about 2,100,000 to 15,000 years ago. The deposits have yielded a rich fossil fauna, including remains of more than 50 hominids, as well as the longest known archaeological record of stone-tool industries.

The Olduvai Beds accumulated in a lake basin about 16 miles (25 km) in diameter, which is underlain by volcanic rocks of Pliocene age (1.6 to 5.3 million years old) and by metamorphic deposits of Precambrian age (540 million to 3.8 billion years old). They contain evidence of relatively continuous rift-valley fault movements and of a semiarid climate. Seven major stratigraphic units or formations have been distinguished. From the oldest to the youngest they are: Bed I, Bed II, Bed III, Bed IV, the Masek Beds, the Ndutu Beds, and the Naisiusiu Beds. Bed I is at most 197 feet (60 m) thick and from about 1,700,000 to 2,100,000 years old. It consists largely of lava flows, volcanic-ash deposits, and detrital sediments. The upper part of Bed I (1,700,000 to 1,850,000 years old) contains a rich and varied fauna and archaeological sites of the Oldowan industry (*q.v.*). Skeletal remains of hominids have been assigned to *Homo habilis* and *Australopithecus boisei* (formerly called *Zinjanthropus boisei*). Campsites and a butchery site have also been excavated in Bed I.

Hominid living sites of Bed I times are found principally where streams from the volcanic highlands brought fresh water to the southern margin of the alkaline Olduvai lake. Conditions for preservation were unusually favourable at these sites because ash falls from nearby volcanoes and fluctuations of the lake led to rapid burial of the hominid and associated remains. Debris consists of Oldowan tools and the bones and teeth of various animals, notably medium-size antelopes. Long bones

Rock formation at Olduvai Gorge, Tanzania

Cyril Toker—Photo Trends

and others containing marrow have generally been split and broken.

A loosely built circle of lava blocks found at a lakeside site low in Bed I suggests that crude shelters were constructed by means of branches stuck into the ground, in a circle, and supported by stones piled around the bases. In similar structures built today, the branches are interlaced and grass is piled on top of them to form roofs.

Living sites in Beds II, III, and IV are generally found in former river or stream channels, where the occupational remains have been displaced by water action.

Bed II (1,150,000–1,700,000 years old) is 66–98 feet (20–30 m) thick and comprises upper and lower divisions of different rock formations separated by a disconformity, or erosional break. The lower part of Bed II was deposited in a lake basin similar to that of Bed I; the upper part was deposited after faulting had reduced the lake's size and enlarged the area of grassland. Only the Oldowan industry occurs below the disconformity; the Developed Oldowan industry and the Acheulian industry (*q.v.*) occur above. Remains of *Homo habilis* are found in the lower one-third of Bed II, and a cranium of *Homo erectus* was collected near the top of Bed II. *Australopithecus boisei* occurs both high and low in Bed II.

The basin was further modified by faulting about 1,150,000 years ago; Bed III (800,000–1,150,000 years old) and Bed IV (600,000–800,000 years old) were deposited on an alluvial plain. These two units are separable only in the eastern part of the gorge and are combined elsewhere into a single unit. Beds III and IV have a maximum aggregate thickness of about 98 feet (30 m) and consist almost entirely of stream-laid detrital sediment. Archaeological sites in Beds III and IV represent the Developed Oldowan and Acheulian industries, and hominid remains are assigned to *Homo erectus* and other *Homo* species.

The Masek Beds (400,000–600,000 years old) accumulated during a period of major faulting and explosive volcanism. They are up to about 82 feet (25 m) thick and consist of about equal amounts of stream-laid detrital sediment and aeolian (wind-worked) tuff. The climate was drier than during the preceding deposits and was probably much like the present. Only one archaeological site, of the Acheulian industry, is known in these beds.

The Ndutu Beds (32,000–400,000 years old) were deposited during intermittent faulting, erosion, and partial filling of the gorge. They consist largely of aeolian tuffs. The maximum thickness is 79 feet (24 m). Two archaeologic sites with nondescript material of Middle Stone Age affinity have been found.

The Naisiusiu Beds (15,000–22,000 years old) were deposited on the sides and in the bottom of the gorge after it had been eroded to very near its present level. These deposits are as much as 33 feet (10 m) thick and consist largely of aeolian tuff. The Naisiusiu Beds contain one archaeological site consisting of a microlithic tool assemblage and a skeleton of *Homo sapiens,* both of which have an age of about 17,000 years.

Oleaceae, the olive family, belonging to the order Scrophulariales and named for the economically important olive tree (species *Olea europaea*). A number of plants in the family are of economic or aesthetic importance: the olive tree is the source of olives and olive oil; the ashes (genus *Fraxinus*) are noted for their hardwood timber; and many genera are famous for their horticultural merit—*e.g., Syringa* (lilacs), *Jasminum* (jasmines), *Ligustrum* (privets), *Forsythia* (golden bell), and *Osmanthus* (tea olive).

Most of the 24 genera and about 900 species of the family Oleaceae are woody plants native to forested regions. Most members are trees or shrubs, but a minority, such as most jasmines, are woody climbers. Plants of the family are distributed throughout the world, except for the Arctic; they are especially abundant in tropical and temperate Asia. The tropical and warm-temperate species are evergreen; those from the colder North Temperate Zone are deciduous.

The flowers in most members of the family have four sepals, four petals, two stamens, and two fused carpels that form a single superior ovary. The four petals are usually joined at the base to form a tube. The leaves are opposite each other on the branch except in a few species of jasmine. The fruit may be fleshy, as in the olive; winged, as in the ash; a woody capsule, as in the genus *Schrebera;* or a two-lobed berry, as in jasmine. The wood of olive and ash trees tends to be hard and very durable.

Many members of the olive family are cultivated for their beautiful and fragrant flowers. The most common flower colour is white, though lilacs occur in a range of colours, and those of *Forsythia* and a few species of jasmine are yellow. Species of mock privet (*Phillyrea*) and privet (*Ligustrum*) are used for hedges and ornamental plantings. The flowers of *Jasminum sambac* are used for making necklaces, or leis, in Hawaii. Lilacs, jasmines, and *Osmanthus* are especially noted for their sweetly fragrant flowers. *Osmanthus* and a few species of jasmines are prized in China and Japan, where their dried flowers are used to scent certain teas. Oil of jasmine, used in perfume, is extracted from *J. grandiflorum* in Spain and southern France.

Olean, city, Cattaraugus county, western New York, U.S. It lies along the Allegheny River at the mouth of Olean Creek, 60 miles (97 km) southeast of Buffalo. First settled in 1804 as a lumber camp and named for Olean Shepard, the first European child born there, it became an embarkation point for settlers bound for the Ohio River valley in flatboats. A town (township) was organized in 1808.

Because of Olean's proximity to the Pennsylvania oil fields, an oil-based economy developed there; it subsequently gave way to engineering industries, notably the manufacture of turbines, compressors, and electric components. St. Bonaventure University (1858) is 2 miles (3 km) west, and Allegany State Park is nearby. Inc. village, 1854; city, 1893. Pop. (1992 est.) 17,066.

oleander, any of the ornamental evergreen shrubs of the genus *Nerium,* belonging to the dogbane family (Apocynaceae) and having a poisonous milky juice.

The best known is the common oleander (*N. oleander*), often called rosebay. A native of the Mediterranean region, this plant is characterized by its tall shrubby habit and its thick lance-shaped opposite leaves. The flowers are borne in terminal clusters and are of a rose colour, rarely white or yellow. The hairy anthers adhere to the thickened stigma. The fruit or seed vessel consists of two long pods, which liberate a number of seeds, each of which has a tuft of silky hairs.

The oleander was known to the Greeks under three names (*rhododendron, nerion,* and *rhododaphne*), as is well described by Pliny the Elder, who mentions its roselike flowers and poisonous qualities. The common oleander has long been cultivated in greenhouses, and numerous varieties have been introduced. The sweet oleander (*N. indicum*) is a smaller plant with vanilla-scented flowers. In warm countries oleanders are widely grown outdoors. All parts of the plant are very toxic if eaten, and contact with them may cause skin irritation.

oleaster, also called RUSSIAN OLIVE, or TREBIZOND DATE (species *Elaeagnus angustifolia*), small deciduous tree of Eurasia, about 4.5 to 6 m (15 to 20 feet) high. It has smooth, dark brown branches that often bear spines and narrow, light green leaves that are silvery on the undersides from a covering of minute scales. The flowers are small, greenish, fragrant, and silvery-scaled on the outside, as are the edible, olive-shaped, yellowish fruits, which are sweet but mealy. The oleaster is hardy, wind resistant, tolerant of poor, dry sites, and thus useful in windbreak hedges, but it is also widely used in ornamental hedges.

Oleaster (*Elaeagnus angustifolia*)

R.H. Runde

olefin, also called ALKENE, any unsaturated hydrocarbon containing one or more pairs of carbon atoms linked by a double bond. The olefins are classified in either or both of the following ways: (1) as cyclic or acyclic (aliphatic) olefins, in which the double bond is located between carbon atoms forming part of a cyclic (closed-ring) or of an open-chain grouping, respectively, and (2) as monoolefins, diolefins, triolefins, etc., in which the number of double bonds per molecule is, respectively, one, two, three, or some other number.

Acyclic monoolefins have the general formula C_nH_{2n}, C being a carbon atom, H a hydrogen atom, and n an integer. They are rare in nature but are formed in large quantities during the cracking (breaking down of large molecules) of petroleum oils to gasoline. The lower monoolefins—*i.e.,* ethylene, propylene, and butylene—have become the basis for the extensive petrochemicals industry. Most uses of these compounds involve reactions of the double bond with other chemical agents. Acyclic diolefins, also known as acyclic dialkenes, or acyclic dienes, with the general formula C_nH_{2n-2}, contain two double bonds; they undergo reactions similar to the monoolefins. The best-known dienes are butadiene and isoprene, used in the manufacture of synthetic rubber.

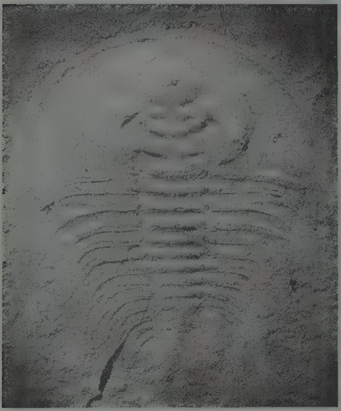
Olefins containing two to four carbon atoms per molecule are gaseous at ordinary temperatures and pressure; those containing five or more carbon atoms are usually liquid at ordinary temperatures. Olefins are only slightly soluble in water.

Oleg (d. *c.* 912), semilegendary Viking (Varangian) leader who became prince of Kiev and is considered to be the founder of the Kievan Rus state.

According to *The Russian Primary Chronicle* of the 12th century, Oleg, after succeeding his kinsman Rurik as ruler of Novgorod (*c.* 879), went down the Dnepr (Dnieper) River with his Varangian retinue and seized control of Smolensk and Kiev (882), which he subsequently made his capital. Extending his authority east and west of the Volkhov–Dneper waterway, he united the local Slavic and Finnish tribes under his rule and became the undisputed ruler of the Kievan–Novgorodian state.

Described in the chronicle as a skilled warrior, Oleg defeated the Khazars, delivering several Slavic tribes from dependence upon them, and also undertook a successful expedition against Constantinople (907), forcing the Byzantine government to sue for peace and pay a large indemnity. In 911 Oleg also concluded an advantageous trade agreement with Constantinople, which regulated commercial relations between the two states and laid the basis for the development of permanent and lucrative trade activities between Constantinople and Kievan Rus.

Olenellus, genus of trilobites (extinct arthropods) common in but restricted to Early Cambrian rocks (570 to 540 million years ago) and thus a useful guide fossil for the Early Cambrian. *Olenellus* had a well-developed head, large and crescentic eyes, and a poorly developed, small tail.



Olenellus of Cambrian age, from Vermont

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

Olenin, Boris: *see* Chernov, Viktor Mikhaylovich.

Olenyok River, also spelled OLEN'OK or OLENEK, river rising on the southern slopes of the Bukochan Ridge on the Central Siberian Plateau and flowing mainly through Yakutiya, east-central Russia. The total length of the river is 1,424 miles (2,292 km), and it has a drainage basin of 84,500 square miles (219,000 square km). The upper course is characterized by falls and rapids. Below the confluence with the Arga-Sala, its valley widens. Eventually the Olenyok passes onto the North Siberian Lowland, whence it enters the Laptev Sea through a delta. It is navigable as far as Sukhana, about 600 miles from the sea.

oleograph, also called CHROMOLITHOGRAPH, or CHROMO, colour lithograph produced by preparing a separate stone by hand for each colour to be used and printing one colour in register over another. Sometimes as many as 30 stones were used for a single print. The technique was pioneered in the 1830s but came into wide commercial use only in the 1860s. It was the most popular method of colour reproduction until the end of the 19th century, when more efficient techniques rendered it obsolete. *See also* lithography.

Oléron Island, French ÎLE D'OLÉRON, island in the Bay of Biscay, forming part of the Charente-Maritime *département*, located off the coast of France south of La Rochelle and north of the Gironde Estuary. Oléron is the second largest French island (after Corsica), with an area of 68 sq mi (175 sq km). More or less bean-shaped, with an average breadth of about 4 mi (6 km) and extending northwest–southeast, it is connected with the mainland by a toll bridge about 1¾ mi long. Most of the island is flat, and one-third of it is wooded. It is bordered by dunes and has extensive marshes. Oysters are cultivated, and vegetables are grown. The small town of Saint-Trojan in the southwest is a seaside resort. A number of small harbour towns and coastal villages accommodate holidaymakers; tourism increased greatly after the completion in 1966 of the bridge to the mainland. Pop. (1982) 16,841.

Olesha, Yury Karlovich (b. March 3 [Feb. 19, Old Style], 1899, Elizavetgrad, Ukraine, Russian Empire—d. May 10, 1960, Moscow), Russian writer who dealt with the conflict between the old mentality and the new in the early years of the Soviet Union.

Olesha was brought up in Odessa, served in the Red Army, and afterward became a journalist. He published some humorous verse and several sharp, critical articles in the early 1920s. In 1927 he produced the novel for which he is remembered, *Zavist* (*Envy*, 1936). It is concerned with a set of six characters, three of whom accept the mechanized, conformist nature of Soviet society and three of whom rebel against that society and question its accepted values. Olesha contrasts the romantic and futilely asserted individualism of the latter against the smug and comfortable conformity of the former. *Zavist* was highly praised by Soviet critics as a vivid indictment of those out of sympathy with the regime, and the book made Olesha's reputation as a writer. But his incisive questioning as to whether personal ethics and individual expression had been denied their rightful place in the planned, totalitarian Soviet society lent a subtle ambiguity and irony to this otherwise ideologically acceptable work. Olesha's later works included the short stories "Lyubov" ("Love") and "Liompa" (both 1929), the fairy-tale novel *Tri tolstyaka* (1928; *Three Fat Men*), and the play *Spisok blagodeyaniy* (1931; "A List of Benefits"). They all deal with variations of the theme presented in *Zavist*.

When in the early 1930s a demand arose for a literature of Socialist Realism (positive portrayal of Communist heroes in real life), Olesha found that he could not write, in his words, "in accordance with the times." He spoke openly of his doubts and misgivings at a meeting of the Union of Soviet Writers in 1934. Following this admission, Olesha's name vanished from Soviet literature, giving rise to rumours in the West that he had been arrested and sent to a labour camp. Little is known of his activities in the postwar years, and only after Stalin's death did his name reenter Soviet literature. The publication in 1956 of a selection of his stories signalized his full rehabilitation; since then several volumes of his works, including many never previously published, have appeared.

Oleśnicki, Zbigniew (b. 1389, Sienno, Pol.—d. April 1, 1455, Sandomierz), Polish statesman and cardinal who was chief councillor to King Władysław II and regent of Poland (1434–47).

A member of the Polish noble house of Dębno of Oleśnica, he became the leading member of the royal Privy Council after he saved the King's life at the Battle of Grunwald in 1410. Olésnicki was ordained a priest in 1412 and was made bishop of Kraków in 1423. Representing the interests of the church and the nobility, he secured a limitation of royal power (March 1430) in exchange for the nobles' recognition of the King's young son Władysław as the heir to the throne, thereby beginning the Polish tradition of an elective monarchy. As regent after Władysław II's death, Oleśnicki opposed the spread of the dissident Hussite religious movement in Poland, defeating the Hussite nobles in 1439. His appointment as the first Polish cardinal by Pope Eugenius IV in 1439 further strengthened his position. When Władysław III died (1444) while on a crusade, the Cardinal ruled the country until the King's death could be proved and his younger brother, Grand Prince Casimir of Lithuania, ascended the throne as Casimir IV (1447).

olethreutid moth, any member of the cosmopolitan insect family Olethreutidae (order Lepidoptera), containing several species with economically destructive larvae. The pale larvae roll or tie leaves and feed on foliage, fruits, or nuts—*e.g., Cydia pomonella,* the codling moth (previously *Carpocapsa*, or *Laspeyresia, pomonella*) and *Cydia molesta,* the Oriental fruit moth (previously *Laspeyresia,* or *Grapholitha, molesta*). Though originally from Europe, the codling moth exists wherever apples are grown. The larvae burrow in the apples and, when fully grown, emerge and pupate under debris or bark or in loose soil.

Olethreutids have somewhat square-tipped forewings and fringed hindwings. Wingspan averages 18 millimetres (¾ inch). They are often known as fruit, or bud, moths. The larvae of the Mexican jumping bean moth (*Laspeyresia saltitans*) live inside the seeds of certain shrubs (*Sebastiania*), feeding on the kernels; their movements make the seed jump.

olfaction: *see* smell.

Olga, SAINT, also called HELGA (b. *c.* 890—d. 969, Kiev; feast day July 11), princess who was the first recorded female ruler in Russia and the first member of the ruling family of Kiev to adopt Christianity. She was canonized as the first Russian saint of the Orthodox Church.

Olga was the widow of Igor I, prince of Kiev, who was assassinated (945) by his subjects while attempting to extort excessive tribute. Because Igor's son Svyatoslav was still a minor, Olga became regent of the grand principality of Kiev from 945 to 964. She soon had Igor's murderers scalded to death and hundreds of their followers killed. Olga became the first of the princely Kievans to adopt Orthodox Christianity. She was probably baptized (*c.* 957), at Constantinople (now Istanbul), then the most powerful patriarchate. Her efforts to bring Christianity to Russia were resisted by her son but continued by her grandson, the grand prince St. Vladimir (died 1015); together they mark the transition between pagan and Christian Russia.

Olgas, also called OLGA ROCKS, tors (isolated weathered rocks) in southwestern Northern Territory, Australia, comprising a circular grouping of more than 30 red conglomerate domes rising from the desert plains north of the Musgrave Ranges. They occupy an area of 11 sq mi (28 sq km) within Uluru National Park (established in 1958 as the former Ayers Rock-Mount Olga National Park), and culminate at Mt. Olga, 1,500 ft (460 m) above the plain and 3,507 ft above sea level. Mt. Olga is the most westerly of Australia's three giant tors; the others are Ayers Rock (called Uluru by the region's Aborigines) and Mt. Conner. They were visited and named in 1872 after Queen Olga of Württemberg by the explorer Ernest Giles. Their Aboriginal name, Katajuta means "many heads." The rocks offer visitors a constantly changing array of colour as the sun moves overhead and illuminates the luxurious vegetation in deep clefts between the domes.

Olgierd (grand duke of Lithuania): *see* Algirdas.

Olhão, town, port, and *concelho* (township), Faro *distrito* ("district"), southern Portugal. It lies at the head of the Barra Nova (a shipping channel landward of sandbars fringing the coast), just east of Faro town. Olhão was one of the first Portuguese towns to enter the Peninsular War (1808–14). Now primarily a fishing port with canning factories, it is also a popular resort frequented by painters. Olhão is often called the "Cubist Town" because of its white, cube-shaped, flat-roofed houses. Pop. (1981) town, 19,817; *concelho,* 34,224.

olibanum (gum resin): *see* frankincense.

Olier, Jean-Jacques (b. Sept. 20, 1608, Paris, Fr.—d. April 2, 1657, Paris), founder of the Sulpicians, a group of secular priests dedicated to training candidates for the priesthood.

Ordained a priest in 1633, Olier soon came under the influence of St. Vincent de Paul, founder of a congregation of missionaries known as Lazarists. In 1641 Olier established at Vaugirard, Fr., a seminary for the training of priests, which he moved to Paris the following year when he was made pastor of Saint-Sulpice. The school became known as Saint-Sulpice Seminary, and the French government approved the Society of Saint-Sulpice (Sulpicians) in 1645. Olier's writings, edited in 1856 by J.P. Migne, concentrate on the spiritual direction of priests.

Olier, engraving by Nicolas Pitau

Harlingue—H. Roger-Viollet

oligarchy, government by the few, especially despotic power exercised by a small and privileged group for corrupt or selfish purposes.

Aristotle used the term *oligarchia* to designate the rule of the few when it was exercised not by the best but by bad men unjustly. In this sense, oligarchy is a debased form of aristocracy, which denotes government by the few in which power is vested in the best individuals. Most classic oligarchies have resulted when governing elites were recruited exclusively from a ruling caste—a hereditary social grouping that is set apart from the rest of society by religion, kinship, economic status, prestige, or even language. Such elites tend to exercise power in the interests of their own class.

It is a recurrent idea that all forms of government are in the final analysis reducible to the rule of a few. Oligarchs will secure effective control whether the formal authority is vested in the people, a monarch, the proletariat, or a dictator. Thus, Karl Marx and Friedrich Engels insisted that, throughout capitalism, the key capitalists had controlled the government; they coined the dictum, "the state is the executive committee of the exploiting class." The Italian political scientist Gaetano Mosca likewise insisted that a "ruling class" always constituted the effective oligarchic control. Vilfredo Pareto elaborated the idea in his doctrine of the "elite." The modern tendency to analyze social patterns in terms of an "elite," although greatly reinforced by Pareto's theory, goes further back than Marx and Engels, who employed the term "elite" to describe the class-conscious communists, the leading group within the proletariat.

One of the most famous modern uses of the term occurs in "iron law of oligarchy," a concept devised by the German sociologist Robert Michels to refer to the alleged inevitable tendency of political parties and trade unions to become bureaucratized, centralized, and conservative. His reasoning was that, no matter how egalitarian or even radical the original ideology and goals of a party or union may be, there must emerge a limited group of leaders at the centre who can direct power efficiently, get things done through an administrative staff, and evolve some kind of rigorous order and ideology to ensure the survival of the organization when faced by internal division and external opposition. Subsequent writers of various persuasions have attempted either to expand on Michel's thesis, extending it to legislatures, religious orders, and other organizations, or to restrict or criticize the thesis, charging that the iron law of oligarchy is not universal and that some unions and parties do maintain a viable system of democratic expression and governance.

Political science and sociology are beginning to differentiate more carefully between various types of control and power. The type of power held by a democratic party boss, while overwhelming in relation to any single member of the party, is very different from that wielded by the boss of the single party in a totalitarian and authoritarian pattern. Likewise, the control group within an organization does not occupy the same position under democratic conditions (which provide for the group's being effectively challenged by outsiders at any time) as it does under an authoritarian plan. If effective control changes hands as rapidly as it does in a city of the United States or a British trade union, it is doubtful that those exercising it should be spoken of as a "class" or an "elite." The expression "the few" is too abstract to convey much information. Like the other purely numerical concepts of government inherited from Greek philosophy, oligarchy is an outmoded term, because it fails to direct attention to the substantive features of a government.

Oligocene Epoch, major worldwide division of the Tertiary Period that began about 36.6 million years ago and ended about 23.7 million years ago. It follows the Eocene Epoch and precedes the Miocene Epoch. The term *Oligocene* is derived from Greek and means the "epoch of few recent forms," referring to the sparseness of the number of modern animals that originated during the Oligocene.

In western Europe the beginning of the Oligocene was marked by an invasion of the sea that brought with it new molluscan forms characteristic of the epoch. Marine conditions did not exist for long, however, and brackish and freshwater conditions soon prevailed. This cycle of marine transgression, followed by the establishment of brackish and then freshwater environments, was repeated during the Oligocene. The Oligocene is subdivided into two ages and their corresponding rock stages—namely, the Rupelian and the Chattian.

During the Oligocene, sediments on the floor of the ancient Tethyan Sea, which covered part of Eurasia, were deformed early in the formation of the European Alps. Oligocene climates appear to have been temperate, and many regions enjoyed subtropical climatic conditions. Grasslands expanded during the Oligocene, and forested regions dwindled. Tropical vegetation flourished along the borders of the Tethyan Sea. Warm, swampy conditions prevailed over much of what is now Germany, and extensive deposits of lignite were formed.

A prominent group of Oligocene marine animals were the foraminiferans, protozoans similar to amoebas but bearing a complex, often calcareous test, or shell. Among the especially prominent foraminiferans were the nummulites. Other marine forms were essentially modern in aspect. Terrestrial invertebrate life was abundant and diverse. Stream and lake deposits on the Isle of Wight contain the remains, often well preserved, of termites and other insects. In the Baltic, many forms of Oligocene insects, including butterflies, bees, ants, and spiders, are preserved in amber.

Oligocene terrestrial vertebrate faunas, diverse and abundant, are known from North America, Europe, Africa, and Asia. The vertebrate faunas of the northern continents possess an essentially modern aspect that is a result less of the appearance of new forms than of the extinction of archaic vertebrates at the close of the preceding Eocene Epoch. The similarities between the various early Oligocene vertebrate faunas of the northern continents suggests a relatively free interchange of animals, but later Oligocene faunas evince a greater degree of provincialism. Bats became more widespread in the Oligocene and at least locally abundant; their droppings in caves contributed to the formation of extensive phosphate deposits that are currently economically significant in many areas. Primitive beavers appeared late in the Oligocene. Throughout the epoch, modern groups of carnivores became diverse and abundant. The largest land mammal of all time, *Baluchitherium,* is known from Asia, and the first mastodons are known from Egypt. In North America, primitive horses were evolving, including three-toed forms such as *Mesohippus* and *Miohippus.* Pigs and peccaries first appeared in the early Oligocene of Europe and reached North America late in the epoch. The earliest apelike form, *Parapithecus,* is known from Oligocene deposits in Egypt, which also have yielded remains of several kinds of Old World monkeys. The earliest New World monkeys are known from late Oligocene deposits in South America. During the Oligocene, South America was isolated from Central and North America, and a unique mammalian fauna developed there. Remarkably, many South American mammals of the Oligocene exhibit extreme parallelism in adaptation to forms that are found elsewhere in the world and are not even closely related.

oligochaete, any worm of the class Oligochaeta (phylum Annelida). About 3,200 living species are known, the most familiar of which is the earthworm (*q.v.*), *Lumbricus terrestris.* Oligochaetes are common all over the world. They live in the sea, in fresh water, and in moist soil.

Oligochaetes, which range in length from a few millimetres (a fraction of an inch) to more than 3 m (10 feet), are notable for the absence of a head and parapodia, the flat, lobelike outgrowths used by many other annelids for locomotion. They have few setae, or bristles, on the body. Many species have a clitellum, a thickened region that secretes cocoons for enclosing eggs.

All forms are hermaphroditic; *i.e.,* the functional reproductive organs of both sexes occur in the same individual. Development and growth are direct, with no larval stages.

Oligochaetes, in particular the earthworm, are ecologically important in their roles of turning over and aerating the soil; the earthworm is secondarily important as fish bait.

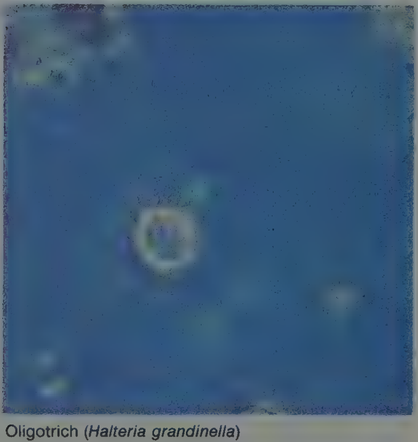
oligoclase, the most common variety of the feldspar mineral plagioclase (*q.v.*).

oligomenorrhea, also spelled OLIGOMENORRHOEA, prolonged intervals between menstrual cycles. Menstruation is the normal cyclic bleeding from the female reproductive tract. Most women menstruate every 25 to 30 days if they are not pregnant, nursing a child, or experiencing reproductive disorders. In oligomenorrhea, menstruation may occur only three or four times yearly. The cause of the disorder may be psychological, hormonal, or structural in nature. If there is no acute illness or disease involved, the irregularity becomes important only because it interferes with conception. Absence of menstruation may be a symptom of some other disorder. *See also* amenorrhea.

oligopoly, market situation in which each of a few producers affects but does not control the market. Each producer must consider the effect of a price change on the actions of the other producers. A cut in price by one may lead to an equal reduction by the others, with the result that each firm will retain approximately the same share of the market as before but at a lower profit margin. Competition in oligopolistic industries tends, therefore, to manifest itself in nonprice forms such as advertising and product differentiation. Characteristic oligopolies in the U.S. are the steel, aluminum, and automobile industries.

oligosaccharide, any carbohydrate of from three to six units of simple sugars (monosaccharides). A large number of oligosaccharides have been prepared by partially breaking down more complex carbohydrates (polysaccharides). Most of the few naturally occurring oligosaccharides are found in plants. Raffinose, a trisaccharide found in many plants, consists of melibiose (galactose and glucose) and fructose. Another plant trisaccharide is gentianose. Maltotriose, a trisaccharide of glucose, occurs in some plants and in the blood of certain arthropods.

oligotrich, any spherical to pear-shaped protozoan of the ciliate order Oligotrichida, found in fresh, salt, and brackish water. Body cilia (minute, hairlike projections), when present, are often fused into groups of bristles, or cirri. The oligotrichs have conspicuous adoral (on margin of groove leading to the mouth) ciliature. For many species an anterior spiralling band of membranelles (cilia fused into a flat plate) serves as an efficient, and in some cases the only, means of locomotion. The species *Halteria grandinella* is a common freshwater representative of the order. Small and spherical, it has seven groups of three cirri set in small grooves along the middle of the cell. The action of the cirri causes the cell to bounce through the water.



Oligotrich (*Halteria grandinella*)
J.M. Langham

Ólimbos, Óros (Greece): *see* Olympus, Mount.

Olinda, city, eastern Pernambuco state, northeastern Brazil, atop a low hill on the Atlantic coast, 5 mi (8 km) north of Recife, the state capital. It was founded by the Portuguese Duarte Coelho Pereira as the colonial capital of Pernambuco captaincy in 1537. By 1600 its economy was based on sugar, and Negro slave labour had made it a feudal and ecclesiastical stronghold. (Slavery was abolished in 1888.) In 1630 the Dutch captured the city, occupying it until 1654. By that time it had declined, its place of leadership being passed to Recife, which became the capital. Olinda is noted principally for its 16th- and 17th-century ornate churches and monasteries and for other colonial buildings. There is a large colony of artists who produce wood carvings and pottery. Pop. (1996) 349,380.

Church of São Bento, Olinda, Braz.
Dilson Martins—EB Inc.

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olingo, also called CUATAQUIL (*Bassaricyon*), any of about four species of small arboreal carnivores of the raccoon family, Procyonidae, found in the jungles of Central and northern South America. Olingos are slender, grayish-brown animals 35–50 centimetres (14–20 inches) long, excluding the bushy, faintly ringed tail, which accounts for an additional 40–50 cm. They have soft fur, pointed muzzles, and rounded ears. They resemble kinkajous but are less stocky and have narrower snouts and longer-haired, nonprehensile tails. Olingos are nocturnal, often travel in small groups, and feed primarily on fruit. Little else is known of their habits.

Oliphant, Laurence (b. 1829, Cape Town—d. Dec. 23, 1888, Twickenham, Middlesex, Eng.), British author, traveller, and mystic, a controversial figure whose quest to establish a Jewish state in Palestine—"fulfilling prophecy and bringing on the end of the world"—won wide support among both Jewish and Christian officials but was thought by some to be motivated either by commercial interests or by a desire to strengthen Britain's position in the Near East.

The son of a British official who travelled widely throughout the empire, Oliphant received a desultory education; he was called to the bar but soon gave up the law for a life of adventure. Before the age of 24 his travels had provided material for two books, a *Journey to Khatmandu* (1852) and *The Russian Shores of the Black Sea in the Autumn of 1852, with a Voyage Down the Volga, and a Tour Through the Country of the Don Cossacks* (1853). Later experiences in various parts of the world, as secretary to the diplomat James Bruce, earl of Elgin, as war correspondent of *The Times,* and as unofficial British observer and (briefly) first secretary of the British legation in Japan, are recorded with verve in *Episodes in a Life of Adventure* (1887) and other books. The *Narrative of the Earl of Elgin's Mission to China and Japan* (1859) gives a fascinating account of 19th-century gunboat diplomacy. In 1865 appeared his satirical novel of London society, *Piccadilly: A Fragment of Contemporary Biography,* and in the same year he became a Conservative member of Parliament.

Laurence Oliphant, engraving after a photograph
BBC Hulton Picture Library

In 1867 Oliphant went to the U.S. and joined the Brotherhood of the New Life, first at Amenia and then at Brocton, N.Y., founded by the spiritualist "prophet" T.L. Harris, to whom he signed over his fortune and to whose rule he submitted until 1881. In 1878 he proposed to Disraeli and Robert Cecil, 3rd marquess of Salisbury, a plan for the Jewish colonization of Palestine (he was not Jewish himself). The plan was well received by Salisbury and by eastern European Jews but was refused by the sultan of Turkey, ruler of Palestine. In 1882 Oliphant and his wife settled in Haifa, where they formed a small community and wrote together the esoteric *Sympneumata; or, Evolutionary Forces Now Active in Man* (1885)—apparently a plea for purified sex life.

Oliphant, Margaret Oliphant (b. April 4, 1828, Wallyford, Midlothian, Scot.—d. June 25, 1897, Windsor, near London), prolific Scottish novelist, historical writer, and biographer best known for her portraits of small-town life.

In 1852 she married her cousin, Francis Wilson Oliphant, an artist in stained glass, and settled in London. Widowed in 1859, she began a wearisome struggle to provide, by writing, for her children and later for her brother's children. Between 1849 and her death she published more than 100 separate books of which the best known are the *Chronicles of Carlingford,* published anonymously 1863–66. These four novels of contemporary life in a small town include *Miss Marjoribanks* (1866), a young lady's attempts at social climbing, and *Salem Chapel* (1863), a young intelligent nonconformist minister's trials with

Margaret Oliphant, detail of a drawing by J.M. Oliphant, 1895
BBC Hulton Picture Library

his narrow-minded congregation. The best of her Scottish novels are *Passages in the Life of Mrs. Margaret Maitland* (1849), *Merkland* (1851), and *Kirsteen* (1890). Other works include *A Beleaguered City* (1880) and *A Little Pilgrim in the Unseen* (1882), excursions into the realm of the supernatural. She also published *Annals of a Publishing House: William Blackwood and his Sons* (1897), a work of importance to literary historians. She wrote with sympathy, insight, and humour about domestic life.

Olita (Lithuania): *see* Alytus.

Olitski, Jules, original name YEVEL, or JEVEL, DEMIKOVSKY, also called JULES DEMIKOV (b. March 27, 1922, Snovsk, Russia), U.S. painter generally identified with the Color Field school. He was one of the first to use thinned paints in a staining technique to create colour compositions of a delicate, ethereal quality.

Olitski studied at the National Academy of Design in New York City (1939–42) and at the Zadkine School of Sculpture in Paris (1949), presenting his first one-man show in Paris in 1951. "Prince Patutsky Command" (1965) typifies the opulent results Olitski achieved with his technique of dyeing and spraying. Large areas saturated with brilliant colour alternate with bare canvas to create an effect of light, airy mist.

Olivares, Gaspar de Guzmán y Pimental, conde-duque de (count-duke of), DUQUE DE SANLÚCAR DE BARRAMEDA (b. Jan. 16, 1587, Rome—d. July 22, 1645, Toro, Spain), prime minister (1623–43) and court favourite (*valido*) of King Philip IV of Spain. He attempted to impose a strong centralizing policy and eventually provoked rebellion and his own fall.

Olivares, detail of "Equestrian Portrait of Olivares" by Diego Velázquez, *c.* 1634–35; in the Prado, Madrid

Archivo Mas, Barcelona

Early life. Olivares' father, Don Enrique de Guzmán, was the Spanish ambassador to Rome. His mother, Doña María Pimental Fonseca, was of the Castilian nobility.

As second-born son of an aristocratic family, Don Gaspar studied for the priesthood, obtaining a degree from the University of Salamanca in law, theology, and the arts (1601–04). With the death of his older brother, however, he renounced his position as canon in Seville (to which he had been appointed by Pope Clement VIII) and joined his father in Valladolid, then the location of the Spanish royal court. In 1607, orphaned and heir not only to a noble title but also to one of the largest fortunes of the kingdom, Don Gaspar married his cousin and niece (they were related through both sides of the family), Doña Inés de Zúñiga y Velasco, lady-in-waiting to Queen Margaret.

In 1615 Olivares became one of Prince Philip's six personal attendants. When Philip was crowned king in April of 1621, he had just reached 16 years of age, and Olivares was approaching the age of 34. By this time Olivares, a man of unpleasing appearance and changing moods, had become the young king's irreplaceable companion. As Philip's favourite he was given the rank of grandee, the title most coveted by Castilian nobility. Reluctant to drop any part of his title, he styled himself "conde-duque" (count-duke).

Prime ministry. From 1623 until Jan. 24, 1643, Olivares served as prime minister of Spain. He was unswervingly loyal to the King and was vehemently patriotic. He was also avid for power—both for himself and for Spain. The main objective of his domestic policy was to engender national unity among the separate kingdoms of the peninsula, kingdoms that he described as "anachronistic as crossbows." He attempted many economic reforms aimed at relieving the difficult situation that had arisen as a result of long reliance on the influx of precious metals from the New World. Among these programs were restrictions on granting favours (except for honorary titles); recoining of the old copper alloy moneys; introduction of paper money; promotion, with the aid of the Castilian Cortes (representative assembly), of various royal decrees to stop the industrial and commercial decline of the kingdom; and a project whereby the shipping companies would be able to compete more advantageously with the Dutch, English, and French commercial fleets. But his attempts to promote trade and industry met with failure, due largely to the fact that aristocratic Castilians, slaves to the idea of a rigid class structure, looked down upon all mercantile professions. His moves toward centralizing power in the hands of the king and his ministers were partly responsible for the revolts of the Catalans and the Portuguese, which began in 1640, and for an abortive conspiracy to form a separate Andalusian kingdom (1641). In foreign policy Olivares was guided by the dream of *austracismo,* a joint European hegemony of the Austrian and Spanish Habsburg kingdoms. This policy meant continued Spanish involvement in the Thirty Years' War and ended with the eclipse of Spanish power by France. Yet in the period of the Counter-Reformation, it is difficult to conceive of Spain following a different course: in this sense it was almost inevitable, and Olivares can hardly be judged in terms of its ultimate failure.

As a result of a court intrigue headed by the Queen (Elizabeth of France), Philip removed his ailing favourite from office in January 1643. Although the King would undoubtedly have liked to recall him later, other grandees, long jealous of his power, continued to discredit him. Eventually Olivares was exiled, along with his wife, to the city of Toro. In December 1644 the Inquisition began to investigate his conduct. He died in Toro the following year. (E.Z.H./Ed.)

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olive (*Olea europaea;* family Oleaceae), subtropical, broad-leaved, evergreen tree and its edible fruit. The tree, ranging in height from 3 to 12 metres (10 to 40 feet) or more, has numerous branches; its leaves, leathery and lance-shaped, are dark green above and silvery on the underside and are paired opposite each other on the twig. The wood is resistant to decay; if the top dies back, a new trunk will often arise from the roots. The tree's beauty has been extolled for thousands of years. The edible olive was grown on the island of Crete about 3500 BC; the Semitic peoples apparently cultivated it as early as 3000 BC. Olive oil was prized for anointing the body in Greece during the time of Homer; and it was an important crop of the Romans *c.* 600 BC. Later, olive growing spread to all the countries bordering the Mediterranean.

Olive trees bloom in late spring; small, whitish flowers are borne in loose clusters in the axils of the leaves. Flowers are of two types: perfect, containing both male and female parts, which are capable of developing into the olive fruits; and male, which contain only the pollen-producing parts. The olive is wind-pollinated. Fruit setting in the olive is often erratic; in some areas, especially where irrigation and fertilization are not practiced, bearing in alternate years is the rule. The trees may set a heavy crop one year and not even bloom the next.

The olive fruit is classed botanically as a drupe, similar to the peach or plum. Within the stone are one or two seeds. Olives tend to have maximum oil content (about 20–30 percent of fresh weight) and greatest weight six to eight months after the blossoms appear. At that stage they are black and will continue to cling to the tree for several weeks. Fruits for oil extraction are allowed to mature, but, for processing as food, immature fruits are picked or shaken off the tree. Hundreds of named varieties of both types of olives, table and oil, are grown in warm climates. In California, olives such as the Mission variety are grown almost exclusively for table use. In Europe, olives such as the Picual, Nevadillo, and Morcal are grown mostly for oil.

Commercial olive production generally occurs in two belts around the world, between 30° and 45° N latitude and between 30° and 45° S, where the climatic requirements for growth and fruitfulness can be found. Olive varieties do not come true from seed. Seedlings generally produce inferior fruit and must be budded or grafted to one of the named varieties. Olives can be propagated by cuttings, either by hardwood cuttings set in the nursery row in the spring or by small, leafy cuttings rooted under mist sprays in a propagating frame. The trees start bearing in 4 to 8 years, but full production is not reached for 15 or 20 years.

Olives are grown mainly for the production of olive oil. Fresh, unprocessed olives are inedible because of their extreme bitterness resulting from a glucoside that can be neutralized by treatments with a dilute alkali such as lye. Salt applications also dispel some of the bitterness. The processed fruit may be eaten either ripe or green. The olive fruit and its oil are key elements in the cuisine of the Mediterranean and popular outside the region.

Olive oil is classified into five grades: (1) virgin, from first pressings that meet defined standards; (2) pure, or edible, a mixture of refined and virgin; (3) refined, or commercial, consisting of *lampante* from which acid, colour, and odour have been removed; (4) *lampante*, high-acid oil, named for its use as a lamp fuel, obtained from a second pressing of residual pulp with hot water (some inferior virgin oils are classed as *lampante*); (5) sulfide, extracted with solvents and refined repeatedly.

In the late 20th century, Spain and Italy were the world leaders in commercial olive production, with more than a quarter each of the world's total followed by Greece, with more than a 10th. Other important olive-producing countries are Turkey, Tunisia, Morocco, Syria, and Portugal. Europe, with nearly 500 million olive trees, has more than three-quarters of the world's cultivated olives, followed by Asia (about 13 percent).

olive shell, any of the marine snails that constitute the family Olividae (subclass Prosobranchia of the class Gastropoda). Fossils of the genus *Oliva* are common from the Eocene Epoch (57.8 to 36.6 million years ago) to the present. The shell, which is distinctive and easily recognizable, has a pointed apex and rapidly expands outward to the main body whorl. It is oval in shape, with a long and narrow aperture, and possesses an agatelike sheen and fine markings. Folds are developed on the end of the body whorl in a characteristic pattern.

Olives burrow in sandy bottoms. Common in southeastern American waters is the lettered olive (*Oliva sayana*), about 6 cm (2.5 inches) long. Abundant in the Indo-Pacific region is the 8-centimetre (3-inch) orange-mouthed olive (*O. sericea*).

Oliver, Isaac, Oliver also spelled OLIVIER (b. 1556?, Rouen, Fr.—d. Oct. 2, 1617, London, Eng.), miniature painter.

Oliver's French Huguenot parents took him to England about 1568, where he studied painting and married the daughter of a then well-known portrait painter, Marcus Gheeraerts the Elder. Oliver soon won renown and royal patronage for his miniatures, including portraits and religious and classical scenes. His son Peter was his student and carried on his father's later style.

"Self-portrait," miniature by Isaac Oliver; in the National Portrait Gallery, London

By courtesy of Christie's, London

Oliver, King, byname of JOSEPH OLIVER (b. May 11, 1885, Abend, La., U.S.—d. April 8, 1938, Savannah, Ga.), American cornetist who was a vital link between the semimythical prehistory of jazz and the firmly documented history of jazz proper. He will always be remembered for choosing as his protégé the man generally considered to have been the greatest of all New Orleans musicians, Louis Armstrong.

Born on a plantation, Oliver went to New Orleans as a boy and began playing the cornet in 1907. By 1915 he was an established bandleader and two years later was being billed as "King." In the following year, after the closing down of Storyville, the city's red-light district, Oliver moved to Chicago. Four years later he sent for Armstrong to join him as second cornetist, thus indirectly ensuring the spread of jazz across the continent and eventually the world. In 1928 he went to New York City, and from then on his fortunes declined. Plagued by dental trouble and outflanked by rapidly evolving jazz styles, he died in obscurity while working as a poolroom marker.

Oliver, Sy, byname of MELVIN JAMES OLIVER (b. Dec. 17, 1910, Battle Creek, Mich., U.S.—d. May 28, 1988, New York, N.Y.), jazz trumpeter, composer, and bandleader who was one of the leading music arrangers of the 1930s and '40s.

Both of Oliver's parents were music teachers in Ohio, where he grew up. He played the trumpet as a boy and at the age of 17 took a job (1927–30) with Zack Whyte and his Chocolate Beau Brummels. He joined the Jimmie Lunceford orchestra in 1933. There he established his reputation for innovative arranging characterized by imaginative instrumentation and a full-bodied sound. He also developed a distinctive sound, sometimes called "growl" trumpet, in his own playing. In 1939 he joined the orchestra of Tommy Dorsey as a singer and arranger. He led a band while in the army during World War II and returned to Dorsey's orchestra after the war. From the late 1940s to the early '70s Oliver held a variety of jobs, including a decade as musical director of Decca Records. In the early '70s he formed a nine-piece orchestra that continued to perform until 1984.

Olives, Mount of, Arabic JABAL AṬ-ṬŪR, Hebrew HAR HA-ZETIM, multisummited limestone ridge just east of the Old City of Jerusalem and separated from it by the Kidron valley. Frequently mentioned in the Bible and later religious literature, it is holy both to Judaism and to Christianity. Politically, it is part of the municipality of Greater Jerusalem placed under direct Israeli administration following the Six-Day War of 1967; it is not part of the West Bank (Judaea and Samaria) territory.

The peak usually regarded as the Mount of Olives proper is the southern summit, 2,652 feet (808 m) above sea level. The middle peak (2,645 feet [806 m]) is crowned by the Augusta Victoria Hospital; at the north is the highest peak, commonly called Mount Scopus (Hebrew: Har ha-Ẓofim; Arabic: R'as al-Mashārif; 2,694 feet [820 m]).

First mentioned in the Bible as the "ascent of the Mount of Olives" (2 Samuel 15), it is referred to in the book of Zechariah in the prophecy of the end of days (Zechariah 14).

The Mount of Olives is frequently mentioned in the New Testament; from it, Jesus entered Jerusalem at the beginning of the last week of his life (Matthew 21:1; Mark 11:1); his prophecies of the apocalyptic fall of Jerusalem were delivered there. The traditional site of the Garden of Gethsemane, where Jesus prayed just before he was betrayed by Judas Iscariot (Matthew 26; Mark 14), is shown on the western slopes. One of the traditional sites of the Ascension is on the mountain (Acts 1:12). From at least the 4th century AD, Christian churches and shrines have been built there; a number of denominations are now represented. According to ancient Jewish tradition, the messianic era will commence on the Mount of Olives; for this reason, its slopes have been the most sacred burial ground in Judaism for centuries.

So-called Tomb of Absalom on the southern slope of the Mount of Olives, Jerusalem

Patellani

On Mount Scopus (north) the cornerstone of the Hebrew University was laid by Chaim Weizmann in 1918; the campus was opened by Lord Balfour in 1925. By 1948 many buildings had been built, including the Jewish National and University Library (1929) and the Rothschild-Hadassah University Hospital (1934), one of the largest in the Middle East. After Israel's War of Independence (1948–49), the university area on Mount Scopus was an exclave (detached portion) of sovereign Israeli territory, separated from Israeli Jerusalem by Jordan. Following the Six-Day War (June 1967), the entire Mount of Olives came under Israeli rule; by the early 1970s the Mount Scopus complex was repaired and was in use by various university faculties.

A list of the abbreviations used
in the MICROPAEDIA *will be found*
at the end of this volume

Olivetti & C. SpA, in full ING. C. OLIVETTI & C. SPA (Italian: Eng[ineer] C. Olivetti and Company Ltd.), Italian multinational firm that manufactures office equipment and information systems. Headquarters are in Ivrea, Italy.

Founded by Camillo Olivetti (1868–1943), an electrical engineer, the company began making typewriters in 1908. In 1925 Olivetti dispatched his son Adriano Olivetti to study modern manufacturing techniques and plant management in the United States. Upon his return, the company underwent a complete reorganization that included streamlining and modernizing operations and development of a new typewriter design, the M-40, which won wide acceptance in the 1930s.

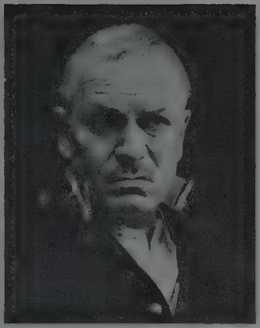
In 1938 the younger Olivetti succeeded his father as president. Under his leadership the company emerged as Italy's second leading exporter of mechanical devices and Europe's principal manufacturer of typewriters and business machines. The company also manufactures calculators, microcomputers, writing systems, and related goods.

Olivetti entered into a joint venture with Sharp Corp. of Japan in 1982 to produce together high-speed copiers and other office machines. That same year Docutel Corp., an electronics company and leading American manufacturer of automated teller machines, purchased Olivetti Corp., an American subsidiary of the company. The merger agreement made Olivetti & C. SpA the largest single stockholder in Docutel, which accordingly changed its name to Docutel/Olivetti Corp. In 1983 a quarter of Olivetti's corporate stock was purchased by American Telephone and Telegraph Company (AT&T) in an arrangement that made Olivetti a major distributor of AT&T products in Europe.

Olivier, Émile: *see* Ollivier, Émile.

Olivier, Isaac: *see* Oliver, Isaac.

Olivier, Laurence (Kerr), BARON OLIVIER OF BRIGHTON, also called (1947–70) SIR LAURENCE OLIVIER (b. May 22, 1907, Dorking, Surrey, Eng.—d. July 11, 1989, near London), English stage and motion-picture actor, director, and producer who helped rebuild London's Old Vic Theatre Company after World War II. He was the first member of his profession to be elevated to a life peerage.



Laurence Olivier as Edgar in the National Theatre Company's 1967 production of *Dance of Death* by August Strindberg

Zoe Dominic

After many stage appearances as a child, Olivier enrolled at the Central School of Dramatic Art in 1924, then began his professional career with the Birmingham Repertory Theatre Company (1926–28). Later he played a supporting role in the original production of Noël Coward's *Private Lives,* and he alternated the parts of Romeo and Mercutio with John Gielgud in *Romeo and Juliet* in London.

In 1937 Olivier joined Old Vic, where he played many Shakespearean roles; on one memorable occasion, he played Hamlet to the Ophelia of Vivien Leigh in a production staged at Elsinore Castle (Kronborg Slot) in Denmark. After a series of films in the United States, including *Wuthering Heights* (1939), *Rebecca* (1939), and *Pride and Prejudice* (1940), he returned to England to serve in the Fleet Air Arm during World War II.

In 1944 he became codirector of the Old Vic with the actor and producer Sir Ralph Richardson. Together, in the next six years, they directed the company in some of its greatest productions. Olivier's notable successes in Shakespearean roles during that time included the title role in *Richard III;* Hotspur in *Henry IV, Part I;* and Justice Shallow in *Henry IV, Part II.* He also played Oedipus in Sophocles' *Oedipus Rex.* He took the Old Vic to the United States in 1946 and a year later was knighted for his services to the theatre. He produced, directed, and played in film versions of *Henry V* (1944) and *Hamlet* (1948); for the latter he received an Academy Award in 1949. He also received an honorary award in 1979 for his contribution to film.

From 1950 Olivier directed and acted under his own management, notably in Shakespeare's *Antony and Cleopatra* and George Bernard Shaw's *Caesar and Cleopatra* with Vivien Leigh, and as Archie Rice in *The Entertainer* (1957) by John Osborne. He became the director of the new, London-based National Theatre Company (1962–73) and also appeared there, notably, in the title role of *Othello,* in August Strindberg's *Dance of Death,* and in Eugene O'Neill's *Long Day's Journey into Night.* In 1970 he was created a life peer and in 1981 received the Order of Merit. Among his many films of the 1950s and '60s were *The Beggar's Opera* (1953); *Richard III* (1956), for which he received a British Film Academy Award; and *Othello* (1965). In 1972 Olivier received the New York Film Critics Award for his performance in *Sleuth.* His later films included *Marathon Man* (1976), *The Boys from Brazil* (1978), and *Richard Wagner* (1982).

Olivier also gave several television performances, for which he received several awards. He received an Emmy in 1973 for *Long Day's Journey into Night;* another Emmy in 1975 for *Love Among the Ruins,* in which he played opposite Katherine Hepburn; and in 1976 he played Big Daddy in *Cat on a Hot Tin Roof.* In 1982 he received another Emmy for his performance in the series *Brideshead Revisited,* and in 1983 he brought a production of *King Lear* to television. His memoirs, *Confessions of an Actor,* were published in 1982.

BIBLIOGRAPHY. Biographies include Foster Hirsch, *Laurence Olivier* (1979), which emphasizes his Shakespearean achievements on film; and Anthony Holden, *Laurence Olivier* (1988), which discusses his versatility as an actor.

olivine, any member of a group of common magnesium, iron silicate minerals. Olivines occur in many basic and ultrabasic igneous rocks and comprise a major constituent of the Earth's upper mantle. They also have been found in some (type A) lunar rocks and in many meteorites.

A brief treatment of olivines follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

All olivines have the same basic orthorhombic structure in which isolated SiO_4 tetrahedra are linked by chains of metal-bearing octahedra. The oxygen atoms of the structure are in approximate hexagonal close-packing, and the two octahedral sites are not equivalent but equal in number. Olivine compositions can be generally described as A_2BO_4 in which the A octahedral ions are most commonly magnesium (Mg) and iron (Fe) with minor amounts of manganese, nickel, and calcium also present; the B tetrahedral ion is silicon. Natural olivine compositions range from nearly pure Mg_2SiO_4 (forsterite) to Fe_2SiO_4 (fayalite) with complete solid solution. Nickel may be present in magnesium-rich olivines, calcium is usually present in all compositions, and manganese is common in iron-rich compositions. No appreciable substitution occurs for silicon. Olivine forms vitreous yellow to greenish yellow equidimensional crystals having no obvious cleavage. Density ranges from 3.2 grams per cubic cm for forsterite to 4.4 grams per cubic cm for fayalite.

Olivine is a particularly interesting mineral for interpreting the origin of igneous rocks.

Olivines

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	fracture or cleavage	refractive indices	crystal system space group	remarks
forsterite–fayalite series									
forsterite Mg_2SiO_4	green to lemon-yellow	vitreous	7	3.2	flattened crystals; compact or granular massive; embedded grains	one distinct, one imperfect cleavage	$\alpha = 1.631$ $\beta = 1.651$ $\gamma = 1.670$	orthorhombic Pbnm	a continuous solid solution series exists between forsterite and fayalite with iron replacing magnesium in the molecular structure; the intermediate members have properties between these two
fayalite Fe_2SiO_4	greenish yellow to yellow-amber	vitreous	6½	4.4		two imperfect cleavages	$\alpha = 1.827$ $\beta = 1.869$ $\gamma = 1.879$	orthorhombic Pbnm	
tephroite–fayalite series									
knebelite $(Mn, Fe)_2SiO_4$	brown-black; gray-black	vitreous	6½	4.0–4.2	crystals; grains	one moderate, two imperfect cleavages	$\alpha = 1.775–1.815$ $\beta = 1.810–1.853$ $\gamma = 1.826–1.867$	orthorhombic Pbnm	a continuous solid solution series exists between fayalite and tephroite with iron replacing manganese in the molecular structure
tephroite Mn_2SiO_4	olive- or bluish green; ash-gray	vitreous	6	3.8		one moderate, one imperfect cleavage	$\alpha = 1.770–1.788$ $\beta = 1.803–1.810$ $\gamma = 1.817–1.825$	orthorhombic Pbnm	
monticellite $CaMgSiO_4$	gray or colourless	vitreous	5½–6	3.1	small prismatic crystals; grains; twinned crystals	poor cleavage	$\alpha = 1.641$ $\beta = 1.646$ $\gamma = 1.653$	orthorhombic Pnma	forms limited solid solution series with glaucochroite and with kirschsteinite with manganese and iron respectively, replacing magnesium in the molecular structure
humite group									
norbergite $Mg(OH, F)_2 \cdot Mg_2SiO_4$	tawny to chamois	vitreous to resinous	6½	3.2	twinned crystals; grains; intergrown with the other members of the group	poor cleavage, subconchoidal to uneven fracture	$\alpha = 1.563–1.567$ $\beta = 1.567–1.579$ $\gamma = 1.590–1.593$	orthorhombic Pmcn	minerals in the humite group are regular intergrowths of brucite and forsterite; they are thus related to the olivines
chondrodite $Mg(OH, F)_2 \cdot 2Mg_2SiO_4$	yellow, brown, hyacinth-red	vitreous to resinous	6½	3.2–3.3			$\alpha = 1.592–1.615$ $\beta = 1.602–1.627$ $\gamma = 1.621–1.646$	monoclinic $P\frac{2_1}{c}$	
humite $Mg(OH, F)_2 \cdot 3Mg_2SiO_4$	yellow, dark orange	vitreous to resinous	6	3.2–3.3			$\alpha = 1.607–1.643$ $\beta = 1.619–1.653$ $\gamma = 1.639–1.675$	orthorhombic Pmcn	
clinohumite $Mg(OH, F)_2 \cdot 4Mg_2SiO_4$	yellow-brown	vitreous to resinous	6	3.2–3.4			$\alpha = 1.629–1.638$ $\beta = 1.641–1.643$ $\gamma = 1.662–1.674$	monoclinic $P\frac{2_1}{c}$	

Because it is generally the first mineral to crystallize from basic and ultrabasic rocks, its composition should reflect to some extent that of the parent magma. In particular, the magnesium-iron ratio of olivine bears a relation to that of its magma as established experimentally and by the study of natural rocks. Minor element concentrations can also be used to derive concentrations in the parent liquid; they also may be used to a limited extent as an indicator of crystallization environment. The ultrabasic rocks dunite and peridotite generally have olivines with between 92 and 88 mole percent forsterite, while basic rocks such as gabbro and basalt have olivines of 85 to 40 mole percent forsterite. Because olivine crystallizes early, thick accumulations may result from gravity settling, especially in igneous intrusions. Compositional zoning within one crystal is very common and represents the changing magma composition as crystallization progresses. Iron-rich olivines are common in quartz-bearing syenites and they occur occasionally in granites. Rather pure forsterite occurs in metamorphosed limestone and dolomites. Olivine is a stable phase only at high temperatures; in the presence of water at low temperatures, it readily undergoes hydrothermal alteration, forming serpentine, chlorite, magnetite, or talc.

Common olivine is relatively infusible, withstanding temperatures of more than 1,500° C (2,700° F), and is sometimes employed in refractory brick. Transparent green olivine is called peridot and is used as a gemstone. Totally serpentinized olivine rocks are commonly utilized as ornamental stone.

Öljeitü, Muslim name MOḤAMMAD KHUDĀBANDA (b. 1280—d. Dec. 16, 1316, Solṭānīyeh, near Kazvin, Iran), eighth Il-Khan ruler of Iran, during whose reign the Shīʿite branch of Islām was first proclaimed the state religion of Iran.

A great-grandson of Hülegü, founder of the Il-Khan dynasty, Öljeitü was baptized a Christian and given the name Nicholas by his mother. As a youth he converted to Buddhism and later to the Sunnite branch of Islām, taking the name Moḥammad Khudābanda. After the death (1304) of his brother Maḥmūd Ghāzān, the seventh Il-Khan, he disposed of his rivals easily and acceded to a relatively peaceful reign. In 1307 the Caspian province of Jilan was conquered, strengthening Il-Khan rule, and a potentially dangerous rebellion was crushed in Herāt (now in Afghanistan). The traditional hostility between the Il-Khans and the Mamlūks of Syria and Egypt persisted, however, and a badly organized invasion of Mamlūk territory took place in 1312. The expedition had to be abandoned after expected help from European princes failed to materialize.

Öljeitü changed his religious affiliations several times. His conversion to Sunnite Islām is attributed to one of his wives. During the winter of 1307–08 there ensued a bitter religious feud between the adherents of the Ḥanafī and Shāfiʿī schools of Sunnite Islāmic law, so disgusting Öljeitü that he considered converting back to Buddhism, a course that proved politically impossible. Greatly influenced by the Shīʿite theologian Ibn al-Muṭahhar al-Hillī, he came to embrace the religion; and on his return from a visit to the tomb of ʿAlī in Iraq (1309–10), he proclaimed Shīʿite Islām to be the state religion of Iran.

An active patron of the arts, Öljeitü built a new capital at Soltānīyeh that required the efforts of many artists, who made it a masterpiece of Il-Khanid architecture. He lent vital encouragement and support to Rashīd ad-Dīn's monumental world history and to the endeavours of Iranian poets.

Olkhon Island, also spelled OL'CHON, island in Lake Baikal, administered as part of Irkutsk *oblast* (province), east-central Russia. It is separated from the lake's western shore by the straits of Olkhon and the Maloye More (Little Sea). Its area is 280 square miles (730 square km), and its highest point, Mount Zhima, rises to 4,186 feet (1,276 m). The island is composed largely of granites and gneisses. The northern part is forested, while the southern has steppe-grasslands. The island has frequent northwesterly winds known as *sarma.*

Ollivier, Émile, Ollivier also spelled OLIVIER (b. July 2, 1825, Marseille, France—d. Aug. 20, 1913, Saint-Gervais-les-Bains), French statesman, writer, and orator who, as minister of justice under Napoleon III, authored an abortive plan for achieving a governmental compromise between Napoleonic autocracy and parliamentary democracy.

Trained in the law and, in his early life, an adherent of the socialist and Romantic movements, Ollivier was appointed commissioner-general of the Bouches-du-Rhône *département* at the outbreak of the Revolution of 1848. When Louis-Napoléon became president of the republic (December 1848), Ollivier was dismissed from his post and from 1849 to 1857 held no public office. During this time he abandoned his socialist activities and concentrated on his law practice.

Elected to the Legislative Assembly in 1857, Ollivier became one of the republican minority known as "the Five," which viewed Napoleon's regime with hostility. But when the emperor made liberal concessions in November 1860, Ollivier offered his support to him if Napoleon would establish representative government. Ollivier soon broke with the republicans and began working with the Duke de Mornay for a "liberal empire" that would incorporate elements of parliamentary government.

Ollivier, photograph by P. Petit; in the Bibliothèque Nationale, Paris
By courtesy of the Bibliotheque Nationale, Paris

On Jan. 2, 1870, Napoleon appointed Ollivier minister of justice at the head of a government chosen from the leaders of a majority in parliament. Ollivier drew up a new constitution that was approved in a plebiscite by nearly 70 percent of the voters, and he set up numerous commissions to prepare the complete reform of such areas as labour, education, and law. He seemed to have transformed the Second Empire from despotism to constitutional monarchy without bloodshed or violence.

Ollivier's work was ruined by the outbreak of the Franco-German War little more than six months after he came to power. He had no desire for war, but he allowed the control of events to slip out of his hands, so that when the Prussian chancellor Otto von Bismarck's Ems telegram was published Ollivier considered it an intolerable insult to France and declared war on Prussia (July 19, 1870). The French military reverses soon obliged him to resign, which he did on Aug. 9, 1870, and he never returned to politics.

During the remaining 43 years of his life, Ollivier cultivated his wide interests and varied talents. At 65 he wrote *L'Empire libéral* ("The Liberal Empire"), partly a history of the Second Empire and partly memoirs. This monumental work of 17 volumes is historically valuable as a contemporary defense of Napoleon III. From 1870 he was a member of the French Academy.

olm (*Proteus anguinus*), blind salamander belonging to the family Proteidae (order Caudata) and found in caves of the Carpathian Mountains in southeastern Europe. It grows to about 30 cm (12 inches) long and has a normally white (unpigmented) body, tiny limbs, red gill plumes, narrow head, and a blunt snout. The olm's vestigial but light-sensitive eyes are covered with skin. It usually lays eggs but sometimes bears its young alive.

Olm (*Proteus anguinus*), darkened by exposure to light
Jacques Six

Olmaliq, Russian ALMALYK, city, eastern Uzbekistan. It is situated 35 miles (55 km) southeast of the city of Tashkent on the northern slopes of the Qurama Mountains and on the left bank of the Ohangaron River. Olmaliq was founded in 1951 from several settlements exploiting the rich nonferrous-metal resources of the Qurama Mountains. The city has become an important centre of nonferrous metallurgy and produces copper, molybdenum, lead, and zinc concentrates. Copper and zinc are also refined there. The Uzbek version of the city's name became the official one in the early 1990s. Olmaliq (Uzbek: "Apple Grove") derives its name from the wild apple trees that grew in the valley. Pop. (1991 est.) 116,400.

Olmec, the first elaborate pre-Columbian culture of Mesoamerica, and one that is thought to have set many of the fundamental patterns evinced by later Indian cultures of Mexico and Central America.

The Olmec people lived in hot, humid lowlands along the Gulf Coast in what is now southern Veracruz and Tabasco states in southern Mexico. The first evidences of their remarkable art style appear at about 1150 BC in their oldest known building site, San Lorenzo. This site is remarkable for its many stone monuments, prominent among which are colossal carved heads that have characteristic flat faces, thickened lips, and helmetlike headgear. A later Olmec ceremonial centre, La Venta (*q.v.*), is marked by great mounds, a narrow plaza, and several other ceremonial enclosures. The Olmecs developed a wide trading network, and between 1100 and 800 BC their cultural influence spread northwestward to the Valley of Mexico and southeastward to parts of Central America. It is clear that later Mesoamerican native religions and iconography, from all parts of the area, can be traced back to Olmec beginnings. Besides monumental architecture and sculpture, Olmec art is expressed in small jade carvings, pottery, and other media. Its dominant motif is the stylized figure of a god that is a hybrid between a jaguar and a human infant.

From the Olmecs' constructions and monuments, as well as from the sophistication and power of their art style, it is evident that their society was complex and nonegalitarian. Olmec stylistic influence disappeared after about 800 BC. Not all of the Olmec sites were abandoned, but Olmec culture gradually changed, and the region ceased to be the cultural leader of Mesoamerica. *See also* Mesoamerican civilization.

Olmedo, José Joaquín (b. March 20, 1780, Guayaquil, New Granada [now in Ecuador]—d. Feb. 19, 1847, Guayaquil, Ecuador), poet and statesman whose odes commemorating South America's achievement of independence from Spain captured the revolutionary spirit of his time and inspired a generation of Romantic poets and patriots. They have remained monuments to the heroic figures of the liberation movement in South America.

After receiving his degree in law in 1805 from the National University of San Marcos in Lima, Peru, Olmedo was sent to Spain in 1811 to represent Guayaquil in the Cortes de Cádiz, the revolutionary parliament that promulgated the liberal constitution of 1812.

Olmedo returned to Guayaquil in 1816, continuing to be active in political life while writing poetry. His forceful themes of battle and liberation, inspired by contemporary events and the poetry of Homer, Horace, and Virgil, soon brought him recognition as an outstanding spokesman of the liberation movement. The ode for which he is best remembered, *La victoria de Junín: Canto a Bolívar* (1825; "The Victory at Junín: Song to Bolívar"), commemorates the decisive battle won there by the forces of the liberator Simón Bolívar against the Spanish armies. Neoclassical in form, yet Romantic in inspiration and imagery, the *Canto a Bolívar* is considered by many critics the finest example of heroic poetry written in Spanish America.

When Ecuador became a republic in 1830, Olmedo was elected its first vice president, but he declined this honour, preferring to remain active in local politics. His later poetry foresaw and deplored the trend toward the militarism and civil war that was beginning to undermine the unity of South America after independence had been achieved.

Olmsted, Frederick Law (b. April 26, 1822, Hartford, Conn., U.S.—d. Aug. 28, 1903, Brookline, Mass.), American landscape architect who designed a succession of outstanding public parks, beginning with Central Park in New York City.

At the age of 14, sumac poisoning seriously affected Olmsted's eyesight and limited his education. As an apprentice topographic engineer for a brief period, he received the fundamental skills needed for his later career. In 1842 and 1847, his sight having improved, Olmsted attended lectures in science and engineering at Yale University. For a time he was interested in scientific farming, which he studied under George Geddes, who had a well-known model farm at Owego, N.Y. During an extensive holiday in Europe, Olmsted was profoundly impressed with English landscaping and wrote about his observations in *Walks and Talks of an American Farmer in England* (1852).

Olmsted's open opposition to slavery led the editor of *The New York Times* to send him to the American South from 1852 to 1855 to report weekly on how slavery affected the region's economy. His report, published as *The Cotton Kingdom* (1861), is regarded as a reliable account of the antebellum South. In 1857 Olmsted was appointed superintendent of New York City's projected Central Park. A competition was held to select a new plan for the park, and Olmsted collaborated with the young British architect Calvert Vaux in developing the successful design. In 1858 he became chief architect of the park and from then until 1861 worked assiduously in one of the first attempts in the United States to apply art to the improvement of nature in a public park. The work attracted widespread attention, with the result that he was engaged thereafter in most of the important works of a similar nature in the United States: Prospect Park, Brooklyn, N.Y.; Fairmont Park, Philadelphia; Riverside and Morningside parks, New York City; Belle Isle Park, Detroit, Mich.; the grounds surrounding the Capitol at Washington, D.C., between 1874 and 1895; Stanford University at Palo Alto, Calif.; and many others. He also designed Mount Royal Park, Montreal.

From 1864 to 1890 Olmsted chaired the first Yosemite commission, taking charge of the property for California and succeeding in preserving the area as a permanent public park. Plans for the Niagara Falls park project, among the last in which Olmsted and Vaux collaborated, did much to influence New York state to preserve the Niagara reservation.

After 1886 Olmsted was largely occupied in laying out an extensive system of parks and parkways for the city of Boston and the town of Brookline, Mass., and in working on a landscape improvement scheme for Boston Harbor. In the late 1880s, when the Chicago World's Columbian Exposition was being planned for 1893, Olmsted was chosen to head the landscape project, which he later redesigned as Jackson Park. He spent his last years mainly at his home in Brookline.

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Olmütz (Czech Republic): *see* Olomouc.

Olmütz, Punctation of, German OLMÜTZER PUNKTATION (Nov. 29, 1850), agreement signed at Olmütz (Olomouc, Moravia, in modern Czech Republic) between Prussia and Austria that regulated those two powers' relations. The development leading up to the punctation was triggered when the elector of Hesse in the autumn of 1850 appealed for help against his rebellious subjects; both Austria and Prussia sent troops in response, and these threatened to clash. The Russian emperor thereupon sided with Austria, and the Prussian troops withdrew as a consequence. Under the terms of an agreement reached at Olmütz, Prussia gave up its own plans for a union of the German states without Austria and accepted Austria's reconstitution of the German Confederation, a loose grouping of German states that it had been hoped might replace the Holy Roman Empire (dissolved by Napoleon in 1806). The Punctation of Olmütz therefore represented a diplomatic reverse for Prussia and a victory for Austria. Though the question of Germany's future organization was settled in April 1851 on terms unfavourable to Austria, Prussia's resentment of the punctation remained.

Olney, Richard (b. Sept. 15, 1835, Oxford, Mass., U.S.—d. April 8, 1917, Boston), U.S. secretary of state (1895–97) who formulated the Olney Corollary to the Monroe Doctrine, which maintained the right of the United States to intervene in any international disputes within the Western Hemisphere.

A Boston attorney who had served only one term in the Massachusetts legislature (1873–74), Olney was suddenly thrust into national prominence when President Grover Cleveland appointed him U.S. attorney general in 1893. In this position, during the strike of railway employees against the Pullman Company in Chicago (1894), he obtained a court-ordered injunction to restrain the strikers from acts of violence, thus setting a precedent for the use of such injunctions to help break labour strikes. Olney sent federal troops to the scene, arrested Eugene Debs and other strike leaders, and saw his use of injunctions sustained by the Supreme Court the following year.

Olney, 1895
By courtesy of the National Archives, Washington, D.C.

Becoming secretary of state in June 1895, Olney was almost immediately faced with the problem of appeals by Venezuela for U.S. support in its dispute with Great Britain over the Venezuela-British Guiana boundary. With Cleveland's support, Olney issued (July 20) an aggressive note demanding that Britain, in conformity with the Monroe Doctrine, arbitrate the controversy to avoid war and asserting the sovereignty of the United States in the Western Hemisphere. The matter was in fact

Gallaudet College, Washington, D.C., designed by Olmsted and Vaux, 1886
Olmsted Sesquicentennial Committee; photo, Circlescan, Red Bank, New Jersey

arbitrated in 1899, after Olney retired in 1897 to the private practice of law.

Olof SKÖTKONUNG: *see* Olaf *under* Olaf (Sweden).

Olomouc, German OLMÜTZ, city, Severomoravský *kraj* (region), Czech Republic. The city lies along the Morava River at its confluence with the Bystřice River, at the northern edge of the fertile Haná farming region.

Olomouc possibly originated as a Roman fort (Mons Iulii) and by the 9th century was an important stronghold. A bishopric, established there in 1063, was raised to an archbishopric in 1777. At the Peace of Olomouc (1478), Moravia was ceded to Hungary. Olomouc was considered the Moravian capital during the Thirty Years' War (1618–48), when it was occupied and plundered by the Swedes. The badly damaged town was displaced after 1640 by Brno as the foremost city of Moravia. It retained its importance as a military stronghold, however, and played a significant role in the mid-18th century during the struggle over Silesia between the Prussians and Austrians. The emperor Ferdinand I of Austria abdicated there in 1848 in favour of the young Francis Joseph I, and the Punctation of Olmütz of 1850 restored the German Confederation. The town's fortifications were eventually demolished in the late 19th century.

Astronomical clock on the town hall tower, in Olomouc, Czech Republic
Flip Schulke—Black Star

Olomouc's historic buildings include the 14th-century Gothic St. Wenceslas' Cathedral, with a 328-foot (100-metre) tower, and the town hall, which is adorned by a 230-foot (70-metre) tower and a 15th-century astronomical clock (restored after being damaged in World War II). Olomouc is also known for its fountains, notable among which are Triton (1707) and Caesar's (1720). The city's university was founded in 1573; it was suppressed in 1854 but was revived after World War II and named after František Palacký, the Czech patriot-scholar. The city's manufactures include steel, machine tools, gas appliances, refrigerators, salt, sugar, chocolate, malt, and beer. Pop. (1991 prelim.) 105,690.

Olongapo, city, southwestern Luzon, Philippines. The city is situated in a lowland area near the mouth of Subic Bay. Olongapo was heavily damaged in World War II. It became a municipality in 1959 and a chartered city in 1966. The United States' Subic Bay Naval Station was located nearby and was largely responsible for the rapid growth of the city and its business and service establishments in the second half of the 20th century. The United States evacuated the base and turned it over to the Philippines in 1992, however. The city, recognized as a major tourist centre, annually attracts many visitors to its numerous resorts and beaches. Pop. (1990 prelim.) 192,000.

Olson, Charles (John) (b. Dec. 27, 1910, Worcester, Mass., U.S.—d. Jan. 10, 1970, New York, N.Y.), avant-garde poet and literary theorist, notable for his influence on American poetry during the late 1950s.

Olson was educated at Wesleyan University, where he earned an M.A. in 1933. He taught at Clark University, Harvard University, and Radcliffe College, but his real influence began in the late 1940s as an instructor and then as rector (1951–56) at Black Mountain College in North Carolina (*see* Black Mountain poet).

Olson first gained recognition for *Call Me Ishmael* (1947), a study of the literary influences on Herman Melville's *Moby Dick.* His concepts of poetry, contained in the essay *Projective Verse* (1950), influenced such poets as Robert Creeley, Robert Duncan, and Denise Levertov. Olson's *The Maximus Poems* (1953, 1956, combined 1960) is a long sequence of poems continued in subsequent volumes, while *Cold Hell, in Thicket* (1953) and *The Distances* (1961) contain some of his best-known shorter poems.

Olson rejected traditional verse forms, advocating instead a primal linkage between breathing and the phrasing of words to obtain the most forceful version of a poem.

Olson, Elder (James) (b. March 9, 1909, Chicago, Ill., U.S.—d. July 25, 1992, Albuquerque, N.M.), American poet, playwright, and literary critic. He was a leading member of the Neo-Aristotelian, or "critical pluralist," school of critical theory that came to prominence in the 1940s at the University of Chicago.

After receiving his Ph.D. from the University of Chicago in 1938, Olson taught for several years at the Armour Institute of Technology in Chicago. He returned to the University of Chicago in 1942 and—along with his teachers and colleagues Richard McKeon, R.S. Crane, and Wayne Booth—became known for his responses to the New Criticism. In *Critics and Criticism* (1952; the Neo-Aristotelian manifesto edited by R.S. Crane) and later works, including *Tragedy and the Theory of Drama* (1961) and *The Theory of Comedy* (1968), Olson argued for a systematic and comprehensive approach to criticism based on the principles of Aristotle's *Poetics.* He attacked the New Critics for focusing on the diction of poetry and argued that criticism should concentrate on poetic wholes instead.

Although less widely known than his criticism, Olson's poetry is characterized by rich imagery, serious and elegiac tone, sharp wit, technical dexterity, and metaphysical themes. His verse collections include *Thing of Sorrow* (1934), *The Scarecrow Christ and Other Poems* (1954), *Plays and Poems* (1958), and *Olson's Penny Arcade* (1975).

Olsztyn, *województwo* (province), northeastern Poland, established in 1975. It is bordered by Russia on the north and by the provinces of Suwałki on the east, Ostrołęka and Ciechanów on the south, and Toruń and Elbląg on the west. Olsztyn is the largest province in Poland and one of the most sparsely populated. The province includes much of the Masurian lake district; it has some 2,000 lakes, and much of its area is densely forested. Tourism, light manufacturing, food processing, lumber milling, and chemical production are the main industries. Agriculture (grains, potatoes) is also economically important. Numerous health spas and resorts are located along the rivers. The provincial capital is Olsztyn (*q.v.*) city. Area 4,759 square miles (12,327 square km). Pop. (1991 est.) 753,000.

Olsztyn, German ALLENSTEIN, capital of Olsztyn *województwo* (province), northeastern Poland. It lies along the Łyna River in the Masurian lake district. The town serves as a trade centre, with major rail and road connections for the lake district. The Masurian Regional Museum and an agricultural school are located here. The Teutonic Knights built an imposing castle there in 1334, and the settlement that grew around it received municipal rights in 1353. The town and its locality became part of Poland in 1466 and was annexed by Prussia in 1772. After suffering extensive damage in World War II, Olsztyn was returned to Poland in 1945 and was entirely resettled by Poles. Parts of the Gothic castle and surrounding walls remain. The town's industry includes tire production. Pop. (1991 est.) 163,900.

Castle of the Teutonic Knights at Olsztyn, Pol.
CAF, Warsaw

Olt, *județ* (district), south-central Romania. It is bounded on the south by Bulgaria. The sub-Carpathian Mountains lie in the northern portion of the district, overlooking settlement areas in intermontane valleys and lowlands. The eastward-flowing Danube River and the southeastward-flowing Olt and Vedea rivers drain the area. Slatina (*q.v.*) town, in existence since the 14th century, is the district capital and has food and aluminum industries. Caracal is a timber centre. Agricultural activities in the district consist of livestock raising and cereal, orchard, and vineyard cultivation. Caracal town was the residence of the rulers of feudal Walachia during the first half of the 17th century. Highway and railway connections extend between the larger towns in the district. Area 2,126 square miles (5,507 square km). Pop. (1992 prelim.) 521,000.

Olt Defile, defile in south-central Romania. The defile was cut into the Transylvanian Alps (Southern Carpathians) by the Olt River. It was particularly important during the Roman occupation (1st century BC to the 2nd century AD), when the Romans built a road and a line of fortifications along the Olt, north of its junction with the Danube River. The line of fortifications, known as the Limes Alutanus, for a time marked the eastern frontier of Roman Dacia. Remains of Roman castra have been found in the villages of Boița, Cîlineni, and Călimănești. Several monasteries and hermitages were built in the area from the 14th to 18th century. The 17th-century Turnul Monastery includes cells carved into the cliffs by hermits from the nearby Cozia Monastery

(14th century), known for its exterior frescoes. The Ostrov Hermitage was built in the 16th century, and the Cornet Hermitage dates from the 17th and 18th centuries. Fortresses (16th century) are located in Turnu Roşu and Boiţa. Hot-springs resorts are situated in the Brezoi-Titeşti Depression of the defile. Walnut and oak trees, wild roses, and white ivy grow in the surrounding mountains. Highway and railway connections run along the defile between Rîmnicu Vilcea and Sibiu.

Olt River, river, rising close to the headwaters of the Mureş River, in the Ciuc Depression, east central Romania, at an altitude of 5,900 ft (1,800 m); it flows generally southwest and then south for 420 mi (670 km), entering the Danube at Turnu-Măgurele. The river exits from the Ciuc Depression through the mountains at Tuşnad, carving out a valley where several resorts and spas are located (including Tuşnad and Malnaş); it then flows through the Bîrsei and Făgăraş valleys before cutting a gorge through the Transylvanian Alps (Southern Carpathians), after which it flows south through the Danube Plain. Its watercourse across the Transylvanian Alps at Turnu Roşu Pass is the most important breach of those mountains in Romania. There is some logging along its upper and middle courses, and its lower course below Slatina is navigable for small boats. Its principal tributaries include the Rîul Negru, the Lotru, the Olteţ, the Cibin, and the Teslui.

Olt River, flowing through the Făgăraş Mountains, central Romania

William Gelman—Artstreet

Olybrius (d. Nov. 2, 472), Western Roman emperor from April to November 472.

Before he became head of state, Olybrius was a wealthy senator; he married Placidia, the daughter of Valentinian III (Western emperor 425–455). Gaiseric, king of the Vandals, a Germanic people who maintained a kingdom in North Africa, hoped that Olybrius would be made Western emperor but his support made Olybrius suspect to the Eastern Roman emperor Leo I. Leo sent Olybrius from Constantinople to Rome, hoping he would be killed by the reigning Western emperor, Anthemius; but the Roman general Flavius Ricimer, known as a kingmaker, elevated him to the throne soon after his arrival (April 472). Anthemius was overthrown and put to death in July 472. Ricimer died in August and his puppet king Olybrius lived only until November. Leo never recognized Olybrius as a legitimate ruler.

Olympia, ancient sanctuary and site of the ancient Olympic Games, located in the western Peloponnese, 10 miles (16 kilometres) inland from the Ionian Sea, near a point where the Alpheus (Alfios) and Cladeus (Kladios) rivers meet. The country is rich and well watered, consisting of low, wooded hills alternating with farmland.

History and excavations. The earliest remains date from 2000 to 1600 BC, the sanctuary itself from around 1000. First controlled by the town of Pisa, after 570 BC Olympia came under the jurisdiction of Elis and Sparta. The religious festival, of which the Games were a part, was held there every four years from the 8th century BC until the end of the 4th century AD.

The first excavations were conducted on the site of the Temple of Zeus in 1829 by the French Expédition Scientifique de Morée (A. Blouet). The temple was sufficiently cleared to reveal its general plan, and fragments of three sculptured metopes (panels) were found, which were later placed in the Louvre, in Paris. The great German excavations of 1875–81 cleared the whole of the sacred precinct and some buildings that lay outside it; the position of the stadium was located by exploratory trenches. Thus the plan of a great Greek sanctuary was revealed for the first time. In the early 20th century some small-scale exploratory digging was done in the deeper layers in the sanctuary. Large-scale work was resumed by the Germans in 1936, one of the chief aims being the excavation and restoration of the stadium. Interrupted by World War II in 1942, work was resumed in 1952, and in 1960 the excavation of the stadium was completed, with its restoration in 1961. Other structures were explored in this period, the most important of which was the workshop of the sculptor Phidias.

The remains. The sacred precinct, the Altis, or Sacred Grove of Zeus, was an irregular quadrangle more than 200 yards (182.9 metres) on a side, bounded on the north by the hill of Cronus and enclosed by a wall on the other three sides. In it were the temples of Zeus and Hera, the principal altars and votive offerings, the treasuries, and administration buildings. Outside were the athletic installations and the hostels, baths, and other accommodations for visitors.

The Temple of Zeus was the largest and most important building at Olympia and one of the largest Doric temples in Greece. Built about 460 BC by the architect Libon of Elis, the temple was made of a coarse local shell conglomerate, the exposed surfaces being covered with a coat of fine white stucco. The temple had 6 columns across the front and 13 on the sides. There was a *pronaos* (porch) and an *opisthodomos* (rear porch), and the *naos* (cella; part enclosed by the walls) was divided into three aisles by two rows of slender columns arranged in two stories. The roof tiles were of marble.

The temple was richly decorated with sculpture, much of which has survived and is to be seen in the Olympia Museum. In the front gable the chariot race between Pelops and Oenomaus was represented, and both parties were shown preparing for the race. In the back gable was the battle of the Lapiths and Centaurs at the wedding of Perithous. These sculptures are masterpieces of the early Classical style, but the name of the artist is not known. Pausanias' attribution of them to Paeonius and Alcamenes is generally rejected because these sculptors are known to have worked in the later 5th century. The frieze that ran above the front and back porches had sculptured metopes with the 12 labours of Heracles, 6 at each end. At the peak of the gable was a gilded figure of Victory and at each corner a gilded caldron, but these have not survived.

Within the temple was the great gold and ivory (chryselephantine) statue of Zeus, the work of the Athenian sculptor Phidias, the most famous of all ancient statues and counted one of the Seven Wonders of the World. It made a profound impression on all who saw it, and people generally agreed that Phidias had succeeded in creating the image of Homer's Zeus. The god was represented seated on an elaborately wrought throne. He held a figure of the goddess of victory (Nike) in his right hand and a sceptre in his left.

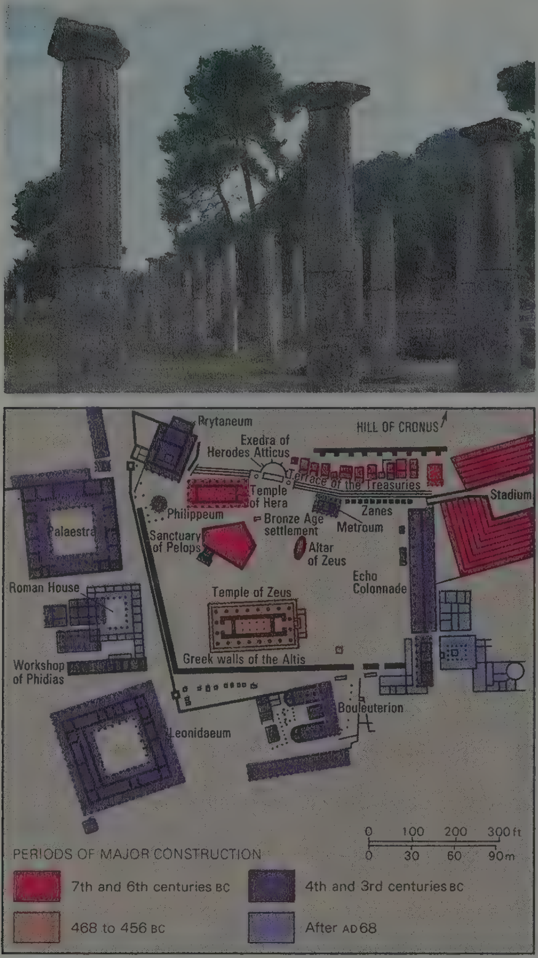
This statue (which was destroyed sometime in the 5th century AD) was made piece by piece by Phidias and his collaborators in a building just outside the Altis to the west of the temple. Subsequently converted into a church, the building was still known in the time of Pausanias as the "workshop of Phidias." The excavations of 1954–58 brought dramatic confirmation of the identification. In the deep layers in and around the building, particularly toward the south, a great mass of material, evidently waste from an artist's atelier, was found. This material included tools, slivers and worked fragments of ivory and bone, glass ornaments, and molds. The clay molds, of a very heavy fabric, like roof tiles, with the larger ones sometimes reinforced with iron rods, are of an unusual open form and were evidently used for hammering into shape the thin plates of gold that formed the statue's drapery. Pottery found with this debris indicates that the workshop was active in the years around 430 BC, an important fact because it settles an old controversy as to whether Phidias made the Zeus before or after his other great chryselephantine statue, the Athena Parthenos, which was completed in 438 BC. The new evidence is decisively in favour of the later date. One of the pieces of pottery, a ribbed mug, has inscribed on its bottom in neat clear letters the words "I am [the property] of Phidias."

The great altar of Olympian Zeus was not in front of the temple, as might have been expected, but to one side and nearer the Temple of Hera. It was elliptical in shape and consisted of an elevated base approached by steps. From the base rose a large mound made of the ashes of the thighs of animal victims sacrificed to Zeus. The whole height of the altar was 22 feet (6.7 metres).

The oldest temple at Olympia and one of the most venerable in all Greece was that of Hera, originally a joint temple of Hera and Zeus until a separate temple was built for him. It has sometimes been thought that the Temple of Hera was built in the 11th or 10th century BC, but this view is now rejected. The existing temple was probably built about 600 BC, and an earlier phase, without peristyle (colonnade), may go back to the 8th century. The temple is long and narrow, having 6 columns across the ends and 16 along the sides. The columns are Doric, showing a great variety of styles because they were originally of wood and were gradually replaced in stone. In the 2nd century AD there was still one wooden column in the *opisthodomos.* The entablature was of wood, and the upper parts of the walls were of mud brick. The cella had two interior rows of columns, alternate columns being attached by spurs to the cella walls and thus forming bays. Pausanias says that in the temple was an image of Hera seated on a throne with an image of Zeus standing beside her. An archaic limestone head thought to be that of the Hera has been found. Pausanias also reports the existence of a stone statue of Hermes carrying the young Dionysus, a work of Praxiteles that was found in the cella of the temple in 1877 and is one of the most prized possessions of the Olympia Museum.

A row of 12 treasuries overlooked the Altis from the lowest slopes of the hill of Cronus. These small structures in the form of Doric temples date from the 6th century BC. All were erected by Dorian states ranging from Byzantium to Gela in Sicily and Cyrene in northern Africa. In the case of only three, Sicyon, Megara, and Gela, is enough material available to allow a reconstruction on paper. These treasuries were erected by the several states either as thanks offerings for Olympic victories gained by their citizens or as a general mark of homage to Olympian Zeus and to contain the dedicated gifts in which the wealth of the sanctuary consisted.

Between the temples of Zeus and Hera, the Elean hero Pelops had a sanctuary in the Altis that was open to the sky and surrounded by a wall, with trees and statues within.



The sanctuary at Olympia
(Top) Ruins of the Palaestra outside the walls of the sacred precinct; (bottom) plan of the sanctuary

(Top) Dan J. McCoy—Black Star; (bottom) adapted from *Westermann Grosser Atlas zur Weltgeschichte*, Georg Westermann Verlag, Braunschweig, West Germany

The Metroum, or Temple of the Great Mother of the Gods, was a small Doric temple of the 4th century BC just below the treasuries. Because the cult no longer existed in Roman times, the excavated temple contained statues of Roman emperors.

A round building of the Ionic order, with Corinthian half columns on the inside, was erected by Philip of Macedon to commemorate his victory over the Greeks at Chaeronea in 338 BC. The building, called the Philippeum, contained gold and ivory statues of Philip, Alexander, and other members of the family.

The Prytaneum, in the northwest corner of the Altis, was a building that contained a hearth on which burned a perpetual fire and a banquet room in which the Olympic victors were feasted. The Exedra of Herodes Atticus is a large, lavishly decorated fountain, on an apsidal (semicircular) plan; it was erected by Herodes Atticus in the name of his wife Regilla. On it were displayed some 20 statues of Herodes and his family and of the Roman emperors Hadrian and Antoninus Pius.

The Echo Colonnade was officially called the Stoa Poikile, or Painted Colonnade, from the paintings that used to be on its walls, but it was popularly called the Echo Colonnade because an echo repeated a word seven times or more. The colonnade closed the east side of the Altis and was separated from the east Altis wall, which supported the stadium embankment, by a narrow passage. The colonnade was built soon after the middle of the 4th century BC. Deep down beneath its floor, the starting line of the early classical stadium has been found.

Zanes were bronze statues of Zeus erected with money from fines imposed on those who wantonly violated the rules of the Games. The bases of 16 of these have been found just outside the covered entrance to the stadium, the entrance by which the athletes entered.

The Bouleuterion, or council house, lies just outside the Altis to the south. It comprised two Doric buildings of different date but of identical oblong form with apsidal ends toward the west. In the space between was a rectangular court at the centre of which stood the statue of Zeus Horkios (Zeus Who Presides over Oaths). Beside this statue the athletes took the oath not to indulge in foul play during the contests.

Outside the Altis to the southwest stood the Leonidaeum, a large hostel for the reception of distinguished visitors, which was built in the 4th century BC and remodelled in Roman times. To the northwest were the Palaestra, where wrestlers and boxers trained, and the gymnasium, which included an elaborate entrance gateway and a covered running track.

The stadium lay to the east of the Altis. In early classical times it was not cut off from the sanctuary, and one end of the track was in the area directly in front of the temple and the great ash altar of Zeus (beneath the later Echo Colonnade). About the middle of the 4th century BC the stadium was shifted about 90 yards (about 82 metres) eastward and a little to the north. The track was surrounded by massive sloping embankments of earth for the accommodation of the spectators, except to the north where the natural slope of the hill sufficed. The western embankment, parallel to which the Echo Colonnade was built, effectively cut the stadium off from the Altis. Connection between the two was maintained by what was called the Krypte, or Covered Entrance, which pierced the embankment and, in Roman times, was covered with a stone vault. This entrance was used by the athletes and the umpires. There were no stone seats in the stadium except for a box on the south side about one-third of the way from the starting line nearest the Altis; here the *hellanodikai,* or chief judges of the Games, sat. Directly opposite the box was the altar of Demeter Chamyne, from which the priestess of that cult was privileged to watch the Games (married women were excluded from the Olympic festival, but unmarried girls were permitted). The track was about 230 yards (210 metres) long and 35 yards (32 metres) wide and separated from the sloping embankments by a low stone parapet beside which ran an open stone water channel with basins at intervals. The actual course was marked by stone starting lines at either end. These were about 210 yards apart (192.28 metres | = | 600 Olympic feet). There was space for 20 runners at a time. The classic race was the stade—*i.e.,* one length of the course. There was also a *diaulos,* two lengths, and a *dolichos,* or long-distance race, the length of which varied and might be as much as 24 stades, or nearly 3 miles. Other athletic contests were also held in the stadium. This 4th-century stadium has been fully excavated and its track and embankments have been restored.

When the stadium embankments were excavated many votive offerings were discovered. Some of these were works of art of various kinds, including bronze statuettes and reliefs and several terra-cotta statues, of which the most noteworthy was a group of Zeus and Ganymede, about half-life-size and dating from around 470 BC. Others were arms or armour that had been dedicated in the sanctuary; the Olympia Museum houses the largest collection of ancient Greek weapons in the world, some of which have identifying inscriptions on them that are interesting historical documents, such as a Persian helmet with the inscription "The Athenians [dedicated the helmet] to Zeus, having taken it from the Medes."

The hippodrome where the horse races were held lay south of the stadium in the open valley of the Alpheus. No trace of this has been found. Pausanias gives a long description of the hippodrome and of the elaborate starting machinery. (E.V.)

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Olympia, capital of Washington, U.S., seat of Thurston County, on Budd Inlet and Capitol Lake (at the south end of Puget Sound), at

Legislative Building, central building of the Capitol Group, Olympia, Wash.

Bond

the mouth of the Deschutes River, 29 miles (47 km) southwest of Tacoma. Laid out in 1851 as Smithfield, it was renamed for the nearby Olympic Mountains. Chosen as the territorial capital in 1853 and incorporated in 1859, Olympia developed port facilities and a lumber-based economy, augmented by oyster farming, dairying, brewing, and other industries. Its harbour serves as the base for a large merchant reserve fleet. The Old Capitol (built 1893) is used as a state office building. The new Capitol Group (completed 1935) stands on a promontory in a 35-acre (14-hectare) park. Located at the base of the Olympic Peninsula, the city is the gateway to Olympic National Park and is the headquarters for the Olympic National Forest. Pop. (1992 est.) city, 35,712; Olympia MSA, 170,155.

Olympias (b. *c.* 375 BC—d. 316), wife of Philip II of Macedonia and mother of Alexander the Great. She had a passionate and imperious nature, and she played important roles in the power struggles that followed the deaths of both rulers.

The daughter of Neoptolemus, king of Epirus, Olympias apparently was originally named Myrtale. Later she may have been called Olympias as a recognition of Philip's victory in the Olympic Games of 356 BC. Philip's polygamy did not threaten her position until 337, when he married a high-born Macedonian, Cleopatra. Olympias withdrew to Epirus, returning after Philip's assassination (336). She then had Cleopatra and her infant daughter killed. Olympias quarreled repeatedly with Antipater, regent of Macedonia during the early years of Alexander's invasion of Asia, and eventually retired again, about 331, to Epirus. Upon the death of Antipater in 319 (Alexander had died in 323), his successor, Polyperchon, invited Olympias to act as regent for her young grandson, Alexander IV (Alexander the Great's son). She declined his request until 317, when Antipater's son Cassander established Philip II's half-witted son Philip III (Arrhidaeus) as king of Macedonia. The Macedonian soldiers supported her return. She put to death Philip Arrhidaeus and his wife, as well as Cassander's brother and a hundred of his partisans. In response Cassander entered Macedonia and blockaded Olympias in Pydna, where she surrendered in the spring of 316. She was condemned to death, but Cassander's soldiers refused to carry out the sentence. She eventually was killed by relatives of those she had executed.

Olympic Games, major athletic contest in ancient Greece and, in modern times, the world's foremost amateur sports competition.

A brief treatment of the Olympic Games follows. For full treatment, *see* MACROPAEDIA: Olympic Games.

According to tradition, the games were first held in 776 BC at Olympia, Greece, and at four-year intervals thereafter. After the subjugation of Greece by Rome, the games declined and were finally abolished in AD 393 by the Christian Roman emperor Theodosius I.

At first the program of the ancient Olympic Games was confined to one day and consisted only of a single event, a footrace the length of the stadium. Afterward, additional races, the discus throw, the javelin throw, the long (broad) jump, boxing, wrestling, the pentathlon, chariot racing, and other events were added; and the duration, including religious ceremonies, was extended to five days.

In the late 19th century, through the efforts of Baron Pierre de Coubertin of France, the Olympic Games were revived. The games of the first Olympiad of the modern cycle were held under the royal patronage of the king of Greece in 1896 in a new stadium constructed in Athens for the purpose. Subsequent games were held in various cities of the world at four-year intervals, except for lapses during World Wars I and II. A separate cycle of winter games was initiated in 1924 at Chamonix, France. The direction of the modern Olympic movement and the regulation of the games is vested in the Comité International Olympique (International Olympic Committee), with headquarters at Lausanne, Switz.

Sites of the modern Olympic Games

year	Summer Games	Winter Games
1896	Athens, Greece	*
1900	Paris, Fr.	*
1904	St. Louis, U.S.	*
1908	London, Eng.	*
1912	Stockholm, Swed.	*
1916	†	*
1920	Antwerp, Belg.	*
1924	Paris, Fr.	Chamonix, Fr.
1928	Amsterdam, Neth.	St. Moritz, Switz.
1932	Los Angeles, U.S.	Lake Placid, U.S.
1936	Berlin, Ger.	Garmisch-Partenkirchen, Ger.
1940	†	†
1944	†	†
1948	London, Eng.	St. Moritz, Switz.
1952	Helsinki, Fin.	Oslo, Nor.
1956	Melbourne, Austl.	Cortina, Italy
1960	Rome, Italy	Squaw Valley, U.S.
1964	Tokyo, Japan	Innsbruck, Austria
1968	Mexico City, Mex.	Grenoble, Fr.
1972	Munich, W.Ger.	Sapporo, Japan
1976	Montreal, Can.	Innsbruck, Austria
1980	Moscow, U.S.S.R.	Lake Placid, U.S.
1984	Los Angeles, U.S.	Sarajevo, Yugos.
1988	Seoul, S.Kor.	Calgary, Can.
1992	Barcelona, Spain	Albertville, Fr.
1994	‡	Lillehammer, Nor.
1996	Atlanta, U.S.	‡
1998	‡	Nagano, Japan
2000	Sydney, Austl.	‡
2002	‡	Salt Lake City, U.S.
2004	Athens, Greece	‡
2006	‡	Torino, Italy

*The Winter Games were not held until 1924. †Games were not held during World War I and World War II. ‡From 1992 the Summer and Winter Games were held on a staggered two-year schedule.

The Summer Olympics now include archery, badminton, baseball, basketball, boxing, canoeing, cycling, diving, equestrian sports, fencing, field hockey, gymnastics, handball, judo, modern pentathlon, rowing, shooting, softball, swimming, table tennis, tae kwon do, tennis, triathlon, track and field, volleyball, water polo, weight lifting, wrestling, and yachting. In addition, the program may include demonstration sports and exhibitions. The Winter Olympics includes the biathlon (skiing and shooting), bobsledding, curling, ice hockey, luge (tobogganing), ski jumping, and ice skating, skiing, and snowboarding. Demonstration sports may also be included. For winners of events of the Summer and Winter Games of the Olympics 1896–1996, *see* Table, pages 926–940. For recent winners *see* Table, pages 940–42.

Olympic Mountains, segment of the Pacific Coast Ranges, extending across the Olympic Peninsula south of the Juan de Fuca Strait and west of Puget Sound in northwestern Washington, U.S. Several peaks exceed 7,000 feet (2,100 m), including Mounts Anderson, Deception, and Olympus (7,965 feet [2,428m]; the highest). The range holds about 60 glaciers. The prevailing westerly wind off the Pacific Ocean produces heavy annual precipitation (more than 140 inches [3,550 mm] in places), resulting in the formation of picturesque rain forests dominated by Douglas fir, Sitka spruce, western red cedar, and hemlock. Some trees reach heights of nearly 300 feet (90 m) and diameters of 8 feet (2.5 m).

Olympic Mountains in Olympic National Park, Washington

Ray Atkeson

The Spanish navigator Juan Pérez sighted the mountains in 1774. John Meares, an English voyager, named the highest peak in 1788 because it appeared, like the Greek Mount Olympus, to be a fit home for the gods. The mountains lie within the Olympic National Park (created 1938) and Forest and are set aside for recreation and for conservation of wildlife and timber.

Olympic National Park, national park, northwestern Washington, U.S., established in 1938 to preserve the Olympic Mountains and their magnificent forests and wildlife. The park, which covers 1,442 square miles (3,735 square km), includes a strip of Pacific Northwest shoreline geographically separated from the rest of the park. There are active glaciers on the highest peak, Mount Olympus (7,965 feet [2,428 m]), and others, more than 60 glaciers in all. On the mountains' western slopes, where rainfall is very heavy, grows a lush rain forest

Hall of Mosses in the Hoh River section of the Olympic Rain Forest, Olympic National Park, Washington

David Muench

Olympic Champions

Summer Games, 1896–1996

Archery

men's individual

1972	J. Williams	U.S.
1976	D. Pace	U.S.
1980	T. Poikolainen	Fin.
1984	D. Pace	U.S.
1988	J. Barrs	U.S.
1992	S. Flute	Fr.
1996	J. Huish	U.S.

1988	S.Kor.
1992	Spain
1996	U.S.

women's team

1988	S.Kor.
1992	S.Kor.
1996	S.Kor.

women's individual

1972	D. Wilbert	U.S.
1976	L. Ryon	U.S.
1980	K. Losaberidze	U.S.S.R.
1984	H.S. Seo	S.Kor.
1988	S.-N. Kim	S.Kor.
1992	Y.J. Cho	S.Kor.
1996	K.-W. Kim	S.Kor.

Association football (soccer)*

men's

1900	Gt.Brit.
1904	Can.
1908	Gt.Brit.
1912	Gt.Brit.
1920	Belg.
1924	Uruguay
1928	Uruguay
1936	Italy
1948	Swed.
1952	Hung.
1956	U.S.S.R.
1960	Yugos.
1964	Hung.
1968	Hung.
1972	Pol.
1976	E.Ger.
1980	Czech.
1984	Fr.
1988	U.S.S.R.
1992	Spain
1996	Nigeria

women's

1996	U.S.

Athletics (track-and-field) (men)

100 metres			sec
1896	T. Burke	U.S.	12.0
1900	F. Jarvis	U.S.	11.0
1904	A. Hahn	U.S.	11.0
1908	R. Walker	S.Af.	10.8
1912	R. Craig	U.S.	10.8
1920	C. Paddock	U.S.	10.8
1924	H. Abrahams	Gt.Brit.	10.6
1928	P. Williams	Can.	10.8
1932	E. Tolan	U.S.	10.3
1936	J. Owens	U.S.	10.3
1948	H. Dillard	U.S.	10.3
1952	L. Remigino	U.S.	10.4
1956	R. Morrow	U.S.	10.5
1960	A. Hary	Ger.†	10.2
1964	R. Hayes	U.S.	10.0
1968	J. Hines	U.S.	9.9
1972	V. Borzov	U.S.S.R.	10.14‡
1976	H. Crawford	Trinidad	10.06
1980	A. Wells	Gt.Brit.	10.25
1984	C. Lewis	U.S.	9.99
1988	C. Lewis	U.S.	9.92
1992	L. Christie	Gt.Brit.	9.96
1996	D. Bailey	Can.	9.84

200 metres			sec
1900	J. Tewksbury	U.S.	22.2
1904	A. Hahn	U.S.	21.6
1908	R. Kerr	Can.	22.6
1912	R. Craig	U.S.	21.7
1920	A. Woodring	U.S.	22.0
1924	J. Scholz	U.S.	21.6
1928	P. Williams	Can.	21.8
1932	E. Tolan	U.S.	21.2
1936	J. Owens	U.S.	20.7
1948	M. Patton	U.S.	21.1
1952	A. Stanfield	U.S.	20.7
1956	R. Morrow	U.S.	20.6
1960	L. Berruti	Italy	20.5
1964	H. Carr	U.S.	20.3
1968	T. Smith	U.S.	19.8
1972	V. Borzov	U.S.S.R.	20.00‡
1976	D. Quarrie	Jam.	20.23
1980	P. Mennea	Italy	20.19
1984	C. Lewis	U.S.	19.80
1988	J. DeLoach	U.S.	19.75
1992	M. Marsh	U.S.	20.01
1996	M. Johnson	U.S.	19.32

400 metres			sec
1896	T. Burke	U.S.	54.2
1900	M. Long	U.S.	49.4
1904	H. Hillman	U.S.	49.2
1908	W. Halswelle	Gt.Brit.	50.0
1912	C. Reidpath	U.S.	48.2
1920	B. Rudd	S.Af.	49.6
1924	E. Liddell	Gt.Brit.	47.6
1928	R. Barbuti	U.S.	47.8
1932	W. Carr	U.S.	46.2
1936	A. Williams	U.S.	46.5
1948	A. Wint	Jam.	46.2
1952	G. Rhoden	Jam.	45.9
1956	C. Jenkins	U.S.	46.7
1960	O. Davis	U.S.	44.9
1964	M. Larrabee	U.S.	45.1
1968	L. Evans	U.S.	43.8
1972	V. Matthews	U.S.	44.66‡
1976	A. Juantorena	Cuba	44.26
1980	V. Markin	U.S.S.R.	44.60
1984	A. Babers	U.S.	44.27
1988	S. Lewis	U.S.	43.87
1992	Q. Watts	U.S.	43.50
1996	M. Johnson	U.S.	43.49

800 metres			min	sec
1896	E. Flack	Australia	2	11.0
1900	A. Tysoe	Gt.Brit.	2	01.2
1904	J. Lightbody	U.S.	1	56.0
1908	M. Sheppard	U.S.	1	52.8
1912	J. Meredith	U.S.	1	51.9
1920	A. Hill	Gt.Brit.	1	53.4
1924	D. Lowe	Gt.Brit.	1	52.4
1928	D. Lowe	Gt.Brit.	1	51.8
1932	T. Hampson	Gt.Brit.	1	49.7
1936	J. Woodruff	U.S.	1	52.9
1948	M. Whitfield	U.S.	1	49.2
1952	M. Whitfield	U.S.	1	49.2
1956	T. Courtney	U.S.	1	47.7
1960	P. Snell	N.Z.	1	46.3
1964	P. Snell	N.Z.	1	45.1
1968	R. Doubell	Australia	1	44.3
1972	D. Wottle	U.S.	1	45.9
1976	A. Juantorena	Cuba	1	43.50‡
1980	S. Ovett	Gt.Brit.	1	45.40
1984	J. Cruz	Braz.	1	43.00
1988	P. Ereng	Kenya	1	43.45
1992	W. Tanui	Kenya	1	43.66
1996	V. Rodal	Nor.	1	42.58

1,500 metres			min	sec
1896	E. Flack	Australia	4	33.2
1900	C. Bennett	Gt.Brit.	4	06.2
1904	J. Lightbody	U.S.	4	05.4
1908	M. Sheppard	U.S.	4	03.4
1912	A. Jackson	Gt.Brit.	3	56.8
1920	A. Hill	Gt.Brit.	4	01.8
1924	P. Nurmi	Fin.	3	53.6
1928	H. Larva	Fin.	3	53.2
1932	L. Beccali	Italy	3	51.2
1936	J. Lovelock	N.Z.	3	47.8
1948	H. Eriksson	Swed.	3	49.8
1952	J. Barthel	Luxem.	3	45.1
1956	R. Delany	Ire.	3	41.2
1960	H. Elliott	Australia	3	35.6
1964	P. Snell	N.Z.	3	38.1
1968	K. Keino	Kenya	3	34.9
1972	P. Vasala	Fin.	3	36.3
1976	J. Walker	N.Z.	3	39.17‡
1980	S. Coe	Gt.Brit.	3	38.40
1984	S. Coe	Gt.Brit.	3	32.53
1988	P. Rono	Kenya	3	35.96
1992	F. Cacho	Spain	3	40.12
1996	N. Morceli	Alg.	3	35.78

5,000 metres			min	sec
1912	H. Kolehmainen	Fin.	14	36.6
1920	J. Guillemot	Fr.	14	55.6
1924	P. Nurmi	Fin.	14	31.2
1928	V. Ritola	Fin.	14	38.0
1932	L. Lehtinen	Fin.	14	30.0
1936	G. Höckert	Fin.	14	22.2
1948	G. Reiff	Belg.	14	17.6
1952	E. Zátopek	Czech.	14	06.6
1956	V. Kuts	U.S.S.R.	13	39.6
1960	M. Halberg	N.Z.	13	43.4
1964	R. Schul	U.S.	13	48.8
1968	M. Gammoudi	Tun.	14	05.0
1972	L. Viren	Fin.	13	26.4
1976	L. Viren	Fin.	13	24.76‡
1980	Miruts Yifter	Eth.	13	21.00
1984	S. Aouita	Mor.	13	05.59
1988	J. Ngugi	Kenya	13	11.70
1992	D. Baumann	Ger.	13	12.52
1996	V. Niyongabo	Burundi	13	07.97

10,000 metres			min	sec
1912	H. Kolehmainen	Fin.	31	20.8
1920	P. Nurmi	Fin.	31	45.8
1924	V. Ritola	Fin.	30	23.2
1928	P. Nurmi	Fin.	30	18.8
1932	J. Kusocinski	Pol.	30	11.4
1936	I. Salminen	Fin.	30	15.4
1948	E. Zátopek	Czech.	29	59.6
1952	E. Zátopek	Czech.	29	17.0
1956	V. Kuts	U.S.S.R.	28	45.6
1960	P. Bolotnikov	U.S.S.R.	28	32.2
1964	W. Mills	U.S.	28	24.4
1968	N. Temu	Kenya	29	27.4
1972	L. Viren	Fin.	27	38.4
1976	L. Viren	Fin.	27	40.38‡
1980	Miruts Yifter	Eth.	27	42.70
1984	A. Cova	Italy	27	47.54
1988	B. Boutaib	Mor.	27	21.46
1992	K. Skah	Mor.	27	46.70
1996	H. Gerbrselassie	Eth.	27	07.34

marathon			hr	min	sec
1896	S. Louis	Greece	2	58	50.0
1900	M. Theato	Fr.	2	59	45.0
1904	T. Hicks	U.S.	3	28	53.0
1908	J. Hayes	U.S.	2	55	18.4
1912	K. McArthur	S.Af.	2	36	54.8
1920	H. Kolehmainen	Fin.	2	32	35.8
1924	A. Stenroos	Fin.	2	41	22.6
1928	A. El Ouafi	Fr.	2	32	57.0
1932	J. Zabala	Arg.	2	31	36.0
1936	K. Son	Japan	2	29	19.2
1948	D. Cabrera	Arg.	2	34	51.6
1952	E. Zátopek	Czech.	2	23	03.2
1956	A. Mimoun	Fr.	2	25	00.0
1960	Abebe Bikila	Eth.	2	15	16.2
1964	Abebe Bikila	Eth.	2	12	11.2
1968	M. Wolde	Eth.	2	20	26.4
1972	F. Shorter	U.S.	2	12	19.8
1976	W. Cierpinski	E.Ger.	2	09	55.0
1980	W. Cierpinski	E.Ger.	2	11	03.0
1984	C. Lopes	Port.	2	09	21.0
1988	G. Bordin	Italy	2	10	32.0
1992	Y.-C. Hwang	S.Kor.	2	13	23.0
1996	J. Thugwane	S.Af.	2	12	36.0

110-metre hurdles			sec
1896§	T. Curtis	U.S.	17.6
1900	A. Kraenzlein	U.S.	15.4
1904	F. Schule	U.S.	16.0
1908	F. Smithson	U.S.	15.0
1912	F. Kelly	U.S.	15.1
1920	E. Thomson	Can.	14.8
1924	D. Kinsey	U.S.	15.0
1928	S. Atkinson	S.Af.	14.8
1932	G. Saling	U.S.	14.6
1936	F. Towns	U.S.	14.2
1948	W. Porter	U.S.	13.9
1952	H. Dillard	U.S.	13.7
1956	L. Calhoun	U.S.	13.5
1960	L. Calhoun	U.S.	13.8
1964	H. Jones	U.S.	13.6
1968	W. Davenport	U.S.	13.3
1972	R. Milburn	U.S.	13.24‡
1976	G. Drut	Fr.	13.30
1980	T. Munkelt	E.Ger.	13.39
1984	R. Kingdom	U.S.	13.20
1988	R. Kingdom	U.S.	12.98
1992	M. McKoy	Can.	13.12
1996	A. Johnson	U.S.	12.95

400-metre hurdles			sec
1900	J. Tewksbury	U.S.	57.6
1904‖	H. Hillman	U.S.	53.0
1908	C. Bacon	U.S.	55.0
1920	F. Loomis	U.S.	54.0
1924	F. Taylor	U.S.	52.6
1928	Lord Burghley	Gt.Brit.	53.4
1932	R. Tisdall	Ire.	51.7
1936	G. Hardin	U.S.	52.4
1948	R. Cochran	U.S.	51.1
1952	C. Moore	U.S.	50.8
1956	G. Davis	U.S.	50.1
1960	G. Davis	U.S.	49.3
1964	W. Cawley	U.S.	49.6
1968	D. Hemery	Gt.Brit.	48.1
1972	J. Akii-Bua	Uganda	47.82‡
1976	E. Moses	U.S.	47.64
1980	V. Beck	E.Ger.	48.70
1984	E. Moses	U.S.	47.75
1988	A. Phillips	U.S.	47.19
1992	K. Young	U.S.	46.78
1996	D. Adkins	U.S.	47.54

3,000-metre steeplechase			min	sec
1920	P. Hodge	Gt.Brit.	10	00.4
1924	V. Ritola	Fin.	9	33.6
1928	T. Loukola	Fin.	9	21.8
1932	V. Iso-Hollo	Fin.	10	33.4¶
1936	V. Iso-Hollo	Fin.	9	03.8
1948	T. Sjöstrand	Swed.	9	04.6
1952	H. Ashenfelter	U.S.	8	45.4
1956	C. Brasher	Gt.Brit.	8	41.2
1960	Z. Krzyszkowiak	Pol.	8	34.2
1964	G. Roelants	Belg.	8	30.8
1968	A. Biwott	Kenya	8	51.0
1972	K. Keino	Kenya	8	23.6
1976	A. Garderud	Swed.	8	08.02‡
1980	B. Malinowski	Pol.	8	09.70
1984	J. Korir	Kenya	8	11.80
1988	J. Kariuki	Kenya	8	05.51
1992	M. Birir	Kenya	8	08.84
1996	J. Keter	Kenya	8	07.12

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*The competitions in 1900 and 1904 are said to be unofficial. †Joint East–West German team. ‡Race first timed in hundredths of a second. §Distance, 100 m. ‖ Hurdles were two feet six inches high, not three feet. ¶An extra lap of 460 m was run in error.

Olympic Champions, Summer Games, 1896–1996 (continued)

Athletics (track-and-field) (men) (continued)

4 × 100 metre relay		
		sec
1912	Gt.Brit.	42.4
1920	U.S.	42.2
1924	U.S.	41.0
1928	U.S.	41.0
1932	U.S.	40.0
1936	U.S.	39.8
1948	U.S.	40.6
1952	U.S.	40.1
1956	U.S.	39.5
1960	Ger.*	39.5
1964	U.S.	39.0
1968	U.S.	38.2
1972	U.S.	38.19†
1976	U.S.	38.33
1980	U.S.S.R.	38.26
1984	U.S.	37.83
1988	U.S.S.R.	38.19
1992	U.S.	37.40
1996	Can.	37.69

4 × 400 metre relay			
		min	sec
1912	U.S.	3	16.6
1920	Gt.Brit.	3	22.2
1924	U.S.	3	16.0
1928	U.S.	3	14.2
1932	U.S.	3	08.2
1936	Gt.Brit.	3	09.0
1948	U.S.	3	10.4
1952	Jam.	3	03.9
1956	U.S.	3	04.8
1960	U.S.	3	02.2
1964	U.S.	3	00.7
1968	U.S.	2	56.1
1972	Kenya	2	59.8
1976	U.S.	2	58.65†
1980	U.S.S.R.	3	01.1
1984	U.S.	2	57.91
1988	U.S.	2	56.16
1992	U.S.	2	55.74
1996	U.S.	2	55.99

20,000-metre walk			hr	min	sec
1956	L. Spirin	U.S.S.R.	1	31	27.4
1960	V. Golubnichy	U.S.S.R.	1	34	07.2
1964	K. Matthews	Gt.Brit.	1	29	34.0
1968	V. Golubnichy	U.S.S.R.	1	33	58.4
1972	P. Frenkel	E.Ger.	1	26	42.6
1976	D. Bautista	Mex.	1	24	40.6
1980	M. Damilano	Italy	1	23	35.5
1984	E. Canto	Mex.	1	23	13.0
1988	J. Pribilinec	Czech.	1	19	57.0
1992	D.P. Montero	Spain	1	21	45.0
1996	J. Perez	Ecua.	1	20	07.0

50,000-metre walk‡			hr	min	sec
1932	T. Green	Gt.Brit.	4	50	10.0
1936	H. Whitlock	Gt.Brit.	4	30	41.4
1948	J. Ljunggren	Swed.	4	41	52.0
1952	G. Dordoni	Italy	4	28	07.8
1956	N. Read	N.Z.	4	30	42.8
1960	D. Thompson	Gt.Brit.	4	25	30.0
1964	A. Pamich	Italy	4	11	12.4
1968	C. Hohne	E.Ger.	4	20	13.6
1972	B. Kannenberg	W.Ger.	3	56	11.6
1980	H. Gauder	E.Ger.	3	49	24.0
1984	R. Gonzales	Mex.	3	47	26.0
1988	V. Ivanenko	U.S.S.R.	3	38	29.0
1992	A. Perlov	U.T.§	3	50	13.0
1996	R. Korzeniowski	Pol.	3	43	03.0

high jump			metres
1896	E. Clark	U.S.	1.81
1900	I. Baxter	U.S.	1.90
1904	S. Jones	U.S.	1.80
1908	H. Porter	U.S.	1.90
1912	A. Richards	U.S.	1.93
1920	R. Landon	U.S.	1.93
1924	H. Osborn	U.S.	1.98
1928	R. King	U.S.	1.94
1932	D. McNaughton	Can.	1.97
1936	C. Johnson	U.S.	2.03
1948	J. Winter	Australia	1.98
1952	W. Davies	U.S.	2.04
1956	C. Dumas	U.S.	2.12
1960	R. Shavlakadze	U.S.S.R.	2.16
1964	V. Brumel	U.S.S.R.	2.18
1968	R. Fosbury	U.S.	2.24
1972	Yu. Tarmak	U.S.S.R.	2.23
1976	J. Wszola	Pol.	2.25
1980	G. Wessig	E.Ger.	2.36
1984	D. Moegenburg	W.Ger.	2.35
1988	G. Avdeenko	U.S.S.R.	2.38
1992	J. Sotomayor	Cuba	2.34
1996	C. Austin	U.S.	2.39

pole vault			metres
1896	W. Hoyt	U.S.	3.30
1900	I. Baxter	U.S.	3.30
1904	C. Dvorak	U.S.	3.50
1908	E. Cooke	U.S.	3.71
	A. Gilbert (tied)	U.S.	
1912	H. Babcock	U.S.	3.95
1920	F. Foss	U.S.	4.09
1924	L. Barnes	U.S.	3.95
1928	S. Carr	U.S.	4.20
1932	W. Miller	U.S.	4.31
1936	E. Meadows	U.S.	4.35
1948	O. Smith	U.S.	4.30
1952	R. Richards	U.S.	4.55
1956	R. Richards	U.S.	4.56
1960	D. Bragg	U.S.	4.70
1964	F. Hansen	U.S.	5.10
1968	B. Seagren	U.S.	5.40
1972	W. Nordwig	E.Ger.	5.50
1976	T. Slusarski	Pol.	5.50
1980	W. Kozakiewicz	Pol.	5.78
1984	P. Quinon	Fr.	5.75
1988	S. Bubka	U.S.S.R.	5.90
1992	M. Tarasov	U.T.§	5.80
1996	J. Galfione	Fr.	5.92

long jump			metres
1896	E. Clark	U.S.	6.35
1900	A. Kraenzlein	U.S.	7.18
1904	M. Prinstein	U.S.	7.34
1908	F. Irons	U.S.	7.48
1912	A. Gutterson	U.S.	7.60
1920	W. Pettersson	Swed.	7.15
1924	H. de Hubbard	U.S.	7.44
1928	E. Hamm	U.S.	7.73
1932	E. Gordon	U.S.	7.64
1936	J. Owens	U.S.	8.06
1948	W. Steele	U.S.	7.82
1952	J. Biffle	U.S.	7.57
1956	G. Bell	U.S.	7.83
1960	R. Boston	U.S.	8.12
1964	L. Davies	Gt.Brit.	8.07
1968	R. Beamon	U.S.	8.90
1972	R. Williams	U.S.	8.24
1976	A. Robinson	U.S.	8.35
1980	L. Dombrowski	E.Ger.	8.54
1984	C. Lewis	U.S.	8.54
1988	C. Lewis	U.S.	8.72
1992	C. Lewis	U.S.	8.67
1996	C. Lewis	U.S.	8.50

triple jump			metres
1896	J. Connolly	U.S.	13.71
1900	M. Prinstein	U.S.	14.47
1904	M. Prinstein	U.S.	14.35
1908	T. Ahearne	Gt.Brit.	14.91
1912	G. Lindblom	Swed.	14.76
1920	V. Tuulos	Fin.	14.50
1924	A. Winter	Australia	15.53
1928	M. Oda	Japan	15.21
1932	C. Nambu	Japan	15.72
1936	N. Tajima	Japan	16.00
1948	A. Ahman	Swed.	15.40
1952	A. da Silva	Braz.	16.22
1956	A. da Silva	Braz.	16.35
1960	J. Schmidt	Pol.	16.81
1964	J. Schmidt	Pol.	16.85
1968	V. Saneyev	U.S.S.R.	17.39
1972	V. Saneyev	U.S.S.R.	17.35
1976	V. Saneyev	U.S.S.R.	17.29
1980	Ya. Uudmae	U.S.S.R.	17.35
1984	A. Joyner	U.S.	17.26
1988	H. Markov	Bulg.	17.61
1992	M. Conley	U.S.	17.63
1996	K. Harrison	U.S.	18.09

shot put			metres
1896	R. Garrett	U.S.	11.22
1900	R. Sheldon	U.S.	14.10
1904	R. Rose	U.S.	14.81
1908	R. Rose	U.S.	14.21
1912	R. McDonald	U.S.	15.34
1920	V. Pörhölä	Fin.	14.81
1924	C. Houser	U.S.	14.99
1928	J. Kuck	U.S.	15.87
1932	L. Sexton	U.S.	16.00
1936	H. Woellke	Ger.	16.20
1948	W. Thompson	U.S.	17.12
1952	P. O'Brien	U.S.	17.41
1956	P. O'Brien	U.S.	18.57
1960	W. Neider	U.S.	19.68
1964	D. Long	U.S.	20.33
1968	R. Matson	U.S.	20.54
1972	W. Komar	Pol.	21.18
1976	U. Beyer	E.Ger.	21.05
1980	V. Kizelyov	U.S.S.R.	21.35
1984	A. Andrei	Italy	21.26
1988	U. Timmermann	E.Ger.	22.47
1992	M. Stulce	U.S.	21.70
1996	R. Barnes	U.S.	21.62

discus throw			metres
1896	R. Garrett	U.S.	29.15
1900	R. Bauer	Hung.	36.04
1904	M. Sheridan	U.S.	39.28
1908	M. Sheridan	U.S.	40.89
1912	A. Taipale	Fin.	45.21
1920	E. Niklander	Fin.	44.68
1924	C. Houser	U.S.	46.15
1928	C. Houser	U.S.	47.32
1932	J. Anderson	U.S.	49.49
1936	K. Carpenter	U.S.	50.48
1948	A. Consolini	Italy	52.78
1952	S. Iness	U.S.	55.03
1956	A. Oerter	U.S.	56.36
1960	A. Oerter	U.S.	59.18
1964	A. Oerter	U.S.	61.00
1968	A. Oerter	U.S.	64.78
1972	L. Danek	Czech.	64.40
1976	M. Wilkins	U.S.	67.50
1980	V. Rashchupkin	U.S.S.R.	66.64
1984	R. Danneberg	W.Ger.	66.60
1988	J. Schult	E.Ger.	68.82
1992	R. Ubartas	Lithuania	65.12
1996	L. Riedel	Ger.	69.40

hammer throw			metres
1900	J. Flanagan	U.S.	49.73
1904	J. Flanagan	U.S.	51.23
1908	J. Flanagan	U.S.	51.92
1912	M. McGrath	U.S.	54.74
1920	P. Ryan	U.S.	52.87
1924	F. Tootell	U.S.	53.30
1928	P. O'Callaghan	Ire.	51.39
1932	P. O'Callaghan	Ire.	53.92
1936	K. Hein	Ger.	56.49
1948	I. Németh	Hung.	56.07
1952	J. Csermák	Hung.	60.34
1956	H. Connolly	U.S.	63.19
1960	V. Rudenkov	U.S.S.R.	67.10
1964	R. Klim	U.S.S.R.	69.74
1968	G. Zsivótzky	Hung.	73.36
1972	A. Bondarchuk	U.S.S.R.	75.50
1976	Yu. Sedykh	U.S.S.R.	77.52
1980	Yu. Sedykh	U.S.S.R.	81.80
1984	J. Tiainen	Fin.	78.08
1988	S. Litvinov	U.S.S.R.	84.80
1992	A. Abduvaliyev	U.T.§	82.53
1996	B. Kiss	Hung.	81.24

javelin throw			metres
1908	E. Lemming	Swed.	54.83
1912	E. Lemming	Swed.	60.64
1920	J. Myyrä	Fin.	65.78
1924	J. Myyrä	Fin.	62.96
1928	E. Lundkvist	Swed.	66.60
1932	M. Järvinen	Fin.	72.71
1936	G. Stöck	Ger.	71.84
1948	T. Rautavaara	Fin.	69.77
1952	C. Young	U.S.	73.78
1956	E. Danielson	Nor.	85.71
1960	V. Tsybulenko	U.S.S.R.	84.64
1964	P. Nevala	Fin.	82.66
1968	Ya. Lusis	U.S.S.R.	90.10
1972	K. Wolfermann	W.Ger.	90.48
1976	M. Nemeth	Hung.	94.58
1980	D. Kula	U.S.S.R.	91.20
1984	A. Haerkoenen	Fin.	86.76
1988	T. Korjus	Fin.	84.28
1992	J. Zelezny	Czech.	89.66
1996	J. Zelezny	Cz.Rep.	88.16

decathlon		
1912	J. Thorpe‖	U.S.
	H. Wieslander	Swed.
1920	H. Lövland	Nor.
1924	H. Osborn	U.S.
1928	P. Yrjölä	Fin.
1932	J. Bausch	U.S.
1936	G. Morris	U.S.
1948	R. Mathias	U.S.
1952	R. Mathias	U.S.
1956	M. Campbell	U.S.
1960	R. Johnson	U.S.
1964	W. Holdorf	Ger.*
1968	W. Toomey	U.S.
1972	N. Avilov	U.S.S.R.
1976	B. Jenner	U.S.
1980	D. Thompson	Gt.Brit.
1984	D. Thompson	Gt.Brit.
1988	C. Schenk	E.Ger.
1992	R. Zmelik	Czech.
1996	D. O'Brien	U.S.

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*Joint East-West German team. †Race first timed in hundredths of a second. ‡Not held in 1976. §Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. ‖Jim Thorpe was stripped of his gold medal in 1913; in 1982 his gold medal was restored, and he was declared "cowinner" of the event.

Olympic Champions, Summer Games, 1896–1996 (continued)

Athletics (track-and-field) (women)

100 metres

			sec
1928	E. Robinson	U.S.	12.2
1932	S. Walasiewicz	Pol.	11.9
1936	H. Stephens	U.S.	11.5
1948	F. Blankers-Koen	Neth.	11.9
1952	M. Jackson	Australia	11.5
1956	B. Cuthbert	Australia	11.5
1960	W. Rudolph	U.S.	11.0
1964	W. Tyus	U.S.	11.4
1968	W. Tyus	U.S.	11.0
1972	R. Stecher	E.Ger.	11.07*
1976	A. Richter	W.Ger.	11.08
1980	L. Kondratyeva	U.S.S.R.	11.06
1984	E. Ashford	U.S.	10.97
1988	F. Griffith Joyner	U.S.	10.54
1992	G. Devers	U.S.	10.82
1996	G. Devers	U.S.	10.94

200 metres

			sec
1948	F. Blankers-Koen	Neth.	24.4
1952	M. Jackson	Australia	23.7
1956	B. Cuthbert	Australia	23.4
1960	W. Rudolph	U.S.	24.0
1964	E. McGuire	U.S.	23.0
1968	I. Szewinska	Pol.	22.5
1972	R. Stecher	E.Ger.	22.40*
1976	B. Eckert	E.Ger.	22.37
1980	B. Eckert-Wockel	E.Ger.	22.03
1984	V. Brisco-Hooks	U.S.	21.81
1988	F. Griffith Joyner	U.S.	21.34
1992	G. Torrence	U.S.	21.81
1996	M.-J. Perec	Fr.	22.12

400 metres

			sec
1964	B. Cuthbert	Australia	52.0
1968	C. Besson	Fr.	52.0
1972	M. Zehrt	E.Ger.	51.08*
1976	I. Szewinska	Pol.	49.29
1980	M. Koch	E.Ger.	48.88
1984	V. Brisco-Hooks	U.S.	48.83
1988	O. Bryzguina	U.S.S.R.	48.65
1992	M.-J. Perec	Fr.	48.83
1996	M.-J. Perec	Fr.	48.25

800 metres

			min	sec
1928	L. Radke-Batschauer	Ger.	2	16.8
1960	L. Lysenko-Shevtsova	U.S.S.R.	2	04.3
1964	A. Packer	Gt.Brit.	2	01.1
1968	M. Manning	U.S.	2	00.9
1972	H. Falck	W.Ger.	1	58.6
1976	T. Kazankina	U.S.S.R.	1	54.94*
1980	N. Olizarenko	U.S.S.R.	1	53.5
1984	D. Melinte	Rom.	1	57.60
1988	S. Wodars	E.Ger.	1	56.10
1992	E. van Langen	Neth.	1	55.54
1996	S. Masterkova	Russia	1	57.73

1,500 metres

			min	sec
1972	L. Bragina	U.S.S.R.	4	01.4
1976	T. Kazankina	U.S.S.R.	4	05.48*
1980	T. Kazankina	U.S.S.R.	3	56.6
1984	G. Dorio	Italy	4	03.25
1988	P. Ivan	Rom.	3	53.96
1992	H. Boulmerka	Alg.	3	55.30
1996	S. Masterkova	Russia	4	00.83

5,000 metres

			min	sec
1996	J. Wang	China	14	59.88

10,000 metres

			min	sec
1988	O. Bondarenko	U.S.S.R.	31	05.21
1992	D. Tulu	Eth.	31	06.02
1996	F. Ribeiro	Port.	31	01.63

marathon

			hr	min	sec
1984	J. Benoit	U.S.	2	24	52.0
1988	R. Mota	Port.	2	25	40.0
1992	V. Yegorova	U.T.†	2	32	41.0
1996	F. Roba	Eth.	2	26	05.0

400-metre hurdles

			sec
1984	N. el Moutawakel	Mor.	54.61
1988	D. Flintoff-King	Australia	53.17
1992	S. Gunnell	Gt.Brit.	53.23
1996	D. Hemmings	Jam.	52.82

4 × 100-metre relay

		sec
1928	Can.	48.4
1932	U.S.	47.0
1936	U.S.	46.9
1948	Neth.	47.5
1952	U.S.	45.9
1956	Australia	44.5
1960	U.S.	44.5
1964	Pol.	43.6
1968	U.S.	42.8
1972	W.Ger.	42.81*
1976	E.Ger.	42.55
1980	E.Ger.	41.60
1984	U.S.	41.65
1988	U.S.	41.98
1992	U.S.	42.11
1996	U.S.	41.95

4 × 400-metre relay

		min	sec
1972	E.Ger.	3	23.0
1976	E.Ger.	3	19.23*
1980	U.S.S.R.	3	20.2
1984	U.S.	3	18.29
1988	U.S.S.R.	3	15.18
1992	U.T.†	3	20.20
1996	U.S.	3	20.91

80-metre hurdles (100 metres from 1972)

			sec
1932	M. Didrikson	U.S.	11.7
1936	T. Valla	Italy	11.7
1948	F. Blankers-Koen	Neth.	11.2
1952	S. Strickland de La Hunty	Australia	10.9
1956	S. Strickland de La Hunty	Australia	10.7
1960	I. Press	U.S.S.R.	10.8
1964	K. Balzer	Ger.‡	10.5
1968	M. Caird	Australia	10.3
1972	A. Ehrhardt	E.Ger.	12.59*
1976	J. Schaller	E.Ger.	12.77
1980	V. Komisova	U.S.S.R.	12.56
1984	B. Fitzgerald-Brown	U.S.	12.84
1988	J. Donkova	Bulg.	12.38
1992	P. Patoulidou	Greece	12.64
1996	L. Engquist	Swed.	12.58

high jump

			metres
1928	E. Catherwood	Can.	1.59
1932	J. Shiley	U.S.	1.66
1936	I. Csák	Hung.	1.60
1948	A. Coachman	U.S.	1.68
1952	E. Brand	S.Af.	1.67
1956	M. McDaniel	U.S.	1.76
1960	I. Balas	Rom.	1.85
1964	I. Balas	Rom.	1.90
1968	M. Rezkova	Czech.	1.82
1972	U. Meyfarth	W.Ger.	1.92
1976	R. Ackermann	E.Ger.	1.93
1980	S. Simeoni	Italy	1.97
1984	U. Meyfarth	W.Ger.	2.02
1988	L. Ritter	U.S.	2.03
1992	H. Henkel	Ger.	2.02
1996	S. Kostadinova	Bulg.	2.05

long jump

			metres
1948	V. Gyarmati	Hung.	5.69
1952	Y. Williams	N.Z.	6.24
1956	E. Krzesinska	Pol.	6.35
1960	V. Krepkina	U.S.S.R.	6.37
1964	M. Rand	Gt.Brit.	6.76
1968	V. Viscopoleanu	Rom.	6.82
1972	H. Rosendahl	W.Ger.	6.78
1976	A. Voigt	E.Ger.	6.72
1980	T. Kolpakova	U.S.S.R.	7.06
1984	A. Stanciu	Rom.	6.96
1988	J. Joyner-Kersee	U.S.	7.40
1992	H. Drechsler	Ger.	7.14
1996	C. Ajunwa	Nigeria	7.12

triple jump

			metres
1996	I. Kravets	Ukr.	15.33

discus throw

			metres
1928	H. Konopacka	Pol.	39.62
1932	L. Copeland	U.S.	40.58
1936	G. Mauermayer	Ger.	47.63
1948	M. Ostermeyer	Fr.	41.92
1952	N. Romashkova	U.S.S.R.	51.42
1956	O. Fikotova	Czech.	53.69
1960	N. Ponomareva-Romashkova	U.S.S.R.	55.10
1964	T. Press	U.S.S.R.	57.27
1968	L. Manoliu	Rom.	58.28
1972	F. Melnik	U.S.S.R.	66.62
1976	E. Schlaak	E.Ger.	69.00
1980	E. Jahl	E.Ger.	69.96
1984	R. Stalman	Neth.	65.36
1988	M. Hellmann	E.Ger.	72.30
1992	M. Marten	Cuba	70.06
1996	I. Wyludda	Ger.	69.66

shot put

			metres
1948	M. Ostermeyer	Fr.	13.75
1952	G. Zybina	U.S.S.R.	15.28
1956	T. Tyshkevich	U.S.S.R.	16.59
1960	T. Press	U.S.S.R.	17.32
1964	T. Press	U.S.S.R.	18.14
1968	M. Gummel	E.Ger.	19.61
1972	N. Chizhova	U.S.S.R.	21.03
1976	I. Christova	Bulg.	21.16
1980	I. Slupianek	E.Ger.	22.41
1984	C. Losch	W.Ger.	20.48
1988	N. Lisovskaya	U.S.S.R.	22.24
1992	S. Krivaleva	U.T.†	21.06
1996	A. Kumbernuss	Ger.	20.56

javelin throw

			metres
1932	M. Didrikson	U.S.	43.68
1936	T. Fleischer	Ger.	45.18
1948	H. Bauma	Austria	45.57
1952	D. Zatopkova	Czech.	50.47
1956	I. Yaunzeme	U.S.S.R.	53.86
1960	E. Ozolina	U.S.S.R.	55.98
1964	M. Penes	Rom.	60.54
1968	A. Nemeth	Hung.	60.36
1972	R. Fuchs	E.Ger.	63.88
1976	R. Fuchs	E.Ger.	65.94
1980	M. Colon	Cuba	68.40
1984	T. Sanderson	Gt.Brit.	69.56
1988	P. Felke	E.Ger.	74.68
1992	S. Renk	Ger.	68.34
1996	H. Rantanen	Fin.	67.94

pentathlon (heptathlon from 1984)

1964	I. Press	U.S.S.R.
1968	I. Becker	W.Ger.
1972	M. Peters	Gt.Brit.
1976	S. Siegl	E.Ger.
1980	N. Tkachenko	U.S.S.R.
1984	G. Nunn	Australia
1988	J. Joyner-Kersee	U.S.
1992	J. Joyner-Kersee	U.S.
1996	G. Shouaa	Syria

10,000-metre walk

			min	sec
1992	Y. Chen	China	44	32
1996	Y. Nikolayeva	Russia	41	49

Badminton

men's singles

1992	A.B. Kusuma	Indon.
1996	P.-E. Hoyer-Larsen	Den.

men's doubles

1992	S.Kor.
1996	Indon.

women's singles

1992	S. Susanti	Indon.
1996	S.-H. Bang	S.Kor.

women's doubles

1992	S.Kor.
1996	China

mixed doubles

1996	S.Kor.

Baseball

1992	Cuba
1996	Cuba

Basketball

men

1936	U.S.
1948	U.S.
1952	U.S.
1956	U.S.
1960	U.S.
1964	U.S.
1968	U.S.
1972	U.S.S.R.
1976	U.S.
1980	Yugos.
1984	U.S.
1988	U.S.S.R.
1992	U.S.
1996	U.S.

women

1976	U.S.S.R.
1980	U.S.S.R.
1984	U.S.
1988	U.S.
1992	U.T.†
1996	U.S.

Boxing

light flyweight (48 kg; 106 lb)

1968	F. Rodriguez	Venez.
1972	G. Gedo	Hung.
1976	J. Hernández	Cuba
1980	Sh. Sabyrov	U.S.S.R.
1984	P. Gonzales	U.S.
1988	I. Hristov	Bulg.
1992	R. Marcelo	Cuba
1996	D. Bojilov	Bulg.

flyweight (51 kg; 112 lb)

1904	G. Finnegan	U.S.
1920	F. De Genaro	U.S.
1924	F. La Barba	U.S.
1928	A. Kocsis	Hung.
1932	I. Enekes	Hung.
1936	W. Kaiser	Ger.
1948	P. Perez	Arg.
1952	N. Brooks	U.S.
1956	T. Spinks	Gt.Brit.
1960	G. Török	Hung.
1964	F. Atzori	Italy
1968	R. Delgado	Mex.
1972	G. Kostadinov	Bulg.
1976	L. Randolph	U.S.
1980	P. Lessov	Bulg.
1984	S. McCrory	U.S.
1988	K.-S. Kim	S.Kor.
1992	S.C. Chol	N.Kor.
1996	M. Romero	Cuba

bantamweight (54 kg; 119 lb)

1904	O. Kirk	U.S.
1908	H. Thomas	Gt.Brit.
1920	C. Walker	S.Af.
1924	W. Smith	S.Af.
1928	V. Tamagnini	Italy
1932	H. Gwynne	Can.
1936	U. Sergo	Italy
1948	T. Csik	Hung.
1952	P. Hämäläinen	Fin.
1956	W. Behrendt	Ger.‡
1960	O. Grigoryev	U.S.S.R.
1964	T. Sakurai	Japan
1968	V. Sokolov	U.S.S.R.
1972	O. Martínez	Cuba
1976	Y.J. Gu	N.Kor.
1980	J. Hernandez	Cuba
1984	M. Stecca	Italy
1988	K. McKinney	U.S.
1992	J. Casamayor	Cuba
1996	I. Kovacs	Hung.

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*Race first timed in hundredths of a second. †Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. ‡Joint East–West German team.

Olympic Champions, Summer Games, 1896–1996 (continued)

Boxing (continued)

featherweight (57 kg; 125 lb)

1904	O. Kirk	U.S.
1908	R. Gunn	Gt.Brit.
1920	P. Fritsch	Fr.
1924	J. Fields	U.S.
1928	L. van Kleveren	Neth.
1932	C. Robledo	Arg.
1936	J. Casanovas	Arg.
1948	E. Formenti	Italy
1952	J. Zachara	Czech.
1956	V. Safronov	U.S.S.R.
1960	F. Musso	Italy
1964	S. Stepashkin	U.S.S.R.
1968	A. Roldan	Mex.
1972	B. Kuznetsov	U.S.S.R.
1976	A. Herrera	Cuba
1980	R. Fink	E.Ger.
1984	M. Taylor	U.S.
1988	G. Parisi	Italy
1992	A. Tews	Ger.
1996	S. Kamsing	Thai.

lightweight (60 kg; 132 lb)

1904	H. Spanger	U.S.
1908	F. Grace	Gt.Brit.
1920	S. Mosberg	U.S.
1924	H. Nielsen	Den.
1928	C. Orlandi	Italy
1932	L. Stevens	S.Af.
1936	I. Harangi	Hung.
1948	G. Dreyer	S.Af.
1952	A. Bolognesi	Italy
1956	R. McTaggart	Gt.Brit.
1960	K. Pazdzior	Pol.
1964	J. Grudzien	Pol.
1968	R. Harris	U.S.
1972	J. Szczepanski	Pol.
1976	H. Davis	U.S.
1980	A. Herrera	Cuba
1984	P. Whitaker	U.S.
1988	A. Zuelow	E.Ger.
1992	O. De La Hoya	U.S.
1996	H. Soltani	Alg.

light welterweight (63.5 kg; 140 lb)

1952	C. Adkins	U.S.
1956	V. Engibaryan	U.S.S.R.
1960	B. Nemecek	Czech.
1964	J. Kulej	Pol.
1968	J. Kulej	Pol.
1972	R. Seales	U.S.
1976	R. Leonard	U.S.
1980	P. Oliva	Italy
1984	J. Page	U.S.
1988	V. Yanovski	U.S.S.R.
1992	H. Vinent	Cuba
1996	H. Vinent	Cuba

welterweight (67 kg; 147 lb)

1904	A. Young	U.S.
1920	T. Schneider	Can.
1924	J. Delarge	Belg.
1928	E. Morgan	N.Z.
1932	E. Flynn	U.S.
1936	S. Suvio	Fin.
1948	J. Torma	Czech.
1952	Z. Chychla	Pol.
1956	N. Linca	Rom.
1960	G. Benvenuti	Italy
1964	M. Kasprzyk	Pol.
1968	M. Wolke	E.Ger.
1972	E. Correa	Cuba
1976	J. Bachfeld	E.Ger.
1980	A. Aldama	Cuba
1984	M. Breland	U.S.
1988	R. Wangila	Kenya
1992	M. Carruth	Ire.
1996	O. Saitov	Russia

light middleweight (71 kg; 156 lb)

1952	L. Papp	Hung.
1956	L. Papp	Hung.
1960	W. McClure	U.S.
1964	B. Lagutin	U.S.S.R.
1968	B. Lagutin	U.S.S.R.
1972	D. Kottysch	W.Ger.
1976	J. Rybicki	Pol.
1980	A. Martinez	Cuba
1984	F. Tate	U.S.
1988	S.-H. Park	S.Kor.
1992	J. Lemus	Cuba
1996	D. Reid	U.S.

middleweight (75 kg; 165 lb)

1904	C. Mayer	U.S.
1908	J. Douglas	Gt.Brit.
1920	H. Mallin	Gt.Brit.
1924	H. Mallin	Gt.Brit.
1928	P. Toscani	Italy
1932	C. Barth	U.S.
1936	J. Despeaux	Fr.
1948	L. Papp	Hung.
1952	F. Patterson	U.S.
1956	G. Shatkov	U.S.S.R.
1960	E. Crook	U.S.
1964	V. Popenchenko	U.S.S.R.
1968	C. Finnegan	Gt.Brit.
1972	V. Lemeshev	U.S.S.R.
1976	M. Spinks	U.S.
1980	J. Gomez	Cuba
1984	J.S. Shin	S.Kor.
1988	H. Maske	E.Ger.
1992	A. Hernandez	Cuba
1996	A. Hernandez	Cuba

light heavyweight (81 kg; 178 lb)

1920	E. Eagan	U.S.
1924	H. Mitchell	Gt.Brit.
1928	V. Avendano	Arg.
1932	D. Carstens	S.Af.
1936	R. Michelot	Fr.
1948	G. Hunter	S.Af.
1952	N. Lee	U.S.
1956	J. Boyd	U.S.
1960	C. Clay	U.S.
1964	C. Pinto	Italy
1968	D. Pozniak	U.S.S.R.
1972	M. Parlov	Yugos.
1976	L. Spinks	U.S.
1980	S. Kacar	Yugos.
1984	A. Josipovic	Yugos.
1988	A. Maynard	U.S.
1992	T. May	Ger.
1996	V. Jirov	Kazak.

heavyweight (over 81 kg; 179 lb)
(91 kg; 200 lb from 1984)

1904	S. Berger	U.S.
1908	A. Oldman	Gt.Brit.
1920	R. Rawson	Gt.Brit.
1924	O. Von Porat	Nor.
1928	R. Jurado	Arg.
1932	A. Lovell	Arg.
1936	H. Runge	Ger.
1948	R. Iglesias	Arg.
1952	E. Sanders	U.S.
1956	P. Rademacher	U.S.
1960	F. de Piccoli	Italy
1964	J. Frazier	U.S.
1968	G. Foreman	U.S.
1972	T. Stevenson	Cuba
1976	T. Stevenson	Cuba
1980	T. Stevenson	Cuba
1984	H. Tillman	U.S.
1988	R. Mercer	U.S.
1992	F. Savon	Cuba
1996	F. Savon	Cuba

superheavyweight
(over 91 kg; 200 lb)

1984	T. Biggs	U.S.
1988	L. Lewis	Can.
1992	R. Balado	Cuba
1996	V. Klichko	Ukr.

Canoeing (men)

kayak singles (500 metres)

			min	sec
1976	V. Diba	Rom.	1	46.41
1980	V. Parfenovich	U.S.S.R.	1	43.43
1984	I. Ferguson	N.Z.	1	47.84
1988	Z. Gyulay	Hung.	1	44.82
1992	M. Kolehmainen	Fin.	1	40.34
1996	A. Rossi	Italy	1	37.423

kayak pairs (500 metres)

		min	sec
1976	E.Ger.	1	35.87
1980	U.S.S.R.	1	32.38
1984	N.Z.	1	34.21
1988	N.Z.	1	33.98
1992	Ger.	1	29.84
1996	Ger.	1	28.697

kayak singles (1,000 metres)

			min	sec
1936	G. Hradetzky	Austria	4	22.90
1948	G. Fredriksson	Swed.	4	33.20
1952	G. Fredriksson	Swed.	4	07.90
1956	G. Fredriksson	Swed.	4	12.80
1960	E. Hansen	Den.	3	53.00
1964	R. Peterson	Swed.	3	57.13
1968	M. Hesz	Hung.	4	03.58
1972	A. Shaparenko	U.S.S.R.	3	48.06
1976	R. Helm	E.Ger.	3	48.20
1980	R. Helm	E.Ger.	3	48.77
1984	A. Thompson	N.Z.	3	45.73
1988	G. Barton	U.S.	3	55.27
1992	C. Robinson	Australia	3	37.26
1996	K. Holmann	Nor.	3	25.785

kayak pairs (1,000 metres)

		min	sec
1936	Austria	4	03.80
1948	Swed.	4	07.30
1952	Fin.	3	51.10
1956	Ger.*	3	49.60
1960	Swed.	3	34.70
1964	Swed.	3	38.54
1968	U.S.S.R.	3	37.54
1972	U.S.S.R.	3	31.23
1976	U.S.S.R.	3	29.01
1980	U.S.S.R.	3	26.72
1984	Can.	3	24.22
1988	U.S.	3	32.42
1992	Ger.	3	16.10
1996	Italy	3	09.190

kayak fours (1,000 metres)

		min	sec
1964	U.S.S.R.	3	14.67
1968	Nor.	3	14.38
1972	U.S.S.R.	3	14.02
1976	U.S.S.R.	3	08.69
1980	E.Ger.	3	13.76
1984	N.Z.	3	02.28
1988	Hung.	3	00.20
1992	Ger.	2	54.18
1996	Ger.	2	51.528

slalom kayak singles

1972	S. Horn	E.Ger.
1992	P. Ferrazzi	Italy
1996	O. Fix	Ger.

Canadian singles (500 metres)

			min	sec
1976	A. Rogov	U.S.S.R.	1	59.23
1980	S. Postrekin	U.S.S.R.	1	53.37
1984	L. Cain	Can.	1	57.01
1988	O. Heukrodt	E.Ger.	1	56.42
1992	N. Bukhalov	Bulg.	1	51.15
1996	M. Doktor	Cz.Rep.	1	49.934

Canadian pairs (500 metres)

		min	sec
1976	U.S.S.R.	1	45.81
1980	Hung.	1	43.39
1984	Yugos.	1	43.67
1988	U.S.S.R.	1	41.77
1992	U.T.†	1	41.54
1996	Hung.	1	40.420

Canadian singles (1,000 metres)

			min	sec
1936	F. Amyot	Can.	5	32.10
1948	J. Holeček	Czech.	5	42.00
1952	J. Holeček	Czech.	4	56.30
1956	L. Rottman	Rom.	5	05.30
1960	J. Parti	Hung.	4	33.03
1964	J. Eschert	Ger.*	4	35.14
1968	T. Tatai	Hung.	4	36.14
1972	I. Patzaichin	Rom.	4	08.94
1976	M. Ljubek	Yugos.	4	09.51
1980	L. Lubenov	Bulg.	4	12.38
1984	U. Eicke	W.Ger.	4	06.32
1988	I. Klementiev	U.S.S.R.	4	12.78
1992	N. Bukhalov	Bulg.	4	05.92
1996	M. Doktor	Cz.Rep.	3	54.418

Canadian pairs (1,000 metres)

		min	sec
1936	Czech.	4	50.10
1948	Czech.	5	07.10
1952	Den.	4	38.30
1956	Rom.	4	47.40
1960	U.S.S.R.	4	17.04
1964	U.S.S.R.	4	04.65
1968	Rom.	4	07.18
1972	U.S.S.R.	3	52.60
1976	U.S.S.R.	3	52.76
1980	Rom.	3	47.65
1984	Rom.	3	40.60
1988	U.S.S.R.	3	48.36
1992	Ger.	3	37.42
1996	Ger.	3	31.870

slalom Canadian singles

1972	R. Eiben	E.Ger.
1992	L. Pollert	Czech.
1996	M. Martikan	Slvk.

slalom Canadian pairs

1972	E.Ger.
1992	U.S.
1996	Fr.

Canoeing (women)

kayak singles (500 metres)

			min	sec
1948	K. Hoff	Den.	2	31.90
1952	S. Saimo	Fin.	2	18.40
1956	Ye. Dementyeva	U.S.S.R.	2	18.90
1960	A. Seredina	U.S.S.R.	2	08.08
1964	L. Khvedosyuk	U.S.S.R.	2	12.87
1968	L. Pinayeva-Khvedosyuk	U.S.S.R.	2	11.09
1972	Yu. Ryabchinskaya	U.S.S.R.	2	03.17
1976	C. Zirzow	E.Ger.	2	01.05
1980	B. Fischer	E.Ger.	1	57.96
1984	A. Andersson	Swed.	1	58.72
1988	V. Guecheva	Bulg.	1	55.19
1992	B. Schmidt	Ger.	1	51.60
1996	R. Koban	Hung.	1	47.655

kayak pairs (500 metres)

		min	sec
1960	U.S.S.R.	1	54.76
1964	Ger.*	1	56.95
1968	W.Ger.	1	56.44
1972	U.S.S.R.	1	53.50
1976	U.S.S.R.	1	51.15
1980	E.Ger.	1	43.88
1984	Swed.	1	45.25
1988	E.Ger.	1	43.46
1992	Ger.	1	40.29
1996	Swed.	1	39.329

kayak fours (500 metres)

		min	sec
1984	Rom.	1	38.34
1988	E.Ger.	1	40.78
1992	Hung.	1	38.32
1996	Ger.	1	31.077

slalom kayak singles

1972	A. Bahmann	E.Ger.
1992	E. Micheler	Ger.
1996	S. Hilgertova	Cz.Rep.

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*Joint East–West German team.

†Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia.

Olympic Champions, Summer Games, 1896–1996 (continued)

Cycling (men)

1,000-metre sprint

1900	G. Taillandier	Fr.
1920	M. Peeters	Neth.
1924	L. Michard	Fr.
1928	R. Beaufrand	Fr.
1932	J. Van Egmond	Neth.
1936	T. Merkens	Ger.
1948	M. Ghella	Italy
1952	E. Sacchi	Italy
1956	M. Rousseau	Fr.
1960	S. Gaiardoni	Italy
1964	G. Pettenella	Italy
1968	D. Morelon	Fr.
1972	D. Morelon	Fr.
1976	A. Tkac	Czech.
1980	L. Hesslich	E.Ger.
1984	M. Gorski	U.S.
1988	L. Hesslich	E.Ger.
1992	J. Fiedler	Ger.
1996	J. Fiedler	Ger.

1,000-metre time trial

			min	sec
1928	W. Falck-Hansen	Den.	1	14.4
1932	E. Gray	Australia	1	13.0
1936	A. van Vliet	Neth.	1	12.0
1948	J. Dupont	Fr.	1	13.5
1952	R. Mockridge	Australia	1	11.1
1956	L. Faggin	Italy	1	09.8
1960	S. Gaiardoni	Italy	1	07.27
1964	P. Sercu	Belg.	1	09.59
1968	P. Trentin	Fr.	1	03.91
1972	N. Fredborg	Den.	1	06.44
1976	K.-J. Grünke	E.Ger.	1	05.927
1980	L. Thoms	E.Ger.	1	02.955
1984	F. Schmidtke	W.Ger.	1	06.104
1988	A. Kirichenko	U.S.S.R.	1	04.499
1992	J. Moreno	Spain	1	03.342
1996	F. Rousseau	Fr.	1	02.712

4,000-metre individual pursuit

1964	J. Daler	Czech.
1968	D. Rebillard	Fr.
1972	K. Knudsen	Nor.
1976	G. Braun	W.Ger.
1980	R. Dill-Bondi	Switz.
1984	S. Hegg	U.S.
1988	G. Umaras	U.S.S.R.
1992	C. Boardman	Gt.Brit.
1996	A. Collinelli	Italy

4,000-metre team pursuit

1920	Italy
1924	Italy
1928	Italy
1932	Italy
1936	Fr.
1948	Fr.
1952	Italy
1956	Italy
1960	Italy
1964	Ger.*
1968	Den.
1972	W.Ger.
1976	W.Ger.
1980	U.S.S.R.
1984	Australia
1988	U.S.S.R.
1992	Ger.
1996	Fr.

road race (individual)†

			hr	min	sec
1896	A. Konstantinidis	Greece	3	22	31.0
1912	R. Lewis	S.Af.	10	42	39.0
1920	H. Stenqvist	Swed.	4	40	01.8
1924	A. Blanchonnet	Fr.	6	20	48.0
1928	H. Hansen	Den.	4	47	18.0
1932	A. Pavesi	Italy	2	28	05.6
1936	R. Charpentier	Fr.	2	33	05.0
1948	J. Beyaert	Fr.	5	18	12.6
1952	A. Noyelle	Belg.	5	06	03.4
1956	E. Baldini	Italy	5	21	17.0
1960	V. Kapitonov	U.S.S.R.	4	20	37.0
1964	M. Zanin	Italy	4	39	51.63
1968	P. Vianelli	Italy	4	41	25.24
1972	H. Kuiper	Neth.	4	14	37.0
1976	B. Johansson	Swed.	4	46	52.0
1980	S. Sukhoruchenkov	U.S.S.R.	4	48	28.90
1984	A. Grewal	U.S.	4	59	57.0
1988	O. Ludwig	E.Ger.	4	32	22.0
1992	F. Casartelli	Italy	4	35	21.0
1996	P. Richard	Switz.	4	53	56.0

road time trial (individual)

			hr	min	sec
1996	M. Indurain	Spain	1	04	05

points race

1984	R. Ilegems	Belg.
1988	D. Frost	Den.
1992	G. Lombardi	Italy
1996	S. Martinello	Italy

cross country (mountain bike)

			hr	min	sec
1996	B. Brentjens	Neth.	2	17	38

Cycling (women)

road race (individual)

			hr	min	sec
1984	C. Carpenter-Phinney	U.S.	2	11	14.0
1988	M. Knol	Neth.	2	00	52.0
1992	K. Watt	Australia	2	04	42.0
1996	J. Longo-Ciprelli	Fr.	2	36	13.0

road time trial (individual)

			min	sec
1996	Z. Zabirova	Russia	36	40

1,000-metre sprint

1988	E. Salumae	U.S.S.R.
1992	E. Salumae	Estonia
1996	F. Ballanger	Fr.

3,000-metre individual pursuit

1992	P. Rossner	Ger.
1996	A. Bellutti	Italy

points race

1996	N. Lancien	Fr.

cross country (mountain bike)

			hr	min	sec
1996	P. Pezzo	Italy	1	50	51

Diving (men)

springboard

1908	A. Zürner	Ger.
1912	P. Günther	Ger.
1920	L. Kuehn	U.S.
1924	A. White	U.S.
1928	P. Desjardins	U.S.
1932	M. Galitzen	U.S.
1936	R. Degener	U.S.
1948	B. Harlan	U.S.
1952	D. Browning	U.S.
1956	R. Clotworthy	U.S.
1960	G. Tobian	U.S.
1964	K. Sitzberger	U.S.
1968	B. Wrightson	U.S.
1972	V. Vasin	U.S.S.R.
1976	P. Boggs	U.S.
1980	A. Portnov	U.S.S.R.
1984	G. Louganis	U.S.
1988	G. Louganis	U.S.
1992	M. Lenzi	U.S.
1996	N. Xiong	China

platform (high) diving

1904	G. Sheldon	U.S.
1908	H. Johansson	Swed.
1912	E. Adlerz	Swed.
1920	C. Pinkston	U.S.
1924	A. White	U.S.
1928	P. Desjardins	U.S.
1932	H. Smith	U.S.
1936	M. Wayne	U.S.
1948	S. Lee	U.S.
1952	S. Lee	U.S.
1956	J. Capilla	Mex.
1960	R. Webster	U.S.
1964	R. Webster	U.S.
1968	K. DiBiasi	Italy
1972	K. DiBiasi	Italy
1976	K. DiBiasi	Italy
1980	F. Hoffman	E.Ger.
1984	G. Louganis	U.S.
1988	G. Louganis	U.S.
1992	S. Sun	China
1996	D. Saoutine	Russia

Diving (women)

springboard

1920	A. Riggin	U.S.
1924	E. Becker	U.S.
1928	H. Meany	U.S.
1932	G. Coleman	U.S.
1936	M. Gestring	U.S.
1948	V. Draves	U.S.
1952	P. McCormick	U.S.
1956	P. McCormick	U.S.
1960	I. Kramer	Ger.*
1964	I. Engel-Kramer	Ger.*
1968	S. Gossick	U.S.
1972	M. King	U.S.
1976	J. Chandler	U.S.
1980	I. Kalinina	U.S.S.R.
1984	S. Bernier	Can.
1988	M. Gao	China
1992	G. Min	China
1996	M. Fu	China

platform (high) diving

1912	G. Johansson	Swed.
1920	S. Fryland Clausen	Den.
1924	C. Smith	U.S.
1928	E. Becker Pinkston	U.S.
1932	D. Poynton	U.S.
1936	D. Poynton-Hill	U.S.
1948	V. Draves	U.S.
1952	P. McCormick	U.S.
1956	P. McCormick	U.S.
1960	I. Kramer	Ger.*
1964	L. Bush	U.S.
1968	M. Duchkova	Czech.
1972	U. Knape	Swed.
1976	Y. Vaytsekhovskaya	U.S.S.R.
1980	M. Jaschke	E.Ger.
1984	J. Zhou	China
1988	Y. Xu	China
1992	M. Fu	China
1996	M. Fu	China

Equestrian sports

grand prix (dressage) individual

1900	C. Haegeman	Belg.
1912	C. Bonde	Swed.
1920	J. Lundblad	Swed.
1924	E. Linder	Swed.
1928	C. von Langen	Ger.
1932	F. Lesage	Fr.
1936	H. Pollay	Ger.
1948	H. Moser	Switz.
1952	H. St. Cyr	Swed.
1956	H. St. Cyr	Swed.
1960	S. Filatov	U.S.S.R.
1964	H. Chammartin	Switz.
1968	I. Kizimov	U.S.S.R.
1972	L. Linsenhoff	W.Ger.
1976	C. Stueckelberger	Switz.
1980	E. Theurer	Austria
1984	R. Klimke	W.Ger.
1988	N. Uphoff	W.Ger.
1992	N. Uphoff	Ger.
1996	I. Werth	Ger.

grand prix (dressage) team

1928	Ger.
1932	Fr.
1936	Ger.
1948	Fr.
1952	Swed.
1956	Swed.
1964	Ger.*
1968	W.Ger.
1972	U.S.S.R.
1976	W.Ger.
1980	U.S.S.R.
1984	W.Ger.
1988	W.Ger.
1992	Ger.
1996	Ger.

grand prix (jumping) individual

1912	J. Cariou	Fr.
1920	T. Lequio	Italy
1924	A. Gemuseus	Switz.
1928	F. Ventura	Czech.
1932	T. Nishi	Japan
1936	K. Hasse	Ger.
1948	H. Mariles Cortes	Mex.
1952	P. Jonquères d'Oriola	Fr.
1956	H. Winkler	Ger.*
1960	R. d'Inzeo	Italy
1964	P. Jonquères d'Oriola	Fr.
1968	W. Steinkraus	U.S.
1972	G. Mancinelli	Italy
1976	A. Schockemoehle	W.Ger.
1980	J. Kowalczyk	Pol.
1984	J. Fargis	U.S.
1988	P. Durand	Fr.
1992	L. Beerbaum	Ger.
1996	U. Kirchhoff	Ger.

grand prix (jumping) team‡

1912	Swed.
1920	Swed.
1924	Swed.
1928	Spain
1936	Ger.
1948	Mex.
1952	Gt.Brit.
1956	Ger.*
1960	Ger.*
1964	Ger.*
1968	Can.
1972	W.Ger.
1976	Fr.
1980	U.S.S.R.
1984	U.S.
1988	W.Ger.
1992	Neth.
1996	Ger.

three-day event (team)

1912	Swed.
1920	Swed.
1924	Neth.
1928	Neth.
1932	U.S.
1936	Ger.
1948	U.S.
1952	Swed.
1956	Gt.Brit.
1960	Australia
1964	Italy
1968	Gt.Brit.
1972	Gt.Brit.
1976	U.S.
1980	U.S.S.R.
1984	U.S.
1988	W.Ger.
1992	Australia
1996	Australia

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*Joint East–West German team. †Distances varied from 87 to 320 km. ‡In 1932 no team completed this course.

Olympic Champions, Summer Games, 1896–1996 (continued)

Equestrian sports (continued)

three-day event (individual)

1912	A. Nordlander	Swed.
1920	H. Mörner	Swed.
1924	A. van der Voort van Zijp	Neth.
1928	C. Pahud de Mortanges	Neth.
1932	C. Pahud de Mortanges	Neth.
1936	L. Stubbendorff	Ger.
1948	B. Chevallier	Fr.
1952	H. von Blixen-Finecke	Swed.
1956	P. Kastenman	Swed.
1960	L. Morgan	Australia
1964	M. Checcoli	Italy
1968	J. Goyon	Fr.
1972	R. Meade	Gt.Brit.
1976	E. Coffin	U.S.
1980	F. Roman	Italy
1984	M. Todd	N.Z.
1988	M. Todd	N.Z.
1992	M. Ryan	Australia
1996	B. Tait	N.Z.

Fencing (men)

foil (individual)

1896	E. Gravelotte	Fr.
1900	C. Coste	Fr.
1904	R. Fonst	Cuba
1912	N. Nadi	Italy
1920	N. Nadi	Italy
1924	R. Ducret	Fr.
1928	L. Gaudin	Fr.
1932	G. Marzi	Italy
1936	G. Gaudini	Italy
1948	J. Buhan	Fr.
1952	C. d'Oriola	Fr.
1956	C. d'Oriola	Fr.
1960	V. Zhdanovich	U.S.S.R.
1964	E. Franke	Pol.
1968	I. Drimba	Rom.
1972	W. Woyda	Pol.
1976	F. Dal Zotto	Italy
1980	V. Smirnov	U.S.S.R.
1984	M. Numa	Italy
1988	S. Cerioni	Italy
1992	P. Omnes	Fr.
1996	A. Puccini	Italy

foil (team)

1904	Cuba
1920	Italy
1924	Fr.
1928	Italy
1932	Fr.
1936	Italy
1948	Fr.
1952	Fr.
1956	Italy
1960	U.S.S.R.
1964	U.S.S.R.
1968	Fr.
1972	Pol.
1976	W.Ger.
1980	Fr.
1984	Italy
1988	U.S.S.R.
1992	Ger.
1996	Russia

épée (individual)

1900	R. Fonst	Cuba
1904	R. Fonst	Cuba
1908	G. Alibert	Fr.
1912	P. Anspach	Belg.
1920	A. Massard	Fr.
1924	C. Delporte	Belg.
1928	L. Gaudin	Fr.
1932	G. Cornaggia-Medici	Italy
1936	F. Riccardi	Italy
1948	L. Cantone	Italy
1952	E. Mangiarotti	Italy
1956	C. Pavesi	Italy
1960	G. Delfino	Italy
1964	G. Kriss	U.S.S.R.
1968	G. Kulcsár	Hung.
1972	C. Fenyvési	Hung.
1976	A. Pusch	W.Ger.
1980	J. Harmenberg	Swed.
1984	P. Boisse	Fr.
1988	A. Schmitt	W.Ger.
1992	E. Srecki	Fr.
1996	A. Beketov	Russia

épée (team)

1908	Fr.
1912	Belg.
1920	Italy
1924	Fr.
1928	Italy
1932	Fr.
1936	Italy
1948	Fr.
1952	Italy
1956	Italy
1960	Italy
1964	Hung.
1968	Hung.
1972	Hung.
1976	Swed.
1980	Fr.
1984	W.Ger.
1988	Fr.
1992	Ger.
1996	Italy

sabre (individual)

1896	J. Georgiadis	Greece
1900	G. de la Falaise	Fr.
1904	M. Diaz	Cuba
1908	J. Fuchs	Hung.
1912	J. Fuchs	Hung.
1920	N. Nadi	Italy
1924	S. Posta	Hung.
1928	O. Tersztyánszky	Hung.
1932	G. Piller	Hung.
1936	E. Kabos	Hung.
1948	A. Gerevich	Hung.
1952	P. Kovács	Hung.
1956	R. Kárpáti	Hung.
1960	R. Kárpáti	Hung.
1964	T. Pézsa	Hung.
1968	J. Pawlowski	Pol.
1972	V. Sidyak	U.S.S.R.
1976	V. Krovopuskov	U.S.S.R.
1980	V. Krovopuskov	U.S.S.R.
1984	J.-F. Lamour	Fr.
1988	J.-F. Lamour	Fr.
1992	B. Szabo	Hung.
1996	S. Pozdnyakov	Russia

sabre (team)

1908	Hung.
1912	Hung.
1920	Italy
1924	Italy
1928	Hung.
1932	Hung.
1936	Hung.
1948	Hung.
1952	Hung.
1956	Hung.
1960	Hung.
1964	U.S.S.R.
1968	U.S.S.R.
1972	Italy
1976	U.S.S.R.
1980	U.S.S.R.
1984	Italy
1988	Hung.
1992	U.T.*
1996	Russia

Fencing (women)

foil (individual)

1924	E. Osiier	Den.
1928	H. Mayer	Ger.
1932	E. Preis	Austria
1936	I. Schacherer-Elek	Hung.
1948	I. Elek	Hung.
1952	I. Camber	Italy
1956	G. Sheen	Gt.Brit.
1960	A. Schmid	Ger.†
1964	I. Ujlaki-Rejtö	Hung.
1968	Ye. Novikova	U.S.S.R.
1972	A. Ragno Lonzi	Italy
1976	I. Schwarczenberger	Hung.
1980	P. Trinquet	Fr.
1984	J. Luan	China
1988	A. Fichtel	W.Ger.
1992	G. Trillini	Italy
1996	L. Badea	Rom.

foil (team)

1960	U.S.S.R.
1964	Hung.
1968	U.S.S.R.
1972	U.S.S.R.
1976	U.S.S.R.
1980	Fr.
1984	W.Ger.
1988	W.Ger.
1992	Italy
1996	Italy

épée (individual)

1996	L. Flessel	Fr.

épée (team)

1996		Fr.

Field hockey

men

1908	Gt.Brit.
1920	Gt.Brit.
1928	India
1932	India
1936	India
1948	India
1952	India
1956	India
1960	Pak.
1964	India
1968	Pak.
1972	W.Ger.
1976	N.Z.
1980	India
1984	Pak.
1988	Gt.Brit.
1992	Ger.
1996	Neth.

women

1980	Zimb.
1984	Neth.
1988	Australia
1992	Spain
1996	Australia

Gymnastics (men)

combined, or all-around (individual)

1900	S. Sandras	Fr.
1904	J. Lenhardt	U.S.
1908	A. Braglia	Italy
1912	A. Braglia	Italy
1920	G. Zampori	Italy
1924	L. Stukelj	Yugos.
1928	G. Miez	Switz.
1932	R. Neri	Italy
1936	A. Schwarzmann	Ger.
1948	V. Huhtanen	Fin.
1952	V. Chukarin	U.S.S.R.
1956	V. Chukarin	U.S.S.R.
1960	B. Shakhlin	U.S.S.R.
1964	Y. Endo	Japan
1968	S. Kato	Japan
1972	S. Kato	Japan
1976	N. Andrianov	U.S.S.R.
1980	A. Dityatin	U.S.S.R.
1984	K. Gushiken	Japan
1988	V. Artemov	U.S.S.R.
1992	V. Sherbo	U.T.*
1996	X. Li	China

combined, or all-around (team)

1920	Italy
1924	Italy
1928	Switz.
1932	Italy
1936	Ger.
1948	Fin.
1952	U.S.S.R.
1956	U.S.S.R.
1960	Japan
1964	Japan
1968	Japan
1972	Japan
1976	Japan
1980	U.S.S.R.
1984	U.S.
1988	U.S.S.R.
1992	U.T.*
1996	Russia

floor exercise

1932	I. Pelle	Hung.
1936	G. Miez	Switz.
1948	F. Pataki	Hung.
1952	K. Thoresson	Swed.
1956	V. Muratov	U.S.S.R.
1960	N. Aihara	Japan
1964	F. Menichelli	Italy
1968	S. Kato	Japan
1972	N. Andrianov	U.S.S.R.
1976	N. Andrianov	U.S.S.R.
1980	R. Bruckner	E.Ger.
1984	N. Li	China
1988	S. Kharikov	U.S.S.R.
1992	X. Li	China
1996	I. Melissanidis	Greece

horizontal bar

1896	H. Weingärtner	Ger.
1904	A. Heida	U.S.
	E. Henning (tied)	U.S.
1924	L. Stukelj	Yugos.
1928	G. Miez	Switz.
1932	D. Bixler	U.S.
1936	A. Saarvala	Fin.
1948	J. Stalder	Switz.
1952	J. Günthard	Switz.
1956	T. Ono	Japan
1960	T. Ono	Japan
1964	B. Shakhlin	U.S.S.R.
1968	M. Voronin	U.S.S.R.
	A. Nakayama (tied)	Japan
1972	M. Tsukahara	Japan
1976	M. Tsukahara	Japan
1980	S. Deltchev	Bulg.
1984	S. Morisue	Japan
1988	V. Artemov	U.S.S.R.
	V. Lyukin (tied)	U.S.S.R.
1992	T. Dimas	U.S.
1996	A. Wecker	Ger.

parallel bars

1896	A. Flatow	Ger.
1904	G. Eyser	U.S.
1924	A. Güttinger	Switz.
1928	L. Vácha	Czech.
1932	R. Neri	Italy
1936	K. Frey	Ger.
1948	M. Reusch	Switz.
1952	H. Eugster	Switz.
1956	V. Chukarin	U.S.S.R.
1960	B. Shakhlin	U.S.S.R.
1964	Y. Endo	Japan
1968	A. Nakayama	Japan
1972	S. Kato	Japan
1976	S. Kato	Japan
1980	A. Tkachyov	U.S.S.R.
1984	B. Conner	U.S.
1988	V. Artemov	U.S.S.R.
1992	V. Sherbo	U.T.*
1996	R. Sharipov	Ukr.

side, or pommel, horse

1896	L. Zutter	Switz.
1904	A. Heida	U.S.
1924	J. Wilhelm	Switz.
1928	A. Hanggi	Switz.
1932	I. Pelle	Hung.
1936	K. Frey	Ger.
1948	P. Aaltonen	Fin.
	V. Huhtanen	Fin.
	H. Savolainen (tied)	Fin.
1952	V. Chukarin	U.S.S.R.
1956	B. Shakhlin	U.S.S.R.
1960	B. Shakhlin	U.S.S.R.
	E. Ekman (tied)	Fin.
1964	M. Cerar	Yugos.
1968	M. Cerar	Yugos.
1972	V. Klimenko	U.S.S.R.
1976	Z. Magyar	Hung.
1980	Z. Magyar	Hung.
1984	N. Li	China
	P. Vidmar (tied)	U.S.
1988	L. Gueraskov	Bulg.
	Z. Borkai	Hung.
	D. Bilozertchev (tied)	U.S.S.R.
1992	V. Sherbo	U.T.*
	G.-S. Pae (tied)	N.Kor.
1996	D. Li	Switz.

long, or vaulting, horse

1896	K. Schuhmann	Ger.
1904	A. Heida	U.S.
	G. Eyser (tied)	U.S.
1924	F. Kriz	U.S.
1928	E. Mack	Switz.
1932	S. Guglielmetti	Italy
1936	K. Schnorzmann	Ger.
1948	P. Aaltonen	Fin.
1952	V. Chukarin	U.S.S.R.
1956	V. Muratov	U.S.S.R.
	H. Bantz (tied)	Ger.†
1960	T. Ono	Japan
	B. Shakhlin (tied)	U.S.S.R.
1964	H. Yamashita	Japan
1968	M. Voronin	U.S.S.R.
1972	K. Koeste	E.Ger.
1976	N. Andrianov	U.S.S.R.
1980	N. Andrianov	U.S.S.R.
1984	Y. Lou	China
1988	Y. Lou	China
1992	V. Sherbo	U.T.*
1996	A. Nemov	Russia

rings

1896	J. Mitropoulos	Greece
1904	H. Glass	U.S.
1924	F. Martino	Italy
1928	L. Stukecj	Yugos.
1932	G. Gulack	U.S.
1936	A. Hudec	Czech.
1948	K. Frei	Switz.
1952	G. Shaginyan	U.S.S.R.
1956	A. Azaryan	U.S.S.R.
1960	A. Azaryan	U.S.S.R.
1964	T. Hayata	Japan
1968	A. Nakayama	Japan
1972	A. Nakayama	Japan
1976	N. Andrianov	U.S.S.R.
1980	A. Dityatin	U.S.S.R.
1984	N. Li	China
	K. Gushiken (tied)	Japan
1988	H. Behrendt	E.Ger.
	D. Bilozertchev (tied)	U.S.S.R.
1992	V. Sherbo	U.T.*
1996	Y. Chechi	Italy

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*Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia.

†Joint East–West German team.

Olympic Champions, Summer Games, 1896–1996 (continued)

Gymnastics (women)

combined, or all-around (individual)

1952	M. Gorokhovskaya	U.S.S.R.
1956	L. Latynina	U.S.S.R.
1960	L. Latynina	U.S.S.R.
1964	V. Cáslavská	Czech.
1968	V. Cáslavská	Czech.
1972	L. Turishcheva	U.S.S.R.
1976	N. Comaneci	Rom.
1980	Y. Davydova	U.S.S.R.
1984	M.L. Retton	U.S.
1988	Y. Shoushounova	U.S.S.R.
1992	T. Gutsu	U.T.*
1996	L. Podkopyeva	Ukr.

combined, or all-around (team)

1928	Neth.
1936	Ger.
1948	Czech.
1952	U.S.S.R.
1956	U.S.S.R.
1960	U.S.S.R.
1964	U.S.S.R.
1968	U.S.S.R.
1972	U.S.S.R.
1976	U.S.S.R.
1980	U.S.S.R.
1984	Rom.
1988	U.S.S.R.
1992	U.T.*
1996	U.S.

balance beam

1952	N. Bocharova	U.S.S.R.
1956	A. Keleti	Hung.
1960	E. Bosáková	Czech.
1964	V. Cáslavská	Czech.
1968	N. Kuchinskaya	U.S.S.R.
1972	O. Korbut	U.S.S.R.
1976	N. Comaneci	Rom.
1980	N. Comaneci	Rom.
1984	E. Szabo	Rom.
	S. Pauca (tied)	Rom.
1988	D. Silivas	Rom.
1992	T. Lyssenko	U.T.*
1996	S. Miller	U.S.

uneven parallel bars

1952	M. Korondi	Hung.
1956	A. Keleti	Hung.
1960	P. Astakhova	U.S.S.R.
1964	P. Astakhova	U.S.S.R.
1968	V. Cáslavská	Czech.
1972	K. Janz	E.Ger.
1976	N. Comaneci	Rom.
1980	M. Gnauck	E.Ger.
1984	J. McNamara	U.S.
	Y. Ma (tied)	China
1988	D. Silivas	Rom.
1992	L. Lu	China
1996	S. Chorkina	Russia

vaulting horse

1952	Y. Kalinchuk	U.S.S.R.
1956	L. Latynina	U.S.S.R.
1960	M. Nikolayeva	U.S.S.R.
1964	V. Cáslavská	Czech.
1968	V. Cáslavská	Czech.
1972	K. Janz	E.Ger.
1976	N. Kim	U.S.S.R.
1980	N. Shaposhnikova	U.S.S.R.
1984	E. Szabo	Rom.
1988	S. Boguinskaya	U.S.S.R.
1992	H. Onodi	Hung.
	L. Milosovici (tied)	Rom.
1996	S. Amanar	Rom.

floor exercise

1952	A. Keleti	Hung.
1956	L. Latynina	U.S.S.R.
	A. Keleti (tied)	Hung.
1960	L. Latynina	U.S.S.R.
1964	L. Latynina	U.S.S.R.
1968	V. Cáslavská	Czech.
	L. Petrik (tied)	U.S.S.R.
1972	O. Korbut	U.S.S.R.
1976	N. Kim	U.S.S.R.
1980	N. Comaneci	Rom.
	N. Kim (tied)	U.S.S.R.
1984	E. Szabo	Rom.
1988	D. Silivas	Rom.
1992	L. Milosovici	Rom.
1996	L. Podkopyeva	Ukr.

rhythmic gymnastics (individual)

1984	L. Fung	Can.
1988	M. Lobatch	U.S.S.R.
1992	A. Timoshenko	U.T.*
1996	E. Serebryanskaya	Ukr.

rhythmic gymnastics (team)

1996	Spain

Handball (team)

men

1936†	Ger.
1952‡	Swed.
1972§	Yugos.
1976§	U.S.S.R.
1980	E.Ger.
1984	Yugos.
1988	U.S.S.R.
1992	U.T.*
1996	Croatia

women

1976§	U.S.S.R.
1980	U.S.S.R.
1984	Yugos.
1988	S.Kor.
1992	S.Kor.
1996	Den.

Judo (men) ||

60 kg; 132.5 lb

1980	T. Rey	Fr.
1984	S. Hosokawa	Japan
1988	J.-Y. Kim	S.Kor.
1992	N. Gousseinov	U.T.*
1996	T. Nomura	Japan

65 kg; 143.5 lb

1980	N. Solodukhin	U.S.S.R.
1984	Y. Matsuoka	Japan
1988	K.-K. Lee	S.Kor.
1992	R. Sampaio	Braz.
1996	U. Quellmalz	Ger.

71 kg; 156.5 lb

1964	T. Nakatani	Japan
1972	T. Kawaguchi	Japan
1976	H. Rodriguez	Cuba
1980	E. Gamba	Italy
1984	B.K. Ahn	S.Kor.
1988	M. Alexandre	Fr.
1992	T. Koga	Japan
1996	K. Nakamura	Japan

78 kg; 172 lb

1972	T. Nomura	Japan
1976	V. Nevzorov	U.S.S.R.
1980	Sh. Khabareli	U.S.S.R.
1984	F. Wieneke	W.Ger.
1988	W. Legien	Pol.
1992	H. Yoshida	Japan
1996	D. Bouras	Fr.

86 kg; 189.5 lb

1964	I. Okano	Japan
1972	S. Sekine	Japan
1976	I. Sonoda	Japan
1980	J. Roethlisberger	Switz.
1984	P. Seisenbacher	Austria
1988	P. Seisenbacher	Austria
1992	W. Legien	Pol.
1996	K.-Y. Jeon	S.Kor.

95 kg; 209.5 lb

1972	Sh. Chochoshvili	U.S.S.R.
1976	K. Ninomiya	Japan
1980	R. Van de Walle	Belg.
1984	H.Z. Ha	S.Kor.
1988	A. Miguel	Braz.
1992	A. Kovacs	Hung.
1996	P. Nastula	Pol.

Over 95 kg; 209.5 lb

1964	I. Inokuma	Japan
1972	W. Ruska	Neth.
1976	S. Novikov	U.S.S.R.
1980	A. Parisi	Fr.
1984	H. Saito	Japan
1988	H. Saito	Japan
1992	D. Khakhaleichvili	U.T.*
1996	D. Douillet	Fr.

Judo (women)

48 kg; 106 lb

1992	C. Nowak	Fr.
1996	S. Kye	N.Kor.

52 kg; 114.5 lb

1992	A. Munoz Martinez	Spain
1996	M.-C. Restoux	Fr.

56 kg; 123.5 lb

1992	M. Blasco Soto	Spain
1996	D. Gonzalez	Cuba

61 kg; 134.5 lb

1992	C. Fleury	Fr.
1996	Y. Emoto	Japan

66 kg; 145.5 lb

1992	O. Reve	Cuba
1996	M.-S. Cho	S.Kor.

72 kg; 158.5 lb

1992	M.J. Kim	S.Kor.
1996	U. Werbrouck	Belg.

Over 72 kg; 158.5 lb

1992	X. Zhuang	China
1996	F. Sun	China

Modern pentathlon

individual

1912	G. Lilliehöök	Swed.
1920	G. Dyrssen	Swed.
1924	B. Lindman	Swed.
1928	S. Thofelt	Swed.
1932	J. Oxenstierna	Swed.
1936	G. Handrick	Ger.
1948	W. Grut	Swed.
1952	L. Hall	Swed.
1956	L. Hall	Swed.
1960	F. Nemeth	Hung.
1964	F. Torok	Hung.
1968	B. Ferm	Swed.
1972	A. Balczo	Hung.
1976	J. Pyciak-Peciak	Pol.
1980	A. Starostin	U.S.S.R.
1984	D. Masala	Italy
1988	J. Martinek	Hung.
1992	A. Skrzypaszek	Pol.
1996	A. Parygin	Kazak.

Rowing (men)¶

single sculls

			min	sec
1900	H. Barrelet	Fr.	7	35.6
1904	F. Greer	U.S.	10	08.5
1908	H. Blackstaffe	Gt.Brit.	9	26.0
1912	W. Kinnear	Gt.Brit.	7	47.6
1920	J. Kelly	U.S.	7	35.0
1924	J. Beresford	Gt.Brit.	7	49.2
1928	H. Pearce	Australia	7	11.0
1932	H. Pearce	Australia	7	44.4
1936	G. Schäfer	Ger.	8	21.5
1948	M. Wood	Australia	7	24.4
1952	Y. Tyukalov	U.S.S.R.	8	12.8
1956	V. Ivanov	U.S.S.R.	8	02.5
1960	V. Ivanov	U.S.S.R.	7	13.96
1964	V. Ivanov	U.S.S.R.	8	22.51
1968	H. Wienese	Neth.	7	47.80
1972	Yu. Malyshev	U.S.S.R.	7	10.12
1976	P. Karppinen	Fin.	7	29.03
1980	P. Karppinen	Fin.	7	09.61
1984	P. Karppinen	Fin.	7	00.24
1988	T. Lange	E.Ger.	6	49.86
1992	T. Lange	Ger.	6	51.40
1996	X. Mueller	Switz.	6	44.85

double sculls

		min	sec
1904	U.S.	10	03.2
1920	U.S.	7	09.0
1924	U.S.	6	34.0
1928	U.S.	6	41.4
1932	U.S.	7	17.4
1936	Gt.Brit.	7	20.8
1948	Gt.Brit.	6	51.3
1952	Arg.	7	32.2
1956	U.S.S.R.	7	24.0
1960	Czech.	6	47.50
1964	U.S.S.R.	7	10.66
1968	U.S.S.R.	6	51.82
1972	U.S.S.R.	7	01.77
1976	Nor.	7	13.20
1980	E.Ger.	6	24.33
1984	U.S.	6	36.87
1988	Neth.	6	21.13
1992	Australia	6	17.32
1996	Italy	6	16.98

four sculls

		min	sec
1976	E.Ger.	6	18.65
1980	E.Ger.	5	49.81
1984	W.Ger.	5	57.55
1988	Italy	5	53.37
1992	Ger.	5	45.17
1996	Ger.	5	56.93

lightweight double sculls

		min	sec
1996	Switz.	6	23.47

pairs (without coxswain)

		min	sec
1904	U.S.	10	57.0
1908	Gt.Brit.	9	41.0
1924	Neth.	8	19.4
1928	Ger.	7	06.4
1932	Gt.Brit.	8	00.0
1936	Ger.	8	16.1
1948	Gt.Brit.	7	21.1
1952	U.S.	8	20.7
1956	U.S.	7	55.4
1960	U.S.S.R.	7	02.01
1964	Can.	7	32.94
1968	E.Ger.	7	26.56
1972	E.Ger.	6	53.16
1976	E.Ger.	7	23.31
1980	E.Ger.	6	48.01
1984	Rom.	6	45.39
1988	Gt.Brit.	6	36.84
1992	Gt.Brit.	6	27.72
1996	Gt.Brit.	6	20.09

lightweight fours (without coxswain)

		min	sec
1996	Den.	6	09.58

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*Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. †Outdoors (field handball). ‡Demonstration. §Indoors. || Not contested in 1968; the weight classifications for judo were changed in 1980. ¶The distances in the men's rowing events have varied from time to time. In 1904 it was 2 miles; in 1908, 1.5 miles; from 1912 to 1936, 2,000 m; in 1948, 1 mile 350 yards; and since 1952, 2,000 m (1 mile 427 yards).

Olympic Champions, Summer Games, 1896–1996 (continued)

Rowing (men) (continued)

fours (without coxswain)

		min	sec
1900	Fr.	7	11.0
1904	U.S.	9	53.8
1908	Gt.Brit.	8	34.0
1920	Gt.Brit.	7	08.6
1928	Gt.Brit.	6	36.0
1932	Gt.Brit.	6	58.2
1936	Ger.	7	01.8
1948	Italy	6	39.0
1952	Yugos.	7	16.0
1956	Can.	7	08.8
1960	U.S.	6	26.26
1964	Den.	6	59.30
1968	E.Ger.	6	39.18
1972	E.Ger.	6	24.27
1976	E.Ger.	6	37.42
1980	E.Ger.	6	08.17
1984	N.Z.	6	03.48
1988	E.Ger.	6	03.11
1992	Australia	5	55.04
1996	Australia	6	06.37

eights (with coxswain)

		min	sec
1900	U.S.	[illegible]	09.8
1904	U.S.	7	50.0
1908	Gt.Brit.	7	52.0
1912	Gt.Brit.	6	15.0
1920	U.S.	6	02.6
1924	U.S.	6	33.4
1928	U.S.	6	03.2
1932	U.S.	6	37.6
1936	U.S.	6	25.4
1948	U.S.	5	56.7
1952	U.S.	6	25.9
1956	U.S.	6	35.2
1960	Ger.*	5	57.18
1964	U.S.	6	18.23
1968	W.Ger.	6	07.00
1972	N.Z.	6	08.94
1976	E.Ger.	5	58.29
1980	E.Ger.	5	49.05
1984	Can.	5	41.32
1988	W.Ger.	5	46.05
1992	Can.	5	29.53
1996	Neth.	5	42.74

Rowing (women)†

single sculls

			min	sec
1976	C. Scheiblich	E.Ger.	4	05.56
1980	S. Toma	Rom.	3	40.69
1984	V. Racila	Rom.	3	40.68
1988	J. Behrendt	E.Ger.	7	47.19
1992	E. Lipa	Rom.	7	25.54
1996	Y. Khodotovich	Bela.	7	32.21

double sculls

		min	sec
1976	Bulg.	3	44.36
1980	U.S.S.R.	3	16.27
1984	Rom.	3	26.75
1988	E.Ger.	7	00.48
1992	Ger.	6	49.00
1996	Can.	6	56.84

lightweight double sculls

		min	sec
1996	Rom.	7	12.78

four sculls

		min	sec
1976	E.Ger.	3	29.99
1980	E.Ger.	3	15.32
1984	Rom.	3	14.11
1988	E.Ger.	6	21.06
1992	Ger.	6	20.18
1996	Ger.	6	27.44

pairs (without coxswain)

		min	sec
1976	Bulg.	4	01.22
1980	E.Ger.	3	30.49
1984	Rom.	3	32.60
1988	Rom.	7	28.13
1992	Can.	7	06.22
1996	Australia	7	01.39

eights (with coxswain)

		min	sec
1976	E.Ger.	3	33.32
1980	E.Ger.	3	03.32
1984	U.S.	2	59.80
1988	E.Ger.	6	15.17
1992	Can.	6	02.62
1996	Rom.	6	19.73

Shooting (men)

clay pigeon (trapshooting) (open)

1900	W. Ewing	Can.
1908	W. Ewing	Can.
1912	J. Graham	U.S.
1920	M. Arie	U.S.
1924	G. Halasy	Hung.
1952	G. Généreux	Can.
1956	G. Rossini	Italy
1960	I. Dumitrescu	Rom.
1964	E. Mattarelli	Italy
1968	J. Braithwaite	Gt.Brit.
1972	A. Scalzone	Italy
1976	D. Haldeman	U.S.
1980	L. Giovannetti	Italy
1984	L. Giovannetti	Italy
1988	D. Monakov	U.S.S.R.
1992	P. Hrdlicka	Czech.
1996	M. Diamond	Australia

skeet shooting (open)

1968	E. Petrov	U.S.S.R.
1972	K. Wirnhier	W.Ger.
1976	J. Panacek	Czech.
1980	H. Rasmussen	Den.
1984	M. Dryke	U.S.
1988	A. Wegner	E.Ger.
1992	S. Zhang	China
1996	E. Falco	Italy

free pistol

1936	T. Ullmann	Swed.
1948	E. Vásquez Cam	Peru
1952	H. Benner	U.S.
1956	P. Linnosvuo	Fin.
1960	A. Gushchin	U.S.S.R.
1964	V. Markkanen	Fin.
1968	G. Kosykh	U.S.S.R.
1972	R. Skanaker	Swed.
1976	U. Potteck	E.Ger.
1980	A. Melentev	U.S.S.R.
1984	H. Xu	China
1988	S. Babii	Rom.
1992	K. Loukachik	U.T.‡
1996	B. Kokorev	Russia

rapid-fire pistol

1948	K. Takács	Hung.
1952	K. Takács	Hung.
1956	S. Petrescu	Rom.
1960	W. McMillan	U.S.
1964	P. Linnovsou	Fin.
1968	J. Zapedzki	Pol.
1972	J. Zapedzki	Pol.
1976	N. Klaar	E.Ger.
1980	C. Ion	Rom.
1984	T. Kamachi	Japan
1988	A. Kuzmin	U.S.S.R.
1992	R. Schumann	Ger.
1996	R. Schumann	Ger.

small-bore rifle (prone)

1900	A. Carnell	Gt.Brit.
1908	A. Carnell	Gt.Brit.
1912	F. Hird	U.S.
1920	L. Nuesslein	U.S.
1924	C. Coquelin de Lisle	Fr.
1932	B. Rönnmark	Swed.
1936	W. Rögeberg	Nor.
1948	A. Cock	U.S.
1952	I. Sarbu	Rom.
1956	G. Quellette	Can.
1960	P. Kohnke	Ger.*
1964	L. Hammerl	Hung.
1968	J. Kurka	Czech.
1972	J.L. Ho	N.Kor.
1976	K. Smieszek	W.Ger.
1980	K. Varga	Hung.
1984	E. Etzel	U.S.
1988	M. Varga	Czech.
1992	E.-C. Lee	S.Kor.
1996	C. Klees	Ger.

small-bore rifle (three positions)

1952	E. Kongshaug	Nor.
1956	A. Bogdanov	U.S.S.R.
1960	V. Shamburkin	U.S.S.R.
1964	L. Wigger	U.S.
1968	B. Klingner	W.Ger.
1972	J. Writer	U.S.
1976	L. Bassham	U.S.
1980	V. Vlasov	U.S.S.R.
1984	M. Cooper	Gt.Brit.
1988	M. Cooper	Gt.Brit.
1992	G. Petikian	U.T.‡
1996	J.-P. Amat	Fr.

moving target (running boar)

1900	L. Debray	Fr.
1972	L. Zhelezniak	U.S.S.R.
1976	A. Gazov	U.S.S.R.
1980	I. Sokolov	U.S.S.R.
1984	Y. Li	China
1988	T. Heiestad	Nor.
1992	M. Jakosits	Ger.
1996	L. Yang	China

air rifle

1984	P. Heberle	Fr.
1988	G. Maksimovic	Yugos.
1992	I. Fedkine	U.T.‡
1996	A. Khadzhibekov	Russia

air pistol

1988	T. Kiriakov	Bulg.
1992	Y. Wang	China
1996	R. di Donna	Italy

double trap

1996	R. Mark	Australia

Shooting (women)

sport pistol

1984	L. Thom	Can.
1988	N. Saloukvadze	U.S.S.R.
1992	M. Logvinenko	U.T.‡
1996	D. Li	China

small-bore rifle (three positions)

1984	X. Wu	China
1988	S. Sperber	W.Ger.
1992	L. Meili	U.S.
1996	A. Ivosev	Yugos.

air rifle

1984	P. Spurgin	U.S.
1988	I. Chilova	U.S.S.R.
1992	K.-S. Yeo	S.Kor.
1996	R. Maver	Pol.

air pistol

1988	J. Sekaric	Yugos.
1992	M. Logvinenko	U.T.‡
1996	O. Klochneva	Russia

double trap

1996	K. Rhode	U.S.

Softball

1996	U.S.

Swimming (men)

50-metre freestyle

			sec
1988	M. Biondi	U.S.	22.14
1992	A. Popov	U.T.‡	21.91
1996	A. Popov	Russia	22.13

100-metre freestyle

			min	sec
1896	A. Hajós	Hung.	1	22.2
1904	Z. Halmay	Hung.	1	02.8§
1908	C. Daniels	U.S.	1	05.6
1912	D. Kahanamoku	U.S.	1	03.4
1920	D. Kahanamoku	U.S.	1	00.4
1924	J. Weissmuller	U.S.		59.0
1928	J. Weissmuller	U.S.		58.6
1932	Y. Miyazaki	Japan		58.2
1936	F. Csik	Hung.		57.6
1948	W. Ris	U.S.		57.3
1952	C. Scholes	U.S.		57.4
1956	J. Henricks	Australia		55.4
1960	J. Devitt	Australia		55.2
1964	D. Schollander	U.S.		53.4
1968	M. Wenden	Australia		52.2
1972	M. Spitz	U.S.		51.22 ‖
1976	J. Montgomery	U.S.		49.99
1980	J. Woithe	E.Ger.		50.40
1984	A. Gaines	U.S.		49.80
1988	M. Biondi	U.S.		48.63
1992	A. Popov	U.T.‡		49.02
1996	A. Popov	Russia		48.74

200-metre freestyle

			min	sec
1900	F. Lane	Australia	2	25.2
1904	C. Daniels	U.S.	2	44.2¶
1968	M. Wenden	Australia	1	55.2
1972	M. Spitz	U.S.	1	52.78 ‖
1976	B. Furniss	U.S.	1	50.29
1980	S. Kopliakov	U.S.S.R.	1	49.81
1984	M. Gross	W.Ger.	1	47.44
1988	D. Armstrong	Australia	1	47.25
1992	Y. Sadovyi	U.T.‡	1	46.70
1996	D. Loader	N.Z.	1	47.63

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*Joint East–West German team. †The distance in women's rowing events was 1,000 m until 1988, at which time it became 2,000 m. ‡Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. §100 yards. ‖ Race first timed in hundredths of a second. ¶220 yards.

Olympic Champions, Summer Games, 1896–1996 (continued)

Swimming (men) (continued)

400-metre freestyle			min	sec
1904	C. Daniels	U.S.	6	16.2*
1908	H. Taylor	Gt.Brit.	5	36.8
1912	G. Hodgson	Can.	5	24.4
1920	N. Ross	U.S.	5	26.8
1924	J. Weissmuller	U.S.	5	04.2
1928	A. Zorilla	Arg.	5	01.6
1932	C. Crabbe	U.S.	4	48.4
1936	J. Medica	U.S.	4	44.5
1948	W. Smith	U.S.	4	41.0
1952	J. Boiteux	Fr.	4	30.7
1956	M. Rose	Australia	4	27.3
1960	M. Rose	Australia	4	18.3
1964	D. Schollander	U.S.	4	12.2
1968	M. Burton	U.S.	4	09.0
1972	B. Cooper	Australia	4	00.27†
1976	B. Goodell	U.S.	3	51.93
1980	V. Salnikov	U.S.S.R.	3	51.31
1984	G. DiCarlo	U.S.	3	51.23
1988	U. Dassler	E.Ger.	3	46.95
1992	Y. Sadovyi	U.T.‡	3	45.00
1996	D. Loader	N.Z.	3	47.97

1,500-metre freestyle			min	sec
1904	E. Rausch	Ger.	27	18.2§
1908	H. Taylor	Gt.Brit.	22	48.4
1912	G. Hodgson	Can.	22	00.0
1920	N. Ross	U.S.	22	23.2
1924	A. Charlton	Australia	20	06.6
1928	A. Borg	Swed.	19	51.8
1932	K. Kitamura	Japan	19	12.4
1936	N. Terada	Japan	19	13.7
1948	J. McLane	U.S.	19	18.5
1952	F. Konno	U.S.	18	30.0
1956	M. Rose	Australia	17	58.9
1960	J. Konrads	Australia	17	19.6
1964	R. Windlo	Australia	17	01.7
1968	M. Burton	U.S.	16	38.9
1972	M. Burton	U.S.	15	52.58†
1976	B. Goodell	U.S.	15	02.40
1980	V. Salnikov	U.S.S.R.	14	58.27
1984	M. O'Brien	U.S.	15	05.20
1988	V. Salnikov	U.S.S.R.	15	00.40
1992	K. Perkins	Australia	14	43.48
1996	K. Perkins	Australia	14	56.40

100-metre butterfly			sec
1968	D. Russell	U.S.	55.9
1972	M. Spitz	U.S.	54.27†
1976	M. Vogel	U.S.	54.35
1980	P. Arvidsson	Swed.	54.92
1984	M. Gross	W.Ger.	53.08
1988	A. Nesty	Suriname	53.00
1992	P. Morales	U.S.	53.32
1996	D. Pankratov	Russia	52.27

200-metre butterfly			min	sec
1956	W. Yorzyk	U.S.	2	19.3
1960	M. Troy	U.S.	2	12.8
1964	K. Berry	Australia	2	06.6
1968	C. Robie	U.S.	2	08.7
1972	M. Spitz	U.S.	2	00.70†
1976	M. Bruner	U.S.	1	59.23
1980	S. Fesenko	U.S.S.R.	1	59.76
1984	J. Sieben	Australia	1	57.04
1988	M. Gross	W.Ger.	1	56.94
1992	M. Stewart	U.S.	1	56.26
1996	D. Pankratov	Russia	1	56.51

100-metre backstroke			min	sec
1904	W. Brack	Ger.	1	16.8 ‖
1908	A. Bieberstein	Ger.	1	24.6
1912	H. Hebner	U.S.	1	21.2
1920	W. Kealoha	U.S.	1	15.2
1924	W. Kealoha	U.S.	1	13.2
1928	G. Kojac	U.S.	1	08.2
1932	M. Kiyokawa	Japan	1	08.6
1936	A. Kiefer	U.S.	1	05.9
1948	A. Stack	U.S.	1	06.4
1952	Y. Oyakawa	Japan	1	05.4
1956	D. Theile	Australia	1	02.2
1960	D. Theile	Australia	1	01.9
1968	R. Matthes	E.Ger.		58.7
1972	R. Matthes	E.Ger.		56.58†
1976	J. Naber	U.S.		55.49
1980	B. Baron	Swed.		56.53
1984	R. Carey	U.S.		55.79
1988	D. Suzuki	Japan		55.05
1992	M. Tewksbury	Can.		53.98
1996	J. Rouse	U.S.		54.10

200-metre backstroke			min	sec
1900	E. Hoppenberg	Ger.	2	47.0
1964	J. Graef	U.S.	2	10.3
1968	R. Matthes	E.Ger.	2	09.6
1972	R. Matthes	E.Ger.	2	02.82†
1976	J. Naber	U.S.	1	59.19
1980	S. Wladar	Hung.	2	01.93
1984	R. Carey	U.S.	2	00.23
1988	I. Polyansky	U.S.S.R.	1	59.37
1992	M. Lopez-Zubero	Spain	1	58.47
1996	B. Bridgewater	U.S.	1	58.54

100-metre breaststroke			min	sec
1968	D. McKenzie	U.S.	1	07.7
1972	N. Tagushi	Japan	1	04.94†
1976	J. Hencken	U.S.	1	03.11
1980	D. Goodhew	Gt.Brit.	1	03.34
1984	S. Lundquist	U.S.	1	01.65
1988	A. Moorhouse	Gt.Brit.	1	02.04
1992	N. Diebel	U.S.	1	01.50
1996	F. Deburghgraeve	Belg.	1	00.65

200-metre breaststroke			min	sec
1908	F. Holman	Gt.Brit.	3	09.2
1912	W. Bathe	Ger.	3	01.8
1920	H. Malmroth	Swed.	3	04.4
1924	R. Skelton	U.S.	2	56.6
1928	Y. Tsuruta	Japan	2	48.8
1932	Y. Tsuruta	Japan	2	45.4
1936	T. Hamuro	Japan	2	42.5
1948	J. Verdeur	U.S.	2	39.3
1952	J. Davies	Australia	2	34.4
1956	M. Furukawa	Japan	2	34.7
1960	W. Mulliken	U.S.	2	37.4
1964	I. O'Brien	Australia	2	27.8
1968	F. Muñoz	Mex.	2	28.7
1972	J. Hencken	U.S.	2	21.55†
1976	D. Wilkie	Gt.Brit.	2	15.11
1980	R. Zulpa	U.S.S.R.	2	15.85
1984	V. Davis	Can.	2	13.34
1988	J. Szabo	Hung.	2	13.52
1992	M. Barrowman	U.S.	2	10.16
1996	N. Rozsa	Hung.	2	12.57

200-metre medley¶			min	sec
1968	C. Hickcox	U.S.	2	12.0
1972	G. Larsson	Swed.	2	07.17†
1984	A. Baumann	Can.	2	01.42
1988	T. Darnyi	Hung.	2	00.17
1992	T. Darnyi	Hung.	2	00.76
1996	A. Czene	Hung.	1	59.91

400-metre medley			min	sec
1964	R. Roth	U.S.	4	45.4
1968	C. Hickcox	U.S.	4	48.4
1972	G. Larsson	Swed.	4	31.98†
1976	R. Strachan	U.S.	4	23.68
1980	A. Sidorenko	U.S.S.R.	4	22.89
1984	A. Baumann	Can.	4	17.41
1988	T. Darnyi	Hung.	4	14.75
1992	T. Darnyi	Hung.	4	14.23
1996	T. Dolan	U.S.	4	14.90

400-metre medley relay		min	sec
1960	U.S.	4	05.4
1964	U.S.	3	58.4
1968	U.S.	3	54.9
1972	U.S.	3	48.16†
1976	U.S.	3	42.22
1980	Australia	3	45.70
1984	U.S.	3	39.30
1988	U.S.	3	36.93
1992	U.S.	3	36.93
1996	U.S.	3	34.84

400-metre freestyle relay¶		min	sec
1964	U.S.	3	33.2
1968	U.S.	3	31.7
1972	U.S.	3	26.42†
1984	U.S.	3	19.03
1988	U.S.	3	16.53
1992	U.S.	3	16.74
1996	U.S.	3	15.41

800-metre freestyle relay		min	sec
1908	Gt.Brit.	10	55.6
1912	Australia	10	11.2
1920	U.S.	10	04.4
1924	U.S.	9	53.4
1928	U.S.	9	36.2
1932	Japan	8	58.4
1936	Japan	8	51.5
1948	U.S.	8	46.0
1952	U.S.	8	31.1
1956	Australia	8	23.6
1960	U.S.	8	10.2
1964	U.S.	7	52.1
1968	U.S.	7	52.3
1972	U.S.	7	35.78†
1976	U.S.	7	23.22
1980	U.S.S.R.	7	23.50
1984	U.S.	7	15.69
1988	U.S.	7	12.51
1992	U.T.‡	7	11.95
1996	U.S.	7	14.84

Swimming (women)

50-metre freestyle			sec
1988	K. Otto	E.Ger.	25.49
1992	W. Yang	China	24.79
1996	A. Van Dyken	U.S.	24.87

100-metre freestyle			min	sec
1912	F. Durack	Australia	1	22.2
1920	E. Bleibtrey	U.S.	1	13.6
1924	E. Lackie	U.S.	1	12.4
1928	A. Osipowich	U.S.	1	11.0
1932	H. Madison	U.S.	1	06.8
1936	H. Mastenbroek	Neth.	1	05.9
1948	G. Andersen	Den.	1	06.3
1952	K. Szöke	Hung.	1	06.8
1956	D. Fraser	Australia	1	02.0
1960	D. Fraser	Australia	1	01.2
1964	D. Fraser	Australia		59.5
1968	J. Henne	U.S.	1	00.0
1972	S. Neilson	U.S.		58.59†
1976	K. Ender	E.Ger.		55.65
1980	B. Krause	E.Ger.		54.79
1984	C. Steinseifer	U.S.		55.92
	N. Hogshead (tied)	U.S.		
1988	K. Otto	E.Ger.		54.93
1992	Y. Zhuang	China		54.64
1996	J. Le	China		54.50

200-metre freestyle			min	sec
1968	D. Meyer	U.S.	2	10.5
1972	S. Gould	Australia	2	03.56†
1976	K. Ender	E.Ger.	1	59.26
1980	B. Krause	E.Ger.	1	58.33
1984	M. Wayte	U.S.	1	59.23
1988	H. Friedrich	E.Ger.	1	57.65
1992	N. Haislett	U.S.	1	57.90
1996	C. Poll	C.Rica	1	58.16

400-metre freestyle			min	sec
1924	M. Norelius	U.S.	6	02.2
1928	M. Norelius	U.S.	5	42.8
1932	H. Madison	U.S.	5	28.5
1936	H. Mastenbroek	Neth.	5	26.4
1948	A. Curtis	U.S.	5	17.8
1952	V. Gyenge	Hung.	5	12.1
1956	L. Crapp	Australia	4	54.6
1960	C. von Saltza	U.S.	4	50.6
1964	V. Duenkel	U.S.	4	43.3
1968	D. Meyer	U.S.	4	31.8
1972	S. Gould	Australia	4	19.04†
1976	P. Thümer	E.Ger.	4	09.89
1980	I. Diers	E.Ger.	4	08.76
1984	T. Cohen	U.S.	4	07.10
1988	J. Evans	U.S.	4	03.85
1992	D. Hase	Ger.	4	07.18
1996	M. Smith	Ire.	4	07.25

800-metre freestyle			min	sec
1968	D. Meyer	U.S.	9	24.0
1972	K. Rothhammer	U.S.	8	53.68†
1976	P. Thümer	E.Ger.	8	37.14
1980	M. Ford	Australia	8	28.90
1984	T. Cohen	U.S.	8	24.95
1988	J. Evans	U.S.	8	20.20
1992	J. Evans	U.S.	8	25.52
1996	B. Bennett	U.S.	8	27.89

100-metre butterfly			min	sec
1956	S. Mann	U.S.	1	11.0
1960	C. Schuler	U.S.	1	09.5
1964	S. Stouder	U.S.	1	04.7
1968	L. McClements	Australia	1	05.5
1972	M. Aoki	Japan	1	03.34†
1976	K. Ender	E.Ger.	1	00.13
1980	C. Metschuck	E.Ger.	1	00.42
1984	M. Meagher	U.S.		59.26
1988	K. Otto	E.Ger.		59.00
1992	H. Qian	China		58.62
1996	A. Van Dyken	U.S.		59.13

200-metre butterfly			min	sec
1968	A. Kok	Neth.	2	24.7
1972	K. Moe	U.S.	2	15.57†
1976	A. Pollack	E.Ger.	2	11.41
1980	I. Geissler	E.Ger.	2	10.44
1984	M. Meagher	U.S.	2	06.90
1988	K. Nord	E.Ger.	2	09.51
1992	S. Sanders	U.S.	2	08.67
1996	S. O'Neill	Australia	2	07.76

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*440 yards. †Race first timed in hundredths of a second. ‡Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia.
§One mile. ‖ One hundred yards. ¶Not held in 1976 and 1980.

Olympic Champions, Summer Games, 1896–1996 (continued)

Swimming (women) (continued)

100-metre backstroke

			min	sec
1924	S. Bauer	U.S.	1	23.2
1928	M. Braun	Neth.	1	22.0
1932	E. Holm	U.S.	1	19.4
1936	D. Senff	Neth.	1	18.9
1948	K. Harup	Den.	1	14.4
1952	J. Harrison	S.Af.	1	14.3
1956	J. Grinham	Gt.Brit.	1	12.9
1960	L. Burke	U.S.	1	09.3
1964	C. Ferguson	U.S.	1	07.7
1968	K. Hall	U.S.	1	06.2
1972	M. Belote	U.S.	1	05.78*
1976	U. Richter	E.Ger.	1	01.83
1980	R. Reinisch	E.Ger.	1	00.86
1984	T. Andrews	U.S.	1	02.55
1988	K. Otto	E.Ger.	1	00.89
1992	K. Egerszegi	Hung.	1	00.68
1996	B. Botsford	U.S.	1	01.19

200-metre backstroke

			min	sec
1968	L. Watson	U.S.	2	24.8
1972	M. Belote	U.S.	2	19.19*
1976	U. Richter	E.Ger.	2	13.43
1980	R. Reinisch	E.Ger.	2	11.77
1984	J. De Rover	Neth.	2	12.38
1988	K. Egerszegi	Hung.	2	09.29
1992	K. Egerszegi	Hung.	2	07.06
1996	K. Egerszegi	Hung.	2	07.83

100-metre breaststroke

			min	sec
1968	B. Bjedov	Yugos.	1	15.8
1972	C. Carr	U.S.	1	13.58*
1976	H. Anke	E.Ger.	1	11.16
1980	U. Geveniger	E.Ger.	1	10.22
1984	P. van Staveren	Neth.	1	09.88
1988	T. Dangalakova	Bulg.	1	07.95
1992	Y. Roudkovskaya	U.T.†	1	08.00
1996	P. Heyns	S.Af.	1	07.73

200-metre breaststroke

			min	sec
1924	L. Morton	Gt.Brit.	3	33.2
1928	H. Schrader	Ger.	3	12.6
1932	C. Dennis	Australia	3	06.3
1936	H. Maehata	Japan	3	03.6
1948	P. van Vliet	Neth.	2	57.2
1952	E. Székely	Hung.	2	51.7
1956	U. Happe	Ger.‡	2	53.1
1960	A. Lonsbrough	Gt.Brit.	2	49.5
1964	G. Prozumenshchikova	U.S.S.R.	2	46.4
1968	S. Wichman	U.S.	2	44.4
1972	B. Whitfield	Australia	2	41.71*
1976	M. Koshevaya	U.S.S.R.	2	33.35
1980	L. Kachushite	U.S.S.R.	2	29.54
1984	A. Ottenbrite	Can.	2	30.38
1988	S. Hoerner	E.Ger.	2	26.71
1992	K. Iwasaki	Japan	2	26.65
1996	P. Heyns	S.Af.	2	25.41

200-metre medley§

			min	sec
1968	C. Kolb	U.S.	2	24.7
1972	S. Gould	Australia	2	23.07*
1984	T. Caulkins	U.S.	2	12.64
1988	D. Hunger	E.Ger.	2	12.59
1992	L. Lin	China	2	11.65
1996	M. Smith	Ire.	2	13.93

400-metre medley

			min	sec
1964	D. De Varona	U.S.	5	18.7
1968	C. Kolb	U.S.	5	08.5
1972	G. Neall	Australia	5	02.97*
1976	U. Tauber	E.Ger.	4	42.77
1980	P. Schneider	E.Ger.	4	36.29
1984	T. Caulkins	U.S.	4	39.24
1988	J. Evans	U.S.	4	37.76
1992	K. Egerszegi	Hung.	4	36.54
1996	M. Smith	Ire.	4	39.18

400-metre medley relay

		min	sec
1960	U.S.	4	41.1
1964	U.S.	4	33.9
1968	U.S.	4	28.3
1972	U.S.	4	20.75*
1976	E.Ger.	4	07.95
1980	E.Ger.	4	06.67
1984	U.S.	4	08.34
1988	E.Ger.	4	03.74
1992	U.S.	4	02.54
1996	U.S.	4	02.88

800-metre freestyle relay

		min	sec
1996	U.S.	7	59.87

synchronized swimming (team)

1996 U.S.

400-metre freestyle relay

		min	sec
1912	Gt.Brit.	5	52.8
1920	U.S.	5	11.6
1924	U.S.	4	58.8
1928	U.S.	4	47.6
1932	U.S.	4	38.0
1936	Neth.	4	36.0
1948	U.S.	4	29.2
1952	Hung.	4	24.4
1956	Australia	4	17.1
1960	U.S.	4	08.9
1964	U.S.	4	03.8
1968	U.S.	4	02.5
1972	U.S.	3	55.19*
1976	U.S.	3	44.82
1980	E.Ger.	3	42.71
1984	U.S.	3	43.43
1988	E.Ger.	3	40.63
1992	U.S.	3	39.46
1996	U.S.	3	39.29

Table tennis (men)

singles

1988	N.K. Yoo	S.Kor.
1992	J. Ove Waldner	Swed.
1996	G. Liu	China

doubles

1988	China
1992	China
1996	China

Table tennis (women)

singles

1988	J. Chen	China
1992	Y. Deng	China
1996	Y. Deng	China

doubles

1988	S.Kor.
1992	China
1996	China

Tennis (men)

singles

1896	J. Boland	Gt.Brit.
1900	L. Doherty	Gt.Brit.
1904	B. Wright	U.S.
1908	M. Ritchie	Gt.Brit.
1912	C. Winslow	S.Af.
1920	L. Raymond	S.Af.
1924	V. Richards	U.S.
1988	M. Mecir	Czech.
1992	M. Rosset	Switz.
1996	A. Agassi	U.S.

doubles

1896	J. Boland F. Thraun	Gt.Brit. Ger.
1900	L. Doherty, R. Doherty	Gt.Brit.
1904	E. Leonard, B. Wright	U.S.
1908	G. Hillyard, R. Doherty	Gt.Brit.
1912	C. Kitson, C. Winslow	S.Af.
1920	O. Turnbull, M. Woosnam	Gt.Brit.
1924	F. Hunter, V. Richards	U.S.
1988	K. Flach, R. Seguso	U.S.
1992	B. Becker, M. Stich	Ger.
1996	T. Woodbridge, M. Woodforde	Australia

Tennis (women)

singles

1900	C. Cooper	Gt.Brit.
1908	D. Chambers-Lambert	Gt.Brit.
1912	M. Broquedis	Fr.
1920	S. Lenglen	Fr.
1924	H. Wills	U.S.
1988	S. Graf	W.Ger.
1992	J. Capriati	U.S.
1996	L. Davenport	U.S.

doubles

1920	H. McNair, K. McKane	Gt.Brit.
1924	H. Wills, H. Wightman	U.S.
1988	Z. Garrison, P. Shriver	U.S.
1992	G. Fernandez, M.J. Fernandez	U.S.
1996	G. Fernandez, M.J. Fernandez	U.S.

Volleyball (men)

indoor

1964	U.S.S.R.
1968	U.S.S.R.
1972	Japan
1976	Pol.
1980	U.S.S.R.
1984	U.S.
1988	U.S.
1992	Braz.
1996	Neth.

beach

1996 U.S.

Volleyball (women)

indoor

1964	Japan
1968	U.S.S.R.
1972	U.S.S.R.
1976	Japan
1980	U.S.S.R.
1984	China
1988	U.S.S.R.
1992	Cuba
1996	Cuba

beach

1996 Brazil

Water Polo

1900	Gt.Brit.
1904	U.S.
1908	Gt.Brit.
1912	Gt.Brit.
1920	Gt.Brit.
1924	Fr.
1928	Ger.
1932	Hung.
1936	Hung.
1948	Italy
1952	Hung.
1956	Hung.
1960	Italy
1964	Hung.
1968	Yugos.
1972	U.S.S.R.
1976	Hung.
1980	U.S.S.R.
1984	Yugos.
1988	Yugos.
1992	Italy
1996	Spain

Weight lifting ‖, ¶

flyweight (54 kg; 119 lb)

			kg
1972	Z. Smalcerz	Pol.	337.5
1976	A. Varonin	U.S.S.R.	242.5
1980	K. Osmanaliev	U.S.S.R.	245.0
1984	G. Zeng	China	235.0
1988	S. Marinov	Bulg.	270.0
1992	I. Ivanov	Bulg.	265.0
1996	H. Mutlu	Tur.	287.5

bantamweight (59 kg; 130 lb)

			kg
1948	J. de Pietro	U.S.	307.5
1952	I. Udodov	U.S.S.R.	315.0
1956	C. Vinci	U.S.	342.5
1960	C. Vinci	U.S.	345.0
1964	A. Vakhonin	U.S.S.R.	357.5
1968	M. Nassiri	Iran	367.5
1972	I. Foeldi	Hung.	377.5
1976	N. Nurikian	Bulg.	262.5
1980	D. Nuñez	Cuba	275.0
1984	S. Wu	China	267.5
1988	O. Mirzoian	U.S.S.R.	292.5
1992	B.-K. Chun	S.Kor.	287.5
1996	N. Tang	China	307.5

featherweight (64 kg; 141 lb)

			kg
1920	F. de Haes	Belg.	220.0
1924	P. Gabetti	Italy	402.5♀
1928	F. Andrysek	Austria	287.5
1932	R. Suvigny	Fr.	287.5
1936	A. Terlazzo	U.S.	312.5
1948	M. Fayad	Egypt	332.5
1952	R. Chimishkyan	U.S.S.R.	337.5
1956	I. Berger	U.S.	352.5
1960	Y. Minayev	U.S.S.R.	372.5
1964	Y. Miyake	Japan	397.5
1968	Y. Miyake	Japan	392.5
1972	N. Nurikian	Bulg.	402.5
1976	N. Kolesnikov	U.S.S.R.	285.0
1980	V. Mazin	U.S.S.R.	290.0
1984	W. Chen	China	282.5
1988	N. Suleymanoglu	Tur.	342.5
1992	N. Suleymanoglu	Tur.	320.0
1996	N. Suleymanoglu	Tur.	335.0

lightweight (70 kg; 154.5 lb)

			kg
1920	A. Neyland	Estonia	257.5
1924	E. Décottignies	Fr.	440.0♀
1928	K. Helbig	Ger.	322.5
	H. Haas (tied)	Austria	
1932	R. Duverger	Fr.	325.0
1936	M. Mesbah	Egypt	342.5
	R. Fein (tied)	Austria	
1948	I. Shams	Egypt	360.0
1952	T. Kono	U.S.	362.5
1956	I. Rybak	U.S.S.R.	380.0
1960	V. Bushuyev	U.S.S.R.	397.5
1964	W. Baszanowski	Pol.	432.5
1968	W. Baszanowski	Pol.	437.5
1972	M. Kirzhinov	U.S.S.R.	460.0
1976	P. Korol	U.S.S.R.	305.0
1980	Ya. Rusev	Bulg.	342.5
1984	J. Yao	China	320.0
1988	J. Kunz	E.Ger.	340.0
1992	I. Militossian	U.T.†	337.5
1996	X. Zhan	China	357.5

middleweight (76 kg; 167.5 lb)

			kg
1920	B. Gance	Fr.	245.0
1924	C. Galimberti	Italy	492.5♀
1928	F. Roger	Fr.	335.0
1932	R. Ismayr	Ger.	345.0
1936	K. el Thouni	Egypt	387.5
1948	F. Spellman	U.S.	390.0
1952	P. George	U.S.	400.0
1956	F. Bogdanovsky	U.S.S.R.	420.0
1960	A. Kurynov	U.S.S.R.	437.5
1964	H. Zdrazila	Czech.	445.0
1968	V. Kurentsov	U.S.S.R.	475.0
1972	Y. Bikov	Bulg.	485.0
1976	Y. Mitkov	Bulg.	335.0
1980	A. Zlatev	Bulg.	360.0
1984	K.-H. Radschinsky	W.Ger.	340.0
1988	B. Guidikov	Bulg.	375.0
1992	F. Kassapu	U.T.†	357.5
1996	P. Lara	Cuba	367.5

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*Race first timed in hundredths of a second. †Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. ‡Joint East–West German team. §Not held in 1976 and 1980. ‖ In 1976 the press lift was removed, weights given being the total for the clean and jerk and the snatch. ¶The weights have varied from time to time, and classifications differ in various reports. ♀Total of five lifts.

Olympic Champions, Summer Games, 1896–1996 (continued)

Weight lifting (continued)

light heavyweight (83 kg; 183 lb)			kg
1920	E. Cadine	Fr.	290.0
1924	C. Rigoulot	Fr.	502.5*
1928	S. Nosseir	Egypt	355.0
1932	L. Hostin	Fr.	365.0
1936	L. Hostin	Fr.	372.5
1948	S. Stanczyk	U.S.	417.5
1952	T. Lomakin	U.S.S.R.	417.5
1956	T. Kono	U.S.	447.5
1960	I. Palinski	Pol.	442.5
1964	R. Plyukfelder	U.S.S.R.	475.0
1968	B. Selitsky	U.S.S.R.	485.0
	V. Belayev (tied)	U.S.S.R.	
1972	L. Jenssen	Nor.	507.5
1976	V. Shary	U.S.S.R.	365.0
1980	Y. Vardanyan	U.S.S.R.	400.0
1984	P. Becheru	Rom.	355.0
1988	I. Arsamakov	U.S.S.R.	377.5
1992	P. Dimas	Greece	370.0
1996	P. Dimas	Greece	392.5

middle heavyweight (91 kg; 200.5 lb)			kg
1952	N. Schemansky	U.S.	445.0
1956	A. Vorobyev	U.S.S.R.	462.5
1960	A. Vorobyev	U.S.S.R.	472.5
1964	V. Golovanov	U.S.S.R.	487.5
1968	K. Kangasniemi	Fin.	517.5
1972	A. Nikolov	Bulg.	525.0
1976	D. Rigert	U.S.S.R.	382.5
1980	P. Baczako	Hung.	377.5
1984	N. Vlad	Rom.	392.5
1988	A. Khrapatyi	U.S.S.R.	412.5
1992	K. Kakhiashvili	U.T.†	412.5
1996	A. Petrov	Russia	402.5

(first) heavyweight (99 kg; 218 lb)			kg
1980	O. Zaremba	Czech.	395.0
1984	R. Milser	W.Ger.	385.0
1988	P. Kouznetsov	U.S.S.R.	425.0
1992	V. Tregubov	U.T.†	410.0
1996	A. Kakhiashvilis	Greece	420.0

(second) heavyweight (108 kg; 238 lb)			kg
1896	V. Jensen	Den.	111.5
1904	P. Kakousis	Greece	111.58
1920	F. Bottino	Italy	270.0
1924	G. Tonani	Italy	517.5*
1928	J. Strassberger	Ger.	372.5
1932	J. Skobia	Czech.	380.0
1936	J. Manger	Ger.	410.0
1948	J. Davis	U.S.	452.5
1952	J. Davis	U.S.	460.0
1956	P. Anderson	U.S.	500.0
1960	Y. Vlasov	U.S.S.R.	537.5
1964	L. Zhabotinsky	U.S.S.R.	572.5
1968	L. Zhabotinsky	U.S.S.R.	572.5
1972	Y. Talts	U.S.S.R.	580.0
1976	Y. Zaytsev	U.S.S.R.	385.0
1980	L. Taranenko	U.S.S.R.	422.5
1984	N. Oberburger	Italy	390.0
1988	Y. Zakharevitch	U.S.S.R.	455.0
1992	R. Weller	Ger.	432.5
1996	I. Iaimazov	Ukr.	430.0

super-heavyweight (over 108 kg; 238 lb)			kg
1972	V. Alekseyev	U.S.S.R.	640.0
1976	V. Alekseyev	U.S.S.R.	440.0
1980	S. Rakhmanov	U.S.S.R.	440.0
1984	D. Lukin	Australia	412.5
1988	A. Kurlovich	U.S.S.R.	462.5
1992	A. Kurlovich	U.T.†	450.0
1996	A. Chemerkin	Russia	457.5

Wrestling–Freestyle‡

light flyweight (48 kg; 106 lb)		
1972	R. Dmitriev	U.S.S.R.
1976	K. Issaev	Bulg.
1980	C. Pollio	Italy
1984	R. Weaver	U.S.
1988	T. Kobayashi	Japan
1992	I. Kim	N.Kor.
1996	I. Kim	N.Kor.

flyweight (52 kg; 114.5 lb)		
1904	R. Curry	U.S.
1948	L. Viitala	Fin.
1952	H. Gemici	Tur.
1956	M. Tsalkalamanidze	U.S.S.R.
1960	A. Bilek	Tur.
1964	Y. Yoshida	Japan
1968	S. Nakata	Japan
1972	K. Kato	Japan
1976	Y. Takada	Japan
1980	A. Beloglazov	U.S.S.R.
1984	S. Trstena	Yugos.
1988	M. Sato	Japan
1992	H.S. Li	N.Kor.
1996	V. Jordanov	Bulg.

bantamweight (57 kg; 125.5 lb)		
1900	G. Mehnert	U.S.
1908	G. Mehnert	U.S.
1924	K. Pihlajamäki	Fin.
1928	K. Maakinen	Fin.
1932	R. Pearce	U.S.
1936	O. Zombori	Hung.
1948	N. Akar	Tur.
1952	I. Ishii	Japan
1956	M. Dagistanli	Tur.
1960	T. McCann	U.S.
1964	Y. Uetake	Japan
1968	Y. Uetake	Japan
1972	H. Yanagida	Japan
1976	V. Yumin	U.S.S.R.
1980	S. Beloglazov	U.S.S.R.
1984	H. Tomiyama	Japan
1988	S. Beloglazov	U.S.S.R.
1992	A. Puerto	Cuba
1996	K. Cross	U.S.

featherweight (62 kg; 136.5 lb)		
1904	I. Niflot	U.S.
1908	G. Dole	U.S.
1920	C. Ackerly	U.S.
1924	R. Reed	U.S.
1928	A. Morrison	U.S.
1932	H. Pihlajamäki	Fin.
1936	K. Pihlajamäki	Fin.
1948	G. Bilge	Tur.
1952	B. Sit	Tur.
1956	S. Sasahara	Japan
1960	M. Dagistanli	Tur.
1964	O. Watanabe	Japan
1968	M. Kaneko	Japan
1972	Z. Abdulbekov	U.S.S.R.
1976	J.-M. Yang	S.Kor.
1980	M. Abushev	U.S.S.R.
1984	R. Lewis	U.S.
1988	J. Smith	U.S.
1992	J. Smith	U.S.
1996	T. Brands	U.S.

lightweight (68 kg; 150 lb)		
1904	B. Bradshaw	U.S.
1908	G. Relwyskow	Gt.Brit.
1920	R. Anttila	Fin.
1924	R. Vis	U.S.
1928	O. Käpp	Estonia
1932	C. Pacome	Fr.
1936	K. Kárpáti	Hung.
1948	C. Atik	Tur.
1952	O. Anderberg	Swed.
1956	E. Habibi	Iran
1960	S. Wilson	U.S.
1964	E. Dimov	Bulg.
1968	A. Movahed	Iran
1972	D. Gable	U.S.
1976	P. Pinigin	U.S.S.R.
1980	S. Absaldov	U.S.S.R.
1984	I.T. You	S.Kor.
1988	A. Fadzyev	U.S.S.R.
1992	A. Fadzyev	U.T.†
1996	V. Bogiyev	Russia

welterweight (74 kg; 163 lb)		
1904	O. Roem	U.S.
1924	H. Gehri	Switz.
1928	A. Haavisto	Fin.
1932	J. Van Bebber	U.S.
1936	F. Lewis	U.S.
1948	J. Dogu	Tur.
1952	W. Smith	U.S.
1956	M. Ikeda	Japan
1960	D. Blubaugh	U.S.
1964	I. Ogan	Tur.
1968	M. Atalay	Tur.
1972	W. Wells	U.S.
1976	J. Date	Japan
1980	V. Raitchev	Bulg.
1984	D. Schultz	U.S.
1988	K. Monday	U.S.
1992	J.S. Park	S.Kor.
1996	B. Saytyev	Russia

middleweight (82 kg; 180.5 lb)		
1908	S. Bacon	Gt.Brit.
1920	E. Leino	Fin.
1924	F. Haggmann	Switz.
1928	E. Kyburz	Switz.
1932	I. Johansson	Swed.
1936	E. Poilvé	Fr.
1948	G. Brand	U.S.
1952	D. Tsimakuridze	U.S.S.R.
1956	N. Stanchev	Bulg.
1960	H. Güngor	Tur.
1964	P. Gardchev	Bulg.
1968	B. Gurevich	U.S.S.R.
1972	L. Tediashvili	U.S.S.R.
1976	J. Peterson	U.S.
1980	I. Abilov	Bulg.
1984	M. Schultz	U.S.
1988	M.-W. Han	S.Kor.
1992	K. Jackson	U.S.
1996	K. Magomedov	Russia

light heavyweight (90 kg; 198.5 lb)		
1920	A. Larsson	Swed.
1924	J. Spellman	U.S.
1928	T. Sjöstedt	Swed.
1932	P. Mehringer	U.S.
1936	K. Fridell	Swed.
1948	H. Wittenberg	U.S.
1952	W. Palm	Swed.
1956	G.-R. Takhti	Iran
1960	I. Atli	Tur.
1964	A. Medved	U.S.S.R.
1968	A. Ayuk	Tur.
1972	B. Peterson	U.S.
1976	L. Tediashvili	U.S.S.R.
1980	S. Oganesyan	U.S.S.R.
1984	E. Banach	U.S.
1988	M. Khadartsev	U.S.S.R.
1992	M. Khadartsev	U.T.†
1996	R. Khadem Azghadi	Iran

heavyweight (100 kg; 220.5 lb)		
1896	K. Schumann	Ger.
1904	B. Hansen	U.S.
1908	G. O'Kelly	Gt.Brit.
1920	R. Rothe	Switz.
1924	H. Steele	U.S.
1928	J. Richthoff	Swed.
1932	J. Richthoff	Swed.
1936	K. Palusalu	Estonia
1948	G. Bóbis	Hung.
1952	A. Mekokishvili	U.S.S.R.
1956	H. Kaplan	Tur.
1960	W. Dietrich	Ger.§
1964	A. Ivanitsky	U.S.S.R.
1968	A. Medved	U.S.S.R.
1972	I. Yarygin	U.S.S.R.
1976	I. Yarygin	U.S.S.R.
1980	I. Mate	U.S.S.R.
1984	L. Banach	U.S.
1988	V. Puscasu	Rom.
1992	L. Khabelov	U.T.†
1996	K. Angle	U.S.

super-heavyweight (over 100 kg; 220.5 lb)		
1972	A. Medved	U.S.S.R.
1976	S. Andiev	U.S.S.R.
1980	S. Andiev	U.S.S.R.
1984	B. Baumgartner	U.S.
1988	D. Gobedjichvili	U.S.S.R.
1992	B. Baumgartner	U.S.
1996	M. Demir	Tur.

Wrestling–Greco-Roman‡

light flyweight (48 kg; 106 lb)		
1972	G. Berceanu	Rom.
1976	A. Shumakov	U.S.S.R.
1980	Z. Ushkempirov	U.S.S.R.
1984	V. Maenza	Italy
1988	V. Maenza	Italy
1992	O. Koutcherenko	U.T.†
1996	K.-H. Sim	S.Kor.

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*Total of five lifts. †Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. ‡The weights have varied from time to time, and classifications differ in various reports. §Joint East–West German team.

Olympic Champions, Summer Games, 1896–1996 (continued)

Wrestling–Greco-Roman (continued)

flyweight (52 kg; 115 lb)

1948	P. Lombardi	Italy
1952	B. Gurevich	U.S.S.R.
1956	N. Solovyev	U.S.S.R.
1960	D. Pirvulescu	Rom.
1964	T. Hanahara	Japan
1968	P. Kirov	Bulg.
1972	P. Kirov	Bulg.
1976	V. Konstantinov	U.S.S.R.
1980	V. Blagidze	U.S.S.R.
1984	A. Miyahara	Japan
1988	J. Ronningen	Nor.
1992	J. Ronningen	Nor.
1996	A. Nazaryan	Arm.

bantamweight (57 kg; 125.5 lb)

1924	E. Pütsep	Estonia
1928	C. Leucht	Ger.
1932	J. Brendel	Ger.
1936	M. Lórincz	Hung.
1948	K. Pettersen	Swed.
1952	I. Hódos	Hung.
1956	K. Vyrupayev	U.S.S.R.
1960	O. Karavayev	U.S.S.R.
1964	M. Ichiguchi	Japan
1968	J. Varga	Hung.
1972	R. Kazakov	U.S.S.R.
1976	P. Ukkola	Fin.
1980	Sh. Serikov	U.S.S.R.
1984	P. Passarelli	W.Ger.
1988	A. Sike	Hung.
1992	H.-B. An	S.Kor.
1996	Y. Melnichenko	Kazak.

featherweight (62 kg; 136.5 lb)

1912	K. Koskelo	Fin.
1920	O. Friman	Fin.
1924	K. Anttila	Fin.
1928	V. Väli	Estonia
1932	G. Gozzi	Italy
1936	Y. Erkan	Tur.
1948	M. Oktav	Tur.
1952	Ya. Punkin	U.S.S.R.
1956	R. Mäkinen	Fin.
1960	M. Sille	Tur.
1964	I. Polyak	Hung.
1968	R. Rurua	U.S.S.R.
1972	G. Markov	Bulg.
1976	K. Lipien	Pol.
1980	S. Migiakis	Greece
1984	W.K. Kim	S.Kor.
1988	K. Madjidov	U.S.S.R.
1992	A. Pirim	Tur.
1996	W. Zawadzki	Pol.

lightweight (68 kg; 150 lb)

1908	E. Porro	Italy
1912	E. Väre	Fin.
1920	E. Väre	Fin.
1924	O. Friman	Fin.
1928	L. Keresztes	Hung.
1932	E. Malmberg	Swed.
1936	L. Koskela	Fin.
1948	G. Freij	Swed.
1952	C. Safin	U.S.S.R.
1956	K. Lehtonen	Fin.
1960	A. Koridze	U.S.S.R.
1964	K. Ayvaz	Tur.
1968	M. Mumemura	Japan
1972	Sh. Khisamutdinov	U.S.S.R.
1976	S. Nalbandyan	U.S.S.R.
1980	S. Rusu	Rom.
1984	V. Lisjak	Yugos.
1988	L. Djoulfalakian	U.S.S.R.
1992	A. Repka	Hung.
1996	R. Wolny	Pol.

welterweight (74 kg; 163 lb)

1924	E. Verterlund	Fin.
1928	V. Kokkinen	Fin.
1932	I. Johansson	Swed.
1936	R. Svedberg	Swed.
1948	G. Andersson	Swed.
1952	M. Szilvási	Hung.
1956	M. Bayrak	Tur.
1960	M. Bayrak	Tur.
1964	A. Kolesov	U.S.S.R.
1968	R. Vesper	E.Ger.
1972	V. Macha	Czech.
1976	A. Bykov	U.S.S.R.
1980	F. Kocsis	Hung.
1984	J. Salomaki	Fin.
1988	Y.-N. Kim	S.Kor.
1992	M. Iskandarian	U.T.*
1996	F. Ascuy Aguilera	Cuba

middleweight (82 kg; 180.5 lb)

1908	F. Martenson	Swed.
1912	C. Johansson	Swed.
1920	C. Westergren	Swed.
1928	I. Moustafa	Egypt
1932	V. Kokkinen	Fin.
1936	I. Johansson	Swed.
1948	A. Grönberg	Swed.
1952	A. Grönberg	Swed.
1956	G. Kartoziya	U.S.S.R.
1960	D. Dobrev	Bulg.
1964	B. Simic	Yugos.
1968	L. Metz	E.Ger.
1972	C. Hegedus	Hung.
1976	M. Petkovic	Yugos.
1980	G. Korban	U.S.S.R.
1984	I. Draica	Rom.
1988	M. Mamiachvili	U.S.S.R.
1992	P. Farkas	Hung.
1996	H. Yerlikiya	Tur.

light heavyweight (90 kg; 198.5 lb)

1908	V. Weckman	Fin.
1920	C. Johansson	Swed.
1924	C. Westergren	Swed.
1928	I. Moustafa	Egypt
1932	R. Svensson	Swed.
1936	A. Cadier	Swed.
1948	K. Nilsson	Swed.
1952	K. Gröndahl	Fin.
1956	V. Nikolayev	U.S.S.R.
1960	T. Kis	Tur.
1964	B. Radev	Bulg.
1968	B. Radev	Bulg.
1972	V. Rezantsev	U.S.S.R.
1976	V. Rezantsev	U.S.S.R.
1980	N. Nottny	Hung.
1984	S. Fraser	U.S.
1988	A. Komchev	Bulg.
1992	M. Bullmann	Ger.
1996	V. Oleynyk	Ukr.

heavyweight (100 kg; 220.5 lb)

1896	K. Schuhmann	Ger.
1908	R. Weisz	Hung.
1912	Y. Saarela	Fin.
1920	A. Lindfors	Fin.
1924	H. Deglane	Fr.
1928	R. Svensson	Swed.
1932	C. Westergren	Swed.
1936	K. Palusalu	Estonia
1948	A. Kirecci	Tur.
1952	J. Kotkas	U.S.S.R.
1956	A. Parfenov	U.S.S.R.
1960	I. Bogdan	U.S.S.R.
1964	I. Kozma	Hung.
1968	I. Kozma	Hung.
1972	N. Martinescu	Rom.
1976	N. Balboshin	U.S.S.R.
1980	G. Raikov	Bulg.
1984	V. Andrei	Rom.
1988	A. Wronski	Pol.
1992	H. Milian	Cuba
1996	A. Wronski	Pol.

superheavyweight (over 100 kg; 220.5 lb)

1972	A. Roshin	U.S.S.R.
1976	A. Kolchinsky	U.S.S.R.
1980	A. Kolchinsky	U.S.S.R.
1984	J. Blatnick	U.S.
1988	A. Kareline	U.S.S.R.
1992	A. Kareline	U.T.*
1996	A. Kareline	Russia

Yachting

Boardsailing (open)†

1984	S. van den Berg	Neth.
1988	B. Kendall	N.Z.

Boardsailing (men)

1992	F. David	Fr.
1996	N. Kaklamanakis	Greece

Boardsailing (women)

1992	B. Kendall	N.Z.
1996	L.-S. Lee	H.K.

Europe‡

1992	L. Andersen	Nor.
1996	K. Roug	Den.

Laser

1996	R. Scheidt	Braz.

Finn monotype§

1952	P. Elvström	Den.
1956	P. Elvström	Den.
1960	P. Elvström	Den.
1964	W. Kuhweide	Ger. ‖
1968	V. Mankin	U.S.S.R.
1972	S. Maury	Fr.
1976	J. Shumann	E.Ger.
1980	E. Rechardt	Fin.
1984	R. Coutts	N.Z.
1988	J.L. Doreste	Spain
1992	J. van der Ploeg	Spain
1996	M. Kusznierewicz	Pol.

470 (open)¶

1976	W.Ger.
1980	Braz.
1984	Spain

470 (men)

1988	Fr.
1992	Spain
1996	Ukr.

470 (women)

1988	U.S.
1992	Spain
1996	Spain

Tornado

1976	Gt.Brit.
1980	Braz.
1984	N.Z.
1988	Fr.
1992	Fr.
1996	Spain

Soling

1972	U.S.
1976	Den.
1980	Den.
1984	U.S.
1988	E.Ger.
1992	Den.
1996	Ger.

Star♀

1932	U.S.
1936	Ger.
1948	U.S.
1952	Italy
1956	U.S.
1960	U.S.S.R.
1964	Bahamas
1968	U.S.
1972	Australia
1980	U.S.S.R.
1984	U.S.
1988	Gt.Brit.
1992	U.S.
1996	Braz.

Winter Games, 1908–1994

Biathlon (men)

10 kilometre			min	sec
1980	F. Ullrich	E.Ger.	32	10.69
1984	E. Kvalfoss	Nor.	30	53.8
1988	F.-P. Roetsch	E.Ger.	25	08.1
1992	M. Kirchner	Ger.	26	02.3
1994	S. Tchepikov	Russia	28	07.0

20 kilometre			hr	min	sec
1960	K. Lestander	Swed.	1	33	21.6
1964	V. Melanin	U.S.S.R.	1	20	26.8
1968	M. Solberg	Nor.	1	13	45.9
1972	M. Solberg	Nor.	1	15	55.50ẟ
1976	N. Kruglov	U.S.S.R.	1	14	12.26
1980	A. Alyabyev	U.S.S.R.	1	08	16.31
1984	P. Angerer	W.Ger.	1	11	52.70
1988	F.-P. Roetsch	E.Ger.		56	33.3
1992	Y. Redkine	U.T.*		57	34.4
1994	S. Tarasov	Russia		57	25.3

4 × 7.5-kilometre relay		hr	min	sec
1968	U.S.S.R.	2	13	02.4
1972	U.S.S.R.	1	51	44.92ẟ
1976	U.S.S.R.	1	57	55.64
1980	U.S.S.R.	1	34	03.27
1984	U.S.S.R.	1	38	51.70
1988	U.S.S.R.	1	22	30.00
1992	Ger.	1	24	43.5
1994	Ger.	1	30	22.1

Biathlon (women)

7.5 kilometre			min	sec
1992	A. Restzova	U.T.*	24	29.2
1994	M. Bedard	Can.	26	08.8

15 kilometre			min	sec
1992	A. Misersky	Ger.	51	47.2
1994	M. Bedard	Can.	52	06.6

4 × 7.5-kilometre relay▫		hr	min	sec
1992	Fr.	1	15	55.6
1994	Russia	1	47	19.5

Bobsled

two-man bob		min	sec
1932	U.S.	8	14.74
1936	U.S.	5	29.29
1948	Switz.	5	29.2
1952	W.Ger.	5	24.54
1956	Italy	5	30.14
1964	Gt.Brit.	4	21.90
1968	Italy	4	41.54
1972	W.Ger.	4	57.07
1976	E.Ger.	3	44.42
1980	Switz.	4	09.36
1984	E.Ger.	3	25.56
1988	U.S.S.R.	3	53.48
1992	Switz.	4	03.26
1994	Switz.	3	30.81

four-man bob		min	sec
1924	Switz.	5	45.54
1928	U.S.	3	20.5◊
1932	U.S.	7	53.68
1936	Switz.	5	19.85
1948	U.S.	5	20.1
1952	W.Ger.	5	07.84
1956	Switz.	5	10.44
1964	Can.	4	14.46
1968	Italy	2	17.39
1972	Switz.	4	43.07
1976	E.Ger.	3	40.43
1980	E.Ger.	3	59.92
1984	E.Ger.	3	20.22
1988	Switz.	3	47.51
1992	Austria	3	53.90
1994	Ger.	3	27.78

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*Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. †After 1988 men and women competed separately in the Boardsailing event. ‡Only women competed in the Europe-class event. §After 1988 only men competed in the Finn monotype event. ‖ Joint East–West German team. ¶After 1984 men and women competed separately in the 470-class event. ♀Not held in 1976. ẟRace first timed in hundredths of a second. ▫3 × 7.5-kilometre relay in 1992. ◊Five men.

Olympic Champions, Winter Games, 1908–1994 (continued)

Figure skating

men's singles

1908	U. Salchow	Swed.
1920	G. Grafström	Swed.
1924	G. Grafström	Swed.
1928	G. Grafström	Swed.
1932	K. Schäfer	Austria
1936	K. Schäfer	Austria
1948	R. Button	U.S.
1952	R. Button	U.S.
1956	H. Jenkins	U.S.
1960	D. Jenkins	U.S.
1964	M. Schnelldorfer	Ger.*
1968	W. Schwarz	Austria
1972	O. Nepela	Czech.
1976	J. Curry	Gt.Brit.
1980	R. Cousins	Gt.Brit.
1984	S. Hamilton	U.S.
1988	B. Boitano	U.S.
1992	V. Petrenko	U.T.†
1994	A. Urmanov	Russia

women's singles

1908	M. Syers	Gt.Brit.
1920	M. Mauroy	Swed.
1924	H. Planck-Szabo	Austria
1928	S. Henie	Nor.
1932	S. Henie	Nor.
1936	S. Henie	Nor.
1948	B. Scott	Can.
1952	J. Altwegg	Gt.Brit.
1956	T. Albright	U.S.
1964	S. Dijkstra	Neth.
1968	P. Fleming	U.S.
1972	T. Schuba	Austria
1976	D. Hamill	U.S.
1980	A. Potzsch	E.Ger.
1984	K. Witt	E.Ger.
1988	K. Witt	E.Ger.
1992	K. Yamaguchi	U.S.
1994	O. Baiul	Ukr.

pairs

1908	A. Hübler, H. Burger	Ger.
1920	L. Jakobsson, W. Jakobsson	Fin.
1924	H. Engelmann, A. Berger	Austria
1928	A. Joly, P. Brunet	Fr.
1932	A. Brunet, P. Brunet	Fr.
1936	M. Herber, E. Baier	Ger.
1948	M. Lannoy, P. Baugniet	Belg.
1952	R. Falk, B. Falk	W.Ger.
1956	E. Schwarz, K. Oppelt	Austria
1960	B. Wagner, R. Paul	Can.
1964	L. Belousova, O. Protopopov	U.S.S.R.
1968	L. Belousova, O. Protopopov	U.S.S.R.
1972	I. Rodnina, A. Ulanov	U.S.S.R.
1976	I. Rodnina, A. Zaytsev	U.S.S.R.
1980	I. Rodnina, A. Zaytsev	U.S.S.R.
1984	E. Valova, O. Vasilyev	U.S.S.R.
1988	Y. Gordeyeva, S. Grinkov	U.S.S.R.
1992	N. Mishkutenok, A. Dmitriev	U.T.†
1994	Y. Gordeyeva, S. Grinkov	Russia

Ice dancing

pairs

1976	L. Pakhomova, A. Gorshkov	U.S.S.R.
1980	N. Linichuk, G. Karponosov	U.S.S.R.
1984	J. Torvill, C. Dean	Gt.Brit.
1988	N. Bestemyanova, A. Bukin	U.S.S.R.
1992	M. Klimova, S. Ponomarenko	U.T.†
1994	O. Grichuk, Y. Platov	Russia

Ice hockey

1920	Can.
1924	Can.
1928	Can.
1932	Can.
1936	Gt.Brit.
1948	Can.
1952	Can.
1956	U.S.S.R.
1960	U.S.
1964	U.S.S.R.
1968	U.S.S.R.
1972	U.S.S.R.
1976	U.S.S.R.
1980	U.S.
1984	U.S.S.R.
1988	U.S.S.R.
1992	U.T.†
1994	Swed.

Luge

men's singles

			min	sec
1964	T. Köhler	Ger.*	3	26.77
1968	M. Schmid	Austria	2	52.48
1972	W. Schneidel	E.Ger.	3	27.58
1976	D. Guenther	E.Ger.	3	27.688‡
1980	B. Glass	E.Ger.	2	54.796
1984	P. Hildgartner	Italy	3	04.258
1988	J. Mueller	E.Ger.	3	05.548
1992	G. Hackl	Ger.	3	02.363
1994	G. Hackl	Ger.	3	21.571

women's singles

			min	sec
1964	O. Enderlein	Ger.*	3	24.67
1968	E. Lechner	Italy	2	29.37
1972	A. Muller	E.Ger.	2	59.18
1976	M. Schumann	E.Ger.	2	50.621‡
1980	V. Zozulya	U.S.S.R.	2	36.537
1984	S. Martin	E.Ger.	2	46.570
1988	S. Walter	E.Ger.	3	03.973
1992	D. Neuner	Austria	3	06.696
1994	G. Weissensteiner	Italy	3	15.517

men's pairs

		min	sec
1964	Austria	1	41.62
1968	E.Ger.	1	35.85
1972	Italy	1	28.35
	E.Ger. (tied)		
1976	E.Ger.	1	25.604‡
1980	E.Ger.	1	19.331
1984	W.Ger.	1	23.620
1988	E.Ger.	1	31.940
1992	Ger.	1	32.053
1994	Italy	1	36.720

Skiing–Alpine (men)

downhill

			min	sec
1948	H. Oreiller	Fr.	2	55.0
1952	Z. Colo	Italy	2	30.8
1956	A. Sailer	Austria	2	52.2
1960	J. Vuarnet	Fr.	2	06.0
1964	E. Zimmermann	Austria	2	18.16§
1968	J.-C. Killy	Fr.	1	59.85
1972	B. Russi	Switz.	1	51.43
1976	F. Klammer	Austria	1	45.73
1980	L. Stock	Austria	1	45.50
1984	B. Johnson	U.S.	1	45.59
1988	P. Zurbriggen	Switz.	1	59.63
1992	P. Ortlieb	Austria	1	50.37
1994	T. Moe	U.S.	1	45.75

slalom

			min	sec
1948	E. Reinalter	Switz.	2	10.3
1952	O. Schneider	Austria	2	00.0
1956	A. Sailer	Austria	3	14.7
1960	E. Hinterseer	Austria	2	08.9
1964	J. Stiegler	Austria	2	21.13§
1968	J.-C. Killy	Fr.	1	39.73
1972	F. Ochoa	Spain	1	49.27
1976	P. Gros	Italy	2	03.29
1980	I. Stenmark	Swed.	1	44.26
1984	P. Mahre	U.S.	1	39.41
1988	A. Tomba	Italy	1	39.47
1992	F.C. Jagge	Nor.	1	44.39
1994	T. Stangassinger	Austria	2	02.02

giant slalom

			min	sec
1952	S. Eriksen	Nor.	2	25.0
1956	A. Sailer	Austria	3	00.1
1960	R. Staub	Switz.	1	48.3
1964	F. Bonlieu	Fr.	1	46.71§
1968	J.-C. Killy	Fr.	3	29.28
1972	G. Thoeni	Italy	3	09.62
1976	H. Hemmi	Switz.	3	26.97
1980	I. Stenmark	Swed.	2	40.74
1984	M. Julen	Switz.	2	41.18
1988	A. Tomba	Italy	2	06.37
1992	A. Tomba	Italy	2	06.98
1994	M. Wasmeier	Ger.	2	52.46

supergiant slalom

			min	sec
1988	F. Piccard	Fr.	1	39.66
1992	K.-A. Aamodt	Nor.	1	13.04
1994	M. Wasmeier	Ger.	1	32.53

alpine combined

1936	F. Pfnür	Ger.
1948	H. Oreiller	Fr.
1972	G. Thoeni	Italy
1976	G. Thoeni	Italy
1988	H. Strolz	Austria
1992	J. Polig	Italy
1994	L. Kjus	Nor.

Skiing–Alpine (women)

downhill

			min	sec
1948	H. Schlunegger	Switz.	2	28.2
1952	T. Jochom-Beiser	Austria	1	47.1
1956	M. Berthod	Switz.	1	40.7
1960	H. Beibl	Ger.*	1	37.6
1964	C. Haas	Austria	1	55.39§
1968	O. Pall	Austria	1	40.87
1972	M.-T. Nadig	Switz.	1	36.68
1976	R. Mittermaier	W.Ger.	1	46.16
1980	A. Moser-Proell	Austria	1	37.52
1984	M. Figini	Switz.	1	13.36
1988	M. Kiehl	W.Ger.	1	25.86
1992	K. Lee-Gartner	Can.	1	52.55
1994	K. Seizinger	Ger.	1	35.93

slalom

			min	sec
1948	G. Fraser	U.S.	1	57.2
1952	A. Lawrence	U.S.	2	10.6
1956	R. Colliard	Switz.	1	52.3
1960	A. Heggtveit	Can.	1	49.6
1964	C. Goitschel	Fr.	1	29.86§
1968	M. Goitschel	Fr.	1	59.85
1972	B. Cochran	U.S.	1	31.24
1976	R. Mittermaier	W.Ger.	1	30.54
1980	H. Wenzel	Liech.	1	25.09
1984	P. Magoni	Italy	1	36.47
1988	V. Schneider	Switz.	1	36.69
1992	P. Kronberger	Austria	1	32.68
1994	V. Schneider	Switz.	1	56.01

giant slalom

			min	sec
1952	A. Lawrence	U.S.	2	06.8
1956	O. Reichert	Ger.*	1	56.5
1960	Y. Ruegg	Switz.	1	39.9
1964	M. Goitschel	Fr.	1	52.24§
1968	N. Greene	Can.	1	51.97
1972	M.-T. Nadig	Switz.	1	29.90
1976	K. Kreiner	Can.	1	29.13
1980	H. Wenzel	Liech.	2	41.66
1984	D. Armstrong	U.S.	2	20.98
1988	V. Schneider	Switz.	2	06.49
1992	P. Wiberg	Swed.	2	12.74
1994	D. Compagnoni	Italy	2	30.97

supergiant slalom

			min	sec
1988	S. Wolf	Austria	1	19.03
1992	D. Compagnoni	Italy	1	21.22
1994	D. Roffe-Steinrotter	U.S.	1	22.15

alpine combined

1936	C. Cranz	Ger.
1948	T. Beiser	Austria
1972	A. Proell	Austria
1976	R. Mittermaier	W.Ger.
1988	A. Wachter	Austria
1992	P. Kronberger	Austria
1994	P. Wiberg	Swed.

Skiing–Freestyle

men's moguls

1992	E. Grospiron	Fr.
1994	J.-L. Brassard	Can.

men's aerials

1994	A. Schoenbaechler	Switz.

women's moguls

1992	D. Weinbrecht	U.S.
1994	S.L. Hattestad	Nor.

women's aerials

1994	L. Tcherjazova	Uzbek.

Skiing–Nordic (men)

10-kilometre cross-country

			min	sec
1992	V. Ulvang	Nor.	27	36.0
1994	B. Daehlie	Nor.	24	20.1

15-kilometre cross-country ‖

			hr	min	sec
1924	T. Haug	Nor.	1	14	31.0
1928	J. Gröttumsbraaten	Nor.	1	37	01.0
1932	S. Utterström	Swed.	1	23	07.0
1936	E.-A. Larsson	Swed.	1	14	38.0
1948	M. Lundström	Swed.	1	13	50.0
1952	H. Brenden	Nor.	1	01	34.0
1956	H. Brenden	Nor.		49	39.0
1960	H. Brusveen	Nor.		51	55.5
1964	E. Mäntyranta	Fin.		50	54.1
1968	H. Groenningen	Nor.		47	54.2
1972	S.-A. Lundbäck	Swed.		45	28.24§
1976	N. Bazhukov	U.S.S.R.		43	58.47
1980	T. Wassberg	Swed.		41	57.63
1984	G. Svan	Swed.		41	25.60
1988	M. Deviatiarov	U.S.S.R.		41	18.9

15-kilometre pursuit¶

			hr	min	sec
1992	B. Daehlie	Nor.	1	05	37.9
1994	B. Daehlie	Nor.	1	00	08.8

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*Joint East–West German team. †Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. ‡Race first timed in thousandths of a second. §Race first timed in hundredths of a second. ‖ 1924–52, 18 km. ¶Combines results of a 10-kilometre (classical) and 15-kilometre (freestyle) race.

Olympic Champions, Winter Games, 1908–1994 (continued)

Skiing–Nordic (men) (continued)

30-kilometre cross-country

			hr	min	sec
1956	V. Hakulinen	Fin.	1	44	06.0
1960	S. Jernberg	Swed.	1	51	03.9
1964	E. Mäntyranta	Fin.	1	30	50.7
1968	F. Nones	Italy	1	35	39.2
1972	V. Vedenin	U.S.S.R.	1	36	31.15*
1976	S. Savelyev	U.S.S.R.	1	30	29.38
1980	N. Zimyatov	U.S.S.R.	1	27	02.80
1984	N. Zimyatov	U.S.S.R.	1	28	56.30
1988	A. Prokourorov	U.S.S.R.	1	24	26.3
1992	V. Ulvang	Nor.	1	22	27.8
1994	T. Alsgaard	Nor.	1	12	26.4

50-kilometre cross-country

			hr	min	sec
1924	T. Haug	Nor.	3	44	32.0
1928	P. Hedlund	Swed.	4	52	03.3
1932	V. Saarinen	Fin.	4	28	00.0
1936	E. Viklund	Swed.	3	30	11.0
1948	N. Karlsson	Swed.	3	47	48.0
1952	V. Hakulinen	Fin.	3	33	33.0
1956	S. Jernberg	Swed.	2	50	27.0
1960	K. Hamalainen	Fin.	2	59	06.3
1964	S. Jernberg	Swed.	2	43	52.6
1968	O. Ellefsaeter	Nor.	2	28	45.8
1972	P. Tyldum	Nor.	2	43	14.75*
1976	I. Formo	Nor.	2	37	30.05
1980	N. Zimyatov	U.S.S.R.	2	27	24.60
1984	T. Wassberg	Swed.	2	15	55.80
1988	G. Svan	Swed.	2	04	30.9
1992	B. Daehlie	Nor.	2	03	41.5
1994	V. Smirnov	Kazak.	2	07	20.3

4 × 10-kilometre relay

		hr	min	sec
1936	Fin.	2	41	33.0
1948	Swed.	2	32	08.0
1952	Fin.	2	20	16.0
1956	U.S.S.R.	2	15	30.0
1960	Fin.	2	18	45.6
1964	Swed.	2	18	34.6
1968	Nor.	2	08	33.5
1972	U.S.S.R.	2	04	47.94*
1976	Fin.	2	07	59.72
1980	U.S.S.R.	1	57	03.46
1984	Swed.	1	55	06.30
1988	Swed.	1	43	58.6
1992	Nor.	1	39	26.0
1994	Italy	1	41	15.0

ski jumping (70 m)†

1924	J. Tullin Thams	Nor.
1928	A. Andersen	Nor.
1932	B. Ruud	Nor.
1936	B. Ruud	Nor.
1948	P. Hugsted	Nor.
1952	A. Bergmann	Nor.
1956	A. Hyvärinen	Fin.
1960	H. Recknagel	Ger.‡
1964 (70)	V. Kankkonen	Fin.
1968	J. Raška	Czech.
1972	Y. Kasaya	Japan
1976	H.-G. Aschenbach	E.Ger.
1980	A. Innauer	Austria
1984	J. Weissflog	E.Ger.
1988	M. Nykänen	Fin.

ski jumping (90 m)†

1964 (80)	T. Engan	Nor.
1968	V. Belousov	U.S.S.R.
1972	W. Fortuna	Pol.
1976	K. Schnabl	Austria
1980	J. Tormanen	Fin.
1984	M. Nykänen	Fin.
1988	M. Nykänen	Fin.
1992	E. Vettori	Austria
1994	E. Bredesen	Nor.

ski jumping (120 m)†

1992	T. Nieminen	Fin.
1994	J. Weissflog	Ger.

Nordic combined 15 kilometres and jumping

1924	T. Haug	Nor.
1928	J. Gröttumsbraaten	Nor.
1932	J. Gröttumsbraaten	Nor.
1936	O. Hagen	Nor.
1948	H. Hasu	Nor.
1952	S. Slättvik	Nor.
1956	S. Stenersen	Nor.
1960	G. Thoma	Ger.‡
1964	T. Knutsen	Nor.
1968	F. Keller	W.Ger.
1972	U. Wehling	E.Ger.
1976	U. Wehling	E.Ger.
1980	U. Wehling	E.Ger.
1984	T. Sandberg	Nor.
1988	H. Kempf	Switz.
1992	F. Guy	Fr.
1994	F.B. Lundberg	Nor.

team ski jumping (120 m)§

1988	Fin.
1992	Fin.
1994	Ger.

Nordic combined 30-kilometre relay and jumping (team)

1988	W.Ger.
1992	Japan
1994	Japan

Skiing–Nordic (women)

5-kilometre cross-country

			min	sec
1964	K. Boyarskikh	U.S.S.R.	17	50.5
1968	T. Gustafsson	Swed.	16	45.2
1972	G. Kulakova	U.S.S.R.	17	00.50*
1976	H. Takalo	Fin.	15	48.69
1980	R. Smetanina	U.S.S.R.	15	06.92
1984	M.-L. Hämälainen	Fin.	17	04.00
1988	M. Matikainen	Fin.	15	04.00
1992	M. Lukkarinen	Fin.	14	13.8
1994	L. Yegorova	Russia	14	08.8

10-kilometre cross-country

			min	sec
1952	L. Wideman	Fin.	41	40.0
1956	L. Kozyreva	U.S.S.R.	38	11.0
1960	M. Gusakova	U.S.S.R.	39	46.6
1964	K. Boyarskikh	U.S.S.R.	40	24.3
1968	T. Gustafsson	Swed.	36	46.5
1972	G. Kulakova	U.S.S.R.	34	17.82*
1976	R. Smetanina	U.S.S.R.	30	13.41
1980	B. Petzold	E.Ger.	30	31.54
1984	M.-L. Hämälainen	Fin.	31	44.20
1988	V. Ventsene	U.S.S.R.	30	08.30

10-kilometre pursuit ‖

			min	sec
1992	L. Yegorova	U.T.¶	40	07.7
1994	L. Yegorova	Russia	41	38.1

15-kilometre cross-country

			min	sec
1992	L. Yegorova	U.T.¶	42	20.8
1994	M. Di Centa	Italy	39	44.5

20-kilometre cross-country♀

			hr	min	sec
1984	M.-L. Hämälainen	Fin.	1	01	45.0
1988	T. Tikhonova	U.S.S.R.		55	53.6

30-kilometre cross-country

			hr	min	sec
1992	S. Belmondo	Italy	1	22	30.1
1994	M. Di Centa	Italy	1	25	41.6

3 × 5-kilometre relay♁

		hr	min	sec
1956	Fin.	1	09	01.0
1960	Swed.	1	04	21.4
1964	U.S.S.R.		59	20.2
1968	Nor.		57	30.0
1972	U.S.S.R.		48	46.15*
1976	U.S.S.R.	1	07	49.75
1980	E.Ger.	1	02	11.10
1984	Nor.	1	06	49.70
1988	U.S.S.R.		59	51.10
1992	U.T.¶		59	34.8
1994	Russia		57	12.5

Speed skating (men)

500 metres

			sec
1924	C. Jewtraw	U.S.	44.0
1928	C. Thunberg	Fin.	43.4
	B. Evensen (tied)	Nor.	
1932	J. Shea	U.S.	43.4
1936	I. Ballangrud	Nor.	43.4
1948	F. Helgesen	Nor.	43.1
1952	K. Henry	U.S.	43.2
1956	Ye. Grishin	U.S.S.R.	40.2
1960	Ye. Grishin	U.S.S.R.	40.2
1964	R. McDermott	U.S.	40.1
1968	E. Keller	W.Ger.	40.3
1972	E. Keller	W.Ger.	39.44*
1976	Y. Kulikov	U.S.S.R.	39.17
1980	E. Heiden	U.S.	38.03
1984	S. Fokichev	U.S.S.R.	38.19
1988	U.-J. Mey	E.Ger.	36.45
1992	U.-J. Mey	Ger	37.14
1994	A. Golubev	Russia	36.33

1,000 metres

			min	sec
1976	P. Mueller	U.S.	1	19.32*
1980	E. Heiden	U.S.	1	15.18
1984	G. Boucher	Can.	1	15.80
1988	N. Gouliaev	U.S.S.R.	1	13.03
1992	O. Zinke	Ger.	1	14.85
1994	D. Jansen	U.S.	1	12.43

1,500 metres

			min	sec
1924	C. Thunberg	Fin.	2	20.8
1928	C. Thunberg	Fin.	2	21.1
1932	J. Shea	U.S.	2	57.5
1936	G. Mathisen	Nor.	2	19.2
1948	S. Farstad	Nor.	2	17.6
1952	H. Andersen	Nor.	2	20.4
1956	Yu. Mikhaylov	U.S.S.R.	2	08.6
	Ye. Grishin (tied)	U.S.S.R.		
1960	Ye. Grishin	U.S.S.R.	2	10.4
	R. Aas (tied)	Nor.		
1964	A. Antson	U.S.S.R.	2	10.3
1968	C. Verkerk	Neth.	2	03.4
1972	A. Schenk	Neth.	2	02.96*
1976	J.E. Storholt	Nor.	1	59.38
1980	E. Heiden	U.S.	1	55.44
1984	G. Boucher	Can.	1	58.36
1988	A. Hoffmann	E.Ger.	1	52.06
1992	J.O. Koss	Nor.	1	54.81
1994	J.O. Koss	Nor.	1	51.29

5,000 metres

			min	sec
1924	C. Thunberg	Fin.	8	39
1928	I. Ballangrud	Nor.	8	50.5
1932	I. Jaffee	U.S.	9	40.8
1936	I. Ballangrud	Nor.	8	19.6
1948	R. Liaklev	Nor.	8	29.4
1952	H. Andersen	Nor.	8	10.6
1956	B. Shilkov	U.S.S.R.	7	48.7
1960	V. Kosichkin	U.S.S.R.	7	51.3
1964	K. Johannesen	Nor.	7	38.4
1968	F. Maier	Nor.	7	22.4
1972	A. Schenk	Neth.	7	23.61*
1976	S. Stensen	Nor.	7	24.48
1980	E. Heiden	U.S.	7	02.29
1984	T. Gustafson	Swed.	7	12.28
1988	T. Gustafson	Swed.	6	44.63
1992	G. Karlstad	Nor.	6	59.97
1994	J.O. Koss	Nor.	6	34.96

10,000 metres

			min	sec
1924	J. Skutnabb	Fin.	18	04.8
1932	I. Jaffee	U.S.	19	13.6
1936	I. Ballangrud	Nor.	17	24.3
1948	A. Seyffarth	Swed.	17	26.3
1952	H. Andersen	Nor.	16	45.8
1956	A. Ericsson	Swed.	16	35.9
1960	K. Johannesen	Nor.	15	46.6
1964	J. Nilsson	Swed.	15	50.1
1968	J. Hoeglin	Swed.	15	23.6
1972	A. Schenk	Neth.	15	01.35*
1976	P. Kleine	Neth.	14	50.59
1980	E. Heiden	U.S.	14	28.13
1984	I. Malkov	U.S.S.R.	14	39.90
1988	T. Gustafson	Swed.	13	48.20
1992	B. Veldkamp	Neth.	14	12.12
1994	J.O. Koss	Nor.	13	30.55

Speed skating (women)

500 metres

			sec
1960	H. Haase	Ger.‡	45.9
1964	L. Skoblikova	U.S.S.R.	45.0
1968	L. Titova	U.S.S.R.	46.1
1972	A. Henning	U.S.	43.33*
1976	S. Young	U.S.	42.76
1980	K. Enke	E.Ger.	41.78
1984	C. Rothenburger	E.Ger.	41.02
1988	B. Blair	U.S.	39.10
1992	B. Blair	U.S.	40.33
1994	B. Blair	U.S.	39.25

1,000 metres

			min	sec
1960	K. Guseva	U.S.S.R.	1	34.1
1964	L. Skoblikova	U.S.S.R.	1	32.6
1968	C. Geijssen	Neth.	1	32.6
1972	M. Pflug	W.Ger.	1	31.40*
1976	T. Averina	U.S.S.R.	1	28.43
1980	N. Petruseva	U.S.S.R.	1	24.10
1984	K. Enke	E.Ger.	1	21.61
1988	C. Rothenburger	E.Ger.	1	17.65
1992	B. Blair	U.S.	1	21.90
1994	B. Blair	U.S.	1	18.74

1,500 metres

			min	sec
1960	L. Skoblikova	U.S.S.R.	2	25.2
1964	L. Skoblikova	U.S.S.R.	2	22.6
1968	K. Mustonen	Fin.	2	22.4
1972	D. Holum	U.S.	2	20.85*
1976	G. Stepanskaya	U.S.S.R.	2	16.58
1980	A. Borckink	Neth.	2	10.95
1984	K. Enke	E.Ger.	2	03.42
1988	Y. Van Gennip	Neth.	2	00.68
1992	J. Börner	Ger.	2	05.87
1994	E. Hunyady	Austria	2	02.19

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*Race first timed in hundredths of [illegible] second. †From 1924 to 1960 the jumping was held on one hill. In 1964 there were two events, one on [illegible] 70-metre and the other on an 80-metre hill; from 1968 to 1988 there were 70-metre and 90-metre events. From 1992 there were 90-metre and 120-metre events. ‡Joint East–West German team. §In 1988 it was a 90-metre event. ‖ Combines results of a 5-kilometre (classical) and 10-kilometre (freestyle) race. ¶Unified Team, consisting of athletes from the Commonwealth of Independent States plus Georgia. ♀Replaced in 1992 with separate 15-kilometre and 30-kilometre events. ♁4 × 5-kilometre relay after 1972.

Olympic Champions, Winter Games, 1908–1994 (continued)

Speed skating (women) (continued)

3,000 metres			min	sec
1960	L. Skoblikova	U.S.S.R.	5	14.3
1964	L. Skoblikova	U.S.S.R.	5	14.9
1968	J. Schut	Neth.	4	56.2
1972	S. Baas-Kaiser	Neth.	4	52.14*
1976	T. Averina	U.S.S.R.	4	45.19
1980	B.-E. Jensen	Nor.	4	32.13
1984	A. Schöne	E.Ger.	4	24.79
1988	Y. Van Gennip	Neth.	4	11.94
1992	G. Niemann	Ger.	4	19.90
1994	S. Bazhanova	Russia	4	17.43
5,000 metres			min	sec
1988	Y. Van Gennip	Neth.	7	14.13
1992	G. Niemann	Ger.	7	31.57
1994	C. Pechstein	Ger.	7	14.37

Speed skating—short-track (men)

500 metres				sec
1994	J.-H. Chae	S.Kor.		43.45
1,000 metres			min	sec
1992	K.-H. Kim	S.Kor.	1	30.76
1994	K.-H. Kim	S.Kor.	1	34.57
5-kilometre relay			min	sec
1992	S.Kor.		7	14.02
1994	Italy		7	11.74

Speed skating—short-track (women)

500 metres				sec
1992	C. Turner	U.S.		47.04
1994	C. Turner	U.S.		45.98
1,000 metres			min	sec
1994	L.-K. Chun	S.Kor.	1	36.87
3-kilometre relay			min	sec
1992	Can.		4	36.62
1994	S.Kor.		4	26.64

Olympic Champions 1998–2000

Summer Games 2000

Archery

men's individual				
S. Fairweather	Austl.			
women's individual				
M.-J. Yun	S.Kor.			
men's team				
S.Kor.				
women's team				
S.Kor.				

Association football (soccer)

men	
Camer.	
women	
Nor.	

Athletics (track-and-field) (men)

100 metres				sec
M. Green	U.S.			9.87
200 metres				sec
K. Kedéris	Greece			20.09
400 metres				sec
M. Johnson	U.S.			43.84
800 metres			min	sec
N. Schumann	Ger.		1	45.08
1,500 metres			min	sec
N. Ngeny	Kenya		3	32.07
5,000 metres			min	sec
M. Wolde	Eth.		13	35.49
10,000 metres			min	sec
H. Gebrselassie	Eth.		27	18.20
marathon		hr	min	sec
G. Abera	Eth.	2	10	11
110-metre hurdles				sec
A. García	Cuba			13.00
400-metre hurdles				sec
A. Taylor	U.S.			47.50
3,000-metre steeplechase			min	sec
R. Kosgei	Kenya		8	21.43
4 × 100-metre relay				sec
U.S.				37.61
4 × 400-metre relay			min	sec
U.S.			2	56.35
20-kilometre walk		hr	min	sec
R. Korzeniowski	Pol.	1	18	59
50-kilometre walk		hr	min	sec
R. Korzeniowski	Pol.	3	42	22
high jump				metres
S. Klyugin	Russia			2.35
pole vault				metres
N. Hysong	U.S.			5.90
long jump				metres
I. Pedroso	Cuba			8.55
triple jump				metres
J. Edwards	U.K.			17.71
shot put				metres
A. Harju	Fin.			21.29
discus throw				metres
V. Alekna	Lith.			69.30
hammer throw				metres
S. Ziólkowski	Pol.			80.02
javelin throw				metres
J. Zelezny	Czech Rep.			90.17
decathlon				
E. Nool	Est.			

Athletics (track-and-field) (women)

100 metres				sec
M. Jones	U.S.			10.75
200 metres				sec
M. Jones	U.S.			21.84
400 metres				sec
C. Freeman	Austl.			49.11
800 metres			min	sec
M. Mutola	Mozam.		1	56.15
1,500 metres			min	sec
N. Mérah-Benida	Alg.		4	5.10
5,000 metres			min	sec
G. Szabo	Rom.		14	40.79
10,000 metres			min	sec
D. Tulu	Eth.		30	17.49
marathon		hr	min	sec
N. Takahashi	Japan	2	23	14
400-metre hurdles				sec
I. Privalova	Russia			53.02
4 × 100-metre relay				sec
Bah.				41.95
4 × 400-metre relay			min	sec
U.S.			3	22.62
100-metre hurdles				sec
O. Shishigina	Kazakh.			12.65
high jump			metres	
Y. Yelesina	Russia		2.01	
long jump			metres	
H. Drechsler	Ger.		6.99	
triple jump			metres	
T. Marinova	Bulg.		15.20	
pole vault			metres	
S. Dragila	U.S.		4.60	
discus throw			metres	
E. Zvereva	Bela.		68.40	
shot put			metres	
Y. Korolchik	Bela.		20.56	
hammer throw			metres	
K. Skolimowska	Pol.		71.16	
javelin throw			metres	
T. Hattestad	Nor.		68.91	
heptathlon				
D. Lewis	U.K.			
20-kilometre walk		hr	min	sec
L. Wang	China	1	29	5

Badminton

men's singles	
X. Ji	China
men's doubles	
Indon.	
women's singles	
Z. Gong	China
women's doubles	
China	
mixed doubles	
China	

Baseball

U.S.

Basketball

men
U.S.
women
U.S.

Boxing

light flyweight	
B. Asloum	France
flyweight	
W. Ponlid	Thai.
bantamweight	
G. Rigondeaux Ortiz	Cuba
featherweight	
B. Sattarkhanov	Kazakh.
lightweight	
M. Kindelan	Cuba
light welterweight	
M. Abdullayev	Uzbek.
welterweight	
O. Saitov	Russia
light middleweight	
Y. Ibraimov	Kazakh.
middleweight	
J. Gutiérrez	Cuba
light heavyweight	
A. Lebziak	Russia
heavyweight	
F. Savon	Cuba
superheavyweight	
A. Harrison	U.K.

Canoeing (men)

kayak singles (500 metres)		min	sec
K. Holmann	Nor.	1	57.84
kayak singles (1,000 metres)		min	sec
K. Holmann	Nor.	3	33.26
kayak pairs (500 metres)		min	sec
Hung.		1	47.05
kayak pairs (1,000 metres)		min	sec
Italy		3	14.46
kayak fours (1,000 metres)		min	sec
Hung.		2	55.18
slalom kayak singles			
T. Schmidt	Ger.		
Canadian singles (500 metres)		min	sec
G. Kolonics	Hung.	2	24.81
Canadian singles (1,000 metres)		min	sec
A. Dittmer	Ger.	3	54.37
Canadian pairs (500 metres)		min	sec
Hung.		1	51.28
Canadian pairs (1,000 metres)		min	sec
Rom.		3	37.35
slalom Canadian singles			
T. Estanguet	France		
slalom Canadian pairs			
Slvk.			

Canoeing (women)

kayak singles (500 metres)		min	sec
J. Idem Guerrini	Italy	2	13.84
kayak pairs (500 metres)		min	sec
Ger.		1	56.99
kayak fours (500 metres)		min	sec
Ger.		1	34.53
slalom kayak singles			
S. Hilgertova	Czech Rep.		

Cycling (men)

road race		hr	min	sec
J. Ullrich	Ger.	5	29	08
individual time trial			min	sec
V. Ekimov	Russia		57	40.420
1-kilometre time trial (track)			min	sec
J. Queally	U.K.		1	1.609
individual pursuit			min	sec
R. Bartko	Ger.		4	18.515
team pursuit			min	sec
Ger.			3	59.710
sprint				
M. Nothstein	U.S.			
Olympic sprint				sec
France				44.233
points race				
J. Llaneras	Spain			
Madison				
Austl.				
Keirin				sec
F. Rousseau	France			11.020
mountain bike		hr	min	sec
M. Martinez	France	2	9	2.50

Cycling (women)

road race		hr	min	sec
L. Zijlaard-van Moorsel	Neth.	3	6	31
individual time trial			min	sec
L. Zijlaard-van Moorsel	Neth.		42	0.781
500-metre time trial				sec
F. Ballanger	France			34.140
individual pursuit			min	sec
L. Zijlaard-van Moorsel	Neth.		3	33.360
sprint				
F. Ballanger	France			
points race				
A. Bellutti	Italy			
mountain bike		hr	min	sec
P. Pezzo	Italy	1	49	24.38

Diving (men)

3-metre springboard	
N. Xiong	China
synchronized springboard	
China	
10-metre platform	
L. Tian	China
synchronized platform	
Russia	

Diving (women)

3-metre springboard	
M. Fu	China
synchronized springboard	
Russia	
10-metre platform	
L. Wilkinson	U.S.
synchronized platform	
China	

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*Race first timed in hundredths of a second.

Olympic Champions 1990–2000, Summer Games 2000 (continued)

Equestrian sports				
dressage individual	A. van Grunsven	Neth.		
dressage team	Ger.			
jumping individual	J. Dubbeldam	Neth.		
jumping team	Ger.			
three-day event (team)	Austl.			
three-day event (individual)	D. O'Connor	U.S.		
Fencing (men)				
individual foil	Y.H. Kim	S.Kor.		
team foil	France			
individual épée	P. Kolobkov	Russia		
team épée	Italy			
individual sabre	M.C. Covaliu	Rom.		
team sabre	Russia			
Fencing (women)				
individual foil	V. Vezzali	Italy		
team foil	Italy			
individual épée	T. Nagy	Hung.		
team épée	Russia			
Field hockey (men)	Neth.			
Field hockey (women)	Austl.			
Gymnastics (men)				
team	China			
all-around	A. Nemov	Russia		
floor exercise	I. Vihrovs	Latvia		
vault	G. Deferr	Spain		
pommel horse	M. Urzica	Rom.		
rings	S. Csollany	Hung.		
parallel bars	X. Li	China		
horizontal bar	A. Nemov	Russia		
trampoline	A. Moskalenko	Russia		
Gymnastics (women)				
team	Rom.			
all-around	S. Amanar	Rom.		
floor exercise	E. Zamolodchikova	Russia		
vault	E. Zamolodchikova	Russia		
uneven bars	S. Khorkina	Russia		
balance beam	X. Liu	China		
trampoline	I. Karavayeva	Russia		
individual rhythmic	Y. Barsukova	Russia		
team rhythmic	Russia			
Handball (team)				
men	Russia			
women	Den.			
Judo (men)				
60 kg; 132 lb	T. Nomura	Japan		
66 kg; 145.5 lb	H. Ozkan	Tur.		
73 kg; 160 lb	G. Maddaloni	Italy		
81 kg; 178.5 lb	M. Takimoto	Japan		
90 kg; 198 lb	M. Huizinga	Neth.		
100 kg; 220 lb	K. Inoue	Japan		
100+ kg; 220+ lb	D. Douillet	France		
Judo (women)				
48 kg; 105.5 lb	R. Tamura	Japan		
52 kg; 114.5 lb	L. Verdecia	Cuba		
57 kg; 125.5 lb	I. Fernández	Spain		
63 kg; 138.5 lb	S. Vandenhende	France		
70 kg; 154 lb	S. Veranes	Cuba		
78 kg; 172 lb	L. Tang	China		
78+ kg; 172+ lb	H. Yuan	China		
Modern pentathlon				
men	D. Svatkovsky	Russia		
women	S. Cook	U.K.		
Rowing (men)				
single sculls	R. Waddell	N.Z.	min 6	sec 48.90
double sculls	Slvn.		min 6	sec 16.63
quadruple sculls	Italy		min 5	sec 45.56
coxless pairs	France		min 6	sec 32.97
lightweight double sculls	Pol.		min 6	sec 21.75
lightweight fours	France		min 6	sec 1.68
coxless fours	U.K.		min 5	sec 56.24
eights	U.K.		min 5	sec 33.08
Rowing (women)				
single sculls	E. Karsten	Bela.	min 7	sec 28.14
double sculls	Ger.		min 6	sec 55.44
quadruple sculls	Ger.		min 6	sec 19.58
coxless pairs	Rom.		min 7	sec 11.00
eights	Rom.		min 6	sec 6.44
lightweight double sculls	Rom.		min 7	sec 2.64
Shooting (men)				
rapid-fire pistol	S. Alifirenko	Russia		
free pistol	T. Kiryakov	Bulg.		
air pistol	F. Dumoulin	France		
10-metre running target	L. Yang	China		
small-bore rifle, 3 position	R. Debevec	Slvn.		
small-bore rifle, prone	J. Edman	Swed.		
air rifle	Y. Cai	China		
trap	M. Diamond	Austl.		
double trap	R. Faulds	U.K.		
skeet	M. Milchev	Ukr.		
Shooting (women)				
pistol	M. Grozdeva	Bulg.		
air pistol	L. Tao	China		
small-bore rifle, 3 position	R. Mauer-Rozanska	Pol.		
air rifle	N. Johnson	U.S.		
trap	D. Gudzineviciute	Lith.		
double trap	P. Hansen	Swed.		
skeet	Z. Meftakhetdinova	Azer.		
Softball	U.S.			
Swimming (men)				
50-metre freestyle	A. Ervin G. Hall (tied)	U.S. U.S.		sec 21.98
100-metre freestyle	P. van den Hoogenband	Neth.		sec 48.30
200-metre freestyle	P. van den Hoogenband	Neth.	min 1	sec 45.35
400-metre freestyle	I. Thorpe	Austl.	min 3	sec 40.59
1,500-metre freestyle	G. Hackett	Austl.	min 14	sec 48.33
100-metre backstroke	L. Krayzelburg	U.S.		sec 53.72
200-metre backstroke	L. Krayzelburg	U.S.	min 1	sec 56.76
100-metre breaststroke	D. Fioravanti	Italy	min 1	sec 0.46
200-metre breaststroke	D. Fioravanti	Italy	min 2	sec 10.87
100-metre butterfly	L. Frölander	Swed.		sec 52.00
200-metre butterfly	T. Malchow	U.S.	min 1	sec 55.35
200-metre individual medley	M. Rosolino	Italy	min 1	sec 58.98
400-metre individual medley	T. Dolan	U.S.	min 4	sec 11.76
4 × 100-metre freestyle relay	Austl.		min 3	sec 13.67
4 × 200-metre freestyle relay	Austl.		min 7	sec 7.05
4 × 100-metre medley relay	U.S.		min 3	sec 33.73
Swimming (women)				
50-metre freestyle	I. de Bruijn	Neth.		sec 24.32
100-metre freestyle	I. de Bruijn	Neth.		sec 53.83
200-metre freestyle	S. O'Neill	Austl.	min 1	sec 58.24
400-metre freestyle	B. Bennett	U.S.	min 4	sec 5.80
800-metre freestyle	B. Bennett	U.S.	min 8	sec 19.67
100-metre butterfly	I. de Bruijn	Neth.		sec 56.61
200-metre butterfly	M. Hyman	U.S.	min 2	sec 5.88
100-metre backstroke	D. Mocanu	Rom.	min 1	sec 0.21
200-metre backstroke	D. Mocanu	Rom.	min 2	sec 08.16
100-metre breaststroke	M. Quann	U.S.	min 1	sec 7.05
200-metre breaststroke	A. Kovacs	Hung.	min 2	sec 24.35
200-metre individual medley	Y. Klochkova	Ukr.	min 2	sec 10.68
400-metre individual medley	Y. Klochkova	Ukr.	min 4	sec 33.59
4 × 100-metre freestyle relay	U.S.		min 3	sec 36.61
4 × 200-metre freestyle relay	U.S.		min 7	sec 57.80
4 × 100-metre medley relay	U.S.		min 3	sec 58.30
synchronized duet	Russia			
synchronized team	Russia			
Table tennis (men)				
singles	L. Kong	China		
doubles	China			
Table tennis (women)				
singles	N. Wang	China		
doubles	China			
Tae kwon do (men)				
58 kg; 128 lb	M. Mouroutsos	Greece		
68 kg; 150 lb	S. Lopez	U.S.		
80 kg; 176 lb	A. Matos Fuentes	Cuba		
80+ kg; 176+ lb	K.-H. Kim	S.Kor.		
Tae kwon do (women)				
49 kg; 108 lb	L. Burns	Austl.		
57 kg; 125.5 lb	J.-E. Jung	S.Kor.		
67 kg; 147.5 lb	S.-H. Lee	S.Kor.		
67+ kg; 147.5+ lb	Z. Chen	China		
Tennis (men)				
singles	Y. Kafelnikov	Russia		
doubles	S. Lareau, D. Nestor	Can.		
Tennis (women)				
singles	V. Williams	U.S.		
doubles	S. Williams, V. Williams	U.S.		
Triathlon				
men	S. Whitfield	Can.		
women	B. McMahon	Switz.		
Volleyball (men)				
beach	U.S.			
indoor	Yugos.			
Volleyball (women)				
beach	Austl.			
indoor	Cuba			
Water polo				
men	Hung.			
women	Austl.			
Weightlifting (men)				
56 kg; 123.5 lb	H. Mutlu	Tur.	kg 305.0	
62 kg; 136.5 lb	N. Pechalov	Cro.	kg 325.0	

Olympic Champions 1998–2000, Summer Games 2000 (continued)

Weightlifting (men) (continued)

69 kg; 152 lb		kg
G. Boevski	Bulg.	357.5
77 kg; 169.5 lb		kg
X. Zhan	China	367.5
85 kg; 187 lb		kg
P. Dimas	Greece	390
94 kg; 207 lb		kg
A. Kakiasvilis	Greece	405
105 kg; 231.5 lb		kg
H. Tavakoli	Iran	425
105+ kg; 231.5+ lb		kg
H. Rezazadeh	Iran	472.5

Weightlifting (women)

48 kg; 105.5 lb		kg
T. Nott	U.S.	185
53 kg; 117 lb		kg
X. Yang	China	225.0
58 kg; 128 lb		kg
S. Jiménez Mendívil	Mex.	222.5
63 kg; 138.5 lb		kg
X. Chen	China	242.5
69 kg; 152 lb		kg
W. Lin	China	242.5
75 kg; 165 lb		kg
M.I. Urrutia	Colom.	245.0
75+ kg; 165+ lb		kg
M. Ding	China	300

Wrestling—freestyle

54 kg; 119 lb	
N. Abdullayev	Azer.
58 kg; 128 lb	
A.R. Dabier	Iran
63 kg; 138.5 lb	
M. Umakhanov	Russia
69 kg; 152 lb	
D. Igali	Can.
76 kg; 167.5 lb	
B. Slay	U.S.
85 kg; 187 kg	
A. Saitiev	Russia
97 kg; 213.5 lb	
S. Murtasaliyev	Russia
130 kg; 286.5 lb	
D. Musulbes	Russia

Wrestling—Greco-Roman

54 kg; 119 lb	
K.H. Sim	S.Kor.
58 kg; 128 lb	
A. Nazarian	Bulg.
63 kg; 138.5 lb	
V. Samurgashev	Russia
69 kg; 152 lb	
F. Azcuy	Cuba
76 kg; 167.5 lb	
M. Kardanov	Russia
85 kg; 187 kg	
H. Yerlikaya	Tur.
97 kg; 213.5 lb	
M. Ljungberg	Swed.
130 kg; 286.5 lb	
R. Gardner	U.S.

Yachting

men's 470	
Austl.	
women's 470	
Austl.	
men's Mistral	
C. Sieber	Austria
women's Mistral	
A. Sensini	Italy
men's Finn	
I. Percy	U.K.
women's Europe	
S. Robertson	U.K.
49er (open)	
Fin.	
Laser (open)	
B. Ainslie	U.K.
Soling (open)	
Den.	
Star	
U.S.	
Tornado (open)	
Austria	

Winter Games 1998, 2002

Biathlon (men)

10 kilometres				min	sec
1998	O.E. Bjoerndalen	Nor.		27	16.2
2002	O.E. Bjoerndalen	Nor.		24	51.3
12.5-kilometre pursuit				min	sec
2002	O.E. Bjoerndalen	Nor.		32	34.6
20 kilometres				min	sec
1998	H. Hanevold	Nor.		56	16.4
2002	O.E. Bjoerndalen	Nor.		51	03.3
4 × 7.5-kilometre relay			hr	min	sec
1998	Ger.		1	21	36.2
2002	Nor.		1	23	42.3

Biathlon (women)

7.5 kilometres				min	sec
1998	G. Koukleva	Russia		23	08.0
2002	K. Wilhelm	Ger.		20	41.4
10-kilometre pursuit				min	sec
2002	O. Pyleva	Russia		31	07.7
15 kilometres				min	sec
1998	Y. Dafovska	Bulg.		54	52.0
2002	A. Henkel	Ger.		47	29.1
4 × 7.5-kilometre relay			hr	min	sec
1998	Ger.		1	40	13.6
2002	Ger.		1	27	55.0

Bobsled

two-man		min	sec
1998	Italy Can. (tied)	3	37.24
2002	Ger.	3	10.11
four-man		min	sec
1998	Ger.	2	39.41
2002	Ger.	3	07.51
two-women		min	sec
2002	U.S.	1	37.76

Curling

men	
1998	Switz.
2002	Nor.
women	
1998	Can.
2002	U.K.

Figure skating

men's singles		
1998	I. Kulik	Russia
2002	A. Yagudin	Russia
women's singles		
1998	T. Lipinski	U.S.
2002	S. Hughes	U.S.
pairs		
1998	O. Kazakova, A. Dmitriyev	Russia
2002	Y. Berezhnaya, A. Dmitriyev	Russia
	J. Sale, D. Pelletier	Can. (shared)

Ice dancing

pairs		
1998	P. Grishuk, Y. Platov	Russia
2002	M. Anissina, G. Peizerat	France

Ice hockey

men	
1998	Czech Rep.
2002	Can.
women	
1998	U.S.
2002	Can.

Luge

men's singles			min	sec
1998	G. Hackl	Ger.	3	18.436
2002	A. Zoeggeler	Italy	2	57.941
men's pairs			min	sec
1998	Ger.		1	41.105
2002	Ger.		1	26.082
women's singles			min	sec
1998	S. Kraushaar	Ger.	3	23.779
2002	S. Otto	Ger.	2	52.464

Skeleton

men			min	sec
2002	J. Shea	U.S.	1	41.96
women			min	sec
2002	T. Gale	U.S.	1	45.11

Skiing—Alpine (men)

downhill			min	sec
1998	J.-L. Cretier	France	1	50.11
2002	F. Strobl	Austria	1	39.13
slalom			min	sec
1998	H.-P. Buraas	Nor.	1	49.31
2002	J.-P. Vidal	France	1	41.06
giant slalom			min	sec
1998	H. Maier	Austria	2	38.51
2002	S. Eberharter	Austria	2	23.28
supergiant slalom			min	sec
1998	H. Maier	Austria	1	34.82
2002	K.A. Aamodt	Nor.	1	21.58
Alpine combined			min	sec
1998	M. Reiter	Austria		
2002	K.A. Aamodt	Nor.	3	17.56

Skiing—Alpine (women)

downhill			min	sec
1998	K. Seizinger	Ger.	1	28.89
2002	C. Montillet	France	1	39.56
slalom			min	sec
1998	H. Gerg	Ger.	1	32.40
2002	J. Kostelic	Croatia	1	46.10
giant slalom			min	sec
1998	D. Compagnoni	Italy	2	50.59
2002	J. Kostelic	Croatia	2	30.01
supergiant slalom			min	sec
1998	P. Street	U.S.	1	18.02
2002	D. Ceccarelli	Italy	1	13.59
Alpine combined			min	sec
1998	K. Seizinger	Ger.		
2002	J. Kostelic	Croatia	2	43.28

Skiing—freestyle

men's moguls		
1998	J. Moseley	U.S.
2002	J. Lahtela	Fin.
men's aerials		
1998	E. Bergoust	U.S.
2002	A. Valenta	Czech Rep.
women's moguls		
1998	T. Satoya	Japan
2002	K. Traa	Nor.
women's aerials		
1998	N. Stone	U.S.
2002	A. Camplin	Australia

Skiing—Nordic (men)

1.5-kilometre cross-country sprint				min	sec
2002	T.A. Hetland	Nor.		2	56.9
10-kilometre cross-country				min	sec
1998	B. Daehlie	Nor.		27	24.5
15-kilometre cross-country				min	sec
1998	T. Alsgaard	Nor.		39	13.7
2002	A. Veerpalu	Est.		37	07.4
Combined pursuit			hr	min	sec
1998	T. Alsgaard	Nor.	1	7	01.7
2002	J. Mühlegg	Spain		49	20.4
30-kilometre cross-country			hr	min	sec
1998	M. Myllylå	Fin.	1	33	56
2002	J. Mühlegg	Spain	1	9	28.9
50-kilometre cross-country			hr	min	sec
1998	B. Daehlie	Nor.	2	5	08.2
2002	M. Ivanov	Russia	2	6	20.8
4 × 10-kilometre relay			hr	min	sec
1998	Nor.		1	40	55.7
2002	Nor.		1	32	45.5
ski jumping (90 metres)					
1998	J. Soininen	Fin.			
2002	S. Ammann	Switz.			
ski jumping (120 metres)					
1998	K. Funaki	Japan			
2002	S. Ammann	Switz.			
Nordic combined sprint					
2002	S. Lajunen	Fin.			
Nordic combined					
1998	B.E. Vik	Nor.			
2002	S. Lajunen	Fin.			
team ski jumping					
1998	Japan				
2002	Ger.				
Nordic combined 30-kilometre relay and jumping (team)					
1998	Nor.				
2002	Fin.				

Skiing—Nordic (women)

1.5-kilometre cross-country sprint				min	sec
2002	Y. Chepalova	Russia		3	10.6
5-kilometre cross-country				min	sec
1998	L. Lazutina	Russia		17	39.9
10-kilometre cross-country				min	sec
1998	L. Lazutina	Russia		46	06.9
2002	B. Skari	Nor.		28	05.6
Combined pursuit				min	sec
1998	L. Lazutina	Russia		46	06.9
2002	O. Danilova	Russia		24	52.1
15-kilometre cross-country				min	sec
1998	O. Danilova	Russia		46	55.40
2002	S. Belmondo	Italy		39	54.4
30-kilometre cross-country			hr	min	sec
1998	J. Tchepalova	Russia	1	22	01.5
2002	G. Paruzzi	Italy	1	30	57.1

Olympic Champions, Winter Games 1998, 2002 (continued)

Skiing—Nordic (women) (continued)				
4 × 5-kilometre relay			min	sec
1998	Russia		55	13.5
2002	Ger.		49	30.6
Snowboarding (men)				
giant slalom			min	sec
1998	R. Rebagliatti	Can.	2	03.96
2002	P. Schoch	Switz.		
half-pipe				
1998	G. Simmen	Switz.		
2002	R. Powers	U.S.		
Snowboarding (women)				
giant slalom			min	sec
1998	K. Ruby	France	2	17.34
2002	I. Blanc	France		
half-pipe				
1998	N. Thost	Ger.		
2002	K. Clark	U.S.		
Speed skating (men)				
500 metres				sec
1998	H. Shimizu	Japan		35.76/ 35.59
2002	C. Fitzrandolph	U.S.		34.42/ 34.81
1,000 metres			min	sec
1998	I. Postma	Neth.	1	10.71
2002	G. van Velde	Neth.	1	07.18
1,500 metres			min	sec
1998	A. Sondral	Nor.	1	47.87
2002	D. Parra	U.S.	1	43.95
5,000 metres			min	sec
1998	G. Romme	Neth.	6	22.20
2002	J. Uytdehaage	Neth.	6	14.66
10,000 metres			min	sec
1998	G. Romme	Neth.	13	15.33
2002	J. Uytdehaage	Neth.	12	58.92
Speed skating (women)				
500 metres				sec
1998	C. Lemay-Doan	Can.		38.39/ 38.21
2002	C. Lemay-Doan	Can.		37.30/ 37.45
1,000 metres			min	sec
1998	M. Timmer	Neth.	1	16.51
2002	C. Witty	U.S.	1	13.83
1,500 metres			min	sec
1998	M. Timmer	Neth.	1	57.58
2002	A. Friesinger	Ger.	1	54.02
3,000 metres			min	sec
1998	G. Niemann-Stirnemann	Ger.	4	07.29
2002	C. Pechstein	Ger.	3	57.70
5,000 metres			min	sec
1998	C. Pechstein	Ger.	6	59.61
2002	C. Pechstein	Ger.	6	46.91
Speed skating—short-track (men)				
500 metres				sec
1998	T. Nishitani	Japan		42.862
2002	M. Gagnon	Can.		41.802
1,000 metres			min	sec
1998	D.-S. Kim	S.Kor.	1	32.428
2002	S. Bradbury	Australia	1	29.109
1,500 metres			min	sec
2002	A.A. Ohno	U.S.	2	18.541
5,000-metre relay			min	sec
1998	Can.		7	06.075
2002	Can.		6	51.579
Speed skating—short-track (women)				
500 metres				sec
1998	A. Perreault	Can.		46.568
2002	Y. Yang (A)	China		41.187
1,000 metres			min	sec
1998	L.-K. Chun	S.Kor.	1	42.776
2002	Y. Yang (A)	China	1	36.391
1,500 metres			min	sec
2002	G.-H. Ko	S.Kor.	2	31.581
3,000-metre relay			min	sec
1998	S.Kor.		4	16.260
2002	S.Kor.		4	12.793

in which conifers reach tremendous size. The forest floor is carpeted with mosses and huge fungi. The eastern slopes are less thickly forested and feature lakes and meadows. At the ocean shore are scenic beaches, islets, and points. Wildlife in the park includes deer, bears, cougars, and rare Roosevelt elk.

Olympio, Sylvanus (b. September 1902, Lomé, Togoland [now Togo]—d. Jan. 13, 1963, Lomé), nationalist politician and first president of Togo. He was the first presidential victim of a wave of military coups that occurred in Africa in the 1960s.

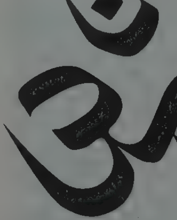
A leader of the Committee of Togolese Unity after World War II, Olympio was elected president of the first territorial assembly in 1946 and by 1947 was in open (though nonviolent) conflict with Togoland's French colonial administration. One of his main early concerns was to unite the Ewe people, who were divided by the boundaries of British and French Togoland. His hopes were dashed in 1956, however, when British Togoland voted by plebiscite to join the Gold Coast (which became independent Ghana in 1957).

Between 1952 and 1958 Olympio was out of office. When Togo received limited self-government in 1956, his rival Nicholas Grunitzky became prime minister. In UN-supervised elections in 1958, however, Olympio's party won an overwhelming victory, and he became prime minister, leading Togo to complete independence in 1960. He was elected president in 1961, under a constitution granting extensive presidential powers. Togo became a one-party state, but its seeming stability was deceptive. Many Togolese resented the regime's authoritarianism; northern leaders felt left out of the predominantly southern government, and the more radical members of Juvento (once the party's youth wing) wanted less dependence on French aid. In January 1963 Olympio was assassinated in the first successful army coup in postwar sub-Saharan Africa.

Olympus, Mount, Modern Greek ÓROS ÓLIMBOS, mountain peak, the highest (9,570 feet [2,917 m]) in Greece. It is part of the Olympus massif near the Gulf of Thérmai of the Aegean Sea and lies astride the border between Macedonia and Thessaly. It is also designated as Upper Olympus (Greek: Áno Ólimbos), as opposed to Lower Olympus (Káto Ólimbos), an adjacent peak on the south rising to 5,210 feet (1,588 m).

Mount Olympus is snowcapped and often has cloud cover. According to Homer's *Odyssey,* however, the peak never has storms and it basks in cloudless *aithēr* (Greek: "pure upper air"; thus "ether"). Later writers elaborated upon this description, which may have originated from the observation that the peak is often visible above a beit of relatively low clouds. In Greek mythology, Mount Olympus was regarded as the abode of the gods and the site of the throne of Zeus. The name Olympus was used for several other mountains as well as hills, villages, and mythical personages in Greece and Asia Minor.

Om, in Hinduism and other religions chiefly of India, a sacred syllable that is considered to be the greatest of all the mantras, or sacred formulas. The syllable *Om* is composed of the three sounds *a-u-m* (in Sanskrit, the vowels *a* and *u* coalesce to become *o*), which represent several important triads: the three worlds of earth, atmosphere, and heaven; the three major Hindu gods, Brahmā, Vishnu, and Śiva; and the three sacred Vedic scriptures, Ṛg, Yajur, and Sāma. Thus *Om* mystically embodies the essence of the entire universe. It is uttered at the beginning and end of Hindu prayers, chants, and meditation and is freely used in Buddhist and Jaina ritual also. From the 6th century, the written symbol designating the sound is used to mark the beginning of a text in a manuscript or an inscription.



Om

The syllable is discussed in a number of the Upanishads, which are the texts of philosophical speculation, and it forms the entire subject matter of one, the *Māndūkya.* It is used in the practice of Yoga and is related to techniques of auditory meditation. In the *Purāṇa*s the syllable is put to sectarian use; thus the Saiva mark the lingam, or sign of Śiva, with the symbol for *Om.* The Vaishnava identify the three sounds as referring to a trinity composed of Vishnu, his wife Śrī, and the worshiper.

O.M., recipient of the Order of Merit, a British honour. *See* Merit, Order of.

Omagh, district (established 1973), formerly in County Tyrone, Northern Ireland. It comprises rolling lowlands and hills and is bordered by the districts of Strabane to the north, Magherafelt and Cookstown to the east, Dungannon to the south, and Fermanagh to the west. Northern and eastern Omagh district includes relatively unproductive moorlands and the 1,778-foot- (542-metre-) high Mullaghcarn mountain. Central and southern Omagh is composed of fertile river valleys. The area was ruled by the ancient O'Neill family from the 5th through the 16th century. It passed to English rule after the flight of Hugh O'Neill, 2nd Earl of Tyrone, in 1607.

Some barley is grown in the district, but most land is grazed by dairy cattle or sheep. Omagh's rivers are popular with salmon and trout anglers, and grouse shooting is enjoyed in the uplands. Omagh town is the district seat. Area 434 square miles (1,125 square km). Pop. (1996 est.) 47,300.

Omagh, Irish AN ÓMAIGH, town and seat of Omagh district, Northern Ireland. Situated on the River Strule, Omagh is a market, shopping, and light-manufacturing centre for the district. Traditional crafts (such as table linens and crochet lace) continue to be produced in the town, and Omagh's West Tyrone Feis annually presents traditional Irish music and arts. The Ulster–American Folk Park north of Omagh is an outdoor display site depicting tools, buildings, and conveyances used by Ulster's 18th- and 19th-century Roman Catholic and Protestant emigrants to the United States. Pop. (1991) 17,280.

Omaha, North American Plains Indian people of the Dhegiha branch of the Siouan language stock. With the other members of this subgroup (the Osage, Ponca, Kansa, and Quapaw [*qq.v.*]), the Omaha migrated westward from the Atlantic coast. An early settlement was in Virginia and the Carolinas. After a time they moved to the Ozark Plateau and the prairies of what is now western Missouri. At this point the five tribes separated, the Omaha and the Ponca moving north to present-day Minnesota, where they lived until the late 17th century. At that time the two tribes were driven farther west by the migrating Dakota people. They separated in present-day South Dakota, the Omaha moving on to Bow Creek in present-day Nebraska. In 1854, under the pressure of encroaching white settlement, the Omaha sold off most of their land to the U.S. government. In 1882 the government allotted land to them to prevent the removal of the tribe to Oklahoma; somewhat later they received U.S. citizenship. The population of the Omaha in 1780 is estimated to have been 2,800. In the late 20th century about 1,500 were reported to be living on the reservation in Nebraska.

Like other prairie tribes, the Omaha combined agriculture with hunting. In spring and autumn they lived in permanent villages of dome-shaped earth lodges, moving into portable tepees for the hunting seasons. Omaha social organization was elaborate, with a class system of chiefs, priests, physicians, and commoners. Rank was inherited in the male line, although an individual could raise his status by distributing horses and blankets or providing feasts.

There were 10 clans organized in two groups, representing earth and sky. Earth clans had charge of ceremonies concerning war and food supply, while the ceremonies overseen by the sky clans were designed to secure supernatural aid. When the entire tribe camped during the summer bison hunt or on migrations, tepees were arranged in a large circle symbolizing the tribal organization. The Omaha, like many other Plains Indians, awarded special insignia for such daring war exploits as touching an enemy in battle, touching a dead enemy surrounded by his tribesmen, and removing a trained horse from the enemy's camp. Killing and scalping the enemy were considered lesser exploits.

Omaha, city, Nebraska, U.S., the port of entry and seat of Douglas county. Omaha is situated in the eastern part of the state and on the west bank of the Missouri River, opposite Council Bluffs, Iowa. It was founded in 1854 in an area that had been visited by Meriwether Lewis and William Clark (1804) on their exploratory journey to the Pacific coast and where the pioneer fur trader Manuel Lisa established a trading post during the War of 1812. A Utah-bound group of Mormons spent the winter of 1846–47 there at an encampment that they named Winter Quarters, later called Florence, and subsequently annexed by Omaha.

Omaha, meaning "upstream people," referring to the Omaha Indians, was established by Council Bluffs promoters who wanted the capital of the newly created Nebraska Territory to be located directly across the river, in part at least to influence the builders of the then-projected transcontinental railroad to lay their tracks through or near their own city. Omaha was indeed made the capital of the territory, and a few years later President Abraham Lincoln designated Council Bluffs as the eastern terminus of the first transcontinental railroad. As the actual starting point (1863) for the railroad (Union Pacific), Omaha soon became a focal point for trade and industry and grew rapidly during its early years, although the capital was moved to Lincoln soon after Nebraska became a state (1867).

A succession of drought years following the great blizzard of 1888, together with the panic of 1893, halted population growth, but by 1914 the city had started to grow again. Several suburban communities, including South Omaha, site of the Union Stockyards, were annexed. Offutt Air Force Base, headquarters of the U.S. Strategic Command, is at nearby Bellevue.

Omaha's basic economy depends on activities connected with agriculture. The city is the largest livestock market and meat-packing centre in the world, and it buys and sells much of the grain produced in the United States. It continues to be one of the largest railroad centres in the United States. It also has a large number of insurance companies. Omaha's other industries include such processing concerns as oil refining and lead smelting, as well as the manufacture of railroad, telephone, and farm equipment and of valves and pumps.

Omaha's educational institutions include the University of Nebraska at Omaha (1908), Creighton University (Roman Catholic; 1878), the University of Nebraska Medical Center (1880), the Roman Catholic women's College of St. Mary (1923), Grace College of the Bible (1943), and Metropolitan Community College (1974). The Joslyn Art Museum in the city houses a collection ranging from ancient times to the present. Fontelle Forest, the largest unbroken native forest in the state, is to the south. Boys Town, a village dedicated to homeless boys, is 10 miles (16 km) west. Pop. (1991 est.) city, 338,987; Omaha MSA, 623,840.

O'Mahony, John (b. 1816, near Mitchelstown, County Cork, Ire.—d. Feb. 6, 1877, New York, N.Y., U.S.), founder of the American branch of the Fenian Brotherhood, an Irish nationalist secret society active in Britain and the United States during the mid-19th century (*see* Fenian).

O'Mahony was educated at Trinity College, Dublin, and became a respected Irish scholar. He took part in the unsuccessful Young Ireland rebellion of 1848 and with its failure fled the country, first to France. By the time O'Mahony arrived in the United States in 1853, he was a well-known leader of the Irish resistance to British rule. He settled in New York, where he helped organize the Emmet Monument Association, a predecessor to the Fenian movement.

In 1857, after discussing with fellow nationalist James Stephens the organization of a revolutionary society to be headed in Ireland by Stephens, O'Mahony conceived of an American support organization that would be formed under his own leadership. He named it the Fenian Brotherhood after the Fianna, legendary defenders of Ireland whose exploits he had recounted in his own translation of a 17th-century Gaelic history of Ireland. Stephens' group came to be called the Irish Republican Brotherhood.

The Fenians at first met with little success, causing a great deal of resentment toward O'Mahony by his counterpart in Ireland. But by 1865 the Fenian Brotherhood had grown large and prosperous, and it was able to send both arms and money to Ireland.

In December 1865 the organization divided over the issue of selling Fenian bonds to raise more support. O'Mahony reluctantly backed the Fenian decision of 1865 to make a series of military raids on Canada, part of a scheme to take Canada hostage for the cause of Irish freedom. He suffered a loss of personal popularity after the failure of an attack against Campobello Island, New Brunswick. He resigned but was called out of retirement in 1872 to resume leadership of the group.

He died in poverty, and his body was returned to Dublin for burial.

O'Malley, Walter (Francis) (b. Oct. 9, 1903, Bronx, New York, N.Y., U.S.—d. Aug. 9, 1979, Rochester, Minn.), American lawyer who was the principal owner of the National League Brooklyn Dodgers professional baseball team (from 1958 the Los Angeles Dodgers).

O'Malley was educated at Jamaica High School (Queens), the Culver Military Academy (Indiana), and the University of Pennsylvania (Philadelphia), graduating in 1926. He received his law degree from Fordham University (New York City) in 1930 and became a director of the Dodgers in 1932 and legal adviser in 1943. He became an owner with two other partners in 1945 and by 1950 controlled 67 percent of the stock and was made president. He achieved sole control after the move to Los Angeles, becoming chairman of the board in 1970 when he passed the presidency on to his son Peter. The team won the National League pennant four times in Brooklyn and seven times in Los Angeles.

O'Malley was a powerful influence in baseball ownership and management; he became the National League representative to baseball's executive committee in 1951 and was reputed to have had a major role in selecting William D. Eckert and Bowie Kuhn as commissioners (1965, 1969).

The Dodgers bought the Los Angeles franchise in 1956 and moved the team there in 1958. Protests in New York were bitter, but O'Malley's business acumen was proved in 1978, when the Dodgers became the first major league team to draw more than 3 million fans.

O'Malley's other financial interests were in railroads, building materials, and real estate. He was also a civic leader.

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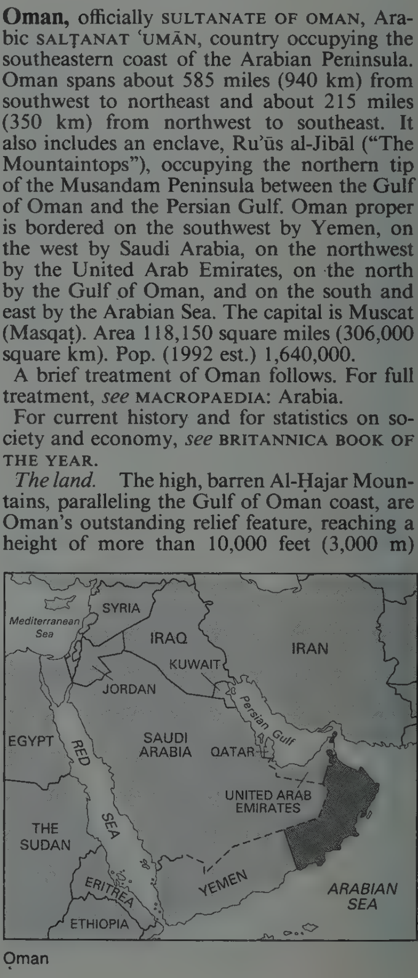
Oman, officially SULTANATE OF OMAN, Arabic SALṬANAT ʿUMĀN, country occupying the southeastern coast of the Arabian Peninsula. Oman spans about 585 miles (940 km) from southwest to northeast and about 215 miles (350 km) from northwest to southeast. It also includes an enclave, Ruʾūs al-Jibāl ("The Mountaintops"), occupying the northern tip of the Musandam Peninsula between the Gulf of Oman and the Persian Gulf. Oman proper is bordered on the southwest by Yemen, on the west by Saudi Arabia, on the northwest by the United Arab Emirates, on the north by the Gulf of Oman, and on the south and east by the Arabian Sea. The capital is Muscat (Masqaṭ). Area 118,150 square miles (306,000 square km). Pop. (1992 est.) 1,640,000.

A brief treatment of Oman follows. For full treatment, *see* MACROPAEDIA: Arabia.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The high, barren Al-Ḥajar Mountains, paralleling the Gulf of Oman coast, are Oman's outstanding relief feature, reaching a height of more than 10,000 feet (3,000 m)



Oman

along al-Akhḍar ridge. The mountains separate al-Bāṭinah, a 20-mile- (32-kilometre-) wide alluvial plain in the northeast, from a broad expanse of gravel desert that extends southwestward for about 370 miles (600 km) and covers three-fourths of the country to meet the mountains in the Dhofar (Ẓufār) region in Oman's southwestern corner.

Oman is a hot and arid country with high humidity along the coasts. It receives an annual rainfall of only about 4 inches (100 mm). Summer temperatures on the coast at Muscat often reach 97° F (36° C); winters have lows of about 63° F (17° C). The sultanate has no permanent bodies of fresh water, and the little natural vegetation that exists consists mostly of acacia trees.

Plantations of irrigated date palms cover the plain of al-Bāṭinah, and oases dot the mountains and the interior desert. Fruits and some grains are grown, but only about 0.2 percent of the country's land is cultivated, and rice, which is the staple food, must be imported. Oman's principal natural resources are petroleum and natural gas. Its estimated reserves are not as substantial as those of many other Arabian countries but are impressive for a country with its small population.

The people. Oman's population is predominantly Arab (more than three-fourths of the total) and tribal in organization, although there are considerable numbers of Indians, Pakistanis (mostly Baluchis), Bengalis, Persians, and blacks (from eastern Africa) working in the country. The petroleum industry has also brought a number of Westerners into Oman. Arabic is the official language; Baluchi and languages of the Mahri group are also spoken. Islām is the principal religion. Adherents to Sunnite Islām are numerous. The country has a high annual population growth rate, and about 45 percent of the population is less than 15 years of age. More than nine-tenths of the total population lives in rural areas.

The economy. Oman has a developing mixed economy in which both the public and private sectors participate. The production and export of petroleum are the largest sector of the economy. The gross national product (GNP) grew much more rapidly than the population during most of the 1980s; the GNP per capita is similar to those of the developed countries.

Agriculture employs approximately half of the work force but accounts for only 3 percent of the GNP. Although subsistence farming predominates, limes and dates are exported. Sharp fluctuations in the amount of annual rainfall make farming heavily dependent on irrigation. Dates, alfalfa, limes, mangoes, melons, wheat, bananas, and onions are the main crops. Goats and sheep, and cattle reared in the Dhofar region, are the major livestock. Fishing is carried on in the Gulf of Oman and the Arabian Sea.

Petroleum in commercial quantities was discovered in Oman in 1964 by a development company that was owned partly by the government and partly by foreign interests. Oil revenues account for more than half of the GNP and provide most of the government's income.

Manufacturing accounts for only 4 percent of the GNP. Traditional handicrafts (such as weaving, leather working, gold and silver work, and boatbuilding) dominated the nation's industry before 1964. The production of petroleum and state investment in the infrastructure have stimulated construction and manufacturing in the country. Manufactures include cement blocks and floors, furniture, aluminum products, household utensils, fertilizers, and fibreglass products.

Government expenditures in the late 1980s grew more rapidly than did oil revenues. As a result, Oman has had to utilize financial aid from other countries as well as curb expenditures. Exports are made up almost entirely of crude petroleum and ordinarily exceed imports, which consist of machinery and transport equipment, manufactured goods, and foodstuffs. Principal trading partners include Japan, the United Arab Emirates, and the United Kingdom.

Government and social conditions. Oman is an independent sultanate ruled by an absolute monarch with the aid of a handpicked cabinet and, since 1981, with a consultative assembly appointed by the sultan. The country is ruled without constitution, elected legislature, or legal political parties. Oman's legal system is based on the Sharī'ah—the laws of the Qu'rān and the oral teachings of Muḥammad. The government has encountered some opposition from the Popular Front for the Liberation of Oman (PFLO), a guerrilla movement operating in the mountains of Dhofar in southern Oman.

The government greatly increased both the quality and the coverage of its health-care services during the 1970s, and the country's high incidence of tuberculosis, trachoma, and whooping cough has declined. Health conditions remain generally poor, however. Malaria and bacillary dysentery plague significant numbers of Omanis, and the country's infant mortality rate remains high. The state of the country's health is reflected in Omanis' relatively low life expectancy of 55 years.

The government has increased the number of primary schools in Oman from only 3 in 1970 to more than 300, and the educational system now teaches girls as well as boys. The Sultan Qabus University (founded in 1985) is located in Muscat. The cultural life of Oman has been dominated by strict adherence to Islāmic beliefs.

History. Human habitation in Oman is at least 10,000 years old. Some archaeological finds suggest that Oman may have been the semilegendary Magan described in Sumerian sources (*c.* 3000 BC) as a prosperous seafaring and trading nation. The ancient Omanis produced and shipped frankincense, which was widely used in the ancient Middle East and the Mediterranean.

Arab migration to Oman began in the 9th century BC. Two distinct families were present: the Qaḥṭan from southwestern Arabia and the Nizār from northwestern Arabia. The rivalry of these two groups affected Omani history into modern times. Before conversion to Islām in the 7th century AD, Oman was wracked by tribal warfare and incursions by the Persians. By 751 the Omanis, who had embraced the Kharijite Islāmic sect, rallied around Ibāḍī preachers and elected Julanda ibn Mas'ūd their imam (spiritual head). Oman was ruled by imams until 1154, when the Banū Nabhān established a dynasty of kings. After 1428 the imams reasserted their authority and challenged the kings. In 1624 Naṣr ibn Murshīd became imam and ended tribal conflict. His successor expelled the Portuguese, who had gained control of the Omani coast in 1507.

In the early 18th century, civil war broke out between the Hināwis (descendants of the Qaḥṭan) and the Ghāfirīs (descendants of the Nizār). The election by both factions of Aḥmad ibn Sa'īd, of the Bū Sa'īd family (Āl Bū Sa'īd), as imam in about 1744 brought an end to the war. His successors, who came to be called sultans, created a substantial empire in Oman and East Africa, and for a time the Omani capital was in Zanzibar. After 1861 Oman and Zanzibar were ruled separately.

The tribes of the Omani interior frequently clashed with the ruling dynasty by continuing to support the elected Ibāḍī imam rather than the sultan. Peace was not restored in the interior until 1959, when the last Ibāḍī imam was evicted from Oman.

Full international recognition of Oman came in 1970, when Qābūs ibn Sa'īd overthrew his father, Sultan Sa'īd, and undertook a liberalization of the government. An uprising by left-wing guerrillas in the Dhofar region, aided by Yemen (Aden), was defeated in 1975. Oman joined the Arab League and the United Nations in 1971 and in 1981 was a founding member of the Gulf Cooperation Council.

Oman, Gulf of, northwest arm of the Arabian Sea, between the eastern portion (Oman) of the Arabian Peninsula to the southwest and Iran to the north. The gulf is 200 miles (320 km) wide between Cape al-Ḥadd in Oman and Gwātar Bay on the Pakistan–Iran border. It is 350 miles (560 km) long and connects with the Persian Gulf to the northwest through the Strait of Hormuz. The small ports along the gulf include Ṣuḥār, al-Khābūrah, Muscat, and Ṣūr, in Oman, and Jāsk and Bandar Beheshtī (formerly Chāh Bahār), in Iran.

Some fishing is carried on, but the gulf's main importance is as a shipping route for the oil-producing area around the Persian Gulf. The Gulf of Oman offers the only entrance from the Arabian Sea and the Indian Ocean into the Persian Gulf. The world's major oil exporters and importers have a joint interest in its security.

Oman, John Wood (b. July 23, 1860, Orkney, Scot.—d. May 17, 1939, Cambridge, Cambridgeshire, Eng.), British Presbyterian theologian.

After graduating from Edinburgh University and the theological college of the United Presbyterian Church, Oman studied in Germany. After serving as an assistant pastor in Paisley, Scot., he transferred to the ministry of the Presbyterian Church of England. In 1907 he was appointed professor of systematic theology at its theological college in Cambridge (Westminster College), of which he was later principal (1922–35). Oman taught the uniqueness and independence of the religious consciousness: the sense of "the sacred" establishes man as a personal being in the midst of natural process. In his main work, *The Natural and the Supernatural* (1931), Oman developed this view in a wide-ranging treatment of knowledge and perception, of necessity and freedom, and of the history and classification of religions. His other works include *Grace and Personality* (1917), *Vision and Authority* (1902), and *The Church and the Divine Order* (1911).

Omar (Arabic, Turkish, Persian personal name): *see under* 'Umar, except as below.

Omar Khayyam, Arabic in full GHIYĀTH AD-DIN ABŪ AL-FATḤ 'UMAR IBN IBRAHĪM AL-KHAIYĀMĪ AN-NĪSHABURI, Persian ABŪ OL-FATḤ 'OMAR EBN EBRAHĪM OL-KHAYYĀMĪ (b. May 18, 1048, Nīshāpūr, Iran—d. Dec. 4, 1131, Nīshāpūr), Persian poet, mathematician, and astronomer, renowned in his own country and time for his scientific achievements but known to English-speaking readers for his *rōbā'īyāt* ("quatrains") in the version *The Rubáiyát of Omar Khayyám,* published in 1859 by Edward FitzGerald (*q.v.*).

His name Khayyam ("Tentmaker") may have been derived from his father's trade. He received a good education in the sciences and philosophy in his native Neyshābūr (Nīshāpūr) and in Balkh and then went to Samarkand, where he completed an important treatise on algebra. He made such a name for himself that he was invited by the Seljuq sultan Malik-Shāh to undertake the astronomical observations necessary for the reform of the calendar. He was also commissioned to build an observatory in the city of Eṣfahān in collaboration with other astronomers. After the death of his patron in 1092, Omar went on a pilgrimage to Mecca. Returning to Neyshābūr he taught and served the court from time to time by predicting events to come. Philosophy, jurisprudence, history, mathematics, medicine, and astronomy are among the subjects mastered by this brilliant man. Unfortunately, few of his prose writings survive; these include a few brief tracts on metaphysics and a treatise on Euclid.

Omar's fame in the West rests upon the collection of *robāʿīyāt,* or "quatrains," attributed to him. (A quatrain is a piece of verse complete in four rhymed lines, although in Omar's *robāʿīyāt* the third line usually does not rhyme.) Omar's poetry had attracted comparatively little attention until they inspired Edward FitzGerald to write his celebrated *The Rubáiyát of Omar Khayyám,* containing such now-famous phrases as "A Jug of Wine, a Loaf of Bread—and Thou," "Take the Cash, and let the Credit go," and "The Flower that once has blown for ever dies." These quatrains have been translated into almost every major language and are largely responsible for colouring European ideas about Persian poetry. Some scholars have doubted that Omar wrote poetry, because his contemporaries took no notice of his verse, and not until two centuries after his death did a few quatrains appear under his name. A.J. Arberry, however, using 13th-century manuscripts, has identified at least 250 authentic *robāʿīyāt* by him.

Each of Omar's quatrains was originally composed on a particular occasion and forms a complete poem in itself. It was FitzGerald who conceived the idea of combining a series of these *robāʿīyāt* into a continuous elegy that had an intellectual unity and consistency lacking in the disconnected originals. FitzGerald's ingenious and felicitous paraphrasing gave his translations a memorable verve and succinctness.

A close reading of the authentic verses reveals Omar as a man of deep thought, troubled by the questions of the nature of reality and the eternal, the impermanence and uncertainty of life, and man's relationship to God. Omar doubts the existence of divine providence and the afterlife, derides religious certainty, and is disturbed by man's frailty and ignorance. Finding no acceptable answers to his perplexities, he chooses to put his faith instead in a joyful appreciation of the fleeting and sensuous beauties of the material world. The idyllic nature of the modest pleasures he celebrates, however, cannot dispel his honest and straightforward brooding over fundamental metaphysical questions.

Omayyad DYNASTY: *see* Umayyad dynasty.

Ombede, Philippe-Louis: *see* Philombe, René.

Ombi Islands (Indonesia): *see* Obi Islands.

Ombre, card game for three players, fashionable in Europe in the 17th century and into the 18th but now practically obsolete. It was similar to Whist, involving bidding, trump suit, and taking tricks. Originally played with the Spanish packs of 40 or 48 cards, it was adapted to the French pack of 52. In the course of time it acquired terms from Spanish, French, Italian, and English, as well as a great complexity of rules.

The game has been traced as far back as the 14th century. As late as 1884 a standard manual stated, "Of all games, undoubtedly the most interesting, diversified, and widely known is Ombre." A variant for four players, called Quadrille, supplanted Ombre in popularity. A simplification of Quadrille, usually called Solo, is still played.

ombres chinoises (French: "Chinese shadows"), European version of the Chinese shadow-puppet show, introduced in Europe in the mid-18th century by returning travelers. Soon adopted by French and English showmen, the form gained prominence in the shows of the French puppeteer Dominique Séraphin, who presented the first popular *ombres chinoises* in Paris in 1776. In 1781 he moved his show to Versailles, where he entertained the French court, and three years later he established a highly successful puppet theatre in Paris.

Cardboard and wire *ombres chinoises* from *Don Quichotte et le moulin,* from the Théâtre Séraphin, Paris, *c.* 1800

By courtesy of the Cooper-Hewitt Museum of Decorative Arts and Design, New York

Using silhouettes cast by solid cardboard figures instead of the coloured transparencies popular in China, the *ombres chinoises* usually featured short, amusing fables such as *The Broken Bridge,* a dialogue in song between a farmer and a gentleman. Although most shadow theatres had closed by the 1860s, *ombres chinoises* were played in London until the end of the 19th century.

The technique was revived between 1887 and 1897 at Le Chat-Noir, a Montmartre café, by painters, writers, and musicians who presented satirical pieces. *See also* shadow play.

ombudsman, legislative commissioner for investigating citizens' complaints of bureaucratic abuse. The office originated in Sweden in 1809–10 and has been copied in various forms in Scandinavia, New Zealand, the United Kingdom, Germany, and Israel and in certain states in the United States and Australia and in provinces in Canada.

The legislature appoints the ombudsman, but it may not interfere with his handling of particular cases. He is supposed to be an independent—and presumably impartial—arbiter between government and the individual. His scope of authority covers all agencies, boards, and commissions but sometimes excludes municipal government (New Zealand and Norway), cabinet decisions (New Zealand, Norway, and Sweden), or judges (Denmark, New Zealand, and Norway). Although the ombudsman's jurisdiction is vast, his power is solely recommendatory. He may suggest changes in government action but may not command them.

A civil ombudsman receives many written complaints a year, in addition to the handful that he takes up of his own volition. The majority of these are rejected without investigation. In a number of cases, the citizen fails to state a complaint; the ombudsman sometimes solicits clarification and helps the aggrieved person to explain his grievance intelligibly. In other cases, the person or body complained of is outside the jurisdiction of the ombudsman, who may then instruct the citizen as to where to lodge his complaint. Other applications are rejected because the party has not exhausted available administrative or legal remedies; again, the ombudsman describes these alternative avenues of appeal. In giving advice, the ombudsman provides legal aid in the administrative sphere—an area of the law in which such assistance has otherwise been lacking.

The balance of the complaints are transmitted by the ombudsman to the agency in question for elucidation. After the agency completes its fact-finding and delivers the results, the ombudsman forms an opinion as to the correctness of the government's action. He does not merely impose his judgment in place of the administrator's but asks whether the administrator acted reasonably under the law. In the majority of cases investigated, the ombudsman finds that the agency acted properly and within the scope of its discretion. In replying to the complainant, he explains why the agency action was unobjectionable. In the remaining cases, the ombudsman comes to the conclusion that the agency acted improperly. He may express to the bureau and to the complainant his opinion that there was rudeness or unnecessary delay. If he feels that the decision of the agency was erroneous, he may state what a correct decision would have been and, whenever possible, suggest a solution. Further, the ombudsman's special and annual reports provide modest assistance to the legislature in carrying out its supervisory function. Article 19 of the New Zealand Ombudsman Act, for example, directs the ombudsman to call attention to laws producing "unreasonable, unjust, oppressive, or improperly discriminatory results."

Functions similar to those of an ombudsman are undertaken by procurators-general in eastern Europe and by the Administrative Management Agency in Japan. Great Britain has a parliamentary commissioner who is authorized to investigate complaints referred to him by members of Parliament. In 1967 Hawaii established the first state ombudsman's office in the United States.

Omdurman, Arabic UMM DURMĀN, one of the Three Towns (with Khartoum and Khartoum North), east-central Sudan. Situated on the left bank of the main Nile River just below the confluence of the Blue and White Niles, Omdurman was an insignificant riverine village until the victory of Muḥammad Aḥmad, known as the Mahdi, over the British in 1885. The Mahdi and his successor, the caliph ʿAbd Allāh, made it their capital, and it grew rapidly as an unplanned town of mud houses. Omdurman was captured by Anglo-Egyptian forces led by Major General Sir Herbert (later Lord) Kitchener in 1898 but continued to develop into the cultural, religious, and commercial centre of The Sudan. ʿAbd Allāh's house is now a museum, and the tomb of the Mahdi has been restored. The Islāmic University of Omdurman (founded 1912; university status 1965), connected with the principal mosque, teaches Islāmic law and theology. There is a large bazaar trading in hides, gum arabic, textiles, agricultural products, livestock, and handicrafts (in metal, wood, leather, and ivory). Furniture and pot-

The tomb of the Mahdi, Omdurman, The Sudan

Charles Beery—Shostal/EB Inc.

tery factories and a tannery are also important to the local economy. Trucking has largely replaced the river in the movement of goods. Pop. (1983) 526,287.

Omdurman, Battle of (Sept. 2, 1898), decisive military engagement in which Anglo-Egyptian forces, under Major General Sir Herbert Kitchener (later Lord Kitchener), defeated the forces of the Mahdist leader ʿAbd Allāh and thereby won Sudanese territory that the Mahdists had dominated since 1881.

Preparations for an advance against ʿAbd Allāh's forces at Omdurman began at the end of July 1898, with the dispatch to Kitchener at Wad Ḥamad (above Al-Matammah on the west bank of the Nile River) of reinforcements from Cairo. There, on August 24, a combined Anglo-Egyptian force of 26,000 men was amassed. It comprised a British division of two brigades, an Egyptian division of four brigades, and mounted troops, artillery, engineers, and a flotilla. The Mahdist forces numbered some 40,000 but their simple weapons were no match for Kitchener's modern armaments.

While a force of Arab irregulars—friendly to the Anglo-Egyptian forces and under British command—proceeded southward to clear the Nile's east bank of all opposition as far as the Blue Nile, the Anglo-Egyptian army under Kitchener proceeded southward along the west bank unopposed. On September 1, while the British army's flotilla shelled the Mahdist forts on both sides of the river and breached the wall of Omdurman, Kitchener bivouacked four miles north of the city at Egeiga on the west bank. He repulsed two successive charges on his lines by Mahdist forces on September 2, slaughtering the Mahdist troops with machine guns and artillery and subsequently sweeping the field in an old-fashioned cavalry charge. He then marched on Omdurman, where he further decimated the Mahdist forces. The Mahdist total losses were about 10,000 killed, 10,000 wounded, and 5,000 taken prisoner. The British had about 500 casualties.

The results of the battle were the destruction of ʿAbd Allāh's army, the extinction of Mahdism in the Sudan, and the establishment of British dominance there.

Ōme, city, Tokyo *to* (metropolis), Honshu, Japan, on the Tama River. An early trade centre and post town, it was known as a weaving centre for cotton textiles. Other traditional industries included the production of lumber and woodwork. Ōme became a municipality in 1951, with the amalgamation of Ōme and two neighbouring villages, covering an administrative area of 125 square miles (323 square km). Industrial plants have been constructed on the outskirts of the city area; electrical machinery and textiles (mainly bedclothes) are major products. Ōme is the gateway to Chichibu-Tama National Park; a shrine crowns Mount Mitake, which rises within the city area. Pop. (1995 prelim.) 137,208.

Omega Centauri (catalog number NGC 5139), the brightest globular star cluster. It is located in the southern constellation Centaurus. It has a magnitude of 3.7 and is visible to the unaided eye as a faint luminous patch. Omega Centauri is about 17,000 light-years from Earth and is thus one of the nearer globular clusters. It is estimated to contain hundreds of thousands of stars; several hundred variables have been observed in it. The English astronomer John Herschel in the 1830s was the first to recognize it as a star cluster and not a nebula.

omen, observed phenomenon that is interpreted as signifying good or bad fortune. In ancient times omens were numerous and varied and included, for instance, lightning, cloud movements, the flight of birds, and the paths of certain sacred animals. Within each type of sign were minor subdivisions, such as the different kinds of bird in flight or the direction of flight in relation to the observer, each of which had a special meaning. *See also* augury.

Ömer (Turkish personal name): *see under* Omar, or ʿUmar, except as below.

Ömer (Ottoman poet): *see* Nefʿi.

Ometecuhtli (Nahuatl: "Two-Lord"), Aztec deity, the Lord of Duality, or Lord of Life, who represented one aspect of the cosmic duality of the Aztec tradition. Along with Omecíhuatl, Ometecuhtli resided in Omeyocan ("the place two," or "double heaven"), the 13th and highest Aztec heaven. The opposing factors in the Aztec universe included male and female, light and dark, motion and stillness, order and chaos. Ometecuhtli was the only Aztec god to whom no temple was erected, nor was any formal cult active in his name. Seeing him as remote in the heavens, the Aztecs assumed he would never interact with them directly, but they were aware of his presence in every act of ritual and in every rhythm of nature.

As part of the Ometéotl complex, representing a single creative theme, Ometecuhtli is depicted by symbols of fertility and adorned with ears of corn. He was believed to be responsible for releasing the souls of infants from Omeyocan in preparation for human births on earth. Despite the paramount importance of the Ometéotl deities within the hierarchy of the heavens, other lesser gods with their own distinct personalities held dominion over specific aspects of Aztec life and were regarded as autonomous in their actions.

Consult the INDEX *first*

Ometepe Island, Spanish ISLA DE OMETEPE, also called ALTA GRACIA, island in southwestern Nicaragua, the largest island in Lake Nicaragua. Ometepe actually consists of two islands joined by a narrow isthmus 2 miles (3 km) in length. Their combined area is about 150 square miles (400 square km). The larger, northern one is 12 miles (19 km) from east to west and 10 miles (16 km) from north to south; from it the cone of active Concepción Volcano rises to 5,282 feet (1,610 m). The smaller, southern island is almost circular, with a 7-mile (11-kilometre) diameter. The perfect cone of Madera Volcano on the southern island attains an elevation of 4,573 feet (1,394 m). Ometepe lies 5 miles (8 km) offshore and approximately 8 miles (13 km) east-northeast of the town of Rivas. The island's land is fertile and largely forested; coffee and tobacco are the principal products. Alta Gracia and Moyogalpa are the island's main towns. Pop. (latest est.) mun., 9,378.

Omicron Ceti (star): *see* Mira Ceti.

Ōmiya, city, Saitama *ken* (prefecture), Honshu, Japan, north of Tokyo. It is the site of the Shintō Hikawa Shrine, said to have been established in the 5th century BC. During the Tokugawa period (1603–1867) Ōmiya was a post town. Its growth since 1891 has been as a major railway junction. The city contains a large workshop of the Japanese National Railways and a vast switchyard. Its park is known for its cherry blossoms. Pop. (1995 prelim.) 433,768.

Omkarji (India): *see* Godarpura.

ommochrome, any of a group of biological pigments (biochromes) conspicuous in the eyes of insects and crustaceans as well as in the changeable chromatophores (pigment-containing cells) in the skin of cephalopods. Although ommochromes, which are derived from the breakdown of the amino acid tryptophan, are responsible for the colours of insect eyes, they are not known to be involved directly in photoreception. In the changing integumentary cells of cephalopods, however, they may contribute to adaptive responses.

omnibus: *see* bus.

omnivore, animal with wide food preferences, which can eat both plant and animal matter. Animals that are omnivorous frequently lack distinct specializations in their food-gathering structures and behaviour. Many small birds and mammals are omnivorous; deer mice and mockingbirds have diets that at different times may include a preponderance of insects or berries. Many animals generally considered carnivores are actually omnivorous, among them the red fox, which enjoys fruits and berries, and the snapping turtle, one-third of whose diet is provided by plants.

Omo remains, group of hominid fossils, the oldest of which are about 3,000,000 years old, found by Yves Coppens, Camille Arambourg, F. Clark Howell, and others on the International Paleontological Research Expedition in the Omo River region of Ethiopia from 1967 to 1974. The remains consist of about 200 teeth, four jaws, a partial skeleton, parts of two skulls, and a leg bone. These fossil finds represented a great breakthrough in the study of early hominids because they were the first ones found to extend back to 3,000,000 years. Until they were uncovered, the earliest fossils were dated at about 1,750,000 years.

The Omo River region is rich in early fossil remains because the area was once a highly volcanic one in which the strata of the earth were heaved up and now lie at angles to the Earth's surface. The layers of ash, easily dated by the potassium-argon method, reveal that the area, now an arid wasteland, was once a fertile region with several rivers and lush forests.

The remains consist of specimens of *Paraustralopithecus aethiopicus, Australopithecus africanus, Australopithecus boisei,* and *Homo erectus.* There is evidence that *Australopithecus boisei,* not viewed as in the direct line of evolution to modern man, lived in the Omo region for at least 1,000,000 years. Various stone tools dating back to the earliest stone tool industry were found alongside the fossils.

Ōmoto (Japanese: "Great Fundamentals"), also called ŌMOTO-KYŌ ("Religion of Ōmoto"), religious movement of Japan that had a large following in the period between World War I and World War II and that served as a model for numerous other sects in that country. The teaching of Ōmoto is based on divine oracles transmitted through a peasant woman, Deguchi Nao, whose healing powers attracted an early following. Her first revelation in 1892 foretold the destruction of the world and the appearance of a messiah who would usher in the new heaven on earth.

The doctrine was systematized and organized by her son-in-law, Deguchi Onisaburō (1871–1948), who denounced armament and war and identified himself as the leader who would establish the new order. He attracted more than 2,000,000 believers in the 1930s but aroused the hostility of the government, which twice, in 1921 and again in 1935, arrested him and destroyed Ōmoto temples and buildings at the sect's headquarters in Ayabe, near Kyōto. He was released on bail in 1942 and initiated the revival of the movement in 1946 under the name Aizen-en (Garden of Divine Love). The sect was known by several names but has reverted to its most commonly used name, Ōmoto.

Though the membership of the sect in 1978 was estimated at only 163,760 believers, its importance may be measured by the number of other "new religions" of Japan that owe their original inspiration to Ōmoto. These include Seichōno-ie (Household of Growth) and Sekai Kyūsei-kyō (Religion of World Salvation), both founded by former disciples of

Onisaburō. Ōmoto emphasizes the universal character of religion. It promotes the use of the international language Esperanto and sponsors an organization called ULBA (Universal Love and Brotherhood Association).

Omotoso, Kole (b. April 21, 1943, Akure, Western State, Nigeria), Nigerian novelist, playwright, and critic who wrote from a Yoruba background and coupled the folklore he learned as a child with his adult studies in Arabic and English. His major themes include interracial marriage, comic aspects of the Biafran–Nigerian conflict, and the human condition—as exemplified in friendship between the Yoruba and the Ibo and in relationships between children and parents.

After attending local schools, Omotoso completed his secondary education at King's College, Lagos, Nigeria (1962–63); and attended the University of Ibadan. After another stint at teaching he went to Scotland in 1969 for his doctorate, after which he returned to Nigeria to teach Arabic at the University of Ife. His works include novels such as *The Edifice* (1971), *The Combat* (1972), *Sacrifice* (1974), *Fella's Choice* (1974), and *The Scales* (1976); a collection of shorter tales, *Miracles and Other Stories* (1973); the plays *The Curse* (1976) and *Shadows in the Horizons* (1977); and many critical articles and reviews.

Omphalea, genus of tropical shrubs or trees of the spurge family (Euphorbiaceae), comprising 15 species; 12 are native to the Americas, 3 to the Old World. *O. triandra*, the Jamaican cobnut, or pop nut, is native to the West Indies and cultivated in Europe. It grows to about 3.5 metres (11.5 feet) and bears yellow nuts 3.75 centimetres (1.5 inches) thick, which are edible if the poisonous embryo is removed. Juice from the fruit blackens and is used in making ink and glue. *O. diandra*, native to Colombia, bears edible oily seeds that are also used as hog feed. Large hunter's nuts from *O. megacarpa* are a stimulating, nutritious food popular in the West Indies.

Omri, Hebrew ʿAMRI (reigned 876–869 or *c.* 884–*c.* 872 BC), king of Israel, the father of Ahab.

Omri is mentioned briefly and unfavourably in the Bible (I Kings 16; Micah 6:16) but is thought by modern scholars to have been one of the most important rulers of the northern kingdom. His name appears frequently in Assyrian inscriptions, and he is known to have conquered Moab, formed an alliance with Tyre, and moved the capital of Israel to Samaria.

Omsk, *oblast* (province), west central Russia, covering an area of 53,900 sq mi (139,700 sq km) in the basin of the middle Irtysh River. Its entire surface is an extremely flat plain, with extensive marshes and peat bogs in the north and innumerable lakes, of which Lake Tenis is the largest. Many southern lakes are saline. In the north is a dense, swampy forest, or taiga, of pine, fir, spruce, and birch; this yields southward to forest-steppe, with groves of birch, and finally to true steppe. The forest-steppe and steppe have rich soils and are intensively cultivated. Much land was plowed up in the Virgin and Idle Lands Campaign of the 1950s. Agriculture dominates the economy, and the towns, apart from Omsk city, the *oblast* headquarters, are small food-processing centres. Grains, especially spring wheat, are the main crop; flax, sunflowers, and mustard are also important. Around Omsk city, market gardening is significant. Livestock husbandry and dairying are highly developed, with large numbers of cattle and sheep. Some timber is cut in the north. Pop. (1991 est.) 2,163,100.

Transporting timber in the north of Omsk *oblast*, Russia

Novosti Press Agency

Omsk, city and administrative centre of Omsk *oblast* (province), west-central Russia, on the Irtysh River at its junction with the Om. Omsk, founded in 1716 as a stronghold at the eastern end of the Ishim fortified line between the Tobol and the Irtysh, developed as an agricultural centre and became a city in 1804. Its military function as headquarters of the Siberian Cossacks lasted until the late 19th century. In 1918–19 it was the seat of the anti-Bolshevik government of Adm. A.V. Kolchak.

Monument to Lenin at Omsk, Russia

Novosti Press Agency

The building of the Trans-Siberian Railroad in the 1890s and Omsk's position as a transshipment point on the Irtysh led to rapid commercial growth. Industrial growth was given great impetus during World War II, since which time its population has more than trebled. Pipelines from the Volga–Urals and West Siberian oil fields supply the refinery and petrochemical industry, which makes synthetic rubber and tires. Engineering, especially the production of agricultural machinery, also dominates a wide range of industry. Other industries include the manufacture of cotton and woollen textiles, cord, footwear, and leather goods and food processing. Timber working is also carried on. Among the cultural and educational facilities of Omsk are agricultural, engineering, medical, and veterinary institutes and other research and higher educational establishments. Pop. (1991 est.) 1,166,800.

Ōmura, city, Nagasaki Prefecture (*ken*), Kyushu, Japan, facing Ōmura-wan (Ōmura Bay), on the western slopes of Tara-dake (Mt. Tara). In the 12th century it was the residence of the Ōmura daimyo and later developed as a port and post town. It became a base for trade with Portugal and a centre of Christianity in the late 16th century. The city is now an industrial centre, producing processed foods and pearls farmed in the bay. Ōmura contains the Nagasaki Airport and a base of the Japanese Self-Defense Force. Pop. (1990) 73,437.

Ōmura Masujirō (b. 1824, Japan—d. December 1869, Ōsaka), Japanese scholar and soldier popularly regarded in Japan as the founder of the modern Japanese Army.

Ōmura was the son of a physician of the Chōshū clan in Sūo Province (now Yamaguchi Prefecture). After studying Confucian ethics, at 19 he began studying Rangaku (Dutch, or Western, learning). When he was 23, he went to Ōsaka to study Western medicine.

In 1850 he returned home to practice medicine but had little success, and in 1853 he became an instructor in Western learning for the Uwajima clan of Iyo (now Ehime Prefecture). He spent some time in Nagasaki studying Western naval science before going to Edo (now Tokyo) in 1856. There he became an instructor at Bansho-Shirabesho, the government's office for the study of Western books, and later at the national military academy. During this period he studied English under James Curtis Hepburn, an American missionary, who later devised a romanized system for the Japanese language and who was then working for the Japanese government. Ōmura also studied Western military strategy.

After returning to his *han* (fief) in 1861, Ōmura applied his knowledge of the Western military sciences as an adviser to the Chōshū military organization. He gained fame as a strategist during the battles between the Chōshū and the forces of the shogunate in 1864 and 1865, before the Meiji Restoration (1868) reestablished direct Imperial rule.

In 1869 he was appointed minister of military affairs and planned the adoption of a conscription system for the new Imperial Army and the complete elimination of the samurai as a warrior class. While in Kyōto inspecting sites for military schools, he was assassinated by samurai opposed to his reforms. Ōmura was posthumously accorded the Junior Grade of Second Court Rank. A statue in front of the Yasukuni Shrine—dedicated to the spirits of all Japanese soldiers—in Tokyo depicts him as the "father" of the Imperial Army that evolved in the Meiji period.

Ōmuta, city, Fukuoka Prefecture (*ken*), northern Kyushu, Japan, on the east coast of the Ariake-kai (Ariake Sea). Formerly a coal-mining centre, Ōmuta's activity declined after the 1960s with the conversion from coal to petroleum as fuel. Consequently, underground shafts were neglected, causing land subsidence, the submersion of farmland under the sea, and the destruction of dwellings. The government is providing assistance via public investments for the introduction of new factories. The artificial harbour has modern coal-handling facilities. Ōmuta has been an important industrial city since 1917, especially in the manufacture of chemicals. Other industries produce coke, zinc, ferroalloys, steel, fireproof brick, cotton, seaweed products, and synthetic petroleum. Pop. (1990) 150,461.

On (ancient city): *see* Heliopolis.

on (Japanese: "pronunciation"), one of two alternate readings (the other is *kun*) for a *kanji* (Japanese: "character"). The ambiguity of a *kanji* arises from the fact that it has two values: the meaning of the original Chinese character and a Chinese pronunciation of the character. In the *on* reading the character is pronounced as it would be in Chinese, and the sounds are interpreted as forming a Japanese word or part of a Japanese word.

Ona, South American Indians once inhabiting the island of Tierra del Fuego and now extinct. They were historically divided into two major sections: Shelknam and Haush. They spoke different dialects and had slightly different cultures. The Ona were hunters and gatherers who subsisted chiefly on guanaco, small herds of which were stalked by bowmen; on various small animals; and on shellfish, cormorants, and berries.

They were organized in patrilineal bands of 40 to 120 members, each claiming territorial rights to a well-defined hunting area. The men took their wives from other bands. The nomadic life of the Ona resembled that of the Patagonian and Pampean hunters more than that of their neighbours of the Chilean archipelago except for social and religious ceremonials. The Ona celebrated male initiation rites, *klóketen;* secrets were revealed by the older men to the younger, and women were excluded from them. The rites were based on a myth that told how the men had overturned a previous regime dominated by women. They believed in a supreme being, who sent punishment and death for wrongdoing. Shamans, who aided hunters and cured sickness, derived their power from the spirits of deceased shamans who appeared to them in dreams.

The Ona had little aesthetic life. Their technology, like that of neighbouring peoples, was very simple.

Oña, Pedro de (b. 1570?, Los Confines, Chile—d. 1643?, Lima), first known poet born in Chile.

After studying at the University of San Marcos in Lima, he entered the army and served in several battles against rebellious Indians. His most famous work is *Primera parte de Arauco domado* (1596; "First Part of the Araucan Conquest"), a verse epic in rhymed couplets depicting the deeds of the Marquis of Canete, viceroy of Peru from 1556 to 1560, based in part on the famous *La Araucana* (1569, 1578, 1589; "The Araucan") of the Spanish poet Alonso de Ercilla. Oña's poem brought him immediate fame. Other works are *El Ignacio de Cantabria* (1639; "Ignatius of Cantabria"), a religious poem about St. Ignatius Loyola, and *Temblor de Lima en 1609* ("The Earthquake of Lima in 1609").

onager (*Equus hemionus onager*), subspecies of the wild ass of Asia that ranged from northwest Iran to Turkmenistan. Pale-coloured and small, it has a short erect mane and fairly large ears. It was domesticated in ancient times but was replaced by the domestic horse and donkey. It now is found in limited numbers and may be approaching extinction. The name onager is sometimes used for the Asian wild ass (*Equus hemionus*). *See also* ass.

Onager (*Equus hemionus onager*) and foal
Kenneth W. Fink—Bruce Coleman Inc.

Onagraceae, evening primrose family of flowering plants, belonging to the myrtle order (Myrtales), comprising 21 genera concentrated in the temperate region of the New World. The family is characterized by flowers with parts mostly on the plan of four (four sepals, four petals, four or eight stamens), but there are some exceptions. The ovary is inferior (*i.e.,* below the flower proper). In the temperate zone the family is known from genera such as *Epilobium,* including the great willow herb, or fireweed (*E. angustifolium*). Another well-known genus is *Oenothera* (with about 80 species), which has been of great importance in studies in genetics and evolution.

In wet places, especially in warmer parts of both the Old and New worlds, is another large day-blooming genus, *Ludwigia,* 75 species of water and marsh plants, mostly of eastern North America, ranging from annual herbs to large shrubs. Some other genera of the family are *Boisduvalia; Circaea,* enchanter's nightshade, with hooked bristles on the fruits; *Gaura,* with small nutlike, indehiscent fruits; *Gayophytum,* thread-stemmed annuals with minute flowers; and *Hauya* of Mexico and Central America, shrubby or treelike, with large white to pinkish flowers. *See also* evening primrose; Fuchsia.

Onassis, Aristotle (Socrates) (b. Jan. 15, 1906, Smyrna [now İzmir], Tur.—d. March 15, 1975, Paris), Greek shipping magnate and international businessman who developed a fleet of supertankers and freighters larger than the navies of many countries.

Although originally wealthy tobacco dealers, Onassis' family lost almost everything in 1922 when Smyrna (modern İzmir), then a Greek city, was captured by the Turks. Escaping to Greece, the family sent Onassis to South America in search of a better fortune. In Buenos Aires Onassis became a night-shift switchboard operator and, with the help of a family friend, began a tobacco-importing business during his daytime hours. He increased the use of imported Oriental tobacco in Argentina from 10 to 35 percent, and in two years he earned $100,000 from a 5 percent commission on tobacco sales.

The Greek government tapped Onassis to negotiate a trade agreement with Argentina in 1928 and then made him consul general. His activities expanded to include cigarette manufacturing and commodities trading. In 1932 Onassis bought his first six freight ships from a Canadian firm, using two of the ships until freight rates improved. Onassis had his first oil tanker built in 1938 and acquired two more by World War II. His empire grew and his fleet expanded through the 1940s and '50s.

In the mid-1950s he bought 17 new tankers in one year. In 1953, he also paid $1,000,000 for controlling interest in the Société des Bains de Mer, which owned the Monte Carlo Casino, theatres, hotels, and other real estate. From 1957 to 1974 he owned and operated Olympic Airways, the Greek national airlines, by concession from the Greek government.

His first marriage, in 1946, was to Athina Livanos, daughter of the shipping magnate Stavros Livanos; it ended in divorce in 1960. He was long intimately associated with the opera diva Maria Callas. He then married Jacqueline Bouvier Kennedy, widow of U.S. President John F. Kennedy, in 1968. His lavish yacht *Christina,* named for his daughter, was called by some a "floating palace" and served for many years as his permanent residence.

At the time of his death his fortune was estimated at more than $500,000,000.

Onassis, Jacqueline Kennedy, *née* JACQUELINE LEE BOUVIER, also called (1953–68) JACQUELINE KENNEDY, byname JACKIE (b. July 28, 1929, Southampton, N.Y., U.S.—d. May 19, 1994, New York), American first lady (1961–63), the wife of John F. Kennedy, 35th president of the United States, who was noted for her style and elegance. Her second husband, Aristotle Onassis (*q.v.*), was one of the wealthiest men in the world.

For a detailed discussion of American first ladies, *see* MACROPAEDIA: United States Presidency and First Lady.

Jacqueline was the elder of two daughters of Janet Lee and John ("Black Jack") Bouvier III, a stock speculator. In 1942, after her parents had divorced and her mother married Hugh D. Auchincloss, Jr., a wealthy lawyer, Jacqueline divided her time between the family's Merrywood estate in Virginia and Hammersmith Farm in Newport, R.I.

From age 15 she attended boarding school; she enrolled at Vassar College in 1947. During her junior year abroad, while studying at the Sorbonne, she polished her French and solidified her affinity for French culture and style. She graduated from George Washington University in 1951 and took a job at the *Washington Times-Herald.*

In 1951 Jacqueline met John F. Kennedy, and on Sept. 12, 1953, they wed in St. Mary's Roman Catholic Church in Newport. The early years of their marriage included considerable disappointment and sadness. John underwent spinal surgery, and she suffered a miscarriage and delivered a stillborn daughter. Their luck appeared to change with the birth of a healthy daughter, Caroline Bouvier Kennedy, on Nov. 27, 1957. John Kennedy was elected president in 1960, just weeks before Jacqueline gave birth to a son, John F. Kennedy, Jr.

The youngest first lady in nearly 75 years, Jacqueline left a distinct mark on the job. She made the White House a showcase for America's most talented and accomplished individuals, inviting musicians, actors, and intellectuals—including Nobel Prize winners—to the executive mansion.

Her most enduring contribution was her work to restore the White House to its original elegance and to protect its holdings. She established the White House Historical Association, which was charged with educating the public and raising funds, and she wrote the foreword to the association's first edition of *The White House: An Historic Guide* (1962). To catalog the mansion's holdings, Jacqueline hired a curator from the Smithsonian Institution, a job that eventually became permanent. Congress, acting with the first lady's support, passed a law to encourage donations of valuable art and furniture and made White House furnishings of "artistic or historic importance" the "inalienable property" of the nation, so that residents could not dispose of them at will. After extensive refurbishing, Jacqueline led a nationally televised tour of the White House in February 1962.

During her travels with the president to Europe (1961) and Central and South America (1962) she won wide praise for her beauty, fashion sense, and facility with languages. Alluding to his wife's immense popularity during their tour of France in 1961, President Kennedy jokingly reintroduced himself to reporters as "the man who accompanied Jacqueline Kennedy to Paris."

In November 1963 Jacqueline agreed to make one of her infrequent political appearances and accompanied her husband to Texas. As the president's motorcade moved through Dallas, he was assassinated as she sat beside him; 99 minutes later she stood beside Lyndon Johnson in her blood-stained suit as he took the oath of office, an unprecedented appearance by a widowed first lady. On her return to the capital, Jacqueline oversaw the planning of her husband's funeral, using many of the details of Abraham Lincoln's funeral a century earlier. Her quiet dignity—and the sight of her two young children standing beside her during the ceremony—brought an outpouring of admiration from all over the world.

Jacqueline moved to an apartment in New York City, which remained her principal residence for the rest of her life. In October 1968 she married the Greek shipping magnate Aristotle Onassis but continued to spend considerable time in New York. Although the bulk of his estate went to his daughter after his death in 1975, she inherited a sum variously estimated at $20 million to $26 million.

Returning to her old interest, Jacqueline worked as a consulting editor at Viking Press and later as an editor at Doubleday. She also maintained her interest in the arts and in landmark preservation.

Soon after she was diagnosed with non-Hodgkins lymphoma in 1994, she died in her New York City apartment. After a funeral at St. Ignatius Roman Catholic Church on Park Avenue, she was buried in Arlington National Cemetery beside John F. Kennedy and the two children who had predeceased them. After her one surviving son, John F. Kennedy, Jr., was killed in a plane accident in July 1999, many books and articles assessed the recurring role of tragedy in the Kennedy story. But it had been a story of luck and glamour as well, and the name she applied to her husband's short administration, "Camelot," seemed to capture much of her essence as well.

(B.B.C./Ed.)

Oñate, Juan de (b. 1550?, New Spain—d. 1630), conquistador who established the colony of New Mexico for Spain. During his despotic governorship, he vainly sought the mythical riches of North America and succeeded instead in unlocking the geographical secrets of what is now the southwestern United States.

The son of wealthy parents in Zacatecas, New Spain, Oñate gained added status when he married a granddaughter of Hernán Cortés. His request to conquer and govern New Mexico was approved in 1595, but it was not until three years later (January 1598) that his expedition of 400 settlers finally began its northern journey. They crossed the Rio Grande at El Paso in July 1598, and Oñate established headquarters at that river's confluence with the Chama at San Juan. From there he sent out small parties in all directions to search for treasure—which did not exist. Disillusioned, many settlers wanted to return to New Spain, but Oñate refused to let them go and executed several of the leading malcontents. His treatment of the Indians was even more brutal.

In June 1601 Oñate set out to find the legendary treasure of Quivira (in what is now central Kansas) but returned in November empty-handed and found, moreover, that most of his colony had departed during his absence. In a last attempt to recover his prestige, he led (1604) 30 soldiers on an expedition west to the Colorado River and south to the Gulf of California, but he still found no gold. He resigned in 1607 and later stood trial for his crimes while governor. Found guilty of cruelty, immorality, and false reporting, he was exiled from the colony, fined, and deprived of his titles. Appeals brought a reversal of his sentence (1624) but not restoration to office.

onchocerciasis, byname ONCHO, also called ONCHOCERCOSIS, filarial disease caused by the helminth *Onchocerca volvulus,* which is transmitted to humans by the bite of the black fly *Simulium.* The disease is found chiefly in Mexico, Guatemala, and Venezuela in the Americas and in sub-Saharan Africa in a broad belt extending from Senegal on the west coast to Ethiopia on the east; in Africa its northern edge is about 15° N of the equator, and it extends as far south as Angola and Tanzania. It has also been reported in Colombia, northern Sudan, and Yemen.

Probably the best-known form of onchocerciasis is also known as river blindness. It has this name because the flies that transmit the disease breed on rivers and mostly affect riverine populations. Blindness is caused by dead microfilariae—the larvae that can be produced for some 15 to 18 years by adult worms—inside the eye. These disintegrating bodies damage surrounding tissue (often the cornea), and if the reproducing adult worms are not attacked, blindness will result. "River blindness" is common in savannah areas of Africa and in Guatemala and Mexico. In the forest areas (as opposed to the savannah), transmission of onchocerciasis is perennial rather than seasonal and blindness is rare.

Other symptoms of the disease include changes in skin pigmentation, dermal swelling, papules, and lichenification of the skin. In newly acquired infections severe itching is common. Nodules that may grow as large as a pigeon egg are found in the pelvic region or in the upper thorax and head region. In Yemen and northern Sudan a type of onchocerciasis called sowda, with infection localized in one leg, is the most common form.

In 1974 the World Health Organization undertook the eradication of the black fly in West Africa, but, considering the lifespan of *Onchocerca* and the distance that certain species of black fly can travel (up to 400 miles [640 km] in one day), the success of the program would not be certain for many years to come.

Until 1987, treatment was generally with diethylcarbamazine, which can remove microfilariae from the skin, or with suramin, a potent and dangerous drug that affects both the adult worm and the microfilariae. In 1987, however, the World Health Organization began to distribute a drug known as ivermectin, originally developed in the 1970s for use against livestock parasites. Though it does not kill the adult parasite, it eliminates the microfilariae and is surprisingly safe and effective.

Oncidium, genus of some 450 species of tropical and subtropical American orchids, family Orchidaceae, that vary greatly in size and shape. Most species grow on other plants and have flowers that range in width from 6 mm (about 0.25 inch) to more than 10 cm (about 4 inches). The flowers of many species are borne on spikes or in long sprays; they are often yellow or brown.

Butterfly orchid (*Oncidium kramerianum*)

Walter Chandoha

The butterfly orchids, *Oncidium papilio* and *O. kramerianum,* have one petal and two sepals modified into long, thin extensions. Other species are known variously as bee orchid, tiger orchid, mule-ear orchid, and dancing ladies because of their appearance.

oncogene, genetic material that carries the ability to induce cancer. An oncogene is a sequence of deoxyribonucleic acid (DNA) that has been altered or mutated from its original form, the proto-oncogene. Operating as a positive growth regulator, the proto-oncogene is involved in promoting the differentiation and proliferation of normal cells. A variety of proto-oncogenes are involved in different crucial steps of cell growth, and a change in the proto-oncogene's sequence or in the amount of protein it produces can interfere with its normal role in cellular regulation. Uncontrolled cell growth, or neoplastic transformation, can ensue, ultimately resulting in the formation of a cancerous tumour.

Oncogenes first were discovered in certain retroviruses (viruses composed of RNA instead of DNA and that contain reverse transcriptase) and were identified as cancer-causing agents in many animals. The search for retroviral oncogenes in humans led to the discovery of the cellular counterparts of retroviral oncogenes, the proto-oncogenes.

With DNA sequences similar, but not identical, to their viral equivalents, proto-oncogenes occur naturally within the genomes of a wide variety of vertebrate species, including humans, but do not cause cellular transformation. Although a useful function of the proto-oncogene was not initially apparent, and it was believed to be "silent" or not expressed until being "switched on" to cause uncontrolled growth, its importance in cell regulation was soon identified.

The similarity between viral and cellular oncogenes can be explained by the life strategy of the retrovirus. The virus inserts itself into the genome of the host cell in order to replicate and then removes itself to infect other cells, sometimes capturing a portion of the host cell's genome along with its own. If a proto-oncogene has been integrated, its proper regulation may not be possible given the limited genetic repertoire of the retrovirus and it is transformed into an oncogene.

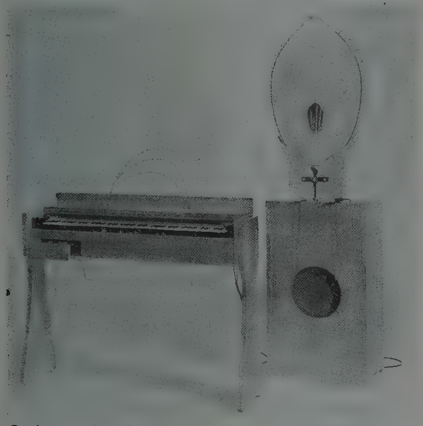
The term "proto-oncogene" was coined to distinguish the normal gene from its altered form. The resulting nomenclature is somewhat misleading. "Onco-," from the Greek *onkos,* meaning bulk, or mass, refers to the tumour-causing ability of the oncogene, which is apt, but the term "proto-oncogene" stresses the potential the gene has to become a malignant force, rather than its integral role as a regulator of cell activity.

Oncogenes are designated by three-letter abbreviations, such as *myc, ras,* and *mas.* The origin or location of the gene is indicated by the prefix of "v-" for virus or "c-" for cell or chromosome; additional prefixes, suffixes, and superscripts provide further delineation. About 60 human oncogenes have been identified. Breast cancer has been linked to the c-*neu* oncogene, and lung cancer to the c-L-*myc* gene. Oncogenes arising in members of the *ras* gene family are found in 20 percent of all human cancers, including lung, colon, and pancreatic.

In humans, proto-oncogenes can be transformed into oncogenes in three ways, all of which result in a loss of or reduction in cell regulation. An alteration of a single nucleotide base pair, called a point mutation, can arise spontaneously or as a result of environmental influences such as chemical carcinogens or ultraviolet radiation. This seemingly minor event can lead to the production of an altered protein that cannot be properly regulated. Point mutations are responsible for converting certain c-*ras* proto-oncogenes to oncogenes. A second method of oncogenesis occurs by the process of translocation, in which a segment of the chromosome breaks off and attaches to another chromosome. If the dislocated chromosome contains a proto-oncogene, it may be removed from its regulatory controls and be continuously produced. Too many protein molecules can swamp the cellular process normally under their control, disrupting the delicate balance of the mechanisms of cell growth. Many leukemias and lymphomas are caused by translocations of proto-oncogenes. The third method of transformation involves an amplification in the number of copies of the proto-oncogene, which also can result in overproduction of the protein and its concomitant effects. Amplified proto-oncogenes have been found in tumours from patients with breast cancer and neuroblastoma.

ondes martenot, also called ONDES MUSICALES (French: "musical waves"), electronic musical instrument demonstrated in 1928 in France by the inventor Maurice Martenot. Oscillating radio tubes produce electric pulses at two supersonic sound-wave frequencies. They in turn produce a lower frequency within audible range that is equal to the difference in their rates of vibration and that is amplified and converted into sound by a loudspeaker. Many timbres, or tone colours, can be created by filtering out upper harmonics, or component tones, of the audible notes.

In the earliest version, the player's hand approaching or moving away from a wire varied one of the high frequencies, thus changing the lower frequency and altering the pitch. Later, a wire was stretched across a model keyboard; the player touched the wire to vary the frequency. In another version the frequency changes are controlled from a functioning keyboard. Works for the ondes martenot include those by the French-born Swiss composer Arthur Honegger, the French composer Darius Milhaud, and the American composer Samuel Barber.


Ondes martenot
Photo Lauros

Ondo, state, western Nigeria. It was created out of former Ondo province of former Western state in 1976. It is bounded by the states of Kwara and Kogi on the north, Edo on the east, Delta on the southeast, and Osun and Ogun on the west and by the Bight of Benin of the Atlantic Ocean on the south. Ondo state includes mangrove-swamp forest near the Bight of Benin, tropical rain forest in the centre part, and wooded savanna on the gentle slopes of the Yoruba Hills in the north.

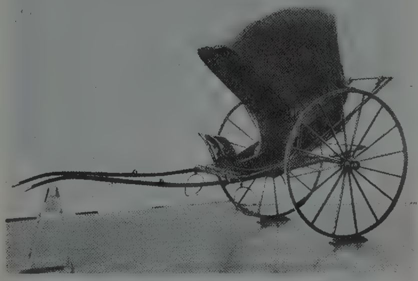
Agriculture is the mainstay of the economy, and the chief products are cotton and tobacco from the north, cocoa from the central part, and rubber and timber (teak and hardwoods) from the south and east; palm oil and kernels are cultivated for export throughout the state. Ondo is Nigeria's chief cocoa-producing state. Other crops include rice, yams, corn (maize), coffee, taro, cassava, vegetables, and fruits. Traditional industries include pottery making, cloth weaving, tailoring, carpentry, and blacksmithing. Mineral deposits include kaolin, pyrites, iron ore, petroleum, and coal. There is a textile mill located at Ado-Ekiti and a palm-oil processing plant at Okitipupa.

The state, primarily inhabited by the Yoruba, has a high proportion of urban dwellers. Akure, the state capital, is rapidly developing into a commercial and industrial centre and is the site of a federal university of technology. The Ikogosi hot spring and the historic Idanre Hills are places of interest. The main highway from Benin City to Lagos crosses the southern part of the state. Area 8,092 square miles (20,959 square km). Pop. (1991) 3,884,485.

one-a-cat (game): *see* tip-cat.

one-armed bandit: *see* slot machine.

one-horse shay, also called CHEER (for chair), or WHISKY (because its light weight enabled it to whisk about), open two-wheeled vehicle that was the American adaptation of the French chaise. Its chairlike body, seating the passengers on one seat above the axle, was hung by leather braces from a pair of square wooden springs attached to the shafts.


One-horse shay, about 1870; in the Henry Ford Museum, Dearborn, Mich.
From the collections of Henry Ford Museum & Greenfield Village

Early one-horse shays had fixed standing tops, later ones folding tops. Oliver Wendell Holmes's poem "The Deacon's Masterpiece," a satire on Calvinism, paints a whimsical picture of a "one-hoss" shay that was so perfectly built that it lasted for 100 years and then fell apart all at once.

One Thousand Guineas, one of the five English Classic horse races, run over a straight mile (1.6 km) on the Rowley Mile course at the Newmarket (Suffolk) spring meeting. The race was first run in 1814. It is for three-year-old fillies and is run on the Friday following the Wednesday running of the Two Thousand Guineas, which is open to three-year-old colts and fillies. The most remarkable One Thousand Guineas winner was Scepter in 1902, the winner also of the Two Thousand Guineas, the Oaks, and the Saint Leger, running fourth in the Derby.

Onega, Lake, Russian ONEZHSKOYE, or ONEZHSKOE, OZERO, second largest lake in Europe, situated in the northwest part of the European portion of Russia, between Lake Ladoga and the White Sea. It covers an area of 3,753 square miles (9,720 square km). It is 154 miles (248 km) long; its greatest width is 50 miles (80 km); and its greatest depth is about 380 feet (116 m).

The hollow of the lake was formed by movements of the Earth's crust, but Quaternary glaciers (the Quaternary Period is from 1.6 million years ago to the present) elongated it from northwest to southeast. The shores to the north and northwest are high and rocky, built of layered granite and covered with forest. There are deep bays at Petrozavodsk, Kondopoga, and Povenots. The southern shores are narrow, sandy, and often marshy or flooded. Onega has about 1,650 islands covering a total of approximately 100 square miles (260 square km), mostly in the northern and northwestern bays.

Fifty rivers enter Onega, the largest being the Shuya and Suna in the northwest and the Vodla in the east. In the southeast and east are the Andoma, Vytegra, and Megra rivers. Lake Onega itself empties into the Svir River. The water level reaches its highest point in the summer and its lowest in March–April, varying about 24 inches (60 cm) annually. The water circulates in a twisting pattern within the lake because of differences of temperature between the coastal and the open regions. During autumn gales, waves sometimes reach 14 or 15 feet (about 4.5 m).

The region has a cold climate. The coastal parts of the lake and the small bays begin to freeze at the end of November, and the deeper central parts in the middle of January, although in some years the central parts do not freeze. Thawing begins at the end of April.

The colour of Onega's water is dark yellowish brown in the open part and grayish brown along the shores. The lake contains more than 40 species of fish, including ryapushka (a small member of the salmon family), smelt, burbot (a freshwater variant of the cod), bream, pike, perch, roach, and salmon. The fish are of considerable economic value.

Lake Onega is connected with the Baltic and White seas by the White Sea–Baltic Canal and with the basin of the Volga River by the Volga-Baltic Waterway, which enable it to play an important part in both internal and international transportation. Goods are shipped over this route from Finland, Sweden, Denmark, and Germany to points in the east and north. For protection against storms, a bypass canal has been dug along the south and southeastern shores from the mouth of the Vytegra River to the source of the Svir. The cities of Petrozavodsk, Kondopoga, and Medvezhyegorsk are on Lake Onega. The island of Kizhi houses the internationally known architectural organization of that name.

Oneida, Iroquoian-speaking North American Indian tribe of what is now central New York state and one of the original five nations of the Iroquois League (*q.v.*). Like the other Iroquois tribes, the Oneida were semi-sedentary and practiced corn (maize) agriculture. Longhouses sheltered families related through maternal descent. They were divided into three clans, each having three representatives in the confederation. Each community also had a local council that guided the chief, or chiefs. The least populous of the confederates, the Oneida during the 17th century had only one palisaded town of 60 to 100 longhouses; the town was destroyed by a French-Canadian expedition in 1696. Thereafter the community divided into Oneida (Upper Castle) and Canawaroghere. In the early 18th century a village of North Carolina Tuscarora joined the Oneida, becoming the sixth nation of the Iroquois League, and former Oneida enemies in the Carolinas became the targets of war parties for a generation.

The Oneida supported the colonist cause in the American Revolution and consequently felt the depredations of the pro-British Iroquois under the Mohawk chief Joseph Brant. They retired within American lines, where they served as scouts. Returning to their homes after the war, they took in remnants of the Mohegan and were compensated by the U.S. government for their losses. In the following years the Oneida divided into factions resulting from disagreements over Quaker missions, their traditional religion, and the sale of lands. By 1833 those who had not settled at Oneida on the Thames River, Ontario, emigrated to Green Bay, Wis.; a few families remained at Oneida and Onondaga, N.Y. Oneida descendants were estimated to number 3,000 in the late 20th century, with major concentrations in Canada, Wisconsin, and central New York state.

Oneida, city, Madison county, central New York, U.S., on Oneida Creek, 6 miles (10 km) southeast of Oneida Lake and 26 miles (42 km) east of Syracuse. Founded in 1834 by Sands Higinbotham and named for a local Indian tribe, it developed as a depot and supply point for the Utica and Syracuse (later New York Central) Railroad. Growth was influenced by the Oneida Community, an experiment in communal living founded in 1848 by John Noyes; in 1881 it was reorganized as a stock company that produced leading lines of silverware (still a major industry). Oneida Limited, which retains some cooperative features, has large factories at Oneida and nearby Sherrill. Local manufactures also include wood products, burial vaults, and dairy equipment. Colgate University (founded 1819) is in Hamilton, 18 mi (30 km) south of the city. Inc. village, 1848; city, 1901. Pop. (1990) 10,850.

Oneida Community, also called PERFECTIONISTS, or BIBLE COMMUNISTS, utopian religious community that developed out of a Society of Inquiry established by John Humphrey Noyes and some of his disciples in Putney, Vt., U.S., in 1841. As new recruits arrived, the society turned into a socialized community.

Noyes had experienced a religious conversion during a revival in 1831, when he was 20 years old. He then gave up law studies and attended Andover Theological Seminary and Yale Divinity School. His acceptance and preaching of the doctrine of perfectionism, the idea that after conversion one was free of all sin, was considered too unorthodox, and he was denied ordination. He also became convinced that the Second Coming of Christ was not an event of the future but had already occurred within a generation of Christ's ministry on Earth. But it was Noyes's ideas concerning sexual union that made him notorious. He considered sexual union very important but rejected monogamy and the idea that one man and one woman should become closely attached to each other. The application of his views led to the practice of complex marriage in his community, in which every woman was the wife of every man and every man was the husband of every woman. Noyes also believed that Socialism without religion was impossible and that the extended family system devised by him could dissolve selfishness and demonstrate the practicality of perfectionism on Earth.

In 1847, at a time when revivalist belief in a new coming of Christ was at its height, Noyes proclaimed that the Spirit of Christ had earlier returned to Earth and had now entered into his group at Putney. This proclamation, together with the practice of complex marriage, aroused the hostility of the surrounding community, and the group left Putney to found a new community at Oneida, N.Y.

For the next 30 years Oneida flourished. The community, which in the early years numbered about 200 persons, earned a precarious existence by farming and logging before the arrival of a new member who gave the community a steel trap that he had invented. Manufacture and sale of Oneida traps, which were considered the best in the land, became the basis of a thriving group of industrial enterprises that included silverware, embroidered silks, and canned fruit.

The community was organized into 48 departments that carried on the various activities of the settlement, and these activities were supervised by 21 committees. The women worked along with the men; for practical reasons they cut their hair short and wore trousers or short-skirted tunics. Though marriage was complex, the Perfectionists denied the charge of free love. Sexual relations were strictly regulated, and the propagation of children was a matter of community control. Those who were to produce children were carefully chosen and paired. Children remained with their mother until they could walk but were then placed in a common nursery.

The central feature of the community was the custom of holding criticism sessions, or cures, a practice that Noyes had discovered in his seminary days at Andover. They were attended by the entire community at first and, later, as the community grew, were conducted before committees presided over by Noyes. For those subjected to criticism it was a nerve-racking ordeal, yet the sessions probably had some therapeutic value as a means of releasing feelings of guilt and aggression. The criticism sessions were also a shaming technique that enforced social control and were a highly successful device for promoting community cohesion.

Hostility mounted in the surrounding communities to the Perfectionists' marriage arrangements, and in 1879 Noyes advised the group to abandon the system. As the reorganization of the community began, the entire Socialist organization of property in Oneida also was questioned. Noyes and a few adherents went to Canada, where he died in 1886. The remaining members set up a joint stock company, known as Oneida Community, Ltd. which carried on the various industries, particularly the manufacture of silver plate, as a commercial enterprise.

Consult the INDEX *first*

O'Neill, Conn, Conn also spelled CON: *see* Tyrone, Conn O'Neill, 1st earl of.

O'Neill, Daniel (b. *c.* 1612—d. Oct. 24, 1664), Irish supporter of Charles I and Charles II during the English Civil Wars.

A member of the Clanaboy branch of the O'Neill family, he married a sister of the celebrated Owen Roe O'Neill. He spent much of his early life at the court of Charles I and became a Protestant. He commanded a troop of horse in Scotland in 1639; he was involved in army plots in 1641, for which he was committed to the Tower of London, but he escaped abroad. On the outbreak of the Civil War he returned to England and served with Prince Rupert, being present at the Battle of Marston Moor, the second Battle of Newbury, and the Battle of Naseby. He then went to Ireland to negotiate between Ormonde and Owen Roe O'Neill. He was made a major general in 1649 and, but for his Protestantism, would have succeeded Owen Roe as chief of the O'Neills. He joined Charles II at The Hague and took part in the expedition to Scotland and the Scotch invasion of England in 1652. At the Restoration he received many marks of favour from the King, including grants of land and lucrative monopolies.

O'Neill, Eugene (Gladstone) (b. Oct. 16, 1888, New York City—d. Nov. 27, 1953, Boston), foremost U.S. dramatist and winner of the Nobel Prize for Literature in 1936. His masterpiece, *Long Day's Journey into Night* (produced posthumously 1956), is at the apex of a long string of great plays, including *Beyond the Horizon* (1920), *Anna Christie* (1922), *Strange Interlude* (1928), *Ah! Wilderness* (1933), and *The Iceman Cometh* (1946).

Early life. O'Neill was born into the theatre. His father, James O'Neill, was a successful touring actor in the last quarter of the 19th century whose most famous role was that of the Count of Monte Cristo in a stage adaptation of the Alexandre Dumas *père* novel. His mother, Ella, accompanied her husband back and forth across the country, settling down only briefly for the birth of her first son, James, Jr., and of Eugene.

Eugene O'Neill

By courtesy of the Collection of American Literature, Yale University Library

Eugene, who was born in a hotel, spent his early childhood in hotel rooms, on trains, and backstage. Although he later deplored the nightmare insecurity of his early years and blamed his father for the difficult, rough-and-tumble life the family led—a life that resulted in his mother's drug addiction—Eugene had the theatre in his blood. He was also, as a child, steeped in the peasant Irish Catholicism of his father and the more genteel, mystical piety of his mother, two influences, often in dramatic conflict, which account for the high sense of drama and the struggle with God and religion that distinguish O'Neill's plays.

O'Neill was educated at boarding schools—Mt. St. Vincent in the Bronx and Betts Academy in Stamford, Conn. His summers were spent at the family's only permanent home, a modest house overlooking the Thames River in New London, Conn. He attended Princeton University for one year (1906–07), after which he left school to begin what he later regarded as his real education in "life experience." The next six years very nearly ended his life. He shipped to sea, lived a derelict's existence on the waterfronts of Buenos Aires, Liverpool, and New York City, submerged himself in alcohol, and attempted suicide. Recovering briefly at the age of 24, he held a job for a few months as a reporter and contributor to the poetry column of the *New London Telegraph* but soon came down with tuberculosis. Confined to the Gaylord Farm Sanitarium in Wallingford, Conn., for six months (1912–13), he confronted himself soberly and nakedly for the first time and seized the chance for what he later called his "rebirth." He began to write plays.

Entry into theatre. O'Neill's first efforts were awkward melodramas, but they were about people and subjects—prostitutes, derelicts, lonely sailors, God's injustice to man—that had, up to that time, been in the province of serious novels and were not considered fit subjects for presentation on the American stage. A theatre critic persuaded his father to send him to Harvard to study with George Pierce Baker in his famous playwriting course. Although what O'Neill produced during that year (1914–15) owed little to Baker's academic instruction, the chance to work steadily at writing set him firmly on his chosen path.

O'Neill's first appearance as a playwright came in the summer of 1916, in the quiet fishing village of Provincetown, Mass., where a group of young writers and painters had launched an experimental theatre. In their tiny, ramshackle playhouse on a wharf, they produced his one-act sea play *Bound East for Cardiff.* The talent inherent in the play was immediately evident to the group, which that fall formed the Playwrights' Theater in Greenwich Village. Their first bill, on Nov. 3, 1916, included *Bound East for Cardiff*—O'Neill's New York debut. Although he was only one of several writers whose plays were produced by the Playwrights' Theater, his contribution within the next few years made the group's reputation. Between 1916 and 1920, the group produced all of O'Neill's one-act sea plays, along with a number of his lesser efforts. By the time his first full-length play, *Beyond the Horizon,* was produced on Broadway, Feb. 2, 1920, at the Morosco Theater, the young playwright already had a small reputation.

Beyond the Horizon impressed the critics with its tragic realism, won for O'Neill the first of four Pulitzer prizes in drama—others were for *Anna Christie*, *Strange Interlude*, and *Long Day's Journey into Night*—and brought him to the attention of a wider theatre public. For the next 20 years his reputation grew steadily, both in the United States and abroad; after Shakespeare and Shaw, O'Neill became the most widely translated and produced dramatist.

Period of the major works. O'Neill's capacity for and commitment to work were staggering. Between 1920 and 1943 he completed 20 long plays—several of them double and triple length—and a number of shorter ones. He wrote and rewrote many of his manuscripts half a dozen times before he was satisfied, and he filled shelves of notebooks with research notes, outlines, play ideas, and other memoranda. His most-distinguished short plays include the four early sea plays, *Bound East for Cardiff, In the Zone, The Long Voyage Home,* and *The Moon of the Caribbees,* which were written between 1913 and 1917 and produced in 1924 under the overall title *S.S. Glencairn*; *The Emperor Jones* (about the disintegration of a Pullman porter turned tropical-island dictator); and *The Hairy Ape* (about the disintegration of a displaced steamship coal stoker).

O'Neill's plays were written from an intensely personal point of view, deriving directly from the scarring effects of his family's tragic relationships—his mother and father, who loved and tormented each other; his older brother, who loved and corrupted him and died of alcoholism in middle age; and O'Neill himself, caught and torn between love for and rage at all three.

Among his most-celebrated long plays is *Anna Christie,* perhaps the classic American example of the ancient "harlot with a heart of gold" theme; it became an instant popular success. O'Neill's serious, almost solemn treatment of the struggle of a poor Swedish-American girl to live down her early, enforced life of prostitution and to find happiness with a likable but unimaginative young sailor is his least-complicated tragedy. He himself disliked it from the moment he finished it, for, in his words, it had been "too easy."

The first full-length play in which O'Neill successfully evoked the starkness and inevitability of Greek tragedy that he felt in his own life was *Desire Under the Elms.* Drawing on Greek themes of incest, infanticide, and fateful retribution, he framed his story in the context of his own family's conflicts. This story of a lustful father, a weak son, and an adulterous wife who murders her infant son was told with a fine disregard for the conventions of the contemporary Broadway theatre. Because of the sparseness of its style, its avoidance of melodrama, and its total honesty of emotion, the play was acclaimed immediately as a powerful tragedy and has continued to rank among the great American plays of the 20th century.

In *The Great God Brown,* O'Neill dealt with a major theme that he expressed more effectively in later plays—the conflict between idealism and materialism. Although the play was too metaphysically intricate to be staged successfully in 1926, it was significant for its symbolic use of masks and for the experimentation with expressionistic dialogue and action—devices that since have become commonly accepted both on the stage and in motion pictures. In spite of its confusing structure, the play is rich in symbolism and poetry, as well as in daring technique, and it became a forerunner of avant-garde movements in American theatre.

O'Neill's innovative writing continued with *Strange Interlude.* This play was revolutionary in style and length: when first produced, it opened in late afternoon, broke for a dinner intermission, and ended at the conventional hour. Techniques new to the modern theatre included spoken asides or soliloquies to express the characters' hidden thoughts. The play is the saga of Everywoman, who ritualistically acts out her roles as daughter, wife, mistress, mother, and platonic friend. Although it was innovative and startling in 1928, its obvious Freudian overtones have rapidly dated the work.

One of O'Neill's enduring masterpieces, *Mourning Becomes Electra,* represents the playwright's most complete use of Greek forms, themes, and characters. Based on the *Oresteia* trilogy by Aeschylus, it was itself three plays in one. To give the story contemporary credibility, O'Neill set the play in the New England of the Civil War period, yet he retained the forms and the conflicts of the Greek characters: the heroic leader returning from war; his adulterous wife, who murders him; his jealous, repressed daughter who avenges him through the murder of her mother; and his weak, incestuous son who is goaded by his sister first to matricide and then to suicide.

Following a long succession of tragic visions, O'Neill's only comedy, *Ah, Wilderness!,* appeared on Broadway in 1933. Written in a lighthearted, nostalgic mood, the work was inspired in part by the playwright's mischievous desire to demonstrate that he could portray the comic as well as the tragic side of life. Significantly, the play is set in the same place and period, a small New England town in the early 1900s, as his later tragic masterpiece, *Long Day's Journey into Night.* Dealing with the growing pains of a sensitive, adolescent boy, *Ah, Wilderness!* was characterized by O'Neill as "the other side of the coin," meaning that it represented his fantasy of what his own youth might have been, rather than what he believed it to have been (as dramatized later in *Long Day's Journey into Night*).

The Iceman Cometh, the most complex and perhaps the finest of the O'Neill tragedies, followed in 1939, although it did not appear on Broadway until 1946. Laced with subtle religious symbolism, the play is a study of man's need to cling to his hope for a better life, even if he must delude himself to do so.

Even in his last writings, O'Neill's youth continued to absorb his attention. The posthumous production of *Long Day's Journey into Night* brought to light an agonizingly autobiographical play, one of O'Neill's greatest. It is straightforward in style but shattering in its depiction of the agonized relations between father, mother, and two sons. Spanning one day in the life of a family, the play strips away layer after layer from each of the four central figures, revealing the mother as a defeated drug addict, the father as a man frustrated in his career and failed as a husband and father, the older son as a bitter alcoholic, and the younger son as a tubercular, disillusioned youth with only the slenderest chance for physical and spiritual survival.

O'Neill's tragic view of life was perpetuated in his relationships with the three women he married—two of whom he divorced—and with his three children. His elder son, Eugene O'Neill, Jr. (by his first wife, Kathleen Jenkins), committed suicide at 40, while his younger son, Shane (by his second wife, Agnes Boulton), drifted into a life of emotional instability. His daughter, Oona (also by Agnes Boulton), was cut out of his life when, at 18, she infuriated him by marrying Charlie Chaplin, who was O'Neill's age.

Until some years after his death in 1953, O'Neill, although respected in the United States, was more highly regarded abroad. Sweden, in particular, always held him in high esteem, partly because of his publicly acknowledged debt to the influence of the Swedish playwright August Strindberg, whose tragic themes often echo in O'Neill's plays. In 1936 the Swedish Academy gave O'Neill the Nobel Prize for Literature, the first time the award had been conferred on an American playwright.

O'Neill's most ambitious project for the theatre was one that he never completed. In the late 1930s he conceived of a cycle of 11 plays, to be performed on 11 consecutive nights, tracing the lives of an American family from the early 1800s to modern times. He wrote scenarios and outlines for several of the plays and drafts of others but completed only one in the cycle—*A Touch of the Poet*—before a crippling illness ended his ability to hold a pencil. An unfinished rough draft of another of the cycle plays, *More Stately Mansions,* was published in 1964 and produced three years later on Broadway, in spite of written instructions left by O'Neill that the incomplete manuscript be destroyed after his death.

O'Neill's final years were spent in grim frustration. Unable to work, he longed for his death and sat waiting for it in a Boston hotel, seeing no one except his doctor, a nurse, and his third wife, Carlotta Monterey. O'Neill died as broken and tragic a figure as any he had created for the stage.

Assessment. O'Neill was the first American dramatist to regard the stage as a literary medium and the only American playwright ever to receive the Nobel Prize for Literature. Through his efforts, the American theatre grew up during the 1920s, developing into a cultural medium that could take its place with the best in American fiction, painting, and music. Until his *Beyond the Horizon* was produced, in 1920, Broadway theatrical fare, apart from musicals and an occasional European import of quality, had consisted largely of contrived melodrama and farce. O'Neill saw the theatre as a valid forum for the presentation of serious ideas. Imbued with the tragic sense of life, he aimed for a contemporary drama that had its roots in the most powerful of ancient Greek tragedies—a drama that could rise to the emotional heights of Shakespeare. For more than 20 years, both with such masterpieces as *Desire Under the Elms, Mourning Becomes Electra,* and *The Iceman Cometh* and by his inspiration to other serious dramatists, O'Neill set the pace for the blossoming of the Broadway theatre. (B.Ge./A.Ge.)

MAJOR WORKS. *One-act plays of the sea. Bound East for Cardiff* (performed 1916); *The Long Voyage Home* (performed 1917), later used as the title of a film version of O'Neill's plays of the sea; *Ile* (performed 1917); *In the Zone* (performed 1917); *The Moon of the Caribbees* (performed 1918), published in a collection, *The Moon of the Caribbees, and Six Other Plays of the Sea* (1919), which included the first book publication of the above plays plus *The Rope* (performed 1918), and *Where the Cross Is Made* (performed 1918). This same collection was published in 1940 as *The Long Voyage Home: Seven Plays of the Sea.*

Longer plays. Beyond the Horizon (performed and published 1920); *The Emperor Jones* (performed 1920, published 1921); *Anna Christie* (performed 1921, published 1922); *The Hairy Ape* (1922); *All God's Chillun Got Wings* (1924); *Desire Under the Elms* (performed 1924, published 1925); *The Great God Brown* (1926); *Marco Millions* (performed 1928, published 1927); *Strange Interlude* (1928), a two-part play in nine acts; *Mourning Becomes Electra* (1931), a trilogy comprising *Homecoming, The Hunted,* and *The Haunted; Ah, Wilderness!* (1933), O'Neill's only comedy; *The Iceman Cometh* (written 1939, performed and published 1946); *A Touch of the Poet* (written 1935–42; performed and published posthumously, 1957), third of a projected cycle of 11 plays to be collectively entitled *A Tale of the Possessors, Self-Dispossessed; Long Day's Journey into Night* (written 1939–41; performed and published posthumously, 1956); *A Moon for the Misbegotten* (written 1943; performed 1957, published 1952); *Hughie* (written 1941; performed 1964, published 1959, one of a projected cycle of one-act plays, to have been collectively entitled *By Way of Orbit*); *More Stately Mansions* (unfinished, written 1935–41; performed 1962, published 1964).

The handiest source for all the plays is "The Library of America" *Complete Plays,* 3 vol. (1988). Some of the other plays have been published as separate volumes.

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O'Neill, Gerard K., in full GERARD KITCHEN O'NEILL (b. Feb. 6, 1927, Brooklyn, N.Y., U.S.—d. April 27, 1992, Redwood, Calif.), American physicist who invented the colliding-beam storage ring and was a leading advocate of space colonization.

Having studied physics at Swarthmore College in Pennsylvania (A.B., 1950) and at Cornell University in New York state (Ph.D., 1954), O'Neill joined the faculty of Princeton University and soon began experimenting with ways to increase the energy output of particle accelerators. His solution, the colliding-beam storage ring, utilized beams of particles moving through a ring-shaped chamber in opposite directions. With Wolfgang Panofsky of Stanford University in California, he constructed two storage rings at Stanford in 1959, and the technique soon was adopted for numerous high-energy installations.

In the late 1960s O'Neill turned his attention to the feasibility of space colonization. He designed a kilometre-long sealed cylinder, to be built primarily of processed lunar materials and powered by solar energy, capable of sustaining a human colony indefinitely at a point in space between the Earth and the Moon. In his book *The High Frontier* (1978) he suggested that space colonies might be the ultimate solution to such terrestrial problems as pollution, overpopulation, and the energy shortage. At the time of his death he was working on a high-speed vehicle powered by magnetic forces and traveling through a vacuum.

O'Neill, Hugh: *see* Tyrone, Hugh O'Neill, 2nd Earl of.

O'Neill, Hugh (d. *c.* 1660, Spain?), Irish general, nephew of the celebrated Owen Roe O'Neill. He was a major Irish commander against the forces of Oliver Cromwell.

In 1646 O'Neill was made a major general of the forces commanded by Owen Roe; and after the death of the latter (1649) he successfully defended Clonmel in 1650 against Cromwell, on whom he inflicted the severest defeat in Ireland. In the following year he so stubbornly resisted Henry Ireton's attack on Limerick that he was excepted from the benefit of the capitulation and, after being condemned to death and reprieved, was sent as a prisoner to the Tower of London. Released in 1652 on the representation of the Spanish ambassador that O'Neill was a Spanish subject, he repaired to Spain, whence he wrote to Charles II in 1660 claiming the earldom of Tyrone. He probably died in Spain, but the date of his death is unknown.

O'Neill, James (b. Nov. 15, 1849, Kilkenny, County Kilkenny, Ire.—d. Aug. 10, 1920, New London, Conn., U.S.), Irish-born American actor, now chiefly remembered for his most famous role, the Count of Monte Cristo, and as the father of playwright Eugene O'Neill.

James O'Neill made his stage debut as a supernumerary in a Cincinnati, Ohio, production of *The Colleen Bawn* (1867). In 1871 he moved to Chicago, playing leading roles in McVicker's company and then in Hooley's opposite many of the day's great stars. He later performed with stock companies in New York City and San Francisco, and he was considered one of the most promising young actors of his time.

In 1879 he was selected to play Christ in a San Francisco production of *The Passion Play* by Salmi Morse. The role, which caused local authorities to arrest him under ordinances forbidding impersonation of the Deity, drew nationwide attention. In 1882 O'Neill opened as Edmond Dantes in *The Count of Monte Cristo* in a stage version by Charles Fechter (1882). His opening-night performance was ill-received by the press, but public enthusiasm was immediate, and the role eventually earned for O'Neill nearly $1,000,000 for more than 6,000 performances throughout the United States over a 30-year period. Dantes was not O'Neill's sole success, however; he was well received in a variety of Shakespearean roles, including that of Hamlet. He played Othello to Edwin Booth's Iago and MacDuff to Booth's Macbeth. O'Neill also excelled as Pierre Frochard in *The Two Orphans,* D'Artagnan in *The Three Musketeers,* and Jean Renard in *A Celebrated Case.* In his later career O'Neill attempted other roles, both modern and classical, but his public preferred to see him in *The Count of Monte Cristo.* An acerbic portrait of O'Neill in decline is presented in his son's semiautobiographical play *Long Day's Journey into Night* in the character of James Tyrone.

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O'Neill, John (b. March 8, 1834, County Monaghan, Ire.—d. Jan. 7, 1878, Omaha, Neb., U.S.), Irish-born military leader of the American branch of the Fenians, an Irish nationalist secret society.

O'Neill immigrated to the United States at the age of 14 to join his mother and older siblings at their home in Elizabeth, N.J. He attended school for a year and then held a number of jobs. After serving as a Union cavalry officer during the American Civil War, O'Neill—disappointed in his failure to be promoted—resigned from the army. He settled in Tennessee, where he was working as a claims agent when he became interested in the Fenian scheme of capturing Canada and holding it hostage in order to secure Irish freedom from Great Britain.

O'Neill gathered troops from his area and in 1866 led a Nashville detachment to Buffalo in preparation for the assault on Canada. With 600 men he crossed the Niagara River and took the Canadian village of Fort Erie. Before British troops could retaliate, O'Neill's force defeated a group of Canadian militiamen at the Battle of Limestone Ridge and fled back to the United States. There he was arrested for violating the neutrality laws, but the charges were dropped.

By 1867 O'Neill was one of the top Fenian leaders. For years he threatened to attack Canada once again, and he finally did so on May 25, 1870. But when the Canadians repulsed his raid along the Vermont border, O'Neill's troops fled, and he was arrested by a U.S. marshall. Convicted and sentenced to two years in prison, O'Neill served only three months before being pardoned by President Ulysses S. Grant.

O'Neill promised that he would not again attack Canada, but then—without the support of the main Fenian organization—he launched a raid on Manitoba on October 5, 1871. After capturing a Hudson's Bay post, he was taken into custody by U.S. troops. He won a quick release from the courts. Finished now with the Fenians, O'Neill took a job attracting Irish immigrants to settle a tract of land in Nebraska.

O'Neill, Owen Roe (b. *c.* 1590—d. Nov. 6, 1649), Irish rebel commander during a major Roman Catholic revolt (1641–52) against English rule in Ireland. His victory at Benburb, Ulster, on June 5, 1646, was one of the few significant rebel triumphs of the war.

A nephew of the renowned Irish chieftain Hugh O'Neill, 2nd Earl of Tyrone (d. 1616), Owen Roe served with distinction for about 30 years in the Spanish army before returning to Ireland in late July 1642, nine months after the outbreak of the insurrection. He immediately replaced Sir Phelim O'Neill as commander in the north, but he soon came into conflict with the other leaders of the Catholic confederacy. O'Neill advocated the independence of Ireland from England though retaining nominal loyalty to the English sovereign, whereas his colleagues favoured a settlement providing for religious liberty and an Irish constitution under the English crown. After routing the army of England's Scottish ally, General Hector Munro, at Benburb, O'Neill helped the papal nuncio, Giovanni Battista Rinuccini, force the confederacy to rescind a peace that it had concluded with the English. Nevertheless, O'Neill and the other members of the Roman Catholic faction eventually had to ally with the English Anglican Royalists against the English Independent Parliamentarians.

He died three months after the Parliamentarian general Oliver Cromwell arrived in Ireland. By 1652 Cromwell's commanders had completely subjugated the country.

O'Neill, Sir Phelim (b. *c.* 1604—d. 1653), Irish Roman Catholic rebel who initiated a major revolt (1641–52) against English rule in Ireland.

Elected a member of the Irish Parliament in 1641, O'Neill appeared to be a supporter of King Charles I. Nevertheless, on Oct. 22, 1641, he seized the strategically important Charlemont Castle, Ulster, and then created confusion by claiming that Charles had authorized this act. O'Neill's followers proceeded to massacre hundreds of England's colonists in Ulster, but after besieging Drogheda, County Louth, for several months they were compelled to withdraw (April 1642). This and other failures caused Phelim to lose his command to his kinsman and rival, Owen Roe O'Neill.

After Owen Roe's death in 1649, Phelim sought unsuccessfully to regain his former position, and he continued to fight bravely until the final defeat of the rebel cause in 1652. The next year he was tried by the English for treason and executed.

O'Neill, Shane, byname SHANE THE PROUD, Irish SHANE AN-DIOMAIS (b. *c.* 1530—d. June 2, 1567, near Cushendun, County Antrim, Ire.), Irish patriot, among the most famous of all the O'Neills.

Shane, the eldest legitimate son of Conn O'Neill, was a chieftain whose support the English considered worth gaining; but he rejected overtures from the Earl of Sussex, the lord deputy, and refused to help the English against the Scottish settlers on the coast of Antrim. He allied himself instead with the MacDonnells, the most powerful of these immigrants. Nevertheless, Queen Elizabeth I of England was disposed to come to terms with Shane, who after his father's death was de facto chief of the O'Neill clan. She recognized his claims to the chieftainship, thus throwing over a kinsman, Brian O'Neill. Shane, however, refused to put himself in the power of Sussex without a guarantee for his safety; and his claims were so exacting that Elizabeth determined to restore Brian. An attempt to incite the O'Donnells against him, however, was frustrated.

Elizabeth, who was not prepared to undertake the subjugation of the Irish chieftain, urgently desired peace with him, especially when the devastation of his territory by Sussex brought him no nearer to submission. Sussex was not supported by the queen, who sent the Earl of Kildare to arrange terms with Shane. The latter agreed to present himself before Elizabeth. Accompanied by Ormonde and Kildare he reached London on Jan. 4, 1562. Elizabeth temporized; but finding that Shane was in danger of becoming a tool in the hands of Spanish intriguers, she permitted him to return to Ireland, recognizing him as "the O'Neill," and chieftain of Tyrone.

There were at this time three powerful contemporary members of the O'Neill family in Ireland—Shane, Turlough, and Hugh, 2nd Earl of Tyrone. Turlough had schemed to supplant Shane during Shane's absence in London. The feud did not long survive Shane's return to Ireland, where he reestablished his authority and renewed his turbulent tribal warfare. Elizabeth at last authorized Sussex to take the field against Shane, but two expeditions failed. Shane then laid the whole blame for his lawless conduct on the lord deputy's repeated alleged attempts on his life. Elizabeth consented to negotiate, and practically all Shane's demands were conceded.

Shane then turned his hand against the MacDonnells, claiming that he was serving the Queen of England in harrying the Scots. He fought an indecisive battle with Sorley Boy MacDonnell near Coleraine in 1564, and in 1565 he routed the MacDonnells and took Sorley Boy prisoner near Ballycastle. This victory strengthened Shane O'Neill's position, but the English made preparations for his subjugation. The English invaded Donegal and restored O'Donnell. O'Neill was routed by the O'Donnells at Letterkenny; and seeking safety in flight, he threw himself on the mercy of his enemies, the MacDonnells. Attended by a small body of retainers and taking his prisoner Sorley Boy with him, he presented himself among the MacDonnells near Cushendun, on the Antrim coast. There, by premeditated treachery or in a sudden brawl, he was slain by the MacDonnells.

O'Neill, Turlough Luineach: *see* Clanconnell, Turlough Luineach O'Neill, Earl of.

oneiromancy, prophetic divination from dreams, considered a divine act in most ancient cultures and surviving to modern times in certain folk traditions. Oneiromancy is based on the belief that dreams are messages sent to the soul by gods or the dead, most often as warnings. In the highly developed oneiromancy of ancient Greece, Egypt, and Babylonia, the class of diviners or seers responsible for dream interpretation often had great political and social influence. The best-known instance of oneiromancy preserved in ancient literature is the biblical account of Pharaoh's dream of seven fat and seven lean cows, explained by Joseph as foretelling years of plenty to be followed by years of famine.

Oneonta, city, Otsego county, east-central New York, U.S. It lies in the Catskill foothills, on the Susquehanna River, within the town (township) of Oneonta, some 80 miles (129 km) southwest of Albany.

The first European settler was John Vanderwerker (1775), and the community was originally known as McDonald's Mills, or Bridge, and Milfordville. Renamed Oneonta (Iroquoian Indian: "Stony Place") in 1832, it was incorporated as a village in 1848. Railroad shops were built after the arrival of the Albany and Susquehanna Railroad in 1865. The Brotherhood of Railroad Trainmen originated (1883) in a sidetracked caboose at Oneonta, which became an important rail centre. It was separated from the town and chartered as a city in 1909.

The State University of New York College at Oneonta originated in 1889 as a normal (teachers') school, and Hartwick College was founded there in 1797. Although no longer a railway hub, Oneonta remains a busy distribution point, and its industries include the manufacture of electronic components, plastics, and clothing. Pop. (1992 est.) 14,053.

Oneşti, formerly GHEORGHE GHEORGHIU-DEJ, city, Bacău *judeţ* (county), eastern Romania. The city was developed as a planned new town, begun in 1953 on the site of a 15th-century settlement. It was originally named for the communist leader Gheorghe Gheorghiu-Dej and was renamed Oneşti in the early 1990s. It developed as a consequence of the oil, chemical, and industrial complexes in the Trotuş River valley, which includes the older settlements of Dărmăneşti and Tîrgu Ocna. The city has an oil refinery, and just southeast are chemical and synthetic rubber works and a thermoelectric power station that supplies the city. Pop. (1992 prelim.) 59,008.

Onetti, Juan Carlos (b. July 1, 1909, Montevideo, Uruguay—d. May 30, 1994, Madrid, Spain), Uruguayan novelist and short-story writer whose existential works chronicle the decay of modern urban life. The protagonists of his novels lead unhappy, isolated lives in an absurd and sordid world from which they can escape only through memories, fantasies, or death.

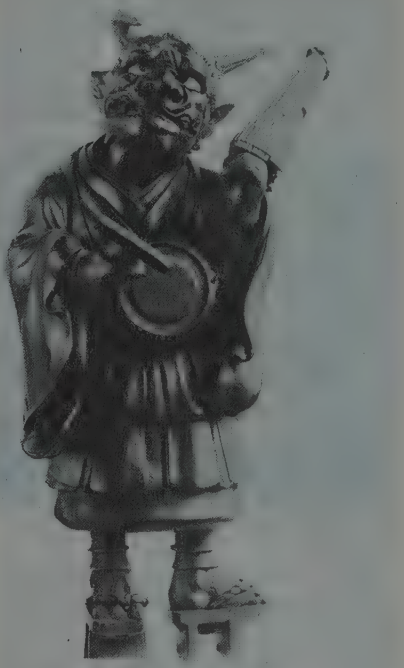
Onetti studied at the university in Buenos Aires and held various jobs before he started writing. His first published work, the novella *El pozo* (1939; *The Pit*), treats the aimless life of a man lost within a city where he is unable to communicate with others. The book's complex fusion of reality with fantasy and inner experience make it one of the first distinctively modern Spanish-American novels. In the novel *Tierra de nadie* (1942; "No-man's-land") Onetti again presents a nihilistic view of city life devoid of any spiritual meaning.

Onetti lived in Buenos Aires from 1943 to 1955, working as a journalist. In his best-known novel, *La vida breve* (1950; *A Brief Life*), he creates the mythical city of Santa María, which is also the setting of several subsequent novels. The book's unhappy narrator fantasizes about living as another person but always encounters the same nullity and helplessness that drove him to escape into fantasy in the first place. This book, too, was technically innovative in its interweaving of fictions upon fictions as the main character's personality progressively disintegrates.

Onetti returned to Montevideo in 1955 and two years later was named director of the city's municipal libraries. In his next major novel, *El astillero* (1961; *The Shipyard*), an antihero named Larsen returns to Santa María to try to revive a useless and abandoned shipyard, ending his life in futility and unheroic defeat. The book has been viewed as an ironic allegory reflecting the decay and breakdown of Uruguayan society. The novel *Juntacadáveres* (1964; *Body Snatcher*) deals with Larsen's earlier career as a brothel keeper and his concomitant loss of innocence.

Onetti's collections of short stories include *Un sueño realizado y otros cuentos* (1951; "A Dream Fulfilled and Other Stories") and *El infierno tan temido* (1962; "The Most Feared Hell"). His *Obras completas* ("Complete Works") were published in 1970, and his *Cuentos completos* ("Complete Stories") appeared in 1974.

oni, in Japanese folklore, a type of demonic creature often of giant size, great strength, and fearful appearance. They are generally considered to be foreign in origin, perhaps introduced into Japan from China along with Buddhism. Cruel and malicious, they can, nevertheless, be converted to Buddhism. Though *oni* have been depicted in various ways in Japanese legend and art, sometimes also as women, they are characteristically thought of as pink, red, or blue-grey in colour, with horns, three toes, three fingers, and on occasion with three eyes.



Oni, disguised as a begging monk converted to Buddhism, wood figurine, Tokugawa period (1603–1867); in the Guimet Museum, Paris

By courtesy of the Musee Guimet, Paris

Ōnin War (1467–77), civil war in the central Kyōto region of Japan, that began in the Ōnin period (1467–68) and was a prelude to a prolonged period of domestic strife (1490–1590). It led to the end of the manorial system and hastened the rise of the great territorial magnates, or daimyo.

The war originated in rivalry between Hosokawa Katsumoto, prime minister (1452–64) for the shogun Ashikaga Yoshimasa, and Yamana Mochitoyo, whose family were powerful landowners in the western Honshu region. Yoshimasa's wife gave birth to a son in 1465, the year after the shogun had designated his brother Yoshimi as heir apparent. Yoshimi was allied with Hosokawa, and Yoshimasa's wife turned to Yamana to help her son gain his rightful position. Warfare erupted between the two sides in 1467. The ancient city of Kyōto was severely damaged in the fighting, which soon spread throughout the country, as local clans took sides in hopes of gaining more territory for themselves.

Although the war ended in a stalemate in 1477, the Hosokawa did eventually win control of the government, but fighting in the provinces continued for another 100 years, eroding all pretense of central control over the outlying regions until the unifiers Oda Nobunaga and Toyotomi Hideyoshi established their hegemony in the late 16th century.

onion (species *Allium cepa*), herbaceous biennial plant and its edible bulb. The onion is probably native to southwestern Asia but is now grown throughout the world, chiefly in the temperate zones. The plant belongs to the lily family, Liliaceae, most members of which have an underground storage system, such as a bulb or tuber. Other members of this family include such ornamental plants as the tulip, hyacinth, and lily-of-the-valley and also such edible plants as the leek, garlic, and chive.

The common onion has one or more leafless stalks that reach a height of 0.75–1.8 m (2.5–6 feet) and terminate in a cluster of small greenish white flowers. The leaf bases of the developing plant swell to form the underground bulb that is the mature, edible onion. Most commercially cultivated onions are grown from the plant's small black seed, which is sown directly in the field, but onions may also be grown from small bulbs or from transplants. Onions are among the hardiest of all garden-vegetable plants.

Onion (*Allium cepa*)
Walter Chandoha

Onions are among the world's oldest cultivated plants. They were probably known in India, China, and the Middle East before recorded history. Ancient Egyptians regarded the spherical bulb as a symbol of the universe, and its name is probably derived from the Latin *unus,* meaning "one." The Romans introduced the onion to Britain and, in the New World, American Indians added a highly pungent wild onion to their stews. Curative powers have been attributed to onions throughout the centuries; they have been recommended for such varied ailments as colds, earaches, laryngitis, animal bites, powder burns, and warts.

Onions are used widely in cooking. They add flavour to such dishes as stews, roasts, soups, and salads, and are also served as a cooked vegetable. The onion's characteristic pungency results from the sulfur-rich volatile oil it contains. Release of this oil during peeling brings tears to the eyes, but many cooks claim that tears can be avoided by peeling onions under running water.

Onions vary in size, shape, colour, and pungency. Warmer climates produce onions with a milder, sweeter flavour than do other climates.

Globe-shaped onions may be white, yellow, or red. They have strong flavour and are used chiefly for soups, stews, and other prepared dishes and for frying.

Bermuda onions are large and flat, with white or yellow colour and fairly mild taste. They are often cooked and may be stuffed, roasted, or French-fried. They are also sliced and used raw in salads and sandwiches.

Spanish onions are large, sweet, and juicy, with colour ranging from yellow to red. Their flavour is mild, and they are used raw and sliced for salads and sandwiches and as a garnish.

Italian onions are flat, with red colour and mild flavour. They are used raw for salads and sandwiches, and their red outer rings make an attractive garnish.

Pearl onions are not a specific variety but are small, round, white onions harvested when 25 mm (1 inch) or less in diameter. They are usually pickled and used as a garnish and in cocktails. Small white onions that are picked when between 25 and 38 mm in diameter are used to flavour foods having fairly delicate taste, such as omelets and other egg dishes, sauces, and peas. They are also served boiled or baked.

Green onions, also called scallions and spring onions, are young onions harvested when their tops are green and the underdeveloped bulbs are 13 mm or less in diameter. Their flavour is mild, and the entire onion, including top, stem, and bulb, is used raw in salads and sauces, as a garnish, and also as a seasoning for prepared dishes.

Onions are low in nutrients but are valued for their flavour. Most whole onions are slightly dried before marketing, making their skins dry and paper-thin. Leading world producers of dry onions include China, India, the United States, Russia, Japan, and Turkey. Spain is the leading European producer.

Onions are also available in various processed forms. Boiled and pickled onions are packed in cans or jars. Frozen onions are available chopped or whole, and bottled onion juice is sold for use as a flavouring.

Dehydrated onion products have been available since the 1930s. Processing involves elimination of most of the moisture by heat or by freeze-drying. Such products include granulated, ground, minced, chopped, and sliced forms. Onion powder is made by grinding dehydrated onions and is sometimes packaged in combination with salt.

Dried onion products are used in a variety of prepared foods. They are also sold directly to the consumer for use as condiments. The United States is the world's leading producer of dried onion products, and the state of California is a major producer of onions developed and cultivated for this industry.

Onitsha, port and market town in Anambra State, southern Nigeria. The town lies on the east bank of the Niger River just south of its confluence with the Anambra River. Founded by adventurers from Benin (nearby, to the west) in the early 17th century, it grew to become the political and trading centre of the small Igbo (Ibo) kingdom of Onitsha. Its monarchical system (rare among the Igbo people) was patterned after that of Benin. An Onitsha *obi* ("king") negotiated in 1857 with William Balfour Baikie, a British trader, for the establishment of a British trading post in the town.

Onitsha remains the chief entrepôt for goods coming upstream from the Niger River delta and those transported downstream from towns on the Niger and Benue rivers. Roads lead to the town from Enugu and Owerri, and the completion in 1965 of the 4,606-foot (1,404-metre) bridge across the Niger River to Asaba provides Onitsha with a direct road link to Benin City and Lagos. Palm oil and kernels are the most important local exports, but yams, cassava, corn (maize), citrus fruits, palm produce, rice, taro, fish, and beef also are traded in the Onitsha market. The market building, one of the largest in Nigeria, was destroyed in 1968 in the Nigerian Civil War (1967–70), but it was rebuilt.

The town is the site of the Roman Catholic Holy Trinity Cathedral (1935) and the Anglican All Saints Cathedral (1952). Onitsha is also known for the annual Ofala Festival, which honours the *obi.*

Onitsha's industries include tire retreading, sawmilling, printing, and soft-drink bottling. A textile plant is located on an industrial estate south of the town near the bridge. Pop. (1991 est.) 328,300.

online system, formerly called VIDEOTEX, any electronic interactive system that delivers information to users via telephone lines to personal computers (PCs) or via cables to terminals. Such a service provides information, usually in text form, about news, education, business, entertainment, shopping, and more. Some also provide message services and graphic and audio information. The term videotex was formerly applied to electronic interactive systems of this type.

Online services are managed by a host, or gateway, system that maintains a base of information accessible to satellite users. Users of so-called "dumb" terminals (*i.e.,* those without processing capability) connected to mainframe or midrange computers simply access the information base via programs stored on the system. PC users typically "log on," or access the host, through a modem (a modulating device that allows computers to communicate digital, or binary, data over conventional analog telephone lines). A PC software program serves as an interface between the server and a PC, allowing the user to maneuver through the online system and select different databases using a keyboard or a mouse.

National and regional online systems usually have local telephone numbers that PC modems can call to access either a local information base or an indirect long-distance connection, thus reducing extraneous long-distance telephone fees. Some online systems allow users to download (copy) large volumes of information onto a local memory storage device, which also minimizes the time the user is connected to the online system.

Besides offering a multitude of different information bases, ranging from full-text journal libraries to reports of missing children, online services allow users to, for example, reserve airline tickets, buy stocks, purchase groceries and consumer goods, and communicate with other users. In exchange for the service, users, or subscribers, typically pay a monthly membership fee. They may also pay to connect to various databases on the service or to download information. Popular national online services in the United States, each of which permits users to access numerous information services, include America Online, CompuServe, and Prodigy.

Online systems, notably France's Minitel service, emerged during the 1970s as government-sponsored computer time-sharing networks. They were popularized in the United States during the 1980s, primarily to communicate legal, business, and news information to PC users. A chief hurdle to the success and improvement of online systems has been slow information retrieval, largely a corollary of the modulation process.

Onmun, Korean ŎNMUN (Korean alphabet): *see* Hankul.

Onn bin Ja'afar, Dato (b. 1895, Johore Bahru, Malaya [now in Malaysia]—d. Jan. 19, 1962, Johore Bahru), Malayan political leader who played a leading role in the Merdeka (independence) movement and the establishment of the Federation of Malaya, forerunner of the present independent nation of Malaysia.

Born in the sultanate of Johore, north of Singapore, Onn was educated in England and served for a time as a government officer in Johore. Turning then to journalism, he edited two Malay newspapers, the *Lembaga Melayu* and the *Warta Malaya,* the first independent Malay daily. After World War II he became extremely active in Malayan politics. By 1946 the British had secured signatures from all the peninsular Malay sultans agreeing to a Malayan Union—one that would transfer political power from the sultans to a central government in Kuala Lumpur and that would grant all people in Malaya, regardless of race or religion, equal rights as citizens. Opposing both the British and the sultans, Onn led the protest against this union, holding that giving the economically dominant Chinese and Indians a part in the government would lead to the "extinction" of the Malay race. Convening a meeting of more than 40 Malay organizations in March 1946 to oppose the Union, Onn founded the United Malays National Organization (UMNO), a political party representing purely Malay interests. When the plan for Union was eventually withdrawn, the Sultan of Johore appointed him prime minister (Mentri Besar) of his state, and in February 1948 he became Member for Home Affairs for the Federation of Malaya.

Although known as an advocate of specifically Malay interests, Onn in 1951 resigned from UMNO because it rejected his proposal that membership be open to persons of all races. He was replaced by Tunku Abdul Rahman, later prime minister of Malaysia. Onn formed two political parties on his own, the Independence of Malaya Party and the Party Negara (National Party) in 1953–55; but, when neither party gained popular support against Rahman's new Alliance Party, he was eclipsed from Malayan political life.

Onnes, Heike Kamerlingh: *see* Kamerlingh Onnes, Heike.

Ono Tōfū (b. 894, Japan—d. 964, Japan), Japanese calligrapher known as one of the *sanseki* ("three prints or traces"), in effect the first calligraphers of the age. The others were Fujiwara Yukinari and Fujiwara Sukemasa, and the three perfected the style of writing called *jōdai-yō* ("ancient style").

Ono was the son of a high government official. His writing, which departed from the traditional Chinese style, may be regarded as the model for subsequent Japanese calligraphy. His extant works include "Chishō daishi shigō chokusho" ("Imperial Rescript on the Posthumous Name for Chishō the Great Teacher"), dated 927, owned by the Tokyo National Museum; "Byōbu jōdai" ("Ancient Folding Screen"), a poem dated 928 and owned by the Imperial Household; "Gyokusen-cho" ("Album of the Pure Spring") owned by the Imperial Household; and "Haku-shi santai-shi kan."

Onomichi, city, Hiroshima *ken* (prefecture), Honshu, Japan, facing the Inland Sea. The city's port opened in 1168 and served for about 500 years as a rice shipment centre and port of call for trade with China. The port's commercial significance declined somewhat during the Tokugawa era (1603–1867) but has since revived. Onomichi now offers steamship services to ports of northern Shikoku and islands in the Inland Sea. The city has a shipbuilding yard and a motor factory.

Onomichi and its industrial channel, Japan

Photos Pack—EB Inc.

The Buddhist Senko Temple was founded in the 9th century. It is located on the side of a hill that commands a fine view of the city and coast and contains an observatory and a planetarium. Pop. (1985) 100,640.

Onondaga, tribe of Iroquoian-speaking North American Indians who lived in what is now New York state. The Onondaga inhabited villages of wood and bark longhouses occupied by related families. They moved these houses periodically to plant new gardens, to seek firewood, and to be nearer fish and game. They grew corn (maize), beans, squash, sunflowers, and tobacco. A council of adult males in each community guided the village chiefs. In the 17th century the Onondaga numbered about 1,700.

The Onondaga tribe, one of the original five nations of the Iroquois League (*q.v.*), was the political and geographical centre of the league. With 14 seats in the council, the Onondaga furnished the chairman and the archivist, who kept the records of transactions in wampum belts.

In the 18th century a sizable faction of Onondaga favouring the French interest migrated to Catholic mission settlements along the St. Lawrence River. Another faction remained loyal to the British, and, upon the breakup of the Iroquois League after the American Revolution, a small party followed other members of the confederacy to Grand River, Ontario. The majority, however, returned to their ancestral valley. The population of the Onondaga reservation in New York in the late 20th century was more than 1,000.

Onsager, Lars (b. Nov. 27, 1903, Kristiania, Nor.—d. Oct. 5, 1976, Coral Gables, Fla., U.S.), Norwegian-born American chemist whose development of a general theory of irreversible chemical processes gained him the 1968 Nobel Prize for Chemistry.

His early work in statistical mechanics attracted the attention of the Dutch chemist Peter Debye, under whose direction Onsager studied at the Federal Institute of Technology, Zürich (1926–28). He then went to the United States and taught at Johns Hopkins University, Baltimore, and Brown University, Providence, R.I. He received his Ph.D. from Yale (1935), where he became professor of theoretical chemistry in 1945. His explanation of the movement of ions in solution as related to turbulences and fluid densities had a major effect on the development of physical chemistry and has been described as providing the fourth law of thermodynamics.

Ontake, Mount, Japanese ONTAKE-SAN, mountain, rising to an elevation of 10,049 feet (3,063 m) on the boundary of Gifu and Nagano prefectures, central Honshu, Japan. A compound volcano with a heavy snow mantle in winter, it is second only to Mount Fuji in elevation and popular esteem. Mount Ontake is an object of worship for pilgrims who climb it each year.

Ontario, the second largest province of Canada, situated between Hudson and James bays to the north and the St. Lawrence River–Great Lakes chain to the south, and bordered by the provinces of Quebec to the east and Manitoba to the west. Ontario occupies an area of 412,581 square miles (1,068,580 square km), a figure that includes 68,491 square miles (177,390 square km) of inland water. Toronto is the capital of the province, in the southeast of which is also located the national capital, Ottawa. Ontario is Canada's demographic and economic centre and is a major force in national politics.

A brief treatment of Ontario follows. For full treatment, *see* MACROPAEDIA: Canada.

Southern Ontario was originally settled by Iroquoian tribes who lived in longhouses in fortified villages and cultivated corn (maize). To their north and west the nomadic Algonquin, Ojibwa, and Cree Indians lived primarily by hunting and fishing. With the arrival of the French in Quebec in 1608, the Huron, an Iroquoian tribe, began to trap beaver and trade the pelts to the French. Southern Ontario became a vital link between the French settlements in Quebec and their fur-trading posts in the Mississippi River region. The main French forts in the region were Fort Frontenac (present-day Kingston, Ont.), Fort Niagara, and Fort Detroit. There was relatively little French settlement of the area, however.

Ontario was ceded by France to Britain in 1763 at the conclusion of the French and Indian War. In 1784 about 10,000 American loyalists emigrating from the newly independent United States were resettled by the British along the northern shores of Lakes Ontario and Erie and along the St. Lawrence River. They became the core of Ontario's future population. In 1791 the Quebec colony, of which Ontario had hitherto been a part, was divided into a French-speaking province (called Lower Canada) and a new English-speaking province called Upper Canada. Upper Canada received a representative government, an established church, and a colonial administration modeled along English lines. From 1815 to 1841 the province was dominated by the "Family Compact," a coalition of supporters of the Anglican church and of the land endowments used to support that church in the province. In 1841 the provinces of Upper and Lower Canada were united, and Upper Canada became known as Canada West. The Canadian federation was formed in 1867, and Canada West became the province of Ontario. Through the rest of the 19th and 20th centuries, Ontario developed economically and enjoyed a fairly high level of prosperity under moderately conservative provincial governments.

The province has two geographic regions. Northern Ontario occupies the area north of the confluence of the Mattawa and Ottawa rivers; the mouth of the French River on Georgian Bay marks its southwestern boundary. Northern Ontario's 350,000 square miles (900,000 square km) have a rocky and rugged terrain with thick forests, bogs, and lakes; the region has extensive mineral reserves. Southern Ontario is suitable for both agriculture and industry. It covers less than 10 percent of the province but is the centre of Canada's population, urban development, and industry.

Until the end of the War of 1812, Ontario's white settlers were mostly loyalists from the United States, along with Quakers and Mennonites from the U.S. state of Pennsylvania. There was a heavy wave of British immigration to the province between 1815 and 1850. The phase of European immigration between 1896 and 1914 brought Germans, Scandinavians, Russians, Poles, Ukrainians, and Italians. Another wave of immigration came after World War II and centred on industrial areas. The province's small American Indian population is rural. Ontario's black population comprises descendants of slaves and immigrants from the United States and West Indies. The skilled work force has been depleted by emigration to the United States.

Most employment and economic activity are concentrated in manufacturing industries and services. Agricultural settlement is more frequent in southern Ontario, which is an important farming region. The principal cash crop is tobacco, though the main activities of most farms are dairying and livestock raising. Large quantities of grain are imported from the United States. The Niagara Peninsula and the Holland Marsh north of Toronto are the chief fruit- and vegetable-growing regions, while Kent and Essex counties are the province's chief centre for the production of grain (mostly corn [maize] and soybeans).

Ontario is Canada's chief mining province and one of the world's main producers of nickel. Significant quantities of copper, iron ore, zinc, gold, and uranium are also mined. The province employs half of Canada's work force and is the leading manufacturing province. Automobile production increased threefold in the late 1960s and 1970s. Other leading manufactures include textiles, furniture, processed foods, industrial machinery, electrical goods, farm implements, rubber and synthetics, and aircraft. Although the federal government dominates economic planning, the provincial government has increasingly stimulated industrial research and development.

Ontario is governed by the Legislative Assembly, which selects the premier, or prime minister. The premier names his own Executive Council, or Cabinet. A lieutenant governor, whose duties are ceremonial, is designated by the governor-general. There are three political parties: the Progressive Conservative, the Liberal, and the New Democratic. The last, founded in 1961, is an amalgamation of a socialist group and sections of the trade-union movement.

Primary and secondary education in the province is free and compulsory through grade 13, with public and Roman Catholic schools operating in conjunction. There are 21 degree-granting universities, of which the University of Toronto is preeminent, and 22 colleges of applied arts and technology. There is comprehensive medical insurance for all residents. Both Toronto and Ottawa have symphony orchestras, museums, and art galleries. Stratford is famous for its annual Shakespeare Festival. Pop. (2001) 11,410,046.

Ontario, city, San Bernardino county, southern California, U.S. It is situated in the Riverside–San Bernardino portion of the consolidated Los Angeles metropolitan area. Named for the province of Ontario in Canada, it was settled in 1882 by George and William Chaffey, who irrigated the land for citrus and vineyard cultivation. After the arrival of the Santa Fe Railroad in 1887, Ontario became a fruit-processing and shipping point. The city's industrial development includes the manufacture of electrical appliances, aircraft parts, steel, and plastics. The Ontario Motor Speedway (1970) is the scene of the annual California "500" auto race. Ontario International Airport serves the area east of Los Angeles. Inc. city, 1891. Pop. (2000) 158,007.

Ontario, city, Malheur county, eastern Oregon, U.S. It lies at the juncture of the Snake and Malheur rivers, 60 miles (96 km) west of Boise, Idaho. A gateway to the Oregon cattle country, it grew after the building of the Union Pacific Railroad in 1884 and was named for the Canadian province. The city has food-processing industries based on the potatoes, sugar beets, alfalfa, onions, and corn (maize) grown in the region, which is irrigated by the Owyhee and Malheur rivers. A tourist centre, the city is close to an area of rugged canyon terrain. Lake Owyhee (created by Owyhee Dam, 1928–32) is nearby. Treasure Valley Community College was opened there in 1962. Inc. 1914. Pop. (2000) 10,985.

Ontario, Lake, smallest and most easterly of the Great Lakes of North America. It is bounded on the north by Ontario (Can.) and on the south by New York (U.S.). The lake is roughly elliptical; its major axis, 193 miles (311 km) long, lies nearly east to west, and its greatest width is 53 miles (85 km). The total area of the lake's drainage basin is 27,200 square miles (70,400 square km), exclusive of the lake's surface area, which is 7,550 square miles (19,554 square km). The Niagara River is the main feeder of the lake; others include the Genesee, Oswego, and Black rivers from the south and the Trent River from the north. The 30-mile-wide eastern extremity of the lake is crossed by a chain of five islands, where the lake discharges into the St. Lawrence River near Kingston, Ont. With a mean surface elevation of 245 feet (75 m) above sea level, Lake Ontario has a mean depth of 283 feet (86 m), and its deepest point is 802 feet (244 m). A general surface current (8 miles a day) flows toward the east and is strongest along the south shore. The Welland Canal (navigational) and the Niagara River (natural) serve as connections with Lake Erie to the southwest. Lake Ontario is linked with the New York State Barge Canal at Oswego, N.Y., and with Lake Huron's Georgian Bay via the Trent Canal at Trenton, Ont. The Rideau Canal runs northeastward in Ontario from Kingston to Ottawa.

The land to the north of Lake Ontario spreads out into broad plains, which are intensively farmed. The Niagara Escarpment, or Lake Ridge, extends eastward along the lake's southern shore (3 to 8 miles inland) from the Niagara River to Sodus, N.Y. Industry is concentrated around the port cities of Toronto and Hamilton, Ont., and Rochester, N.Y. Other important ports along the lake include Kingston and Oswego, N.Y. The lake freezes only near the land, and its harbours are icebound from mid-December to mid-April.

Lake Ontario was visited by Étienne Brûlé, a French scout, and by Samuel de Champlain in 1615. The Iroquois Indians, allies of the British, held the Ontario region; but during the late 17th and early 18th centuries a temporary peace allowed the French to build forts, including Fort-Frontenac (1673), where Kingston now stands. The French and Indian Wars led to British control, and the American Revolution hastened settlement, trade, and shipping in the region.

Ontario Museum, Royal: *see* Royal Ontario Museum.

ontology, the theory or study of being as such; *i.e.,* of the basic characteristics of all reality. Though the term was first coined in the 17th century, ontology is synonymous with metaphysics or "first philosophy" as defined by Aristotle in the 4th century BC. Because metaphysics came to include other studies (*e.g.,* philosophical cosmology and psychology), ontology has become the preferred term for the study of being. It was brought into prominence in the 18th century by Christian Wolff, a German rationalist, for whom it was a deductive discipline leading to necessary truths about the essences of beings. His great successor Immanuel Kant, however, presented influential refutations of ontology as a deductive system and of the ontological argument for God's necessary existence (as supreme and perfect being). With the 20th-century renovation of metaphysics, ontology or ontological thought has again become important, notably among phenomenologists and existentialists, among them Martin Heidegger.

Ontowirjo, Raden Mas (Javanese military leader): *see* Dipo Negoro, Pangeran.

Onu (ancient city): *see* Heliopolis.

Onverwacht series, division of Archean rocks (3.8 to 2.5 billion years ago) in the Swaziland region of southern Africa. The Onverwacht series is well known from exposures in the Komati valley in the eastern Transvaal region, South Africa, where Onverwacht rocks consist of dark, andesitic lavas, dolomitic limestones, cherts, and jaspers, as well as serpentines, gabbros, and peridotites. Many of the rocks have been intensely deformed by metamorphic processes; the results of these processes are observed as locally abundant schists and marbles. Rocks of the Onverwacht series underlie those of the Fig Tree series and form the basement rocks in the region of their occurrence.

Radiometric dating techniques have established the age of the Onverwacht series at about 3.7 billion years. Tiny cell-like forms have been discovered and studied in the Onverwacht rocks of sedimentary origin; studies of the hydrocarbon compounds in the rocks have also been carried out. The Onverwacht series possibly contains some of the earliest known traces of living organisms on Earth. Indeed, it is possible that the transition from nonliving to living material is recorded within the Onverwacht. Further study, it is hoped, will elucidate the actual steps in this transition.

onychophoran, also called ONYCHOPHORE, any of about 90 species of free-living, elongated, terrestrial invertebrates belonging to the Onychophora, usually considered a class. In evolutionary development, onychophorans are considered to lie between annelid worms and arthropods (*e.g.,* insects, crustaceans). Onychophorans range in size from 14 to 150 mm (about 0.6 to 6 inches).

Because onychophorans, which are terrestrial, cannot control water loss, they cannot tolerate dry habitats. They live among litter in forests, under stones or fallen logs, inside galleries of fallen logs, inside nests of termites, or in crevices and galleries in the soil, sometimes to depths of more than one metre (about three feet). They have a remarkable ability to squeeze themselves through narrow passages, an adaptation that permits them to find shelters of satisfactory humidity and safety. Onychophorans are carnivorous (*i.e.,* flesh eaters); they use their jaws to open captured prey and suck out the juices. A quick-hardening slime squirted from the oral papillae, fingerlike projections near the mouth, is used for defense or to subdue prey. They avoid light and are usually well concealed from casual observation. Touch is important, and onychophores are provided with tactile spines that are sensitive to air currents.

Onychophoran (*Peripatoides novaezealandiae*)
J. Green—G.R. Roberts

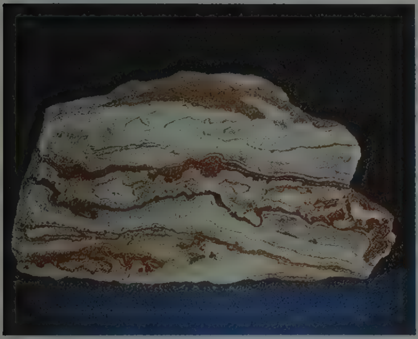
The onychophorans have a well-developed brain and two widely separated, nonganglionated ventral nerve cords that unite caudally (*i.e.,* toward the tail) above the rectum, a very primitive condition. The eyes of onychophorans are similar in structure to those of some annelids. The respiratory system consists of numerous, irregularly distributed pits, from which many thin tracheae, or breathing tubes, originate. The tracheae may penetrate deep into the body and may branch.

Onychophorans have a pair of excretory segmental organs on each leg-bearing segment. A ciliated (*i.e.,* with hairlike structures) funnel leads to the outside at the excretory pore. Each segmental organ eliminates water and other substances, but nitrogenous excretion, in the form of uric acid, takes place into the midgut.

A common genus is *Peripatus,* found in the West Indies, Central America, and the northern parts of South America. About 20 species of *Peripatus* are known. They have an elongated body consisting of 14 to 44 trunk segments, each having a pair of short legs. The number of segments differs according to the species. The dry, velvety skin of the animals varies in colour to match the surroundings and ranges from dark slate to reddish brown, with a darker median stripe on the back.

Peripatus species live in moist spots in damp forests. They are usually nocturnal and feed on small insects.

onyx, striped, semiprecious variety of the silica mineral agate with white and black alternating bands. Onyx is used in carved cameos and intaglios because its layers can be cut to show a colour contrast between the design and the background. Other varieties include carnelian onyx, with white and red bands, and sardonyx, with white and brown bands. The chief localities of onyx are India and South America. The name was used by the Romans for a variety of stones including alabaster, chalcedony, and what is now known as onyx marble. Onyx is one of the 12 stones mentioned in the Bible (Exodus 28:20; 39:13) as adorning the breastplate (*ḥoshen*) of Yahweh's high priests. Its properties are the same as those of quartz.



Onyx from Yavapai county, Ariz.

Floyd R. Getsinger

Oodnadatta, town, northern South Australia, on The Neales River. Founded in 1890, it was once the chief supply centre for central Australia; as the northern terminus of the Central Australian Railway (until the railway was extended to Alice Springs some 280 miles [450 km] north-northwest in 1929), it was the starting point for camel caravans bound for the desert interior. When the railway was relocated farther west in 1980, Oodnadatta began to decline. It now functions as a cattle-marshaling station, dependent on artesian wells, with its poor hinterland yielding little produce. The town, the Aboriginal name of which means "blossom of the mulga," in reference to local species of acacia trees, is near an area of artesian springs that is thought to be the largest in Australia. Pop. (latest est.) 229.

oogenesis, in the human female reproductive system, growth process in which the primary egg cell (or ovum) becomes a mature ovum. In any one human generation, the egg's development starts before the female that carries it is even born; 8 to 20 weeks after the fetus has started to grow, cells that are to become mature ova have been multiplying, and by the time that the female is born, all of the egg cells that the ovaries will release during the active reproductive years of the female are already present in the ovaries. These cells, known as the primary ova, number around 400,000. The primary ova remain dormant until just prior to ovulation, when an egg is released from the ovary. Some egg cells may not mature for 40 years; others degenerate and never mature.

The egg cell remains as a primary ovum until the time for its release from the ovary arrives. The egg then undergoes a cell division. The nucleus splits so that half of its chromosomes go to one cell and half to another. One of these two new cells is usually larger than the other and is known as the secondary ovum; the smaller cell is known as a polar body. The secondary ovum grows in the ovary until it reaches maturation; it then breaks loose and is carried into the fallopian tubes. Once in the fallopian tubes, the secondary egg cell is suitable for fertilization by the male sperm cells. *See also* ovulation; ovum.

Ōoka Tadasuke (b. 1677, Edo [now Tokyo], Japan—d. January 1752, Edo), highly respected Japanese judge of the Tokugawa period (1603–1867).

Appointed to office by Tokugawa Yoshimune (shogun 1716–45), Ōoka soon gained a reputation as one of the most able and incorruptible officials of the realm. As a reward, Yoshimune also appointed him the head of a small hereditary fief. Ōoka's wisdom and fair-mindedness in arriving at decisions while serving on the bench made him a legendary figure, much celebrated in popular stories.

oölite, ovoid or spherical crystalline deposit with a concentric or radial structure; most are composed of calcium carbonate, but some are composed of silica, siderite, calcium phosphate, iron silicate, or iron oxide. Oölite diameters range from 0.25 to 2 mm (0.01 to 0.08 inch), with most being in the 0.5- to 1-millimetre range; oölitic bodies with diameters greater than 2 mm are called pisolites.

The term oölite has been applied both to the concretionary bodies and to the rock composed largely of such structures; to avoid ambiguity, these structures sometimes have been called oöids, oöliths, or ovulites and the term oölite reserved for the rock. The term also is used in an adjectival sense, such as oölitic limestone or oölitic chert. False oölites bear superficial resemblance to oölites but are devoid of a regular internal structure.

Calcareous oölites form where cold oceanic waters flow onto warm shallow banks, as in the Bahamas. The carbonate is precipitated on bits of shell, quartz grains, or other nuclei. They also are known to form in springs and caves, as cave pearls.

Oomycetes, class of fungi (kingdom Fungi) distinguished by their production of asexual reproductive cells, called zoospores, that can move through the use of one or two whiplike swimming structures (flagella). New fungi may germinate from these spores, or mature fungi may reproduce sexually, with the resulting fertilized eggs being converted into nonmobile spores, or oospores, which then also germinate into mature individuals. Oomycetic fungi may occur as saprophytes (living on decayed matter) or as parasites living on higher plants. Among the various aquatic, amphibious, or terrestrial species, one played an important role in modern history: the species *Phytophthora infestans* destroyed Ireland's potato crop and caused the famine of 1845, which resulted in a mass migration of the Irish to the United States. Some other economically destructive genera include *Saprolegnia* (water molds), *Aphanomyces* (the cause of root rot of pea), *Plasmopara* (downy mildews), and *Albugo* (white rusts).

Oort, Jan Hendrik (b. April 28, 1900, Franeker, Neth.—d. Nov. 5, 1992, Leiden), Dutch astronomer who was one of the most important figures in 20th-century efforts to understand the nature of the Milky Way Galaxy.

After studies at the University of Groningen, Oort was appointed astronomer to the Leiden Observatory in 1924 and became director in 1945, a position he held until 1970. In 1925 Bertil Lindblad of Sweden had advanced the theory that the Milky Way rotates in its own plane around the centre of the galaxy. Oort was able to confirm this theory in 1927 through his own direct observations of star velocities in the galaxy, and he modified the theory substantially into the form used thereafter.

Oort's subsequent work, as well as that of the school of astronomy he developed in The Netherlands, was directed toward strengthening and testing the Lindblad-Oort theory. Soon after having become a professor at the University of Leiden (1935), he determined by radio astronomy that the Sun is 30,000 light-years from the centre of the galaxy and takes 225 million years to complete an orbit around it. The discovery in 1951 of the 21-centimetre radio waves generated by hydrogen in interstellar space provided him with a new method for mapping the spiral structure of the galaxy.

In 1950 Oort proposed that comets originate from a vast cloud of small bodies that orbit the Sun at a distance of about one light-year, and the approach of other stars toward this cloud alters some comets' orbits so that they pass close to the Sun. The existence of this region, which was named the Oort Cloud, eventually came to be accepted by most astronomers.

From 1958 to 1961 Oort was president of the International Astronomical Union, of which he had been general secretary from 1935 to 1948.

Oostende (Belgium): *see* Ostend.

Oosterbaan, Bennie, byname of BENJAMIN GAYLORD OOSTERBAAN (b. Feb. 24, 1906, Muskegon, Mich., U.S.—d. Oct. 25, 1990, Ann Arbor, Mich.), American collegiate football player and coach for the University of Michigan (Ann Arbor), who was the first of the great collegiate pass receivers. His coaching record was 63 games won, 33 lost, and 4 tied. In his first year as coach his team won nine games and lost none and won the national championship.

Oosterbaan played both basketball and football at Muskegon (Mich.) High School. At the University of Michigan (1924–27) he was an All-American end (1925 and 1927) and became, when teamed with quarterback Benny Friedman, a great scoring threat. In one season he was the Big Ten (Western Conference) leading scorer in football, basketball, and baseball.

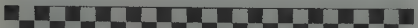
After graduation he was an assistant football coach (1927–37), basketball coach (1938–46), and backfield football coach (1946–47) before becoming head football coach in 1948. During his tenure Michigan won three Big Ten championships (1947–48, 1950), tying for the honour in 1949, and won the 1951 Rose Bowl game and a national championship (1948). He retired from coaching in 1958.

Ootacamund (India): *see* Uthagamandalam.

ooze, pelagic (deep-sea) sediment of which at least 30 percent is composed of the skeletal remains of microscopic floating organisms. Oozes are basically deposits of soft mud on the ocean floor. They form on areas of the seafloor distant enough from land so that the slow but steady deposition of dead microorganisms from overlying waters is not obscured by sediments washed from the land. The oozes are subdivided first into calcareous oozes (containing skeletons made of calcium carbonate) and siliceous oozes (containing skeletons made of silica) and then are divided again according to the predominant skeleton type. Thus, the calcareous oozes include globigerina ooze, containing the shells of planktonic foraminifera, and pteropod ooze, made up chiefly of the shells of pelagic mollusks. The siliceous oozes include radiolarian ooze, comprising essentially brown clay with more than 30 percent of the skeletons of warm-water protozoa, and diatom ooze, containing the frustules (tiny shells) of diatoms. The siliceous oozes exist only where the rate of deposition of diatoms or radiolarians is greater than the rate at which their silica content is dissolved in the deep waters; thus the diatom oozes are confined to belts in the North Pacific and Antarctic, and the radiolarian oozes are found only under the eastern part of the North Pacific. Globigerina ooze is the most widespread of the oozes and occurs in both the Atlantic and Indian oceans. Pteropod ooze is found only in the mid-Atlantic.

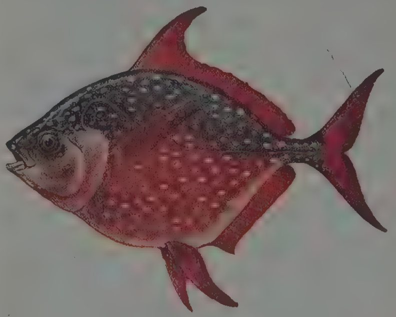
Op art, also called OPTICAL ART, branch of mid-20th-century geometric, abstract art that deals with optical illusion. Achieved through the systematic and precise manipulation of shapes and colours, the effects of Op art can be based either on perspective illusion or on chromatic tension; in painting, the dominant medium of Op art, the surface tension is usually maximized to the point at which an actual pulsation or flickering is perceived by the human eye. In its concern with utterly abstract formal relationships Op art is indirectly related to such other 20th-century styles as Orphism, Constructivism, Suprematism, and Futurism—particularly the latter because of its emphasis on pictorial movement and dynamism. Op painters differed from earlier artists working in geometric styles, however, in their purposeful manipulation of formal relationships in order to evoke perceptual illusions, ambiguities, and contradictions in the vision of the viewer.

The principal artists of the Op movement as it emerged in the late 1950s and '60s were Victor Vasarely, Bridget Riley, Richard Anuskiewicz, Larry Poons, and Jeffrey Steele. The movement first attracted international attention with the Op exhibiton "The Responsive Eye" at the Museum of Modern Art in New York City in 1965. Op art painters devised complex and paradoxical optical spaces through the illusory manipulation of such simple repetitive forms as parallel lines, checkerboard patterns, and concentric circles or by creating chromatic tension from the juxtaposition of complementary (chromatically opposite) colours of equal intensity. These spaces create the illusion of movement, preventing the viewer's eye from resting long enough on any one part of the surface to be able to interpret it literally. "Op art works exist," according to one writer, "less as objects than as generators of perceptual responses."


"Vega," Op art painting by Victor Vasarely, oil, 1957; in the artist's collection
By courtesy of Victor Vasarely

Op art goals were shared by the French Groupe de Recherche d'Art Visuel ("Group for Research in the Visual Arts") and by the Chilean-born artist Jesus Raphael Soto. These artists made large-scale Op sculptures that employ light and motors, as well as sculptural materials, to create the illusion of movement in space that is fundamental to all Op art.

opah, also called MOONFISH (species *Lampris regius*), large marine fish of the family Lampridae (order Lampridiformes), widely distributed in warm oceans. A deep-bodied fish with a small, toothless mouth, the opah grows to a length of about 2 m (7 feet) and a weight of 140 kg (300 pounds), although larger specimens have been reported. It is distinctively coloured, blue above and rosy below, with scarlet fins and jaws and round white spots on the body. Although uncommon, it is valued as food.


Opah (*Lampris regius*)
Painting by Richard Ellis

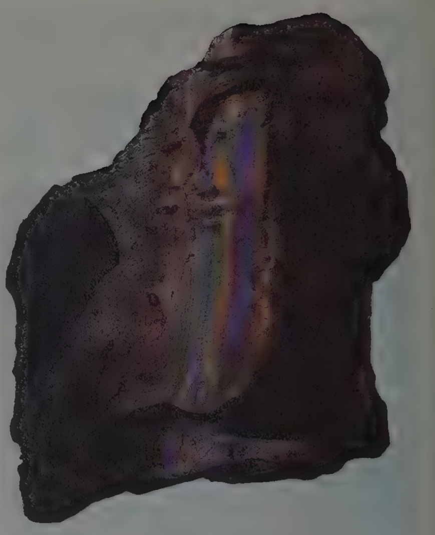
opal, silica mineral extensively used as a gemstone, a submicrocrystalline variety of cristobalite (*q.v.*). In ancient times opal was included among the noble gems and was ranked second only to emerald by the Romans. In the Middle Ages it was supposed to be lucky, but in modern times it has been regarded as unlucky.

Opal is fundamentally colourless, but such material is rarely found. Disseminated impurities generally impart to opal various dull body colours that range from the yellows and reds derived from iron oxides to black from manganese oxides and organic carbon. The milkiness of many white and gray opals is attributable to an abundance of tiny gas-filled cavities in them. Black opal, with a very dark gray or blue to black body colour, is particularly rare and highly prized. White opal, with light body colours, and fire opal, characterized by yellow, orange, or red body colour, are much more common.

Precious opals are translucent to transparent and are distinguished by a combination of milky to pearly opalescence and an attractive play of many colours. These colours flash and change as a stone is viewed from different directions and are caused by interference of light along minute cracks and other internal inhomogeneities.

Opal is deposited from circulating waters in such varied forms as nodules, stalactitic masses, veinlets, and encrustations and is widely distributed in nearly all kinds of rocks. It is most abundant in volcanic rocks, especially in areas of hot-spring activity. It also forms pseudomorphs after wood and other fossil organic matter and after gypsum, calcite, feldspars, and many other minerals that it has replaced. As the siliceous material secreted by organisms such as diatoms and radiolarians, opal constitutes important parts of many sedimentary accumulations.

The finest gem opals have been obtained from South Australia, Queensland, and New South Wales in Australia; the Lightning Ridge field is famous for superb black stones. Deposits of white opal in Japan, fire opal in Mexico and Honduras, and several varieties of precious opal in India, New Zealand, and the western United States also have yielded much gem material. Most of the precious opal marketed in ancient times was obtained from occurrences in what is now Slovakia. Various forms of common opal are widely mined for use as abrasives, insulation media, fillers, and ceramic ingredients.


Black opal from Australia; in the collection of the Department of Earth Sciences, Washington University, St. Louis, Mo.
John H. Gerard

Fire opals usually are facet cut, but most other precious opals are finished en cabochon because their optical properties are best displayed on smoothly rounded surfaces. Undersized fragments are used for inlay work, and small pieces scattered throughout a natural matrix are commonly sold under the name root of opal. Because opal may crack or lose its colour if it dries, many finished stones are protected by water or films of oil until they are sold. Opals absorb liquids very readily. An extremely porous variety, known as hydrophane, can absorb surprising quantities of water; it is almost opaque when dry but nearly transparent when saturated. Light-coloured stones are often dyed to resemble rarer, more deeply coloured varieties.

opaline glass, usually opaque glass or crystal, either white or coloured, made in France between approximately 1810 and 1890. Opaline resembles the milk glass of 16th-century Venice and the opaque, white glass associated with Bristol, Eng., in the 18th century.

The main centres of production were Creusot, Baccarat, and Saint-Louis. Items made of opaline included bowls, vases, boxes, cups, and decanters as well as objects used by perfumers and hairdressers.

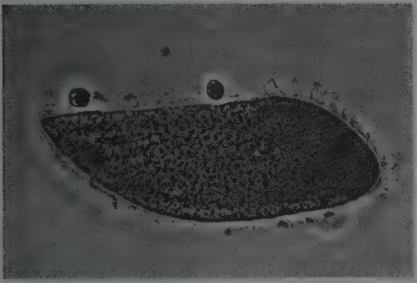
The earliest colours used were turquoise blue,

Opaline glass bowl made at Choisy-le-Roi, France, 1827; in the National Museum of Ceramics, Sèvres, France
By courtesy of Musee National de Ceramique, Sevres, France

yellow, and pink (the latter not produced after 1840). In the mid-19th century, opaline was made in more vivid colours, in imitation of Bohemian glass. It was also produced in the form of crystal, semicrystal, glass, and *pâte-de-riz* (glass made by firing glass powder in a mold), the latter a Bohemian innovation. Sky blue—a colour invented in Bohemia in 1835—was copied at Baccarat and Saint-Louis about 1843; the glass used was generally *pâte-de-riz*. Ultramarine blue was most frequently used between 1845 and 1850. Some bicolour (white and blue) opaline was made at Baccarat in 1850. Purple opaline was made in small quantity about 1828 at the Paris factory of Bercy and also outside the capital at Choisy-le-Roi. Various greens were also produced, ranging from almond and sea green between 1825 and 1830 to less subtle shades of leaf green in later years.

Decoration included gilding, painting, and transfer printing. From 1840 onward copies of Chinese and Japanese porcelain were made in opaline glass.

opalinid (subphylum Opalinata), any of about 150 protozoans found in the intestinal tracts of amphibians and some other animals. The nuclei of opalinids vary in number from two (*e.g., Zelleriella*) to many (*e.g., Cepedea*); the locomotor organelles (short, hairlike projections) are arranged in slanting, longitudinal rows. Species of the genus *Opalina* range from 90 to 500 micrometres in length. Reproduction is sexual by fusion of gametes (syngamy) or asexual by longitudinal splitting with distribution of the nuclei. Opalinids inhabit the intestines of amphibians (*e.g.,* salamanders, newts) and some reptiles and fishes. They do not harm their host. Distribution is by encystment after reproduction; the cyst escapes in host feces and is ingested by another host. Opalinids are found worldwide, although species vary with location. One species, *Zelleriella opisthocarya,* is itself parasitized by another protozoan, *Entamoeba paulista.*



Opalina
J.M. Langham

The taxonomic position of opalinids is uncertain, and they have been variously classified. Formerly considered a separate group, they were called Protociliata, but any close relationship to contemporary ciliate groups is now considered doubtful.

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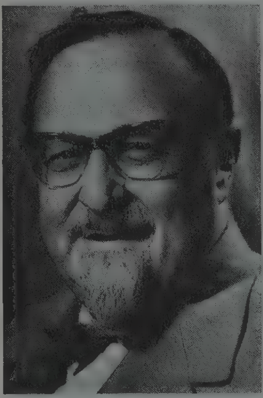
Opaliński, Krzysztof (b. 1609, Sieraków, Pol.—d. Dec. 7, 1655, Włoszakowice, near Poznań), Polish writer, a noted satirist.

A highly educated and well-traveled man, and governor (*wojewoda*) of the province of Poznania, Opaliński figured in the history of Polish literature as the author of *Satyry albo przestrogi do naprawy rządu i obyczajów w Polszcze należące* (1650; "Satires or Warnings on the Reform of the Government and Customs in Poland"). In this work, which was widely read in Poland during the 17th century, Opaliński attacked the injustice and abuses afflicting contemporary Polish life and castigated its society in vivid and realistic satires. One of his concerns was the lack in Poland of a strong central government and of a solid standing army. In 1655 he surrendered his province to the Swedes because he naively saw in King Charles X Gustavus a powerful monarch capable of curing Poland's evils.

Oparin, Aleksandr, in full ALEKSANDR IVANOVICH OPARIN (b. Feb. 18 [March 2, New Style], 1894, Uglich, near Moscow, Russia—d. April 21, 1980), Russian biochemist noted for his studies on the origin of life from chemical matter. By drawing on the insights of chemistry, he extended the Darwinian theory of evolution backward in time to explain how simple organic and inorganic materials might have combined into complex organic compounds and how the latter might have formed the primordial organism.



Oparin, 1970
Tass—Sovfoto

When Oparin was nine, his family moved to Moscow because there was no secondary school in their village. While majoring in plant physiology at Moscow State University, Oparin was influenced by K.A. Timiryazev, a Russian plant physiologist, who had known the English naturalist Charles Darwin. The indirect effect of Darwin upon Oparin's thinking can be found in many of the latter's writings.

In his postdoctoral days Oparin was influenced also by A.N. Bakh, a botanist. Bakh left Russia at the time of the Revolution but later returned. Despite the financial difficulties of the times, the Soviet government established a biochemical institute in his honour in 1935 in Moscow; Oparin helped to found it and served as its director until his death.

At a meeting of the Russian Botanical Society in the spring of 1922, Oparin first introduced his concept of a primordial organism arising in a brew of already formed organic compounds. He stated a number of premises that were not popular at the time. For example, according to his hypothesis, the earliest organisms were heterotrophic; *i.e.,* they obtained their nutrition ready-made from compounds that had already been formed in variety and profusion by what are in the laboratory quite ordinary means. Thus, at that early stage, these first organisms did not need to synthesize their own food materials in the way that present-day plants do. Oparin also emphasized that a high degree of structural and functional organization is characteristic of the living state, a point of view that is in opposition to the idea that "life" is essentially molecular. He was also farsighted in his observation that living organisms, as open systems, must receive energy and materials from outside themselves; they cannot, therefore, be limited by the second law of thermodynamics, which is applicable to closed systems in which energy is not replenished.

When Oparin first proposed his hypothesis, the prevailing view was that the first organisms could make all of their own organic compounds, and so the negative reaction to his proposal was almost universal. With continued retesting, however, his concept has come to be accepted in its main outlines. Although the possibility of a natural origin of life had been promulgated for at least 2,500 years, a specific formulation had to compete with vitalistic points of view in modern times. Also, organic chemistry, necessary for Oparin's hypothesis, had not been sufficiently developed by the time of the 19th-century French pathologist Louis Pasteur.

Oparin's various novel premises can be shown to be closely related to one another. What had been missing was (1) an explanation of how populations of large, complex molecules of largely predetermined structure could have arisen in contrast with the widely held view that the first proteins would have been random in structure and (2) an adequate explanation of how a first cell-like system might reproduce. When experimental answers to these questions arose from another laboratory, Oparin acknowledged them in a forthright manner. These answers consisted essentially of (1) ordered coupling of amino acids due to their differing shapes and distribution of electric charge and (2) the formation of buds on microscopic droplets followed by growth of separated buds and cyclical repetition of the process. In attempting to test his basic hypothesis, Oparin dealt with coacervate droplets, which are microscopic units assembled typically from gelatin and gum arabic, as models of early cells. His experiments showed that enzymes (biological catalysts) could function more efficiently within the boundaries of these artificial cells than they could in ordinary aqueous solution. This demonstration helped emphasize the fact that complete cells are important for the action of enzymes and metabolism.

The heterotrophic hypothesis for the origin of life has gained wide attention through Oparin's efforts. He organized the first international meeting of the origin of life in Moscow in 1957 at which representatives from 16 countries participated. A second conference was held in 1963 and a third in Pont-à-Mousson, Fr., in 1970. Oparin's definitive work is *The Origin of Life on Earth,* 3rd rev. ed. (1957).

Although he is best known for his contributions to studies of the origin of life, Oparin also devoted considerable effort to enzymology and to the closely related subject of industrial biochemistry. His wide interests are reflected in the title of the volume prepared in honour of his 70th birthday, *Problems in Evolutionary and Industrial Biochemistry.* But throughout the 1970s, the centre of his interest remained at the A.N. Bakh Institute, where, under his direction, a number of research workers were concerned with the problems of the origin of life. Oparin received many decorations, including the Order of Lenin, Hero of Socialist Labour, the Bakh Prize, the Kalinga Prize, and the Mechnikov Gold Medal. (S.W.F.)

BIBLIOGRAPHY. J.D. Bernal, *The Origin of Life* (1967), discusses the historical and modern development of the subject and includes the text of Oparin's classic paper in an appendix.

Opatija, Italian ABBAZIA, resort town, one of the best-known coastal resorts in Istria, republic of Croatia, situated on the Kvarner (gulf) of the Adriatic Sea. The town's name derives from the old Benedictine *opatija* ("abbey") of San Giacomo al Palo, situated in the main park. Besides remains of medieval walls and the town gate, there are striking villas built by Austrian and Hungarian nobility in the 19th century.

Austrian before World War I, Opatija was ceded to Italy in 1919 and returned to Yugoslavia after World War II. The Opatija Riviera developed as a tourist and vacation centre in the latter half of the 19th century, stimulated by the Trieste-Rijeka railway in 1873; the resort still draws great numbers of tourists annually. Pop. (1991 prelim.) mun., 29,785.

Opava, German TROPPAU, Polish OPAWA, city, Severomoravský *kraj* (region), eastern Czech Republic. It lies along the Opava River near the Polish border and is northwest of Ostrava, from which it is separated by part of the wooded Oder Hills.

First recorded as Oppavia in 1195, it was a principate and fief of the Bohemian crown in the early 14th century and later became the capital of Austrian Silesia. In 1820, after the Napoleonic Wars, representatives of Prussia, Austria, and Russia convened there for the Congress of Troppau. Many historic buildings in the city were destroyed in World War II. Surviving in the Upper Square is the 237-foot- (72-metre-) high town-hall tower. In the Lower Square is the restored 17th-century Jesuit Church of St. George and the building of the former Silesian Diet. The Gothic Church of St. Mary was built by the Teutonic Knights. The Silesian Museum has exhibits of natural science, prehistory, history, art, and culture.

The town is now a market centre with good rail and road connections to other parts of the Czech Republic, Slovakia, and Poland. Its manufactures include clothing, machinery, railway cars, and foodstuffs. Pop. (1991 prelim.) 63,601.

OPEC: *see* Petroleum Exporting Countries, Organization of.

Opel AG, in full ADAM OPEL AG, German automotive company, a wholly owned subsidiary of the U.S. General Motors Corporation, specializing in the manufacture of passenger cars, minibuses, and light vans. Headquarters are in Rüsselsheim, Ger.

The company was started in 1898 when the five Opel brothers began converting the bicycle and sewing machine factory of Adam Opel (1837–95) into the automobile complex that before World War II was to produce more cars than any other European facility. In their first year of production, they brought out the Opel-Lutzmann but soon abandoned it. The firm introduced its first original model, a twin-cylinder Opel, in 1902.

The company was emerging as a major force in the early development of the auto industry when in 1911 the plant was destroyed by fire. Forced to rebuild from scratch, Opel took advantage of the opportunity to retool with the most modern and efficient equipment. In 1913 Opel trucks were added to the product line. Although production was restricted following Germany's defeat in World War I, productivity improved as Opel became the first German manufacturer to adopt the efficient assembly-line method of operation. One of its most distinctive roadsters of this period was the Laubfrosch, or tree frog, so named for its green colour.

The hyperinflation and economic uncertainty of the 1920s prompted the Opel family to relinquish control of the firm, ultimately to General Motors. With the defeat of Germany in World War II, Opel lost a portion of its facilities to the Soviet Union but quickly resumed production of its remaining lines. As one of the largest industrial firms in Europe, Opel accounts for about one-quarter of all German vehicle output and exports mainly to other European countries and South Africa.

Opelousas, city, seat (1803) of St. Landry parish, south-central Louisiana, U.S. It lies on the Gulf Coastal Plain, 22 miles (35 km) north of Lafayette. Founded in 1720 as a French garrison and trading post and named for the Opelousas Indians, it became a sanctuary for Acadians exiled from Nova Scotia. The site of the State Supreme Court until 1819, it was incorporated as a town in 1821 and was the temporary Confederate capital of Louisiana during the American Civil War. Its agriculture-based economy, which depends largely on cotton and cattle, has been augmented by oil and gas (discovered in 1929 at Port Barre). The city is associated with sweet potatoes and holds a "Yambilee" (yam festival) each October. Its Jim Bowie Museum displays Bowie mementos and French and Indian relics. Inc. city, 1898. Pop. (1990) 18,151.

open cluster, in astronomy, any group of young stars held together by mutual gravitation. *See* star cluster.

Open Door policy, statement of principles initiated by the United States (1899, 1900) for the protection of equal privileges among nations trading with China and in support of Chinese territorial and administrative integrity. The statement was issued in the form of circular notes dispatched by U.S. Secretary of State John Hay to Great Britain, Germany, France, Italy, Japan, and Russia. The Open Door policy was received with almost universal approval in the United States, and for more than 40 years it was a cornerstone of American foreign policy.

The principle that all nations should have equal access to any of the ports open to trade in China had been stipulated in the Anglo-Chinese treaties of Nanking and Wanghia (1842–44). Great Britain had greater interests in China than any other power and successfully maintained the policy of the open door until the late 19th century. After the first Sino-Japanese War (1894–95), however, a scramble for "spheres of influence" in various parts of coastal China—primarily by Russia, France, Germany, and Great Britain—began. Within each of these spheres the controlling major power claimed exclusive privileges of investment, and it was feared that each would likewise seek to monopolize the trade. Moreover, it was generally feared that the breakup of China into economic segments dominated by various great powers would lead to complete subjection and the division of the country into colonies.

The crisis in China coincided with several major developments in the United States. A new interest in foreign markets had emerged there following the economic depression of the 1890s. The United States also had just gained the Philippines, Guam, and Hawaii as a result of the Spanish-American War and was becoming increasingly interested in China, where American textile manufacturers had found markets for cheap cotton goods.

The 1899 Open Door notes provided that: (1) each great power should maintain free access to a treaty port or to any other vested interest within its sphere; (2) only the Chinese government should collect taxes on trade; and (3) no great power having a sphere should be granted exemptions from paying harbour dues or railroad charges. The replies from the various nations were evasive, but Hay interpreted them as acceptances.

In reaction to the presence of European armies in North China to suppress the Boxer Rebellion, Hay's second circular of 1900 stressed the importance of preserving China's territorial and administrative integrity. Hay did not ask for replies, but all the powers except Japan expressed agreement with those principles.

Japan violated the Open Door principle with its presentation of Twenty-one Demands to China (1915). The Nine-Power Treaty after the Washington Conference (1921–22) reaffirmed the principle, however. The Manchurian crisis of 1931 and the war between China and Japan in 1937 led the United States to adopt a rigid stand in favour of the Open Door policy, including the cutting off of supplies to Japan. Japan's defeat in World War II and the communist victory in China's civil war (1949), which ended all special privileges to foreigners, made the Open Door policy meaningless.

open-end trust: *see* mutual fund.

open-field system, basic community organization of cultivation in European agriculture for 2,000 years or more. Its best-known medieval form consisted of three elements: individual peasant holdings in the form of strips scattered among the different fields; crop rotation; and common grazing. Crop rotation was by the two-field system (*q.v.*) in the earlier age and by the three-field system (*q.v.*) in the later centuries; in either case some of the commonly held fields were always fallow and used for common grazing.

The system was especially well adapted to the feudal manorial social system, in which the lord's holdings were intermixed and cultivated with those of the peasants. As society grew more complex and a market economy began to appear, the open-field system tended to give way to individual farming, permitting progressive peasants to farm as they pleased without having to conform to the old restrictive pattern.

open-heart surgery, any surgical procedure that requires an incision into the heart, exposing one or more of the cardiac chambers. The most common open-heart operations are for repair of valvular disease and for correction of congenital heart defects, chiefly septal and valve defects. Open-heart surgery has also been used in the treatment of severe coronary-artery disease.

Open-heart surgery is performed with the aid of a heart-lung machine, a device that allows circulation and oxygenation of the blood to be maintained outside the patient's body. By this means the surgeon has access to a dry and motionless heart. Until the first such cardiopulmonary bypass devices were developed, most cases of valve disease and congenital defects either were considered inoperable or were corrected by "blind" (closed-heart) procedures. The first successful open-heart operation using a heart-lung machine was performed by the American surgeon John H. Gibbon, Jr., in 1953. Gibbon used the procedure to close an atrial septal defect, a hole in the wall between the two upper chambers of the heart.

Congenital or acquired disease of the mitral valve between the left atrium and left ventricle may also be repaired in an open-heart procedure, often by replacement of the defective valve with an artificial substitute. In such surgery, an incision is made into the wall of the left atrium, thus exposing the mitral valve to the surgeon's view. Defects of the aortic and pulmonary valves, which lead out of the heart, usually can be repaired without opening the heart; replacement of the tricuspid valve between the right atrium and ventricle, although less common than mitral valve surgery, may be performed with open-heart procedures.

open-hearth process, also called SIEMENS-MARTIN PROCESS, steelmaking technique that for most of the 20th century accounted for the major part of all steel made in the world. William Siemens, a German living in England in the 1860s, seeking a means of increasing the temperature in a metallurgical furnace, resurrected an old proposal for using the waste heat given off by the furnace; directing the fumes from the furnace through a brick checkerwork, he heated the brick to a high temperature, then used the same pathway for the introduction of air into the furnace; the preheated air materially increased the flame temperature. The first to use the device to produce steel were Pierre and Émile Martin of

Sireuil, France, in 1864, charging the furnace with pig iron and some wrought-iron scrap. The ores most readily available in both Great Britain and the United States were especially well suited to the open-hearth process, the product of which proved superior to that from the Bessemer converter.

Natural gas or atomized heavy oils are used as fuel; both air and fuel are heated before combustion. The furnace is charged with liquid blast-furnace iron and steel scrap together with iron ore, limestone, dolomite, and fluxes. The furnace itself is made of highly refractory materials such as magnesite bricks for the hearths and roofs. Capacities of open-hearth furnaces are as high as 600 tons, and they are usually installed in groups, so that the massive auxiliary equipment needed to charge the furnaces and handle the liquid steel can be efficiently employed.

Though the open-hearth process has been almost completely replaced in most industrialized countries by the basic oxygen process and the electric arc furnace, it nevertheless accounts for about one-sixth of all steel produced worldwide.

open-market operation, any of the purchases and sales of government securities and sometimes commercial paper by the central banking authority for the purpose of regulating the money supply and credit conditions on a continuous basis. Open-market operations can also be used to stabilize the prices of government securities, an aim that conflicts at times with the credit policies of the central bank. When the central bank purchases securities on the open market, the effects will be (1) to increase the reserves of commercial banks, a basis on which they can expand their loans and investments; (2) to increase the price of government securities, equivalent to reducing their interest rates; and (3) to decrease interest rates generally, thus encouraging business investment. If the central bank should sell securities, the effects would be reversed.

Open-market operations are customarily carried out with short-term government securities (in the United States, frequently Treasury bills). Observers disagree on the advisability of such a policy. Supporters believe that dealing in both short-term and long-term securities would distort the interest-rate structure and therefore the allocation of credit. Opponents believe that this would be entirely appropriate because the interest rates on long-term securities have more direct influence on long-run investment activity, which is responsible for fluctuations in employment and income.

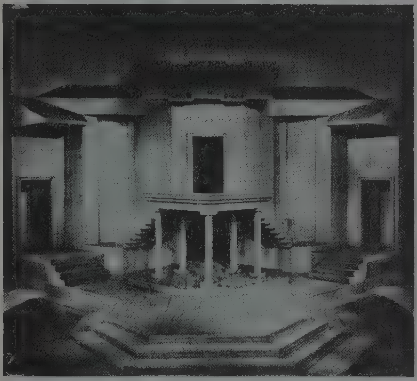
open-pit mining, surface mining (*q.v.*) to obtain minerals other than coal.

Open Range, in U.S. history, the areas of public domain north of Texas where from about 1866 to 1890 more than 5,000,000 cattle were driven to fatten and be shipped off to slaughter. The open ranges of western Kansas, Nebraska, the Dakotas, Montana, Wyoming, and other western states and territories served as huge pasturelands for the herds of the Texas ranchmen.

The cattle trails went from western Texas northward, through Indian territory, and into the vast stretches of public-domain lands in the central and northern Great Plains. During the relatively brief period of open-range cattle grazing, these areas—"cow country"—were largely free of farmers with their barbed-wire fences and grass-eating sheep. Where water was scarce, wells were drilled and dams constructed.

In the mid-1880s, enormous amounts of British capital went to the United States for investment in open-range ranching. Foreign enthusiasm infected American financiers and businessmen, who formed cattle companies to reap the big profits of raising beef for domestic consumption or overseas shipment. The government cooperated by banning the fencing of lands on either the public domain or Indian reservations and by awarding beef contracts to the cattle companies. Beef purchased by the government was distributed among the western Indians, who were left without a food supply when the buffalo herds were destroyed.

The disastrously cold winter of 1886–87 sent the open-range cattle industry into a tailspin from which it never recovered. Investors were ruined as hundreds of thousands of cattle perished in the thick snow and ice. As cattle raising dwindled, homesteaders took over and fenced the lands. By 1890 there was little remaining to indicate what had once been a booming business on the open range.



Open stage designed by Tanya Moiseiwitsch for the Stratford Festival
Courtesy of the Stratford Festival

open stage, also called THRUST STAGE, or PLATFORM STAGE, theatrical stage without a proscenium, projecting into the audience and surrounded on three sides by the audience. The open stage was used in the *corrales* of Spain's Golden Age of theatre (beginning about 1570) and in the traditional nō theatre of Japan. It was also used in the first London playhouses, including the Globe, which were built during Elizabethan times. The open stage evolved from stages set up in the courtyards of inns.

From the mid-17th century until the 20th century the proscenium stage dominated theatre, exposing only the front of the stage to the audience and lending itself well to attempts to create the illusion of reality, which formed the dominant movement in staging during that period. Open stages have come into use again in modern productions that stress actor-audience contact rather than illusionistic effects and also in theatres such as the Shakespearean Festival Theatre at Stratford, Ont., Can., where it is used to approximate the original conditions under which William Shakespeare's plays were performed.

Open University, British experiment in higher education for adults. It opened in January 1971 with headquarters at the new town of Milton Keynes, Buckinghamshire. There are no academic prerequisites for enrollment in Open University, the aim of which is to extend educational opportunities to all. Courses, centrally organized by a distinguished faculty, are conducted by various means, including television, correspondence, study groups, and residential courses or seminars held at centres scattered throughout Great Britain. The correspondence course, however, is the principal educational technique. Televised lectures and seminars merely supplement it.

opencast mining, surface mining (*q.v.*) to obtain minerals other than coal.

opera, a drama set to music and made up of vocal pieces with orchestral accompaniment and orchestral overtures and interludes. In some operas, such as those of Richard Wagner, the music is continuous throughout an act; in others, it is broken up either by recitative (which is more like sung speech) or by dialogue.

A brief treatment of opera follows. For full treatment, *see* MACROPAEDIA: Musical Forms and Genres.

Opera had its origins in the liturgical drama of the Middle Ages, and this form was combined in 16th-century Florence with contemporary notions of classical Greek tragedy. The subjects chosen by such early operatic composers as Jacopo Peri, Jacopo Corsi, Francesco Cavalli, and Claudio Monteverdi were the old myths about Daphne, Ulysses, and Orpheus, though Monteverdi in his *L'incoronazione di Poppea* (1642; *The Coronation of Poppaea*) dealt with the Roman historical personages of Nero and Poppaea.

In Paris at the court of Louis XIV the new art was encouraged in the lavish works of Jean-Baptiste Lully, while at the court in Vienna, the Italian operas of Pietro Antonio Cesti were performed. In England the development was more sketchy, but one operatic masterpiece was achieved: Henry Purcell's *Dido and Aeneas* (1689). When opera did become popular in London, in the mid-18th century, it was in a form imported from Italy and refined by the German-born composer George Frideric Handel, who was in turn largely influenced by the style of Alessandro Scarlatti, which formalized the music into recitative and arias. In these arias the action stopped while a character expressed his emotions of the moment at length. At this time the role of the leading singer became more important, with special attention devoted to the castrati, who sang most of the male roles. Contemporaneously in France, Jean-Philippe Rameau was developing opera along different lines, with an emphasis on declamation, a more flexible form, and heightened visual displays, including extensive ballet interludes.

At the same time, a vein of more mundane, comic opera was coming to the fore. John Gay's *The Beggar's Opera* (1728) in England was a brilliant social and political satire. A series of operas on more common subjects was produced in Hamburg. Naples was also the source of pieces, such as Giovanni Battista Pergolesi's *La serva padrona* (1733; *The Maid as Mistress*), on popular themes.

Christoph Willibald Gluck contributed to this genre in the early part of his career. Later he introduced his famous reforms, which were designed to reduce the role of the virtuoso singer and place emphasis on the drama. His *Orfeo ed Eurydice* (1762), *Alceste* (1767), and two operas about Iphigenia are samples of the new method, often severely classical in effect and tragic in emotional tone. Wolfgang Amadeus Mozart followed a similar vein in his first masterpiece, *Idomeneo* (1781), but he soon managed to combine the attributes of his predecessors with comic opera in his three masterpieces, *Le Nozze di Figaro* (1786; *The Marriage of Figaro*), *Don Giovanni* (1787), and *Così fan tutte* (1790), developing the importance of ensembles and using symphonic form in his finales. His *Die Zauberflöte* (1791; *The Magic Flute*) raised the singspiel (a comic opera with spoken dialogue) into the realm of the sublime.

Luigi Cherubini, with his *Médée* (1797), and Gaspare Spontini, with his *La Vestale* (1807), carried forward the ambitions of serious opera and influenced Ludwig van Beethoven, whose *Fidelio* (1805) is unique in operatic history. In the meantime, Domenico Cimarosa's comedy *Il matrimonio segreto* (1792; *The Secret Marriage*) formed the inspiration for Gioacchino Rossini's series of successful comic operas, including *Il barbiere di Siviglia* (1816; *The Barber of Seville*) and *La Cenerentola* (1817;

Cinderella). His later operas, however, are dignified and romantic in style. Their grandeur of manner led to the even grander style of Giacomo Meyerbeer.

In the 19th century opera developed along national lines. Giovanni Bellini's affecting works and Gaetano Donizetti's tragedies and comedies (he wrote more than 60 operas) were the stepping stones to the glory of Giuseppi Verdi, who himself developed from such successes as *Rigoletto* (1851), *Il trovatore* (1853; *The Troubadour*), *La traviata* (1853; *The Fallen Woman*), and *Aida* (1871) to the complete mastery of drama and music achieved in *Otello* (1887) and *Falstaff* (1893). In Germany, Carl Maria von Weber's Romantic opera *Der Freischütz* (1821) and the works of Heinrich August Marschner paved the way for the giant figure of Richard Wagner, whose music dramas revolutionized opera. His major works—*Die Meistersinger* (1868), *Tristan und Isolde* (1865), *Parsifal* (1882), and *Der Ring des Nibelungen* (1876; *The Ring of the Nibelung*)—remain one of the peaks of operatic achievement to this day.

After the brief popularity of Daniel-François-Esprit Auber, France moved on to the era of Charles Gounod, Ambroise Thomas, Georges Bizet, and Jules Massenet, in whose works grand opera and opéra-comique are ingeniously melded. Hector Berlioz meanwhile trod his own individual course, unrecognized as a master until the middle of the 20th century, when his *Les Troyens* (composed 1855–58) was recognized as a great tragic epic.

Meanwhile nationalism exerted its influence on opera in Russia and elsewhere. The seminal works of Mikhail Ivanovich Glinka led to the very different operas of Peter Ilich Tchaikovsky and Modest Mussorgsky. In Czechoslovakia, Bedřich Smetana's patriotic works were followed by Antonín Dvořák's more lyrical operas. In the 20th century Leoš Janáček's realistic works have won increasing attention. Hungary produced Béla Bartók and his *Bluebeard's Castle* (1918), and Spain Manuel de Falla's *La vida breve* (1913). All these composers drew heavily from the folk-oriented music of their individual countries.

In Italy the school of *verismo,* led by Giacomo Puccini and Pietro Mascagni, flourished, culminating in Puccini's mature works: *La Bohème* (1896), *Tosca* (1900), *Madama Butterfly* (1904), and *La fanciulla del west* (1910; *The Girl of the Golden West*). In Germany, Richard Strauss carried forward the aims of music drama in *Salome* (1905) and *Elektra* (1909), then tamed their epic qualities in his no less successful comedies, *Der Rosenkavalier* (1911) chief among them. In France, Claude Debussy's *Pelléas et Mélisande* (1902), though a highly individual creation, was obviously influenced by *Tristan.* Maurice Ravel left two charming one-act pieces. Arnold Schoenberg's *Moses und Aron* (1957), Alban Berg's *Wozzeck* (1925) and *Lulu* (1937), Igor Stravinsky's *The Rake's Progress* (1951), Kurt Weill's satiric pieces, and Benjamin Britten's *Peter Grimes* (1945) have been acclaimed modern works.

Opéra, in full THÉÂTRE NATIONALE DE L'OPÉRA, Paris opera house designed by Charles Garnier. The building, considered one of the masterpieces of the Second Empire style, was begun in 1861 and opened with an orchestral concert on Jan. 5, 1875. The first opera performed there was Fromental Halévy's work *La Juive* on Jan. 8, 1875.

The Opéra also houses the Académie Nationale de Musique, which had been founded in 1669–71 during the reign of Louis XIV.

opera buffa (Italian: "comic opera"), genre of comic opera originating in Naples in the mid-18th century. It developed from the intermezzi, or interludes, performed between the acts of serious operas. Opera buffa plots centre on two groups of characters: a comic group of (usually) five male and female personages and a pair (or more) of lovers. The dialogue is sung. The operatic finale, a long, formally organized conclusion to an opera act, including all principal personages, developed in opera buffa. The earliest opera buffa still regularly performed is Giovanni Battista Pergolesi's *La serva padrona* (1733; *The Maid as Mistress*). Opera buffa is distinct from French opéra-bouffe, a general term for any light opera.

opéra-comique, French form of opera in which spoken dialogue alternates with self-contained musical numbers. The earliest examples of opéra-comique were satiric comedies with interpolated songs, but the form later developed into serious musical drama distinguished from other opera only by its spoken dialogue.

The opéra-comique developed in the early 18th century out of the *comédies de vaudeville,* farcical entertainments performed at fairs. Their characters derived from those of the improvised Italian commedia dell'arte, and they included popular songs, or vaudevilles, which were given new, often satiric words. In 1715 the various performing groups were combined in Paris as the Théâtre de l'Opéra-Comique.

In the mid-18th century the writer Charles-Simon Favart brought a higher literary level to the opéra-comique texts, and newly composed songs began to be added, eventually replacing the popular vaudevilles. Plots began to centre on characters from everyday life. This emphasis was influenced by Jean-Jacques Rousseau's theories of the noble, simple life. He himself composed an early example of opéra-comique, *Le Devin du village* (1752; *The Village Soothsayer*).

Lesser 18th-century composers such as Nicolas Dalayrac, Egidio Duni, Pierre-Alexandre Monsigny, and François Philidor specialized in opéra-comique. Christoph Willibald Gluck, writing for audiences in Vienna that favoured the French genre, was the only great composer of that era to devote himself extensively to it. The opéras-comiques of this period were characterized by social comment, light plots of romance or intrigue, and tuneful music. The tradition continued in the late 18th and early 19th centuries in the work of André Grétry, François Boieldieu, and Daniel Auber, who treated more serious and romantic subjects and made a more evocative use of the orchestra.

Also characteristic of this period was the "rescue opera" with its plot of political tyranny defeated. Toward 1830 the opéra-comique developed into serious music drama approximating grand opera and gradually lost its satiric character. Georges Bizet's *Carmen* (1875) is a late, isolated example of opéra-comique, possessing spoken dialogue but dealing with a tragic theme.

opera seria (Italian: "serious opera"), style of Italian opera dominant in 18th-century Europe. It emerged in the late 17th century, notably in the work of Alessandro Scarlatti and other composers working in Naples, and is thus frequently called Neapolitan opera. The primary musical emphasis of opera seria was on the solo voice and on bel canto, the florid vocal style of the period. Chorus and orchestra played a circumscribed role. High voices were cultivated, both in women and in the castrati, or eunuch sopranos. Music and text were divided into recitative (simply accompanied dialogue sung with speech rhythms), which advanced the dramatic action, and arias, solos that reflected a character's feelings and also served as vehicles for vocal virtuosity. Arias characteristically took the da capo form (ABA), the first section (A) being repeated after the B section, but with improvised embellishments.

Apostolo Zeno and Pietro Metastasio were the leading masters of the required libretto style, which presented characters from classical mythology or history and avoided diversionary comic episodes. Among the examples of opera seria are *Rinaldo* (1711), by George Frideric Handel, *Demofoonte* (1764), by Niccolò Jommelli, *Didone abbandonata* (1725; *Dido Abandoned*), by Nicola Porpora, and *Artaserse* (1730), by Johann Adolf Hasse.

operating system, software that controls the many different operations of a computer and directs and coordinates its processing of programs. An operating system is a remarkably complex set of instructions that schedules the series of jobs (user applications) to be performed by the computer and allocates them to the computer's various hardware systems, such as the central processing unit, main memory, and peripheral systems. The operating system directs the central processor in the loading, storage, and execution of programs and in such particular tasks as accessing files, operating software applications, controlling monitors and memory storage devices, and interpreting keyboard commands. When a computer is executing several jobs simultaneously, the operating system acts to allocate the computer's time and resources in the most efficient manner, prioritizing some jobs over others in a process called time-sharing. An operating system also governs a computer's interactions with other computers in a network.

The English mathematician Charles Babbage conceived the first set of operating instructions for a digital computer in the design of his "analytical engine" (1834), which was never built. The first operational stored-program computer was completed in 1949 at the University of Cambridge. The operating systems that came into wide use between 1950 and 1980 were developed mostly by private companies to operate proprietary mainframe computers and applications. The most popular of these systems—which are used to run mainframes built by the industry leader, International Business Machines Corporation (IBM)—include MVS, DOS/VSE, and VM.

In addition to proprietary systems, open, or portable, operating systems have been developed to run computers built by other manufacturers. Open operating systems rose to prominence during the 1980s and are now widely used to run personal computers (PCs) and workstations, which use extremely powerful PCs. The dominant operating system is the disk operating system (DOS) developed by Microsoft Corporation. Also popular is Microsoft's Windows NT, an adjunct to DOS that provides enhanced computer graphics.

Besides mainframe and PC-type operating systems, network operating systems have been developed that allow PCs and workstations to share peripheral devices and communicate with a mainframe computer or a server (*i.e.,* a device that stores information and assists in the operation of a network of computers). Network operating systems usually act as an additional layer above a primary operating system, such as DOS. Dominant in this category are Novell Inc.'s UNIX, an operating system designed for networked workstations, and Novell's Netware, which is the leading network operating system.

operations research, also called OPERATIONAL RESEARCH, the application of scientific methods to the management and administration of organized military, governmental, commercial, and industrial systems.

A brief treatment of operations research follows. For full treatment, *see* MACROPAEDIA: Industrial Engineering and Production Management.

Operations research began as a distinct discipline in the early years of World War II in Britain when scientists cooperated with personnel in the Royal Air Force to improve the efficiency of radar to detect enemy aircraft.

That specific task led to joint efforts to improve the entire system of early warning and coordinated defense, and by the early 1940s, operations research sections were established throughout the British armed services to evaluate, test, and maintain military systems. U.S. military groups began to employ operations research in 1942, and in 1948 the discipline was acknowledged as an academic pursuit with the introduction of a course in nonmilitary techniques at the Massachusetts Institute of Technology. In the early 1950s, American industry adapted programs of operations research to improve the management of particular industrial systems.

The discipline is characterized by a systems orientation, the use of interdisciplinary teams of researchers, and the adaptation of scientific method to the conditions under which research is conducted. Because laboratory experimentation is inappropriate to large systems, for each system under study a representative model is devised. The solutions that are derived from scientific testing of models are recommended to the system manager, who bears responsibility for their subsequent implementation and control.

Prototypical operational problems studied by research teams include allocation of resources (such as manpower, machines, money, products, or facilities); control of inventory; replacement and maintenance of resources; and queuing, or dealing in sequence with people or items waiting for a service or product.

Computers have become an increasingly important tool of operations research. Management information systems (MIS) allow operations researchers to manipulate computerized company records to analyze trends and cycles and monitor company performance against projections or budgets. Decision support systems allow analysts to manipulate the variables of a computerized model of a real system to test and evaluate the consequences of alternative programs before they are implemented.

operator, in mathematics, any symbol that indicates an operation to be performed. Examples are $\sqrt{x}$ (which indicates the square root of x is to be taken) and d/dx (which indicates a differentiation with respect to x is to be performed). As a synonym for function, the word indicates the particular operation of the function, the association of a set of objects (the independent variable) with another set of objects (the dependent variable). The domain of the independent variable is mapped onto its image in the range of the dependent variable. An operator may be a transformation, map, or mapping.

operetta, musical-dramatic production similar in structure to an opera but characteristically having a romantically sentimental plot interspersed with songs, orchestral music, and rather elaborate dancing scenes, along with the spoken dialogue. The operetta originated in part with the tradition of popular theatrical genres such as the commedia dell'arte that flourished in Italy from the 16th to the 18th century and the *vaudeville* of France. In the 19th century the term operetta came to designate stage plays with music that were generally of a farcical and satiric nature. The most successful practitioner of this art was Jacques Offenbach, whose *Orphée aux enfers* (1858; *Orpheus in the Underworld*) and *La Belle Hélène* (1864) used the guise of Greek mythology to express a satiric commentary on contemporary Parisian life and mores. In England, from the late 1870s, the team of Sir William S. Gilbert and Sir Arthur Sullivan, influenced by Offenbach's works, established their own part in the genre with such familiar works as *H.M.S. Pinafore* (1878), *The Pirates of Penzance* (1879), *The Mikado* (1885), and *Iolanthe* (1882), among many others.

In Vienna, about 1870, Johann Strauss the Younger was producing operettas of a more romantic and melodious type, such as *Die Fledermaus* (1874; *The Bat*), which in many respects reconciled the differences between operetta and opera. Toward the end of the 19th century, perhaps influenced by the gentler quality of Viennese operetta, the French style became more sentimental and less satiric, stressing elegance over parodic bite. Viennese successors to Strauss, such as Franz Lehár (Hungarian by birth), Oscar Straus, and Leo Fall, and French composers such as André Messager contributed to the evolution of operetta into what is now called musical comedy.

The operetta traditions of Austria, France, Italy, and England began to wane in the early 20th century but found new life in the United States. Victor Herbert, Reginald De Koven, and Sigmund Romberg were all significant transitional figures, adding to American musical life with such operettas as, respectively, *Babes in Toyland* (1903), *Robin Hood* (1890), and *The Student Prince* (1924) and *The Desert Song* (1926).

In the United States, works that might be regarded as just short of serious opera and hardly recognizable as comedy are George Gershwin's *Porgy and Bess* (1935), Kurt Weill's *The Threepenny Opera* (1928), Jerome Kern's *Show Boat* (1927), Leonard Bernstein's *West Side Story* (1957), and Stephen Sondheim's *Sweeney Todd* (1979). *See also* musical.

operon, genetic regulatory system of single-celled organisms (prokaryotes) and their viruses in which genes coding for functionally related proteins are clustered along the DNA, enabling their expression to be controlled coordinately in response to the needs of the cell. By providing prokaryotes with the means to produce proteins only when and where they are required, the operon allows the cell to conserve energy (which is an important part of an organism's life strategy).

A typical operon consists of a group of structural genes that code for enzymes involved in a metabolic pathway, such as the biosynthesis of an amino acid. These genes are located contiguously on a stretch of DNA and are under the control of one promoter (a short segment of DNA to which the RNA polymerase binds to initiate transcription). A single unit of messenger RNA (mRNA) is transcribed from the operon and is subsequently translated into separate proteins.

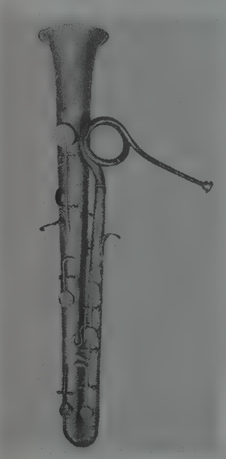
The promoter is controlled by various regulatory elements that respond to environmental cues. One common method of regulation is carried out by a regulator protein that binds to the operator region, which is another short segment of DNA found between the promoter and the structural genes. The regulator protein can either block transcription, in which case it is referred to as a repressor protein; or as an activator protein it can stimulate transcription. Further regulation occurs in some operons: a molecule called an inducer can bind to the repressor, inactivating it; or a repressor may not be able to bind to the operator unless it is bound to another molecule, the corepressor. Some operons are under attenuator control, in which transcription is initiated but is halted before the mRNA is transcribed. This introductory region of the mRNA is called the leader sequence; it includes the attenuator region, which can fold back on itself, forming a stem-and-loop structure that blocks the RNA polymerase from advancing along the DNA.

The operon theory was first proposed by the French microbiologists François Jacob and Jacques Monod in the early 1960s. In their classic paper they described the regulatory mechanism of the *lac* operon of *Escherichia coli,* a system that allows the bacterium to repress the production of enzymes involved in lactose metabolism when lactose is not available.

Opet, ancient Egyptian festival of the New Year. In the celebration of Opet, the god Amon together with Mut, his consort, and Khons, their son, made a ritual journey from their shrines at Karnak to the temple of Luxor (called *Ipet resyt* in pharaonic Egyptian, hence the name of the festival). Scenes of the festival in the Colonnade of the Temple of Luxor carved during Tutankhamen's reign (1333–23 BC) show white-robed priests carrying statues of Amon, Mut, and Khons in golden barks through the streets of ancient Thebes, thence onto river barges and on to Luxor. Following this appearance to the populace, the statues remained in the temple of Luxor for about 24 days, during which the city remained in festival. The images were returned by the same route to their shrines in Karnak in a second public appearance that closed the festival. A direct survival of the ancient cult is seen in the present-day feast of the Muslim holy man Sheikh Yūsuf al-Haggāg, whose boat is carried about Luxor amid popular celebration. His mosque stands in the northeastern corner of the first court of the temple of Luxor, over the foundations of a Byzantine church.

Through an association with Mut, the name Opet (or Apet) was also applied to a local city goddess of Thebes, who was depicted in a manner similar to that of Taurt, the hippopotamus goddess of fertility and childbirth.

ophicleide, brass wind musical instrument with a cup-shaped mouthpiece and padded keys, the bass version of the old keyed bugle.



Belgian ophicleide; in the Musée Instrumental du Conservatoire Royal, Brussels

By courtesy of the Musée Instrumental, Brussels; photograph, © A.C.L., Brussels

The name (from Greek *ophis* and *kleid,* "serpent" and "key") alludes to its improvement on the military band "upright serpents" (now-obsolete S-shaped bass instruments sounded by vibration of the lips against a cup mouthpiece) by providing 11 brass keys to replace open finger holes.

The ophicleide was normally built in C or B♭ with the same compass (three octaves) as the euphonium and with a similar tone. It was invented in 1817 by the Parisian Jean Asté, known as Halary, and was extensively used in French and British bands and orchestras until replaced by the tuba near the end of the 19th century.

Ophioglossaceae, only family in the fern order Ophioglossales, a primitive group not closely related to other ferns. The family contains three genera and about 55 species. Its members are characterized by leaves (fronds) that are divided into two parts, a sterile green blade and a fertile spike with spore-producing structures (sporangia) embedded in its tissues. Most species produce only one such frond each season. The separate genera are distinguished mainly by the position and structure of the sporangia.

The genus *Ophioglossum* (adder's-tongue ferns), with tropical and temperate species, has sporangia in two rows near the tip of a usually unbranched, narrow, fertile spike. The genus *Botrychium,* distributed throughout the world, includes the grape ferns, moonworts, and rattlesnake fern. *Helminthostachys,* with one species (*H. zeylanica*) in Sri Lanka (Ceylon) and regions extending from the Himalayas to Queensland, Australia, has sporangia in small groups on both sides of the fertile spike.

Rattlesnake fern (*Botrychium virginianum*)

Louise K. Broman from Root Resources

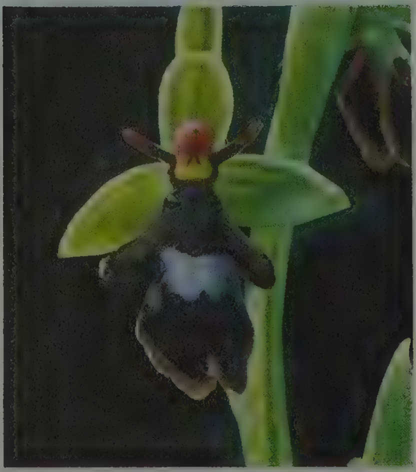
Ophir, unidentified region famous in Old Testament times for its fine gold. The geographic list of Genesis 10 apparently places it in Arabia, but in the time of Solomon (*c.* 920 BC), Ophir was thought of as being overseas. Gold, almug (or algum) wood (*i.e.,* sandalwood), ivory, monkeys, and peacocks were procured there. Many areas of the Arabian Peninsula have been proposed as the site of Ophir; the principal alternative locations overseas are East Africa and India.

That many Egyptian pharaohs reported sending naval expeditions to Punt (Somaliland) for monkeys, ivory, frankincense, and slaves lends credence to an East African site. On the other hand, the Jewish historian Josephus and St. Jerome evidently understood that India was the location of Ophir. The Hebrew words for the products of Ophir may be derived from Indian languages; furthermore, sandalwood and peacocks are commonly found in India, whereas, at least in modern times, they do not exist in East Africa.

Ophite (from Greek *ophis,* "serpent"), member of any of several Gnostic sects that flourished in the Roman Empire during the 2nd century AD and for several centuries thereafter. A variety of Gnostic sects, such as the Naassenes and Cainites, are included under the designation Ophites. These sects' beliefs differed in various ways, but central to them all was a dualistic theology that opposed a purely spiritual Supreme Being, who was both the origin of the cosmic process and the highest good, to a chaotic and evil material world. To the Ophites, man's dilemma results from his being a mixture of these conflicting spiritual and material elements. Only gnosis, the esoteric knowledge of good and evil, can redeem man from the bonds of matter and make him aware of the unknown God who is the true source of all being.

The Ophites regarded the Jehovah of the Old Testament as merely a demiurge, or subordinate deity who had created the material world. They attached special importance to the serpent in the biblical book of Genesis because he had enabled men to obtain the all-important knowledge of good and evil that Jehovah had withheld from them. Accordingly, the serpent was a true liberator of mankind since he first taught men to rebel against Jehovah and seek knowledge of the true, unknown God. The Ophites further regarded the Christ as a purely spiritual being who through his union with the man Jesus taught the saving gnosis.

Ophrys, genus of orchids, family Orchidaceae, containing approximately 30 species of plants native to Eurasia and North Africa. All have metallic-coloured, hairy flowers that resemble insects. Each plant is less than 30 cm (1 foot) tall and bears several flowers on a single spike. Male insects attempt to copulate with the flowers, which resemble females of their own species. During this process, pollen sacs become attached to the insect's body and are transferred to the next flowers visited. The fly orchid (*O. insectifera*) and the bee orchid (*O. apifera*) are common European species. Some species of *Ophrys* are known as spider orchids because their flower lips resemble the bodies of spiders.



Ophrys

Ingmar Holmasen

ophthalmology, medical specialty dealing with the diagnosis and treatment of diseases and disorders of the eye. The first ophthalmologists were oculists. These paramedical specialists practiced on an itinerant basis during the Middle Ages. Georg Bartisch, a German physician who wrote on eye diseases in the 16th century, is sometimes credited with founding the medical practice of ophthalmology. Many important eye operations were first developed by oculists, as, for example, the surgical correction of strabismus, first performed in 1738. The first descriptions of visual defects included those of glaucoma (1750), night blindness (1767), colour blindness (1794), and astigmatism (1801).

The first formal course in ophthalmology was taught at the medical school of the University of Göttingen in 1803, and the first medical eye clinic with an emphasis on teaching, the London Eye Infirmary, was opened in 1805, initiating the modern specialty. Advances in optics by the Dutch physician Frans Cornelis Donders in 1864 established the modern system of prescribing and fitting eyeglasses to a particular vision problem. The invention of the ophthalmoscope for looking at the interior of the eye created the possibility of relating eye defects to internal medical conditions.

In the 20th century, advances in the field have chiefly involved the prevention of eye disease through regular eye examinations and the early treatment of congenital eye defects. Another major development was the eye bank, first established in 1944 in New York, which made corneal tissues for transplantation more generally available.

The function of the human eye is to receive visual images. Whatever adversely affects vision is the concern of the ophthalmologist, whether it be caused by faulty development of the eye, disease, injury, degeneration, senescence, or refraction. He makes tests of visual function and examines the interior of the eye as part of a general physical examination for symptoms of systemic or neurologic diseases. He prescribes medical treatment for eye disease and glasses for refraction and performs surgical operations where indicated. *See also* optometry.

ophthalmoplegia, also called EXTRAOCULAR MUSCLE PALSY, paralysis of the extraocular muscles, which control the movements of the eye and of the pupil. Ophthalmoplegia usually involves either the third (oculomotor), fourth (trochlear), or sixth (abducent) cranial nerves. In oculomotor paralysis, the muscles controlling one pupil are affected so that the pupil drifts outward and cannot turn inward (*i.e.,* toward the nose) past the midline point. Abducent nerve paralysis affects another ocular muscle so that one eye turns inward and cannot turn outward past the midline. Trochlear paralysis, involving still another muscle, causes a vertical deviation of the affected eye. Double vision is the characteristic symptom in all three conditions.

Ophthalmoplegia is usually caused by disorders that affect the nervous system, including multiple sclerosis, cerebral tumours, and cerebrovascular disease. It can also occur as a complication of muscle disorders such as myasthenia gravis, in which it is usually associated with other muscular symptoms.

ophthalmoscope, instrument for inspecting the interior of the eye, invented in 1851 by the German physiologist Hermann von Helmholtz. The device consists of a strong light that can be directed into the eye by a small mirror. The light reflects off the retina and back through a small hole in the ophthalmoscope, through which the examiner sees a magnified image of the structures at the back of the eye, including the optic disk, retina, blood vessels, macula, and choroid.

Ophüls, Max, Ophüls also spelled OPULS (b. May 6, 1902, Saarbrücken, Ger.—d. March 26, 1957, Hamburg, W.Ger.), German motion-picture director whose mastery of fluid camera movement gave his films a characteristic lyrical flow. He was one of the first truly international directors, sensitive to national differences and to the human qualities common to all his characters.

Ophüls was an actor, stage director, and producer in Germany and Austria from 1921 to 1930. His first famous film was *Liebelei* (1932; "Love Affair"). A bittersweet love story set in Vienna, it exemplified the narrative excellence that characterized his subsequent films. In Italy he directed *La signora di tutti* (1934; "The Mistress of All"); for French audiences he made *La Tendre Ennemie* (1936; *The Tender Enemy*), *Sarajevo* (1940), and a French version of *Liebelei.* Between 1947 and 1949 he was in the United States (where he was billed as Opuls) and made four Hollywood films: *The Exile* (1947), *Letter from an Unknown Woman* (1948), *Caught* (1949), and *The Reckless Moment* (1949). Between 1925 and 1941 Ophüls was also a writer and producer for German and French radio stations.

Returning to France in 1950 he directed the stylishly witty *La Ronde* (1950; "The Round") and *Le Plaisir* (1952; "Pleasure"), considered two of his finest pictures. His last film, *Lola Montès* (1955; *The Sins of Lola Montès,* or *Lola Montez*), is also highly regarded, despite the fact that it has rarely been seen in Ophüls' original version.

Opie, John (b. May 1761, St. Agnes, Cornwall, Eng.—d. April 9, 1807, London), English portrait and historical painter popular in England during the late 18th century.

Opie received art instruction from John Wolcot ("Peter Pindar") in Truro from about 1775 and in 1781 was successfully launched in London as the "Cornish wonder," a self-taught genius. Opie attempted fashionable portrait painting but was most at ease with unsophisticated subjects, where his gifts for depicting rough textures in strong chiaroscuro could best be displayed. The works of Rembrandt, Caravaggio, and Velázquez were strong formative elements in his art. In 1786 he was commissioned to paint seven illustrations for John Boydell's Shakespeare Gallery. His first exhibited historical work was the "Assassination of James I of Scotland" (1786), followed by "The Murder of Rizzio" (1787), which secured his election in 1787 as a member of the Royal Academy. He was made a professor of painting at the academy in 1805.

John Opie, self-portrait, 1785; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Öpik, Ernest Julius (b. Oct. 23, 1893, Port-Kunda, Estonia, Russian Empire—d. November 1985), Estonian astronomer best known for his studies of meteors and meteorites, and whose life work was devoted to understanding the structure and evolution of the cosmos.

Öpik graduated with a gold medal from Tallinn University in Estonia in 1911, and in 1916 he received his degree in astronomy from Moscow University. In 1919 he joined the staff of the Tashkent Observatory (now in Uzbekistan) and from 1921 to 1944 worked at the Astronomical Observatory in Tartu, Estonia. The research he performed during the early 1920s elucidated the theory of the entry of high-speed bodies into the atmosphere and was fundamental to the understanding of ablation, the peeling back of meteor surfaces during vaporization. In 1922 he proposed the double-count method of tallying meteors, in which two observers work simultaneously. His work on meteors enabled him to correctly predict the frequencies of craters on Mars many years before these could be ascertained. He also contributed to cometary studies and proposed that a reservoir of comets orbit the Sun, providing the source of those few comets that assume orbits sufficiently eccentric to bring them so close to the Sun that they are visible.

In 1922 Öpik proved that the source of stellar energy was nuclear and heavily dependent upon temperature. At this time he also made an estimate of the distance of the Andromeda Nebula that was still valid a half century later. In the 1930s and '50s he made estimates of the age of the universe from meteorites and from galactic and extragalactic statistics. After World War II Öpik left his Baltic home land and joined the staff of the Armagh Observatory in Northern Ireland. From 1956 he held a position on the faculty of the University of Maryland, College Park, dividing his time equally between Armagh and Maryland.

opisthobranch, any marine gastropod of the approximately 2,000 species of the subclass Opisthobranchia. These gastropods, sometimes called sea slugs, breathe either through gills, which are located behind the heart, or through the body surface. The shell and mantle cavity are reduced or lacking. Larval asymmetry may give way to bilateral symmetry in the adult through a partial untwisting of the embryonic viscera. Reproduction is hermaphroditic—*i.e.,* both male and female reproductive organs occur in one individual.

For more information on the major groups of opisthobranchs, *see* bubble shell; nudibranch; sea butterfly; sea hare.

Opitz (von Boberfeld), Martin (b. Dec. 23, 1597, Bunzlau, Silesia—d. Aug. 20, 1639, Danzig), German poet and literary theorist who introduced foreign literary models and rules into German poetry.

Opitz studied at the universities of Frankfurt an der Oder, Heidelberg, and Leiden, where he met Daniel Heinsius. He led a wandering life in the service of various territorial nobles. In 1625, as a reward for a requiem poem on the death of Charles Joseph of Austria, he was crowned laureate by the Holy Roman emperor Ferdinand II, who later ennobled him. In 1629 he was elected to the Fruchtbringende Gesellschaft, the most important of the literary societies that aimed to reform the German language. He went to Paris in 1630, where he made the acquaintance of Hugo Grotius. He lived from 1635 until his death at Danzig (Gdańsk), where Władysław IV of Poland made him his historiographer and secretary.

Opitz was the head of the so-called First Silesian school of poets and during his life was regarded as the greatest German poet. He was the "father of German poetry," at least in respect to its form. His *Aristarchus sive de Contemptu Linguae Teutonicae* (1617) asserted the suitability of the German language for poetry. His influential *Buch von der deutschen Poeterey*, written in 1624, established long-standing rules for the "purity" of language, style, verse, and rhyme. It insisted upon word stress rather than syllable counting as the basis of German verse and recommended the alexandrine. The scholarly, stilted, and courtly style introduced by Opitz dominated German poetry until the middle of the 18th century. Opitz' poems follow his own rigorous rules. They are mostly didactic and descriptive—formal elaborations of carefully considered themes—containing little beauty and less feeling. The generation of poets who built upon his work far outshone him.

Opitz' activities as an aesthetic educator and translator have assumed much importance in retrospect. He translated from Heinsius, Grotius, Seneca, and Sophocles; he partly translated from the text by O. Rinuccini the libretto of *Dafne,* the first opera in German; he introduced the political novel (John Barclay's *Argenis*) into Germany; and he edited (1638) the German version of Sir Philip Sidney's *Arcadia* and the 11th-century *Annolied.* Opitz' *Opera Poetica* appeared in 1646.

opium, narcotic drug obtained from the immature fruits of the opium poppy (*Papaver somniferum*; *see* poppy), family Papaveraceae, by collecting and drying the juice from slightly incised fruits. The white juice coagulates and turns brown after exposure to air, and some types of opium appear black. Raw opium is marketed as lumps, cakes, or bricks that may be powdered or further treated.

The legitimate uses of opium are medical and include the extraction of purified opium alkaloids (*e.g.,* morphine, codeine; *qq.v.*) and the manufacture of alkaloid derivatives (*e.g.,* dihydromorphinone, dihydrocodeinone). Opium, either raw or purified as alkaloids and their derivatives (such as heroin), is also used illicitly.

The active principles of opium reside in its alkaloids, the most important of which is morphine. Opium alkaloids are of two types, depending on chemical structure and action. Morphine, codeine, and thebaine, which represent one type, act upon the nervous system. They are analgesic, narcotic, and potentially addicting compounds. Papaverine, noscapine (formerly called narcotine), and most of the other opium alkaloids are not analgesic, narcotic, or addicting; instead they act to relax involuntary (smooth) muscles. For many years morphine was the physician's mainstay for the relief of severe pain, although powerful synthetic substitutes have now partially replaced it. In the treatment of pain the opium alkaloids are given orally, rectally, or by injection. For the symptomatic treatment of diarrhea, opium is used orally in the form of its alcoholic tincture, laudanum, and as the diluted and camphorated tincture of opium, paregoric. In ancient times, the drug was made into pills or added to beverages.

In the 1st century AD, Dioscorides, whose *De Materia Medica* was the leading text on pharmacology for centuries, described opium. Assyrian herb lists and medical texts refer to both the opium poppy plant and opium. The growth of poppies for their opium content spread slowly eastward from Greece and Mesopotamia. Apparently opium was unknown in either India or China in ancient times, and its widespread cultivation in these countries is a comparatively recent development. Knowledge of the opium poppy first reached China about the 7th century AD, but Japan probably did not begin cultivating it until the 15th century.

Opium smoking did not begin until after the discovery of America, where the practice of pipe smoking originated. It was reported as a problem in China about the middle of the 17th century. Between World Wars I and II the illicit cultivation of the poppy for opium became established in the mountains of western Mexico. Later, it was begun to some extent in Peru and Ecuador.

The cultivation of opium, both licit and illicit, is carried on chiefly in Asia. The two major opium-producing and opium-exporting countries in the world are India and Turkey. The medical needs of the world exceeded 1,700 tons by the 1980s, in spite of the advent of synthetic drugs that often can be substituted for opium and its alkaloids.

The habitual use of opium produces physical and mental deterioration and shortens life. In acute poisoning through the overdosage of opium, respiratory depression, which otherwise may be fatal, can be treated with levallorphan or nalorphine (*q.v.*).

Opium Wars, two trading wars in the mid-19th century in which Western nations gained commercial privileges in China; the first Opium War (1839–42) was between China and Britain, and the second Opium War (1856–60), also known as the "Arrow" War, or the Anglo-French War in China, was fought by Britain and France against China.

At the beginning of the 19th century British traders began illegally importing opium into China. In 1839 the Chinese government attempted to stop the opium trade and confiscated all opium warehoused at Canton by British merchants. The antagonism between the two sides increased a few days later when some drunken British sailors killed a Chinese villager. The British government, which did not trust the Chinese legal system, refused to turn the accused men over to the Chinese courts.

Hostilities broke out, and the small British forces were quickly victorious. The Treaty of Nanking, signed Aug. 29, 1842, and the

British Supplementary Treaty of the Bogue, signed Oct. 8, 1843, provided for the payment of a large indemnity by China, cession of five ports for British trade and residence, and the right of British citizens to be tried by British courts. Other Western countries quickly demanded and were given similar privileges.

In 1856 the British, seeking to extend their trading rights in China, found an excuse to renew hostilities when some Chinese officials boarded the ship *Arrow* and lowered the British flag. The French joined the British in this war, using as their excuse the murder of a French missionary in the interior of China.

The allies began military operations in late 1857 and quickly forced the Chinese to sign the treaties of Tientsin (1858), which provided residence in Peking for foreign envoys, the opening of several new ports to Western trade and residence, the right of foreign travel in the interior of China, and freedom of movement for Christian missionaries. In further negotiations in Shanghai later in the year, the importation of opium was legalized. The Chinese, however, refused to ratify the treaties, and the allies resumed hostilities, captured Peking, and burned the emperor's summer palace. In 1860 the Chinese signed the Peking Convention, in which they agreed to observe the treaties of Tientsin. *See also* Unequal Treaty.

Opobo (Nigeria): *see* Ikot Abasi.

Opole, *województwo* (province), southwestern Poland, established in 1975. It is bordered by the Czech Republic on the south and by the provinces of Wałbrzych and Wrocław on the west, Kalisz on the north, Częstochowa on the northeast, and Katowice on the southeast. Physiographically, Opole ranges from the sandy plains and forests in the northeast to the Sudeten (Sudety) foothills in the south. The Oder River crosses the province southeast to northwest; other rivers are the Nysa Kłodzka, Mała Panew, Stobrawa, Budkowiczanka, and Biała. The economy is based on agriculture (grain, sugar beets, potatoes), lumber milling, and the production of textiles, chemicals, and cement. There are thermoelectric-power plants near Opole (*q.v.*) city, the provincial capital, and the town of Kędzierzyn Koźle. Area 3,295 square miles (8,535 square km). Pop. (1991 est.) 1,018,600.

Opole, German OPPELN, city, capital of Opole *województwo* (province), southwestern Poland, situated on the Oder River. Opole began as the home of the Slavic Opolanie tribe; the earliest mention of it was in the 9th century. In 1202 it became the capital of the Opole principality, which included the entire Upper Silesia region. The town passed to Bohemia (1327), the Habsburgs (16th century), and Prussia (1742) and was returned to Poland in 1945. Opole is an important river port and rail link between Wrocław and Upper Silesia; its economy depends on cement industries and iron foundries. A regional museum and many notable historic buildings are located there. Pop. (1991 est.) 128,900.

Oporto (Portugal): *see* Porto.

opossum, also called POSSUM, any of about 66 species of New World mammals constituting the family Didelphidae of the superorder Marsupialia. For ordinal relatives in American tropics, *see* rat opossum; for Australasian marsupials called possum, *see* phalanger.

The only species occurring north of Mexico is the common, or Virginia, opossum (*Didelphis marsupialis*). It ranges from lower eastern Canada and Puget Sound southward to Argentina; the only other member of that genus, Azara's opossum (*D. azarae*), is found in South America. The common opossum may grow to 100 cm (40 inches) in length (including the tail) and is about the size of a house cat. Its coarse coat varies from grayish white (in northern regions) to nearly black (in warm regions). It has a pointy white face, beady black eyes, round black ears, and a stout body. The opossum's hairless, scaly, prehensile tail is about half the animal's total length. There are five sharp-clawed toes on each front foot, and the innermost toe on each hind foot is clawless and opposable and can be used for grasping branches. The animal has 50 teeth.

The common opossum eats almost anything, including insects, small mammals, eggs, nestlings, fruit, berries, and sometimes cultivated crops. Opossums are almost equally adaptable as to their habitat, but, being largely arboreal, they are absent from treeless, dry areas. Their dens are often found in a hollow tree or under stumps and roots. If surprised on the ground the opossum may feign death; hence the expression "play possum." The animal's flesh is enjoyed as food locally in the southern United States, where possum hunting is a popular fall and winter sport.

The common opossum breeds from midwinter to late autumn. One litter is produced annually in cooler regions, but as many as three in warmer ones. After only 12 to 16 days of gestation (average 12.5), an opossum may have as many as 25 young; the average number is 10. The young are born blind, naked, and grublike and weigh only 2 g (0.07 ounce). Using their clawed forelimbs, they instinctively struggle toward the mother's fur-lined pouch; those that reach the pouch seek out a nipple—there usually are 13 of them—and achieve a firm oral grip as the nipple swells. Some newborns never succeed in entering the pouch, and others die because there are more young born than there are teats to serve them. After four or five weeks in the pouch the young spend an additional eight or nine weeks clinging to the mother's back. The notion that the opossum gives birth through its nose probably comes from the female's habit of putting her face into the pouch to clean it just before giving birth.

Common opossum (*Didelphis marsupialis*)
Robert J. Ellison—The National Audubon Society Collection/ Photo Researchers

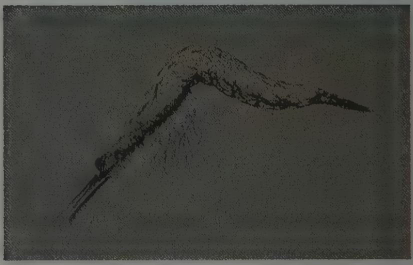
The water opossum, or yapok (*Chironectes minimus,* sometimes *panamensis*), a carnivorous opposum found from Mexico to Argentina, is the only marsupial adapted to a semiaquatic life: it has webbed hind toes, dense oily fur, and a pouch opening that can be tightened to keep the young dry. It has a head and body length of 30 cm and a 38-centimetre naked tail. The dark upperparts are broadly striped.

The gray four-eyed opossum (*Philander opossum*) and the brown four-eyed, or rat-tailed, opossum (*Metachirus nudicaudatus*) have a pair of large whitish spots over the eyes. Both are found in Central and South America; they have large heads and long tails, and the latter species is pouchless.

The thick-tailed opossum, or little water opossum (*Lutreolina crassicaudata*), of South America east of the Andes is found chiefly along watercourses but may enter cities. As long as 70 cm, including its 30-centimetre tail, it resembles a weasel and is fiercely carnivorous. Woolly opossums include the two species of *Glironia,* of the northern Andes, *Dromiciops australis,* of Chile, and the three species of *Caluromys,* found from southern Mexico to Brazil.

The smallest didelphids are the shrewlike, small-eyed, rather short-tailed species of *Monodelphis,* of South America (one, *M. melanops,* found in Panama); some are only 15 cm long, the tail included. The most abundant didelphids are the 40 species of *Marmosa,* sometimes called mouse, or murine, opossums, which are found from northern Mexico to Argentina.

opossum shrimp, also called POSSUM SHRIMP, any member of the crustacean order Mysidacea. Most of the 450 known species live in the sea; a few live in brackish water; and fewer still live in fresh water. Most are 1 to 3 cm (about 0.4 to 1.2 inches) long. The name opossum shrimp derives from the females' brood pouch, in which young larvae spend several weeks.



Opossum shrimp (Mysidacea)
William H. Amos—Helen Wohlberg, Inc.

Most species live in cold water, often at great depths. Some burrow into or crawl along the bottom; others creep among vegetation. Certain species swim in the open water, occasionally forming swarms consisting of great numbers of individuals. The freshwater species *Mysis relicta,* which is common in cold lakes of North America, Great Britain, and northern Europe, is an important food for lake trout in the Great Lakes. Some species, such as *Heteromysis cotti* of the Canary Islands, live in caves and are either blind or have poorly developed eyes.

Oppeln (Poland): *see* Opole.

Oppenheim, E. Phillips, in full EDWARD PHILLIPS OPPENHEIM (b. Oct. 22, 1866, London, Eng.—d. Feb. 3, 1946, St. Peter Port, Guernsey, Channel Islands, U.K.), internationally popular British author of novels and short stories dealing with international espionage and intrigue.

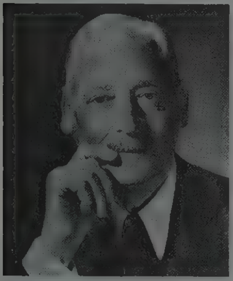
After leaving school at age 17 to help in his father's leather business, Oppenheim wrote in his spare time. His first novel, *Expiation* (1886), and subsequent thrillers caught the fancy of a wealthy New York businessman who bought out the leather business at the turn of the century and made Oppenheim a high-salaried director. He was thus freed to devote the major part of his time to writing. The novels, volumes of short stories, and plays that followed, totaling more than 150, were peopled with sophisticated heroes, adventurous spies, and dashing noblemen. Among his well-known works are *The Long Arm of Mannister* (1910), *The Moving Finger* (1911), and *The Great Impersonation* (1920).

Oppenheim, Lassa Francis Lawrence (b. March 30, 1858, Windecken, near Frankfurt am Main—d. Oct. 7, 1919, Cambridge, Cambridgeshire, Eng.), German jurist and teacher of law who was best known for his Positivist approach to international law.

Oppenheim moved from Basel, Switz., to London, where he joined the faculty of the newly organized London School of Economics and Political Science in 1895. In 1908 he became Whewell professor of international law at Cambridge. Oppenheim's most important book is *International Law: A Treatise,* 2 vol. (1905–06), in which he elaborated an international jurisprudence based on specific agreements and customs among nations rather than on theoretical prescriptions. Although he emphasized the supremacy of national laws and national sovereignty over international law, he came, during and after World War I, to believe in the necessity for the League of Nations.

Oppenheimer, Sir Ernest (b. May 22, 1880, Friedberg, Hesse-Nassau, Ger.—d. Nov. 25, 1957, Johannesburg, S.Af.), German-born industrialist, financier, and one of the most successful leaders in the mining industry in South Africa and Rhodesia.

Oppenheimer became a junior clerk at the age of 16 with Dunkelsbuhlers & Company, London diamond brokers. In 1902 he moved to Kimberley, S.Af., where he served as a Dunkelsbuhlers' representative. In 1917, with considerable backing from the financier J.P. Morgan, he formed the Anglo American Corporation of South Africa, Ltd., to exploit the east Witwatersrand goldfield. Two years later he formed Consolidated Diamond Mines of South West Africa, Ltd. This diamond prospecting corporation was so successful that he gained control of the De Beers Consolidated Mines, which once dominated the world diamond market, and in 1930 established The Diamond Corporation, Ltd.


Sir Ernest Oppenheimer
Popperfoto

In 1929 Oppenheimer formed the Rhodesian Anglo American Corporation to exploit the rich copper deposits in Northern Rhodesia. His last project was the pioneering of new goldfields in the Orange Free State, S.Af.

Oppenheimer served as mayor of Kimberley from 1912 to 1915 and was a member of the Union of South Africa Parliament from 1924 to 1938. A philanthropist and an outstanding figure in South African life, he furthered Commonwealth studies at Oxford University. He was knighted in 1921.

Oppenheimer, J(ulius) Robert (b. April 22, 1904, New York City—d. Feb. 18, 1967, Princeton, N.J., U.S.), U.S. theoretical physicist and science administrator, noted as director of the Los Alamos laboratory during development of the atomic bomb (1943–45) and as director of the Institute for Advanced Study, Princeton (1947–66). Accusations as to his loyalty and reliability as a security risk led to a government hearing that resulted in the loss of his security clearance and of his position as adviser to the highest echelons of the U.S. government. The case became a cause célèbre in the world of science because of its implications concerning political and moral issues relating to the role of scientists in government.

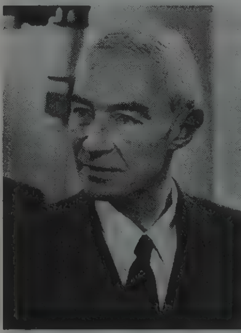
Oppenheimer was the son of a German immigrant who had made his fortune by importing textiles in New York City. During his undergraduate studies at Harvard University, Oppenheimer excelled in Latin, Greek, physics, and chemistry, published poetry, and studied Oriental philosophy. After graduating in 1925, he sailed for England to do research at the Cavendish Laboratory at the University of Cambridge, which, under the leadership of Lord Rutherford, had an international reputation for its pioneering studies on atomic structure. At the Cavendish, Oppenheimer had the opportunity to collaborate with the British scientific community in its efforts to advance the cause of atomic research.

Max Born invited him to Göttingen University, where he met other prominent physicists, such as Niels Bohr and Paul Dirac, and where, in 1927, he received his doctorate. After short visits at science centres in Leiden and Zürich, he returned to the United States to teach physics at the University of California at Berkeley and the California Institute of Technology.

In the 1920s the new quantum and relativity theories were engaging the attentions of science. That mass was equivalent to energy and that matter could be both wavelike and corpuscular carried implications seen only dimly at that time. Oppenheimer's early research was devoted in particular to energy processes of subatomic particles, including electrons, positrons, and cosmic rays. Since quantum theory had been proposed only a few years before, the university post provided him an excellent opportunity to devote his entire career to the exploration and development of its full significance. In addition, he trained a whole generation of U.S. physicists, who were greatly affected by his qualities of leadership and intellectual independence.

The rise of Hitlerism in Germany stirred his first interest in politics. In 1936 he sided with the republic during the Civil War in Spain, where he became acquainted with Communist students. Although his father's death in 1937 left Oppenheimer a fortune that allowed him to subsidize anti-Fascist organizations, the tragic suffering inflicted by Stalin on Russian scientists led him to withdraw his associations with the Communist Party—in fact, he had never joined the party—and at the same time reinforced in him a liberal democratic philosophy.

After the invasion of Poland by Nazi Germany in 1939, the physicists Albert Einstein and Leo Szilard warned the U.S. government of the danger threatening all of humanity if the Nazis should be the first to make a nuclear bomb. Oppenheimer then began to seek a process for the separation of uranium-235 from natural uranium and to determine the critical mass of uranium required to make such a bomb. In August 1942 the U.S. Army was given the responsibility of organizing the efforts of British and U.S. physicists to seek a way to harness nuclear energy for military purposes, an effort that became known as the Manhattan Project. Oppenheimer was instructed to establish and administer a laboratory to carry out this assignment. In 1943 he chose the plateau of Los Alamos, near Santa Fe, N.M., where he had spent part of his childhood in a boarding school.


J. Robert Oppenheimer
By courtesy of the Los Alamos National Laboratory, New Mexico

For reasons that have not been made clear, Oppenheimer in 1942 initiated discussions with military security agents that culminated with the implication that some of his friends and acquaintances were agents of the Soviet government. This led to the dismissal of a personal friend on the faculty at the University of California. In a 1954 security hearing he described his contribution to those discussions as "a tissue of lies."

The joint effort of outstanding scientists at Los Alamos culminated in the first nuclear explosion on July 16, 1945, at Alamogordo, N.M., after the surrender of Germany. In October of the same year, Oppenheimer resigned his post. In 1947 he became head of the Institute for Advanced Study at Princeton University and served from 1947 until 1952 as chairman of the General Advisory Committee of the Atomic Energy Commission, which in October 1949 opposed development of the hydrogen bomb.

On Dec. 21, 1953, he was notified of a military security report unfavourable to him and was accused of having associated with Communists in the past, of delaying the naming of Soviet agents, and of opposing the building of the hydrogen bomb. A security hearing declared him not guilty of treason but ruled that he should not have access to military secrets. As a result, his contract as adviser to the Atomic Energy Commission was cancelled. The Federation of American Scientists immediately came to his defense with a protest against the trial. Oppenheimer was made the worldwide symbol of the scientist, who, while trying to resolve the moral problems that arise from scientific discovery, becomes the victim of a witch-hunt. He spent the last years of his life working out ideas on the relationship between science and society.

The Cold War having declined, Pres. Lyndon B. Johnson in 1963 formalized Oppenheimer's reinstatement by presenting him the Enrico Fermi Award of the Atomic Energy Commission. He retired from Princeton in 1966 and died of throat cancer the following year. (Mi.Ro.)

BIBLIOGRAPHY. Michel Rouze, *Oppenheimer* (1962; *Robert Oppenheimer: The Man and His Theories,* 1965), is the only biography (to 1961). Oppenheimer's philosophical ideas are expressed in his two books, *Science and the Common Understanding* (1954) and *The Open Mind* (1955). Certain aspects of Oppenheimer's elusive personality are revealed in his letters published in *Robert Oppenheimer: Letters and Recollections,* ed. by Alice Kimball Smith and Charles Weiner (1980). His scientific work is spread in many reports, published in particular in *Physical Review,* from 1928 to 1948. *In the Matter of J. Robert Oppenheimer: Transcript of Hearings Before Personnel Security Board, Washington, D.C. April 12, 1954 Through May 6, 1954* (1954), is the fundamental document on Oppenheimer's trial by the Atomic Energy Commission. Among the numerous publications on this trial (all of them in favour of Oppenheimer), see Philip M. Stern, *The Oppenheimer Case: Security on Trial* (1969); and Peter Michelmore, *The Swift Years: The Robert Oppenheimer Story* (1969). Haakon Chevalier, the professor denounced by Oppenheimer, describes this issue in *The Man Who Would Be God* (1959) and *Oppenheimer: The Story of a Friendship* (1965).

Oppland, *fylke* (county), south-central Norway. Bisected by Gudbrand's Valley, it extends from Mjøsa and Randsfjorden lakes northwestward to the Jotunheimen, Dovrefjell, and Rondane mountains. Much of the *fylke* is made up of high plateaus; large areas of the mountainous north are virtually uninhabited. The population is strung out along the principal valleys, where farming (livestock, grains, potatoes, and fruit [in the south]) is the most important occupation. Industry is centred at Lillehammer (the county seat) and Gjøvik. Tourism is important to the economy; the scenic Gudbrand's Valley and the high northern peaks are major attractions. Area 9,753 square miles (25,260 square km). Pop. (1993 est.) 182,583.

opportunity cost: *see* cost.

opposites, table of, in Pythagorean philosophy, a set of 10 pairs of contrary qualities. The earliest reference is in Aristotle, who said that it was in use among some contemporary Pythagoreans. But Aristotle provided no real information about its function in Pythagorean practice or theory or about its origin. Some scholars have detected possible archaic elements in it, but others have suggested that its originator was in fact Speusippus, Plato's nephew. Because no statements of Pythagoras have survived, and because Aristotle customarily accommodated pre-Socratic philosophy to his own terminology and problems, the problem is difficult to resolve.

Aristotle's table of the Pythagorean opposites is as follows:

Limited	Unlimited
Odd	Even
Unity	Plurality
Right	Left
Male	Female
At Rest	In Motion
Straight	Curved
Light	Darkness
Good	Evil
Square	Oblong

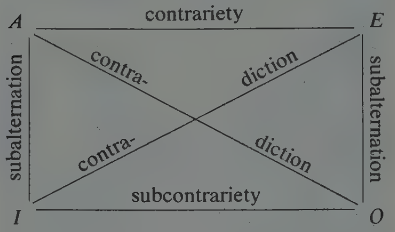
Aristotle remarked that Alcmaeon of Croton, a medical writer, also had pairs of contraries as the first "principles" of things and also of most human things, but he did not know whether contemporary Pythagoreans influenced Alcmaeon in this regard or vice versa.

Aristotle associated moral prestige with the left-hand column, because the "good" things appear in that column. The table had some currency among Aristotle's contemporaries, perhaps in the Academy (Plato's school in Athens), but his references are made merely in the interest of supporting certain views of his own.

Aristotle's formal table has 10 members, because the Pythagoreans considered 10 the perfect number. But the pairs varied in different authors. Possibly no list or set number of opposites became canonical among the Pythagoreans.

opposition, in astronomy, the circumstance in which two celestial bodies appear in opposite directions in the sky. The Moon, when full, is said to be in opposition to the Sun; the Earth is then approximately between them. A superior planet (one with an orbit farther from the Sun than Earth's) is in opposition when Earth passes between it and the Sun. The opposition of a planet is a good time to observe it, because the planet is then at its nearest point to the Earth and in its full phase. The planets Venus and Mercury, whose orbits are smaller than Earth's, can never be in opposition to the Sun.

opposition, square of, in traditional logic, a diagram exhibiting four forms of a categorical proposition (*q.v.*), or statement, with the same subject and predicate, together with their pairwise relationships:



in which *A, E, I,* and *O* are of the forms "Every *S* is *P*," "No *S* is *P*," "Some *S* is *P*," and "Some *S* is not *P*." As shown on the square, "Every swan is white" is the contrary of "No swan is white" and the contradictory of "Some swans are not white." Conclusions drawn from one of these forms to another (as in subalternation) are said to be obtained by immediate inference.

oprichnina, private court or household created by Tsar Ivan IV the Terrible (1565) that administered those Russian lands (also known as *oprichnina*) that had been separated from the rest of Muscovy and placed under the tsar's direct control. The term also refers generally to the economic and administrative policy that divided the Russian lands into two parts and established the new court.

The *oprichnina* land area was located in northern and central Muscovy and was created by the forcible removal of boyars (upper nobility) from their estates; the boyars were either executed or relocated on land that continued to be ruled in the traditional manner.

The term *oprichnina* also refers to this reign of terror, which was conducted by the *oprichniki,* members of the tsar's new court, who were primarily drawn from the lower gentry and foreign population. The terror culminated with the proscription of the entire population of Novgorod and the sack of that northern city, which opposed Muscovite dominance (1570). The policy reduced the boyars' political power, disrupted the Russian economy, and contributed to the centralization of the Muscovite state. After 1572, when the *oprichniki* were disbanded, the term *dvor* (court) replaced *oprichnina.*

Optic, Oliver: *see* Adams, William Taylor.

optic atrophy, degeneration of the optic (second cranial) nerve, which carries visual data from the retina of the eye to a relay station in the centre of the brain (the lateral geniculate body) for transmission to a cortical area at the back of the brain. The atrophy may be a hereditary defect (Leber's disease) affecting males, primarily between the ages of 15 and 25 years, and causing loss of central vision. There is sometimes some recovery of vision in Leber's disease, but it is rarely complete. Optic atrophy may also be caused by physical injury, as from a blow to the head; by glaucoma; by a tumour that presses on the nerve; by poisons such as wood alcohol, quinine, or arsenic; or by disease of the retina.

optic disk: *see* blind spot.

optic nerve, second cranial nerve that carries sensory nerve impulses from the retina to the visual cortex of the brain. In the eye, the nerve forms from the convergence of visual nerve fibres in the optic disk at the rear of the eyeball. The optic disk contains no receptor cells (cones) and is thus not capable of transmitting visual images; therefore it is called the "blind spot." The nerve emerges from the eye at this point and passes along the underside of the brain to the optic chiasma, an X-shaped structure in which the optic nerves from each eye converge. Half of the nerve fibres from each eye continue to the visual cortex on the same side of the brain, and half cross over at the chiasma to join fibres from the opposite eye and continue to the visual cortex on that side, producing binocular vision.

Although its major components are the visual fibres from the retina, the optic nerve also carries nervous impulses to and from the iris to regulate the pupillary reflex, a response to changing light conditions. Structurally, the optic nerve is a tract of the central nervous system rather than a true peripheral nerve.

optic neuritis, inflammation of the optic (second cranial) nerve, the nerve that carries visual data from the retina of the eye to a relay station in the centre of the brain for transmission to a cortical area at the back of the brain. Most instances of optic neuritis occur as a result of multiple sclerosis, a disease of the brain and spinal cord in which hard patches in the nerve-fibre sheaths interfere with the transmission of impulses. Other causes include inflammation of the brain and spinal cord as a result of such infections as smallpox or measles and poisoning by such substances as wood alcohol or lead. Optic neuritis may be centred in the optic disk, the point of entrance of the nerve and of blood vessels into the eyeball (this type is called papillitis), or it may be in the nerve shaft behind the eyeball (retrobulbar, or axial, neuritis). The effect may be in the nerve fibres or only in the sheath enveloping the nerve, and it may extend to adjacent areas of the retina. The chief effects of the inflammation are a blind spot (a scotoma, usually in the centre of the visual field), pain in the eyeball, and headache on the affected side. The optic nerve usually recovers from the inflammation, but there may be some residual degeneration of the nerve fibres.

optical activity, the ability of a substance to rotate the plane of polarization of a beam of light that is passed through it. (In plane-polarized light, the vibrations of the electric field are confined to a single plane.) The intensity of optical activity is expressed in terms of a quantity, called specific rotation, defined by an equation that relates the angle through which the plane is rotated, the length of the light path through the sample, and the density of the sample (or its concentration if it is present in a solution). Because the specific rotation depends upon the temperature and upon the wavelength of the light, these quantities also must be specified. The rotation is assigned a positive value if it is clockwise with respect to an observer facing the light source, negative if counterclockwise. A substance with a positive specific rotation is described as dextrorotatory and denoted by the prefix *d* or (+); one with a negative specific rotation is levorotatory, designated by the prefix *l* or (−).

Optical activity was first observed in quartz crystals in 1811 by a French physicist, François Arago. Another French physicist, Jean-Baptiste Biot, found in 1815 that liquid solutions of tartaric acid or of sugar are optically active, as are liquid or vaporous turpentine. Louis Pasteur was the first to recognize that optical activity arises from the dissymmetric arrangement of atoms in the crystalline structures or in individual molecules of certain compounds.

optical antipode: *see* enantiomorph.

Optical art: *see* Op art.

optical crystallography, branch of crystallography that deals with the optical properties of crystals. It is of considerable interest theoretically and has the greatest practical importance. The science of petrography is largely based on the study of the appearance of thin, transparent sections of rocks in a microscope fitted with two polarizing calcite prisms; in the absence of external crystalline form, as with the minerals in a rock, a mineral often may be readily identified by the determination of some of its optical properties.

According to their action on transmitted plane-polarized light, all crystals may be assigned to one or another of the five groups enumerated below, which correspond to the six systems of crystallization (in the second group, two systems are included together). The several symmetry classes of each system are optically the same, except in rare cases:

1. Optically isotropic crystals (isometric system), which exhibit only one index of refraction for light of each colour;
2. Optically uniaxial crystals (tetragonal and hexagonal systems), which exhibit double refraction and yield two refractive indices for light of each colour, one parallel to the optical axis and one perpendicular to the optical axis;
3. Optically biaxial crystals (all of which exhibit three principal refractive indices, one along each of the mutually perpendicular optical axes) in which the three optical axes correspond to the three crystallographic axes (orthorhombic system);
4. Optically biaxial crystals in which only one of the three optical axes corresponds to a crystallographic axis (monoclinic system);
5. Optically biaxial crystals with no fixed and definite relation between the optical and crystallographic axes (triclinic system).

optical image, the apparent reproduction of an object, formed by a lens or mirror system from reflected, refracted, or diffracted light waves. There are two kinds of images, real and virtual. In a real image the light rays actually are brought to a focus at the image position, and the real image may be made visible on a screen—*e.g.,* a sheet of paper—whereas a virtual image cannot. Examples of real images are those made by a camera lens on film or a projection lens on a motion-picture screen. Virtual images are made by rays that do not actually come from where the image seems to be; *e.g.,* the virtual image in a plane mirror is at some distance behind the mirror.

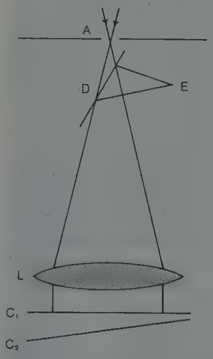
optical interferometer, instrument for making precise measurements for beams of light of such factors as length, surface irregularities, and index of refraction. It divides a beam of light into a number of beams that travel unequal paths and whose intensities, when reunited, add or subtract (interfere with each other). This interference appears as a pattern of light and dark bands called interference fringes. Information derived from fringe measurements is used for precise wavelength determinations, measurement of very small distances and thicknesses, the study of spectrum lines, and determination of refractive indices of transparent materials. In astronomy, interferometers are used to measure the distances between stars and the diameters of stars.

In 1881 the American physicist A.A. Michelson constructed the interferometer used in the Michelson-Morley experiment. The Michelson interferometer and its modifications are used in the optical industry for testing lenses and prisms, for measuring index of refraction, and for examining minute details of surfaces (microtopographies). The instrument consists of a half-silvered mirror that divides a light beam into two equal parts, one of which is transmitted to a fixed mirror and the other of which is reflected to a movable mirror. By counting the fringes created as the mirror is moved, the amount of movement can be precisely determined. Michelson also developed the stellar interferometer, capable of measuring the diameters of stars in terms of the angle, as small as 0.01″ of an arc, subtended by the extreme points of the star at the point of observation.

In 1896 the British physicist Lord Rayleigh described the Rayleigh interference refractometer, still widely used for determining the refractive indices of gases and liquids. It is a split-beam instrument, like the Michelson interferometer. One beam serves as a reference, while the other is passed first through a material of known index of refraction and then through the unknown. The index of refraction of the unknown can be determined by the displacement of its interference fringes from those of the known material.

The Fabry-Pérot interferometer (variable-gap interferometer) was produced in 1897 by the French physicists Charles Fabry and Alfred Pérot. It consists of two highly reflective and strictly parallel plates called an etalon. Because of the high reflectivity of the plates of the etalon, the successive multiple reflections of light waves diminish very slowly in intensity and form very narrow, sharp fringes. These may be used to reveal hyperfine structures in line spectra, to evaluate the widths of narrow spectral lines, and to redetermine the length of the standard metre.

The Fizeau-Laurent surface interferometer reveals departures of polished surfaces from a plane. The system was described by the French physicist A.-H.-L. Fizeau in 1862 and adapted in 1883 into the instruments now widely used in the optical industry. In the Fizeau-Laurent system, monochromatic light (light of a single colour) is passed through a pinhole and illuminates a reference plane and a workpiece directly below it. The light beam is perpendicular to the workpiece. By maintaining a slight angle between the surface of the workpiece and the surface of the plane of reference, fringes of equal thickness can be seen through a reflector placed above them. The fringes constitute a contour map of the surface of the workpiece, enabling an optical polisher to see and to remove defects and departures from flatness.



Fizeau-Laurent surface interferometry system:
(A) Pinhole at lens focus; (D) reflector; (E) eye point; (L) quality lens; (C_1) reference plane; (C_2) workpiece

The Twyman-Green interferometer, an adaptation of the Michelson instrument introduced in 1916 by the English electrical engineer Frank Twyman and the English chemist Arthur Green, is used for testing lenses and prisms. It uses a point source of monochromatic light at the focus of a quality lens. When the light is directed toward a perfect prism, it returns to a viewing point exactly as it was from the source, and a uniform field of illumination is seen. Local imperfections in the prism glass distort the wave front. When the light is directed toward a lens backed by a convex mirror, it passes through the lens, strikes the mirror, and retraces its path through the lens to a viewing point. Imperfections in the lens result in fringe distortions.

optical model, in physics, description of atomic nuclei as similar to cloudy crystal balls in that, when struck by a beam of particles, they partially absorb the beam, partially scatter it, and partially transmit it in a way analogous to the behaviour of light. The nuclear optical model has proved very successful in explaining nuclear reactions in which the incident (striking) particles have energies of about 10^6 to 10^9 electron volts.

optical pumping, in physics, the use of light energy to raise the atoms of a system from one energy level to another. A system may consist of atoms having a random orientation of their individual magnetic fields. When optically pumped, the atoms will undergo a realignment of individual magnetic fields with respect to the direction of the light beam; that is, there will be a rearrangement of magnetic energy levels; and, in some cases, the bulk of the atoms will be oriented to generate a magnetic field throughout the system.

More familiarly, optical pumping takes place in laser action, in which the energy of electrons is raised by their absorption of photons of light. The electrons remain at the higher energy level until they are triggered to release their stored energy in the form of a laser beam, in which the light waves all have the same wavelength and vibrate in unison.

optical sound recording, use of an optical system for registering sound on photographic film; it is a technique widely used in making the sound track (*q.v.*) of motion pictures.

optical storage, electronic storage medium that uses low-power laser beams to record and retrieve digital (binary) data. In optical-storage technology, a laser beam encodes digital data onto an optical, or laser, disk in the form of tiny pits arranged in concentric tracks on the disk's surface. A low-power laser scanner is used to "read" these pits, with variations in the intensity of reflected light from the pits being converted into electric signals. This technology is used in the compact disc (*q.v.*), which records sound; in the CD-ROM (*q.v.*), which can store text and images as well as sound; in WORM, a type of disk that can be written on once and read any number of times; and in newer disks that are totally rewritable.

Optical storage provides greater memory capacity than magnetic storage because laser beams can be controlled and focused much more precisely than can tiny magnetic heads, thereby enabling the condensation of data into a much smaller space. An entire set of encyclopedias, for example, can be stored on a standard 12-centimetre (4.72-inch) optical disk. Besides higher capacity, optical-storage technology also delivers more authentic duplication of sounds and images. Optical disks are also inexpensive to make: the plastic disks are simply molds pressed from a master, as phonograph records are. The data on them cannot be destroyed by power outages or magnetic disturbances, the disks themselves are relatively impervious to physical damage, and unlike magnetic disks and tapes, they need not be kept in tightly sealed containers to protect them from contaminants. Optical-scanning equipment is similarly durable because it has relatively few moving parts.

Early optical disks were not erasable—*i.e.,* data encoded onto their surfaces could be read but not erased or rewritten. This problem was solved in the 1990s with the development of WORM and of writable/rewritable disks. The chief remaining drawback to optical equipment is a slower rate of information retrieval compared to conventional magnetic-storage media. Despite its slowness, its superior capacity and recording characteristics make optical storage ideally suited to memory-intensive applications, especially those that incorporate still or animated graphics, sound, and large quantities of text. Multimedia encyclopedias, video games, training programs, and directories are commonly stored on optical media.

optics, science concerned with the genesis and propagation of light, the changes that it undergoes and produces, and other phenomena closely associated with it. There are two major branches of optics: physical and geometrical. Physical optics deals primarily with the nature and properties of light itself. Geometrical optics has to do with the principles that govern the image-forming properties of lenses, mirrors, and other devices that make use of light. It also includes optical data processing, which involves the manipulation of the information content of an image formed by coherent optical systems.

A brief treatment of optics follows. For full treatment of the theories of physical optics, *see* MACROPAEDIA: Light. For the principles of geometrical optics and their applications to optical systems and optical processing, *see* MACROPAEDIA: Optics, Principles of.

The ancient Greeks and Arabs had some knowledge of the nature and properties of light. The foundations of the science of optics, however, were not established until the 17th century. During the early 1600s Galileo Galilei constructed the first telescopes that could be used for astronomical observation. In the 1650s the French mathematician Pierre de Fermat succeeded in deriving the law of refraction from a principle attributed to the Greek geometer Hero of Alexandria (1st century AD), according to which reflected light traverses the shortest distance between two points compatible with meeting the reflecting surface. By century's end, the Dutch mathematician-physicist Christiaan Huygens provided a mechanical explanation of reflection and refraction in his *Traité de la lumière* (1690; *Treatise on Light*). In the same work, he formulated a theory on the nature of light in which he related light to wave motion. In 1704 Isaac Newton published his *Opticks,* which included a comprehensive study of refraction, dispersion, diffraction, and polarization and a theoretical description of the corpuscular nature of light (*i.e.,* light as consisting of moving particles). Newton's views, especially his particle theory of light, came to dominate scientific thought for over a century, completely overshadowing Huygens' contributions.

During the early 1800s Thomas Young, an English physician and physicist, studied the phenomenon of interference and found that it could only be explained if light consisted of waves. Young's findings, which were corroborated by the mathematical analysis of A.J. Fresnel of France, resurrected the wave theory of light. This conception held sway among the next several generations of investigators, including the British physicist James Clerk Maxwell, whose electromagnetic theory of light (1864) is generally considered the foremost achievement of classical optics. According to Maxwell's theory, light and various other forms of radiant energy are propagated in the form of electromagnetic waves—*i.e.,* disturbances generated by the oscillation or acceleration of an electric charge and characterized by the temporal and spatial relations associated with wave motion.

The groundwork for modern optics was laid by the introduction of quantum theory at the turn of the century. The theory, proposed in 1900 by Max Planck of Germany, explained that radiant energy is emitted in discrete units, or quanta. In 1905 Albert Einstein extended this idea of light and demonstrated that, in the photoelectric effect, light behaves as though all of its energy were concentrated in minute particles later called photons. Einstein's finding, coupled with the electromagnetic theory, led to the present-day view that light behaves like waves in certain situations and like particles in others. The subsequent development of quantum mechanics, largely from 1925 to 1935, yielded a systematic explanation of this fundamental wave-particle duality of light.

Advances in physical optics were paralleled by rapid progress in geometrical optics. Lenses of reasonably high quality had been produced for telescopes and microscopes since the late 1700s, and in 1841 the German mathematician Carl Friedrich Gauss published his influential treatise on geometrical optics. In it he detailed the concept of the focal length and cardinal points of a lens system and devised formulas for calculating the position and size of the image formed by a lens of a given focal length. A little over a decade later, Gauss's theoretical work was extended to the calculation of the five principal aberrations of a lens (spherical, coma, astigmatism, Petzval field curvature, and distortion), thus establishing the basis for the formal procedures of lens design that were used for the next 100 years.

Two major developments, the emergence of communication and information theory in the 1950s and the invention of the laser in the early 1960s, ushered in a new era in optics. The initial tie between optics and communications arose because of the many analogies that exist between the two areas and because of the similar mathematical methods used to formally describe the behaviour of electrical circuits and optical systems. A matter of much concern since the invention of the lens as an imaging device has always been the description of the optical system that forms the image; information about an object is relayed and presented as an image. In this sense, an optical system can be considered a communication channel and be analyzed as such.

The manipulation of the content of an image by means of optical systems using coherent light (*i.e.,* light of a single frequency or colour in which all the components are in step with each other) became a subject for serious study in the 1950s. The laser provided an ideal tool for optical data processing and communication. It gave rise to significant advances in holography, a two-step coherent image-forming process in which an intermediate record is made of the complex optical field associated with an object. A notable application of holography in the area of optical information processing is binary data storage and retrieval.

The laser, moreover, has proved to be a very efficient means of transmitting audio and video information (*e.g.,* telephone conversations and television programs). It is superior to ordinary electronic transmitters for several reasons. Because the frequency of laser light is appreciably higher than that of radio waves, for example, a laser beam can carry substantially more information. Furthermore, since a laser beam is highly directional, it is able to transmit information with very little interference and over long distances. In long-distance communication applications, lasers are frequently used in conjunction with optical fibres of glass or plastic that make it possible to transfer laser light from one relay station to the next with almost no loss of energy.

Optimates and Populares (Latin: respectively, "Best Ones," or "Aristocrats", and "Demagogues," or "Populists"), two principal patrician political groups during the later Roman Republic from about 133 to 27 BC. The members of both groups belonged to the wealthier classes.

The Optimates were the dominant group in the Senate. They blocked the wishes of the others, who were thus forced to seek tribunician support for their measures in the tribal assembly and hence were labeled Populares, "demagogues," by their opponents. The two groups differed, therefore, chiefly in their methods: the Optimates tried to uphold the oligarchy; the Populares sought popular support against the dominant oligarchy, either in the interests of the people themselves or in furtherance of their own personal ambitions. Finally, it is well to remember that the Senate's authority was based on custom and consent rather than upon law. It had no legal control over the people or magistrates: it gave, but could not enforce, advice. Until 133 BC any challenge to its authority was little more than a pinprick, but thereafter more deadly blows were struck, first by such Populares as Tiberius and Gaius Gracchus, then by Gaius Marius, and finally by the army commanders from the provinces.

optimization, field of applied mathematics consisting of a collection of principles and methods used for the solution of quantitative problems in many disciplines: physics, biology, engineering, economics, business, and others. This mathematical area grew from the recognition that problems under consideration in manifestly different fields could be posed theoretically in such a way that a central store of ideas and methods could be used in obtaining solutions for all of them.

A brief treatment of optimization follows. For full treatment, *see* MACROPAEDIA: Optimization, The Mathematical Theory of.

A typical optimization problem may be described in the following way. There is a system, such as a physical machine, a set of biological organisms, or a business organization, whose behaviour is determined by several specified factors. The operator of the system has as a goal the optimization of the performance of this system. The latter is determined at least in part by the levels of the factors over which the operator has control; the performance may also be affected, however, by other factors over which there is no control. The operator seeks the right levels for the controllable factors that will optimize, as far as possible, the performance of the system. For example, in the case of a banking system, the operator is the governing body of the central bank; the inputs over which there is control are interest rates and money supply; and the performance of the system is described by economic indicators of the economic and political unit in which the banking system operates.

The first step in the application of optimization theory to a practical problem is the identification of relevant theoretical components. This is often the most difficult part of the analysis, requiring a thorough understanding of the operation of the system and the ability to describe that operation in precise mathematical terms. The main theoretical components are the system, its inputs and outputs, and its rules of operation. The system has a set of possible states; at each moment in its life, it is in one of these states, and it changes from state to state according to certain rules determined by inputs and outputs. There is a numerical quantity called the performance measure, which the operator seeks to maximize or minimize. It is a mathematical function whose value is determined by the history of the system. The operator is able to influence the value of the performance measure through a schedule of inputs. Finally, the constraints of the system must be identified; these are the restrictions on the inputs that are beyond the control of the operator.

The simplest type of optimization problem may be analyzed using elementary differential calculus. Suppose that the system has a single input variable, represented by a numerical variable x, and suppose that the performance measure can be expressed as a function $y=f(x)$. The constraints are expressed as restrictions on the values assumed by the input x; for example, the nature of the problem under consideration may require that x be positive. The optimization problem takes the following precise mathematical form: For which value of x, satisfying the indicated constraints, is the function $y=f(x)$ at its maximum (or minimum) value? From calculus, the extreme values of a function $y=f(x)$ with a sufficiently smooth graph can be located only at points of two kinds: (1) points where the tangent to the curve is horizontal (critical points) or (2) endpoints of an interval, if x is restricted by the constraints to such an interval. Thus the problem of finding the largest or smallest value of a function over the indicated interval is reduced to the simpler problem of finding the largest and smallest value among a finite set of candidates, and this can be done by direct computation of the value of $f(x)$ at those points x.

The theory of linear programming (*q.v.*) was developed for the purpose of solving optimization problems involving two or more input variables. This theory uses only the elementary ideas of linear algebra; it can be applied only to problems for which the performance measure is a linear function of the inputs. Nevertheless, this is sufficiently general to include applications to important problems in economics and engineering.

option, stock: *see* stock option.

optometry, profession concerned with examining the eyes for defects or faults of refraction. Optometrists prescribe corrective lenses or other optical aids and supervise exercise programs designed to treat problems of vision. They also examine the eyes to detect such disorders as glaucoma and cataracts. Unlike the ophthalmologist, who is a physician with a specialization in the diagnosis and treatment of eye diseases (and who may also test vision and prescribe corrective lenses), the optometrist generally is not licensed to prescribe drugs or trained to perform surgery, though in some areas they are licensed to use topical therapeutic drugs.

Requirements for the practice of optometry vary. In the United States professional optometrists must complete a four-year course of study in addition to at least two years of undergraduate work and must be licensed by the state in which they practice. Schools of optometry are accredited nationally by the Council on Optometric Education and grant the Doctor of Optometry (O.D.) degree.

The optician, another optical specialist, makes, fits, and sells optical devices, particularly the corrective lenses prescribed by optometrists and ophthalmologists.

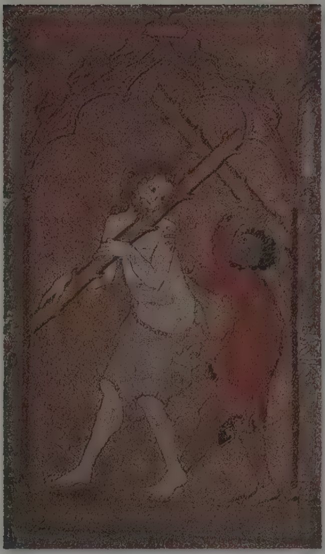
Opuntia, largest cactus genus of the family Cactaceae, native to the New World and featuring the characteristic glochidia—small bristles with backward-facing barbs. The genus is divided into subgroups based on the form of the stem segments. *Opuntia*s that have cylindrical joints are called chollas (*see* cholla); the remaining *Opuntia*s are prickly pears (*see* prickly pear), composed of flat joints.

Opuntia occurs from the Peace River in western Canada almost to the tip of South America. In the Northern Hemisphere it is the most northern-ranging cactus. *O. ficus-indica* (or *O. megacantha*), the commonly cultivated prickly pear of Mexico, is treelike, reaching 5 m (16 feet), with a woody trunk and joints 30–50 cm long or more.

Opuntia littoralis, a desert succulent

Dorothea W. Woodruff

opus anglicanum (Latin: "English work"), embroidery done in England between about 1100 and about 1350 and of a standard unsurpassed anywhere. The technical skill that was shown by English workers in handling gold—*i.e.,* silver gilt thread—was unequaled. Gold was used as background for figures that were embroidered in coloured silks. Another characteristic of opus anglicanum was the general vivacity of expression and pose in the figure modeling of features—the use of split stitches worked spirally, for example, to suggest rotund cheeks and black, popping eyes. Minutely observed birds and animals, based on contemporary animal drawings, figured largely in the decorative schemes.



Christ carrying the Cross, detail of an opus anglicanum orphrey embroidered in silver and silver gilt threads and coloured silks on linen, English, 1315–35; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Opus anglicanum was famous throughout Europe. Liturgical vestments such as copes in this type of embroidery were given and sold to churches abroad, and several popes commissioned such vestments. Opus anglicanum has consequently survived all over Europe; there are also examples in the United States in the Metropolitan Museum of Art, New York City. In England the largest collection is in the Victoria and Albert Museum, London, which possesses, among other examples, several famous copes, including the Butler-Bowden cope (early 14th century).

Opus Dei (Latin: "Work of God"), in full PRELATURE OF THE HOLY CROSS AND OPUS DEI, Roman Catholic lay and clerical organization whose members seek personal Christian perfection and strive to implement Christian ideals and values in their occupations and in society as a whole. Theologically conservative, Opus Dei accepts the teaching authority of the church without question. Opus Dei is the subject of controversy and has been accused of secrecy, cultlike practices, and political ambitions. With separate branches for men and women, the organization has been headed since 1982 by a prelate elected by its members. Priests constitute only a tiny percentage of the organization, numbering some 1,600 of the nearly 84,000 members in 80 countries.

Founded in 1928 in Spain by Josemaría Escrivá de Balaguer y Albás (canonized in 2002), a priest trained in journalism and law, Opus Dei was formally approved by the Holy See in 1950 as a secular institute (*i.e.,* a new form of religious association whose members "profess the evangelical counsels in secular life"). On Nov. 28, 1982, Pope John Paul II, a staunch supporter of Opus Dei, established it as the first and only personal prelature in the church, with jurisdiction over people rather than over a geographic area. The prelate can establish seminaries and promote students to holy orders, but the organization remains subject to some oversight by local bishops.

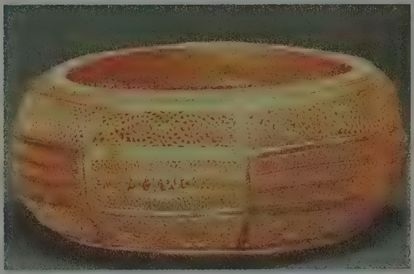
Some members of Opus Dei, called Numeraries, devote much of their time to the organization. Like priests, they are required to remain unmarried and to take vows of celibacy, obedience, and chastity but live in the world and pursue secular occupations; they are known to practice self-mortification. The majority of members, however, are the Supernumeraries, who are free to marry, contribute financially to Opus Dei, and demonstrate Christian virtue in their daily activities. Members serve a period of probation and attend monthly meetings and an annual religious retreat. The group is assisted by Cooperators, who are not members and, by permission of the Holy See, need not even be Christians.

Because Opus Dei included many educated people, Spain's leader, Francisco Franco, involved several of its members in instituting economic reform in 1956. After Franco's death in 1975, Opus Dei's influence waned in Spain as other groups entered the political arena.

Beyond its association with Franco, Opus Dei has been accused of promoting a right-wing political agenda. Aggressive recruiting, the brainwashing of new recruits, and the isolation of members from their families are among the charges often leveled against the organization. Pointing to its continued growth, Opus Dei denies these accusations.

The organization has established vocational, trade, home-arts, and agricultural centres internationally, numerous high schools, schools of business administration, and charitable activities. Opus Dei also founded and endowed (with government assistance) the University of Navarre, widely regarded as Spain's finest university, and operates the Pontifical University of the Holy Cross in Rome and the University of Piura in Peru.

opus interassile, metalwork technique developed in Rome and used during the 3rd century AD, especially appropriate for making arabesques and other nonrepresentational designs. Probably of Syrian origin, the technique consists of piercing holes in the metal to create a design suggesting lacework. It was used for large wheels placed next to the clasps of loop-in-loop chains. The technique survived in certain Byzantine and early Christian designs, such as crescent-shaped earrings.



Roman *opus interassile* bracelet, 4th century AD; in the Staatliche Museen, Preussischer Kulturbesitz, Berlin

By courtesy of the Staatliche Museen, Preussischer Kulturbesitz Antikenabteilung, Berlin; photograph, Art Resource

opus reticulatum (architecture): *see* reticulated work.

opus sectile, type of mosaic work in which figural patterns are composed of pieces of stone or, sometimes, shell or mother-of-pearl cut in shapes to fit the component parts of the design, thereby differing in approach from the more common type of mosaic in which each shape in the design is composed of many small cubes (tesserae) of stone or glass. Although portable stone mosaic works of similar technique were produced in the Near East as early as about 3000 BC, the term *opus sectile* properly refers to an art that began in the Hellenistic world, perhaps first in Italy, and continued as a European decorative tradition. *Opus sectile* first appeared in Rome in Republican times (before the 2nd century BC) as pavement in simple geometrical and floral designs. From the 1st century AD there was also a regular production of small pictures of the *opus sectile* type.

Both traditions continued as important pavement- and wall-decorating arts throughout the Roman era. A fine example of pictorial *opus sectile* from the late antique period is a picture composed of coloured marbles of a tiger attacking a calf, from a wall in the Basilica of Junius Bassus, Rome (4th century; Capitoline Museum, Rome). Early Christian churches in Rome and Ravenna were decorated with both types of *opus sectile*. In medieval Europe the ornamental *opus sectile* of antiquity evolved into more specialized arts, notably the intricate and severely geometrical Byzantine *opus Alexandrinum* and its descendants, Roman Cosmati work and other similar Italian arts. Pictorial *opus sectile* gained great sophistication in the Renaissance with monumental compositions of marble inlay in Italian churches and reached its climax with the Florentine *commesso* work of the 17th century, in which shaped pieces of highly coloured stone were joined together to form pictures that rival painting in their realism. Geometrical *opus sectile* continued to be the major form of floor decoration in Italian churches throughout the Middle Ages and Renaissance.

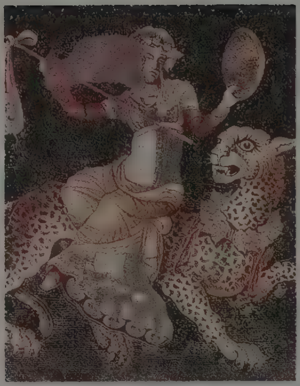
Tiger attacking a calf, detail of an *opus sectile* wall from the Basilica of Junius Bassus, Rome, 4th century AD; in the Capitoline Museum, Rome

SCALA—Art Resource/EB Inc.

opus signinum, in mosaic, type of simple, unpatterned or roughly patterned pavement commonly used in Roman times. It was composed of river gravel, small pieces of stone, or terra-cotta fragments cemented in lime or clay.

Opus signinum was the prevalent form of pavement in Roman houses from the 1st century BC to about the 2nd century AD. It was rapidly superseded in main rooms by patterned pavement mosaics made up of small, shaped pieces of stone, ceramic, or glass tesserae.

opus tessellatum, mosaic technique that involves the use of tesserae (small cubes of stone, marble, glass, ceramic, or other hard material) of uniform size applied to a ground to form pictures and ornamental designs. *Opus tessellatum* was the most commonly used technique in the production of Hellenistic, Roman, early Christian, and Byzantine mosaics. Evolving from the supplementary use of stone tesserae to achieve colour intensity in earlier pebble mosaics, *opus tessellatum* came to be used for entire mosaic floors in most areas of the eastern Mediterranean by at least the beginning of the 2nd century BC. The earliest mosaics in *opus tessellatum* were composed of stone and marble tesserae, but, in the course of the 2nd century, tesserae of coloured glass were introduced for special colour effects. In the Hellenistic period (3rd to 1st centuries BC) in cities in Greece, Africa, Sicily, and Italy, pictorial mosaics of great virtuosity were produced in *opus tessellatum*; more commonly, however, *opus tessellatum* was reserved for decorative borders surrounding *emblēmata*, or central figural panels executed in *opus vermiculatum*, a finer mosaic work using much smaller tesserae.

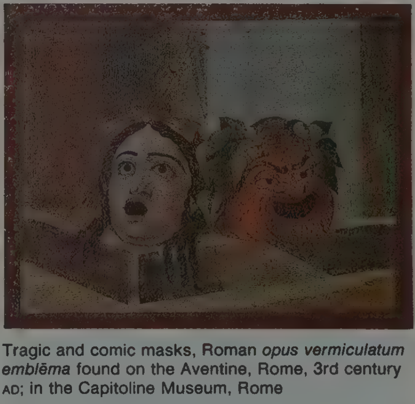


Mythological figure, possibly Dionysus, riding a panther, a Hellenistic *opus tessellatum emblēma* from the House of Masks on Delos, Greece, 2nd century BC

Dimitri Papadimos

In the 1st century BC, with the rise of the Roman Empire, Italy became the centre of mosaic production; there and in the rest of the empire *opus tessellatum* continued to be used in a mainly secondary, decorative role whenever *opus vermiculatum* could be afforded. Beginning with the 1st century AD, however, figural *opus tessellatum* was increasingly used to cover whole floors, and by the early Christian period it had become the dominant technique. With the widespread use of monumental wall mosaics that began with that era, *opus tessellatum* entirely replaced *opus vermiculatum*, being much better suited, with its large tesserae and rougher visual effect, for viewing at a distance. Glass tesserae were used almost exclusively for these wall mosaics, and glass *opus tessellatum* remained the common mosaic technique throughout the Middle Ages.

opus vermiculatum, type of mosaic work frequently used in Hellenistic and Roman times, in which part or all of a figural mosaic is made up of small, closely set tesserae (cubes of stone, ceramic, glass, or other hard material) that permit fine gradations of colour and an exact following of figure contours and outlines. The word *vermiculatum* ("wormlike") refers to the undulating rows of tesserae that characterize this work. *Opus vermiculatum* was generally used for *emblēmata*, or central figural panels, which were surrounded by geometrical or floral designs in *opus tessellatum*, a coarser mosaic technique with larger tesserae; occasionally *opus vermiculatum* was used only for faces and other details in an *opus tessellatum* mosaic.



Tragic and comic masks, Roman *opus vermiculatum emblēma* found on the Aventine, Rome, 3rd century AD; in the Capitoline Museum, Rome

SCALA—Art Resource/EB Inc.

The earliest known example of *opus vermiculatum*, *c.* 200 BC, is an *emblēma* showing a personification of the city of Alexandria (Greco-Roman Museum, Alexandria). By the 1st century BC, Romans had adopted the technique or at least imported Greek artists to work in it; a number of fine *opus vermiculatum* pieces from this period have been found at Pompeii, including a magnificent large *emblēma* with many figures, usually identified as a scene of the Battle of Issus between Alexander the Great and the Persian king Darius III (Museo Nazionale, Naples). This work probably copies a famous Greek painting from the 4th century BC; with its thousands of chromatically blended tesserae and its complete subordination of the natural properties of the stone and glass medium to plastic pictorial effect, it well illustrates the primary objective of *opus vermiculatum*: to paint in stone.

Although its use decreased steadily after the 1st century AD, *opus vermiculatum* continued to be the major technique for finer pictorial mosaics in the Roman world until the 4th century. Thereafter the style of floor mosaics changed to a more impressionistic one that took advantage of the crystalline and reflective qualities of stone and glass and was better suited to the coarser *opus tessellatum*. With the advent of widespread use of mosaic decoration for walls and vaults in the early Christian period, *opus vermiculatum* was entirely abandoned in favour of an increasingly impressionistic *opus tessellatum* that was visually effective at a distance.

oracle (Latin *oraculum* from *orare*, "to pray," or "to speak"), divine communication delivered in response to a petitioner's request; also, the seat of prophecy itself. Oracles were a branch of divination but differed from the casual pronouncements of augurs by being associated with a definite person or place. For example, the oracles of Zeus originated at Dodona, Olympia, or Siwa; those of the Sibyl were in general circulation, but their provenance was unknown.

Oracular shrines were numerous in antiquity, and at each the god was consulted by a fixed means of divination. The method could be simple, such as the casting of lots or the rustling of tree leaves, or more sophisticated, taking the form of a direct inquiry of an inspired person who then gave the answer orally. One of the most common methods was incubation, in which the inquirer slept in a holy precinct and received an answer in a dream.

The most famous ancient oracle was that of Apollo at Delphi, located on the slopes of Mt. Parnassus above the Corinthian Gulf. Traditionally, the oracle first belonged to Mother Earth (Gaea) but later was either given to or stolen by Apollo. At Delphi the medium was a woman over fifty, known as the Pythia, who lived apart from her husband and dressed in a maiden's clothes. Though the oracle, at first called Pytho, was known to Homer and was the site of a Mycenaean settlement, its fame did not become Panhellenic until the 7th and 6th centuries BC, when Apollo's advice or sanction was sought by lawmakers, colonists, and founders of cults. The Pythia's counsel was most in demand to forecast the outcome of projected wars or political actions.

Consultations were normally restricted to the seventh day of the Delphic month, Apollo's birthday, and were at first banned during the three winter months when Apollo was believed to be visiting the Hyperboreans in the north, though Dionysus later took Apollo's place at Delphi during that time. According to the usual procedure, sponsors were necessary, as was the provision of a *pelanos* (ritual cake) and a sacrificial beast that conformed to rigid physical standards. The Pythia and her consultants first bathed in the Castalian spring; afterward, she drank from the sacred spring Cassotis and then entered the temple. There she apparently descended into a basement cell, mounted a sacred tripod, and chewed leaves of the laurel, Apollo's sacred tree. While in her abnormal state, the Pythia would speak, intelligibly or otherwise. Her words, however, were not directly recorded by the inquirer; instead they were interpreted and written down by the priests, often in highly ambiguous verse.

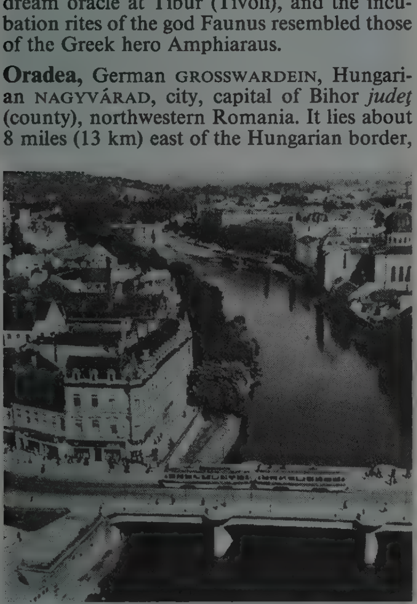
In addition to Delphi, there were less frequented oracles at Thebes, Tegyra, and Ptoon in Boeotia, at Abae in Phocis, at Corope in Thessaly, and on Delos, Apollo's birthplace. In Anatolia the god's oracles at Patara, Branchidae, Claros, and Grynium were also well known, though none rivaled Delphi.

The oracle of Zeus at Dodona in northwestern Greece was regarded as the oldest. At Dodona the priests (later priestesses) revealed the god's will from the whispering of the leaves on a sacred oak, from a sacred spring, and from the striking of a gong. Zeus also prophesied from his altar at Olympia, where priests divined from offerings, as well as from the oasis of Siwa in Libya, which was originally an oracle of the Egyptian god Amon.

Oracles delivered through incubation were believed to come from chthonian (underworld) powers. Thus invalids slept in the hall of Asclepius, the god of medicine, at Epidaurus and claimed to receive cures through dreams. At the oracle of the hero Amphiaraus at Oropus in Attica, consultants slept on skins, while visitors to the oracle of Trophonius (son of Erginus the Argonaut) at Levádhia slept in a hole in the ground. Incubation was also practiced at the oracle of Dionysus at Amphicleia, while an oracle for consulting the dead existed beside the river Acheron in central Greece.

Oracles in the formal sense were generally confined to the classical world. The Egyptians, however, divined from the motion of images paraded through the streets, and the Hebrews from sacred objects and dreams. Babylonian temple prophetesses also interpreted dreams. In Italy the lot oracle of Fortuna Primigenia at Praeneste was consulted even by the Roman emperors. The goddess Albunea possessed a dream oracle at Tibur (Tivoli), and the incubation rites of the god Faunus resembled those of the Greek hero Amphiaraus.

Oradea, German GROSSWARDEIN, Hungarian NAGYVÁRAD, city, capital of Bihor *judeţ* (county), northwestern Romania. It lies about 8 miles (13 km) east of the Hungarian border, along the Crişul Repede River where it leaves the western foothills of the Western Carpathians and flows onto the Hungarian Plain.



Oradea on the Crişul Repede River, Romania

By courtesy of "Carpati" Romanian National Tourist Office

One of the first feudal states in the area, a principality ruled by Prince Menumorut in the 9th–10th century, was centred on a citadel at Biharea, northwest of Oradea. The citadel of Oradea was erected between 1114 and 1131, destroyed by the Tatars in 1241, and rebuilt in the 15th century under the Corvinus dynasty. Between 1660 and 1692 the community was occupied by the Turks; it then became Hungarian until ceded to Romania in 1919.

Oradea is a cultural centre, with a state theatre, puppet theatre, philharmonic orchestra, regional library, and museum. Five miles east of Oradea are the spas of Băile 1 Mai (Băile Felix) and Băile 9 Mai (Băile Victoria). Since World War II, Oradea has become a major industrial centre, producing machine tools, mining equipment, chemicals, processed foods, and footwear. Pop. (1997 est.) 223,288.

Oradour-sur-Glane, village, Haute-Vienne *département,* Limousin *région,* south-central France. It is located 14 miles (23 km) northwest of Limoges.

Oradour-sur-Glane was the site of a particularly brutal atrocity during World War II. The village and its inhabitants were destroyed by German troops on June 10, 1944, exactly two years after a similar fate had befallen the Czechoslovakian village of Lidice. In reprisal for Resistance attacks, an SS detachment of 200 men routed all 652 inhabitants from their homes and into the village square. A search for hidden explosives and an identity check were announced, and the people were herded off—the men into barns, the women and children into the church. The troops then barred the doors and with dynamite and incendiary devices set fire to the entire village. Anyone not suffocated or burned to death was killed by machine-gun fire and grenades, except for 10 who somehow survived the fire and feigned death until the SS had departed. The toll was 642: 245 women and 207 children in the church and 190 men in the barns. Postwar efforts to bring the SS men to trial were hampered by the difficulty of locating and identifying the Germans, many of whom had been subsequently killed in action, and by legal complications. Finally, in 1953, 21 of the 200 were brought to trial. All but one were convicted; five of them received terms of imprisonment and two were executed.

The gutted, abandoned village was left unreconstructed, its ruins a memorial to the victims. A new village, with a strikingly modern church, was built nearby. Pop. (1990) 2,010.

Öræfajökull, ice-covered volcanic massif, southeastern Iceland. It lies at the southern end of the giant ice field of Vatnajökull (*q.v.*). Its highest peak, Mount Hvannadals, reaches an elevation of 6,952 feet (2,119 m) above sea level and is also the highest peak in Iceland.

Oraibi, also called OLD ORAIBI, Indian pueblo (village), Navajo county, northeastern Arizona, U.S. The pueblo is situated at an elevation of nearly 6,500 feet (1,980 m) on the narrow, rocky Third Mesa of the Hopi Indian Reservation. It is the unofficial capital of the reservation and is thought to be the oldest continuously occupied settlement in the United States (from about AD 1150). Oraibi was the site of the San Francisco Mission (1629–80). In 1890 a group of farmers from Oraibi moved to the base of the mesa and formed Kykotsmovi, where a trading post and a Hopi elementary school are now located. After 1906, dissenting Hopi residents founded the nearby pueblo of Hotevilla 6 miles (10 km) northwest of Oraibi.

Oral, Russian URALSK, also spelled URAL'SK, city, western Kazakhstan, along the Ural (Kazakh Zhayyq) River. Founded in 1613 or 1622 by Cossacks fleeing a tsarist punitive campaign, it was known as Yaitsky Gorodok until 1775, when its name was changed following the Pugachov Rebellion. The town was a centre of both the Stenka Razin (1667) and Yemelyan Pugachov (1773) uprisings and was the headquarters of the Ural Cossacks. It had a lively trade with European Russia in fish from the Ural River and livestock products from the Kazakh steppes. Its commercial importance began to decline in the early 20th century when the new railway to Turkistan bypassed it. Oral's industries today include leather and footwear, meat-packing, flour milling, some engineering, and a licorice works. The city has teacher-training and agricultural institutes, the oldest theatre in Kazakhstan, and a museum with historic Cossack mementos. Pop. (1997 est.) 214,700.

oral cancer, disease characterized by the growth of cancerous cells in the mouth, including the lips. Oral cancer is often associated with cancers of the cavity located behind the tonsils and the back of the throat (oropharyngeal cancer). Most cases originate from the flattened cells that make up the lining of the oral cavity (squamous cell carcinomas). Oral cancers can spread into the jaw and may occur simultaneously with cancers of the larynx, esophagus, or lungs.

Several factors have been identified that increase the risk of developing oral cancer. Tobacco and alcohol use are the leading factors, with each increasing the risk sixfold. Oral cancer affects men at twice the rate of women, probably because men have generally been more likely to use tobacco and alcohol. Vitamin A deficiency is also a risk factor, and some strains of human papillomavirus can infect the mouth and may increase risk of oral cancer. Exposure to ultraviolet radiation from the sun is responsible for some cancers of the lips.

Symptoms of oral cancer vary depending on the location of the cancer. The most common symptom is a mouth sore that does not heal. Some early visual signs include white or red patches in the mouth. Other symptoms of oral or oropharyngeal cancer include lumps or swelling in the cheek, neck, or jaw, difficulty swallowing or moving the tongue or jaw, and pain in the jaw or teeth. Virtually any type of mouth pain may indicate oral cancer and should be investigated by a physician.

Suspected tumours are analyzed by biopsy, and the mouth, pharynx, and larynx are examined visually with small mirrors or a laryngoscope. In some cases a more extensive examination of the head and neck may be conducted under general anesthesia. Several imaging methods may also be used, such as chest and head X rays, computed tomography (CT) scans, or magnetic resonance imaging (MRI). Once oral cancer has been diagnosed, its stage is determined to indicate how far the cancer has progressed. Survival is considerably higher when the cancer is detected early but very low once the cancer has spread to distant organs.

Like most cancers, oral and oropharyngeal cancers can be treated with surgery, radiation, or chemotherapy. Surgery is often the first mode of treatment. In order to minimize tissue loss, superficial cancers of the lip may be shaved off a layer at a time until no cancer is detected. Small early-stage tumours can be removed along with some surrounding tissue with minimal side effects. If the cancer has spread into the surrounding bone, part or all of the jaw may have to be removed (mandible resection) or a maxillectomy performed to remove the hard palate. Oral and oropharyngeal cancers also may be treated with radiation, using either external beams or surgically implanted radioactive pellets.

Oral cancer is almost completely preventable if the key risk factors of smoking and alcohol consumption are avoided. A healthy diet containing sufficient vitamin A is also recommended. Regular dental examinations may detect oral cancer early. Dentures should be removed and cleaned at night to avoid trapping cancer-causing agents against the gums.

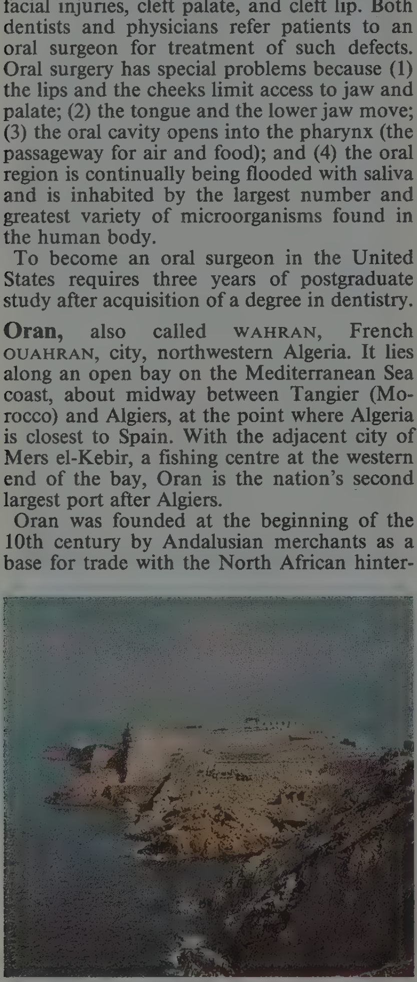
oral stage, in Freudian psychoanalytic theory, initial psychosexual stage during which the developing infant's main concerns are with oral gratification. The oral phase in the normal infant has a direct bearing on the infant's activities during the first 18 months of life. For the newborn, the mouth is the all-absorbing organ of pleasure. Freud said that through the mouth the infant makes contact with the first object of libido (sexual energy), the mother's breast. Oral needs are also satisfied by thumbsucking or inserting environmental objects, such as dolls, other toys, or blankets into the mouth. Freud believed the oral phase begins to shift toward the end of an infant's first year to the anal region.

oral surgery, dental specialty that deals with the diagnosis and surgical treatment of the diseases, injuries, and defects of the human mouth, jaw, and associated structures. The most common oral surgery procedure is tooth extraction. Other dental problems that require the skill of an oral surgeon include treatment of cysts (liquid- or semisolid-filled sacs), tumours, lesions, and infections of the mouth and jaw. More complex problems that are dealt with by the oral surgeon include jaw and facial injuries, cleft palate, and cleft lip. Both dentists and physicians refer patients to an oral surgeon for treatment of such defects. Oral surgery has special problems because (1) the lips and the cheeks limit access to jaw and palate; (2) the tongue and the lower jaw move; (3) the oral cavity opens into the pharynx (the passageway for air and food); and (4) the oral region is continually being flooded with saliva and is inhabited by the largest number and greatest variety of microorganisms found in the human body.

To become an oral surgeon in the United States requires three years of postgraduate study after acquisition of a degree in dentistry.

Oran, also called WAHRAN, French OUAHRAN, city, northwestern Algeria. It lies along an open bay on the Mediterranean Sea coast, about midway between Tangier (Morocco) and Algiers, at the point where Algeria is closest to Spain. With the adjacent city of Mers el-Kebir, a fishing centre at the western end of the bay, Oran is the nation's second largest port after Algiers.

Oran was founded at the beginning of the 10th century by Andalusian merchants as a base for trade with the North African hinterland, and it developed commercially owing to its sea connections with Europe. It became the port for the North African kingdom of Tlemcen in 1437 and also was an entrepôt for trade with the Sudan. In 1492 and 1502 Oran received colonies of Spanish Muslims fleeing from forcible conversion to Christianity. Thereafter its prosperity began to decline, and, with Mers el-Kebir, it became a centre for pirates. It was occupied by the Spanish in 1509. For the next two centuries Oran was contested by the various Mediterranean powers until it fell to the Turks in 1708. The constant raids of pirates based at Mers el-Kebir prompted Spain to retake Oran in 1732. Devastated by an earthquake in 1790, the town was evacuated and returned (1792) to the Turks, who settled a Jewish community there. Oran was occupied in 1831 by the French, who developed it as a modern port and turned Mers el-Kebir into a major naval base.



The Santa Cruz citadel of Oran, Alg., overlooking the Mediterranean Sea
Art Resource

In June 1940, at the time of the Franco-German armistice, a major part of the French fleet took refuge at Mers el-Kebir. On July 3 a British naval force sank or damaged most of the French ships in order to keep them from falling into German hands. Oran was one of the principal objectives in the Allied landings in North Africa and was captured by U.S. forces on Nov. 10, 1942. Oran had a higher proportion of European inhabitants than any other North African city, and much strife occurred between Frenchmen and Arab Muslims at the time of Algerian independence in 1962. Most of the Europeans subsequently left, and Oran's naval functions gradually lapsed in favour of commercial ones.

Modern Oran is divided into a waterfront and old and new city sections occupying terraces above it that were formerly divided by a ravine (now built over). The old Spanish-Arab–Turkish city, called La Blanca, lies west of the ravine on a hill. The newer city, called La Ville Nouvelle and built by the French after 1831, occupies the terraces on the east bank of the ravine. La Blanca is crowned by the Turkish citadel of Santa Cruz, which was subsequently modified by the Spanish and French. The Spanish quarter, with its narrow streets, contains the former Cathedral of Saint-Louis (rebuilt by the French in 1838), the Porte de Canastel (reconstructed in 1734), and the fountain in the Place Emerat (1789). In the Turkish part of the old town is the Great Mosque built in 1796 with money obtained by ransoming Spanish captives. To the east lies the Château Neuf, former residence of the beys of Oran and later a French army headquarters. Near the Casbah, which surrounds the old Spanish castle, are the mosque of Sīdī el-Haowri, a 15th-century scholar and monk; the former barracks of the Janissaries; and the harem of the beys. The former French sector now spreads across the ravine and far outside the second city wall (1866; now largely demolished). This sector contains government and commercial offices and many mid-rise apartment buildings.

The University of Oran was founded in 1965, and the University of Science and Technology of Oran was founded in 1975. Other institutions include the Municipal Museum (Roman and Punic exhibits), the Museum of Tlemcen (Islāmic art), and the Aubert Library. The city is the setting for the French writer Albert Camus's novel *La Peste* (1947; *The Plague*).

Oran's artificial harbour was greatly enlarged after 1848 and has a jetty more than 8,800 feet (2,700 m) long. The city is connected by rail to Algiers, Morocco, and Béchar, and its international airport lies beyond the village of Es-Senia. The industrial part of Oran, in the outlying south-southeastern districts, contains hundreds of small food-processing and diversified manufacturing plants. The port's principal exports are wine, cereals, vegetables, and fruits. Pop. (1998) 692,516.

orang (ape): *see* orangutan.

Orange, town, Vaucluse *département,* Provence-Alpes-Côte d'Azur *région,* southeastern France. It lies in a fertile plain on the left bank of the Rhône River, north of Avignon.

Roman theatre, Orange, Fr.
Victor Englebert—De Wys Inc.

The town has grown up around the Roman monuments for which it is famous. The semicircular theatre, probably built during the reign of the first Roman emperor, Caesar Augustus (27 BC–AD 14), is the best preserved of its kind. The tiered benches (partly rebuilt), which rise on the slopes of a slight hill, originally seated 1,100. The magnificent wall that constitutes the back of the theatre is 334 feet (102 m) long and 124 feet (38 m) high. An imposing statue of Augustus, about 12 feet (3.7 m) high, stands in the wall's central niche. Orange also has a triumphal arch that is one of the largest built by the Romans. It is about 61 feet (19 m) high and has fine sculptures evoking the victories in the 1st century BC of the Roman general and statesman Julius Caesar.

Orange is now a market town whose main industries include the manufacture of brooms and glass and food processing (jam, canned fruit). It derives its name from Arausio, a Gaulish god. Under Augustus' rule it became a prosperous city. In the 5th century it was pillaged by the Visigoths. The town became an independent countship in the 11th century and later passed to the house of Nassau. The French king Louis XIV captured the town and pulled down its fortifications in 1660. Orange was ceded to France in 1713 by the Treaty of Utrecht. Pop. (1999) 27,989.

Orange, city, Orange county, southern California, U.S. It lies along the Santa Ana River. Part of Rancho Santiago de Santa Ana, it was founded as Richland in 1868, laid out in 1871, and renamed in 1875 for its orange groves. Orange was initially a citrus-packing centre. It subsequently developed with the Los Angeles metropolitan area and acquired some light manufacturing. The city is the site of Chapman University (established 1861 in Los Angeles, relocated 1954) and of a branch campus of West Coast University. Inc. city, 1888. Pop. (2000) 128,821.

Orange, city, seat (1852) of Orange county, southeastern Texas, U.S. It lies at the Louisiana state line. Orange is a deepwater port on the Sabine River, which has been canalized to connect with the Gulf Intracoastal Waterway. With Beaumont and Port Arthur it forms the "Golden Triangle" industrial complex.

Settled in 1836 as Green's Bluff, it was known as Madison in 1852 but was renamed (1856) either for the orange groves along the river or for Orange, N.J. An early rice, lumber, and shipbuilding centre, it boomed during World War I when shipyard construction became a major industry. After World War II the U.S. Navy maintained a naval station and "mothball fleet" there. Orange is located in a major natural-gas and oil-field area. Its key industries include steel fabrication and shipbuilding and the manufacture of petrochemicals, synthetic rubber, paper products, and cement. A branch (1969) of Lamar University is in the city. Inc. 1881. Pop. (2000) 18,643.

orange, any of several species of small trees or shrubs of the genus *Citrus* of the family Rutaceae and their nearly round fruits, which have leathery and oily rinds and edible, juicy inner flesh. The species of orange most important commercially are the China orange, also called the sweet, or common, orange; the mandarin orange, some varieties of which are called tangerines (*q.v.*); and the sour, or Seville, orange, from which marmalade is made. Other varieties include the Jaffa, from Israel; the Maltese, or blood, orange; and the navel, which is usually seedless. The tree of the sweet orange often reaches 6 m (20 feet) and sometimes 10 m. The broad, glossy, evergreen leaves are medium-sized and ovate; the petioles (leafstalks) have narrow wings. Its flowers are very fragrant. The usual shape of the sweet-orange fruit is round and the colour of its pulp orange, but there are variations. The mandarin, for example, is distinctly flattened, and the blood orange has red pulp. The pulp of the sweet orange is agreeably acidulous and sweet, the peel comparatively smooth, and the oil glands convex.

Orange (*Citrus*)

By courtesy of Florida Department of Commerce

Prior to 1920 the orange was mainly considered a dessert fruit. The spread of orange-juice drinking, in contrast with eating of the fresh fruit, significantly increased the per capita consumption of oranges. Also important was the growing appreciation of the dietary value of citrus fruits; oranges are rich in vitamin C, potassium, and magnesium.

The most important product made from oranges in the United States is frozen concentrated juice, which accounts for nearly 40 percent of the crop. Essential oils, pectin, candied peel, and orange marmalade are among the important by-products. Stock feed is made from the material left from processing. Orange oil is a mild but effective solvent used in cleaners, polishes, and soaps and because of its pleasant scent has many fragrance and flavouring applications.

Oranges are believed native to the tropical regions of Asia, especially the Malay Archipelago; along with other citrus species, they have been cultivated from remote ages. Orange culture probably spread from its native habitat to India and the east coast of Africa and from there to the eastern Mediterranean region. The Roman conquests, the development of Arab trade routes, and the expansion of Islām contributed significantly to this dispersal. By the time Christopher Columbus sailed, orange trees were common in the Canary Islands. Today oranges are cultivated in subtropical and tropical America, northern and eastern Mediterranean countries, Australia, and South Africa.

Oranges thrive best where the trees are chilled somewhat by occasional light frosts in winter. The trees are semidormant at that season, and temperatures just below freezing will not harm trees or fruit unless frost occurs early, before the trees have finished their annual growth. In the coldest cultivation areas, the orchards may be heated with smudge pots or smokeless natural-gas burners.

The orange thrives in a wide range of soil conditions, from extremely sandy soils to rather heavy clay loams; it grows especially well in intermediate types of soil. Orange orchards are generally planted in relatively deep soil where drainage is good. The orange trees are usually budded on stocks grown from the seed of selected trees. The seeds are sown in well-prepared soil in a lath house; after about 12 months' growth there, the seedlings are removed to a nursery. After about 12–16 months in the nursery, the trees are usually large enough to bud. When the budded tops are one to two years old, the trees are large enough to plant in the orchard.

The culture of intercrops such as beans, tomatoes, or melons among immature orange trees is common. The growth of cover crops makes use of seasonal rainfall for production of organic matter to be incorporated into the soil. In many areas where oranges are grown, it is necessary to supplement the rainfall with irrigation; this is generally the practice in Texas, California, Israel, Spain, Morocco, and parts of South Africa. Orange trees bear abundantly from 50 to 80 years or even more, and some old orange trees whose age must be reckoned by centuries still produce crops. Oranges are picked when fully ripe, for they do not ripen or improve in quality after being picked.

The sweet and mandarin oranges are the principal species produced commercially in the following countries, listed in order of importance: Brazil, the United States, China, Mexico, Spain, Italy, India, and Egypt. The chief orange-growing states in the United States are Florida, California, Texas, and Arizona, in that order. The world production of all kinds of oranges is approximately 76,000,000 metric tons annually.

Orange, HOUSE OF, princely dynasty that derived its name from the medieval principality of Orange, in old Provence in southern France. The dynasty was important in the history of The Netherlands and is that nation's royal family.

The counts of Orange became independent upon the disintegration of the feudal kingdom of Arles. They were vassals of the Holy Roman emperors from the 12th century, and they early began to style themselves princes. When Philibert de Chalon, prince of Orange, died in 1530, he was succeeded by his nephew René of Nassau, who in 1538 succeeded his father, Henry III of Nassau-Dillenburg-Breda, not only in his German patrimony but also in scattered possessions in the Netherlands. Dying in 1544, René bequeathed his titles to his cousin, William I of Nassau-Orange.

Known as William I the Silent, the prince of Orange led the Netherlands' revolt against Spain from 1568 to his death in 1584 and held the office of stadtholder in four of the rebelling provinces. This was the start of a tradition in the Dutch Republic whereby the stadtholderships were for long periods monopolized by the princes of Orange and counts of Nassau, supported by an enduring Orange "party" composed of nobles, orthodox Calvinist leaders, artisans, and peasants against the rivalry of the patriciate of Holland. The gifted 16th- and 17th-century stadtholders were followed by less effective Orange leaders in the 18th century. The last stadtholder fled to England in 1795 as the republic collapsed.

The next titular prince of Orange became sovereign prince of The Netherlands in 1814 and king in 1815, as William I. He and his successors, William II and William III, were also grand dukes of Luxembourg; and the title prince of Orange was borne by heirs apparent to the Dutch throne. With King William III the male line died out in 1890; but the Dutch queen Wilhelmina decreed in 1908 that her descendants should be styled princes and princesses of Orange-Nassau. *See also* Nassau.

Orange, councils of, two church synods held in Orange, France, in 441 and 529. The first, under the presidency of St. Hilary of Arles, dealt mainly with disciplinary matters. The second, and by far the more important, was concerned with refuting the Semi-Pelagianism of Faustus of Riez. It was attended by 15 bishops and was under the presidency of Caesarius of Arles. Caesarius had sought the aid of Rome against Semi-Pelagianism, and in response Pope Felix IV had sent certain passages concerning grace and free will, drawn chiefly from the writings of Augustine and Prosper of Aquitaine. The synod approved 25 of them and adopted a supplementary statement reaffirming the Augustinian doctrines of corruption, human inability, prevenient grace, and baptismal regeneration. Its decrees were later confirmed by Pope Boniface II, and they became the Roman Catholic norm for doctrines on grace, predestination, and free will.

Orange Bowl, American college football game played for many years on New Year's Day in Miami, Fla. By the late 1990s it was often played on January 2 or 3. It is one of the four bowls included in the Bowl Championship Series and every four years hosts the national championship game.

The game was first played in 1933 to attract winter tourists to Florida a month before their usual arrival. From 1954 through 1995 the champion of the Big 8 Conference (currently Big 12) was invited to 38 of the 42 games. Currently the game's opponents are champions of the Big East and Atlantic Coast conferences unless it is the Orange Bowl's turn to host the national championship game.

The Orange Bowl Festival features, in addition to the football game, a parade, a tennis tournament, a basketball tournament, a fireworks display, and a sailboat regatta.

Orange Free State, Afrikaans ORANJE VRY STAAT, Boer state in southern Africa that became a province of the Republic of South Africa in 1910. One of the four traditional provinces of South Africa, it was bordered by the Transvaal to the north, Natal and the independent state of Lesotho to the east, and Cape Province to the south and west. The first postapartheid South African government renamed the province Free State (*q.v.*) in 1995.

Before the arrival of Europeans, the area was the home of seminomadic Bantu-speaking peoples such as the Tswana. Europeans first crossed the Orange River northward to enter the area in the 18th century. Early in the 19th century the Tswana were dispersed by Zulu military campaigns, and their place was taken by the Basuto (Sotho) and Griqua peoples. At the same time, seminomadic pastoral farmers of Dutch descent called trekboers (Boers) began to settle the area. After 1836 came the Great Trek, a migratory movement in which larger numbers of Boer farmers seeking freedom from British rule moved north across the Orange River. In 1848 the British annexed the territory between the Orange and Vaal rivers, proclaiming it the Orange River Sovereignty over the resistance of the Boer general Andries Pretorius. The British proved unable to build an orderly administration, however, and conflicts with the Sotho convinced the British to withdraw in 1854. On Feb. 23, 1854, under the Bloemfontein Convention, the British relinquished their sovereignty and the local Boer settlers formed the independent Orange Free State.

The political structure of this new state combined traditional Boer institutions with Dutch and American constitutional theory. The members of the unicameral legislative assembly, the Volksraad ("People's Council"), were elected by white adult males only. A directly elected president and an executive council exercised the executive power. During the first few years of the new state's existence, it was much harassed by raids from Basuto peoples from the east. The Basuto were at length conquered, and part of their territory was annexed under a treaty (1869) that determined the permanent boundary between Natal and Lesotho. These gains were made under the capable leadership of J.H. Brand, who was president of the Orange Free State from 1864 to 1888. The state prospered under his administration and accepted rail links with the British-ruled Cape Colony in the 1890s.

After L.S. Jameson's abortive raid into the Transvaal in 1895, the Orange Free State was increasingly drawn into the tensions between Boers and British that resulted in the South African (Boer) War (1899–1902). In this conflict the Orange Free State fought against Britain by the side of its sister state, the South African Republic (*i.e.,* the Transvaal), with which it had a defensive alliance. Under the leadership of President M.T. Steyn and General C.R. de Wet, the Orange Free State's forces won some victories against the British army, but the two Boer republics could not ultimately prevail. In 1900, after British forces had occupied Bloemfontein, the Orange Free State was annexed by Britain as the Orange River Colony. The Boers continued to fight for two more years, but the Peace of Vereeniging (May 31, 1902) ended the independence of the Orange Free State and the South African Republic and reimposed British rule over them.

Self-government was restored in 1907, after which, in 1910, the colony became the Orange Free State Province within the Union of South Africa. The province remained unchanged when the Union of South Africa became the Republic of South Africa in 1961; but after apartheid (racial separation) was abolished and the provincial governments were reorganized in 1993–94, the Orange Free State was renamed simply Free State.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Orange Order, also called LOYAL ORANGE ASSOCIATION, original name ORANGE SOCIETY, byname ORANGEMEN, an Irish Protestant and political society, named for the Protestant William of Orange, who, as King William III of Great Britain, had defeated the Roman Catholic king James II.

The society was formed in 1795 to maintain the Protestant ascendancy in Ireland in the face of rising demands for Catholic Emancipation. Enmity between Roman Catholics and Protestants had always been endemic in Ireland and was much exacerbated in the 17th century by the introduction into Ulster of Presbyterian settlers, by the rebellion of 1641, and by the war of 1688–91, when the Catholic king James II attempted to maintain in Ireland the power he had lost in England. Intersectarian feeling became especially bad again in the 1790s, especially in County Armagh, where Protestants, known as the "Peep o' Day Boys," attacked their Catholic neighbours. After a major confrontation in 1795, known as the Battle of the Diamond, the Orange Society was formed as a secret society, with lodges spreading throughout Ireland and ultimately into Great Britain and various British dominions. In 1835, with the Orange Society in mind, the House of Commons petitioned the king to abolish societies that were secret and that excluded persons on the ground of religion. Some official attempts were made to discourage the provocative Orange processions, the most notable of which is held annually on July 12, the anniversary of the Battle of Aughrim, at which William III's generals were finally victorious in Ireland. The Orange Society strengthened resistance in Ulster to the Irish Home Rule Bill of 1912 and has continued as a bastion of Protestant Unionist opinion.

Orange Range (New Guinea): *see* Jayawijaya Mountains.

Orange River, river, one of the longest in southern Africa.

A brief treatment of the Orange River follows. For full treatment, *see* MACROPAEDIA: Africa.

The Orange River rises in the Lesotho Highlands as the Sinqu River and flows westward as the Orange River across the Republic of South Africa, along the southern edge of the Kalahari (desert), and through the Namib (desert) before draining into the Atlantic Ocean at Alexander Bay, South Africa. Along part of its upper course, the river forms the boundary between the South African provinces of Free State (north) and Eastern and Northern Cape (south), while along its lower course the river forms the border between Namibia (north) and South Africa (south). The Orange River is about 1,300 miles (2,100 km) long and drains an area of roughly 330,000 square miles (855,000 square km).

The Orange River's upper course in Lesotho is steep and marked by numerous rapids. Its major tributary after it enters South Africa is the Caledon River. Below the confluence with its other main tributary, the Vaal River, the Orange flows alternately through deep gorges and broad valleys. Farther downstream, at Upington, the river splits into innumerable channels and spreads out to a width of nearly 4 miles (6 km) in places, and some 20 miles (32 km) below Kakamas the river forms the Augrabies Falls. The lowermost course of the river, from the Augrabies Falls to the sea, similarly alternates between deep gorges and more open valleys. The river makes one last great bend as it flows north along the Richtersveld before turning west to the coastal desert of the Namib, where it empties into the Atlantic Ocean.

There are two distinct rainfall patterns in the river basin. Above the Vaal River confluence, the river receives an annual rainfall of 28–32 inches (700–800 mm), most of which falls in summer; below the Vaal confluence, rainfall decreases from 9 inches (230 mm) a year to less than 2 inches (50 mm) in the Namib. Temperatures increase in a westerly direction, resulting in a higher rate of evaporation along the river's lower course. There are some irrigated sections along the river, but there are no large towns. This situation remained little changed by The Orange River Project (begun 1962), which was designed to accumulate water at several large dams for diversion to the valleys of the Great Fish and Sunday rivers and to the cities of Port Elizabeth and Bloemfontein.

orange-tip butterfly, member of the cosmopolitan insect family Pieridae (order Lepidoptera), which also includes the white and sulfur butterflies and contains more than 1,000 species. Adults have a wingspan of 37 to 63 mm (1.5 to 2.5 inches). The orange-tips (so called because most species have an orange spot on the top of the forewings) have whitish wings with black markings and green marbling on the underside. The larvae feed on plants in the mustard family.

Orange Walk, town, northwestern Belize, situated on the left (west) bank of the New River. Established in early colonial times, it was pillaged by hostile Indians in 1872. During the late 19th and early 20th centuries, it conducted a thriving trade in mahogany. The town declined after demand for mahogany lessened. Sugarcane and citrus fruit cultivation and rum distilling are the main economic activities. The area's inhabitants are primarily Spanish-speaking mestizos. Recently excavated Maya archaeological sites date from 600 BC to AD 50. Pop. (1992 est.) 11,728.

Orangeburg, city, seat of Orangeburg county, central South Carolina, U.S. It is situated on the North Fork of the Edisto River. In 1735 Germans, Swiss, and Dutch established a settlement, naming it for William, prince of Orange. The Donald Bruce House (*c.* 1735), on nearby Middlepen Plantation, served as the headquarters for Governor John Rutledge, General William Moultrie, and Lord Rawdon during the U.S. War of Independence. Orangeburg's original agricultural economy has given way to light diversified industry (textiles, tools, chemicals) and educational services. Orangeburg is the seat of Claflin College (1869), South Carolina State University (1896), and Orangeburg-Calhoun Technical College (1966). The Edisto Memorial Gardens have test sections affiliated with the American Rose and Camellia societies. The Orangeburg National Fish Hatchery (established 1912) occupies 20 acres (8 hectares) of ponds. Inc. 1883. Pop. (1994 est.) 13,762.

Edisto Memorial Gardens on the North Fork of the Edisto River, Orangeburg, S.C.

Milt and Joan Mann from CameraMann

Orangemen: *see* Orange Order.

orangeroot (plant): *see* goldenseal.

orangery, garden building designed for the wintering of exotic shrubs and trees, primarily orange trees. The earliest orangeries were

Orangery at Kew House, Greater London

British Crown Copyright reproduced with permission of the Controller of Her Britannic Majesty's Stationery Office practical buildings that could be completely covered by planks and sacking and heated in the cold season by stoves; such buildings existed in Great Britain and France as early as the second half of the 16th century.

The great period of the orangery, when few great gardens were without one, extended from the latter half of the 17th century into the early 18th century. Great numbers of orange trees were fruited in what became the most elaborate architectural feature of princely gardens. Many famous orangeries survive, notably those at the gardens of Versailles in France and Kew House, Greater London.

Oranges, War of the (1801), brief conflict in which France and Spain fought against Portugal. The war was brought about by Portugal's refusal in 1800 to accept Napoleon's demands to become a political and economic extension of France and to cede to France the major part of its national territory.

In April 1801, French troops arrived in Portugal, and on May 20 they were bolstered by Spanish troops under the command of Manuel de Godoy. In a battle that was disastrous for Portugal, Godoy took the town of Olivenza, near the Spanish frontier. Following his victory, Godoy picked oranges at nearby Elvas and sent them to the Queen of Spain with the message that he would proceed to Lisbon. Thus, the conflict became known as the War of the Oranges.

After Olivenza, Portugal negotiated a treaty with France and Spain—the Peace of Badajoz (June 1801)—ending the invasion. Portugal agreed to close its ports to English ships, to give commercial concessions to France, to cede Olivenza to Spain and part of Brazil to France, and to pay an indemnity.

orangutan (Malaysian: "man of the forest"), also spelled ORANGOUTAN, also called ORANG (species *Pongo pygmaeus*), large manlike ape (family Pongidae) that is now restricted to lowland swamp forests in Borneo and a small part of Sumatra. Orangutans formerly lived in the jungles of mainland Southeast Asia as well, and the principal cause of the extreme shrinkage of their range in the last few thousand years seems to have been hunting by humans.

Like the related gorilla and chimpanzee, the orangutan has a short, thickset body, long arms, and short legs. It differs in having a shaggy, reddish coat, an even greater disproportion between arm and leg lengths, and a differently shaped skull. The male orangutan may be about 137 cm (4.5 feet) tall and weigh about 85 kg (185 pounds) when mature, while females usually attain a weight of only about 40 kg (90 pounds). The male orangutan is strikingly different from the female not only in being considerably larger but also in having cheek flaps of subcutaneous fatty tissue and an air sac that forms a baglike swelling hanging from the throat.

Orangutan (*Pongo pygmaeus*)
Russ Kinne—Photo Researchers

The orangutan is mostly arboreal and is active in the daytime. It uses all four of its limbs when walking or climbing along branches in the forest canopy, and it may swing from one branch to another, though it is much less active in this regard than its cousin, the gibbon. Adult male orangutans must sometimes descend to the ground to travel long distances, since the smaller tree branches cannot support their weight. When walking, orangs place the clenched fist (rather than the knuckles) on the ground to aid locomotion. The orangutan feeds mainly on wild figs and other fruits that it picks from trees, though it also eats smaller quantities of leaves, bark, and even insects. Each night it constructs a sleeping platform in the trees out of interwoven branches.

Unlike virtually all other apes and monkeys, adult orangutans are solitary animals that come together only for a brief courtship before mating. Their population densities in the forest are low, with only two or three per square mile. A single young is born after a gestation period of about 275 days and is nursed by the mother, who carries it at her breast or on her back. The young is usually completely weaned at the end of 3 years, by which time the mother has mated again. Baby and adolescent orangs are noticeably more social than adults. Sexual maturity is attained at 8 years in the female, 10 years in the male. Life span, at least in captivity, may exceed 30 years. The orangutan is remarkably silent; among its few vocalizations are grunts, lip-smacking, and the "long call" of the adult male; the latter is a loud sequence of roars that presumably specify his location to other orangs.

By nature, the orangutan is a placid, deliberate animal. It is highly intelligent, and in captivity it has shown considerable ingenuity and persistence, with a particular ability to manipulate mechanical objects.

The *Red Data Book* lists the orangutan as an endangered animal. Factors contributing to the decline in its population include hunting and the destruction of its habitat by humans. It is protected by law in Indonesia and Malaysia.

Oranian industry: *see* Ibero-Maurusian industry.

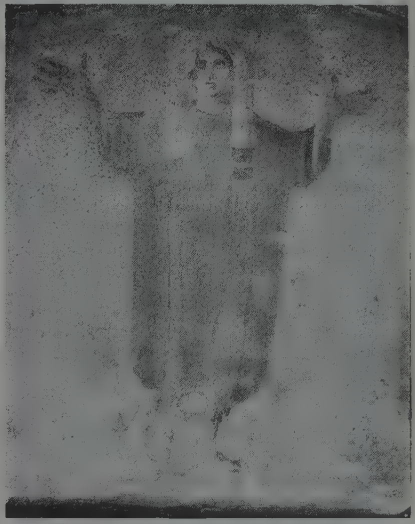
Oranienbaum (Russia): *see* Lomonosov.

Oranjemund, planned company town in one of the principal gem-diamond producing areas of the world, in extreme southwestern Namibia. It is located near the Atlantic coast about 5 miles (8 km) north of the mouth of the Orange River, in the sand dunes of the extremely arid Namib Desert. Gem-quality diamonds were discovered in the vicinity in the late 1920s, and in 1943 Oranjemund became the headquarters of the monopolistic Consolidated Diamond Mines of South West Africa, Ltd. Access to Oranjemund and adjacent areas is restricted by the diamond-mining company.

The town has no ocean port facilities but is connected to Alexander Bay, South Africa (across the Orange River), by a modern highway bridge. Air services from Alexander Bay indirectly connect Oranjemund with Windhoek, the capital of Namibia, and with Cape Town in South Africa. A number of planned satellite settlements have been built in the mining area along the coast north of Oranjemund. Pop. (1981) 4,112.

Oranjestad, seaport and chief administrative centre of the Caribbean island of Aruba, located on the island's western coast. It is a free port and a petroleum-processing and shipping centre. The enclosed harbour, with two basins, has modern cargo-handling and fueling equipment. Oranjestad has brightly coloured buildings, fine residential sections, and a modern sports arena, Wilhelmina Stadium. Pop. (1986 est.) 19,800.

orant, in Christian art, a figure in a posture of prayer, usually standing upright with raised arms. The motif of the orant, which seems to reflect the standard attitude of prayer adopted by the first Christians, is particularly important in Early Christian art (*c.* 2nd–6th century) and especially in the frescoes and graffiti that decorated Roman catacombs from the 2nd century on. Here many of the characters in Old Testament scenes of divine salvation of the faithful, the most commonly represented narrative subjects of the catacombs, are shown in the orant position. The most frequent use of the orant in the catacombs, however, was as an abstract representation of the soul of the deceased. In certain contexts, when it is identified with no particular individual, the orant has been interpreted as a symbol of faith or of the church itself.



Orant, fresco in the crypt of "La Velata," Catacomb of Priscilla, Rome, late 3rd century
EDI Studio, Barcelona

In the painting of the Byzantine Empire, the Madonna orant, or *blacherniotissa,* was one of the major types of depictions of the Virgin. Used to decorate the main apse of a number of churches, the Madonna orant stood symbolically as an intercession with Christ on behalf of the congregation.

Oraon, also called KURUKH, aboriginal people of the Choṭa Nāgpur region in the state of Bihār, India. They call themselves Kurukh and speak a Dravidian language akin to Gondi and other tribal languages of central India. They once lived farther to the southwest on the Rohtās Plateau, but they were dislodged by other populations and migrated to Choṭa Nāgpur, where they settled in the vicinity of Munda-speaking tribes.

Speakers of Oraon number about 1,900,000, but in urban areas, and particularly among Christians, many Oraon speak Hindi as their mother tongue. The tribe is divided into numerous clans associated with animal, plant, and mineral totems. Every village has a headman and a hereditary priest; a number of neighbouring villages constitute a confederation, the affairs of which are conducted by a representative council.

An important feature of the social life of a village is the bachelors' dormitory for unmarried males. The bachelors sleep together in the dormitory, which is usually on the outskirts of the village. There is a separate house for the females. The dormitory institution serves in the socializing and training of the young.

The traditional religion of the Oraon comprises the cult of a supreme god, Dharmes, the worship of ancestors, and the propitiation of numerous tutelary deities and spirits. Hinduism has influenced the ritual and certain beliefs. Many Oraon, including the majority of the educated, have become Christians.

Orapa, mining town, east-central Botswana. It is located about 240 miles (385 km) north of Gaborone, the national capital. Situated on the eastern edge of the Kalahari (desert), the town was built to accommodate mine workers after the discovery in 1967 of a large diamond field, or pipe (a roughly cylindrical diamond-bearing geological formation), with a surface area of 277 acres (112 hectares); it is one of the largest such formations known. The diamond mine came into operation in 1971; it is operated by Debswana, a company owned equally by the government of Botswana and De Beers Consolidated Mines, Ltd. of South Africa. Pop. (1988 est.) 8,330.

Oratio Dominica: *see* Lord's Prayer.

Oratorian, member of either of two separate but similar congregations of secular priests, one centred in Rome and the other in France.

The Institute of the Oratory of St. Philip Neri was founded by the saint in Rome in 1575, approved in 1612, and confederated and reapproved in 1942. It consists of independent communities of secular priests held under obedience but not bound by vows, and it is dedicated to prayer, preaching, and the sacraments. Associated with it is the Brotherhood of the Little Oratory, a confraternity of clerics and laymen. Although the seat of government is in Rome, there are other foundations elsewhere, notably in Italy, in Spain, and in England.

The Congregation of the Oratory of Jesus and Mary Immaculate—popularly called the Bérullians as well as the Oratorians—derives and takes some of its rules from the organization of St. Philip, but it is a distinct institution, founded by Pierre de Bérulle in 1611 and approved in 1613; it later underwent a number of reconstitutions and reapprovals, the latest in 1925. The chief work of this French congregation is the training of candidates for the priesthood.

oratorio, a large-scale musical composition on a sacred or semisacred subject, for solo voices, chorus, and orchestra. An oratorio's text is usually based on scripture, and the narration necessary to move from scene to scene is supplied by recitatives sung by various voices to prepare the way for airs and choruses. A basically dramatic method is used in all successful oratorios, though they may or may not be produced with theatrical action. The oratorio is not intended for liturgical use, and it may be performed in both churches and concert halls. The principal schools of oratorios are the Italian, essentially a form of religious opera; the German, developed from treatment of the Passion story; and the English, synthesized by the composer George Frideric Handel from several forms. The term oratorio derives from the oratory of the Roman church in which, in the mid-16th century, St. Philip Neri instituted moral musical entertainments, which were divided by a sermon, hence the two-act form common in early Italian oratorio.

The earliest surviving oratorio is *Rappresentazione di anima et di corpo* (*The Representation of Soul and Body*) by Emilio del Cavaliere, produced in 1600 with dramatic action, including ballet. Toward the mid-17th century Giacomo Carissimi introduced a more sober type with a Latin text based on the Old Testament. His oratorios (some short, some longer) are simple and free from extravagance and make effective use of the chorus. Their style is basically operatic, though, and the most memorable episodes are those in which the narrative is interrupted and the characters express their emotions. Latin- and Italian-language types of oratorios continued in use, but the vernacular Italian *oratorio volgare,* sung by virtuoso singers, was more popular and flourished until the late 18th century. Stage action had been abandoned in the oratorios of Italy by the late 18th century. The French composer Marc-Antoine Charpentier, who studied with Carissimi, successfully transferred the Italian oratorio to France.

The German oratorio began with Heinrich Schütz, a composer whose style is a blend of German and Italian elements. His oratorios, confined to Gospel subjects, show great powers of emotional expression and anticipate those of Johann Sebastian Bach in their vigorous treatment of the choruses. In his *Easter Oratorio* (published 1623) Schütz retains the old convention of setting the words of each character for two or more voices. His oratorios achieve a balance between austerity and exuberance, but by the late 17th century this balance had been disturbed. Passion oratorio texts (dealing with the death of Jesus) of this period often abandon biblical words for a mixture of rhymed paraphrase and lyrical commentary of a more or less sentimental nature.

J.S. Bach's two great Passion oratorios, the *Passion According to St. John* (first performed 1724) and the *Passion According to St. Matthew* (1729), restored the balance attained by Schütz, though they are written on a greater scale and are enriched by the introduction of the later Italian aria. Bach, besides increasing the significance of the chorale, or congregational hymn, used the evangelist's narrative as a framework for binding the dramatic element (the words of the characters) to the epic and contemplative sections (arias, chorales, opening and final choruses). There is nothing novel about Bach's settings except their genius, which holds the long and complex structure in perfect balance. The *Christmas Oratorio* and other works by Bach that bear the name oratorio are more properly church cantatas.

G.F. Handel's oratorios are essentially theatrical presentations that reflect his experience as an opera composer. Most of his oratorios use biblical stories put into modern librettos. Influenced by opera, masque, and even Greek tragedy, they were performed by opera singers in theatres (though ecclesiastical prejudice forbade stage action) and have no direct connection with the church. The breadth of Handel's achievement in the genre has been distorted by the concentration of posterity on such oratorios as *Saul* and *Israel in Egypt* (1739), *Messiah* (1742), and *Samson* (1743). In these and Handel's other oratorios, his mastery of characterization and of every type of choral utterance is crowned by a deep and sympathetic pondering of the moral issues involved in the story.

After Bach and Handel, oratorio on the European continent, apart from the works of Joseph Haydn, ceased to represent a vital, creative tradition. Haydn's *Die Schöpfung* (1798; *The Creation*) shows the impact of Handel's oratorios and Wolfgang Amadeus Mozart's operas, fusing these epic and dramatic elements with Haydn's own mature mastery of symphonic style to make the work a masterpiece. Haydn called *Die Jahreszeiten* (1801; *The Seasons*) an oratorio, though its content is secular and its form a loosely articulated series of evocative pieces. Ludwig van Beethoven's single oratorio, *Christus am Ölberg* (1803; *Christ on the Mount of Olives*), does not succeed, nor do most of those occasioned by the 19th-century large halls, choral societies, and festivals, especially in Germany and England.

Felix Mendelssohn's *Elijah* (1846) is one of the few 19th-century oratorios still performed. Mendelssohn's promotion of the revival of Bach's music and his experience of Handel's music led him to attempt a fusion of the two styles. *Elijah* is remarkable for the vitality of the choruses, but Mendelssohn's earlier oratorio *St. Paul* (1836) has been criticized as expressing no religious emotion except in terms of respectable complacency.

Germany produced little of consequence after Mendelssohn, unless *Ein deutsches Requiem* (*A German Requiem;* 1868), a setting of texts from Martin Luther's Bible by Johannes Brahms, is classed as an oratorio. The two oratorios of Franz Liszt, *Christus* (composed 1855–56) and *Die Legende von der heiligen Elisabeth* (*The Legend of St. Elizabeth;* 1873), combine devotional and theatrical elements on the grandest scale. Italian oratorio remained in abeyance after the 18th century, and Slavic composers produced few oratorios. Perhaps the only French oratorio of major importance is *L'Enfance du Christ* (1854) by Hector Berlioz, a series of theatrical tableaus.

A masterpiece of 20th-century English oratorio is Sir Edward Elgar's *Dream of Gerontius* (1900). The poem by Cardinal Newman on which it is based has a dramatic framework within which the music could expand without becoming disorderly. Igor Stravinsky's opera-oratorio *Oedipus Rex* (1927), with a Latin text, was most successful in the opera house. The Swiss Frank Martin was one of the most active oratorio composers in the mid-20th century. A number of large-scale works, generally secular in content, have come out of the Soviet Union and eastern European communist countries and China. An especially notable oratorio is the *St. Luke Passion* of the Polish composer Krzysztof Penderecki. *See also* Passion music.

oratory, the rationale and practice of persuasive public speaking. It is immediate in its audience relationships and reactions, but it may also have broad historical repercussions. The orator may become the voice of political or social history.

A vivid instance of the way a speech can focus the concerns of a nation was Martin Luther King's address to a massive civil rights demonstration in Washington, D.C., in 1963. Repeating the phrase "I have a dream," King applied the oratorical skill he had mastered as a preacher to heighten his appeal for further rights for U.S. blacks to an intensity that galvanized millions.

An oration involves a speaker; an audience; a background of time, place, and other conditions; a message; transmission by voice, articulation, and bodily accompaniments; and may, or may not, have an immediate outcome.

Rhetoric, classically the theoretical basis for the art of oratory, is the art of using words effectively. Oratory is instrumental and practical, as distinguished from poetic or literary composition, which traditionally aims at beauty and pleasure. Oratory is of the marketplace and as such not always concerned with the universal and permanent. The orator in his purpose and technique is primarily persuasive rather than informational or entertaining. An attempt is made to change human behaviour or to strengthen convictions and attitudes. The orator would correct wrong positions of the audience and establish psychological patterns favourable to his own wishes and platform. Argument and rhetorical devices are used, as are evidence, lines of reasoning, and appeals that support the orator's aims. Exposition is employed to clarify and enforce the orator's propositions, and anecdotes and illustrations are used to heighten response.

The orator need not be a first-rate logician, though a capacity for good, clear thought helps to penetrate into the causes and results of tentative premises and conclusions and to use analogy, generalizations, assumptions, deductive–inductive reasoning, and other types of inference. Effective debaters, who depend more heavily on logic, however, are not always impressive orators because superior eloquence also requires strong appeals to the motives, sentiments, and habits of the audience. Oratorical greatness is invariably identified with strong emotional phrasing and delivery. When the intellectual qualities dominate with relative absence of the affective appeals, the oration fails just as it does when emotion sweeps aside reason.

The ideal orator is personal in his appeals and strong in ethical proofs, rather than objective or detached. He enforces his arguments by his personal commitment to his advocacy. William Pitt, later Lord Chatham, punctuated his dramatic appeals for justice to the American colonies with references to his own attitudes and beliefs. So were personal appeals used by the Irish orator Daniel O'Connell, the French orators Mirabeau and Robespierre, and the Americans Daniel Webster, Wendell Phillips, and Robert G. Ingersoll.

The orator, as illustrated by Edmund Burke, has a catholic attitude. Burke's discussion of American taxation, conciliation, Irish freedoms, justice for India, and the French Revolution show analytical and intellectual maturity, the power of apt generalization, and comprehensiveness of treatment.

Oratory has traditionally been divided into legal, political, or ceremonial, or, according to Aristotle, forensic, deliberative, or epideictic.

Typically, forensic, or legal, oratory is at its best in the defense of individual freedom and resistance to prosecution. It was the most characteristic type of oratory in ancient Athens, where laws stipulated that litigants should defend their own causes. In the so-called Golden Age of Athens, the 4th century BC, great speakers in both the law courts and the assembly included Lycurgus, Demosthenes, Hyperides, Aeschines, and Dinarchus.

In the 1st century BC of ancient Rome, Cicero became the foremost forensic orator and exerted a lasting influence on later Western oratory and prose style. Cicero successfully prosecuted Gaius Verres, notorious for his mismanagement while governor of Sicily, and drove him into exile, and he dramatically presented arguments against Lucius Sergius Catiline that showed a command of analysis and logic and great skill in motivating his audience. Cicero also delivered 14 bitter indictments against Mark Antony, who was to him the embodiment of despotism.

Among the great forensic orators of later times was the 18th- and 19th-century English advocate Thomas Erskine, who contributed to the cause of English liberties and the humane application of the legal system.

Demosthenes, the Athenian lawyer, soldier, and statesman, was a great deliberative orator. In one of his greatest speeches, "On the Crown," he defended himself against the charge by his political rival Aeschines that he had no right to the golden crown granted him for his services to Athens. So brilliant was Demosthenes' defense of his public actions and principles that Aeschines, who was also a powerful orator, left Athens for Rhodes in defeat.

The third division of persuasive speaking, epideictic, or ceremonial, oratory was panegyrical, declamatory, and demonstrative. Its aim was to eulogize an individual, a cause, occasion, movement, city, or state, or to condemn them. Prominent in ancient Greece were the funeral orations in honour of those killed in battle. The outstanding example of these is one by Pericles, perhaps the most finished orator of the 5th century BC, in honour of those killed in the first year of the Peloponnesian War.

The 19th-century American speaker Daniel Webster excelled in all three major divisions—forensic, deliberative, and epideictic oratory. He brought more than 150 pleas before the U.S. Supreme Court, including the Dartmouth College Case (1819) and the *Gibbons* v. *Ogden* case (1824); he debated in the U.S. Senate against Robert Young Hayne and John Calhoun on the issues of federal government versus states' rights, slavery, and free trade; and he delivered major eulogies, including those on the deaths of Thomas Jefferson and John Adams.

Another major type of persuasive speaking that developed later than ancient Greek and Roman rhetoric was religious oratory. For more than 1,000 years after Cicero the important orators were churchmen rather than politicians, lawyers, or military spokesmen. This tradition derived from the Judaean prophets, such as Jeremiah and Isaiah, and in the Christian Era, from the Apostle Paul, his evangelistic colleagues, and such later fathers of the church as Tertullian, Chrysostom, and St. Augustine. Ecclesiastical speaking became vigorously polemical. The rhetorical principles of Aristotle and Cicero were adopted by ecclesiastical leaders who challenged rival doctrines and attacked the sins of the communities.

In the Middle Ages, Pope Urban II elicited a great response to his oratorical pleas for enlistment in the First Crusade. The Second Crusade was urged on with great eloquence by St. Bernard, abbot of Clairvaux. In the 15th and 16th centuries the revolt against the papacy and the Reformation movement stimulated the eloquence of Huldrych Zwingli, John Calvin, Hugh Latimer, and, most notably, Martin Luther. At the Diet of Worms, as elsewhere, Luther spoke with courage, sincerity, and well-buttressed logic. Religious controversies in the 17th century engaged such great oratorical skills as those of Richard Baxter, the English Puritan, and Catholic bishop J.B. Bossuet of France. In the 18th century the Methodist George Whitefield in England and North America, and the Congregationalist Jonathan Edwards in America, were notably persuasive speakers. Preachers of oratorical power in the 19th century included Henry Ward Beecher, famous for his antislavery speeches and his advocacy of women's suffrage from his Congregational pulpit in Plymouth Church, Brooklyn, N.Y., and William Ellery Channing, American spokesman for Unitarianism.

Because the orator intuitively expresses the fears, hopes, and attitudes of his audience, a great oration is to a large extent a reflection of those to whom it is addressed. The audience of Pericles in ancient Greece, for example, was the 30,000 or 40,000 citizens out of the state's total population of 200,000 or 300,000, including slaves and others. These citizens were sophisticated in the arts, politics, and philosophy. Directing their own affairs in their Assembly, they were at once deliberative, administrative, and judicial. Speaker and audience were identified in their loyalty to Athens. Similarly, the senatorial and forum audience of Cicero in ancient Rome was an even smaller elite among the hundreds of thousands of slaves and aliens who thronged the Roman world. In the Forum the citizens, long trained in law, and with military, literary, and political experience, debated and settled the problems. The speeches of Cato, Catiline, Cicero, Julius Caesar, Brutus, Antony, Augustus, and the others were oratory of and for the Roman citizen.

In the Christian Era, however, the religious orator often found himself addressing an alien audience that he hoped to convert. To communicate with them, the Christian often appealed to ancient Greek and Roman thought, which had achieved widespread authority, and to Judaean thought and method, which had the sanction of scripture. By the time of the Reformation, however, Christian dogma had become so codified that most of the disputation could be carried on in terms of doctrine that had become well known to all.

The history of the British Parliament reveals a continuing trend toward common speech and away from the allusions to ancient Greek and Roman thought that abounded when the members consisted largely of classically educated aristocrats.

In the golden age of British political oratory of the late 18th century, greater parliamentary freedom and the opportunity to defend and extend popular rights gave political oratory tremendous energy, personified by such brilliant orators as both the elder and the younger William Pitt, John Wilkes, Charles James Fox, Richard Sheridan, Edmund Burke, and William Wilberforce. Parliamentary reforms of the 19th century, initiated and promoted by Macaulay, Disraeli, Gladstone, and others of the century, led to more and more direct political speaking on the hustings with the rank and file outside Parliament. Burke and his contemporaries had spoken almost entirely in the Commons or Lords, or to limited electors in their borough homes, but later political leaders appealed directly to the population. With the rise of the Labour Party in the 20th century and the further adaptation of government to the people, delivery became less declamatory and studied. The dramatic stances of the 18th-century parliamentary debaters disappeared as a more direct, spontaneous style prevailed. As delivery habits changed, so did the oratorical language. Alliteration, antithesis, parallelism, and other rhetorical figures of thought and of language had sometimes been carried to extremes, in speeches addressed to those highly trained in Latin- and Greek-language traditions. These devices gave way, however, to a clearness of style and vividness consonant with the idiom of the common man and later with the vocabulary of radio and television.

Similarly, American speech inherited and then gradually discarded British oratorical techniques for its own speaking vernacular. John Calhoun, in his addresses to Congress on behalf of the South, absorbed much of the Greek political philosophy and methods of oral composition and presentation, and his principal opponent in debate, Daniel Webster, too, had the marks of British communicative tradition. This inheritance was absorbed into the speaking adjustments indigenous to those later peoples of New England, the West, and the South. The orator whose speech preceded Lincoln's at Gettysburg—Edward Everett, statesman and former professor of Greek literature at Harvard—was a classical scholar. Lincoln, on the same platform, had address born of his native Middle West yet expressed with authentic eloquence.

The 20th century saw the development of two leaders of World War II who applied oratorical techniques in vastly different ways with equal effect. It was primarily through his oratory that Adolf Hitler whipped the defeated and divided Germans into a frenzy of conquest, while Winston Churchill used his no less remarkable powers to summon up in the English people their deepest historical reserves of strength against the onslaught. Subsequently, though the importance of persuasive speech in no way diminished, radio and television so reshaped the method of delivery that much of the theory of traditional oratory often seemed no longer to apply. The radio fireside chats of Pres. Franklin Roosevelt were the most successful of his persuasions. In the televised debates of John F. Kennedy and Richard Nixon during the U.S. presidential campaign in 1960, the candidates might be said to have been most persuasive when they were least oratorical, in the traditional sense of the term. Nonetheless, even conventional oratory persisted as peoples in newly developing nations were swept up into national and international political struggles.

A good general collection is H. Peterson (ed.). *A Treasury of the World's Great Speeches*, rev. ed. (1965). (A.C.B.)

oratory, in architecture, a small, private chapel (*q.v.*).

orb, emblem of royal power, usually made of precious metal and jewels and consisting of a sphere surmounted by a cross. The ball as a symbol of the cosmos, or of the universe as a harmonious whole, is derived from the ancient Romans, who associated it with Jupiter and, hence, with the emperor as his earthly representative.

Orb of the Holy Roman Empire, 12th century; in the Hofburg Treasury, Vienna
Lessing—Magnum

Christians adapted the symbol by setting a cross above the ball to signify the world dominated by Christianity. Rulers were often depicted with the orb, but the first to hold it in hand at his coronation was the Holy Roman emperor Henry II in 1014; thereafter the "imperial apple" became an important emblem of the royal power invested in the monarch.

orb weaver, any spider of the family Araneidae (Argiopidae or Epeiridae) of the order Araneida, a large and widely distributed group noted for their orb-shaped webs. More than 2,500 species are known.

Notable among them are the silk spiders (subfamily Nephilinae), so called because of the great strength of their silk, which is sometimes used in the manufacture of textiles. The garden spiders (subfamily Argiopinae), common in grassy areas, are brightly coloured—yellow and black or red and black.

Golden garden spider (*Argiope aurantia*), an orb weaver
John H. Gerard—EB Inc.

Orbigny, Alcide Dessalines d' (b. Sept. 6, 1802, Couëron, Fr.—d. June 30, 1857, near Saint-Denis), founder of the science of micropaleontology.

During eight years of travel in South America (1826–34) Orbigny studied the people, natural history, and geology of the continent. He summarized these studies in *Voyage dans l'Amérique méridionale,* 10 vol., (1834–47; "Journey into South America") and proceeded to draw up the first comprehensive map of that continent (1842). The most important result of his work was the founding of the science of stratigraphical paleontology, based on his observations of exposed fossil-bearing strata in the Paraná Basin. He realized that the distinct layers of sedimentary rock must have been deposited in water at successive periods of time, which could be known by dating the fossils found in each layer. Thus, he was the first to divide geological formations into stages of deposition. He believed, however, that each stage represented an independent fauna made by a special act of creation. His position thus differed radically from the evolutionary theory advanced by Charles Darwin, who had explored much of South America and observed many of the same phenomena during the time that Orbigny was there.

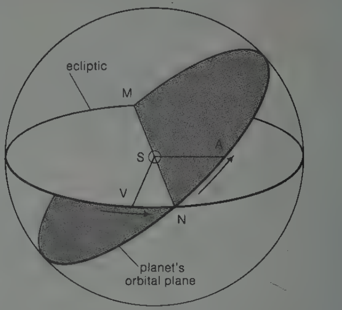
Orbigny, engraving
Boyer—H. Roger-Viollet

His study of small marine fossils, pollen, grain and spores found in sedimentary rocks for the purpose of dating stages began the science of micropaleontology. This discipline is of great practical value in petroleum exploration. In 1850 Orbigny undertook the detailed assignment of stages represented by Jurassic Period fossils in geologic formations of northwestern Europe. His *Paléontologie française*, 14 vol. (1840–54), although never completed, is considered a monumental work.

orbit, in astronomy, path of a body revolving around an attracting centre of mass, as a planet around the Sun or a satellite around a planet. In the 17th century, Johannes Kepler and Isaac Newton discovered the basic physical laws governing orbits; in the 20th century, Albert Einstein's general theory of relativity supplied a more exact description.

The orbit of a planet is, if unaffected by the attraction of another planet, elliptical; some elliptical orbits are very nearly circles, while others are much elongated. Some bodies may follow parabolic or hyperbolic paths (open-ended curves). The orbit of a body approaching the solar system from a very great distance, curving once around the Sun, and receding again is such an open curve.

In determining the elements of a body's orbit, at least three positions of the body should be measured. Observations should be spread evenly in time and should extend over a considerable arc of the orbit. Further measurements are necessary to account for the effects of minor disturbing forces, such as planetary attractions, irregularities of mass within the body at the centre of the orbit, and, in the case of some artificial satellites, atmospheric drag.



Planet's orbital plane in relation to the ecliptic

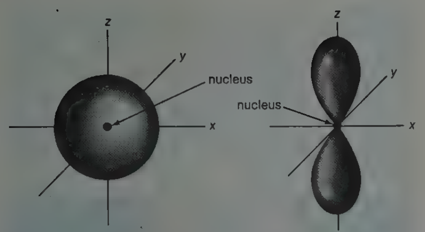
An orbit is completely described by six geometric properties called its elements; from them the future positions of the planet can be calculated. The elements are (1) the inclination of the orbit plane and (2) the longitude of the ascending node, which fix the orbit plane; (3) the semimajor axis, (4) the eccentricity and (5) the longitude of periapsis (*see* apse), which fix the size and shape of the orbit in the orbit plane; and (6) the time of periapsis, which locates the body in the orbit. These are explained below.

The Sun occupies one of the two foci of the ellipse of a planet's orbit. A line drawn through the point of the planet's closest approach to the Sun (perihelion) and farthest retreat (aphelion) passes through the Sun and is called the line of apsides or major axis of the orbit; one-half this line's length is the semimajor axis, equivalent to the planet's mean distance from the Sun. The eccentricity of an elliptical orbit is a measure of the amount by which it deviates from a circle; it is found by dividing the distance between the focal points of the ellipse by the length of the major axis. To predict the position of the planet at any time it is necessary to know the time when it passed through any definite position; *e.g.,* its time of perihelion passage.

The inclination, or tilt, of a planet's orbit is measured in degrees of arc from the plane of the Earth's orbit, called the ecliptic. S, at the centre of the drawing, represents the Sun. The points where the two orbital planes intersect (as projected in imagination upon the celestial sphere) are called the nodes, shown as M and N. V is the vernal equinox, a point on the ecliptic from which several celestial coordinates are measured. The angle VSN, in degrees of arc, is the longitude of the ascending node, *i.e.,* of the point where the moving planet passes north of the plane of Earth's orbit. M, the descending node, is where the planet passes from north to south. The sum of the angles subtended at S by the arcs VN and NA is called the longitude of the perihelion. It defines the direction of the major axis in the plane of the orbit.

orbital, in chemistry and physics, a mathematical expression, called a wave function, that describes properties characteristic of no more than two electrons in the vicinity of an atomic nucleus or of a system of nuclei as in a molecule. An orbital often is depicted as a three-dimensional region within which there is a 95 percent probability of finding the electron.

Atomic orbitals are commonly designated by a combination of numerals and letters that represent specific properties of the electrons associated with the orbitals—for example, 1*s*,



Electron orbitals in atoms
(Left) *s* orbital; (right) *p* orbital

2*p,* 3*d,* 4*f.* The numerals, called principal quantum numbers, indicate energy levels as well as relative distance from the nucleus. A 1*s* electron occupies the energy level nearest the nucleus. A 2*s* electron, less strongly bound, spends most of its time farther away from the nucleus. The letters, *s, p, d,* and *f* designate the shape of the orbital. (The shape is a consequence of the magnitude of the electron's angular momentum, resulting from its angular motion.) An *s* orbital is spherical with its centre at the nucleus. Thus a 1*s* electron is almost entirely confined to a spherical region close to the nucleus; a 2*s* electron is restricted to a somewhat larger sphere. A *p* orbital has the approximate shape of a pair of lobes on opposite sides of the nucleus, or a somewhat dumbbell shape. An electron in a *p* orbital has equal probability of being in either half. The shapes of the other orbitals are more complicated. The letters *s, p, d, f,* originally were used to classify spectra descriptively into series called sharp, principal, diffuse, and fundamental, before the relation between spectra and atomic electron configuration was known.

No *p* orbitals exist in the first energy level, but there is a set of three in each of the higher levels. These triplets are oriented in space as if they were on three axes at right angles to each other and may be distinguished by subscripts, for example, $2p_x$, $2p_y$, $2p_z$. In all but the first two principal levels, there is a set of five *d* orbitals and, in all but the first three principal levels, a set of seven *f* orbitals, all with complicated orientations.

Only two electrons, because of their spin, can be associated with each orbital. An electron may be thought of as having either a clockwise or a counterclockwise spin about its axis, making each electron a tiny magnet. Electrons in full orbitals are paired off with opposite spins or opposite magnetic polarities.

orbital velocity, velocity sufficient to cause a natural or artificial satellite to remain in orbit. Inertia of the moving body tends to make it move on in a straight line, while gravitational force tends to pull it down. The orbital path, elliptical or circular, thus represents a balance between gravity and inertia. A cannon fired from a mountaintop will throw a projectile farther if its muzzle velocity is increased. If velocity is made high enough the projectile never falls to the ground. The surface of the Earth may be thought of as curving away from the projectile, or satellite, as fast as the latter falls toward it. The more massive the body at the centre of attraction, the higher is the orbital velocity for a particular altitude or distance. Near the surface of the Earth, if air resistance could be disregarded, orbital velocity would be about eight kilometres (five miles) per second. The farther from the centre of attraction a satellite is, the weaker the gravitational force and the less velocity it needs to remain in orbit. *See also* escape velocity.

Orbiting Astronomical Observatory (OAO), any of a series of unmanned U.S. scientific satellites developed to observe cosmic objects from above the Earth's atmosphere. OAO-2, launched Dec. 7, 1968, carried two large telescopes and a complement of spectrometers and other auxiliary devices. It weighed more than 4,200 pounds (1,900 kilograms), the heaviest satellite orbited up to that time. OAO-2 was able to photograph young stars that emit mostly ultraviolet light. Astronomers had detected very few such stars with ground-based telescopes because ultraviolet radiation is absorbed by the Earth's atmosphere. OAO-3, also called Copernicus, was equipped with more powerful instruments, including a reflecting telescope with a 32-inch (81-centimetre) mirror. Launched Aug. 21, 1972, this satellite was primarily used to study ultraviolet emissions from interstellar gas and stars in the far reaches of the Milky Way.

Orbiting Geophysical Observatory (OGO), any of a series of six unmanned scientific satellites launched by the United States from 1964 to 1969. Equipped with a complex of magnetometers, these orbiting satellites were designed to study the Earth's magnetosphere (*i.e.,* zone of strong magnetic forces around the planet) and its effect on high-energy particles emitted by the Sun. These studies included investigations of auroral displays, magnetic storms, and other related phenomena.

OGO-1, the first in the series, was launched on Sept. 4, 1964. It weighed about 250 pounds (113 kilograms) and carried instrumentation for 20 to 25 experiments. The other OGO satellites were identical in size and equipment.

Orcagna, Andrea original name ANDREA DI CIONE (b. *c.* 1308—d. *c.* 1368), the most prominent Florentine painter, sculptor, and architect of the mid-14th century.

The son of a goldsmith, Orcagna was the leading member of a family of painters, which included three younger brothers: Nardo (died 1365/66), Matteo, and Jacopo (died after 1398) di Cione. He matriculated in the *Arte dei Medici e degli Speziali* in 1343–44 and was admitted to the guild of stonemasons in 1352. In 1354 he contracted to paint an altarpiece for the Strozzi Chapel in the left transept of Sta. Maria Novella, in Florence. This polyptych (signed and dated 1357) shows that the forceful handling of the figures is strongly individual, as is the attempt to treat the panels of the polyptych as a unitary scheme. The surviving section of a fresco of the "Triumph of Death" in Sta. Croce has also been ascribed to Orcagna. In September 1367 he received the commission from the Arto del Cambio for an altarpiece of the patron of the guild, St. Matthew, with four scenes from his life. In August 1368 the execution of this picture (now in the Uffizi, Florence) was taken over by Jacopo di Cione on account of the illness of his brother. Orcagna is assumed to have died in this year.

Altarpiece of "The Redeemer," polyptych by Andrea Orcagna, 1357; in the Strozzi Chapel, Sta. Maria Novella, Florence
SCALA—Art Resource/EB Inc.

As a sculptor, Orcagna is known through a single work, the tabernacle in the guild oratory of Or San Michele, of which he became superintending architect by 1356. This is a decorative structure of great complexity, supported on four octagonal piers and heavily encrusted with coloured inlay. Its principal sculptural features are, on the front and sides, a number of hexagonal reliefs with scenes from the life of the Virgin, and, at the back, a large relief of the Dormition and Assumption of the Virgin, signed and dated 1359. The large relief is among the most notable surviving examples of the expressive art that sprang up in Tuscany after the Black Death. There are marked differences of quality in the figurated parts of the tabernacle, and some of these may be due to Orcagna's brother Matteo.

It is known that Orcagna was employed as architect in the Duomo in Florence in 1357 and 1364–67. In 1358 he became architect of the cathedral at Orvieto, where he was engaged in 1359–60 with his brother Matteo in supervising the mosaic decoration of the facade.

Orchard, William Edwin (b. Nov. 20, 1877, Buckinghamshire, Eng.—d. June 12, 1955, Brownhills, Staffordshire), English ecumenical priest who strove for a closer understanding between Protestants and Roman Catholics. He entered Westminster College, Cambridge, to prepare for the Presbyterian ministry and in 1904 was ordained and became a minister at Enfield, Middlesex. After receiving a D.D. in 1909, he became minister of the King's Weigh House Congregational Church, London, in 1914.

Throughout World War I, Orchard's preaching attracted large congregations. The courage of his ministry was shown by his braving a hostile mob in Trafalgar Square, London, to conduct a prayer meeting aimed at ending the war. Seeking a worldwide Christianity, he introduced Roman Catholic thought and practices into his services and attempted a rapprochement with the Church of England, a plan that collapsed after prolonged negotiations.

Becoming a Roman Catholic in 1932, he was ordained in 1935. He preached and lectured in the United States, and in 1943 he became a psychological consultant in Gloucestershire. His numerous works include the popular *The Temple* (1913) and its sequel, *Sancta Sanctorum* (1955).

orchard grass, also called COCKSFOOT GRASS (*Dactylis glomerata*), perennial pasture, hay, and forage grass of the family Poaceae. It has flat leaf blades and open, irregular, stiff-branched panicles (flower clusters).

Orchard grass grows in dense clusters, or tussocks, about 0.6 to 1 metre (2 to 3 feet) tall. It is widely cultivated throughout temperate North America, Eurasia, and Africa.

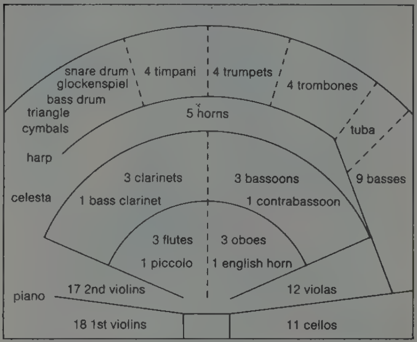
Seed heads of orchard grass (*Dactylis glomerata*)
Grant Heilman—EB Inc.

Orchardson, Sir William Quiller (b. March 27, 1832, Edinburgh—d. April 13, 1910, London), British portraitist and painter of historical and domestic genre scenes.

After studying at the Trustees' Academy in Edinburgh from 1850 to 1857, Orchardson began to do illustrations, chiefly for the periodical *Good Words,* after the Pre-Raphaelite manner. After exhibiting at the Royal Scottish Academy, he went to London in 1862, exhibiting at the Royal Academy from 1863. He was elected academician in 1877 and knighted in 1907. Two of his more famous paintings, "Napoleon on Board the Bellerophon" (1880) and "Her Mother's Voice" (1888), are in the Tate Gallery, London.

Consult the INDEX *first*

orchestra, instrumental ensemble of varying size and composition. Although applied to various ensembles found in Western and non-Western music, orchestra in an unqualified sense usually refers to the typical Western music ensemble of bowed string instruments complemented by wind and percussion instruments that, in the string section at least, has more than one player per part. The word stems from the Greek *orchēstra,* the circular part of the ancient Greek theatre in front of the proscenium in which the dancers and instrumentalists performed.



Full symphony orchestra
Number and position of instruments is typical but may vary with musical requirements and conductor's preference

Antecedents of the modern symphony orchestra appeared around 1600, the most notable early example being the ensemble required in the Italian composer Claudio Monteverdi's opera *Orfeo.* In the late 17th century, the French composer Jean-Baptiste Lully directed for the royal court an orchestra dominated by stringed instruments but including woodwinds, such as oboes and bassoons, and sometimes also flutes and horns. In the 18th century in Germany, Johann Stamitz and other composers in what is known as the Mannheim school established the basic composition of the modern symphony orchestra: four sections, consisting of woodwinds (flutes, oboes, and bassoons), brass (horns and trumpets), percussion (two timpani), and strings (first and second violins, violas, cellos, and double basses). Clarinets were adopted into the orchestra during this period, while earlier mainstays, such as the harpsichord, lute, and theorbo (a bass lute), were gradually dropped.

The 19th century was a fertile period for the orchestra. Woodwinds were increased from two to typically three or four of each instrument, and the brass section was augmented by a third trumpet, third and fourth horns, and the inclusion of trombones. Composers such as Hector Berlioz, Richard Wagner, Nikolay Rimsky-Korsakov, and—into the 20th century—Richard Strauss, Gustav Mahler, and Igor Stravinsky postulated, and in many instances created, orchestras of unprecedented size and tonal resources. The large orchestra typical of the late 19th through the mid-20th century incorporated an average of 100 performers and might include a wide variety of instruments and devices required in specific works. In the 1920s, however, many composers began to turn toward smaller, chamber-size ensembles, sometimes maintaining and sometimes discarding the traditional instrumental complements.

orchestral bells (musical instrument): *see* tubular bells.

orchestration, the arrangement or composition of music for instruments, especially those found in an orchestra. *See* instrumentation.

orchestrina di camera, any of a group of small keyboard instruments related to the harmonium, invented and made by W.E. Evans of London. He patented them on Oct. 29, 1862.

Designed to imitate the tone of the clarinet, oboe, flute, French horn, bassoon, and others, they were intended primarily to be used as substitutes for those instruments in orchestral performances when players of the actual instruments were not available. They had bellows-activated free reeds and had the same compass as the instruments they replaced.

Orchha, former Rājput princely state of central India, founded in about 1500. In the early 17th century it was systematically devastated by the forces of the Mughal emperor Shāh Jahān following the rebellion of the Bundēla chief Jujhār Singh.

Tehri (later Tīkamgarh) was chosen as the capital in 1783. Orchha was part of the Central Indian Agency under British rule. In 1948, following the achievement of Indian independence, it was merged into Vindhya Pradesh (later Madhya Pradesh) as the district of Tīkamgarh.

Orchha, historic town, Tīkamgarh district, Madhya Pradesh state, central India, on the Betwa River. The town, surrounded by thick jungle that long made it impregnable, was founded in 1531 and served until 1783 as the capital of the former Orchha princely state. An island in the Betwa, approached by a causeway, contains a large 17th-century fort and palace. Other buildings of historic interest are several temples and a palace of Jahāngīr, an excellent example of Muslim domestic architecture. There are also several cenotaphs of the Orchha rulers. Two fairs are held annually. Orchha declined with the transfer of the capital to Tīkamgarh in 1783.

orchid, any member of the family Orchidaceae, a group of attractively flowered plants that composes the order Orchidales. There are from 400 to 800 genera of orchids, with at least 15,000 to as many as 35,000 species.

Tiger orchid (*Odontoglossum grande*)
Sven Samelius

A brief treatment of orchids follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

The word orchid is derived from the Greek word (*orchis*) for testicle because of the shape of the root tubers in some species of the genus *Orchis.* Orchids are found throughout most of the nonpolar world and are especially abundant in tropical regions. These nonwoody perennial plants grow in soil or on other plants. Those attached to other plants often are vinelike and have a spongy root covering called the velamen that absorbs water from the surrounding air. Most species manufacture their own food, but some live on dead organic material or are helped to obtain nourishment by a fungus living in their roots.

Orchid (*Polystachya bella*)
A to Z Botanical Collection—EB Inc.

An orchid may have one of two growth patterns, sympodial or monopodial. Most orchids are sympodial; that is, they develop a new stem each year along a horizontal axis. The stem often has a swollen, bulblike region termed a pseudobulb. A monopodial orchid has one erect stem that grows taller each year, adding more leaves and flowers. Flowers are borne singly or in erect or pendent clusters. They range in sizes from about 2 millimetres (about 0.1 inch) to 38 centimetres (15 inches) in diameter.

All orchids have the same bilaterally symmetrical flower structure, with three sepals, but the flowers vary greatly in colour and shape. One of the petals, called the lip, is often distinct in shape and colour from the other petals. The lip usually is the lowest part of the flower, although it is the uppermost part in the developing bud, which turns around its axis as it grows in a process termed resupination. A club-shaped structure in the centre of the flower, known as the column, results from the fusion of male and female reproductive parts. Most orchid species have one stamen at the top of the column, rarely two at the sides. The pollen grains, contained within lobes at the top of the stamen, are grouped into mealy or waxy masses termed pollinia. These packets usually are transferred from one flower to another by insects or birds, although some species are wind- or self-pollinated. Many orchids have highly developed mechanisms (structures, scents, etc.) to ensure cross-pollination between plants. The flowers of some species resemble female insects so closely that male insects try to mate with them (a process called pseudocopulation) and thus carry pollen between flowers.

More than 2,000,000 seeds may be contained in the seedpod produced by a single orchid flower. The size of these seeds caused some botanists to give the orchid order the name Microspermae. An orchid seed contains little nutritive material and needs the help of a fungus to germinate and obtain food.

The only economically important product derived from an orchid is the flavouring agent vanilla, which is obtained from the seedpod of several species of the genus *Vanilla.* Many folk medicines, local beverages, and foods are prepared from parts of orchid plants.

The ornamental genera *Cattleya, Cymbidium, Vanda,* and *Laelia* are commonly grown for hybridization. Many thousands of hybrids have been developed for use as garden or greenhouse ornamentals and in the commercial flower trade. Species of *Pleurothallis, Lepanthes,* and *Stelis* are popular among horticulturists because of their extremely small size.

orchid cactus: *see* leaf cactus.

orchil, also called ARCHIL, a violet dye obtained from some lichens by fermentation. It is also the term for any lichen that yields orchil (*Roccella, Lecanora, Ochrolechin*, and *Evernia*) and refers to any colour obtained from this dye.

Orchis, genus of orchids, family Orchidaceae, containing as many as 100 species native to Eurasia and North America. Each plant bears a single flower spike with many flowers and has egg-shaped, lobed, or forked tuberous roots. Most species have several leaves at the base. The petals and sepals often form a helmetlike structure, and the flower lip usually is several lobed. The monkey orchid (*O. simia*) and the soldier, or military, orchid (*O. militaris*) are two European species the flowers of which resemble helmeted human figures.

The root of the early purple orchid (*O. mascula*) and several other species contain a nutritive starch. In southern Europe they are softened by soaking to produce a drink called salep. The green-winged orchid (*O. morio*) is widely distributed throughout Eurasia. Other Eurasian species of *Orchis* include some known as marsh orchids and others as spotted orchids. The showy orchis (*O. spectabilis*) is the most well known of the three North American species of *Orchis.* It has pink or purple flowers and ranges in height from 6 to 20 centimetres (2 to 8 inches).

orchitis, inflammation and swelling of the testes as a result of infection or physical injury. The testes are a pair of organs located in the scrotum of the male; they produce sperm cells for reproduction. Connected to the back of each testis is the epididymis, which serves as a storage duct for sperm awaiting release. The tube that conducts sperm away from the testis and epididymis is the spermatic cord. The rich blood supply and lymphatic supply in the testicle prevent most infections from obtaining a strong foothold in this organ. Infections can spread from elsewhere in the body by way of the bloodstream, lymphatic channels, or the spermatic cords to the epididymes and testes. Organisms causing inflammation can be bacterial, viral, fungal, or parasitic, and inflammation can come from chemical or physical injury. The usual symptoms of orchitis are high fever, sudden pain in the testicle, nausea, vomiting, swelling, tightness, and tenderness of the gland upon touching. Fluids that may accumulate around the testes may contain pus or blood. The scrotum is generally red and thickened.

Orchitis may result from infections and other diseases elsewhere in the body. Mumps is probably the systemic disease most likely to affect the testes; it is caused by a virus. The orchitis generally subsides spontaneously in 10 days or less and permanent damage is rare. Usually only one testis is influenced, with sometimes the epididymis. In the rare cases where both testes are involved, impotence and sterility may ensue.

Physical injuries, such as those caused by blows, are generally followed by infections when severe; the injury lowers the resistance to bacteria. Chemicals such as iodine, lead, and alcohol have on occasion caused testicular injury. Treatment for most orchitis is administration of antibiotics, bed rest, support of the testes, use of compresses, and surgical relief or drainage when required.

Orchoë (ancient Mesopotamian city): *see* Erech.

Orchomenus, also spelled ORCHOMENOS, or ERCHOMENOS, ancient Boeotian town on a promontory on the north of the Copiac plain. The northernmost Mycenaean fortified town, it was a seat of the Minyae dynastic family and controlled a large part of Boeotia. In the Archaic period, Orchomenus was a member of the Calaurian League, but political supremacy in Boeotia passed to Thebes. Among the first Boeotian cities to coin money (*c.* 550 BC), it was famed in legend for its wealth. The worship of the Charites or Graces was an important cult.

Orchomenus became the headquarters of the oligarchic exiles who freed Boeotia from Athenian control (447/446), and by the 4th century its policy was anti-Theban. After repeated sackings by the Thebans in the 4th century, Orchomenus was left to obscurity and the encroaching waters of Lake Copias.

The excavations of H. Schliemann (late 19th century) and A. Furtwängler and H. Bulle (early 20th century) showed Orchomenus to have been an important Neolithic and Bronze Age site with a Late Bronze Age *tholos,* or "beehive," temple and palace.

Orczy, Baroness Emmuska (b. Sept. 23, 1865, Tarnaörs, Hung.—d. Nov. 12, 1947, London), Hungarian-born British novelist, chiefly remembered as author of *The Scarlet Pimpernel,* one of the greatest popular successes of the 20th century.

The only child of Baron Felix Orczy, a noted composer and conductor, she was educated in Brussels and Paris, then studied art in London. She later exhibited some of her work in the Royal Academy. She became famous in 1905 with the publication of *The Scarlet Pimpernel,* set in the times of the French Revolution, and relating the swashbuckling adventures of the "elusive" Sir Percy Blakeney, whose mission was to smuggle French aristocrats out of the country to safety. Baroness Orczy produced sequels—*The Elusive Pimpernel* (1908), *The Way of the Scarlet Pimpernel* (1933)—which were less successful than the original. She also wrote several detective stories, including *Lady Molly of Scotland Yard* (1910) and *Unravelled Knots* (1925).

Ord River, river in the Kimberley plateau region, northeastern Western Australia. It rises in the Albert Edward Range and follows an easterly and northerly course for 300 mi (500 km) to Cambridge Gulf. Chief tributaries are the Denham, Stirling, Panton, Wilson, Bow, Nicholson, and Elvire. Its upper reaches cut through deep gorges, which give way to grasslands and forests along its middle course and to alluvial plains in its lower valley. The region is subject to irregular rainfall. The river was discovered in 1879 by Alexander Forrest and was named for Sir Harry Ord, governor of Western Australia (1877–80).

Ord River Diversion Dam, Western Australia
Authenticated News International

The Ord River Project is a major undertaking designed to prevent seasonal flooding and to impound water for irrigating large areas subject to drought. The Kimberley Research Station decided in 1945 that irrigated agriculture would be possible in this area, and plans were formed for the development of 180,000 ac (72,000 ha) of farmland. The Kununurra Diversion Dam, completed in 1967, allowed for the cultivation of the first 14,000 ac under the project. Kununurra town was built nearby as the service and residential centre. A larger dam, built 25 mi south of Kununurra in 1970–72, holds the main reservoir (Lake Argyle) for irrigation and possibly for eventual hydroelectric power generation. The main crop projected for the area was cotton, but this crop was rendered uneconomic by insect pests by 1974. Various other crops were experimented with, but without much success, and by the 1980s only some 11,000 ac were still under cultivation out of a possible irrigation area of nearly 150,000 ac. The Ord scheme has become Australia's most costly and controversial irrigation project.

Ordainer, in full LORD ORDAINER, one of a committee of 21 nobles and prelates who opposed Edward II and framed a body of "Ordinances" intended to regulate his household and power.

Conflict began soon after Edward II's accession in 1307. The King was tactless; and, after July 1309, when Thomas, earl of Lancaster, became chief leader of the opposition, a serious crisis was clearly impending. By February 1310 he, together with the earls of Warwick, Hereford, and Pembroke, had decided on drastic action; and they openly accused Edward of wasting his inheritance and of ruining the kingdom. The King then had to agree to the appointment of a committee of eight earls, seven bishops, and six barons, who, before Michaelmas 1312, were to prepare ordinances for reforming the government of the realm. This body was known as the Lords Ordainers. Weakened by yet another failure in Scotland, Edward met the Ordainers at Westminster in August 1311, where about 40 Ordinances were presented.

The Ordinances were well-meaning and strictly traditional in tone. The Ordainers looked back to the precedents of Henry III's time, and they had "the righteous earl," Simon de Montfort, as their model. The King must rid himself of his evil advisers and get some better ones, and the Ordainers were in no doubt where these could be found. Edward must look to his "natural counsellors," the baronage, and especially to the whole body of them in Parliament, where policy ought to be decided and all important appointments in the royal service made. All the King's officers, including the steward of the household and the keeper of the wardrobe, should swear to observe the Ordinances, while in all future parliaments a baronial committee should hear complaints against royal servants. In the 20th Ordinance Edward's favourite, Piers Gaveston, was singled out for special mention. He was to be permanently exiled from all the King's dominions. The ordainers also cherished the illusion that, if only the royal revenue were properly managed, the King could live on his own without continuous financial demands upon his subjects.

The King accepted the ordinances because he had no alternative, but he seems to have had no real intention of observing them. Fighting broke out; and, Gaveston, returned from exile, was captured and executed by the reformers. Peace was eventually reestablished, but Edward's disastrous defeat by the Scots at the Battle of Bannockburn (June 24, 1314) put him at the mercy of Lancaster and the extreme Ordainers, who thereafter ruled England until their own overthrow by Edward's new favourites, the Despensers, in 1322.

ordeal, a trial or judgment of the truth of some claim or accusation by various means based on the belief that the outcome will reflect the judgment of supernatural powers and that these powers will ensure the triumph of right. Although fatal consequences often attend an ordeal, its purpose is not punitive.

The main types of ordeal are ordeals by divination, physical test, and battle. A Burmese ordeal by divination involves two parties being furnished with candles of equal size and lighted simultaneously; the owner of the candle that outlasts the other is adjudged to have won his cause. Another form of ordeal by divination is the appeal to the corpse for the discovery of its murderer. The ordeal of the bier in medieval Europe was founded on the belief that a sympathetic action of the blood causes it to flow at the touch or nearness of the murderer.

The ordeal by physical test, particularly by fire or water, is the most common. In Hindu codes a wife may be required to pass through fire to prove her fidelity to a jealous husband; traces of burning would be regarded as proof of guilt. The practice of dunking suspected witches was based on the notion that water, as the medium of baptism, would "accept," or receive, the innocent and "reject," or buoy, the guilty.

In ordeal by combat, or ritual combat, the victor is said to win not by his own strength but because supernatural powers have intervened on the side of the right, as in the duel in the European Middle Ages in which the "judgment of God" was thought to determine the winner. If still alive after the combat, the loser might be hanged or burned for a criminal offense or have a hand cut off and property confiscated in civil actions.

Ordelaffi FAMILY, noble Italian family that ruled the town of Forlì and neighbouring places in the Romagna during most of the 14th and 15th centuries. Little is known of their rise; a reference in Dante's *Inferno* indicates that Forlì had passed effectively under their control by the early 14th century. In 1307 Scarpetta Ordelaffi became head of the city with the title *capitano del popolo* ("captain of the people"). They were aggressively Ghibelline (pro-imperial) and during the 14th century added Forlimpopoli and Cesena to their dominion. Eventually the Guelf (papal) faction organized a campaign against them that led to three years of war (1356–59), including the stubborn defense of Cesena by Francesco Ordelaffi and his no less resolute wife, Cia Ubaldini, before they won. Even then, though Francesco lost Forlì, it was recovered in 1376 by his son Sinibaldo. A popular rising in 1405 led to another dispossession of the Ordelaffi by the papal party, followed by another recovery; through the remainder of the century the family alternately seized and lost its dynastic estate, culminating in the reign of Pino III Ordelaffi, distinguished for his patronage of the arts and his murderous violence. Having seized the throne by the murder of his brother Cecco III, he killed his first wife, his mother, and his second wife before being himself murdered by his third wife, Lucrezia Pico, in 1480. Pope Sixtus IV reclaimed Forlì and gave it to his nephew; except for a momentary restoration in 1503–04, the Ordelaffi disappeared from mention.

order, also called ORDER OF ARCHITECTURE, in any of several styles of classical or Neoclassical architecture that are defined by the particular type of column and entablature they use as a basic unit. A column consists of a shaft together with its base and its capital. The column supports a section of an entablature, which constitutes the upper horizontal part of a classical building and is itself composed of (from bottom to top) an architrave, frieze, and cornice. The form of the capital is the most distinguishing characteristic of a particular order. There are five major orders: Doric, Ionic, Corinthian, Tuscan, and Composite.

There are many separate elements that make up a complete column and entablature. (*See* the Figure.) At the bottom of the column is the stylobate; this is a continuous flat pavement on which a row of columns is supported. Rising out of the stylobate is the plinth, a square or circular block that is the lowest part of the base. Atop the plinth and forming the remainder of the base are one or more circular moldings that have varying profiles; these may include a torus (a convex molding that is semicircular in profile), a scotia (with a concave profile), and one or more fillets, or narrow bands.

The shaft, which rests upon the base, is a long, narrow, vertical cylinder that in some orders is articulated with fluting (vertical grooves). The shaft may also taper inward slightly so that it is wider at the bottom than at the top.

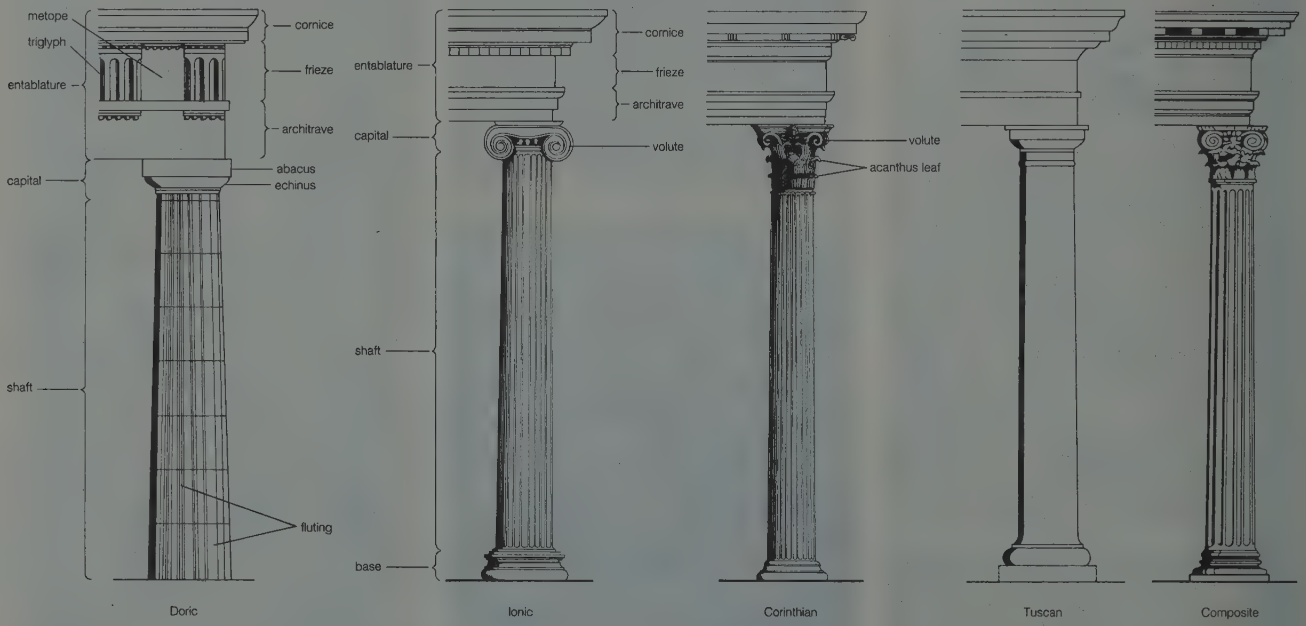
Atop the shaft is the capital, which serves to concentrate the weight of the entablature on the shaft and also acts as an aesthetic transition between those two elements. In its simplest form (the Doric), the capital consists (in ascending order) of three parts; the necking, which is a continuation of the shaft but which is set off from it visually by one or more narrow grooves; the echinus, a circular block that bulges outward at its uppermost portion in order to better support the abacus; and the abacus itself, a square block that directly supports the entablature above and transmits its weight to the rest of the column below.

The entablature is composed of three horizontal sections that are visually separated from each other by moldings and bands. The three parts of the entablature (in ascending order) are called the architrave, frieze, and cornice.

The unit used in the measurement of columns is the diameter of the shaft at the base; thus, a column may be described as being eight (lower) diameters high.

Ancient Greek architecture developed two distinct orders, the Doric and the Ionic, together with a third (Corinthian) capital, which, with modifications, were adopted by the Romans in the 1st century BC and have been used ever since in Western architecture.

The Doric order is characterized by a slightly tapered column that is the most squat of all the orders, measuring in height (including the capital) only about four to eight lower diameters. The Greek forms of the Doric order have no individual base and instead rest directly



The five orders

From (Doric, Ionic, Corinthian) Sir Bannister Fletcher, *A History of Architecture on the Comparative Method*, p. 160 (1961); (others) John Fleming, Hugh Honour, Nikolaus Pevsner, *The Penguin Dictionary of Architecture*, copyright © John Fleming, Hugh Honour, Nikolaus Pevsner, 1966, 1972, Penguin Books Ltd.

on the stylobate, although subsequent forms of Doric frequently were given a conventional plinth-and-torus base. The Doric shaft is channeled with 20 shallow flutes. The capital, as stated before, consists of a simple necking; a spreading, convex echinus; and a square abacus. The frieze section of the Doric entablature is distinctive. It is composed of projecting triglyphs (units each consisting of three vertical bands separated by grooves) that alternate with receding square panels, called metopes, that may be either plain or carved with sculptured reliefs. The Roman forms of the Doric order have smaller proportions and appear lighter and more graceful than their Greek counterparts.

The Ionic order differs from the Doric in having more flutes on its shaft and in the scrolls, or volutes, that droop over the front and rear portions of the echinus in the capital. The echinus itself is carved with an egg-and-dart motif. The height of the entire Ionic order—column, base, capital, and entablature—is nine lower diameters. The base of the column has two tori (convex moldings) separated by a scotia. The shaft, which is eight lower diameters high, has 24 flutes. On the entablature, the architrave is usually made up of three stepped fasciae (bands). The frieze lacks the Doric triglyph and metope, and hence this area can hold a continuous band of carved ornament, such as figural groups.

The Corinthian order is the most elegant of the five orders. Its distinguishing characteristic is the striking capital, which is carved with two staggered rows of sylized acanthus leaves and four scrolls. The shaft has 24 sharp-edged flutes, while the column is 10 diameters high.

The Tuscan order is a Roman adaptation of the Doric. The Tuscan has an unfluted shaft and a simple echinus-abacus capital. It is similar in proportion and profile to the Roman Doric but is much plainer. The column is seven diameters high. This order is the most solid in appearance of all the orders.

The Composite order, which was not ranked as a separate order until the Renaissance, is a late Roman development of the Corinthian. It is called Composite because its capital is composed of Ionic volutes and Corinthian acanthus-leaf decoration. The column is 10 diameters high.

The Doric and Ionic orders originated nearly simultaneously on opposite shores of the Aegean Sea; the Doric on the Greek mainland and the Ionic in the Greek cities of Asia Minor. (The volutes of the Ionic capital were adapted from Phoenician and Egyptian capital designs.) The Doric may be considered the earlier order of the two only in its developed form. Both orders originated in temples constructed out of wood. The earliest well-preserved example of Doric architecture is the Temple of Hera at Olympia, built soon after 600 BC. From these beginnings, the evolution of the stone Doric column can be traced in architectural remains in Greece, Sicily, and southern Italy, where the Doric was to remain the chief order for monumental buildings for the next eight centuries.

The Greeks as well as the Romans regarded the Corinthian as only a variant capital to be substituted for the Ionic. The first known use of a Corinthian capital on the outside of a building is that of the choragic Monument of Lysicrates (Athens, 335/334 BC). The Corinthian was raised to the rank of an order by the 1st-century-BC Roman writer and architect Vitruvius.

The Romans adopted the Doric, Ionic, and Corinthian orders and modified them to produce the Tuscan order, which is a simplified form of the Doric, and the Composite order, which is a combination of the Ionic and Corinthian orders. Another Roman innovation was the superposed order; when columns adorned several successive stories of a building, they were normally of different orders, in an ascending sequence from heaviest to most slender. Thus columns of the Doric order were assigned to the ground floor of a building, Ionic ones to the middle story, and Corinthian or Composite ones to the top story. To avoid the complications of separate orders for each story, the architects of the Renaissance invented the Colossal order, which is composed of columns extending the height of two or more stories of a building.

Vitruvius was the only ancient Greek or Roman writer on architecture whose works survived the Middle Ages. When his handbook for Roman architects, *De architectura,* was rediscovered in the early 15th century, Vitruvius was at once hailed as the authority on classical architecture. Based on his writings, Italian architects of the Renaissance and Baroque periods developed an aesthetic canon that established rules for superposing the classical orders. The architects also laid down rules for the proportions of the orders and their parts down to the most minute members. The exact proportional dimensions of every element of an order was specified, so that, given the diameter of the column or any other dimension, the entire order and all of its separate elements could be reconstructed through routine calculations. The rules were thus carried to extravagant lengths that were undreamed of by the Greeks and rarely observed by the Romans.

Succeeding artistic periods witnessed revivals of the archeologically "correct" use of the orders, though many architects continued to use the various orders with the utmost freedom. In Modernist architecture of the 20th century, the orders have tended to pass from use altogether as superfluous ornament, their structural functions having been taken over by columns and piers made of steel or reinforced concrete.

order, holy: *see* holy order.

order, rules of: *see* parliamentary procedure.

order in council, in Great Britain, a regulation issued by the sovereign on the advice of the Privy Council; in modern practice, however, an order is issued only upon the advice of ministers, the minister in charge of the department concerned with the subject matter of the order being responsible to Parliament for its contents.

In modern practice, there are two distinct types of order in council: that issued under the royal prerogative and that made under a power conferred by a statute. An example of the first type is the order declaring a state of war to be at an end, since the power to make war and peace is a matter of the royal prerogative. Most orders in council, however, are issued to implement legislation passed by Parliament; for example, the Ministers of the Crown (Transfer of Functions) Act, 1946, arranged for the redistribution of ministerial functions and the dissolution of government departments to be effected by order in council, confirmed by a resolution of both houses of Parliament.

Orders in council were first issued during the 18th century. Historically, the best known are those issued in November and December 1807, which imposed a blockade on Napoleonic Europe by the British and, in response, the decree by which the French might seize any neutral ship that complied with the British regulations.

Order of ——— : *see under* substantive word or words (*e.g.,* Merit, The Order of; Garter, The Most Noble Order of the), except as below.

Order of Geneva (religious manual): *see* Common Order, Book of.

Orderic Vitalis (b. Feb. 16, 1075, near Shrewsbury, Shropshire, Eng.—d. *c.* 1142), English monk of Saint-Évroult in Normandy, a historian who in his *Historia ecclesiastica* left one of the fullest and most graphic accounts of Anglo-Norman society in his own day.

The eldest son of Odelerius of Orléans, the chaplain to Roger de Montgomery, Earl of Shrewsbury, he was sent to Normandy in 1085 to become a monk at Saint-Évroult, where he was given the name Vitalis. There, apart from a few visits to other monasteries, he passed the remainder of his life.

He began his historical work before 1109 by transcribing the *Gesta Normannorum ducum* of William of Jumièges with lengthy interpolations of his own, chiefly relating to the history of Norman families connected with Saint-Évroult. Not later than 1115, at the command of his abbot, he began a history of his own monastery and its patrons, which gradually expanded into a general history of the church and incorporated a chronological outline of events from the birth of Christ, originally intended as a separate work. He worked on his history, periodically revising the early parts, until June 1141.

He made critical use of all the works of contemporary historians. His account of William the Conqueror's campaigns in 1067–71, based on William of Poitiers, has the value of a contemporary narrative, because the last books of William's *Gesta Guillelmi ducis Normannorum et regis Anglorum* have not survived in the original. Otherwise the *Historia ecclesiastica* is most valuable for Norman, English, and French history in the period 1082–1141.

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ordinary differential equation, in mathematics, an equation relating a function f of one variable to its derivatives. (The adjective "ordinary" here refers to those differential equations involving one variable, as distinguished from such equations involving several variables, called partial differential equations.)

The derivative, written f' or df/dx, of a function f expresses its rate of change at each point—that is, how fast the value of the function is increasing or decreasing as the value of the variable is increased or decreased. For the function $f = ax + b$ (representing a straight line), the rate of change is simply its slope, expressed as $f' = a$. For other functions, the rate of change varies along the curve of the function, and the precise way of defining and calculating it is the subject of differential calculus. The derivative of a function is again a function, because the rate of change varies along the curve. Therefore, the derivative of the derivative can also be calculated, $(f')'$ or simply f'' or d^2f/dx^2, and is called the second-order derivative of the original function. Higher-order derivatives can be similarly defined.

The order of a differential equation is defined to be that of the highest order derivative it contains. The degree of a differential equation is defined as the power to which the highest order derivative is raised. The equation $(f''')^2 + (f'')^4 + f = x$ is an example of a second-degree, third-order differential equation. A first-degree equation is called linear if the function and all its derivatives occur to the first power, and if the coefficient of each derivative in the equation involves only the independent variable x.

Some equations, such as $f' = x^2$, can be solved by merely recalling which function has a derivative that will satisfy the equation, but in most cases the solution is not obvious by inspection, and the subject of differential equations consists partly of classifying the numerous types of equations that can be solved by various techniques.

ordinary language analysis, method of philosophical investigation concerned with how verbal expressions are used in a particular, nontechnical, everyday language. The basic source for this school of thought is the later writings of the Viennese-born philosopher Ludwig Wittgenstein, followed by the contributions of John Langshaw Austin, Gilbert Ryle, John Wisdom, G.E. Moore, and other British philosophers. In the posthumous *Philosophical Investigations* (1953), Wittgenstein advocated that, in solving philosophical problems, an understanding of how language is used is more important than its abstract meaning (*i.e.,* the context in which a sentence is uttered may be more useful in determining its meaning than its innate semantic context). To this extent he parted from his earlier positivistic position, which viewed language in terms of a strict correspondence with reality.

ordination, in Christian churches, a rite for the dedication and commissioning of ministers. The essential ceremony consists of the laying of hands of the ordaining minister upon the head of the one being ordained, with prayer for the gifts of the Holy Spirit and of grace required for the carrying out of the ministry. The service also usually includes a public examination of the candidate and a sermon or charge concerning the responsibilities of the ministry.

Christianity derived the ceremony from the Jewish custom of ordaining rabbis by the laying on of hands (the *Semikha*). In the Old Testament, Moses ordained Joshua (Numbers 27:18, 23; Deuteronomy 34:9), and in the New Testament the seven were ordained by the Twelve Apostles (Acts 6:6) and Barnabas and Paul were commissioned by prophets and teachers at Antioch (Acts 13:3). According to the Pastoral Letters (1 Timothy 4:14; 2 Timothy 1:6), ordination confers a spiritual gift of grace. The oldest ordination prayers extant are contained in the *Apostolic Tradition* of Hippolytus of Rome (*c.* AD 217). In medieval times the Latin rites were elaborated by the addition of various prayers and of such ceremonies as the anointing of hands, clothing the ordinand with the appropriate vestments, and presenting him with the symbols pertinent to his rank; *e.g.,* the Gospels to a deacon and the chalice and paten with the bread and wine to a candidate for the priesthood. The rites of ordination in the Roman Catholic church were considerably simplified in 1968.

In churches that have retained the historic episcopate, the ordaining minister is always a bishop. In Presbyterian churches, ordination is conferred by ministers of the presbytery. In the Reformed Protestant tradition lay persons are ordained to be ruling elders and deacons by the minister joined by others so ordained previously. In Congregational churches ordination is conducted by persons chosen by the local congregation.

According to Eastern Orthodox and Roman Catholic theology, ordination (holy orders) is a sacrament essential to the church, and it bestows an unrepeatable, indelible character upon the person ordained. *See also* holy order.

Ordóñez, Bartolomé (b. *c.* 1490, Burgos, Castile [Spain]—d. 1520, Carrara, Papal States [Italy]), sculptor who was one of the originators of the Spanish school of Renaissance sculpture. Influenced by the masters of the Italian Renaissance, he evolved his own pure style, which was widely imitated after his early death.

A member of a wealthy family, Ordóñez apparently studied under Andrea Sansovino in Florence, though not much is known of his early years. It is known that he collaborated with Diego de Siloé on the "Caraccioli Altarpiece" (1514–15; San Giovanni a Carbonara) and worked on the marble tomb of Andrea Bonifacio (*c.* 1518; SS. Severino e Sosia), both in Naples. He probably established himself in Barcelona about 1515. He was commissioned by the Barcelona cathedral in 1517 to make wooden reliefs for the choir stalls and marble reliefs for the *trascoro* (a screen wall at the rear of the choir).

Ordóñez knew the work of Donatello, Leonardo da Vinci, and Michelangelo. His "The Adoration of the Magi," the principal panel of the "Caraccioli Altarpiece," is a splendid example of his mastery of Renaissance style in its clear organization of figures, careful perspective, and distinct rhythm. This panel and his other masterpieces profoundly influenced the major Neapolitan sculptors of the 16th century.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Ordos Desert, Wade-Giles romanization MAO-WU-SU SHA-MO, Pinyin MAOWUSU SHAMO, desert on a plateau in the southern section of the Inner Mongolian autonomous *ch'ü* (region), China. The Ordos fills the area inside the great northern bend of the Huang Ho (Yellow River) and is bounded by the provincial boundaries with Shensi province and with the Hui Autonomous Region of Ningsia, a frontier that follows closely the line of the Great Wall of China. Structurally, the Ordos Desert is the northern part of the great raised basin-platform that occupies northern Shensi, where its peneplained surface (*i.e.,* worn down by erosion to a nearly flat plain) is masked by massive deposits of loess (wind-blown silt). This basin consists of immense thicknesses of largely undisturbed sedimentary rocks of the Carboniferous and Jurassic periods. These include rich coal strata, particularly along the eastern border of the basin, and the whole basin plateau has potential as an oil-producing area.

Generally, the surface features of the Ordos comprise undulating hills and plains. There are some higher ridges; the Arhiso Mountains in the northwest, which overlook the Huang Ho, represent the raised western edge of the basin structure, while in the southeast the ridge of the Pai-yü Mountains constitutes the northern limit of the drainage basin of the Wei River. The general elevation of the plateau is about 3,600 feet (1,100 m), and the ridges rarely rise above 6,500 feet (2,000 m). Much of the area, particularly the lower-lying depressions, is covered with shifting sands; blown by the strong prevailing northwesterly winds of winter, they are constantly encroaching on the territory of northern Shensi bordering the desert. There are very few streams in the Ordos region. The climate is extremely arid, the country receiving less than 10 inches (250 mm) of rain annually. The only sizable river is the Tu-ssu-t'u River, flowing west into the upper Huang Ho. In the south of the Ordos are great numbers of salt pools and lakes with no drainage outlet; many of these have dried up, leaving deposits of salt and soda.

Vegetation is extremely sparse, particularly in the drier northern and western sections. In the lake basins there are salt meadows with sedge swamps along the seasonal watercourses. The vegetation gradually improves in the wetter east and south, where much of the surface, apart from the shifting sand dunes, is covered with drought-resistant grasses and sparse shrubs. The whole area is very sparsely populated, human life being generally supported only by nomadic herds of sheep, goats, and horses. The population is almost entirely Mongol. To prevent the spread of the sand dunes, the Chinese government in the 1960s planted a wide belt of drought-resistant trees along the southern and eastern edges of the desert.

In the 1970s and '80s, Chinese scientists unearthed more than 20 human fossils from 30,000 to 60,000 years old at Hsiao-ch'iao-pan in the Sjara-osso River valley. The terms Ordos man and Ordosian culture are applied to their findings.

Ordovician Period, interval of geologic time from 505 to 438 million years ago. The second oldest period of the Paleozoic Era, it follows the Cambrian and precedes the Silurian. The Ordovician Period is often divided into the Early Ordovician Epoch (505 to 478 million years ago), the Middle Ordovician Epoch (478 to 458 million years ago), and the Late Ordovician Epoch (458 to 438 million years ago). The rocks that originated during the period constitute the Ordovician System.

A brief treatment of the Ordovician Period follows. For full treatment, *see* MACROPAEDIA: Geochronology.

The Ordovician System was proposed in 1879 by the English geologist Charles Lapworth for rocks exposed in the Arenig Mountains, located along the border of England and Wales and eastward to the Bala district of North Wales. This was part of an area inhabited by an ancient Celtic tribe called the Ordovices.

Fossiliferous sedimentary rocks of Ordovician age occur on all the modern continents. The rock types and constituent fossils indicate that the configuration of the continents and their geographic distribution during the Ordovician were quite different from those of today. Many of the landmasses, including Laurentia (consisting primarily of present-day North America and Greenland), Siberia, Kazakhstan, North China, Australia, and segments of Southeast Asia and Antarctica, were aligned in the tropics during Ordovician time. As the period proceeded, Laurentia and Baltica (composed mainly of present-day northern Europe, including Scandinavia) began to move toward each other, and the Iapetus Ocean that lay between them started to close. A subduction zone (*i.e.,* a narrow region where two of the various lithospheric plates that make up the Earth's surface come together, with one of the plates buckling downward beneath the other) formed along the eastern margin of North America. Mountain building and volcanic activity took place along this region in the Late Ordovician. Also, during the course of the Ordovician, a large continent known as Gondwana (which included what is now South America, Africa, southern Europe, much of the Middle East, India, and Australia) began moving over the South Pole. Continental glaciers developed in the area of central and northern Africa. A sharp lowering of the sea level—about 100 m (330 feet) or more—occurred as a result of this south polar glaciation, which lasted roughly 10 to 15 million years.

Ordovician life was dominated by marine invertebrates. The close of the Cambrian Period had been marked by a mass mortality among the trilobites. They had been the predominant marine invertebrates, and the sharp reduction in their numbers opened many marine environments to colonization by other types of animals in the Ordovician Period. Graptolites (colonial organisms with a skeleton of tough chitinlike material) evolved rapidly at this time, as did various forms of brachiopods (lamp shells). Other important marine invertebrates, such as the bryozoans, crinoids, and tabulate corals and tetracorals, appeared for the first time during the Ordovician in the tropical shelf seas. Nautiloids also populated the shallow sectors of these warm seas, and bivalve mollusks inhabited various nearshore environments. Ostracoderms (jawless armoured fishes) lived in the near-shore tropical waters as well.

It is thought that some forms of land plants may have appeared during the mid-Ordovician. Spores suggestive of a tropical terrestrial environment have been found in rocks of that age.

Ordu, city and port, northern Turkey, on the Black Sea. It lies at the mouth of the Melet River on the eastern slopes of Boztepe (1,800 feet [550 m]), which protects it against storms from the northwest. Ordu was the site of ancient Cotyora, founded by Greek colonists from Sinope (modern Sinop) in the 5th century BC, and is the place from which the survivors of Xenophon's Ten Thousand (Greeks who went to Asia to seek their fortunes) embarked for Sinope and Heraclea Pontica (modern Ereğli). Ordu is now a centre for hazelnut processing and exporting, fishing, and timber exporting. The city is on the Samsun-Trabzon coastal road about 100 miles (160 km) west of Trabzon.

The area in which Ordu is situated is rugged, well-forested, and humid. The fertile coastal strip supports a variety of agricultural products, including corn (maize) and hazelnuts. Livestock is raised and grain is grown in the deep valleys of the interior. Pop. (1990) 102,107.

Ordyn-Nashchokin, Afanasy Lavrentyevich (b. *c.* 1605, Pskov province, Russia—d. 1680/81, Monastery of St. John the Evangelist, near Pskov), statesman and diplomat who became the chief adviser on foreign affairs to Tsar Alexis of Russia (ruled 1645–76).

The son of a petty landowner, Ordyn-Nashchokin received a good education in the relatively cosmopolitan environment of Pskov. During the reign of Michael (ruled 1613–45), he participated in the work of ambassadorial commissions that defined the Russo-Swedish borders and gained a reputation as a talented administrator. In 1656–58 he served as the virtual ruler of all the Livonian lands recently seized by Russia from Poland-Lithuania.

The experience Ordyn-Nashchokin acquired in dealing with Sweden at this time convinced him that Russia should seek to become a maritime power with a Baltic seaboard. Since Russia could not simultaneously contend for Livonia against Sweden and for Ukraine against Poland, he recommended peace with Poland even at the price of losing Ukraine. Alexis, however, overruled his plan; he concluded the Peace of Kardis (1661) with Sweden that restored the prewar territorial distribution, and pursued his war against Poland until 1666, when he commissioned Ordyn-Nashchokin to conclude a peace settlement with Poland. After eight months of negotiations, Ordyn-Nashchokin and the Poles agreed upon the Truce of Andrusovo (January 1667), which placed those parts of Ukraine east of the Dnieper River, as well as the city and region of Kiev, under Russian control. Following his diplomatic success, Ordyn-Nashchokin was promoted to the rank of boyar, appointed minister of foreign affairs, and also made head of several other departments, including the Ukrainian department.

Assuming the role of Alexis' chief adviser, Ordyn-Nashchokin not only involved himself in foreign policy but also, foreshadowing Peter I the Great (reigned 1682–1725), advocated using western Europe as a model for Russian development. He promulgated a trade ordinance protecting Russian merchants from both foreign competition and native bureaucrats (1667); advanced the prospect of trade with Iran and Central Asia, and promoted interest in the shipbuilding industry.

Nevertheless, as Ordyn-Nashchokin continued to view expansion into the Baltic region as the major objective of Russian foreign policy and to favour a policy of friendship with Poland, which precluded an attempt to seize control of the remainder of Ukraine, he came into conflict with the tsar, who dismissed him from the Ukrainian department in 1669 and from the Foreign Office in 1671. In February 1672 Ordyn-Nashchokin took monastic vows and subsequently only briefly resumed his lay career to conduct negotiations with the Poles in 1679.

Ordzhonikidze (Russia): *see* Vladikavkaz.

Ordzhonikidze, Grigory Konstantinovich, byname SERGO (b. Oct. 12 [Oct. 24, New Style], 1886, Goresha, Russia—d. Feb. 18, 1937, Moscow), communist leader who played a major role in bringing Georgia under Soviet rule and in industrializing the Soviet Union.

Having joined the Bolshevik faction of the Russian Social Democratic Workers' Party in 1903, Ordzhonikidze was active in the revolutionary movement, becoming a member of the party's central committee (1912). In April 1912, however, he was arrested for the third time. He resumed his activities only after the imperial Russian government had been overthrown (February 1917) and he had returned from exile in Siberia.

Ordzhonikidze then became a member of both the executive committee of the Petrograd Soviet (the revolutionary council of workers and soldiers that rivaled the authority of the provisional government) and of the Bolshevik Party committee. After the Bolsheviks seized power (October 1917), he became commissar extraordinary for the Ukraine area (1918), a member of his party's Central Committee (1921), and chairman of the Central Committee's Caucasian bureau (1921). Despite Vladimir Lenin's objections to his brutal methods (which were approved by Joseph Stalin) and the opposition of the local communist organizations, Ordzhonikidze helped the Red Army conquer Georgia, then merged Georgia with Armenia and Azerbaijan to create the Transcaucasian Federal Republic, which in turn, was compelled to join Russia, Belorussia, and Ukraine to form the Soviet Union (December 1922).

During the intraparty power struggles of the mid-1920s, Ordzhonikidze generally supported Stalin. Although he incurred the hostility of Lavrenty Beria, who as chief of the secret police in Transcaucasia forced him to transfer to the northern Caucasus (1926), Ordzhonikidze nevertheless advanced in 1926 to become a candidate member of the Central Committee's Politburo, chairman of the party's central control commission, which was responsible for eliminating dissension among party members, and commissar for worker-peasant inspection. In 1930 he became a full member of the Politburo.

Having helped organize the development of Soviet industry during the First Five-Year Plan (1928–32), Ordzhonikidze became commissar for heavy industry in 1932. During the mid-1930s he opposed Stalin's industrial policy and displayed his disapproval of Stalin's terroristic rule. Although Ordzhonikidze's sudden death in 1937 was officially attributed to natural causes, Nikita Khrushchev later charged (1956) that Stalin had driven Ordzhonikidze to commit suicide.

ore, aggregate of economically important minerals that is sufficiently rich to enable separation of the minerals at a profit.

A brief treatment of ore deposits follows. For full treatment, *see* MACROPAEDIA: Industries, Extraction and Processing.

Although more than 2,800 mineral species have been identified, only about 100 are considered ore minerals. Among these are hematite, magnetite, limonite, and siderite, which are the principal sources of iron; chalcopyrite, bornite, and chalcocite, the principal sources of copper; and sphalerite and galena, the principal sources, respectively, of zinc and lead. Copper, molybdenum, and gold are commonly found in disseminated deposits—*i.e.,* scattered more or less uniformly through a large volume of rock. Copper, lead, and zinc are frequently found in massive sulfide deposits. Many such deposits are believed to have been formed by precipitation from volcanic exhalations on the seafloor or by metasomatic replacement (a process of simultaneous solution and deposition). The term "ore" was originally applied only to metallic minerals, but its definition has been broadened to include such nonmetallic substances as sulfur, calcium fluoride (fluorite), and barium sulfate (barite).

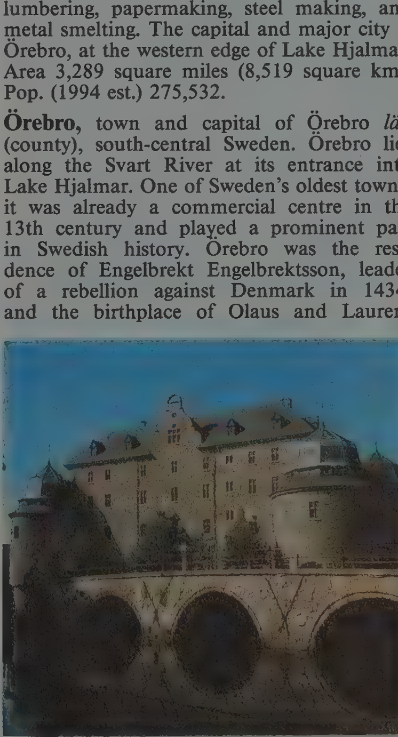
No ore deposit consists entirely of a single ore mineral. The ore is always mixed with unwanted or valueless rocks and minerals that are collectively known as gangue. The ore and the gangue are mined together—*i.e.,* taken out of the host rock in a mass, by either mechanical or manual means. Then the ore is separated from the gangue by various operations known collectively as mineral processing (*q.v.*), or ore dressing. The desired metallic element is then extracted from the ore by various smelting, roasting, or leaching processes. After this, the metal may be still further refined (purified) or alloyed with other metals, as in a copper refinery or steel mill. Mining, processing, and refining are thus successive steps in the utilization of an ore deposit to yield a metal.

ore dressing: *see* mineral processing.

Ore Mountains (Czech Republic–Germany): *see* Erzgebirge.

Örebro, *län* (county) of south-central Sweden. It extends from the Bergslagen mining region in the north to Lake Hjalmar in the east and Lake Vätter in the south. It comprises the traditional *landskap* (province) of Närke and parts of those of Västmanland and Värmland. The *län* has a number of lakes and is drained by several rivers that flow south and east. Iron, zinc, and copper deposits are exploited in the county. Other important industries include lumbering, papermaking, steel making, and metal smelting. The capital and major city is Örebro, at the western edge of Lake Hjalmar. Area 3,289 square miles (8,519 square km). Pop. (1994 est.) 275,532.

Örebro, town and capital of Örebro *län* (county), south-central Sweden. Örebro lies along the Svart River at its entrance into Lake Hjalmar. One of Sweden's oldest towns, it was already a commercial centre in the 13th century and played a prominent part in Swedish history. Örebro was the residence of Engelbrekt Engelbrektsson, leader of a rebellion against Denmark in 1434, and the birthplace of Olaus and Lauren-



Castle on an island in the Svart River, Örebro, Sweden

Refot

tius Petri, 16th-century church reformers. Of the several important assemblies held there, the most notable was that of 1810, at which the French field marshal Jean Bernadotte was elected heir to the Swedish throne as Charles XIV John.

Largely rebuilt since a fire in 1854, Örebro has a modern appearance, but its imposing historic buildings include a 16th-century Swedish Renaissance castle on an island in the river, used partly as a museum and partly as the governor's residence; a 13th-century Gothic church; and the 15th-century Kungsstugan ("King's House"), one of the best-preserved wooden buildings in Sweden. The University of Örebro, affiliated with the University of Uppsala, was founded in 1970. There is also a school of social work and public administration, founded in 1967.

The town is known for its shoe manufacture and biscuit making. It has good rail and boat communications and lies at the junction of national highways. Pop. (2001 est.) 124,873.

Orechovo-Zujevo (Russia): *see* Orekhovo-Zuyevo.

oregano, also called ORIGANUM, flavourful dried leaves and flowering tops of any of various perennial herbs of the mint family (Lamiaceae, or Labiatae), particularly *Origanum vulgare,* called wild marjoram in northern and central Europe, widely used to season many foods. The name is derived from the Greek *oros,* "mountain," and *ganos,* "joy." Oregano has long been an essential ingredient of Mediterranean cooking. Pliny the Elder thought it a remedy for bad digestion. The aroma, strong and aromatic, and the taste, warm, pungent, and bitter, are prominent in Italian cooking and in robust dishes of certain other cuisines, such as the Mexican chili con carne. In the United States the use of oregano rose sharply in the late 20th century, owing largely to the popularity of pizza. Italians call it the mushroom herb but use it with many other foods as well. The Spanish word *orégano* means marjoram, and the herbs are sometimes used interchangeably.

Native to the hills of the Mediterranean countries and western Asia, the herbs were brought to the Western Hemisphere in early times and are naturalized in parts of Mexico and the United States.

All varieties contain essential oil. In some, the principal component of the oil is thymol, in others carvacrol.

Oregon, city, seat of Ogle county, northern Illinois, U.S., on the Rock River. It was founded in the 1830s by John Phelps, a sawmiller. Near Lowden Memorial State Park (immediately north) is the site of Eagle's Nest Camp, a retreat used by Lorado Taft and other artists from 1898 to 1942; the 66-acre (27-hectare) tract was acquired in 1951 by Northern Illinois University for a field campus. Taft's "Soldiers Monument" is in the courthouse square, and on the river bluffs stands his Black Hawk statue (1911), commemorating the American Indian. White Pines Forest State Park is to the west. Oregon has an agricultural economy with some manufacturing (chiefly pianos, printing plates, and road-building equipment). Inc. town, 1843; city, 1869. Pop. (2000) 4,060.

Oregon, constituent state of the United States of America lying in the Pacific Northwest Coast region of the country.

A brief treatment of Oregon follows. For full treatment, *see* MACROPAEDIA: United States of America.

Facing the Pacific Ocean on the west, Oregon is bounded on the north by Washington, on the east by Idaho, and on the south by California and Nevada. The state capital is Salem. The state is roughly rectangular in shape and extends about 400 miles (650 km) from east to west and 300 miles (480 km) from north to south.

At the time of initial European exploration, the leading Indian tribes were the Chinook along the lower Columbia River; the Tillamook, Yamel, Molaha, Clackamus, and Multnomah in the northwest; the Cayuse, Northern Paiute, Umatilla, Nez Percé, and Bannock in the east; and the Klamath and Modoc in the south-central area. The first Europeans to see the Oregon coast were Spanish sailors searching for a northwest passage to facilitate trade with the Orient. In 1579 the English buccaneer Francis Drake claimed the region for Queen Elizabeth I. The Oregon Country received scant attention from non-Indians until about two centuries later, when the Spanish, English, and Americans renewed exploration and established claims. The United States' claim to the Pacific Northwest by right of discovery was established in 1792 when Captain Robert Gray sailed into the mouth of the Columbia River. The Lewis and Clark expedition, traveling from the east, reached the mouth of the Columbia River in 1805.

The first white settlement was an American fur-trading post established at Astoria in 1811 by John Jacob Astor. The British captured the post during the War of 1812, and the region was largely dominated by the Hudson's Bay Company until American settlers began migrating to the Willamette River valley over the Oregon Trail in the 1830s and '40s. The Oregon Country was formally added to the United States in 1846, when a treaty with Great Britain set the (present) northern boundary at 49° N latitude. The original Territory of Oregon, as organized by Congress in 1848, included all the land west of the Continental Divide at the summit of the Rocky Mountains and between 42° N and 49° N latitudes. Oregon, with its present reduced boundaries, was admitted to the Union as the 33rd state in 1859.

The state is a region of wide physical diversity, from the moist rainforests and mountains and fertile valleys of its western third to the naturally arid climatic harshness of its eastern deserts. Its mountains, plateaus, plains, and valleys of many different geologic ages and materials can be divided into nine major landform regions: (1) the Coast Range, (2) the Klamath Mountains, (3) the Willamette River valley, (4) the Cascade Range, (5) the North Central Oregon Plateau, or Columbia Basin, (6) the Blue-Wallowa Mountains, (7) the Harney High Lava Plains, (8) the Great Basin of the Basin and Range Province, and (9) the Malheur-Owyhee Upland. The greater part of the state lies within the drainage areas of the Columbia River and its major tributary, the Snake. Streams in the western slopes of the coastal mountains drain directly into the Pacific Ocean, while the surface waters of the Great Basin have no ocean outlet.

Oregon's climates range from equable, mild, marine conditions on the coast to continental conditions of dryness and extreme temperatures in the interior. Location with respect to ocean, prevailing wind and storm paths, and topography and elevation are the principal climatic controls.

Early white settlement of Oregon was predominantly by American immigrants who settled on farms in the fertile Willamette River valley and developed the logging industry in the heavily forested western mountains. The majority of the population lives in the counties to the west of the crest of the Cascades, and more than two-thirds lives in the metropolitan areas of the four largest cities—Portland, Eugene, Salem, and Medford—all of which are located in the western valleys of the state. Nonwhites constitute only a tiny percentage of the population.

The economy of Oregon traditionally has been resource-oriented, strongly dependent on its forests and farms. Livestock products contribute about one-half of the total agricultural-commodity value, led by cattle and calves. Wheat is the leading crop, with vegetables and fruits among the other major crops. Salmon and shellfish provide the bases of the fishing industry. Oregon's mining activity is primarily limited to nonmetals such as sand and gravel, cement, and pumice, although the state has the only domestic nickel mine. Forest-products manufacturing—lumber, plywood and hardboard, pulp and paper—ranks as Oregon's leading industry. Food-processing and metals-related industries, especially aluminum, have grown with the development of electricity sources, natural-gas pipelines, and abundant water. Tourists have increasingly been attracted by the natural landscape and recreational opportunities afforded by the beaches and mountains.

The state is served by several interstate highways and a score of railroads. There is an international airport at Portland, which, lying near the confluence of the Columbia and Willamette rivers, is by far the largest port in the state.

As a relatively young region of the United States, Oregon has not developed a cultural identity equivalent to those of the longer-settled or more populous regions. Activity in the arts is centred in Portland, Salem, and the larger university cities. Oregon State University at Corvallis and the University of Oregon at Eugene are the leading universities. Popular events such as rodeos, roleos (log-rolling jamborees), and festivals are held annually in towns throughout the state. Environment-conscious Oregonians continually assess the need for economic growth, with its attendant population growth and pollution, in light of their desire to preserve the state's many natural wonders. Area 97,073 square miles (251,418 square km). Pop. (2000) 3,421,399.

Oregon Caves National Monument, single cave comprising a series of chambers joined by subterranean corridors on four levels, in

Farmland near Newberg, Ore., in the Willamette River valley

Gary Braasch

southwestern Oregon, U.S., in the Siskiyou Mountains near the California border. Established in 1909, the monument occupies an area of 488 acres (197 hectares). Formed by the dissolving of limestone by groundwater, the cave contains many beautiful stalagmites, stalactites, and other fantastic formations. On the surface above and around the caves are forests of Jeffrey pine, with many trees from 100 to 180 feet (30 to 55 m) high and from 200 to 400 years old.

Oregon City, seat (1843) of Clackamas county, northwestern Oregon, U.S., at Willamette Falls (40 feet [12 m] high) and the juncture of the Clackamas and Willamette rivers. It forms part of a tri-city complex, just southeast of Portland, that includes Gladstone and West Linn. In 1829–30 John McLoughlin of the Hudson's Bay Company settled the site at an Indian village on a narrow plain backed by high cliffs. His house (1845–46) is preserved as a national historic site. Laid out in 1842 and incorporated in 1849, Oregon City became the first territorial capital. It flourished as a supply point during the California gold rush and published (1846) one of the first newspapers (*Oregon Spectator*) west of the Mississippi River.

Locks now bypass the falls, which supply power for paper and woolen mills. Dairying, fruit growing, and tourism are further economic factors. A free municipal elevator (built 1915, replaced 1955) lifts pedestrians 90 feet (27 m) from the river (business) to the cliff (residential) sections of the city. Clackamas Community College was opened there in 1966. Oregon City was the birthplace of poet Edwin Markham (1852–1940). Pop. (1990) 14,698.

Oregon grape, also called HOLLY GRAPE, any of several species of the genus *Mahonia,* evergreen shrubs of the barberry family (Berberidaceae) grown for their ornamental value. *M. aquifolium,* the typical Oregon grape, is 90 cm (3 feet) or more tall and is native to the Pacific coast of North America. It is most used for its foliage: the glossy, leathery leaves, with five to nine leaflets, are spiny-edged like a holly. Small, fragrant yellow flowers in terminal clusters precede small, blue edible berries.

Oregon grape (*Mahonia aquifolium*)

G.E. Hyde from the Natural History Photographic Agency

Among the lower-growing Oregon grapes are *M. repens,* also called creeping barberry, *M. nervosa,* also called water holly, and *M. pumila;* protected from winter winds, these varieties provide durable ground cover.

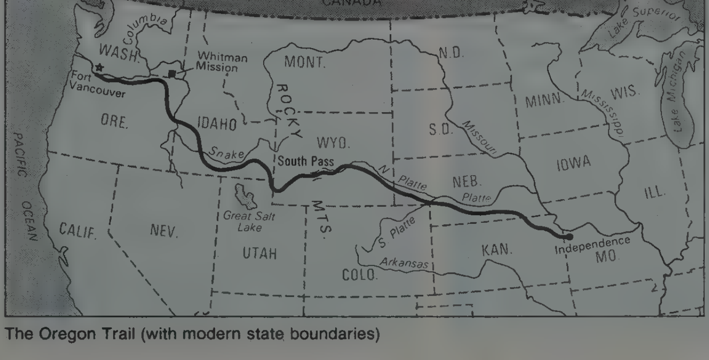
Oregon Question, in U.S.-Canadian history, dispute over ownership of the Pacific Northwest involving Spain, Russia, the United States, and Great Britain, all of which had established claims based on exploration or settlement by their nationals. Spain first vacated its claims by the Nootka Sound Convention (1790) with Britain and the Transcontinental Treaty (1819) with the United States. The United States and Great Britain, in the Convention of 1818, established a joint claim over "Oregon Country," eventually defined to lie below latitude 54° 40′ N, above latitude 42° N, and west of the Continental Divide. Russia later abandoned its claim to the area in separate treaties with the United States and Great Britain (1824–25). Using the slogan "Fifty-four forty or fight," the Democrats succeeded in electing James K. Polk president in 1844 on a platform that demanded exclusive U.S. control of the area. U.S. preoccupation with the Mexican War (1846–47) and British troubles in Ireland, however, paved the way for the Oregon Treaty (1846), a compromise by which British navigation rights on the Columbia River were guaranteed and the land boundary was drawn along latitude 49° N. Final delineation of the marine portion south of Vancouver Island was arbitrated in 1872. *See also* Nootka Sound controversy.

"Ridiculous Exhibition; or, Yankee-Noodle putting His Head into the British Lion's Mouth," cartoon by John Leech, 1846, on the Oregon boundary dispute

The Granger Collection

Oregon Trail, in U.S. history, one of the great emigrant routes to the Northwest, running from Independence, Mo., to the Columbia River region of Oregon. It crossed about 2,000 miles (3,200 km) of rugged terrain, including desert and Indian territory.

First used by fur traders and missionaries, the trail was suddenly in the 1840s thick with the wagon trains of about 12,000 emigrants to Oregon. Including an occasional stop at various forts for replenishment of supplies and livestock and for repairs, the journey took about four to six months. During the journey, cholera was a persistent problem. Some 1,000 settlers joined the "great migration" led by Marcus Whitman (1843). Hordes of gold seekers also used the eastern portion of the trail to California in the late 1840s. Beginning in 1847, thousands of Mormons followed a route later called the Mormon Trail, which frequently coincided in Wyoming with the Oregon Trail. Of all the overland routes west, the Oregon Trail was in use for the longest period; after railroads replaced much travel by wagon train, the trail was often used for eastward cattle and sheep drives.



The Oregon Trail (with modern state boundaries)

Oregon yew: *see* western yew.

Oregonian, The, morning daily newspaper published in Portland, Ore., one of the outstanding dailies of the U.S. Northwest, for many years the only newspaper in the seven northwesternmost states.

It was founded as a weekly when Portland had only 700 inhabitants. The paper's first publisher, Thomas J. Dryer, was appointed by President Abraham Lincoln to be U.S. commissioner of the Sandwich Islands (later the Hawaiian Islands), and Dryer gave the paper to his typographer and printer, Henry Pittock, in lieu of back wages. The paper became a daily in 1861.

Independent politically, *The Oregonian* gained fame throughout the region and in the United States for its editorial excellence. The paper was a technological pioneer, one of the first in the United States to transmit copy by telegraph and to use pictures received by wirephoto. In 1950 Samuel I. Newhouse purchased the paper. *The Oregonian* converted from letterpress to offset printing in 1975.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Orekhovo-Zuyevo, also spelled ORECHOVO-ZUJEVO, or OREKHOVO-ZUEVO, city in Moscow *oblast* (province), western Russia, east of Moscow city, along the Klyazma River. Formed in 1917 through the amalgamation of several industrial villages, Orekhovo-Zuyevo is now one of the largest textile-manufacturing cities of Russia, specializing in cotton. Chemicals and engineering are also important. Peat is extracted in the vicinity. Pop. (1991 est.) 136,800.

Orel (Russia): *see* Oryol.

Orellana, Francisco de (b. *c.* 1490, Trujillo, Castile [Spain]—d. *c.* 1546, Amazon River), Spanish soldier and first explorer of the Amazon River.

After participating with Francisco Pizarro in the conquest of Peru in 1535, Orellana moved to Guayaquil and was named governor of that area in 1538. When Pizarro's half brother, Gonzalo, prepared an expedition to explore the unknown regions east of Quito, Orellana was appointed his lieutenant. In April 1541 he was sent ahead of the main party to seek provisions, taking a brigantine with 50 soldiers. He reached the junction of the Napo and Marañón rivers, where his group persuaded him of the impossibility of returning to Pizarro. Instead, he entered upon an exploration of the Amazon system. Drifting with the current, he reached the mouth of the river in August 1542. Proceeding to Trinidad, he finally returned to Spain, where he told of hoards of gold and cinnamon and of encounters with tribes led by women resembling the

Amazons of Greek mythology—a comparison that is presumed to have led him to name the river the Amazon.

Orellana sought the right to explore and exploit the lands that he had discovered. Because the Spanish crown was involved in controversy with Portugal over the ownership of the area, it could provide him only with some assistance but no official support. His return to the Amazon proved a disaster. Ships and men were lost on the passage to America, and Orellana's vessel capsized near the mouth of the great river and he drowned.

Orem, city, Utah county, north-central Utah, U.S., 4 miles (6.5 km) north of Provo. To the east runs the Provo River and canyon (containing the scenic Bridal Veil Falls), and to the west lies Utah Lake, a 150-square-mile (390-square-kilometre) remnant of ancient Lake Bonneville. The area has much truck gardening, and industry in Orem centres on vegetable canning, especially of tomatoes. Inc. 1919. Pop. (1990) city, 67,561; Provo-Orem MSA, 263,590.

Orenburg, *oblast* (province), western Russia, occupying an area that extends across the southern end of the Ural Mountains. It stretches from the limestone plateaus of the Obshchy Syrt in the west, across the low Urals ridges, to the flat Turgay Plateau in the east. Most of the *oblast* lies in the feather-grass and fescue steppe; in the north and northwest are groves of birch and pine, especially in the Buzuluk pine forest nature reserve. Much of the steppe is plowed up, particularly as a result of the Virgin and Idle Lands Campaign of the 1950s, and agriculture is important, principally spring wheat, corn (maize), millet, and sunflowers. The economy is dominated, however, by the mining and industrial area at the southern end of the Urals, centred on Orenburg city, the *oblast* headquarters. Many minerals are exploited, and heavy industry—iron and steel, petrochemicals, and engineering—is highly developed. Area 47,900 square miles (124,000 square km). Pop. (1990 est.) 2,183,000.

Orenburg, formerly (1938–57) CHKALOV, city and administrative centre of Orenburg *oblast* (province), western Russia, on the Ural River at the Sakmara confluence. Founded as a fortress in 1735 at the Ural-Or confluence, where Orsk now stands, it was moved to its present site in 1743. It was originally the military centre of the Ural Cossacks, and its commercial importance grew with trade to Central Asia, especially after the railway from Kuybyshev was built in 1871–73. Modern Orenburg has major engineering industries, producing heavy-industrial and agricultural machinery; it manufactures a range of consumer goods and foodstuffs. It also has gas-processing facilities. The city has teacher-training, medical, and agricultural institutes. Pop. (1989 prelim.) 547,000.

Orense, *provincia,* northwestern Spain, the only landlocked province in the *comunidad autónoma* ("autonomous community") of Galicia. It is bounded by Portugal on the south and by the *provincias* of Pontevedra (west), La Coruña (north), Lugo (northeast), and León and Zamora (east). The principal river system is the Miño-Sil, the fertile valleys of which produce corn (maize) and grapes for wine. The Sil is harnessed for hydroelectric power. The Ribeiro area is famous for its white wine. There is also considerable pig breeding and potato growing. Industries include chemical manufacture; tin and tungsten are mined, and granite deposits are quarried. Tourism contributes to the economy: large lakes offer sailing and fishing facilities, and Mount Trevinca (6,660 feet [2,030 m]), the region's highest peak, is the site of one of Spain's better winter skiing resorts. The provincial capital, Orense, is the only large centre, and the population of the province is predominantly rural. Area 2,810 square miles (7,278 square km). Pop. (1988 est.) 435,823.

Orense, town, capital of Orense *provincia,* in the *comunidad autónoma* ("autonomous community") of Galicia, northwestern Spain, situated along the eastern bank of the Miño River, south-southeast of La Coruña. Its name derives from its hot springs, which were known to the Romans as Aquae Originis, or Urentae, and are now utilized predominantly for domestic supply. It was part of the Suebi (Suevi) kingdom during most of the 5th, 6th, and 7th centuries and was destroyed by the Moors in 716 and later rebuilt by Alfonso III of Asturias about 877.

The Miño is crossed at Orense by one of the most remarkable bridges in Spain, built by Bishop Lorenzo in 1230 but frequently repaired since then; it has seven arches and a central span of 150 feet (45 m). The town has three parts: the medieval, the area of 19th-century expansion, and the modern perimeter. Medieval family mansions include those of the Oca and the Valladares (now a casino). The Capilla del Cristo, or Christ's Chapel (16th century), in the Gothic cathedral (founded 572; rebuilt in the 13th century) contains a crucifix venerated throughout Galicia. The former episcopal palace houses the Provincial Archaeological Museum. The town has sawmills, flour mills, iron foundries, and some light industries. Pop. (1982 est.) 88,159.

Oreopithecus, extinct genus of primates found as fossils in Late Miocene deposits in East Africa and Early Pliocene deposits in southern Europe (11.2 to 3.4 million years ago). *Oreopithecus* is best known from complete but crushed specimens found in coal deposits in Europe. The relation of the genus to other primates has been a matter of some debate and confusion; *Oreopithecus* appears to combine primitive and advanced features that, on one hand, seem to ally it with the Old World monkeys and, on the other, with the advanced, manlike apes. It is probable that *Oreopithecus* represents a specialized side branch of primate evolution that did not give rise to more advanced forms; it is generally included in a separate ape family, the Oreopithecidae. *Oreopithecus,* an inhabitant of swampy regions, was about 1.2 m (4 feet) tall and had long arms; it is estimated that *Oreopithecus* weighed about 40 kg (90 pounds). The skull was small and the teeth were specialized; it probably ate soft plant foods. It is doubtful that *Oreopithecus* habitually stood erect.

Oreshek (Russia): *see* Petrokrepost.

Oresme, Nicholas, French NICOLE D'ORESME (b. *c.* 1325, Allemagne, Fr.—d. July 11, 1382, Lisieux), French Roman Catholic bishop, Aristotelian scholar, and economist whose work provided some basis for the development of modern mathematics and science and of French prose, particularly its scientific vocabulary.

After studying theology in Paris, Oresme served as bursar in the Collège de Navarre at the University of Paris from 1348 to 1356, and then as master until he resigned in 1361. He was canon (1362) and dean (1364) of Rouen, Fr., and preached before Pope Urban V on Christmas Eve 1363.

By 1370 Oresme had been appointed chaplain to King Charles V the Wise of France, who introduced notable changes in financial matters in accordance with Oresme's theories of the lawfulness of tax and its necessary permanence coupled with the indispensability of a stable coinage. Oresme regarded the coin as constituting a definite weight of precious metal, its fineness guaranteed by the issuing authority; he viewed coins as belonging to the public, not to the prince, who had no right to vary their standard, weight, or bimetallic ratio. Furthermore, his economic policy took account neither of credit nor of bills of exchange, although they were in general use by the 14th century.

Because Charles was ardently interested in books and in men of learning who would be especially beneficial to his government, he asked Oresme (*c.* 1375) to translate Aristotle for him. Oresme's translations from the contemporary Latin versions of Aristotle's *Ethics, Politics,* and *Economics* are considered to have been an important contribution to the development of the French language. He was elected bishop of Lisieux in 1377 and was consecrated in 1378.

In mathematics Oresme helped lay the foundation that later led to the discovery of analytic geometry. In science, Oresme made a major contribution to kinematics (the principles and laws of motion) by proving geometrically the Merton theorem: *i.e.,* the space traversed in a given period by a body with uniformly accelerated motion is the same as if the body moved uniformly at its speed for the middle instant of the period.

Oresme's *Traité de la sphère* ("Treatise on the Sphere") and *Livre du ciel et du monde* ("Book on the Sky and the World") reveal his original scientific concepts. Against black magic and the claims of astrologers to predict the future, he wrote *Livre de divinacions* ("Book on Divinations"). He taught against Aristotle by advocating the possibility of several universes and, more specifically, against the Aristotelian theory expressed in *De caelo* ("On the Heavens") that the heavens move around a stationary Earth. Oresme's theory of earthly motion preceded Copernicus. His celebrated treatise *De moneta* (*c.* 1360; "On Coinage"), first printed in 1484 and frequently reissued in the 17th century, is directed against any debasement of the coinage. On the basis of this work, Oresme has been called the greatest medieval economist.

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Oresteia, trilogy of tragic dramas by the ancient Greek dramatist Aeschylus, first performed in 458 BC. It is his last work and the only complete trilogy of Greek dramas that has survived.

The *Oresteia* tells the story of the house of Atreus. The first play, *Agamemnon,* portrays the victorious return of that king from the Trojan War and his murder by his wife, Clytemnestra, and her lover, Aegisthus. The second play, *Choephoroi* (*The Libation Bearers*), deals with Agamemnon's daughter Electra and his son Orestes. Orestes avenges his father's murder by killing his mother and her lover. The third play, *Eumenides,* describes Orestes driven by the Furies (Erinyes), for, though he was required to avenge his father's death, a matricide is infamous in the eyes of the gods. He is finally absolved at the court of the Areopagus by the goddess Athena.

Orestes, in Greek mythology, son of Agamemnon, king of Mycenae (or Argos), and his wife, Clytemnestra. According to Homer, Orestes was away when his father returned from Troy to meet his death at the hands of Aegisthus, his wife's lover. On reaching manhood, Orestes avenged his father by killing Aegisthus and Clytemnestra.

According to the poet Stesichorus, Orestes was a small child at the time of Agamemnon's

Orestes being purified by Apollo after his acquittal by the court of the Areopagus, with the placated Eumenides nearby, detail of a 5th-century-BC Greek vase; in the Louvre

Alinari—Art Resource/EB Inc.

murder and was smuggled to safety by his nurse. Clytemnestra was warned of impending retribution by a dream, and Orestes, for the crime of matricide, was haunted by the Furies (Erinyes) after her death. In Aeschylus' dramatic trilogy the *Oresteia,* Orestes acted in accordance with Apollo's commands; he posed as a stranger with tidings of his own death, and, after killing his mother, he sought refuge from the Furies at Delphi. Prompted again by Apollo, he went to Athens and pleaded his case before the Areopagus. The jury divided equally, Athena gave her deciding vote for acquittal, and the Furies were placated by being given the epithet Eumenides (kindly goddesses).

In Euripides' play *Iphigenia in Tauris* some of the Furies remained unappeased, and Orestes was ordered by Apollo to go to Tauris and bring the statue of Artemis back to Athens. Accompanied by his friend Pylades, he reached his goal, but they were arrested because it was the local custom to sacrifice all strangers to the goddess. The priestess in charge of the sacrifice was Orestes' sister Iphigeneia; they recognized each other, and all escaped together, taking the statue with them. Orestes inherited his father's kingdom, adding to it Argos and Lacedaemon. He married Hermione, daughter of Helen and Menelaus, and eventually died of snakebite.

The story of Orestes was a favourite in ancient art and literature. Aeschylus' *Oresteia* showed its dramatic potentialities, and these were further exploited by Sophocles and Euripides. Aspects of the story were also featured in the work of many later Western dramatists and composers.

Øresund, Swedish ÖRESUND (Baltic Sea): *see* Sound, The.

orfe (fish): *see* ide.

Orff, Carl (b. July 10, 1895, Munich, Ger.—d. March 29, 1982, Munich), German composer known particularly for his operas and dramatic works and for his innovations in music education.

Orff studied at the Munich Academy of Music and with the German composer Heinrich Kaminski and later conducted in Munich, Mannheim, and Darmstadt. His *Schulwerk,* a manual describing his method of conducting, was first published in 1930. Orff edited some 17th-century operas and in 1937 produced his secular oratorio *Carmina Burana.* Intended to be staged with dance, it was based on a manuscript of medieval poems. This work led to others inspired by Greek theatre and by medieval mystery plays, notably *Catulli carmina* (1943; *Songs of Catullus*) and *Trionfo di Afrodite* (1953; *The Triumph of Aphrodite*), which form a trilogy with *Carmina Burana.* His other works include an Easter cantata, *Comoedia de Christi Resurrectione* (1956); a nativity play, *Ludus de nato infante mirificus* (1960); and a trilogy of "music dramas"—*Antigonae* (1949), *Oedipus der Tyrann* (1959), and *Prometheus* (1966). Orff's system of music education for children, largely based on developing a sense of rhythm through group exercise and performance with percussion instruments, has been widely adopted. In 1924 in Munich he founded, with the German gymnast Dorothee Günther, the Günther School for gymnastics, dance, and music.

Orfila, (Washington) Alejandro (b. March 9, 1925, Mendoza, Arg.), Argentine diplomat who served as secretary-general of the Organization of American States (OAS) from 1975 to 1984.

Orfila was educated at the University of Buenos Aires and at Stanford and Tulane universities in the United States. As a career diplomat, he served as secretary in the Ministry of Foreign Affairs and held diplomatic posts in Moscow, Warsaw, San Francisco, New Orleans, and Washington, D.C., from 1946 to 1952. In the 1950s he became active in the OAS and was director of its Office of Public Relations for five years. From 1958 to 1960 he was Argentina's minister plenipotentiary to the United States and then served as ambassador to Japan for two years. He returned to private life as a business consultant until his appointment as ambassador to the United States (1973–75), a post he held until he was elected head of the OAS. Orfila resigned one year before the expiration of his term.

Orford, Horace Walpole, 4th Earl of: *see* Walpole, Horace.

Orford, Robert Walpole, 1st Earl of: *see* Walpole, Robert.

orfray (embroidery): *see* orphrey.

organ, in biology, a group of tissues in a living organism that have been adapted to perform a specific function. In higher animals, organs are grouped into organ systems; *e.g.,* the esophagus, stomach, and liver are organs of the digestive system.

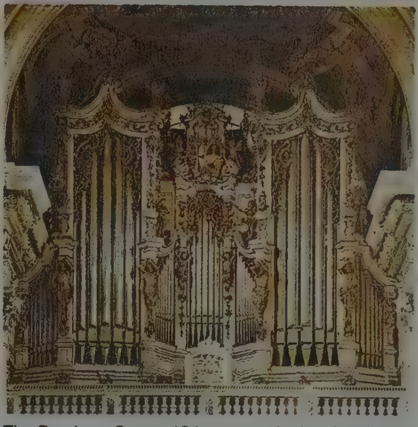
For a depiction of many of the organs of the human body, shown in relation to each other, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

In the more advanced animals, there are usually 10 organ systems: integumentary, skeletal, muscular, nervous, endocrine (hormonal), digestive, respiratory, circulatory, excretory, and reproductive. These systems appear gradually in the lower animals and attain their full complexity and functional specialization in the higher animals. In plants the primary organs are the stem, root, and leaf, all of which help to nourish the plant, and the reproductive organs (*e.g.,* flowers, seed, and spores). As with animals, these organs are reponsible for the basic life-sustaining functions of the organism.

organ, in music, a keyboard instrument, operated by the player's hands and feet, in which pressurized air produces notes through a series of pipes organized in scalelike rows. The term organ encompasses reed organs and electronic organs but, unless otherwise specified, is usually understood to refer to pipe organs. The organ, although one of the most complex of all musical instruments, has the longest and most involved history and the largest and oldest extant repertoire of any instrument in Western music.

A brief treatment of the organ follows. For full treatment, *see* MACROPAEDIA: Musical Instruments.

In spite of far-ranging technical developments, the organ's basic principles of operation remain substantially unchanged from when they were discovered more than 2,000 years ago. Conventional pipe organs consist of four main parts: a keyboard or keyboards and other controls, pipes to produce the tone, a device to supply wind under pressure, and a mechanism connected to the keys for admitting wind to the pipes. The most basic instrument consists of a single set, or rank, of pipes with each pipe corresponding to one key on the keyboard, or manual. Organs usually possess several sets of pipes (also known as stops, or registers), however, playable from several keyboards and a pedalboard. Under their control are the various ranks of wooden and metal pipes of differing length and shape. These fall into the two distinct categories of flue pipes and reeds.



The Bruckner Organ, 18th century; in the church of the Abbey of Sankt Florian, Austria

Toni Schneiders

The pipes are arranged over a wind chest that is connected to the keys via a set of pallets, or valves, and fed with a supply of air by electrically or mechanically activated bellows. Each rank is brought into action by a stop that is connected by levers, or electrically, to a slider. To bring a pipe into speech the player must first draw a stop to bring the holes in the slider into alignment with the foot of the pipes on the toe board. Pressing a key causes the pallet under that pipe to open, allowing air to travel along a narrow channel, through the slider hole, and into the pipe.

Mechanical action, until the 19th century the sole method of linkage between pipe and keyboard, is still commonplace. The usual forms of mechanically aided action are tubular pneumatic, electro-pneumatic, and direct electric. An organ is generally disposed in divisions, each with a number of separate ranks controlled by separate manuals (two manuals and pedals are the minimum required to play the bulk of the legitimate repertoire). A large instrument may have five, or exceptionally more, manuals banked above each other, each controlling families of tones and pitches.

A characteristic of the organ is the freedom it allows the player to build up the volume and timbre by adding, to the basic tone, stops of proportionately higher or lower pitch. The pitch of any pipe is proportional to its length. Thus, an 8-foot (2.4-metre) pipe will sound at normal keyboard pitch, one of 16 feet (5 m) will sound its sub-octave, and one of 4 feet (1 m), its octave. Mutation stops sound at pitches corresponding to the harmonics of unison pitch. Pipes may vary from 32 feet (10 m) long to less than 1 inch (2.5 cm), giving the organ a possible range of nine octaves—larger than any other instrument.

The earliest-known organ was the hydraulus of 250 BC, a rudimentary Greek invention, with the wind regulated by water pressure. The first recorded appearance of an exclusively bellow-fed organ, however, was not until nearly 400 years later. By the 8th century organs were being built in Europe, and from the 10th century their association with the church had been established. The most important period of organ development occurred during the 15th and 16th centuries, which witnessed significant tonal and mechanical advances and the emergence of national schools of organ building. By the early 17th century all the essential elements of the instrument had been developed, and subsequent developments involved either tonal changes or technological refinements.

It was during the High Baroque period that the organ reached its greatest popularity and found its most important composer in Johann Sebastian Bach (1685–1750). There existed at this time two principal schools of organ building: the French, with its colourful reeds and mutations, and the German and Dutch, with their outstanding choruses.

After the death of Bach, organ building entered into a gradual decline, most particularly in Germany and England, where organs built after 1800 were of increasingly poor tonal quality. There was, however, more emphasis on orchestrally imitative stops. The 19th century also saw the widespread introduction of reed organs, such as the harmonium and the melodeon (*qq.v.*). Reed organs produce sound using freely vibrating reeds (rather than the beating reeds used in the reed pipes of pipe organs), usually without resonators. Smaller and less complicated than pipe organs, they remained popular in homes and small institutions until the early 20th century, when they lost ground to electronic organs and mass-produced pianos.

The 20th century witnessed both the revival of classical ideals in organ construction and the reemergence of the organ as an independent instrument commanding its own idiomatic literature. When Laurens Hammond introduced the electronic organ (*q.v.*) in the United States in 1935, it provided an economical and compact substitute for the organ, but its imitative sounds have never replaced those of the original organ.

organ-pipe cactus (species *Lemairocereus,* or *Cereus, thurberi*), plant belonging to the family Cactaceae, native to southern Arizona in the United States. Related species occur from Mexico to Venezuela and Peru and the West Indies. The name is also applied to a few other species of *Cereus*-like cacti that have several to many tall columns arising candelabra-like from the base or not far above it.

L. thurberi is characteristic of warmer parts of the Sonoran Desert, in Arizona, Baja California, and Sonora, Mexico. It and most similar species are valued for their delicious fruit. Cuttings are often planted closely in rows for hedges or fences.

Lemairocereus species vary from treelike thickets 12 m or more (40 feet or more) tall to shrubby thickets of 2 to 3 m (6.5 to about 10 feet).

Organ Pipe Cactus National Monument, national monument in southwestern Arizona, U.S., at the Mexican border, 12 miles (19 km) south of Ajo. Established in 1937 with an area of 517 square miles (1,339 square km), it preserves segments of the mountainous Yuma, or Sonoran, Desert and is named for the organ-pipe cactus (found in the United States only in this locality and so called because its branches resemble organ pipes). Desert ironwood, ocotillo, and numerous other desert plants are also found there. Wildlife includes the venomous lizards known as Gila monsters, pronghorn antelope, coyotes, and a variety of birds. Portions of El Camino del Diablo ("Devil's Highway"), the historic Spanish route along which hundreds of miners and pioneers lost their lives, may still be seen.

organ-pipe coral (genus *Tubipora*), any of a genus of marine animals of the class Anthozoa (phylum Cnidaria). The single known species, *Tubipora musica,* occurs on reefs in shallow waters of the Indian and Pacific oceans and is characterized by long, parallel upright polyps, or stalks, supported by a skeleton of rigid tubes of calcium carbonate. The tentacles of the polyps are sometimes green, and the skeleton is bright red or crimson. After the soft parts die, the skeleton remains as a brightly coloured mass of tubes that resemble organ pipes (hence the common name).

Organ-pipe coral (*Tubipora musica*)

Runk/Schoenberger from Grant Heilman—EB Inc.

organic compound, any of a large class of chemical compounds in which one or more atoms of carbon are covalently linked to atoms of other elements, most commonly hydrogen, oxygen, or nitrogen. The few carbon-containing compounds not classified as organic include carbides, carbonates, and cyanides. *See* chemical compound.

organic farming, also called ORGANIC GARDENING, system of crop cultivation employing biological methods of fertilization and pest control as substitutes for chemical fertilizers and pesticides; the latter products are regarded by proponents of organic methods as injurious to health and the environment and unnecessary for successful cultivation.

Organic farming as a conscious rejection of modern agri-chemical techniques had its origin in the 1930s, when Sir Albert Howard, a British agricultural scientist, introduced a system of holistic and natural animal and plant husbandry in which town wastes were returned to the soil for utilization as nutrient material. The practice has been employed in portions of every continent where miscellaneous organic materials, including animal manure, sewage sludge, compost, grass turf, straw, and other crop residues, are applied to fields to improve both soil structure and moisture-holding capacity and to nourish soil life, which in turn nourishes plants; chemical fertilizers, by contrast, feed plants directly.

Biological pest control is achieved through preventive methods, including diversified farming, crop rotation, and the planting of pest-deterrent species, and by pest-management techniques, including the releasing of sterile male insects and predators of pests. Organic farming uses less petroleum than does conventional farming and is most compatible with diversified, small-scale, labour-intensive cultivation.

Organic Statute: *see* Règlement Organique.

organic unity, in literature, a structural principle, first discussed by Plato (in *Phaedrus, Gorgias,* and *The Republic*) and later described and defined by Aristotle. The principle calls for internally consistent thematic and dramatic development, analogous to biological growth, which is the recurrent, guiding metaphor throughout Aristotle's writings. According to the principles, the action of a narrative or drama must be presented as "a complete whole, with its several incidents so closely connected that the transposal or withdrawal of any one of them will disjoin and dislocate the whole." The principle is opposed to the concept of literary genres—standard and conventionalized forms that art must be fitted into. It assumes that art grows from a germ and seeks its own form and that the artist should not interfere with its natural growth by adding ornament, wit, love interest, or some other conventionally expected element.

Organic form was a preoccupation of the German Romantic poets and was also claimed for the novel by Henry James in *The Art of Fiction* (1884).

Organización Regional Interamericana de Trabajadores (ORIT), English INTER-AMERICAN REGIONAL ORGANIZATION OF WORKERS, Latin-American labour organization established in January 1951 as a regional organization for the Latin-American members of the International Confederation of Free Trade Unions (*q.v.*), which had been founded in 1949. At the time of ORIT's founding, the bulk of its members comprised most of the union groups formerly affiliated with the Confederación Interamericana de Trabajadores (CIT), a democratic organization opposed to communism but subject to political attack for its strong U.S. orientation.

The aims of the new organization included land reform, opposition to totalitarianism, and support for organizing efforts in areas where unionism was weak. One of its well-known activities, which began in the 1950s, was the sponsorship of a training school for trade union leaders.

Organization of (or for) ———: *see under* substantive word or words (*e.g.,* American States, Organization of; Economic Co-operation and Development, Organisation for).

organizational relations: *see* industrial relations.

organized crime, complex of highly centralized enterprises set up for the purpose of engaging in illegal activities. Although Europe and Asia have historically had their international rings of smugglers, jewel thieves, and drug traffickers, and Sicily and Japan have centuries-old criminal organizations, organized criminal activities operated as major industries are primarily a 20th-century phenomenon and are most prevalent in the United States, where organized crime has so vast an operation that it has been compared to a cartel of legitimate business firms.

The tremendous growth in crime in the United States during Prohibition (1920–33) led to the formation of a national organization. After repeal of the Eighteenth Amendment put an end to bootlegging—the practice of illegally manufacturing, selling, or transporting liquor—criminal overlords turned to other activities and became even more highly organized. The usual setup was a hierarchical one with different "families," or syndicates, in charge of operations in many of the major cities. At the head of each family was a boss who had the power of life and death over its members. *See also* Mafia.

Wherever organized crime existed, it sought protection from interference by the police and the courts. Accordingly, large sums of money have been expended by syndicate bosses in an attempt to gain political influence on both local and national levels of government. Furthermore, profits from various illegal enterprises have been invested in legitimate business.

In addition to the illegal activities—principally gambling and narcotics—that have been the syndicates' chief source of income, they may also engage in nominally legitimate enterprises, such as loan companies (in underworld parlance "the juice racket") that charge usurious rates of interest and collect from delinquent debtors through threats and violence. They may also engage in labour racketeering, in which control is gained over a union's leadership so that the union's dues and other financial resources can be used for illegal enterprises. Real-estate firms, dry-cleaning establishments, waste-disposal firms, and vending-machine operations—all legally constituted businesses—when operated by the syndicate may include in their activities the elimination of competition through coercion, intimidation, and assassination. The hijacking of trucks carrying valuable, easily disposable merchandise is another favoured activity of organized crime. In 1975 a federally sponsored study of such crime in the United States concluded that the total volume of activities controlled by organized crime amounted to more than $50,000,000,000 per year.

The ability of organized crime to flourish in the United States rests upon several factors. One factor is the threats, intimidation, and bodily violence (including assassination) that a syndicate can bring to bear to prevent victims or witnesses (including its own members) from informing on or testifying against its activities. Jury tampering and the bribing of judges are other tactics used to prevent successful government prosecutions. Bribery and payoffs, sometimes on a systematic and far-reaching scale, are useful tools for ensuring that municipal police forces tolerate organized crime's activities.

Another important contribution to the continuing prosperity of syndicate operations is that numbers rackets and other types of illegal gambling, which provide the economic base for some of the uglier forms of organized crime, are activities that many American citizens feel are not innately immoral or socially destructive and therefore deserve a certain grudging tolerance on the part of law-enforcement agencies.

organogenesis, in embryology, the series of organized integrated processes that transforms an amorphous mass of cells into a complete organ in the developing embryo. The cells of an organ-forming region undergo differential development and movement to form an organ primordium, or anlage. Organogenesis continues until the definitive characteristics of the organ are achieved. Concurrent with this process is histogenesis; the result of both processes is a structurally and functionally complete organ. The accomplishment of organogenesis ends the period during which the developing organism is called an embryo and begins the period in which the organism is called a fetus. *See also* histogenesis.

organometallic compound, any of a class of substances in which the molecules contain at least one metal-to-carbon bond in which the carbon is part of an organic group. The class includes such compounds as tetraethyl lead—an antiknock gasoline additive and ferrocene, a remarkably stable compound in which an iron atom is "sandwiched" between two hydrocarbon rings.

A brief treatment of organometallic compounds follows. For full treatment, *see* MACROPAEDIA: Chemical Compounds.

Organometallic compounds constitute a very large group of substances that have played a major role in the development of the science of chemistry. They are used to a large extent as catalysts and intermediates in the laboratory and in industry.

Organometallic compounds are typically discussed in terms of the metal as either main-group compounds or transition metal compounds. The main-group metals of organometallic compounds are typically considered to be those of the S-block (groups 1 and 2) and the heavier elements of the *p*-block (groups 13–15) in the periodic table of elements. The transition metals include those elements in the *d*- and *f*-blocks (groups 3–12).

The physical and chemical properties of organometallic compounds vary greatly. Most are solids, particularly those whose hydrocarbon groups are ring-shaped or aromatic, but some are liquids and some are gases. Their heat and oxidation stability vary widely. Some are very stable, but a number of compounds of electropositive elements such as lithium, sodium, and aluminum are spontaneously flammable. Many organometallic compounds are highly toxic, especially those that are volatile.

The properties of the organometallic compounds depend in large measure on the type of carbon-metal bonds involved. Some are ordinary covalent bonds, in which pairs of electrons are shared between atoms. Others are multicentre covalent bonds, in which the bonding involves more than two atoms. A third type are ionic bonds, in which the bonding electron pair is donated by only one atom. In donor-acceptor bonds, the metal atom is connected to hydrocarbons with multiple bonds between carbon atoms.

Where metal atoms form covalent bonds with carbon atoms, the electrons are usually shared unequally. As a result, the bond is polarized—one end is more negative than the other. The extent of polarization depends on the strength with which the metal atom binds electrons. Organometallic compounds range in polar power from methylpotassium, in which the bond is almost like certain ionic bonds, to lead, which bonds with carbon with very little polarization.

Because of this bond polarity, many organometallic compounds have reactivities that have made them important in chemical synthesis. The organomagnesium halides (Grignard reagents), for example, are used widely in synthetic organic chemistry, as are organolithium and organoboron compounds. Alkylaluminum compounds are also employed in organic synthesis. Used with titanium salts, they are important catalysts in the polymerization of unsaturated hydrocarbons, such as ethylene and propylene. The mechanism of action of the titanium-aluminum alkyl catalysts probably involves interaction between the titanium atoms and the double bonds of the hydrocarbons.

Organometallic compounds containing lead, tin, and mercury are all commercially significant. A large number of organotin compounds, for example, are used as pharmaceuticals, pesticides, stabilizers for polyvinyl chloride, and fire retardants. Methylmercury has caused severe pollution problems as a result of its toxicity. This fact has led to stringent controls on the discharge of mercury from chemical plants into rivers, lakes, and oceans. Tetraethyl lead, a major industrial organolead compound, is also a cause for environmental concern. Its use as an antiknock agent in gasoline has been curtailed in recent years because, when burned in engines, it emits lead particulates into the atmosphere.

Carbon monoxide reacts readily with many transition-metal atoms to form metal carbonyls, themselves a class of organometallics. One of the earliest to be discovered was tetracarbonylnickel, a volatile nickel compound that became the basis of a process for purifying nickel. Metal carbonyls are employed as catalysts in many reactions in the petrochemical industry.

organum, plural ORGANA, originally, any musical instrument (later in particular an organ); the term attained its lasting sense, however, during the Middle Ages in reference to a polyphonic (many-voiced) setting, in certain specific styles, of Gregorian chant.

In its earliest written form, found in the treatise *Musica enchiriadis* (*c.* 900; "Musical Handbook"), organum consisted of two melodic lines moving simultaneously note against note. Sometimes a second, or organal, voice doubled the chant, or principal voice, a fourth or a fifth below (as G or F below c, etc.). In other instances, the two voices started in unison, then moved to wider intervals. Both melodies might in turn be doubled at the octave. Early organum of this sort (9th–11th century) was, it seems, spontaneously produced by specially trained singers before being committed to manuscript.

In more elaborate forms of organum, a freely composed melody was sung note against note above the plainchant. Finally, at the abbeys of Santiago de Compostela, Spain (*c.* 1137), and Saint-Martial of Limoges, Fr. (*c.* 1150), an important new principle emerged—that of composing a highly florid melody (duplum) above the plainchant "tenor."

This new "melismatic" organum (having several pitches to a syllable) reached maturity in compositions associated with the Notre-Dame school in Paris and collected in the *Magnus liber organi* (*c.* 1170; "Great Book of Organum"), probably by Léonin, or Leoninus, the first major composer known by name, who set chant melodies for the Graduals, Alleluias, and Responsories of the masses for all major feasts.

In Notre-Dame organum, the organal style proper alternates with "descant" sections in which both melodies move rhythmically in accordance with the triple patterns of the late medieval system of rhythmic modes (*see* rhythmic mode). Modern scholars have tended to apply these modes also to the ambiguously notated melismatic portions. More likely, however, melismatic organum reflected the free melodic flow of Oriental music with which crusaders in particular must have been thoroughly familiar. Characteristically, Léonin's two-part compositions were quickly superseded by the rhythmically solid three- and four-part organa of his successor Pérotin, or Perotinus.

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orgasm, also called CLIMAX, climactic physiological state of heightened sexual excitement and gratification that is followed by relaxation of sexual tensions and the body's muscles.

Orgasm is marked by a feeling of sudden and intense pleasure, an abrupt increase in pulse rate and blood pressure, and spasms of the pelvic muscles that cause contractions of the lower vagina in the female and contractions of the urethra and ejaculation by the male. Males and females are physiologically capable of experiencing orgasm from infancy, and children who engage in masturbation or sex play may achieve this sensation. Orgasm can occur while a person is asleep and dreaming, as well as from sexual intercourse or masturbation.

Generally, the differences between the human male and female orgasms are that the climax in the female can be physiologically interrupted more easily than can the male response, and the male's orgasm is usually accompanied by ejaculation of semen; both male and female experience momentary muscular contractions during the orgasm, but the female's effects are usually longer in duration. As the ejaculation (and thus orgasm) is essential for fertilization, and since the male responses are usually more rapidly induced, the male probably achieves orgasms more consistently during intercourse than does the female. Once the female attains an orgasm, however, she remains sexually excited longer and may experience several successive orgasms, whereas the male is ordinarily unable to experience a second orgasm except after a waiting period.

Orgueil meteorite, object involved in the controversy about whether the organic matter in meteorites is evidence of extraterrestrial life. From a meteoric fall on the village of Orgueil, near Toulouse, France, on the night of May 14, 1864, some 20 fragments of the carbonaceous chondrite type were recovered. Examination soon after the fall showed that the meteorite contained hydrogen, carbon, and oxygen and that its substance resembled peat and lignite, which are produced on Earth from living matter. Further examination four years later revealed hydrocarbons much like those of petroleum. The origin of those organic substances in the meteorite, and others since found in Orgueil and in other carbonaceous chondrites, remains uncertain.

In 1962 an examination of parts of the Orgueil meteorite that had lain sealed in a museum case for almost a century disclosed an attempted hoax. Seeds, bits of the European reed *Juncus conglomeratus,* and fragments of gravel and coal were found embedded in the meteorite. These particles must have been painstakingly placed there, since the substance of the meteorite had been restored around them in such a way as to rule out accidental contamination. The apparent fakery is thought to have been connected with the vehement debate going on in France during 1864 over the possibilities that life might evolve from nonliving matter.

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Orhan, also called ORHAN GAZI, Orhan also spelled ORKHAN (b. 1288—d. 1360), the second ruler of the Ottoman dynasty, which had been founded by his father, Osman I. Orhan's reign (1324–60) marked the beginning of Ottoman expansion into the Balkans.

Under Orhan's leadership, the small Ottoman principality in northwestern Anatolia continued to attract Ghazis (warriors for the Islāmic faith) from surrounding Turkish emirates fighting against Byzantium. In 1324 the Byzantine town of Brusa (later Bursa) fell to the Ottomans, followed by Nicaea (modern İznik) in 1331 and Nicomedia (modern İzmit) in 1337.

Turning to the neighbouring Turkmen states, Orhan annexed the principality of Karası, which had been weakened by dynastic struggles (*c.* 1345), and he extended his control to the extreme northwest corner of Anatolia. In 1346 the Ottomans became the principal ally of the future Byzantine emperor John VI Cantacuzenus by crossing over into the Balkans to assist him against his rival John V Palaeologus.

As John VI's ally, Orhan married Theodora, John's daughter, and acquired the right to conduct raids in the Balkans. His campaigns provided the Ottomans with an intimate knowledge of the area, and in 1354 they seized Gallipoli as a permanent foothold in Europe.

Orhan's reign also marked the beginning of the institutions that transformed the Ottoman principality into a powerful state. In 1327 the first silver Ottoman coins were minted in Orhan's name, while the Anatolian conquests were consolidated and the army was reorganized on a more permanent basis. Finally, Orhan built mosques, medreses (theological colleges), and caravansaries in the newly conquered towns, particularly the Ottoman capital, Bursa, which later became a major Islāmic centre.

Orhon inscriptions, Orhon also spelled ORKHON, oldest extant Turkish writings, discovered in the valley of the Orhon River, northern Mongolia, in 1889 and deciphered in 1893 by the Danish philologist Vilhelm Thomsen. They are on two large monuments, erected in AD 732 and 735 in honour of the Turkish prince Kül (d. 731) and his brother the emperor Bilge (d. 734), and are carved in a script used also for inscriptions found in Mongolia, Siberia, and Eastern Turkistan and called by Thomsen "Turkish runes." They relate in epic language the legendary origins of the Turks, the golden age of their history, their subjugation by the Chinese, and their liberation by Bilge. The polished style of the writings suggests considerable earlier development of the Turkish language.

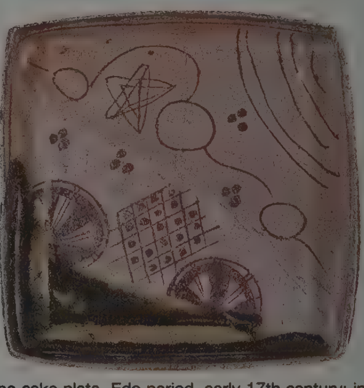
Orhon River, Orhon also spelled ORKHON, or ORCHON, river in north-central Mongolia. The river lies entirely within Mongolia and rises from the heavily forested slopes of the Hangayn Mountains. It flows east out of the mountains and then turns north, past Karakorum, the ancient capital of the Mongol empire. The Orhon is separated from the Selenge River by a massif. Both rivers flow northeast to meet at Sühbaatar, a trade centre just south of the border with Russia. The Selenge then continues northward into Russia. Funerary stelae dating from the 8th century and containing some of the oldest known writing in a Turkic language were discovered near Karakorum in 1889 and are known as the Orhon inscriptions.

The Orhon River is 700 miles (1,130 km) long and is navigable for shallow-draft vessels only in July and August. The river has a drainage area of some 51,000 square miles (132,000 square km). The primary tributaries are the Tuul, Haraa, and Yöröö rivers, all of which rise in the Hentiyn Mountains and enter the Orhon from the right. The Tuul river flows past Ulaanbaatar, the capital of Mongolia, on its way to the Orhon. Because of unreliable rainfall and harsh winters, agriculture along the Orhon River is limited to subsistence farming.

Oribe, Manuel Ceferino (b. Aug. 27, 1792, Montevideo, Río de la Plata [now in Uruguay]—d. Nov. 12, 1857, Montevideo), second president of Uruguay (1835–38), a member of the Treinta y Tres Orientales, the legendary 33 nationalists who successfully fought for Uruguayan independence in the Cisplatine War (1825–28).

Although he had been allied with José Fructuoso Rivera, the first president of Uruguay, their ambitions eventually clashed. As president, Oribe sought to extend government control over rural districts ruled by Rivera. Angered by this challenge and by accusations of financial mismanagement during his term in office, Rivera rose in revolt in 1836, eventually forcing Oribe's resignation in October 1838. Oribe then emigrated to Buenos Aires along with his supporters and was given a military commission by Argentine dictator Juan Manuel de Rosas. In 1842 he defeated Rivera's army with Argentine troops, returned to Uruguay, and laid siege to Montevideo for nine years (1843–51). This civil strife divided the nation into rival factions named Blanco (White) and Colorado (Red), led by Oribe and Rivera, respectively. These two main parties, with the Blancos representing the conservative rural population and the Colorados representing the liberals, have dominated Uruguayan politics to the present day. From 1853 to 1855 Oribe was forced into exile in Europe by the Colorados, who feared his return to the military leadership of the Blancos. Eight more years of civil strife, complicated by Brazilian and Argentinian interference, followed Oribe's death before the Colorados were finally able to establish their control, ruling almost continuously for nearly a century thereafter.

Oribe ware, type of Japanese ceramics, usually glazed in blue or green and first appearing during the Keichō and Genna eras (1596–1624). The name Oribe is derived from Furuta Oribe, a pupil of Sen Rikyū, under whose guidance it was first produced.

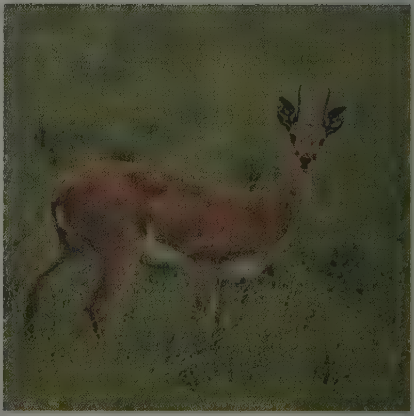


Oribe cake plate, Edo period, early 17th century; in the Seattle Art Museum, Seattle, Wash.

By courtesy of the Seattle Art Museum, Seattle, Wash., Eugene Fuller Memorial Collection; photograph, Earl Fields

Some Oribe utensils and functional objects were made in standard ceramic shapes and forms. Others, however, were deliberately deformed by a distortion or imbalance to create a new aesthetic sensibility. The blue-green vitriol glazes have the lustre of fine glass, and the decorative motifs, which are drawn in an iron glaze, have the same imaginative and modernistic feeling found in contemporary textiles and lacquerware. Many of the motifs are exotic, probably deriving from foreign imports arriving at the port of Sakai (just south of Ōsaka), which was also the original home of Sen Rikyū.

oribi (*Ourebia ourebia*), swift African antelope, family Bovidae (order Artiodactyla), living on sub-Saharan grasslands in pairs or small herds. The oribi is a graceful animal with a silky coat, large ears, and a short, bushy tail. It stands about 50–66 cm (20–26 inches) at the shoulder and is yellowish to reddish brown with white underparts. There is a bare, dark spot beneath each ear and a tuft of long hair on each "knee." The male has slim, spikelike horns.



Oribi (*Ourebia ourebia*)

Lloyd McCarthy—Tom Stack and Associates

oriel, in architecture, a bay window in an upper story, supported from below by projecting corbels, or brackets of stone or wood. Usually semihexagonal or rectangular in plan, oriels first became prevalent early in the 15th century. They were often placed over gate-

Oriel window, the Great Gateway of Hampton Court Palace, London, designed by Henry Redman, *c.* 1520

A.F. Kersting

ways or entrances to manor houses and public buildings of the late Gothic and Tudor periods. They became popular again during the revivals of these styles in the 19th and early 20th centuries.

Orient-Express, also called (1919–77) SIMPLON–ORIENT-EXPRESS, luxury train that ran from Paris to Constantinople (Istanbul) for more than 80 years (1883–1977). Europe's first transcontinental express, it initially covered a route of more than 1,700 miles (about 2,740 km) that included brief stopovers in such cities as Munich, Vienna, Budapest, and Bucharest. Its service was stopped by World War I but resumed in 1919, with the route running from Calais and Paris to Lausanne, then via the Simplon Pass to Milan, Venice, Zagreb, Belgrade, and Sofia; the train was then called the Simplon–Orient-Express. Interrupted again during World War II, service resumed in 1947.

The Orient-Express was developed by the Belgian businessman Georges Nagelmackers and made its inaugural run in 1883. During its first journey the passengers traveled from Paris to the Bulgarian port of Varna via train and were then ferried by steamship across the Black Sea to Constantinople. By 1889, however, the entire trip was by rail. Nagelmackers' firm, La Compagnie Internationale des Wagons-Lits et des Grands Express Européens, furnished the train, which had sleeping, restaurant, and salon cars that housed smoking compartments and ladies' drawing rooms. With its Oriental rugs, velvet draperies, mahogany paneling, deep armchairs covered in soft Spanish leather, and fine cuisine, the Orient-Express was unmatched in luxuriousness and comfort. For years it attracted the elite of Europe's society, including royalty. The glamour of the train also caught the imagination of numerous writers, among them Graham Greene and Agatha Christie, whose works helped to make it world-famous.

The Orient-Express was discontinued in 1977 after several decades of steadily declining ridership. In 1982, an American, James Sherwood, revived the train as the Venice Simplon Orient-Express, with several routes between London and Venice.

Oriental button (infection): *see* Oriental sore.

Oriental Jew, Hebrew BEN HA-MIZRAḤ ("Son of the East"), plural BENE HA-MIZRAḤ, any of the approximately 1,500,000 Diaspora Jews who lived for several centuries in North Africa and the Middle East and whose ancestors did not reside in either Germany or Spain. They are thus distinguished from the two other major groups of Diaspora Jews—the Ashkenazim (German) and the Sephardim (Spanish).

In the Arab lands of Morocco, Algeria, Tunisia, Libya, Egypt, Yemen, Jordan, Lebanon, Iraq, and Syria, Oriental Jews speak Arabic as their native tongue. In Iran, Afghanistan, and Bukhara they speak Farsi (Persian), whereas in Kurdistan (a region including parts of modern Turkey, Iraq, Iran, Syria, and Armenia) their language is a variant of ancient Aramaic.

Some Oriental Jews migrated to India, other parts of Central Asia, and China. In some Oriental Jewish communities (notably those of Yemen and Iran), polygyny has been practiced. Following the establishment of the state of Israel in 1948, practically all the Yemenite, Iraqi, and Libyan Jews and major parts of the other Oriental Jewish communities migrated to Israel.

Oriental lacquer, varnish resin derived from a tree indigenous to China, species *Rhus vernicifera,* commonly known as the varnish tree (*q.v.*). The manufacturing process was introduced into Japan and remained secret for centuries. A milklike emulsion secured from the tree is concentrated by evaporation to a viscous liquid. When this is applied as a thin film, it hardens in about a day to form a tough skin. The composition is peculiar in that it will dry only in a dark, moist atmosphere; when exposed to light and heat, the varnish remains tacky. It contains a skin irritant, somewhat similar to that in poison ivy, *Rhus toxicodendron. See also* lacquerwork.

Oriental sore, infectious disease that is a type of leishmaniasis (*q.v.*).

orientation (from Latin *oriens, orientum,* "the rising sun"), in architecture, the position of a building in relation to an east-west axis. In Mesopotamia and Egypt, as well as in pre-Columbian Central America, the important features of the buildings, such as entrances and passages, faced east, in the direction of the rising sun. Orientation, however, varies according to religious and practical considerations. Muslims, in their prayers, turn toward Mecca, whatever direction that may be. Accordingly, mosques are oriented so that the mihrab, or prayer niche, faces Mecca. Christian churches have usually been oriented with the apse or high altar placed at the east end, but this orientation was not always favoured. In early Christian churches, architects commonly oriented churches to the west, such as in the basilica of Old St. Peter's in Rome.

Orientation is frequently planned to take maximum advantage of the daily and seasonal variations of the sun's radiation. Optimum orientation of a structure is, in the end, a compromise between its function, its location, and the prevailing environmental factors of heat, light, humidity, and wind.

orienteering, outdoor competitive sport that is similar to cross-country running, but with emphasis on map-reading and direction-finding skills. Through woods and over hills or rough plains, contestants plot courses between isolated control points that must usually be visited in sequence. Introduced in Sweden in 1918, orienteering had its first success in Scandinavia but later spread throughout Europe, culminating in the establishment of an International Orienteering Federation in 1961, with European championships held from 1962 and world championships from 1966. National orienteering federations were established in Canada in 1968 and in the United States in 1971.

In orienteering, competitors study a master map of the course at the common starting point, and may copy control positions on individual maps; they also study a list and description of the controls. Maps used are of a 1:15,000 scale, with 5-metre contour intervals, though other scales and vertical intervals may be allowed in certain competitions. Selecting their routes according to terrain, competitors must choose between more direct courses with obstacles such as water, marshes, woods, and hills, and more circuitous routes with easier passage. Runners set out from the starting point at intervals of one to five minutes, using map and compass to locate, check in, and stamp or punch their cards at controls indicated by orange and white marking flags, which may be from a few hundred yards to a mile apart. The winner is the runner who completes the course in the fastest time.

Variations of orienteering include line orienteering, in which the competitors follow the same route, visiting controls that can be found only by accurately adhering to the route; route orienteering, in which the route is marked not on a master map but on the ground itself and in which contestants must indicate the position of the controls on their own maps; and score orienteering, in which controls, which may be visited in any order, are set up in a selected area, with a point value assigned to each according to its distance or difficulty of location. Orienteering may also be practiced by cyclists, canoeists, and horseback riders. In Scandinavia, skiers practice a popular variation of the sport.

origami: *see* paper folding.

Origen, Latin in full OREGENES ADAMANTIUS (b. *c.* 185, probably Alexandria, Egypt—d. *c.* 254, Tyre, Phoenicia [now Ṣūr, Lebanon]), the most important theologian and biblical scholar of the early Greek church. His greatest work is the *Hexapla,* which is a synopsis of six versions of the Old Testament.

Life. Origen was born of pagan parents, according to the Neoplatonist philosopher Porphyry, but of Christian parents, according to the ecclesiastical historian Eusebius of Caesarea, whose account is probably more accurate. Eusebius stated that Origen's father, Leonides, was martyred in the persecution of 202, so that Origen had to provide for his mother and six younger brothers. At first he lived in the house of a wealthy lady. He then earned money by teaching grammar and lived a life of strenuous asceticism. Eusebius added that he was a pupil of Clement of Alexandria, whom he succeeded as head of the Catechetical school under the authority of the bishop Demetrius. Eusebius also alleged that Origen, as a young man, castrated himself so as to work freely in instructing female catechumens; but this was not the only story told by the malicious about his extraordinary chastity, and thus it may merely have been hostile gossip. Eusebius' account of Origen's life, moreover, bears the embellishments of legends of saints and needs to be treated with this in mind.

According to Porphyry, Origen attended lectures given by Ammonius Saccas, the founder of Neoplatonism. A letter of Origen mentions his "teacher of philosophy," at whose lectures he met Heraclas, who was to become his junior colleague, then his rival, and who was to end as bishop of Alexandria refusing to hold communion with him. Origen invited Heraclas to assist him with the elementary teaching at the Catechetical school, leaving himself free for advanced teaching and study. During this period (from *c.* 212), Origen learned Hebrew and began to compile his *Hexapla.*

A wealthy Christian named Ambrose, whom

Origen converted from the teachings of the heretical Valentinus and to whom he dedicated many of his works, provided him with shorthand writers. A stream of treatises and commentaries began to pour from Origen's pen. At Alexandria he wrote *Miscellanies* (*Stromateis*), *On the Resurrection* (*Peri anastaseos*), and *On First Principles* (*De principiis*). He also began his immense commentary on St. John, written to refute the commentary of the Gnostic follower of Valentinus, Heracleon. His studies were interrupted by visits to Rome (where he met the theologian Hippolytus), Arabia, Antioch, and Palestine.

Because of his reputation, Origen was much in demand as a preacher, a circumstance that provoked the disapproval of Demetrius, bishop of Alexandria, who was anxious to control this free lay teacher and especially angry when Origen was allowed to preach at Caesarea Palestinae. In about 229–230 Origen went to Greece to dispute with another follower of Valentinus, Candidus. On the way he was ordained presbyter at Caesarea. The Valentinian doctrine that salvation and damnation are predestinate, independent of volition, was defended by Candidus on the ground that Satan is beyond repentance; Origen replied that if Satan fell by will, even he can repent. Demetrius, incensed at Origen's ordination, was appalled by such a doctrinal view and instigated a synodical condemnation, which, however, was not accepted in Greece and Palestine. Thenceforth, Origen lived at Caesarea, where he attracted many pupils. One of his most notable students was Gregory Thaumaturgus, later bishop of Neocaesarea.

From Caesarea, Origen continued his travels. In 235 the persecution of Maximinus found him in Cappadocia, from which he addressed to Ambrose his *Exhortation to Martyrdom.* During this period falls the "Discussion with Heracleides," a papyrus partially transcribing a debate at a church council (probably in Arabia) where a local bishop was suspected of denying the preexistence of the divine Word and where obscure controversies raged over Christological issues and whether the soul is, in actuality, blood. During the persecution under the emperor Decius (250), Origen was imprisoned and tortured but survived to die several years later. His tomb at Tyre was held in honour, and its long survival is attested by historians of the period of the Crusades.

Writings. Origen's main lifework was on the text of the Greek Old Testament and on the exposition of the whole Bible. The *Hexapla* was a synopsis of Old Testament versions: the Hebrew and a transliteration, the Septuagint (an authoritative Greek version of the Old Testament), the versions of Aquila, Symmachus, and Theodotion and, for the Psalms, two further translations (one being discovered by him in a jar in the Jordan Valley). The purpose of the *Hexapla* was to provide a secure basis for debate with rabbis to whom the Hebrew alone was authoritative.

Origen's exegetical writings consist of commentaries (scholarly expositions for instructed Christians), homilies for mixed congregations, and scholia (detached comments on particular passages or books). All extant manuscripts of the commentary on St. John, which extended to 32 books, depend on a codex preserved in Munich containing only a few of the books. This codex and a related manuscript at Trinity College, Cambridge, are the sole witnesses for the Greek original of books 10–17 of his commentary on St. Matthew. Greek fragments of this, as of most of Origen's exegetical works, survive in writings known as *catenae* ("chains"; *i.e.,* anthologies of comments by early Church Fathers on biblical books). Commentaries on the Song of Solomon and on Romans survive in a drastically abbreviated Latin paraphrase by the Christian writer Tyrannius Rufinus (*c.* 365–410/411). The homilies on Genesis through the Book of Judges (except Deuteronomy) and Psalms 36–38 survive in a Latin translation by Rufinus. Jerome, the great Christian scholar (*c.* 347–*c.* 420), translated homilies on the Song of Solomon, Isaiah, Jeremiah, Ezekiel, and Luke. These Latin homilies were widely read in medieval monasteries and have a rich manuscript tradition. The Greek original of homilies on Jeremiah survives in a single manuscript in the Escorial (Spain), and that of a homily on the witch of Endor (which provoked early criticism for its thesis that Samuel really was conjured up) in a manuscript in Munich and on papyrus.

Prior to 231 Origen wrote *De principiis,* an ordered statement of Christian doctrine on an ambitious scale, based on the presupposition that every Christian is committed to the rule of faith laid down by the Apostles (the Creator as God of both Old and New Testaments, the incarnation of the preexistent Lord, the Holy Spirit as one of the divine triad, the freedom of rational souls, discarnate spirits, the noneternity of the world, judgment to come) but that outside this restriction the educated believer is free to speculate. Origen was writing long before the conciliar definitions of Chalcedon (451) concerning the Trinity and the Person of Christ and at a period when a far larger area of doctrine could be regarded as open for discussion and argument than was the case by 400. *De principiis* diverged in its speculations from later standards of orthodoxy. The original was consequently lost and can only be reconstructed from the *Philocalia* (an anthology compiled by Basil the Great and Gregory of Nazianzus illustrating Origen's biblical interpretation), from Rufinus' Latin paraphrase (which avowedly rewrites heterodox-sounding passages), and from later writers, notably Jerome and Justinian I (who quote especially compromising passages to prove Origen a heretic). The polemical anti-Origenists, however, need to be read with care since they were not above misquoting Origen and ascribing to him the words of later Origenists.

Origen's great vindication of Christianity against pagan attack, *Contra Celsum,* written (probably in 248) at Ambrose's request, survives in its entirety in one Vatican manuscript, with fragments in the *Philocalia* and on papyruses. Paragraph by paragraph it answers the *Alēthēs logos* ("The True Doctrine" or "Discourse") of the 2nd-century anti-Christian philosopher Celsus and is therefore a principal source for the pagan intelligentsia's view of 2nd-century Christianity as well as a classic formulation of early Christian reply. Both protagonists agree in their basic Platonic presuppositions, but beside this agreement, serious differences are argued. Celsus' brusque dismissal of Christianity as a crude and bucolic onslaught on the religious traditions and intellectual values of classical culture provoked Origen to a sustained rejoinder in which he claimed that a philosophic mind has a right to think within a Christian framework and that the Christian faith is neither a prejudice of the unreasoning masses nor a crutch for social outcasts or nonconformists.

The tract *On Prayer,* preserved in one manuscript at Cambridge, was written in about 233; it expounds the Lord's Prayer and discusses some of the philosophical problems of petition, arguing that petition can only be excluded by a determinism false to the experience of personality, while the highest prayer is an elevation of the soul beyond material things to a passive inward union with Christ, mediator between men and the Father.

Theological System. Origen's experience as a teacher is reflected in his continual emphasis upon a scale of spiritual apprehension. Christianity to him was a ladder of divine ascent, and the beginner must learn to mount it with the saints in a never-ceasing advance.

Everything in Origen's theology ultimately turns upon the goodness of God and the freedom of the creature. The transcendent God is the source of all existence and is good, just, and omnipotent. This omnipotence is never mere power emptied of moral quality; one cannot appeal to it to rationalize absurdity or the extraordinary. In overflowing love, God created rational and spiritual beings through the Logos (Word); this creative act involves a degree of self-limitation on God's part.

In relation to the created order, God is both conditioned and unconditioned, free and under necessity, since he is both transcendent to and immanently active in it. In one sense, the cosmos is eternally necessary to God since one cannot conceive such goodness and power as inactive at any time. Yet in another sense, the cosmos is not necessary to God but is dependent on his will, to which it also owes its continued existence. Origen was aware that there is no solution of this dilemma. The rational beings, however, neglected to adore God and fell. The material world was created by God as a means of discipline (and its natural catastrophes such as earthquakes and plagues remind man that this world is not his ultimate destiny). Origen speculated that souls fell varying distances, some to be angels, some descending into human bodies, and the most wicked becoming devils. (Origen believed in the preexistence of souls, but not in transmigration nor in the incorporation of rational souls in animal bodies.) Redemption is a grand education by providence, restoring all souls to their original blessedness, for none, not even Satan, is so depraved and has so lost rationality and freedom as to be beyond redemption. God never coerces, though with reformative intention he may punish. His punishments are remedial; even if simple believers may need to think of them as retributive, this is pedagogic accommodation to inferior capacity, not the truth.

The climax of redemption is the incarnation of the preexistent Son. One soul had not fallen but had remained in adoring union with the Father. Uniting himself with this soul, the divine Logos, who is the second *hypostasis* (Person) of the triad of Father, Son, and Spirit (subordinate to the Father but on the divine side of the gulf between infinite Creator and finite creation), became incarnate in a body derived from the Virgin Mary. So intense was the union between Christ's soul and the Logos that it is like the union of body and soul, of white-hot iron and fire. Like all souls Christ's had free will, but the intensity of union destroyed all inclination for change, and the Logos united to himself not only soul but also body, as was apparent when Jesus was transfigured. Origen, influenced by a semi-Gnostic writing, the *Acts of John,* thought that Jesus' body appeared differently to different observers according to their spiritual capacities. Some saw nothing remarkable in him, others recognized in him their Lord and God. In his commentary on St. John, Origen collected titles of Christ, such as Lamb, Redeemer, Wisdom, Truth, Light, Life. Though the Father is One, the Son is many and has many grades, like rungs in a ladder of mystical ascent, steps up to the Holy of Holies, the beatific vision.

The union of God and man in Christ is pattern for that of Christ and the believer. The individual soul, as well as the church, is the bride of the Logos, and the mystery of that union is portrayed in the Song of Solomon, Origen's commentary on which was regarded by Jerome (in the period of his enthusiasm for Origen) as his masterpiece. Thus, redemption restores fallen souls from matter to spirit, from image to reality, a principle directly exemplified both in the sacraments and in the inspired biblical writings, in which the inward spirit is veiled under the letter of law, history, myth, and parable. The commentator's task is to penetrate the allegory, to perceive within the material body of Scripture its soul and spirit, to discover its existential reference for the individual Christian. Correct exegesis (critical interpretation) is the gift of grace to those spiritually worthy.

Origen viewed both the biblical revelation and the spiritual life of the believer as progressive processes. The church is the great "school of souls" in which erring pupils are disciplined: elementary education in this life, higher education in the world to come, where the atoning and sanctifying process will continue in a purging baptism of fire. Hell cannot be an absolute since God cannot abandon any creature; because of his respect for freedom it may take time, but God's love will ultimately triumph. Christ's work remains unfinished until he has subdued all to himself. Heaven is not necessarily absolute because freedom is an inalienable characteristic of the rational creature. "If you remove free will from virtue, you destroy its essence." Because the redeemed remain free, when all souls have been restored the whole drama may begin again. The Stoics believed in world cycles determined by fate. Origen thought them possible for the opposite reason, because freedom means that there is no ultimate finality.

Influence. If orthodoxy were a matter of intention, no theologian could be more orthodox than Origen, none more devoted to the cause of Christian faith. His natural temper is world denying and even illiberal. The saintliness of his life is reflected in the insight of his commentaries and the sometimes quite passionate devotion of his homilies. The influence of his biblical exegesis and ascetic ideals is hard to overestimate; his commentaries were freely plagiarized by later exegetes, both Eastern and Western, and he is a seminal mind for the beginnings of monasticism. Through the writings of the monk Evagrius Ponticus (346–399), his ideas passed not only into the Greek ascetic tradition but also to John Cassian (360–435), a Semi-Pelagian monk (who emphasized the worth of man's moral effort), and to the West. Yet he has been charged with many heresies.

In his lifetime he was often attacked, suspected of adulterating the Gospel with pagan philosophy. After his death, opposition steadily mounted, respectful in the Greek Christian Methodius of Olympus' criticism of his spiritualizing doctrine of the Resurrection (*c.* 300), offensive in Epiphanius' (375), a refuter of Christian heresies, violent in Jerome's anti-Origenist quarrel with Rufinus (*c.* 393–402). Origen had his defenders, especially in the East (Eusebius of Caesarea; Didymus the Blind, the head of Catechetical School of Alexandria; Athanasius, bishop of Alexandria, to some degree; and especially the Cappadocian Fathers—*i.e.,* Basil the Great, Gregory of Nazianzus, and Gregory of Nyssa); but in the West Rufinus' translation of *De principiis* (398) caused scandal, and in the East the cause of Origen suffered by the permanent influence of Epiphanius' attack.

In the 6th century the "New Laura" (monastic community) in Palestine became a centre for an Origenist movement among the monastic intelligentsia, hospitable to speculations about such matters as preexistent souls and universal salvation. The resultant controversy led Justinian I to issue a long edict denouncing Origen (543); the condemnation was extended also to Didymus and Evagrius by the fifth ecumenical council at Constantinople (553). Nevertheless, Origen's influence persisted, such as in the writings of the Byzantine monk Maximus the Confessor (*c.* 550–662) and the Irish theologian John Scotus Erigena (*c.* 810–877), and, since Renaissance times, controversy has continued concerning his orthodoxy, Western writers being generally more favourable than Eastern Orthodox.

The chief accusations against Origen's teaching are the following: making the Son inferior to the Father and thus being a precursor of Arianism, a 4th-century heresy that denied that the Father and the Son were of the same substance; spiritualizing away the resurrection of the body; denying hell, a morally enervating universalism; speculating about preexistent souls and world cycles; and dissolving redemptive history into timeless myth by using allegorical interpretation. None of these charges is altogether groundless. At the same time there is much reason to justify Jerome's first judgment that Origen was the greatest teacher of the early church after the Apostles. (H.Cha.)

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original sin, in Christian doctrine, the condition or state of sin into which each human being is born; also, the origin (*i.e.,* the cause, or source) of this state. Traditionally, the origin has been ascribed to the sin of the first man, Adam, who disobeyed God in eating the forbidden fruit (of knowledge of good and evil) and, in consequence, transmitted his sin and guilt by heredity to his descendants.

The doctrine has its basis in the Bible. Although the human condition (suffering, death, and a universal tendency toward sin) is accounted for by the story of the Fall of Adam in the early chapters of the book of Genesis, the Old Testament says nothing about the transmission of hereditary sin to the entire human race. In the Gospels also there are no more than allusions to the notion of the Fall of Man and universal sin. The main scriptural affirmation of the doctrine is found in the writings of St. Paul and particularly in Romans 5:12–19, a difficult passage in which Paul establishes a parallelism between Adam and Christ, stating that whereas sin and death entered the world through Adam, grace and eternal life have come in greater abundance through Christ.

Orihuela, town, Alicante *provincia,* in the *comunidad autónoma* ("autonomous community") of Valencia, southeastern Spain. Orihuela lies in the fertile Vega (flat lowland) del Segura, just northeast of Murcia city. A pre-Roman settlement, it became the Roman Orcelis. Captured by the Moors in 713, it was finally liberated by the Christians in 1264. It was sacked during the disturbances at the beginning of the reign of Charles I (Charles V of the Holy Roman Empire; 1520) and again in the War of the Spanish Succession (1706). Orihuela suffered several epidemics of plague, was partly destroyed by an earthquake in 1829, and has often been flooded by the Segura River.

The old part of the town is north of the Segura, the new part on the south. Historic buildings include the 14th-century cathedral; the Church of Santiago (once a mosque; rebuilt in the 18th century); the 14th-century Church of Santas Justa y Rufina, with an 18th-century facade; and the College of Santo Domingo (1516–1701), the former university. There is a diocesan museum of sacred art.

Local agriculture is furthered by a remarkable irrigation system left by the Moors. Its effectiveness resulted in the proverb "Rain or no rain, corn in Orihuela." Oranges, lemons, potatoes, pepper, hemp, cotton, corn (maize), oats, wheat, almonds, and dates are the chief products. Orihuela is also famous for its carnations. Pop. (1991 prelim.) 48,013.

Orillia, city, Simcoe county, southeastern Ontario, Canada, 60 miles (100 km) north of Toronto, between Lakes Couchiching and Simcoe. The name, probably derived from the Spanish *orilla* ("border," "shore," or "bank"), was suggested by Sir Peregrine Maitland, lieutenant governor of Upper Canada (1818–28), who had served in Spain. The townsite was surveyed in 1839, a few years after an earlier settlement called The Narrows had been established. Orillia Corporation built the first municipally owned hydroelectric plant in Canada on the Severn River in 1902. Lumbering, once important, has given way to light manufacturing. The house of Stephen Leacock, Canadian humorist, who lived in Orillia for many years, is a national literary shrine. A monument commemorating the visit by Samuel de Champlain to the area in 1615 stands in Couchiching Beach Park. Inc. village, 1867; town, 1875. Pop. (1991) 25,925.

Orinoco River, Spanish RÍO ORINOCO, major river of South America, rising on the western slopes of the Sierra Parima along the Venezuela-Brazil border and flowing in a giant arc through Venezuela for 1,700 miles (2,740 km) to enter the Atlantic Ocean near the island of Trinidad.

A brief treatment of the Orinoco River follows. For full treatment, *see* MACROPAEDIA: South America.

The river flows mostly through Venezuela, except where it forms part of the border between Colombia and Venezuela. With its tributaries (including the Caroní, Mavaca, Apura, Vichada, Meta, and Guárico rivers), the Orinoco is the northernmost of South America's four major river systems (the others are the Amazon, the Paraná–Paraguay–la Plata, and the São Francisco). Fed mainly by snow, its average annual rate of flow is about 1,060,000 cubic feet per second (30,000 cubic m per second), but because of seasonal variation in rainfall the flow fluctuates widely. The river carries immense amounts of sediments, and its vast delta is rapidly expanding into the Atlantic. Much of the river's drainage basin of 366,000 square miles (948,000 square km) consists of the broad grassland region of the Llanos; dense tropical rain forests are found on the eastern and southern highlands. The water fauna includes the carnivorous piranha; the *laulao,* a catfish that can attain a weight of over 200 pounds (90 kg); and the Orinoco crocodile, which is the longest of its kind in the world, reaching a length of more than 20 feet (6 m). The Macagua and the Guri dams on the Caroní River are among the world's largest hydroelectric plants. The Guiana Highlands in the southeast have rich iron-ore and bauxite reserves. The river basin is largely inhabited by indigenous Indian groups. The Orinoco is navigable by large oceangoing vessels from its mouth to its confluence with the Caroní (a distance of about 225 miles [360 km]). Ciudad Bolívar and Ciudad Guayana are the major port cities and centres of economic development along the river.

Oriol, Pierre, Oriol also spelled D'ORIOL: *see* Petrus Aureoli.

oriole, any of 24 species of birds of the Old World genus *Oriolus,* family Oriolidae, or, in the New World, any of the 30 species of *Icterus,* family Icteridae. Both are families of perching birds (order Passeriformes). Males of either group typically are black and yellow or black and orange, with some white. Females tend to be plainer. They are shy and not easily seen in the treetops but may be detected by their loud whistling and jarring notes. All are insect eaters (several species also take much fruit) in woodlands and gardens, chiefly in warm regions.

The only European species is the 24-centimetre (9.5-inch) golden oriole (*O. oriolus*), which ranges eastward to Central Asia and India. It is yellow, with black-eye marks and black wings. The African golden oriole (*O. auratus*) is similar. The maroon oriole (*O. traillii*) of the Himalayas to Indochina is one of the Asian species of oriole that have a glowing crimson colouring instead of the ordinary yellow one. Northern Australia has the yellow oriole (*O. flavicinctus*), which is strictly a fruit-eater.

(Top) Golden oriole (*Oriolus oriolus*), (bottom) Baltimore oriole (*Icterus galbula*)

(Top) H. Schrempp—Bruce Coleman Inc., (bottom) R. Austing—Bruce Coleman Inc.

The icterids of the New World were first called orioles by the early American settlers because the birds' black-and-yellow patterns resembled those of the true orioles of Europe. Among the icterids is the well-known Baltimore oriole (*I. galbula*), which breeds in North America east of the Rockies; it is black, white, and golden orange. In western North America is the closely related Bullock's oriole (*I. bullockii*). The orchard oriole (*I. spurius*), black and chestnut, occurs over the eastern United States and Mexico. Among the tropical forms of icterids are the epaulet oriole (*I. cayanensis*) and the troupial (*I. icterus*).

Orion, in astronomy, major constellation lying at about 5 hours 30 minutes right ascension (the coordinate on the celestial sphere analogous to longitude on the Earth) and zero declination (at the celestial equator), named for the Greek mythological hunter. Orion is one of the most conspicuous constellations and contains many bright stars. One of these, Betelgeuse (Alpha Orionis), a variable star, is easily distinguished by its reddish colour. The total brightness of Rigel, in the hunter's leg, when measured over all visible light, is greater than that of Betelgeuse. The third brightest star in the constellation is Bellatrix. Orion's girdle, or belt—consisting of three bright stars—lies nearly on the celestial equator. His sword, south of the belt, contains the great Orion Nebula, visible to the unaided eye, an emission nebula containing hundreds of young stars. Faint extensions of this nebula fill almost the whole constellation.

Orion, in Greek mythology, a giant and very handsome hunter who was identified as early as Homer with the constellation known by his name.

The story of Orion has many different versions. He is considered to be Boeotian by birth, born (according to a late legend) of the earth (from a buried bull hide on which three gods had urinated). Some legends have him as the son of Poseidon. He is associated with the island of Chios, from which he is said to have driven the wild beasts. There he fell in love with Merope, daughter of the king of Chios. The king, who disapproved of Orion and continually deferred the nuptials, eventually had Orion blinded.

His vision restored by the rays of the rising sun, Orion is said to have gone to Crete to live with Artemis as a hunter. Accounts of his death vary widely: some legends have him a victim of Artemis' jealousy, others of Apollo's jealousy over Artemis' love of Orion; still other legends have him killed by a monstrous scorpion. After his death he was placed among the stars, and he can be identified (somewhat fancifully) by his club, lion's skin, girdle (or belt), and sword.

Orion Nebula (catalog numbers NGC 1976 and M 42), bright diffuse nebula, faintly visible to the unaided eye in the sword of the hunter's figure in the constellation Orion. The nebula lies about 1,500 light-years from Earth and contains hundreds of very hot (O-type) young stars clustered about a nexus of four massive stars known as the Trapezium. Radiation from these stars excites the nebula to glow. It was discovered in 1610 by the French scholar Nicolas-Claude Fabri de Peiresc and independently in 1618 by the Swiss astronomer Johann Cysat. It was the first nebula to be photographed (1880), by Henry Draper in the United States.

Images of the nebula continued to improve, and technological advances in the late 1980s enabled scientists to photograph infrared-emitting objects in the Orion Nebula that had never before been observed optically. The Hubble Space Telescope in 1991 revealed the sharpest details yet available of known features of the nebula, including what appeared to be a jet (an energetic outflow) related to the birth of a young star.

Oriskany, Battle of (Aug. 6, 1777), in the U.S. War of Independence, battle between British troops and American defenders of the Mohawk Valley, which contributed to the failure of the British campaign in the North. British troops under Lieutenant Colonel Barry St. Leger were marching eastward across central New York to join with British forces at Albany. En route, they arrived at Fort Stanwix (also called Fort Schuyler, now Rome, N.Y.) and demanded its surrender. Attempting to come to the fort's rescue, 800 colonial militiamen under General Nicholas Herkimer were ambushed two miles west of Oriskany Creek by a force of about 1,200 British and their Iroquois allies. The battle that followed resulted in heavy casualties for both sides. St. Leger was unable to capture the fort and retreated to Oswego on August 22.

Orissa, constituent state of India, situated in the eastern part of the country. It is bounded by the Bay of Bengal in the southeast, by West Bengal in the northeast, by Bihār in the north, by Madhya Pradesh in the west, and by Andhra Pradesh in the south. The capital is Bhubaneshwar.

A brief treatment of Orissa follows. For full treatment, *see* MACROPAEDIA: India.

Over the centuries, the land now called Orissa has passed under the names of Utkala, Kaliṅga, and Oḍra Deśa, names originally associated with particular peoples. Kaliṅga was a thriving kingdom at the time of Buddha, and in the 3rd century BC it was the scene of a great war involving the renowned Aśoka. Kaliṅga became a maritime power in the early centuries of the modern era, enjoying a golden age under the Gaṅga dynasty, which lasted from 1078 to 1264. In the 13th and 14th centuries, the area of Orissa remained an independent citadel of Hindu religion, philosophy, and art and architecture despite the Muslim conquest of India.

In 1568 Orissa lost its independence to the Afghān rulers of Bengal and then became part of the Mughal Empire. When the Mughal Empire declined in the 18th century, part of Orissa remained under the Bengal Nawābs, but the greater part passed to the Marāṭhās. The Bengal sector came under British rule in 1757, the Marāṭhā sector in 1803. Numerous princely states remained in the region until Indian independence in 1947, at which time Orissa assumed its present form.

Orissa comprises a number of contrasting topographic areas. The historic core of the state is the densely populated alluvial delta of the Mahānadi River, which flows eastward through Orissa and empties into the Bay of Bengal. Behind the coastal plain is the edge of an extensive plateau through which the Mahānadi cuts in great gorges. Southward the plateau edge constitutes the Eastern Ghāts, where the country is mountainous, thickly forested, and difficult of access. North of the Mahānadi River lies the Chota Nāgpur Plateau. In the northwest of the state the Mahānadi flows in a broad course through extensive valley basins on the plateau's surface.

Orissa is situated in a tropical savanna. The main seasons are summer (from mid-February to June), the rainy season (from July to October), and winter (from November to mid-February). The average annual rainfall is about 70 inches (1,800 mm).

The state's population includes numerous racial groups, divided into Muṇḍā-, Dravidian-, and Oṛiyā-speaking tribes. (Oṛiyā is the official and most widely spoken language of Orissa.) Many tribes have become almost indistinguishable from the Hindus who—at more than 90 percent of the population—dominate the state. Orissa's people are predominately rural, with only about 12 percent living in towns. Cuttack is the largest city in the state.

About two-thirds of the state's rural population is engaged in agriculture, even though some areas are unproductive and others are unsuitable for more than a single annual crop. Some farming families engage in nonagricultural pursuits for additional income. Roughly four-fifths of the state's sown area is in rice; other major crops are oilseed, jute, sugarcane, and coconut.

The state's industrial resources are considerable. Orissa is India's leading state in the production of chromite, manganese, and dolomite. In addition, it produces a great deal of iron ore, coal, and limestone and has rich deposits of graphite and bauxite. There are many large-scale industries in Orissa, including plants producing steel, fertilizer, cement, and heat-resistant ceramics. Other industrial output includes paper, textiles, sugar, chlorine, caustic soda, and glass. The Hīrākud dam project and the Machkund hydroelectric system furnish power. An all-weather, deep-draft port has been constructed at Parādīp at the mouth of the Mahānadi River, particularly for the export of iron ore. The state still lacks adequate railway facilities.

Orissa has a rich artistic heritage and has produced some of the best examples of Indian art and architecture. Artistic traditions are maintained through mural paintings, stone carvings, wood carvings, icon paintings, and paintings on palm leaves. Handicraft workers are famous for their silver filigree ornamentation and decorative work. Orissa has a wide variety of folk dances, accompanied by the *madal* and flute. The classical dance known as *oṛissī* is a temple performance that has survived for more than 700 years.

There are many traditional festivals in Orissa. One that is unique is the ceremony of Boita-Bandana (worshiping of ships), which takes place over five days in October–November. The greatest religious festival in Orissa is the Chariot Festival of Jagannātha at Puri. This event draws hundreds of thousands of people from all parts of India each year.

The state has several universities and about 100 colleges for general education, along with a few medical colleges. It is also home to India's Central Rice Research Institute. The Kala Vikas Kendra centre exists to promote dancing and music, and the National Music Association serves a similar purpose. Area 60,119 square miles (155,707 square km). Pop. (1994 est.) 33,795,000.

oṛissī, one of the principal classical dance styles of India; others include *bhārata-nāṭya, kuchipudi, kathak, kathākali,* and *manipuri.* It is indigenous to Orissa, eastern India, and follows the principles of the *Nāṭya-śāstra* (*q.v.*). Its close replication of poses found on classical temple sculptures suggests great antiquity.

Oṛissī, related to *bhārata-nāṭya* in its basic pattern, emphasizes sinuous postures and is enlivened by a variety of elevations and jumps. It is predominantly a dance for women.

Oristano, town and archepiscopal see, Oristano *provincia,* western Sardinia, Italy, near the mouth of the Tirso River, northwest of the city of Cagliari. It was founded in the 11th century BC by the people of Tharros, a Punic city, the ruins of which are nearby. There are also Roman remains. In its early days it was the capital of Arborea, one of the *giudicati,* each under separate family control, into which Sardinia was divided. There is a monument in the town to Eleanora d'Arborea, who ruled from 1383 to 1404 and was an important figure in Sardinian history. The Tower of St. Christopher dates from 1291, and the cathedral, largely rebuilt in the 18th century, dates from 1288. Oristano is now an agricultural and fish-canning centre (especially eel and mullet). Pop. (2000) 33,007.

Oṛiyā language, Indo-Aryan language of the eastern group spoken mainly in the state of Orissa, India. Oṛiyā is one of the 14 regional languages recognized by the Indian constitution. A direct descendant of the Ardhamāgadhī Prākrit spoken in the ancient kingdom of Magadha, it is now most closely related to Maithilī, Assamese, and Bengali. Oṛiyā has not changed greatly since the 14th century, the time of the earliest-known inscriptions in the language. It shows less foreign influence (Muslim and British) than most Indo-Aryan languages because its speakers were among the last to be conquered. Oṛiyā's literary style borrows heavily from Sanskrit. In grammar, Oṛiyā distinguishes between rational and nonrational beings and objects. Like Bengali, it uses the plural verb forms instead of the singular to show respect to a rational being.

Orizaba, city, west-central Veracruz *estado* ("state"), east-central Mexico. It lies in a fertile, well-drained, and temperate valley of the Sierra Madre Oriental, over which towers Citlaltépetl (also called Pico de Orizaba), a snow-capped volcano. The town was founded by Spaniards in the 16th century on the former site of an Aztec garrison called Ahuaializapan ("Pleasant Waters") to guard strategic routes linking the port of Veracruz and Mexico City. Chartered in 1774, Orizaba was licensed under crown monopoly to produce tobacco and was one of the first Mexican textile centres. Its public buildings reflect its long colonial past. It is an agricultural centre (producing tobacco, corn [maize], sugarcane, and cereals), an industrial centre, and a tourist resort. It is accessible by highway and railroad. In August 1973 a severe earthquake, centred near the city, caused many deaths and widespread destruction. Pop. (1995) 114,341.

Orizaba, Pico de (Mexico): *see* Citlaltépetl.

Ørjasaeter, Tore (b. March 3, 1886, Skjåk, Nor.—d. Feb. 29, 1968, Skjåk), Norwegian regional poet who worked in the tradition of the ballad and of folk and nature lyrics.

Ørjasaeter's concern with the conflict between the individual and his heritage is the underlying theme of his main works, *Gudbrand Langleite* (1913), *Brumillom* (1920), and *Skuggen* (1927; "The Shadow"), published as an epic trilogy in a revised edition of his collected works in 1941. Ørjasaeter's finest poetry is found in his collection *Elvesong* (1932; "Song of the River"), a cycle of poems about a drop of water on its way to the sea as a symbol for the individual longing for freedom and human solidarity. Modernist trends that were evident in much European poetry of the 1930s are reflected in his work. Ørjasaeter also wrote several dramas, including *Christophoros* (1948) and *Den lange bryllaupsreisa* (1949; "The Long Honeymoon").

Orkan, Władysław, pseudonym of FRANCISZEK SMRECZYŃSKI (b. Nov. 27, 1875, Poręba Wielka, Austria-Hungary [now in Poland]—d. May 14, 1930, Kraków, Pol.), Polish poet and writer who eloquently portrayed the people of the Tatra Mountains.

Born into a family of poor highlanders, Orkan received an incomplete education. Most of his works are set in the region of his birth and depict the poverty-stricken lives of the highlanders set against a natural landscape of great beauty. In his first volume, *Nowele* (1898; "Short Stories"), as well as in *Komornicy* (1900; "Tenant Farmers"), Orkan gives a naturalistic account of highlander-peasant life in his native Tatra region. Later, influenced by the literary and political movement of Young Poland, he wrote the novel *Wroztokach* (1903; "In the Mountain Valleys"), which presents a gloomy image of the country's poorest districts and their inhabitants. *Drzewiej* (1912; "In the Old Days") lyrically describes the life of the Tatra region's first settlers. *Listy ze wsi,* 2 vol. (1925–27; "Letters from a Village"), contains reflections on Poland's immediate condition and the country's prospects.

Although they are somewhat dated, Orkan's novels deal convincingly with difficult aspects of mountain village life, such as poverty, exploitation, and disease.

Orkney and Shetland, James Hepburn, Duke of: *see* Bothwell, James Hepburn, 4th Earl of.

Orkney Islands, group of more than 70 islands and islets—only about 20 of which are inhabited—in Scotland, lying about 20 miles (32 km) north of the Scottish mainland, across the strait known as the Pentland Firth. The Orkney Islands constitute a council area and belong to the historic county of Orkney.

The Orkney Islands were the Orcades of ancient classical literature. There remains much evidence of prehistoric occupation at various periods: underground houses, circles, standing stones, and earth houses. Skara Brae, an underground village on the west coast of the island of Mainland, is one of the most complete European relics of the late Neolithic Period. Norse raiders arrived in the late 8th century and colonized the islands in the 9th century; thereafter the islands were ruled by Norway and Denmark. Celtic missionaries had arrived in the 7th century, but the Norsemen were not converted until much later. Kirkwall's cathedral, dedicated to St. Magnus, was mainly built by Norsemen during the 12th century. Orkney and Shetland passed into Scottish rule in 1472 in compensation for the nonpayment of the dowry of Margaret of Denmark, wife of James III.

The Orkney Islands were fashioned by glacial erosion into low undulating hills covered extensively by glacial deposits. Westerly winds and gales account for the general scarcity of trees. The largest of the islands is Mainland, or Pomona, which is divided into East Mainland and West Mainland; they are connected by a narrow strip of land about 2 miles (3 km) wide between Kirkwall and Scapa Flow. The streams are short, but trout fishing is good. The small islands of Burray and South Ronaldsay, south of East Mainland, are now joined to it by causeways constructed during World War II to prevent submarines from entering the naval base at Scapa Flow. The second largest of the Orkneys, Hoy, lies south of West Mainland, along with smaller islands such as Graemsay, Flotta, and South Walls. To the north of Mainland, across the Wide Firth and Shapinsay Sound, lie Shapinsay, Rousay, Egilsay, Stronsay, Eday, Westray, Papa Westray, Sanday, North Ronaldsay, and several smaller islands.

Orkney is a prosperous farming area despite its fragmentation. Its farms are small and owner-occupied, averaging about 35 acres (14 hectares) and using modern mechanical methods to achieve high productivity. Each year more land is claimed for agriculture, but much peat and moor remain. The main agricultural products are beef cattle and eggs, although the raising of pigs and the production of milk (largely for cheese) have both greatly increased. Some fodder crops are grown, but much is imported. Because of the importance of agriculture, the fishing industry has not been intensively developed.

Exploitation of North Sea oil resulted in the construction of a major landfall terminal for the Piper and Claymore oil fields at Flotta on Scapa Flow. This terminal offers much-needed employment to the area. Other oil-related activities in Orkney include a limited amount of offshore servicing and the operation of helicopter services from Kirkwall.

There are only two towns on Mainland: Kirkwall, a royal burgh, and Stromness. Kirkwall is the islands' largest town and their commercial and administrative centre. Both towns are picturesque, with narrow streets. In Kirkwall there are, in addition to St. Magnus Cathedral, fine old houses and the ruins of the Bishop's Palace and Earl's Palace.

Connections between Orkney and the Scottish mainland are good, with daily air service to Kirkwall and ferry connections from Stromness. Area 376 square miles (975 square km). Pop. (1999 est.) 19,600.

Orlando, city, seat (1856) of Orange county, central Florida, U.S. It is situated in a region dotted by lakes, about 85 miles (135 km) northeast of Tampa. It is the focus of one of the state's most populous metropolitan areas.

The region was originally inhabited by Timucua and later Seminole peoples. Settlement began about 1843 around Fort Gatlin, a U.S. Army post. First called Jernigan, for an early settler, the town was renamed in 1857 to honour Orlando Reeves, an army sentry killed during the Seminole Wars. Prior to the American Civil War, the area was a cotton and cattle centre; after the war, citrus became a leading industry. The South Florida Railroad arrived in 1880 and was extended to Tampa in

1883. The development after 1950 of the Cape Canaveral aerospace complex, 50 miles east, spurred population and economic growth, which were further boosted when Walt Disney World opened in 1971 about 20 miles southwest. The construction of other attractions followed, and the city acquired a National Basketball Association franchise (the Orlando Magic) in 1987.

The Disney complex covers 47 square miles (122 square km). In addition to its several large resorts, Walt Disney World has a variety of attractions, including the Magic Kingdom, Epcot, Disney-MGM Studios, and Animal Kingdom. Also in the greater Orlando area are Universal Orlando (with the Universal Studios and Islands of Adventure theme parks), Sea World of Florida (a marine-animal park), and Wet 'n Wild (a water park). Lack Haven Park contains art, science, and history museums. Gatorland is home to alligators and crocodiles.

Tourism, conventions, and trade shows are the basis of Orlando's economy. Manufacturing (aerospace and missile systems), high-technology industries, and citrus are also important. The University of Central Florida (1963) and Valencia Community College (1967) are in the city. Inc. 1875. Pop. (2000) city, 185,951; Orlando MSA, 1,644,561.

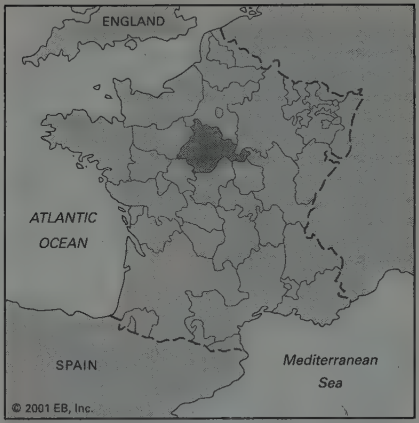
Orlando, Vittorio Emanuele (b. May 19, 1860, Palermo, Italy—d. Dec. 1, 1952, Rome), Italian statesman and prime minister during the concluding years of World War I and head of his country's delegation to the Versailles Peace Conference.

Educated at Palermo, Orlando made a name for himself with writings on electoral reform and government administration before being elected to the Chamber of Deputies in 1897. He served as minister of education in 1903–05 and of justice in 1907–09, resuming the same portfolio in 1914. He favoured Italy's entrance into the war (May 1915), and in October 1917, following the defeat of Italy's forces at the Battle of Caporetto by the Austrians, he became prime minister, successfully rallying the country to a renewed effort.

After the war's victorious conclusion, Orlando went to Paris and Versailles, where he had a serious falling out with his allies, especially President Woodrow Wilson of the United States, over Italy's claims to formerly Austrian territory. On the question of the port of Fiume, which was contested by Yugoslavia after the war, Wilson appealed over Orlando's head to the Italian people, a maneuver that failed. Orlando's inability to get concessions from the Allies rapidly undermined his position, and he resigned on June 19, 1919. On December 2 he was elected president of the Chamber of Deputies. In the rising conflict between the workers' organizations and the new Fascist Party of Benito Mussolini, he at first supported Mussolini, but when the leader of the Italian Socialist Party, Giacomo Matteotti, was assassinated by the Fascists, Orlando withdrew his support. (The murder marked the beginning of Mussolini's dictatorship over Italy.) Orlando opposed the Fascists in local elections in Sicily and resigned from Parliament in protest against Fascist electoral fraud (1925).

Orlando remained in retirement until the liberation of Rome in World War II, when he became a member of the consultative assembly and president of the Constituent Assembly elected in June 1946. His objections to the peace treaty led to his resignation in 1947. In 1948 he was elected to the new Italian Senate and was a candidate for the presidency of the republic (an office elected by Parliament) but was defeated by Luigi Einaudi.

Orléanais, one of the *généralités* ("generalities") into which France was divided before the Revolution of 1789. It comprised not only the territory of the original countship and the later duchy of Orléans but also a number of adjacent lands; in terms of modern *départements* it includes most of Loiret, Loir-et-Cher, and Eure-et-Loir, with parts of Essonne, Seine-et-Marne, and Sarthe. Thus, Orléanais was the country around Orléans, the *pagus Aurelianensis,* and for ecclesiastical purposes formed the diocese of Orléans. It was in the possession of the Capet family before the advent of Hugh Capet to the French throne in 987.



The *gouvernement* of Orléanais in 1789

Orleanist, French ORLÉANISTE, any of the constitutional monarchists in 18th- and 19th-century France who favoured the Orléans branch of the house of Bourbon (the descendants of Philippe, duke d'Orléans, younger brother of Louis XIV). Its zenith of power occurred during the July Monarchy (1830–48) of Louis-Philippe (duke d'Orléans from 1793 to 1830).

The Orleanists, enormously rich, had long been the centre of opposition to the encroachment of Bourbon royal power. After the outbreak of the Revolution, Philippe, duke d'Orléans, took the name Philippe Égalité to express his extreme revolutionary views; and his son Louis-Philippe fought, as duke de Chartres, under the republican Tricolor. Executed or exiled during the later Revolutionary and Napoleonic years, the Orleanists returned at the restoration of Louis XVIII and were identified with liberal and bourgeois principles. Louis XVIII had been induced to grant a constitutional charter, but he and his successor, Charles X, claimed to rule by divine right and to confer liberties upon their subjects of their own will. The difference between the Legitimists and the Orleanists was thus fundamental. So was that between the Orleanists and the Bonapartists; the former aimed at securing political liberty, in addition to equality, before the law and in social life, whereas the latter aimed at subjection to a military despotism.

The July Revolution of 1830 brought Louis-Philippe and the Orleanists into power. Their foremost representatives were Casimir Perier, Jacques Laffitte, Adolphe Thiers, François Guizot, and Albert, duke de Broglie. Eventually, the Orleanists split into the conservative Parti de la Résistance (Perier, Guizot), standing for the consolidation of the dynasty and limitation of the franchise, and the more liberal Parti du Mouvement (Laffitte), advocating the spread of liberalism abroad and progressive extension of the franchise. The latter, under the leadership of Odilon Barrot, became after 1831 the "dynastic left" in the Chamber of Deputies.

The Orleanists supported Louis-Philippe's grandson and heir, Louis-Philippe-Albert, count de Paris, after the fall of the July Monarchy (1848) and during the Second Republic and Second Empire. The demise of the Second Empire, in 1870, offered a chance for a restoration of the monarchy, but the Third Republic was born while the Orleanists and Legitimists were arguing over a candidate. After the direct male line of the elder Bourbons died out in 1883, most of the Legitimists joined the Orleanists in fruitlessly supporting the count de Paris for the throne.

Orléans, capital of Loiret *département* and of the Centre *région,* north-central France, south-southwest of Paris. The city stands on the banks of the Loire River in a fertile valley on the edge of the Beauce plain. Orléans, which derives its name from the Roman Aurelianum, was conquered by Julius Caesar in 52 BC. It became an intellectual capital under Charlemagne, emperor from 800 to 814, and in the 10th and 11th centuries it was the most important city in France after Paris. In 1429, during the Hundred Years' War (1337–1453), after it had been besieged for seven months by the English, the French national heroine St. Joan of Arc, the Maid of Orléans, and her troops delivered it. The victory continues to be celebrated annually (*see* Orléans, Siege of). Orléans was a Huguenot (Protestant) centre during the 16th-century Wars of Religion, but the Roman Catholics took control of the city in 1572 after the Massacre of St. Bartholomew's Day, in which about 1,000 Protestants were killed. It was occupied in 1870 by the Prussians after a long siege. The city was severely bombed in World War II. Many buildings of historical and artistic interest were destroyed, including the Jeanne-d'Arc Museum and the Church of St. Paul.

The Loire divides the town into two unequal parts. To the south lies the small Saint-Marceau quarter, a market-gardening centre. The main part of the city stands on the northern bank of the Loire. The old quarter, surrounded by pleasant wide boulevards and quays along the river, was largely destroyed during World War II. It has been rebuilt in keeping with the style of the old 18th-century town, with consideration for the imperatives of modern traffic. Beyond the boulevards new districts were built in the 1970s along the main roads leading out of the town.

Orléans is the centre of a modern road network; the railway junction just outside the city at Les Aubrais is one of the most important in France. The university, founded in 1305, was abolished during the French Revolution, but the new one was established at La Source (source or springs of the Loire River) in 1962. Traditionally a centre for market gardening and horticulture (Orléans roses are famous), it has benefited from the decentralization of Paris, which took place after World War II, and has developed new industries. These include textiles, food processing (nearly half of France's production of vinegar), and the manufacture of machinery (automobile accessories, agricultural equipment).

The Sainte-Croix Cathedral, begun in the 13th century, was largely destroyed by the Protestants in 1568. Henry IV, king of France from 1589 to 1610, gave funds for its reconstruction, and it was faithfully rebuilt (17th–19th century) in Gothic style. The 18th-century towers were damaged in World War II but were later restored. The cathedral is about the same size as Notre-Dame of Paris. The stone and brick Renaissance Hôtel de Ville (1549–55) was restored and enlarged in the 19th century. Pop. (1999) 112,833.

Orléans, DUKES OF, titled nobility who constituted four dynasties of princes of the royal houses of France, grouped below chronologically and indicated by the symbol •.

For genealogical tables treating the house of Orléans, *see* MACROPAEDIA: Bourbon, House of.

•Orléans, Philippe I, duc d' (duke of) (b. July 1, 1336—d. Sept. 1, 1375), the only member of the first dynasty of dukes of Orléans.

Philippe was the younger son of King Philip VI of France, who in 1344 established the peerage duchy for him to compensate for losing his expectation of Dauphiné, which had been reserved for him in 1343 but was subsequently assigned to his elder brother John (the future King John II). Philippe caused alarm by expanding his possessions but left no children by his wife, Charles IV's daughter Blanche de France. On his death, therefore, the duchy was reunited to the French crown by Charles V.

• **Orléans, Louis I, duc d'** (duke of) (b. March 13, 1372, Paris—d. Nov. 23, 1407, Paris), younger brother of King Charles VI and first in the second dynasty of dukes of Orléans. He initiated the power struggle with the dukes of Burgundy that became the dominating factor in 15th-century France. Known for his ambition and his love of pleasure, he was said to have had a liaison with the Queen as well as with other ladies.

Louis was at first titled comte de Valois; in 1386 Charles granted him Touraine, which he exchanged in 1392 for the duchy of Orléans. In 1386 he married his cousin Valentina Visconti, daughter of the Duke of Milan, who brought as part of her dowry lands in northern Italy and awakened Orléans's ambitions for founding a kingdom there. Her hereditary right to Milan furnished her descendants, the kings Louis XII and Francis I, with a pretext for the wars they undertook in Italy.

Orléans sat on his brother's council. When Charles VI went mad, a power struggle developed between Orléans and his uncle Philip the Bold, duke of Burgundy. When Philip died in 1404, the rivalry continued with his son John the Fearless, culminating in Orléans's assassination by John's agents in 1407. A long feud ensued between the Armagnacs, partisans of Orléans's heirs, and the Burgundians. Orléans was the father of the poet Charles d'Orléans (1394–1465), head of the Armagnacs after his father's death and grandfather of Louis XII.

• **Orléans, Charles, duc d'** (duke of) (b. Nov. 24, 1394, Paris—d. Jan. 4, 1465, Amboise, Fr.), last, and one of the greatest, of the courtly poets of France, who during exile in England also earned a reputation for his poems in English. He was the son of Louis, duc d'Orléans (brother of Charles VI of France).

Charles succeeded to the title in 1407, when his father was assassinated by the Burgundians in the struggle for power that followed on the King's insanity. Aged 13, he sought vengeance with the help of the party led by Bernard VII, comte d'Armagnac. Six years of negotiations, truces, and civil war ended in 1414 with the public condemnation of Louis's murder and the temporary eclipse of Burgundian influence. Henry V of England invaded France in 1415, and in the advance of the French army to Agincourt Charles held high command. Defeated and captured in the ensuing battle, he spent 25 years in England as a prisoner.

Charles's release was agreed to on July 2, 1440, and on November 3 he returned to France, where he married Mary of Cleves (his first wife, Isabella, having died in 1409). He withdrew from public life to Blois, receiving there important literary figures including François Villon, Georges Chastellain, and Jean Meschinot. Many others visited or corresponded with him. His son, who became King Louis XII, was born in 1462.

His enforced idleness in England gave him leisure to pursue his literary interests; he had written some verse before his capture, and he now composed a complete love-history, mainly in ballades, besides other poems. He also wrote more than 6,000 lines in English, arranged in two love-histories linked by a miscellany. These are now generally accepted as having been written by Charles, although previously thought to be the work of an Englishman. The collection of English poems is much more of a literary unit than are the French poems, to which Charles continually added after his return to France.

• **Orléans, Louis II, duc d'** (duke of): *see* Louis XII *under* Louis (France).

• **Orléans, Henri, duc d'** (duke of): *see* Henry II *under* Henry (France).

• **Orléans, Charles, duc d'** (duke of), also called DUC D'ANGOULÊME (b. Jan. 22, 1522—d. Sept. 9, 1545, Forêtmoutiers, Fr.), King Francis I's favourite son and a noted campaigner, who twice took Luxembourg from the Holy Roman emperor Charles V's forces (1542 and 1543). There were plans for marrying him to a Habsburg princess who would bring him either Milan or part of the Netherlands as dowry, but he died suddenly, after rashly exposing himself to infection from the plague.

• **Orléans, Charles, duc d'** (duke of): *see* Charles IX *under* Charles (France).

• **Orléans, Gaston (-Jean-Baptiste), duc d'** (duke of), DUC D'ANJOU, byname GASTON DE FRANCE, or MONSIEUR (b. April 25, 1608, Fontainebleau, Fr.—d. Feb. 2, 1660, Blois), prince who readily lent his prestige to several unsuccessful conspiracies and revolts against the ministerial governments during the reign of his brother, King Louis XIII (ruled 1610–43), and the minority of his nephew, Louis XIV (ruled 1643–1715).

The third son of King Henry IV (ruled 1589–1610) and Marie de Médicis, Gaston was at first known as the Duc d'Anjou. As the only surviving brother of Louis XIII, he was known as "Monsieur" from 1611. He first came into conflict with royal authority in 1626, when Marie de Médicis and Louis XIII's powerful chief minister, the Cardinal de Richelieu, attempted to force him to marry Marie de Bourbon-Montpensier. Several nobles, including the Duchesse de Chevreuse and her lover, the Marquis de Chalais, encouraged him to resist the marriage and drew him into a plot to assassinate Richelieu. Richelieu discovered the conspiracy and had Chalais beheaded; but Anjou, as heir presumptive to the throne, escaped prosecution. He went through with the marriage (August 1626) and was created duc d'Orléans, the first duke of the third dynasty of Orléans; nine months later his wife died in childbirth.

Gaston, duc d'Orléans, engraving by N. de Poilly

By courtesy of the Bibliotheque Nationale, Paris

When Marie de Médicis was exiled from Paris by Louis in February 1631 for demanding Richelieu's dismissal, Orléans declared his support for the Queen Mother and began raising troops; but he fled to the duchy of Lorraine Marguerite, sister of Charles IV, duc de Lorraine. A few days later Louis XIII's troops invaded Lorraine and forced Orléans to flee to the Spanish Netherlands. He re-entered France with a small army in July to join a revolt led by the powerful Duc de Montmorency, governor of Languedoc. On the suppression of the uprising, Orléans was pardoned; but after the execution of Montmorency in November, he again withdrew to the Spanish Netherlands. Richelieu allowed him to return to France in 1634. Orléans campaigned for Louis XIII against the Spaniards in Picardy in 1636, but the King continued to refuse to recognize his marriage to Marguerite. The birth of the dauphin Louis (later King Louis XIV) in 1638 quashed his hopes of succeeding to the throne. He was further humiliated by the exposure of his complicity in the Marquis de Cinq-Mars's plot against Richelieu (1642).

In accord with the provisions of the will of Louis XIII, Orléans became lieutenant general of the kingdom on the accession of young Louis XIV. He helped the queen mother, Anne of Austria, to become sole regent; but she proceeded to appoint Richelieu's protégé, Cardinal Jules Mazarin, as first minister. When the aristocratic uprising known as the Fronde broke out in 1648, Orléans at first supported Mazarin; in 1651, however, he joined the coalition of princes that forced Anne to dismiss the minister. Exiled by Louis XIV upon the recapture of Paris by government forces in 1652, Orléans was formally reconciled with the King four years later. His *Mémoires* were published in 1683. G. Dethan's *Gaston d'Orléans* appeared in 1959.

• **Orléans, Philippe I de France, duc d'** (duke of), also called (until 1660) DUC D'ANJOU, byname MONSIEUR (b. Sept. 21, 1640, Saint-Germain-en-Laye, Fr.—d. June 9, 1701, Saint-Cloud), first of the last Bourbon dynasty of dukes of Orléans; he was the younger brother of King Louis XIV (reigned 1643–1715), who prevented him from exercising political influence but tolerated him as an overtly respected and covertly despised figure at court.

The son of King Louis XIII and Anne of Austria, Philippe was titled duc d'Anjou until he succeeded his uncle Gaston de France as duc d'Orléans in 1660. Orléans married (March 1661) his cousin Henrietta, sister of King Charles II of England, but he soon avoided her and became involved in a succession of homosexual relationships. Henrietta died suddenly and in circumstances that caused scandal in 1670. In the following year Orléans was married to Elizabeth Charlotte, daughter of the Elector Palatine.

Orléans proved to be a courageous soldier. He distinguished himself fighting in the Spanish Netherlands in the War of Devolution (1667–68), and during the Dutch War (1672–78) he won an important victory over William of Orange at Cassel (April 11, 1677). Allegedly jealous of his brother's military success, Louis gave him no further commands. Two of Orléans's daughters by his first marriage became queens. Philippe, his son by his second marriage, inherited the dukedom of Orléans and served as regent for young King Louis XV from 1715 to 1723.

• **Orléans, Philippe II, duc d'** (duke of), also called (until 1701) DUC DE CHARTRES (b. Aug. 2, 1674, Saint-Cloud, Fr.—d. Dec. 2, 1723, Versailles), regent of France for the young King Louis XV from 1715 to 1723.

The son of Philippe I, duc d'Orléans, and Elizabeth Charlotte of the Palatinate, Philippe d'Orléans was known as the duc de Chartres during his father's lifetime. Although he served with the French army against the English and Dutch in the War of the Grand Alliance (1689–97), his uncle, Louis XIV, excluded him from the high military commands to which he considered himself entitled. The Duc de Chartres retaliated by studiously neglecting his wife, Françoise-Marie de Bourbon, the King's favourite legitimized daughter. His irreverence, habitual drunkenness, and licentious behaviour had earned him an unsavoury reputation by the time he succeeded to his father's title in 1701. Nevertheless, he was given military commands in Italy (1706) and Spain (1707–08) during the War of the Spanish Succession (1701–14).

Philippe II, duc d'Orléans, detail of an engraving by C. DuFlos after a painting by R. Tournières

H. Roger-Viollet

As premier prince of the blood royal, Orléans became regent for the five-year-old Louis XV upon the death of Louis XIV (Sept. 1, 1715). Through the provisions of his will, however, Louis XIV had left the effective power in the hands of his own two legitimized bastard sons in order to prevent Orléans from dismantling the system of absolute royal despotism. If the sickly Louis XV had died, the legitimized princes would have rejected Orléans's claim to the throne in favour of the claim of Louis XIV's grandson, King Philip V of Spain. Hence, in order to assert his authority as regent and advance his dynastic ambitions, Orléans induced the Parlement (high court of justice) of Paris to annul Louis XIV's will (Sept. 12, 1715). He then proceeded to institute an experimental system of conciliar government—known as *la polysynodie*—designed to destroy the authority of the secretaries of state and restore political power to the high nobility. The new system proved so cumbersome and inefficient that the Regent dissolved it in September 1718 and reinstated the secretaries of state.

Orléans's foreign policy was also tied to his dynastic interests. In 1716 he had his minister, the abbé (later Cardinal) Guillaume Dubois, concluded with Great Britain, France's traditional enemy, an alliance that secured British support against Philip V's claim to the succession to the French throne. France and Great Britain went to war with Spain in 1719, and in the following year Philip V was forced to renounce his French claims and recognize Orléans as Louis XV's heir.

Meanwhile, Orléans had to grapple with the acute fiscal problems that had resulted from the costly wars of Louis XIV. In 1717 he entrusted the reform of French finances to a Scottish banker, John Law, whose innovations led to a financial disaster three years later that severely discredited Orléans's regime.

Orléans's regency ended when Louis XV came of age in February 1723. The following August, the Duc himself became first minister, but he died only four months later. Philippe Erlanger's biography of Orléans, *Le Régent,* was published in 1938.

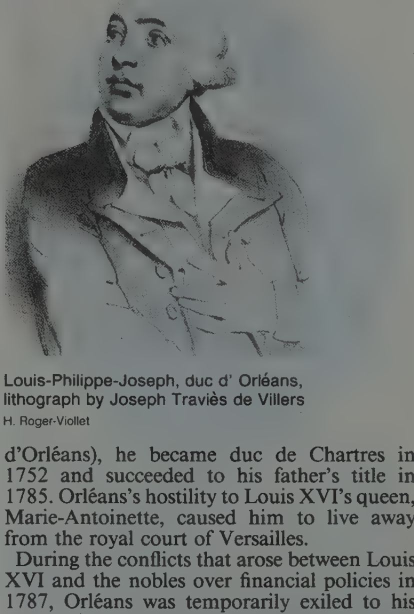
• **Orléans, Louis, duc d'** (duke of) (b. Aug. 4, 1703, Versailles, Fr.—d. Feb. 4, 1752, Paris), son of Philippe II, duc d'Orléans; he became governor of Dauphiné (1719), commander of infantry (1721), and chief of the Conseil d'État. The death of his wife, Auguste-Marie-Jeanne, princess of Bade (1726), threw him into prolonged grief, and he retired to the Abbey of Sainte-Geneviève, devoting himself to theological studies. His name frequently appears in the memoirs of the time.

• **Orléans, Louis-Philippe, duc d'** (duke of), also called DUC DE CHARTRES (b. May 12, 1725, Versailles, Fr.—d. Nov. 18, 1785, Sainte-Assise, Brie), son of Duke Louis; he was appointed lieutenant general (1744) and governor of Dauphiné (1747).

Having served with distinction from 1742 to 1757, he lived in seclusion and devoted himself to the theatre, patronizing actors and musicians. After his first wife died (1759), he became so passionately enamoured of the Marquise de Montesson that he secured Louis XV's permission to marry her secretly (1773). She shared her husband's love of the theatre and put on splendid theatrical entertainments.

• **Orléans, Louis-Philippe-Joseph, duc d'** (duke of), also called (1752–85) DUC DE CHARTRES, byname PHILIPPE ÉGALITÉ (b. April 13, 1747, Saint-Cloud, Fr.—d. Nov. 6, 1793, Paris), Bourbon prince who became a supporter of popular democracy during the Revolution of 1789.

The cousin of King Louis XVI (ruled 1774–92) and the son of Louis-Philippe (later duc d'Orléans), he became duc de Chartres in 1752 and succeeded to his father's title in 1785. Orléans's hostility to Louis XVI's queen, Marie-Antoinette, caused him to live away from the royal court of Versailles.



Louis-Philippe-Joseph, duc d' Orléans, lithograph by Joseph Traviès de Villers

H. Roger-Viollet

During the conflicts that arose between Louis XVI and the nobles over financial policies in 1787, Orléans was temporarily exiled to his estates for challenging the King's authority before the Parlement of Paris (one of the high courts of justice). He was elected a representative for the nobles to the States General, which convened on May 5, 1789. Orléans supported the unprivileged Third Estate (bourgéoisie) against the two privileged orders (nobles and clergy). On June 25 he and a small group of nobles joined the Third Estate, which had already (June 17) proclaimed itself a National Assembly. His Paris residence, the Palais-Royal, became a centre of popular agitation, and he was viewed as a hero by the crowd that stormed the Bastille on July 14.

On returning from a mission to England in July 1790, Orléans took a seat in the National Assembly. He was admitted to the politically radical Jacobin Club in 1791. After the fall of the monarchy in August 1792, he renounced his title of nobility and accepted the name Philippe Égalité from the Paris Commune, one of the popular Revolutionary bodies. Elected to the National Convention (the third successive Revolutionary legislature), which convened in September 1792, Égalité supported the radical democratic policies of the Montagnards against their more moderate Girondin opponents. Nevertheless, during the trial of Louis XVI by the Convention, the Girondins attempted to confuse the issues by accusing the Montagnards of conspiring to put Égalité on the throne. Égalité voted for the execution of Louis, but he fell under suspicion when his son Louis-Philippe, duc de Chartres, defected to the Austrians with the French commander Charles-François du Périer Dumouriez on April 5, 1793. Accused of being an accomplice of Dumouriez, Égalité was arrested on April 6 and was sent to the guillotine in November. The Duc de Chartres reigned as King Louis-Philippe from 1830 to 1848.

E.S. Scudder's biography of Égalité, entitled *Prince of the Blood,* was published in 1938.

• **Orléans, Louis-Philippe, duc d'** (duke of): *see* Louis-Philippe.

• **Orléans, Ferdinand-Louis-Philippe-Charles-Henri, duc d'** (duke of) (b. Sept. 3, 1810, Palermo—d. July 13, 1842, Neuilly-sur-Seine, Fr.), son of Louis-Philippe of France, who succeeded to the title of duc d'Orléans when his father became king (1830).

He was a noted soldier and served in Algeria from 1834 to 1836. In 1837 he married Princess Helena of Mecklenburg. In 1839 he again went to Algeria, but the fatigues of the campaign were too much for him. He died at Neuilly at the age of 31. His sons refused the title of duc d'Orléans: Philippe (1838–94) became comte de Paris (*see* Paris, Philippe d'Orléans, comte de); Robert (1840–1910) became duc de Chartres. Philippe's eldest son, also named Philippe (1869–1926), was the last duc d'Orléans, dying without issue.

• **Orléans, Louis-Philippe-Robert, duc d'** (duke of) (b. Feb. 6, 1869, Twickenham, Middlesex, Eng.—d. March 28, 1926, Palermo), pretender to the French throne during the Third Republic.

The eldest son of Louis-Philippe-Albert, comte de Paris, and great-grandson of King Louis-Philippe, Orléans was banished from France in 1886 as a threat to the republican regime. Returning in 1890, he was arrested and given a prison sentence but was released after a few months and escorted out of the country. He subsequently travelled in Europe and the Middle East.

Louis-Philippe-Robert, duc d'Orléans, engraving by Dujardin after a photograph, 1890

By courtesy of the Bibliotheque Nationale, Paris

After his father's death (September 1894), the Duc d'Orléans was recognized by most French royalists as their rightful king. He undertook voyages to the Arctic in 1905, 1907, and 1919 and travelled in British East Africa in 1922–23, bringing back zoological specimens that he bequeathed to France. During World War I he had vainly sought permission to serve in either the French or an Allied army.

Orléans had no children by his marriage (Nov. 5, 1896) to the Austrian archduchess Maria Dorothea Amalia, so that when he died his pretensions passed to his cousin Jean d'Orléans, Duke de Guise (1874–1940).

Orléans, Anne-Marie-Louise d': *see* Montpensier, Anne-Marie-Louise d'Orléans, duchesse de.

Orléans, Siege of (Oct. 12, 1428–May 8, 1429), siege of the French city of Orléans by English forces, the military turning point of the Hundred Years' War between France and England.

The siege was begun by Thomas de Montacute, Earl of Salisbury, after the English conquest of Maine, a border region between the zone recognizing Henry VI of England as king of France and the zone recognizing the dauphin, Charles VII. But Salisbury's enterprise was contrary to the advice of Henry VI's regent in France, John, Duke of Bedford, who argued for an advance into Anjou instead. Salisbury captured some important places upstream and downstream from Orléans, along with the bridgehead fort on the south bank of the Loire River opposite the city itself, then died of a wound on Nov. 3, 1428. His successor in command, William de la Pole, Earl of Suffolk, did nothing to promote the operation until December, when John Talbot (later Earl of Shrewsbury) and Thomas Scales arrived to stimulate him. Impressive siegeworks, including forts, were then undertaken. Weeks went by; a French attempt to cut the besiegers' line of supply was defeated (Battle of the Herrings, Feb. 12, 1429); and the defenders, under Jean d'Orléans, Count de Dunois (bastard son of Charles VII's late uncle Louis, Duke d'Orléans), were considering capitulation when Joan of Arc persuaded Charles VII to send an army to relieve the city. Diversionary action against one of the English forts enabled Joan, from Chézy, five miles upstream, to enter Orléans with supplies on April 30. In the following week the principal English forts were stormed, and Suffolk abandoned the siege.

Orléansville (Algeria): *see* Cheliff, ech-.

Orley, Bernard van, Bernard also spelled BERNAERT, or BAREND (b. 1492?, Brussels [now in Belgium]—d. 1542, Brussels), Flemish painter of religious subjects and portraits and designer of tapestries.

The son of the painter Valentin van Orley, he entered the employ of Margaret of Austria, regent of the Netherlands, in 1515 and three years later was appointed court painter. The German painter Albrecht Dürer made a portrait of him in 1521. Orley's earliest important work, painted about 1512, was an altarpiece of Saints Thomas and Matthew, of which the centrepiece is in the Kunsthistorisches Museum, Vienna, and the wings in the Royal Museums of Fine Arts, Brussels. From 1516 to 1522 he followed the style of the Flemish painter Jan Mabuse, but after that he was influenced by Raphael, whose tapestry cartoons were in Brussels for many years; both influences may be seen in an altarpiece representing the "Banquet of the Children of Job" (1521), now in the Royal Museums of Fine Arts. Of Orley's portraits, that of Georg Zelle (Royal Museums of Fine Arts) is the only surviving one that is signed and dated (1519).

Tapestries designed by Orley are the "Hunts of Maximilian" (Louvre) and the "Victory of Pavia" (Naples). His paintings residing in the United States include the well-known "Virgin and Child with Angels" (Metropolitan Museum of Art, New York City) and works at the National Gallery of Art, Washington, D.C.

Orlice Mountains, Czech ORLICKÉ HORY, German ADLERGEBIRGE, mountain range, a subgroup of the Sudeten mountains in northeastern Bohemia, Czech Republic, forming part of the frontier with Poland for a distance of 25 miles (40 km). The mountains are, for the most part, made up of crystalline rocks, like most of the northern highland rim of Bohemia. The highest point is Velká Deštná, at 3,658 feet (1,115 m).

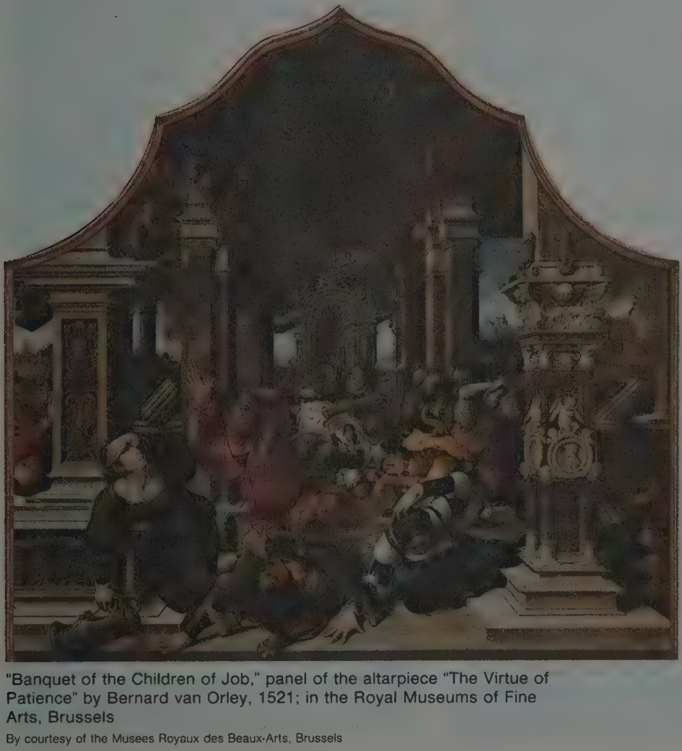
Orlov, Aleksey Fyodorovich, Prince (Knyaz) (b. Oct. 8 [Oct. 19, New Style], 1786, Moscow, Russia—d. May 9 [May 21], 1861, St. Petersburg), military officer and statesman who was an influential adviser to the Russian emperors Nicholas I (reigned 1825–55) and Alexander II (reigned 1855–81) in both domestic and foreign affairs.

The nephew of Catherine II the Great's lover, Grigory Grigoryevich Orlov, and the illegitimate son of Count Fyodor Grigoryevich Orlov, who had helped Grigory place Catherine on the throne (1762), Aleksey was educated under Catherine's general supervision. In 1804 he entered the army and, during the Napoleonic Wars, took part in all the Russian campaigns after 1805. But he opposed the radical ideas adopted by many Russian officers, including his brother General Mikhail Fyodorovich Orlov, and in 1825, having become the commander of a cavalry regiment, helped suppress the uprising of the Decembrist movement, which hoped to establish a constitutional regime. As a reward, Nicholas I made him a count.

Orlov fought in the Russo-Turkish war of 1828–29, attained the rank of lieutenant general, and led the Russian delegation that concluded the peace treaty of Adrianople (1829). He then participated in the suppression of the Polish uprising of 1830–31. After becoming both commander in chief of Russia's Black Sea fleet and ambassador to Turkey (1833), he concluded a defense alliance with Turkey (Treaty of Hünkâr İskelesi; 1833) that improved Russia's defenses on its southern frontier but also made Russia's relations with France and Great Britain more tense.

Having become Nicholas' trusted adviser, Orlov accompanied the emperor on his foreign tour in 1837 and, from 1839 to 1842, served on a secret committee that considered and recommended minor reforms for the peasantry. In 1844 he was appointed chief of the third department of the imperial chancellery; Orlov thus became responsible for the security police force and, by spending a great deal of time with the emperor, attained a high degree of influence over him and his policies.

In 1854, after the Crimean War began, Nicholas sent Orlov on an unsuccessful mission to Vienna to convince Austria to remain neutral. After the war, Orlov attended the peace conference and helped negotiate the Treaty of Paris (1856). When he returned to Russia, the new emperor, Alexander II, made him a prince, named him president of both the state council and the council of ministers, and in 1858 appointed him chairman of a committee to investigate the problems of emancipating the serfs. Despite his great influence, the conservative Orlov was unable to prevent the emancipation, which was proclaimed several months before his death.



"Banquet of the Children of Job," panel of the altarpiece "The Virtue of Patience" by Bernard van Orley, 1521; in the Royal Museums of Fine Arts, Brussels

By courtesy of the Musees Royaux des Beaux-Arts, Brussels

Orlov, Aleksey Grigoryevich, Count (Graf) (b. Oct. 5 [Sept. 24, Old Style], 1737, Lyutkino, Tver province, Russia—d. Jan. 5, 1808 [Dec. 24, 1807], Moscow), military officer who played a prominent role in the coup d'état that placed Catherine II the Great on the Russian throne.

Having entered the cadet corps in 1749, Orlov became an officer in the Russian guards as well as a close adviser to his brother Grigory Grigoryevich Orlov, who about 1760 became the lover of Catherine, wife of Emperor Peter III (reigned 1762). The Orlov brothers, supported by the guards, planned to overthrow the unpopular Peter; on the night of July 9 (June 28), 1762, Aleksey Orlov brought Catherine from her residence at Peterhof, outside St. Petersburg, to the guards' barracks. From there a military escort accompanied her into St. Petersburg, where she was solemnly proclaimed empress of Russia by the archbishop of Novgorod. Aleksey Orlov then proceeded to Peter's palace at Oranienbaum, received his abdication, arrested him, and transported him to the village of Ropsha. Several days later, while still under Orlov's supervision, Peter was killed (July 16 [July 5]).

Immediately after the coup d'état Orlov was promoted to the rank of major general, and in 1769 during the Russo-Turkish War of 1768–74, he was placed in command of the Russian fleet, which destroyed the superior Turkish fleet near Çeşme (Cheshme, located on the Aegean coast of Anatolia) on July 6, 1770. Although Orlov's actual role in this victory was minor and he subsequently refrained from forcing his way through the Dardanelles strait, he was welcomed in St. Petersburg as a hero and given the title Count Chesmenski.

In 1775, when the beautiful Yelizaveta Alekseyevna Tarakanova was being put forward by two Polish emigres in Italy as the daughter of the Russian empress Elizabeth, Catherine, regarding her as a potential pretender to the throne, sent Orlov to bring her to St. Petersburg. Orlov seduced Tarakanova, lured her onto his ship at Livorno, Italy, and had her imprisoned at the Shlisselburg Fortress near St. Petersburg (1775). After this incident Orlov resigned from the army (1775), retired to his estate at Lyutkino, and devoted himself to horse breeding.

Graf Aleksey Grigoryevich Orlov, oil painting by an unknown artist
Novosti Press Agency

Orlov was later recalled to St. Petersburg, however, by Emperor Paul I (ruled 1796–1801), Catherine's successor, who forced him to carry the crown of Peter III in a procession transferring the late emperor's body to a place of honour in the Cathedral of St. Peter and St. Paul.

Orlov, Fyodor Grigoryevich, Graf (Count) (b. Feb. 19 [Feb. 8, Old Style], 1741, Lyutkino, Tver Province, Russia—d. May 28 [May 17], 1796, Moscow), Russian army officer and statesman, the younger brother of Grigory and Aleksey Orlov.

He participated in the coup d'état of 1762 that placed the empress Catherine II the Great on the throne. Afterward he was appointed chief procurator of the Senate. He took part in the Russo-Turkish War of 1770 as commander of a naval squadron in the Mediterranean Sea and was made a count for his exploits there. He retired from service in 1774.

Orlov, Grigory Grigoryevich, Graf (Count) (b. Oct. 17 [Oct. 6, Old Style], 1734, Lyutkino, Tver Province, Russia—d. April 24 [April 13], 1783, Neskuchnoye, near Moscow), military officer and lover of Catherine II, empress of Russia from 1762 to 1796. He organized the coup d'état that placed Catherine on the Russian throne and subsequently was her close adviser.

Having entered the cadet corps in 1749, Orlov became an artillery officer and fought in the Battle of Zorndorf (1758) during the Seven Years' War (1756–63). In 1759, after escorting a Prussian prisoner of war to St. Petersburg, he was introduced to the grand duke Peter and his wife, Catherine. Leading a riotous life in the capital, Orlov caught Catherine's fancy, and around 1760 he became her lover.

Graf Grigory Grigoryevich Orlov, oil painting by an unknown artist
Novosti Press Agency

After Peter ascended the Russian throne (1762) as Peter III, Orlov and his brother Aleksey Grigoryevich planned the coup d'état of July 1762 that overthrew Peter and made Catherine Russia's empress. Catherine then gave her lover the title of count, promoted him to the rank of adjutant general, and made him director-general of engineers and general in chief, but her political mentor, Nikita Panin, frustrated her intention of marrying Orlov. Grigory then began to study natural science and was one of the founders of the Free Economic Society (1765), which was organized to modernize the country's agricultural system.

While Catherine was composing her "Instruction" for the legislative commission that was to devise liberal government reforms and formulate a new legal code, Orlov acted as her consultant, and later, when he was a member of the commission (1767–68), he strongly urged the passage of reforms that would improve the condition of the serfs. The commission, however, adjourned without making any substantial proposals. In 1772 Catherine sent Orlov as her chief delegate to a peace conference to end the Russo-Turkish War that had begun in 1768, but he advocated the liberation of Christian subjects from Turkish rule, as well as the dismemberment of the Ottoman Empire, and thereby failed in his mission; peace was not concluded until 1774.

Around 1772 Orlov also ceased to be Catherine's lover; he subsequently left Russia (1775) and married a cousin (1777). After his wife's death (1782) he lost his sanity and returned to his estate in Russia.

Orlov, Nikolay Alekseyevich, Knyaz (Prince) (b. May 9 [April 27, Old Style], 1827, St. Petersburg, Russia—d. March 29 [March 17], 1885, Fontainebleau, Fr.), Russian diplomat notable for his humanitarian interest in his country's internal affairs.

The son of Prince Aleksey Fyodorovich Orlov, he entered the army in 1845, fought in Hungary in 1849, and lost an eye on the Walachian front during the Crimean War in 1854. Prince A.M. Gorchakov, the chancellor, took him into the diplomatic service and sent him to be ambassador in Brussels (1859–69). After short periods in Vienna and London, Orlov was appointed ambassador to Paris in December 1871. He was thus Gorchakov's spokesman in Paris during the years of tension after the Franco-German War and during the crisis that led to the Congress of Berlin (1878). Recalled in 1882, Orlov was posted for a time to Berlin. As a political writer, Orlov criticized corporal punishment in a number of articles published in the monthly *Russkaya Starina* in 1881 and advocated tolerance for religious dissenters. He also published in 1856 a sketch of Napoleon's three-week campaign of 1806 against Prussia.

Orlov diamond, rose-cut gem from India, one of the Romanov crown jewels; it is shaped like half an egg, with facets covering its domed surface, and the underside is nearly flat. It weighs nearly 200 carats. According to legend, it was once used as the eye of an idol in a Brahman temple in Mysore and was stolen by a French deserter, who escaped with it to Madras. Others contend that the authenticated history of the Orlov extends to the middle of the 18th century, when the stone (believed to be the long-missing Great Mogul diamond; *q.v.*) belonged to Nāder Shāh, king of Persia. After his assassination it was stolen and sold to an Armenian millionaire named Shaffrass. In either case, it was purchased in 1774 by Count Grigory Grigoryevich Orlov, who in an unsuccessful attempt to regain favour gave it to Empress Catherine II the Great. Catherine had it mounted in the Romanov imperial sceptre, and it is now part of Russia's Diamond Fund (which contains the tsarist regalia) in Moscow.

Orm, also called ORMIN (fl. *c.* 1200), Augustinian canon, author of an early Middle English book of metrical homilies on the Gospels, to which he gave the title *Ormulum,* "because Orm made it." The work (dated on linguistic evidence *c.* 1200) is of little literary interest but of great value to linguists, for Orm—who clearly wished to spread sound teaching, derived mainly from works of Gregory the Great, Bede, and Aelfric—invented an individual and remarkably consistent orthography based on phonetic principles. Intended to help preachers when reading his work aloud, it shows, for example, the quantity (length) of the vowels by doubling a consonant after a short vowel in a closed syllable, and it distinguishes by three separate symbols sounds that in the Anglo-Celtic or insular script of Old English were all represented by a single symbol.

Ormandy, Eugene, original name JENÖ ORMANDY BLAU (b. Nov. 18, 1899, Budapest—d. March 12, 1985, Philadelphia), Hungarian-born American conductor who was identified with the Late Romantic and early 20th-century repertoire.

Ormandy graduated from the Budapest Royal Academy, where he studied violin with Jenö Hubay, at age 14. By age 17 he was a professor of violin, undertaking concert tours throughout Central Europe. Lured to New York City by the prospect of a U.S. tour, he instead ended up playing the violin in the orchestra of the Capitol Theatre, accompanying silent films. In 1924 he stood in for the regular conductor and thereupon chose conducting as his career. He began conducting light classics for radio and appearing at summer concerts, which led to a position as deputy for Arturo Toscanini during a major concert series of the Philadelphia Orchestra. A contract with the Minneapolis Symphony Orchestra ensued, and he remained there from 1931 to 1936, gaining national prominence with a series of recordings. He returned to the Philadelphia Orchestra in 1936 to share the conductorship with Leopold Stokowski. In 1938 Ormandy was made principal conductor of the Philadelphia Orchestra, a post that he held until he retired in 1980. Ormandy shaped the orchestra's sound by developing the lush, velvety string colour that became its trademark.

Ormazd, also spelled ORMIZD (ancient Iranian deity): *see* Ahura Mazdā.

Ormazd, also spelled ORMIZD (Sāsānian kings): *see under* Hormizd.

Ormoc, chartered city, western Leyte, Philippines. The city lies at the head of Ormoc Bay, an inlet of the Camotes Sea. It serves the only commercial sugarcane district in the eastern Visayas. Rice, copra, and sugar are exported, and sugar, rice, and corn (maize) milling are important. Ormoc has an airport and is the headquarters of Tongonan Hot Spring National Park.

During World War II, Ormoc was Leyte's largest Japanese stronghold and supply base; it fell to the U.S. general Douglas MacArthur's forces on Dec. 10, 1944. The modern city was built on the ruins of the old city. Inc. city, 1947. Pop. (1995) mun., 144,003.

ormolu (from French *dorure d'or moulu:* "gilding with gold paste"), gold-coloured alloy of copper, zinc, and sometimes tin, in various proportions but usually containing at least 50 percent copper. Ormolu is used in mounts (ornaments on borders, edges, and as angle guards) for furniture, especially 18th-century furniture, and for other decorative purposes. Its gold colour may be heightened by immersion in dilute sulfuric acid or by burnishing.

Secretary decorated with ormolu mounts, marquetry, and intarsia, French, *c.* 1770; in the Wallace Collection, London

By courtesy of trustees of the Wallace Collection, London

The earliest ormolu appears to have been produced in France in the mid-17th century, and France always remained the main centre of manufacture, though fine examples were also produced in other countries during the 18th and 19th centuries. To fashion ormolu, a model is made in wood, wax, or some other suitable medium; a mold is formed and the molten alloy is poured into it. The cast alloy is then chased (ornamented with indentations) and gilded. True ormolu is gilded by a process whereby powdered gold is mixed with mercury, and the resulting paste is brushed onto the cast form. The whole is then fired at a temperature that causes the mercury to evaporate, leaving a gold deposit on the surface. Finally, the gold is burnished or matted to give the greatest effect of metallic brilliance. (During the second half of the 19th century, pieces were gilded by a process of electrolysis, and these are often inaccurately referred to as ormolu.) Master craftsmen who worked in ormolu include Jean-Jacques Caffieri, Pierre Gouthière, and Pierre-Philippe Thomire in France and Matthew Boulton in England.

Ormond Beach, city, Volusia county, northeastern Florida, U.S., on the Halifax River (lagoon), adjacent to Daytona Beach (south). Primarily a resort, it has about 4 mi (6 km) of compact white sand, part of a reef that continues southward for more than 20 mi along the Atlantic coast to Ponce de Leon Inlet. In 1874 a colony from Connecticut settled the site and called it New Britain. When incorporated as a town in 1880, it was renamed for Capt. James Ormond, who had arrived from the Bahamas in 1815 and lived on a Spanish land grant. Henry M. Flagler, a railroad pioneer and resort promoter, bought and enlarged the Hotel Ormond (built in 1875), and several large estates developed, including John D. Rockefeller's winter home, the Casements. Early in the 20th century, Henry Ford, Ransom E. Olds, Louis Chevrolet, and others tested automobiles on the Ormond-Daytona Beach, marking the beginning of the speed trials at Daytona Beach. The Antique Car Festival is an annual (Thanksgiving weekend) event. Ormond became a city in 1930 and was renamed Ormond Beach in 1949. Pop. (2000) 36,301.

Ormonde, EARLS AND DUKES OF, titled Irish nobility of the Anglo-Irish Butler family, grouped below chronologically and indicated by the symbol •.

•**Ormonde, Piers Butler, 8th earl of,** EARL OF OSSORY, Piers also spelled PIERCE, byname THE RED EARL (b. *c.* 1467—d. Aug. 21/26, 1539), leading member of the Butler family in Ireland; he claimed the earldom in 1515, seized the estates, and revived the Butler influence.

A cousin of the 7th earl (Thomas Butler), who died without issue, Piers Butler fought for the English against the rebel Irish lords and in 1522, styled as the pretended earl of Ormonde, he was made lord deputy of Ireland. In 1528, renouncing his claim to the earldom of Ormonde, he was made earl of Ossory, and Sir Thomas Boleyn was made earl of Ormonde. Then in 1538, Piers was given the earldom of Ormonde as a new creation. However, his son and successor, James (*c.* 1496–1546), 9th earl, was confirmed in the possession and precedence of the ancient earldom by Act of Parliament in 1544. James died, poisoned, at Ely House, London, on Oct. 28, 1546.

•**Ormonde, Thomas Butler, 10th earl of,** byname THE BLACK EARL (b. 1531/32—d. Nov. 22, 1614), Irish nobleman who sided with the English in the rebellions in the mid-16th century.

The son of the 9th earl (James Butler), he was brought up a Protestant at the English court after his father's death in 1546. He returned to Ireland in 1554 and was appointed lord treasurer there in 1559. In the rebellions of the Irish he threw his great influence on the English side, but he was equally zealous in prosecuting his private feud with the Desmond family of Fitzgeralds. Gerald Fitzgerald, 14th earl of Desmond, finally rose in open revolt in December 1579, and Ormonde was appointed military governor of Munster in 1580 to put down the rebellion. He was able to pacify Munster after Desmond's death in 1583. Appointed lieutenant governor in 1597, he suppressed the rebellion of the O'Neills and the Burkes. On his death he was succeeded by his nephew, Walter Butler (1569–1633), the 11th earl, who was in turn succeeded by a grandson, James Ormonde, the famous 1st duke of Ormonde.

•**Ormonde, James Butler, 12th earl and 1st duke of** (b. Oct. 19, 1610, London—d. July 21, 1688, Kingston Lacy, Dorset, Eng.), Anglo-Irish Protestant who was the leading agent of English royal authority in Ireland during much of the period from the beginning of the English Civil War to the Revolution of 1688.

James Butler, 1st duke of Ormonde, detail of a painting after Sir Peter Lely, *c.* 1665; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Born into the prominent Butler family, he grew up in England and in 1632 succeeded to the earldom of Ormonde. He began his active career in Ireland in 1633 by offering his services to Lord Deputy Thomas Wentworth (later earl of Strafford). Upon the outbreak of the Roman Catholic rebellion in Ireland in 1641, Ormonde was appointed a lieutenant general in the English Army. He defeated the rebels of the Catholic Confederacy at Kilrush, Munster (April 15, 1642), and at New Ross, Leinster (March 18, 1643). Those triumphs, however, did not prevent the confederates from overrunning most of the country. Ormonde's attempts to conclude a peace were blocked by a Catholic faction that advocated complete independence for Ireland. The situation deteriorated further, and in July 1647 Ormonde departed from Ireland, leaving the Protestant cause in the hands of the Parliamentarians, who had defeated King Charles I in the English Civil War.

Returning to Ireland in September 1648, Ormonde concluded a peace with the confederacy (January 1649); he then rallied Protestant Royalists and Catholic confederates in support of Charles II, son and successor of Charles I. For several months most of Ireland was under Ormonde's control. But the Parliamentarian general Oliver Cromwell landed at Dublin in August 1649 and swiftly conquered the country for Parliament. Ormonde fled to Charles II's court-in-exile in Paris in December 1650, and for the next 10 years he was one of Charles's closest advisers.

When Charles II returned to England in the Restoration of 1660, Ormonde, who had urged constitutional rather than military rule, was made commissioner for the treasury and the navy. Appointed lord lieutenant of Ireland in 1662, he made vigorous attempts to encourage Irish commerce and industry. Nevertheless, his enemies at court persuaded Charles to dismiss him in 1669. He was restored to royal favour in 1677 and again appointed lord lieutenant of Ireland. Although he was created a duke in the English peerage in 1682, he was recalled from Ireland in 1684 as a result of new intrigues at Charles's court and because of the determination of James, duke of York, to strengthen his supporters in Ireland. A biography, W. Burghclere's *Life of James, First Duke of Ormonde*, was published in 1912.

•**Ormonde, James Butler, 2nd duke of** (b. April 29, 1665, Dublin—d. Nov. 16, 1745, Avignon, Fr.), Irish general, one of the most powerful men in the Tory administration that governed England from 1710 to 1714.

The grandson of the Irish statesman James Butler, 1st duke of Ormonde, he inherited his grandfather's title in 1688 but deserted James II in the Revolution of 1688–89. He then fought in the wars of King William III. Ormonde served Queen Anne as lord lieutenant of Ireland from 1703 to 1707 and from 1710 to 1713. In 1711 he succeeded John Churchill, duke of Marlborough, as commander in chief of the British forces in the War of the Spanish Succession against the French (1701–13). Nevertheless, soon after he landed in the Netherlands, he was secretly instructed (May 1712) not to join England's allies in offensive operations while the Tory government was trying—unknown to the Allies and the Whigs—to come to terms with the French. Because Ormonde maintained ties with the Jacobites, who upheld Stuart claims to the English throne, he was removed from his command on the accession of the Hanoverian king George I in 1714. In June 1715 the Duke was impeached by the Whigs for his complicity in the secret Tory negotiations. He fled to France in August, and Parliament passed an act of attainder confiscating his titles and estates. Shortly thereafter he attempted, without success, to land in England during an abortive Jacobite rebellion. He settled in Spain and later lived at Avignon.

Ormsby-Gore, William George Arthur, 4th Baron Harlech (b. April 11, 1885, London—d. Feb. 14, 1964, London), British politician and scholar who was active in promoting education in the British colonies.

Educated at Eton and at New College, Oxford (1907), Ormsby-Gore was elected to Parliament in 1910. During World War I he served in Egypt, where he acquired a lifelong interest in Zionism, and in 1917 he became an assistant secretary to the Cabinet. He was British liaison officer with the 1918 Zionist Mission in Palestine, and he was a member of the British delegation to the Paris Peace Conference in 1919.

Ormsby-Gore held several other diplomatic posts before being appointed parliamentary undersecretary in the Colonial Office in October 1922. He was made a privy councillor in February 1927 and remained in the Colonial Office until 1929. In 1936 he was appointed colonial secretary, a post he resigned two years later because of his elevation to the peerage (on the death of his father, the 3rd Baron Harlech) and because of his outspoken criticism of Nazi Germany. Lord Harlech subsequently held other high positions in government and banking.

In dealing with Britain's African colonies, he promoted educational policies in keeping with the needs of the region. He also championed scientific research to aid in solving the medical and agricultural problems afflicting the underdeveloped portions of the British Empire. In line with his interest in and commitment to education, he served as prochancellor of the University of Wales from 1945 to 1957.

A scholar of the arts and architecture, he was associated with several museums and was a trustee of the National Gallery (1927–34; 1936–41) and of the British Museum (1937–64). As postmaster general from 1931 to 1936, he made a determined effort to improve post office architecture. His books—*Florentine Sculptors of the Fifteenth Century* (1930) and four volumes in the series *Guide to the Ancient Monuments of England* (1935, 1936, and 1948)—reflected his knowledge of and enthusiasm for the arts.

Ormuz (Iran): *see* Hormuz.

Ormuz, Strait of (Asia): *see* Hormuz, Strait of.

ornament, in architecture, any element added to an otherwise merely structural form, usually for purposes of decoration or embellishment. Three basic and fairly distinct categories of ornament in architecture may be recognized: mimetic, or imitative, ornament, the forms of which have certain definite meanings or symbolic significance; applied ornament, intended to add beauty to a structure but extrinsic to it; and organic ornament, inherent in the building's function or materials.

Mimetic ornament is by far the most common type of architectural ornament in primitive cultures, in Eastern civilizations, and generally throughout antiquity. It grows out of what seems to be a universal human reaction to technological change: the tendency to use new materials and techniques to reproduce shapes and qualities familiar from past usage, regardless of appropriateness. For example, most common building types in antiquity, such as tombs, pyramids, temples, and towers, began as imitations of primeval house and shrine forms. An obvious example is the dome, which developed as a permanent wooden or stone reproduction of a revered form originally built of pliable materials. In the mature stages of early civilizations, building types tended to evolve past primitive prototypes; their ornament, however, usually remained based on such models. Decorative motifs derived from earlier structural and symbolic forms are innumerable and universal. In developed Indian and Chinese architecture, domical and other originally structural forms occur often and lavishly as ornament. In ancient Egypt, architectural details continued throughout history to preserve faithfully the appearance of bundled papyrus shafts and similar early building forms. In Mesopotamia, brick walls long imitated the effect of primitive mud-and-reed construction. In the carved stone details of Greco-Roman orders (capitals, entablatures, moldings), the precedent of archaic construction in wood was always clearly discernible.

Architectural ornament in classical Greece exemplified the common tendency for mimetic ornament to turn into applied ornament, which lacks either symbolic meaning or reference to the structure on which it is placed. By the 5th century BC in Greece, the details of the orders had largely lost whatever conscious symbolic or structural significance they may have had; they became simply decorative elements extrinsic to the structure. The Doric frieze is a good case: its origin as an imitation of the effect of alternating beam ends and shuttered openings in archaic wood construction remained evident, but it came to be treated as a decorative sheath without reference to the actual structural forms behind. In losing their mimetic character, the details of the Greek orders acquired a new function, however; they served to articulate the building visually, organizing it into a series of coordinated visual units that could be comprehended as an integrated whole, rather than a collection of isolated units. This is the concept of applied decoration which was passed on through the Greco-Roman period. The triumphal arch of Rome, with its system of decorative columns and entablature articulating what is essentially one massive shape, is a particularly good illustration. Most of the great architecture of the Renaissance and Baroque periods depends on applied ornament; to a large extent, the difference between these styles is the difference in decoration.

Judicious and intellegent use of applied ornament remained characteristic of most Western architecture until the 19th century. During the Victorian period, however, the rationale of applied ornament broke down, and an indiscriminate and inappropriate use of decoration became one of the most characteristic features of 19th-century architecture. Architectural ornament and architectural forms proper tended to part company, to be designed quite independently of each other. Since it became obvious that ornament so conceived served no good purpose at all, a reaction was inevitable; it began to appear in force by the 1870s.

As early as the 1870s H.H. Richardson adopted the Romanesque style less for its historical associations than for the opportunities it afforded him to express the nature and texture of stone. In mature examples of his architecture from the mid-1880s, ornament in the older, applied sense has virtually disappeared, and buildings depend for their aesthetic effect mainly on the inherent qualities of their materials. The generation following Richardson saw a further development of this principle everywhere.

By the early 20th century a preoccupation with the proper function of architectural ornament was characteristic of all advanced architectural thinkers; by the mid-20th century what may be called an organic concept of architectural ornament had been formulated. In the United States Louis Sullivan was the chief contributor to the new architectural expression. Sullivan's urban architecture was largely based on an emphasis of the dynamic lines and patterns that were produced by modern steel-frame construction, but he retained interspersed bands and patches of naturalistic ornament on parts of his buildings' facades, applied with studied discipline. With the general reaction against Victorian principles after World War I, however, leading designers rejected even this kind of applied ornament and relied for ornamental effect on the inherent qualities of building materials alone. The International Style, in which Walter Gropius and Le Corbusier were the chief figures, dominated advanced design during the late 1920s and 1930s. During the period of dominance of the austere International Style, which lasted into the 1960s, architectural ornament of almost any kind was absent from the facades of major buildings. It was not until the 1970s, with the advent of the Post-Modernist architectural movement, that the unadorned functionalism of the International Style was moderated to permit a modest use of ornament, including classical motifs.

ornamentation, in music, the embellishment of a melody, either by adding notes or by modifying rhythms. In European music, ornamentation is added to an already complete composition in order to make it more pleasing. This concept is foreign to ancient and much modern Oriental music, in which boundaries between ornamentation, improvisation, and composition are impossible to define. *See* improvisation; melody type.

Ornamentation varies greatly in different ages and countries. Its traditional vocabulary reflects and often influences musical styles. Some styles of ornamentation result from technical limitations of an instrument; others reflect the desire to add variety to repetitions. Most creatively, ornamentation is linked with improvisation and, therefore, with composition. When a piece is transferred from one medium to another, the instrumental style and ornamentation appropriate to the new medium may alter the character of the music. Until the late 18th century, performers learned to improvise florid embellishment in order to heighten the expressive power of music. But badly executed ornaments cause confusion, and critics complained that ornamentation was sometimes debased by a tasteless display of virtuosity.

Vocal ornamentation in sacred music was opposed by medieval churchmen as detrimental to the purity of the chant. All that is known of early medieval ornamentation is that some notational signs signified ornaments and that the vocal trill was known from at least the 3rd century. The first notated dances, dating from the 13th century, show features of a purely instrumental style of ornamentation. In 14th-century Italian secular music a fundamental technique of ornamentation arose, that of diminution, or division (*i.e.,* dividing the basic melody notes into groups of shorter notes). This technique became codified, and the performer could choose one of several diminution patterns to ornament a phrase. Diminutions were generally cadential (*i.e.,* performed at the end of a section), and the practice became a feature of the 18th-century concerto (*see* cadenza).

In the 15th century the first theoretical works dealing with ornamentation appeared, followed in the 16th century by many guides to ornamentation, mostly by Italian authors and directed toward amateurs. In these works vocal ornamentation was conceived as abstract musical expression rather than as an expression of literary ideas. It was primarily concerned with reflecting the mood of the text, not with underlining individual words. Therefore, the singer's approach to diminution was basically similar to the instrumentalist's.

Early in the 17th century there was a decisive change in vocal and instrumental styles of composition, and two distinct national styles of ornamentation, Italian and French, were founded. Vocal ornamentation was used expressly to heighten the emotional content of the words. To achieve this, a new, emotionally expressive style of melodic writing developed, together with a rhythmically mannered vocabulary of vocal ornamentation. In Italy, although diminution was still practiced, the new style of ornamentation was reserved for solo vocal music.

The principles of diminution were preserved in the 17th-century French style of vocal ornamentation associated with the *airs de cour* (accompanied solo songs, or airs). They also survived in the varied repeats found in harpsichord and lute music. Early 17th-century French lute music used many small ornaments for purposes of articulation and accentuation, as well as rhythmic modifications of the written notes. These ornaments became important features of harpsichord music, while rhythmic modifications were incorporated in later instrumental styles.

Following the ornamented vocal style of about 1600, the Italian instrumental style remained florid. Elaboration of solo works in the mid-18th century required great skill on the performer's part, as it was customary for the composer to write only a skeleton of the melody to be filled out by the performer. But the gymnastics practiced by virtuosi of the late 18th and early 19th centuries led ultimately to debasement of the Italian style.

The French and Italian styles of ornamentation remained distinct throughout most of the 18th century. Thus J.S. Bach, not born to either style, could use both at will. In the works of Joseph Haydn and W.A. Mozart, written ornaments were incorporated in a manner that marked the absorption of ornaments into the accepted musical language. In the 19th century many ornaments became an integral part of the musical language without being left to the performer's discretion, except in Italian opera. Thus, many phrases in works of Frédéric Chopin and Richard Wagner can be traced back to earlier forms of ornamentation.

Orne, *département,* Basse-Normandie *région,* northwestern France. It was created from parts of the historical province of Normandy (*q.v.*), the county of Perche, and the duchy of Alençon. It is separated from the English Channel by the *départements* of Manche on the west and Calvados on the north. Hilly in most parts, especially in the southwest and east, Orne is the watershed between rivers flowing to the Channel and the Atlantic Ocean. Most of the land lies above 600 feet (180 m). The highest point in Orne and in all of Normandy is 1,368 feet (417 m) in the Forest d'Écouves. Southeast of the forest is the ancient market town of Alençon, Orne's capital, which is situated on the Sarthe River on the *département*'s southern boundary. The Sarthe, which springs from headwaters north of Mortagne-au-Perche (one of the most picturesque small towns in France), flows southwestward and is one of 20 rivers and 800 streams rising in the *département.* The Orne River rises near the ancient cathedral city of Sées and flows northwestward through the market town of Argentan, which was seriously damaged in 1944 during the Battle of Normandy.

Predominantly agricultural, Orne has a temperate climate with moderate rainfall. Most of the farming land is used for horse and cattle breeding. Butter and cheese, particularly Camembert (the name of a village in the north), are among the chief products. The apple trees that were the source of a well-known local cider have been widely removed to facilitate more extensive, larger-scale forms of agriculture (beef cattle and grains), and the cider industry was reduced as a result. A stud farm founded under Louis XIV is situated near Argentan. Textiles are still manufactured, and some light industries have been developed. Alençon, Argentan, and Mortagne-au-Perche are the administrative centres of the three *arrondissements* of the *département,* which is in the educational division of Caen. Area 2,356 square miles (6,103 square km). Pop. (1993 est.) 294,100.

Orne River, river, Basse-Normandie *région,* northern France. It is 94 miles (152 km) long and flows through Orne and Calvados *départements* to empty into the English Channel 8 miles (13 km) north-northeast of Caen. It rises in the Perche Hills, east of the city of Sées, after which it flows northwestward through Argentan and then westward through Putanges-Pont-Écrepin, below which it is dammed. Its course then runs through the Saint-Aubert gorges to Pont-d'Ouilly and Thury-Harcourt, traversing some of the most beautiful parts of a region sometimes called the Norman Switzerland. The river crosses pastureland to Caen, which is connected with the sea by a canal running parallel to the Orne and its estuary, along its left bank. Limestone from the formations that flank the lower course of the river was used to construct historic buildings in England, including the Tower of London and Norwich Cathedral.

ornithischian, any member of an order (Ornithischia) of herbivorous dinosaurs with hip bones arranged like those of birds (hence their name, "bird-hipped"). The ornithischians were one of the two major orders of dinosaurs, the other being the saurischians. Their chief distinguishing feature was the structure of their pelvis, or hip, which had a backward-pointing pubis bone, like those of birds, in contrast to the pubis of saurischians, which extended forward like those of modern reptiles. Ornithischians were also distinguished by an extra bone at the tip of the lower jaw. Many species had a toothless, horny beak that was useful for nipping off vegetation, along with powerful cheek teeth for grinding it up. Many ornithischians also had a lattice of bony tendons that stiffened their tail bones.

The ornithischians consisted of two distinct suborders: Cerapoda and Thyreophora. The cerapods are further subdivided into the infraorders Ornithopoda, Pachycephalosauria, and Ceratopsia. The ornithopods all walked on two legs but were otherwise quite diverse in habit, size, and distribution, including as they did the iguanodons and hadrosaurs (duck-billed dinosaurs). The closely related pachycephalosaurs were also bipedal but had dome-shaped heads with high foreheads and thick skulls. The Thyreophora consisted of the infraorders Stegosauria and Ankylosauria. The stegosaurs were four-legged dinosaurs with double rows of bony plates running along their backs. The ankylosaurs were heavily armoured with plates and spikes on their backs, flanks, and heads. The ceratopsians' defensive armour was confined to their massive head, which culminated in a great bony frill to protect the neck and shoulders.

Ornithischians were more efficient plant-eaters than were saurischians, partly because their grinding teeth were set recessed within fleshy cheeks that prevented food from falling out of their mouths while they were chewing it. Because of these superior adaptations, the ornithischians outnumbered plant-eating saurischians by the end of the Cretaceous Period (66.4 million years ago).

Ornithogalum, genus of plants in the family Liliaceae, consisting of about 100 species of bulbous herbs, native to Eurasia and Africa. The leaves are grouped at the base of the plant, and the white or yellow bell- or star-shaped flowers are borne in clusters at the top of a leafless stalk. Each flower is on a short stem, with a bract (leaflike structure) below it. Star-of-Bethlehem (*O. umbellatum*), a common garden ornamental, has white-marked leaves and white star-shaped flowers. There is a wide green band on the outside of three segments of each flower.

Star-of-Bethlehem (*Ornithogalum umbellatum*)
© Nell Bolen, The National Audubon Society Collection/Photo Researchers

Ornitholestes, small, lightly built dinosaur found as fossils in Late Jurassic deposits (*i.e.,* those 144 to 163 million years old) of North America and belonging to the order Saurischia, suborder Therapoda. *Ornitholestes* is relatively well known from a complete skeleton found in Wyoming. It was about 2 m (6 feet) long. The skull, neck, and tail were long, and the neck was apparently very flexible. The forelimbs were well developed and ended in three clawed fingers that were longer and slimmer than were common in dinosaurs, indicating that *Ornitholestes* could catch quick-moving and elusive prey. It has been suggested that *Ornitholestes* may have preyed upon the early birds, hence the name, which means "bird robber," but it is equally probable that it ate small, speedy lizards and even early mammals. The hind limbs were well developed, with strong running muscles; *Ornitholestes* was a biped capable of rapid movement, running with the neck and tail outstretched as counterbalances to the body. It is probable that *Ornitholestes,* a small, active predator, filled an ecological niche that was later filled by mammals. *Ornitholestes* probably inhabited forest undergrowth in the Late Jurassic of North America. Some authorities equate *Ornitholestes* and *Coelurus.*

ornithology, a branch of zoology dealing with the study of birds. Most of the early writings on birds are more anecdotal than scientific, but they represent a broad foundation of knowledge, including much folklore, on which later work was based. In the European Middle Ages many treatises dealt with the practical aspects of ornithology, particularly falconry and game-bird management. From the mid-18th to the late 19th century, the major thrust was the description and classification of new species, as scientific expeditions made collections in tropical areas rich in bird species. By the early 20th century the large majority of birds were known to science, although the biology of many species was virtually unknown. In the latter half of the 19th century much study was done on the internal anatomy of birds, primarily for its application to taxonomy. Anatomical study was overshadowed in the first half of the 20th century by the rising fields of ecology and ethology (the study of behaviour) but underwent a resurgence beginning in the 1960s with more emphasis on the functional adaptations of birds.

Ornithology is one of the few scientific fields in which nonprofessionals make substantial contributions. Much research is carried out at universities and museums, which house and maintain the collections of bird skins, skeletons, and preserved specimens upon which most taxonomists and anatomists depend. Field research, on the other hand, is conducted by both professionals and amateurs, the latter providing valuable information on behaviour, ecology, distribution, and migration.

Although much information about birds is gained through simple, direct field observation (usually aided only by binoculars), some areas of ornithology have benefited greatly from the introduction of such instruments and techniques as bird banding, radar, radio transmitters (telemeters), and high-quality, portable audio equipment.

Bird banding (or ringing), first performed early in the 19th century, is now a major means of gaining information on longevity and movements. Banding systems are conducted by a number of countries, and each year hundreds of thousands of birds are marked with numbered leg bands. The study of bird movements has also been greatly aided by the use of sensitive radar. Individual bird movements are also recorded on a day-to-day basis by the use of minute radio transmitters (telemeters) worn by or implanted inside the bird. Visual markings, such as plumage dyes and plastic tags on the legs or wings, allow visual recognition of an individual bird without the difficult task of trapping it and allow the researcher to be aided by amateur bird-watchers in recovering his marked birds. Research into the nature and significance of bird calls has burgeoned with the development of high-quality, portable audio equipment.

Ornithomimus, genus of ostrichlike dinosaurs (infraorder Tetanurae) found as fossils in Tibetan and North American deposits from the Late Cretaceous Period (97.5 to 66.4 million years ago).

Ornithomimus was about 3.5 m (11.5 feet) long. With its slender, muscular rear limbs, it was well adapted for running and is believed to have used its long, outstretched tail for balance. Like other "ostrich dinosaurs," *Ornithomimus* was toothless, having beaklike jaws. Its small, thin-boned skull had an unusually large brain cavity.

For a time *Ornithomimus* was identified with *Struthiomimus,* but authorities have differentiated the two by the forelimbs (*Struthiomimus*' were much stronger) and by the age of the rocks bearing fossils (*Ornithomimus* is found in younger rocks). They are also believed to have inhabited different environments. *See also* Struthiomimus.

ornithopod, any member of an infraorder (Ornithopoda) of ornithischian dinosaurs characterized by a bipedal (two-legged) stance, from which is derived their name ("bird feet"). Ornithopods, along with pachycephalosaurids and ceratopsians, made up the cerapod suborder of the ornithischians. Unlike most other ornithischians, ornithopods could walk and run on their hind legs, with the tail held off the ground, though they may have spent much of their time moving more slowly on all fours. Many were good runners who made use of their speed to escape predators. Ornithopods were the dinosaur equivalent of such modern ruminants as cattle and deer; their toothless, horny beaks were designed for cropping vegetation, which they ground up in their molarlike cheek teeth.

The ornithopods flourished from the Late Triassic to the Late Cretaceous period (230 to 66.4 million years ago) and were one of the most successful and longest-lived dinosaur groups. They consisted of five families: Fabrosauridae, Heterodontosauridae, Hypsilophodontidae, Iguanodontidae, and Hadrosauridae. The fabrosaurs were the earliest and most primitive of the ornithopods; these small, lightly built, lizardlike creatures reached lengths of 0.6–1.2 m (2–4 feet). The heterodonts were more advanced and began to show the horny beaks and specialized teeth typical of ornithischians. The hypsilophodonts flourished from the Late Jurassic to the Late Cretaceous (163 to 66.4 million years) and were one of the most widespread and long-lived families of dinosaurs. Their members ranged in size from 1.5 to 7 m and show evidence of having been speedy runners. They may have given rise to the more advanced iguanodonts and hadrosaurs, who spent most of their time on all fours. The iguanodonts were medium-sized to large dinosaurs with the specialized grinding teeth typical of advanced ornithopods. The largest and best-known species, *Iguanodon,* reached a length of 9 m. The hadrosaurs, or duck-billed dinosaurs, received their name from their broad, flattened, elongated snouts and their toothless beaks. Their sets of grinding teeth and their cheek pouches were extremely well adapted to browsing on vegetation. The hadrosaurs commonly reached lengths of 9–11 m and were among the most abundant dinosaurs in North America by the end of the Cretaceous Period.

ornithosis (disease): *see* psittacosis.

Örnsköldsvik, city in the *län* (county) of Västernorrland, northern Sweden, on the Gulf of Bothnia. It was founded in 1842. In 1892 the railroad arrived, and the next year Örnsköldsvik received city status. Wood pulp is the major industrial product and the chief export through the city's harbour. Metalworking and leatherworking are also significant. The city has an airfield and ferry service to Vaasa, Fin. Örnsköldsvik also has a museum of local art, history, and ethnography. Pop. (1995 est.) mun., 58,663.

Orodes II (d. 37/36 BC), king of Parthia (reigned *c.* 57–37/36 BC) who helped his brother Mithradates III murder their father, Phraates III, and in turn supplanted Mithradates.

When Mithradates occupied Seleucia and Babylon, Orodes stormed those towns, immediately executing his brother. No less ruthless to his attendants, he put to death the general who in 53 BC had crushed the Romans under the triumvir Marcus Licinius Crassus at Carrhae in northern Mesopotamia. Parthian raids into Roman Syria were checked by the death of Pacorus, Orodes' favourite son and perhaps joint king. Orodes, stunned by the loss, was murdered in turn by another son, who became Phraates IV.

orogeny, mountain-building event, generally one that occurs in geosynclinal areas. In contrast to epeirogeny, an orogeny tends to occur during a relatively short time in linear belts and results in intensive deformation. Orogeny is usually accompanied by folding and faulting of strata, development of angular unconformities, and the deposition of clastic wedges of sediments in areas adjacent to the orogenic belt. Igneous intrusion and regional metamorphism are often associated with an orogenic event as well. Orogenies may result from continental collisions, the underthrusting of continents by oceanic plates, continental rifting, the overriding of oceanic ridges by continents, and other causes. *Compare* epeirogeny.

orographic precipitation, rain, snow, or other precipitation produced when moist air is lifted as it moves over a mountain range. As the air rises and cools, orographic clouds form and serve as the source of the precipitation, most of which falls upwind of the mountain ridge. Some also falls a short distance downwind of the ridge and is sometimes called spillover. On the lee side of the mountain range, rainfall is usually low, and the area is said to be in a rain shadow. Very heavy precipitation typically occurs upwind of a prominent mountain range that is oriented across a prevailing wind from a warm ocean.

Or'ol (Russia): *see* Oryol.

Oromo, also called (pejorative) GALLA, one of the two largest ethnolinguistic groups of Ethiopia, constituting nearly one-third of the population and speaking a language of the Cushitic branch of the Afro-Asiatic (formerly Hamito-Semitic) family. Originally confined to the southeast of the country, they migrated in waves of invasions in the 16th century AD. They occupied all of southern Ethiopia, with some settling along the Tana River in Kenya; most of the central and western Ethiopian provinces, including the southern parts of the Amhara region; and, farther north, the Welo and Tigre regions near Eritrea. Wherever the Oromo settled in these physically disparate areas, they assimilated local customs and intermarried to such an extent that the Oromo people's original cultural cohesiveness and racial homogeneity were largely lost. Also, the resultant political division of the Oromo facilitated their own eventual subjugation by the people whom they had driven northward, the Amhara, the other major ethnolinguistic group in Ethiopia.

The Oromo pursued pastoralism before the great migration, and this way of life still prevails for the great numbers of people in the southern provinces. In the east and north, however, long mingling and intermarrying with the Sidamo and Amhara resulted in the adoption of a sedentary agriculture.

The southern groups, such as the Arusi and Boran (Borana) Oromo, have remained pagan, believing in a sky god. They have retained virtually intact the *gada,* or highly formalized age-set system (a system in which all members of society are included in separate age groups for life). These traditions have been diluted in the north, where the Oromo are either Muslim or Ethiopian Orthodox Christian and where many Oromo have, through acculturation, become social equals to the dominant Amhara. The influence of the Oromo increased after the Ethiopian revolution of 1974.

Oron, also called IDUA ORON, town, Akwa Ibom state, southeastern Nigeria. It lies at the mouth of the Cross River and is the terminus of roads from Uyo and Opobo. Oron is a coastal trade centre for the yams, cassava, fish, and palm oil and kernels produced by the Ibibio people of the hinterland. The town is the site of a hospital, a teacher-training college, the Federal Nautical College of Nigeria, and several secondary schools. Oron also has a museum (1959) that houses a notable collection of ancestral carvings of the Ibibio people. Pop. (1992 est.) 70,550.

Orono, town, Penobscot county, southern Maine, U.S. It lies along the Penobscot River, 8 miles (13 km) northeast of Bangor. Settled about 1775, it was known as Deadwater and Stillwater Plantation before acquiring in 1840 its present name honouring Joseph Orono, a Penobscot Indian chief who befriended the settlers during the American Revolutionary War. Mainly residential, the town is the seat of the parent campus of the University of Maine (1865). Light manufactures include textiles and wood and paper products. Inc. 1806. Pop. (1994 est.) 9,463.

Orontes River, Arabic NAHR AL-ʿĀSĪ, river in southwestern Asia, draining a large part of the northern Levant into the Mediterranean Sea. From its source in Al-Biqāʾ (*i.e.,* the Bekaa Valley) of central Lebanon, the river flows northward between the parallel ranges of the Lebanon and Anti-Lebanon mountains into Syria, where it has been dammed to form Ḥimṣ Lake. Northwest of Ḥamāh the Orontes crosses the fertile Al-Ghāb, once a swampy depression, and enters Turkey, where it bends westward and empties into the sea near Samandağ. Largely unnavigable for most of its 250-mile (400-kilometre) length, it is, nonetheless, an important source of irrigation water, especially between Homs and Ḥamāh and in Al-Ghāb. Major tributaries of the Orontes include the Kura Su and the Odi Meidani. Homs, Ḥamāh, and the ancient Greek city of Antioch (Antakya) are the largest riparian settlements.

oropendola, any of a dozen tropical American bird species of the family Icteridae (order Passeriformes) that are larger than caciques but of similar habits. Oropendolas weave hanging nests—up to 1.8 m (6 feet) long—in tall, isolated trees. They nest colonially: males stand guard by day but roost apart, and females construct the nests—sometimes 100 in a single tree—and raise the young. Males are about 30 to 50 cm (12 to 20 inches) long; females are considerably smaller. Both sexes are largely black or, in certain species, greenish, sometimes with touches of reddish or brown. They have rounded yellow tails and heavy bills swollen at the base to form frontal shields. The most widely distributed species is the crested oropendola (*Psarocolius,* formerly *Ostinops, decumanus*), from Panama to Argentina.

Oroquieta, city, northwestern Mindanao, Philippines. The city fronts on Iligan Bay (east) and the Bohol (Mindanao) Sea (northeast). It was a municipality until designated a city in 1969. Oroquieta is an important coconut-growing area and a major agricultural trading centre, and it also has a small port. It is a leading producer of copra and has several coconut-processing factories. Pop. (1990 prelim.) 53,000.

Orosius, Paulus (b. probably Braga, Spain; fl. 414–417), defender of early Christian orthodoxy, theologian, and author of the first world history by a Christian.

As a priest Orosius went in about 414 to Hippo, where he met St. Augustine. In 415 Augustine sent him to Palestine, where he immediately opposed Pelagianism. At a synod summoned that July by Bishop John of Jerusalem, Orosius ineffectively accused Pelagius of heresy.

Early in 416 he returned to Augustine, who asked him to compose a historical apology of Christianity, *Historiarum adversus paganos libri VII* (Eng. trans. by I.W. Raymond, *Seven Books of Histories Against the Pagans*). This book chronicles the history of the world from its creation through the founding and history of Rome up until AD 417. In it Orosius describes the catastrophes that befell mankind before Christianity, arguing against the contention that the calamities of the late Roman Empire were caused by its Christian conversion. Orosius' book enjoyed great popularity in the early European Middle Ages, but only its narrative covering the years after AD 378 has any value to modern scholars.

Oroville Dam, earth-fill dam on the Feather River, California, U.S., completed in 1968 by the state of California. It is one of the highest embankment dams in the world. The dam, 754 feet (230 m) high and 6,799 feet (2,073 m) long at its crest, has a volume of 78,000,000 cubic yards (59,635,000 cubic m) and forms a reservoir of 3,484,000 acre-feet (4,297,000,000 cubic m) capacity. The first and key unit of the Feather River project, which serves extensive areas in central and southern California hundreds of miles distant, Oroville Dam provides irrigation water, flood control, and 440 megawatts of hydroelectric-power capacity.

Oroya (Peru): *see* La Oroya.

"Self-Portrait," tempera on cardboard, by Orozco, 1940; in the Museum of Modern Art, New York City

By courtesy of the Museum of Modern Art, New York City

Orozco, José Clemente (b. Nov. 23, 1883, Ciudad Guzmán, Mex.—d. Sept. 7, 1949, Mexico City), Mexican painter, considered the most important 20th-century muralist to work in fresco.

Early life and training. Orozco first became interested in art in 1890, when his family moved to Mexico City. Going to and from school each day, he paused in the open workshop of José Guadalupe Posada, Mexico's first great printmaker, whose grotesque caricatures and illustrations appeared in sensational news sheets devoted to reporting lurid crimes and political scandals. Orozco was captivated by Posada's strong images and vivid style and for the rest of his life acknowledged the early influence of the master engraver.

Orozco's prodigious skill was immediately recognized, and he began night classes in drawing at the Academy of San Carlos. Toward the end of the decade, his pursuit of art was interrupted when he was forced to study for careers as an agronomist and, later, as an architectural draftsman. When he was 17, however, he lost his left hand in a laboratory accident, and he abandoned his architectural studies for painting. He reentered the Academy of San Carlos in 1905 with a renewed passion for painting and set about assiduously to become a competent painter.

About this time Orozco became acquainted with a radical student named Gerardo Murillo. Violently opposed to the cultural anti-Mexicanism in vogue, Murillo assumed the Aztec name of Doctor Atl and urged artists to reject the cultural domination of Europe and to cultivate in their work Mexican traits. Accordingly, Orozco began conscientiously to explore Mexican themes and to draw more directly from scenes of daily life. He became a caricaturist for an opposition newspaper and haunted the barrios, or slums, of Mexico City, painting a series of watercolours dealing with the lives of prostitutes and collectively titled "House of Tears." When civil war broke out again in Mexico in 1914, Orozco supported the forces of General Venustiano Carranza as a satirical artist on the revolutionary paper *La vanguardia* ("The Vanguard"), which was edited by Atl.

Mature work and later years. In 1917 the reaction of critics and moralists to the exhibition of his "House of Tears" paintings forced Orozco to leave Mexico for the United States, where he lived for several unhappy years in San Francisco and New York City. On his return to Mexico in 1920, he found that the new government of President Álvaro Obregón was eager to sponsor his work, and, along with his colleagues Diego Rivera, David Alfaro Siqueiros, and others, he was commissioned to paint murals on the walls of the National Preparatory School; these artists' efforts initiated the Mexican muralist movement. Orozco's early (1923–27) murals there, such as "Maternity" and "Christ Destroying His Cross," were derivative, and Orozco himself destroyed many of them. Those dating from 1926, however, show him coming into his own style, achieving in such works as "Cortés and Malinche" and "The Trench" (both in the National Preparatory School) a monumentality unprecedented in Mexican art.

In 1927 government patronage and protection were withdrawn from Orozco and his fellow muralists, and the subsequent attacks of critics and moralists or conservatives again forced him to flee to the United States. Humiliated in his own country, he consciously strove, after settling in New York City, to forge an international reputation that would force his countrymen to recognize his value as an artist. He slowly became known in American art circles and finally was commissioned in 1930 to paint a major mural in the refectory of Pomona College, Claremont, Calif. In choosing to do a mural of Prometheus, Orozco temporarily abandoned social criticism and historical subjects in favour of a more universal theme: the self-sacrificing titan from ancient Greek mythology, bringing man fire, which enlightens, liberates, and purifies but also consumes. Orozco also turned away from the relative stylistic repose of his earlier murals. Recalling Atl's drawings and enthusiastic descriptions of the tortured figures in Michelangelo's "Last Judgment" in the Sistine Chapel, he portrayed Prometheus as a monumental pseudo-Michelangelesque giant, straining his powerful muscles against the burden of his fate. By contrast, his murals (1930–31) at the New School for Social Research in New York City, dealing with the themes of universal brotherhood and social revolution, suffer by the slavish use of "dynamic symmetry," a theory fashionable in the 1920s, which purported to represent the ancient Greek system of proportions.

In 1932 Orozco made a brief trip to Europe, where he viewed the art of England, France, Spain, and Italy. Although he was impressed with the paintings of Pablo Picasso, his even deeper admiration of the Byzantine mosaics of Rome and Ravenna is reflected in his great series of murals (1932–34) in the Baker Library at Dartmouth College. Orozco divided this vast scheme into two series of murals correlated to the two main scenes, "The Coming of Quetzalcoatl" and "The Return of Quetzalcoatl." This dichotomy contrasted the stages of man's progression from a primeval, non-Christian paradise to a Christian, capitalist hell. Byzantine mosaics also clearly influenced the pictorial style of "Modern Migration of the Spirit," but such scenes as "Stillborn Education" and the Quetzalcoatl murals achieve unique levels, respectively, of grotesqueness and of sweeping force.

His art enriched and matured and his reputation firmly established, Orozco in 1934 returned triumphantly to Mexico, where he completed the illustration of his view of history in the mural "Catharsis" (Palace of Fine Arts, Mexico City). This eschatological work displayed a laughing prostitute lying among the debris of civilization's last cataclysm, showing the constantly increasing pessimism that culminated in his Guadalajara murals (1936–39). His murals painted in the lecture hall of the University of Guadalajara, the Governor's Palace (1937), and the chapel of the orphanage of Cabañas Hospice (1938–39) recapitulate the historical themes developed at Dartmouth and in "Catharsis" but with an intensity of anguish and despair he never again attempted. Here, history is blindly careening toward Armageddon. The only hope for salvation is the self-sacrificing creative man, the "Man of Fire," painted in the hospice dome.

Orozco's subsequent murals, such as those in the Gabino Ortíz Library in Jiquilpan (1940), in the Palace of Justice in Mexico City (1941), and in his last great work, "National Allegory" (1947–48; Normal School, Mexico City), neglect universal themes and dwell almost exclusively on nationalism. Canvases such as "Metaphysical Landscape" (1948), however, hint at a growing mysticism, and its abstract style indicates that Orozco may have been on the brink of nonfigurative painting when he died. His easel paintings, such as "Zapatistas" (1931; Museum of Modern Art, New York City), often attain the grandeur of his murals, which remain his definitive vehicles of expression, the touchstones of his genius.

Orozco became a national hero in his later years, honoured as the leader among those who raised Mexican art to a position of international eminence. In 1947 the president of Mexico awarded him a prize as the outstanding Mexican figure in the arts and sciences during the preceding five years.

BIBLIOGRAPHY. MacKinely Helm, *Man of Fire: J.C. Orozco* (1953, reissued 1971), the earliest major work in English, is still considered a classic. Alma Reed, *Orozco* (1956), is a biographical account written by an American who had known the artist for many years. David Elliott (ed.), *Orozco!* (1980), an exhibition catalog, is most useful for its collection of critical studies.

Orpen, Sir William, in full SIR WILLIAM NEWENHAM MONTAGUE ORPEN (b. Nov. 27, 1878, Stillorgan, County Dublin, Ire.—d. Sept. 29, 1931, London, Eng.), British painter, best known for his vigorously characterized portraits; he was also an official artist during World War I.

"Leading the Life in the West" (self-portrait), oil on canvas by Sir William Orpen; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, gift of George F. Baker, 1914

Orpen studied at the Dublin Municipal School of Art and at the Slade School, London. He first exhibited at the New English Art Club, of which he became a member in 1900. His portraits, which established his reputation, showed the influence of Édouard Manet. He also became known as a painter of such conversation pieces as "Homage to Manet" (1909; City Art Gallery, Manchester), which portrayed members of the contemporary English art world sitting in conversation beneath a famous portrait by that artist. Orpen was the official painter of the Peace Conference at Versailles after World War I, for which he painted "The Signing of the Peace Treaty at Versailles" (1919–20; Imperial War Museum, London). Orpen is now regarded as a facile and prolific but somewhat superficial artist who nevertheless achieved great popularity in his day.

He was created knight commander of the Order of the British Empire in 1918 and elected a Royal Academician in 1919.

Orpheus, ancient Greek legendary hero endowed with superhuman musical skills. He became the patron of a religious movement based on sacred writings said to be his own.

Traditionally, Orpheus was the son of a Muse (probably Calliope, the patron of epic poetry) and Oeagrus, a king of Thrace (other versions give Apollo). According to some legends, Apollo gave Orpheus his first lyre. Orpheus' singing and playing were so beautiful that animals and even trees and rocks moved about him in dance.

Orpheus joined the expedition of the Argonauts, saving them from the music of the Sirens by playing his own, more powerful music. On his return, he married Eurydice, who was soon killed by a snakebite. Overcome with grief, Orpheus ventured himself to the land of the dead to attempt to bring Eurydice back to life. With his singing and playing he charmed the ferryman Charon and the dog Cerberus, guardians of the River Styx. His music and grief so moved Hades, king of the underworld, that Orpheus was allowed to take Eurydice with him back to the world of life and light. Hades set one condition, however: upon leaving the land of death, both Orpheus and Eurydice were forbidden to look back. The couple climbed up toward the opening into the land of the living, and Orpheus, seeing the Sun again, turned back to share his delight with Eurydice. In that moment, she disappeared.

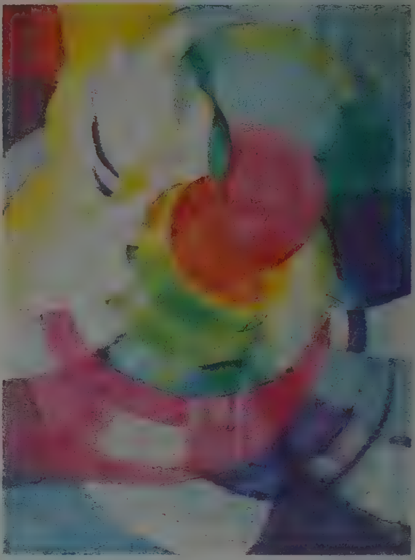
Orpheus himself was later killed by the women of Thrace. The motive and manner of his death vary in different accounts, but the earliest known, that of Aeschylus, says that they were Maenads urged by Dionysus to tear him to pieces in a Bacchic orgy because he preferred the worship of the rival god Apollo. His head, still singing, with his lyre, floated to Lesbos, where an oracle of Orpheus was established. The head prophesied until the oracle became more famous than that of Apollo at Delphi, at which time Apollo himself bade the Orphic oracle stop. The dismembered limbs of Orpheus were gathered up and buried by the Muses. His lyre they had placed in the heavens as a constellation.

The story of Orpheus was transformed and provided with a happy ending in the medieval English romance of *Sir Orfeo*. The character of Orpheus appears in Christoph Gluck's opera *Orfeo ed Euridice* in the 18th century and in Jean Cocteau's drama and film *Orphée* and the Brazilian film *Black Orpheus* in the 20th century.

A Hellenistic mystery religion based on the teachings and songs of Orpheus is thought to have eventually arisen in ancient Greece, although no coherent description of such a religion can be constructed from historical evidence. Most scholars agree that by the 5th century BC there was at least an Orphic movement, with traveling priests who offered teaching and initiation, based on a body of legend and doctrine said to have been founded by Orpheus. Part of the Orphic ritual is thought to have involved the mimed or actual dismemberment of an individual representing the god Dionysus, who was then seen to be reborn. Orphic eschatology laid great stress on rewards and punishment after bodily death, the soul then being freed to achieve its true life.

Orphism, French ORPHISME, trend in Cubist painting that gave priority to colour. The movement was named in 1912 by the French poet Guillaume Apollinaire, whose use of the word Orphic recalls both the Symbolist painters' use of the term Orphic art in reference to Paul Gauguin's orchestration of colour and the poetry of Orpheus, the legendary poet and singer. Among the painters working in this style, Apollinaire noted Robert Delaunay (*q.v.*), Fernand Léger, Francis Picabia, and Marcel Duchamp. In the attempt to approximate music, Delaunay and his wife, Sonia, led the way in transforming the visual into abstract colour harmonies.

One of the resources Delaunay used to arrive at a way of integrating colour and Cubism was a book on simultaneous contrasts (*De la loi du contraste simultané des couleurs,* 1839), by the chemist Michel-Eugène Chevreul. Unlike the Neo-Impressionist painter Georges Seurat, who had employed these theories during the 1880s, Delaunay was interested in applying them in an abstract way, exploring the effects of colour and light when they are not bound to an object. In his abstract work "Simultaneous Composition: Sun Disks" (1912–13; Museum of Modern Art, New York City), superimposed circles of colour have their own rhythm and movement.



"Disks of Newton (Study for Fugue in Two Colors)," Orphic painting by František Kupka, oil on canvas, 1912; in the Philadelphia Museum of Art

By courtesy of the Philadelphia Museum of Art, the Louise and Walter Arensberg Collection

Another painter associated with Orphism was František Kupka, a Czech who lived in Paris. Possibly Kupka was aware of Delaunay's disk paintings when he painted his "Disks of Newton (Study for Fugue in Two Colors)" in 1912 (Philadelphia Museum of Art). As the musical analogy implicit in the title suggests, the vibrating colour orchestrations on the canvas seem to create visual music.

It was Delaunay's canvases, however, that deeply impressed August Macke, Franz Marc, and Paul Klee, who visited his Paris studio in 1912; this exposure had a decisive influence on their subsequent work. Orphism also exerted an influence on the development of German Cubism.

orphrey, also spelled ORFRAY, or ORFREY, highly elaborate embroidery work, or a piece of such embroidery. More specifically orphrey is an ornamental border, or embroidered band, especially as used on ecclesiastical vestments. Orphreys often utilized cloth of gold, gold trimming, or gold and silk weft, or filling. They were frequently woven several bands wide and then cut apart.

orpiment, the transparent yellow mineral arsenic sulfide (As_2S_3), formed as a hot-springs deposit, an alteration product (especially from realgar), or as a low-temperature product in hydrothermal veins. It is found in Copalnic, Romania; Andreas-Berg, Ger.; Valais, Switz.; and Çölemerik, Tur. The crystals belong to the monoclinic system. For detailed physical properties, *see* sulfide mineral (table).

Ancient Middle Eastern artists used orpiment (from Latin *auri,* "golden"; *pigmentum,* "paint") as a pigment, but it gained little

Orpiment from the Caucasus, U.S.S.R.

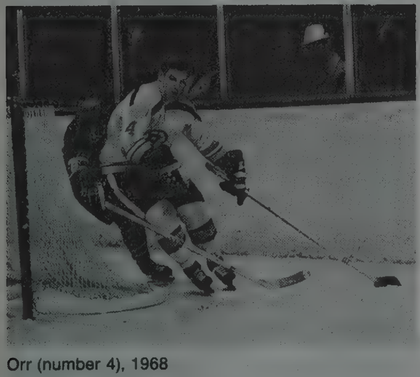
By courtesy of the Field Museum of Natural History, Chicago, photograph, John H. Gerard—EB Inc.

attention from Western artists until the 18th century, when production of artificial arsenic trisulfide was begun. Because of its extreme toxicity, it was abandoned, except for a very fine grade called king's yellow, which was used until cadmium yellow (principally cadmium sulfide) became available.

orpine (plant): *see* stonecrop.

Orr, Bobby, byname of ROBERT GORDON ORR (b. March 20, 1948, Parry Sound, Ont., Can.), Canadian-American professional National Hockey League (NHL) ice hockey player, who was the first defenseman to lead the NHL in scoring.

Orr came to the attention of Boston Bruin scouts when he was 12, and he was signed to a junior amateur contract. He joined the Bruins in 1966, when he had reached the legally required age of 18, and played with them for 10 seasons, during which time he helped the Bruins to the playoffs eight consecutive seasons and to two Stanley cups. Orr was a highly decorated player and received more than 16 major awards in his career, including the Norris Trophy as most valuable defenseman (1967–75). In the 1968–69 season he scored 21 goals and made 43 assists (64 points) for a season record for a defenseman. In his career he set seasonal defenseman records for goals (46), assists (102), and points (139). He won the Art Ross Trophy for most points scored (1970 and 1975) and the Hart Trophy for most valuable player (1970–72).



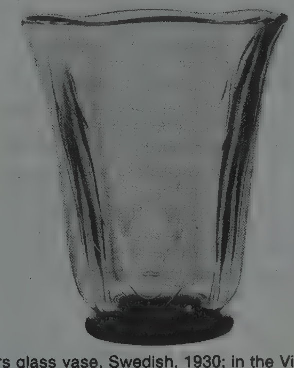
Orr (number 4), 1968

Canada Wide—Pictorial Parade/EB Inc.

Orr was frequently injured in the course of play. He was traded to the Chicago Black Hawks in 1976, where he served as assistant coach during the 1976–77 season. He retired in 1978. After his retirement as a player, Orr received the Lester Patrick Trophy for outstanding contributions to hockey in the United States.

Orr, Sir John Boyd: *see* Boyd-Orr of Brechin Mearns, John Boyd Orr, Baron.

Orrefors glass, fine 20th-century glass produced by a glasshouse at Orrefors in the south of Sweden. In 1916 and 1917 the Orrefors glasshouse hired the painters Simon Gate and Edvard Hald, respectively, to become the first artists engaged directly in glass design. One of their innovations was *Graal* glass, in which coloured relief decorations were encased in a layer of colourless, transparent crystal to produce a smooth surface. Orrefors art glass is characterized by smooth, clean lines of brilliant crystal, especially suggestive of frozen liquid. Orrefors glassware is noted for its ornamentation, which combines a simple, modern decorative style with a revival of 18th-century scrupulousness in engraving technique. Such ware includes chandeliers and several lines of hand-blown stemware.



Orrefors glass vase, Swedish, 1930; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, A.C. Cooper Ltd.

orrery, mechanical model of the solar system used to demonstrate the motions of the planets about the Sun, probably invented by George Graham (d. 1751) under the patronage of Charles Boyle, 4th Earl of Orrery. In use for several centuries, the device was formerly called a planetarium. The orrery presents the planets as viewed from outside the solar system in an accurate scale model of periods of revolution (with the Earth completing a year's rotation in about 10 minutes). The planets' sizes and distances, however, are necessarily inaccurate. *See also* planetarium.

Orrery, Roger Boyle, 1st Earl of, LORD BOYLE, BARON OF BROGHILL (b. April 25, 1621, Waterford, Ire.—d. Oct. 16, 1679, Castlemartyr, Ire.), Irish magnate and author prominent during the English Civil Wars, Commonwealth, and Restoration periods.

Boyle took the Parliamentary side in the Civil Wars and became a confidential adviser of Oliver Cromwell; yet, when Charles II was restored to the throne in 1660, he also became a popular member of the king's circle as a poet and playwright. He wrote *Parthenissa* (1676), a romance in the French style, and introduced rhymed heroic drama into England. Created Earl of Orrery in 1660, he was made a privy councillor and lord president of the council of Munster in the same year. In 1669 he successfully defended himself before Parliament on charges of having tried to seize the lord lieutenantship of Ireland.

orris oil, yellowish, semisolid, fragrant essential oil obtained from the roots of the Florentine iris (*Iris florentina*) and used as a flavouring agent, in perfume, and medicinally. The use of orris oil to flavour candies, soft drinks, and gelatin desserts, once common, has declined owing to components that may cause allergic reactions. Orris oil has mild medicinal properties and was formerly used to treat bronchitis, edema, and liver ailments.

Orry, Jean (b. Sept. 4, 1652, Paris, Fr.—d. Sept. 29, 1719, Paris), French economist whose broad financial and governmental reforms in early 18th-century Spain helped to further the implementation of centralized and uniform administration in that country.

Louis XIV of France, whose grandson had just succeeded to the Spanish throne as Philip V (November 1700), sent Orry to Spain in 1701 to report on the finances of that kingdom. Orry drew up detailed memoranda advising not only the centralization of financial administration but also a thoroughgoing reform of the governmental system in which political power would be transferred from the royal councils, dominated by nobles with strong vested interests, to a number of ministers, similar to the French secretaries of state, who would be loyal to the crown.

Orry was first put in charge of Spain's military finance. He reorganized and increased tax collection and devised various expedients to pay for troops and provisions for the War of the Spanish Succession (1701–14). He also instituted proceedings to recover stolen or alienated royal property. Shortly after May 1705 a secretaryship of war and finance was created, an initial step in Orry's governmental reform program.

Orry was recalled to France in the summer of 1706 and returned to Spain in April 1713. He and the royal favourite, Madame des Ursins, then became the real rulers of the country. Orry continued his efforts to bring financial administration under the control of the central government. He also packed the royal councils with new members whose votes would support his policies and created four new secretaries of state who reported to him. Meanwhile, local government was centralized by the division of Spain into 21 provinces, each governed by an intendant responsible to the *veedor general,* who was Orry. Before his reforms could be established, however, Orry was dismissed and ordered to leave Spain (Feb. 7, 1715).

Though certain of Orry's reforms did not survive his departure, his financial reorganization, destruction of the power of the royal councils, and creation of secretaries of state and intendants had a significant impact on future Spanish governmental administration.

Ors y Rovira, Eugenio d' (b. Sept. 28, 1882, Barcelona, Spain—d. Sept. 25, 1954, Villanueva y Geltrú), Catalan essayist, philosopher, and art critic who was a leading ideologue of the Catalan cultural renaissance of the early 20th century.

Although Ors studied law in Barcelona and earned a doctorate in philosophy from the University of Madrid, he was by profession a journalist who wrote an influential column (later anthologized) in Catalan called *Glossari.* When he moved to Madrid in 1920 he continued to write *El nuevo glosario* ("The New Glossary") in Castilian. He excelled in a short-essay genre, the *glosa.* In a column in 1906, he coined the term *noucentisme* ("1900-ism") to characterize Catalan culture of the 20th century. He believed that art should be "arbitrary," or subjectivist, breaking with traditional norms. By extending this concept to the political movement of Catalan nationalism, he was able to characterize a whole program of political and cultural renewal for Catalonia. He wrote *Tres horas en el Museo del Prado* (1923; "Three Hours in the Prado Museum") and provided valuable criticisms of the art of Francisco de Goya, Paul Cézanne, and Pablo Picasso. He was also a gifted caricaturist, influenced by Aubrey Beardsley.

Ors studied philosophy at the Sorbonne in Paris with Henri Bergson and Émile Boutroux. He was particularly interested in the study of reason and the classical ideal. His *El secreto de la filosofía* (1947; "The Secret of Philosophy") recapitulates many of his ideas.

Orsay Museum, French MUSÉE D'ORSAY, museum of Paris, France. It is housed in the former Orsay Railway Station (Gare d'Orsay), a large, ornate structure built in the Beaux Arts style and completed in 1900; it sits on the Left Bank of the Seine River opposite the Tuileries. The luxurious railway station was largely vacant by the 1970s owing to the decline in train travel. With government funds, the building was restored and remodeled in the early 1980s and opened in 1986 as a museum housing a comprehensive selection of mid- and late 19th-century French painting, sculpture, photography, and decorative arts. The Orsay Museum holds the Impressionist paintings that were formerly at the Jeu de Paume Museum, the Post-Impressionist works that were formerly at the Palais de Tokyo, and selected paintings that were at the Louvre Museum. A comprehensive collection of 19th-century French academic painting and sculpture complements works by the better-known artists of the late Romantic and Neoclassical, Realist, Barbizon, Impressionist, Post-Impressionist, Divisionist, and Nabi schools.

Orsha, also spelled ORŠA, city, Vitebsk *oblast* (province), east-central Belarus. It lies about 60 miles (100 km) southwest of Smolensk on the Dnieper River. First mentioned in 1067, it has always been a major focus of trade routes and has frequently been attacked and destroyed. During World War II the city came under German occupation and suffered extensive damage. Today Orsha is an important railway junction on the Moscow-Warsaw and St. Petersburg–Odessa lines, with other lines to Lepel and Krichov. The city has linen, clothing, machine-building, and food-processing industries. Pop. (1991 est.) 125,300.

Orsi, Paolo (b. Oct. 18, 1859, Rovereto, Austria—d. Nov. 9, 1935, Rovereto), archaeologist who pioneered in the excavation and research of sites, from the prehistoric to the Byzantine, in Sicily and southern Italy.

A large part of present knowledge of Sicilian art and civilization, especially in the Siculan (pre-Greek) period, is the result of Orsi's work. Appointed director of the museum at Syracuse, Sicily, in 1888, he devoted himself to explorations, discovering the Siculan culture from excavations of cemeteries all over the island and laying the groundwork for the chronology of its four periods. His meticulous excavations of Greek cities throughout Sicily and in the southern Italian provinces of Magna Graecia uncovered many new sites and extended known sites, including Syracuse and Gela in Sicily and Croton and Locri Epizephyrii on the mainland. He organized his finds in the museums of Syracuse and Reggio di Calabria and published 300 titles. He also edited *Bullettino di paletnologia italiana* and *Archivio storico della Calabria e Lucania.*

Orsi
By courtesy of the Antichita della Sicilia Orientale

Orsini FAMILY, one of the oldest, most illustrious, and for centuries most powerful of the Roman princely families. Their origins, when stripped of legend, can be traced back to a certain Ursus de Paro, recorded at Rome in 998. They first became important in the late 12th century with the election of Giacinto Orsini as Pope Celestine III (1191–98), whose generosity to his nephews founded the territorial fortunes of the family. During the next 100 years, allegiance to the papacy developed into a firm, if profitable, tradition in the house of Orsini; they assumed leadership of pro-papal Guelf interest against the pro-imperial Ghibelline Colonna family, and for centuries afterward the savage rivalry of these two magnate families dominated the politics of Rome and its territory.

In 1241, as senator of Rome, Matteo Orsini (d. 1246) saved the city from capture by the Holy Roman emperor Frederick II and the Colonna. As the 13th century advanced, the Orsini acquired increasing influence in church policy and administration; four of the family were chosen cardinals, and one of them, Giovanni, also became pope, as Nicholas III, in 1277. Their Guelf allegiance also brought them land and lordships in the Angevin kingdom of Naples, where several long-lived lines of the family took root among the nobility. At the end of the 13th century, the Orsini were among the principal supporters of Pope Boniface VIII in his attacks on the Colonna family and were rewarded for their services with the grant of Nepi in fee. Not all of them, however, were partisans of Boniface. Napoleone Cardinal Orsini, partly for family reasons, sided with the Colonna and the French, and it was he who promoted in 1305 the election of a French pope, Clement V, the first of the "popes of Avignon."

From this time on, apart from the brief interval of Borgia rule (late 15th and early 16th centuries) when the Orsini were dispossessed of their castles and three of them were put to death, the Orsini retained their dominant place among the Roman aristocracy, providing soldiers, statesmen, and prelates to the church. In 1629 they were created princes of the Holy Roman Empire, and in 1718 they were raised to the princely dignity at Rome. In 1724 Pietro Francesco Orsini was elected pope as Benedict XIII.

The family survived in the Orsini dukes of Gravina, descended from Napoleone Orsini, son of the 13th-century senator, Matteo. Their principal fiefs were Bracciano (near Rome), acquired in the 14th century, and Gravina (near Bari), acquired in the 15th century. They received the ducal title from Pius IV in 1560 and held Bracciano into the 17th century and Gravina to 1807. From the 16th century it became regular for an Orsini to hold the office of prince assistant to the pontifical throne.

Orsini, Felice (b. Dec. 10, 1819, Meldola, Papal States [now in Italy]—d. March 13, 1858, Paris, France), Italian nationalist revolutionary and conspirator who tried to assassinate the French emperor Napoleon III.

A follower of the Italian revolutionary leader Giuseppe Mazzini, Orsini participated in the uprisings in Rome in 1848–49, thereafter serving as Mazzini's agent in Switzerland, Hungary, and England. After a daring escape from an Austrian prison in Mantua in 1855, he went to London and wrote two accounts of his adventures—*The Austrian Dungeons in Italy* (1856) and *Memoirs and Adventures of F. Orsini Written by Himself* (1857)—which were extremely popular with the British public. Orsini broke with Mazzini in 1857 and, emotionally disturbed, began to plot the assassination of Napoleon III, impelled by the notion that the emperor's death would trigger in France a revolution that would spread to Italy. On the night of Jan. 14, 1858, he and two accomplices threw bombs at the carriage of Napoleon and Empress Eugénie as they were going to the opera in Paris; although several persons were killed, the intended victims were unhurt. Orsini was arrested and executed.

Ironically, following Orsini's attack, Napoleon, remembering the pro-Italian sympathies of his youth, was prompted to declare war on Austria in 1859, from which Italy's independence followed.

Orsini, Giovanni Gaetano: *see* Nicholas III *under* Nicholas (Papacy).

Orsini, Pietro Francesco Vincenzo Maria (pope): *see* Benedict XIII.

Orsk, city, Orenburg *oblast* (province), western Russia. It lies about 150 miles (240 km) south of Magnitogorsk at the confluence of the Ural and Or rivers. It was founded in 1735 as the fortress of Orenburg (*q.v.*), which was moved downriver in 1743. Orsk is now a major industrial centre, with a large oil refinery using petroleum piped from fields on the Caspian Sea. Other products include nickel and cobalt, heavy-metallurgical and mining machinery, electrical equipment, and synthetic alcohol. Pop. (1994 est.) 278,200.

Ørsted, Hans Christian, Ørsted also spelled OERSTED (b. Aug. 14, 1777, Rudkøbing, Den.—d. March 9, 1851, Copenhagen), Danish physicist and chemist who discovered that electric current in a wire can deflect a magnetized compass needle, a phenomenon the importance of which was rapidly recognized and which inspired the development of electromagnetic theory.

Ørsted, detail of a lithograph by Kaufmann after a drawing by C.A. Jensen
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

In 1806 Ørsted became a professor at the University of Copenhagen, where his first physical researches dealt with electric currents and acoustics. During an evening lecture in April 1820, Ørsted discovered that a magnetic needle aligns itself perpendicularly to a current-carrying wire, definite experimental evidence of the relationship between electricity and magnetism. This phenomenon had been first discovered by the Italian jurist Gian Domenico Romagnosi in 1802, but his announcement was ignored.

Ørsted's discovery (1820) of piperine, one of the pungent components of pepper, was an important contribution to chemistry, as was his preparation of metallic aluminum in 1825. In 1824 he founded a society devoted to the spread of scientific knowledge among the general public. Since 1908 this society has awarded an Ørsted Medal for outstanding contributions by Danish physical scientists. In 1932 the name oersted was adopted for the physical unit of magnetic field strength.

Orta, Lake, Italian LAGO D'ORTA, also called LAGO CUSIO, lake in Novara and Verbano-Cusio-Ossola *provincie,* Piemonte (Piedmont) *regione,* northwestern Italy, just west of Lake Maggiore, from which it is divided by Mount Mottarone. About 8 miles (13 km) long and

0.75 mile (1.2 km) wide, it has an area of 7 square miles (18 square km). Its greatest depth is 469 feet (143 m), and the surface is 951 feet (290 m) above sea level. It is the remnant of a much larger body of water through which the waters of the Toce River flowed south toward Novara. From its north end the Nigoglia River flows toward Lake Maggiore.

Island of San Giulio, Lake Orta, Italy
SCALA—Art Resource

Ortega, Domingo, in full DOMINGO LÓPEZ ORTEGA (b. Feb. 25, 1906, Borox, Toledo, Spain—d. May 8, 1988, Madrid), Spanish matador noted for his daring and for his contribution to the literature of bullfighting.

Ortega came from a family of labourers and began bullfighting in 1928. He first appeared as a matador on March 8, 1931, and continued to fight for more than 20 years. He was one of Spain's most admired matadors, and his artistry and daring influenced most bullfighters who came after him. His *El Arte del Toreo* (1950; "The Art of Bullfighting") extolled the virtues of his style of fighting: moving into the bull's path and leading it past the body in an arc, rather than in a straight line. He appeared with decreasing frequency after 1950 and retired in 1954.

Consult the INDEX *first*

Ortega Saavedra, Daniel (b. Nov. 11, 1945, La Libertad, Nicaragua), Nicaraguan guerrilla leader, member of the Sandinista junta that took power in 1979, and from November 1984 to April 1990 the elected president of Nicaragua.

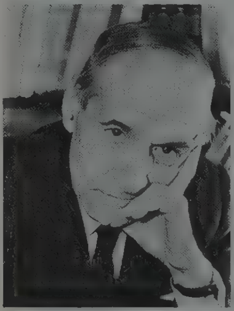
Son of a veteran of the peasant army of César Augusto Sandino, Ortega moved with his family to Managua in the mid-1950s. He briefly attended the Central American University in Managua, then in 1963 he went underground and became a member of the Sandinista National Liberation Front (FSLN). By 1967 he was in charge of the FSLN's urban resistance campaign against the ruling Somoza family.

In the fall of 1967 Ortega was arrested for his part in a bank robbery and spent the next seven years in jail. He and a number of other Sandinista prisoners were released at the end of 1974 in exchange for high-level Somocista hostages. Ortega, with the other released prisoners, was exiled to Cuba, where he received several months of guerrilla training. After secretly returning to Nicaragua, Ortega played a major role in the conciliation of various FSLN factions and in the formation of alliances with business and political groups. This policy gradually turned the guerrilla campaign into a full-fledged civil war and led to the Sandinista victory in 1979. One of the five members of the Sandinista junta, Ortega was named coordinator of the junta in 1981 and three years later was elected president of Nicaragua. He was defeated in his bid for reelection in 1990 by Violeta Barrios de Chamorro, who had served for less than a year as a member of the Sandinista junta.

Ortega y Gasset, José (b. May 9, 1883, Madrid, Spain—d. Oct. 18, 1955, Madrid), philosopher and humanist who greatly influenced the cultural and literary renaissance of Spain in the 20th century.

Ortega y Gasset studied at Madrid University (1898–1904) and in Germany (1904–08) and was influenced by the neo-Kantian philosophical school at Marburg. As professor of metaphysics at Madrid (1910), however, he diverged from neo-Kantianism in such works as *Adán en el paraíso* (1910; "Adam in Paradise"), *Meditaciones del Quijote* (1914; "Quixote's Meditations"), and *El tema de nuestro tiempo* (1923; *Modern Theme*). He saw individual life as the fundamental reality: reason as a function of life is substituted for absolute reason, and for absolute truth he substituted the perspective of each individual ("I am I, and my circumstance"). He shared the preoccupation of his generation with Spain's problems. He founded the periodicals *España* (1915), *El Sol* (1917; "The Sun"), and *Revista de Occidente* (1923; "Review of the West").

Between 1936 and 1945 he was a voluntary exile in Europe and Argentina, returning to Spain at the end of World War II. In 1948 he founded the Institute of Humanities in Madrid. Of his other works, the best known are *España invertebrada* (1922; *Invertebrate Spain*) and *La rebelión de las masas* (1929; *The Revolt of the Masses*), in which he characterized 20th-century society as dominated by masses of mediocre and indistinguishable individuals, who he proposed should surrender social leadership to minorities of cultivated and intellectually independent men.



Ortega y Gasset
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BIBLIOGRAPHY. Franz Niedermayer, *José Ortega y Gasset* (1973), chronicles the philosopher's life. Antón Donoso and Harold C. Raley, *José Ortega y Gasset* (1986), contains 4,000 items of Ortega scholarship.

Ortelius, Abraham (Latin), Flemish ABRAHAM ORTELS, or WORTELS (b. April 14, 1527, Antwerp [Belgium]—d. July 4, 1598, Antwerp), Flemish cartographer and dealer in maps, books, and antiquities, who published the first modern atlas, *Theatrum orbis terrarum* (1570; *Epitome of the Theater of the Worlde*).

Trained as an engraver, Ortelius about 1554 set up his book and antiquary business. About 1560, under the influence of Gerardus Mercator, Ortelius became interested in mapmaking. Within a decade he compiled maps of the world on a heart-shaped projection (1564), of Egypt (1565), and of Asia (1567), as well as the first edition of the *Theatrum,* which contained 70 maps, derived from 87 authorities and engraved in a uniform style. Enlarged and kept up to date in successive editions until late 1612, the *Theatrum* appears to have been the most popular atlas of its time. He was appointed geographer to Philip II of Spain (1575). A facsimile of the *Theatrum* was published in 1964.

orthochlorite, subgroup of chlorite minerals. *See* chlorite.

orthoclase, common alkali feldspar mineral, a potassium aluminosilicate ($KAlSi_3O_8$); it usually occurs as variously coloured, frequently twinned crystals in granite. Orthoclase is used in the manufacture of glass and ceramics; occasionally, transparent crystals are cut as gems. Orthoclase is primarily important as a rock-forming mineral, however, and is abundant in alkali and acidic igneous rocks, in pegmatites, and in gneisses. For detailed physical properties, *see* feldspar (table).

The feldspar minerals are mixtures of sodium, potassium, and calcium aluminosilicates, and any feldspar may be classed by its percentage of each of these three pure compounds, called end-members. Orthoclase is the potassium-bearing end-member of the system; its symbol is *Or*.

Orthoclase and the sodium-bearing end-member of the system, albite (sodium aluminosilicate; $NaAlSi_3O_8$), form the alkali feldspars, a series in which sodium-bearing and potassium-bearing species intermingle; thus, there is a continuous chemical variation between the two end-members. Because the intermediate members, called orthoclase-microperthites, cannot blend homogeneously, they take the form of intergrowths of microscopic but distinct crystals of the sodium and potassium end-members.

Orthoclase from Serra de Peneda, Portugal
Emil Javorsky

Orthoclase has an intermediate degree of ordering of the aluminum and silicon atoms in its aluminosilicate crystal framework, falling between the fully ordered arrangement of microcline and the random arrangement of high-sanidine.

orthodontics, division of dentistry dealing with the prevention and correction of irregularities of the teeth—generally entailing the straightening of crooked teeth or the correcting of a poor bite, or malocclusion (physiologically unacceptable contact of opposing dentition, which may be caused by imperfect development, loss of teeth, or abnormal growth of jaws). Of significance to the orthodontist is the sequence of eruption (emergence of the tooth from its developmental crypt into the oral cavity), because such knowledge helps to determine the position of the teeth. Human bone responds best to tooth movement before the age of 18, and consequently orthodontic work is usually more beneficial to a child than an adult.

The practice of orthodontics has existed since early antiquity, but the more elaborate methods of treatment came about in the 20th century. Orthodontics quickly became a specialized branch of dentistry with its own professional organization. Training in orthodontics usually consists of a two-year postgraduate course.

orthodox (from Greek *orthodoxos,* "of the right opinion"), true doctrine and its adherents as opposed to heterodox or heretical doctrines and their adherents. The word was first used in early 4th-century Christianity by the Greek Fathers. Because almost every Christian group believes that it holds the true faith (though not necessarily exclusively), the meaning of "orthodox" in a particular instance can be correctly determined only after examination of the context in which it appears.

It forms part of the official title of the Greek-speaking church (Eastern Orthodox Church) and those in communion with it. Also including orthodox as part of their titles are some of the smaller Eastern churches, which separated from the rest of Christendom in the 5th century as a result of the Monophysite controversy concerning the question of two natures in Christ.

Within Judaism, Orthodox Judaism represents a form of religious belief and practice that adheres most strictly to ancient tradition. Orthodox Judaism, consequently, rejects the view held by modern Reform Judaism that the Bible and other sacred Jewish writings contain not only eternally valid moral principles but also historically and culturally conditioned interpretations of the Law that may be legitimately abandoned. For Orthodox Jews, therefore, the Law is immutably fixed and remains the sole norm of religious observance.

The term is also used to distinguish true Islāmic doctrine from heretical teachings, such as those of the Muʿtazilites.

Orthodox is also applied to a certain type of Protestantism that is usually quite conservative in its interpretation of Scripture. The term evangelical orthodoxy is commonly applied to Protestant Christianity that insists on the full or literal authority and inerrancy of the Bible. In a nonreligious sense, the accepted views held by any unified body of opinion or in any field of study are referred to as orthodox.

Orthodox Church in America, formerly RUSSIAN ORTHODOX GREEK CATHOLIC CHURCH OF AMERICA, ecclesiastically independent, or autocephalous, church of the Eastern Orthodox communion, recognized as such by its mother church in Russia; it adopted its present name on April 10, 1970.

Established in 1794 in Alaska, then Russian territory, the Russian Orthodox mission spread to other parts of the North American continent after the sale of Alaska to the United States (1867). In 1872 the episcopal see was transferred from Sitka, Alaska, to San Francisco and in 1905 to New York. It incorporated many Greek Catholics (Roman Catholics of Eastern rite), immigrants from Austro-Hungary (Galicia and Carpatho-Russia) who returned to Orthodoxy upon arrival in America. It also organized parishes for Russian, Ukrainian, Greek, Serbian, Albanian, Romanian, Bulgarian, and Syrian immigrants.

In 1905 Archbishop Tikhon, head of the American diocese and future patriarch of Moscow (1918), submitted a plan for the autonomy and eventual autocephaly of the American Church to the Holy Synod of St. Petersburg. He also encouraged services in English and published appropriate liturgical books.

In the chaos that followed the Russian Revolution, the administration of the church was paralyzed and relations with Russia cut. Non-Russian ethnic groups organized separate jurisdictions connected with their own mother churches. Thus, in 1922, a Greek archdiocese was established in America by the patriarch of Constantinople. The Orthodox Church in America was consequently divided into a number of national dioceses, each designated by its ethnic origin.

The original diocese itself severed relations with Moscow and in 1924 proclaimed its self-government and broke completely with the Russian Church rather than give a statement of loyalty to the Soviet government. Thus, the American metropolitanate became de facto independent, but without regular canonical status.

The creation of an autocephalous Orthodox Church in America in 1970 provided it with permanent status, without any dependence upon foreign interests, and allowed Orthodox Americans to define their religious affiliation without reference to ethnic origin.

The Orthodox Church in America, which has been joined by Romanian, Bulgarian, Mexican, and Albanian ethnic groups, had a membership of about 1,000,000 in 1978. It maintains a graduate school of theology, St. Vladimir's Seminary, in New York City; an undergraduate school at St. Tikhon Monastery, in South Canaan, Pa.; and a seminary for the training of native Alaskan clergy in Kodiak, Alaska. A member of the World Council of Churches and the National Council of Churches in the U.S.A., the Orthodox Church is governed by a council of bishops, clergy, and laity. It includes approximately 400 parishes, using mostly English in worship.

The Orthodox Church in America does not include all Orthodox groups in the United States and Canada. Among others are the Greek archdiocese, subject to the Ecumenical Patriarchate of Constantinople, and the Ukrainian Orthodox Church. Total Orthodox Church membership in America has been estimated at about 3,000,000.

Orthodox Church of Cyprus: *see* Cyprus, Church of.

Orthodox Church of Czechoslovakia, autocephalous, or ecclesiastically independent, member of the Eastern Orthodox communion, created in 1951 by the patriarchate of Moscow.

There was no unified Orthodox organization in Czechoslovakia before World War II. In the 19th century some Czechs formed an Orthodox church and by 1910 numbered more than 1,000 persons. With the disintegration of the Austro-Hungarian Empire in 1918, an Orthodox church was formed in Bohemia and Moravia by the Serbian patriarch of Belgrade, who consecrated Bishop Gorazd of Prague as the first independent bishop of the Czechs and established the diocese of Mukačevo (1921) for the Carpatho-Russians. In 1930 an important group of Eastern rite Catholics of Carpatho-Russia, who had left the Orthodox Church in 1643, and the clergy and laity of the Czechoslovak church returned to Orthodoxy. All the work of the Czech church, however, was forcibly discontinued, and the church was disbanded during World War II, when Bishop Gorazd and four Orthodox clergy were executed by the Nazis for alleged connections with the resistance movement. Only the eparchy of Mukačevo continued in eastern Slovakia.

After World War II, eastern Carpatho-Russia, with Mukačevo, was annexed by the Soviet Union, and the Serbian patriarch released his own faithful to the Russian church. At the same time, about 10,000 Czechs of Orthodox faith returned to Czechoslovakia after having emigrated under the Austrian monarchy to Volhynia (northwestern Ukraine). After the 1950 Prešov conference, another substantial group of Eastern-rite Catholic laymen and clergy decided to return to the Orthodox Church. The church grew sufficiently to make possible the establishment of four indigenous bishoprics: Prague, Olomouc, Prešov, and Michalovce. Thereupon, the Russian Orthodox Church immediately acknowledged the autocephalous status of the Orthodox Church of Czechoslovakia.

During the liberalization of the Communist regime under the government of Alexander Dubček in 1968, an identification between Orthodoxy and Russian influence in Czechoslovakia caused a large number of former Eastern rite Catholics to return to the Roman communion, and the Greek Catholic Church came into official existence again, reducing the membership and the prestige of the Orthodox Church.

Orthodox Church of Finland, Eastern Orthodox church, recognized as the second state church of Finland. Most of the Orthodox Finns were originally from Karelia, the southeastern part of Finland that was annexed by the Soviet Union in 1940, which was Christianized by Russian monks in the 12th century. The Orthodox are now spread throughout Finland. The church has two dioceses, Kuopio and Helsinki, and a seminary. Having separated itself from Russian jurisdiction when Finland became an independent republic after World War I, it was granted autonomy (independence except in relations with other churches and in the appointment of its archbishop) in 1919 by the patriarch of Moscow but then transferred to the jurisdiction of Constantinople with autonomous status in 1923.

The Finnish Orthodox Church numbers about 60,000 faithful, a little over 1 percent of the total population in a predominantly Lutheran country. It follows the Western dates for Easter and the fixed feasts and uses Finnish and Slavonic as liturgical languages. There are three Orthodox monasteries, an archbishop at Kuopio, and a bishop at Helsinki.

Orthodox Church of Poland, in full AUTOCEPHALOUS ORTHODOX CHURCH OF POLAND, ecclesiastically independent member of the Eastern Orthodox communion, established in 1924 to accommodate the 4,000,000 Orthodox Christians residing in the vast Ukrainian and Byelorussian territories acquired by Poland after World War I. As the new political situation made it difficult for these Orthodox communities to maintain canonical dependence on the patriarchate of Moscow, the Polish government strongly supported, against the protests of Patriarch Tikhon of Moscow, the creation of an autocephalous church in Poland. After World War II, however, most of the areas were returned to the Soviet Union, and the bishops were accepted back into the jurisdiction of Moscow; no more than 350,000 Orthodox remained in Polish territory. In 1948 the Polish Orthodox Church received a new charter of autocephaly from Patriarch Alexis of Moscow. The metropolitan of Warsaw currently oversees five dioceses: Warsaw, Bialystok, Łódź, Wrocław, and Gdańsk.

Orthodox Jewish Congregations of America, Union of, official federation of Jewish Orthodox synagogues in the United States and Canada; its counterpart organization for rabbis is the Rabbinical Council of America.

The union was established in New York City in 1898 to foster Orthodox beliefs and practices. To pursue its goals, the union sponsors numerous elementary and secondary day schools oriented toward Orthodoxy and supports some 15 Orthodox institutes of higher learning (yeshivas). It also publishes the quarterly *Perakim* and two bi-monthlies, *Jewish Life* and *Jewish Action.* The union's main auxiliary unit, Women's Branch (established 1924), publishes *Hachodesh* and operates the Hebrew Teachers Training School for Girls. The National Conference of Synagogue Youth was set up in 1954. Many manufactured foods that meet the requirements of Jewish dietary laws (*kashrut*) bear the union's mark of approval.

Orthodox Judaism, the religion of those Jews who adhere most strictly to traditional beliefs and practices. Jewish Orthodoxy resolutely refuses to accept the position of Reform Judaism that the Bible and other sacred Jewish writings contain not only eternally valid moral principles but also historically and culturally conditioned adaptations and interpretations of the Law that may be legitimately discarded in modern times. In Orthodox Judaism, therefore, both the Written Law (Torah, the first five books of the Old Testament) and the Oral Law (codified in the Mishna and interpreted in the Talmud) are immutably fixed and remain the sole norm of religious observance.

Orthodox Judaism has resisted modern pressures to modify its observance and has held fast to such practices as daily worship, dietary laws (*kashruth*), traditional prayers and ceremonies, regular and intensive study of the Torah, and separation of men and women in the synagogue. It also enjoins strict observance of the sabbath and religious festivals and does not permit instrumental music during communal services.

Despite such seeming inflexibility, Orthodox Judaism is marked by considerable variety. Neo-Orthodoxy, for example, a late 19th-century development under the leadership of Samson Raphael Hirsch, sanctioned modern dress, the use of the vernacular in sermons, and a more positive view of modern culture.

All Jewish groups—Orthodox, Conservative, and Reform—consider themselves and each other as adherents of the Jewish faith. This fact, however, has not deterred Orthodox rabbis from challenging the legitimacy of certain non-Orthodox marriages, divorces, and conversions on the grounds that they violate prescriptions of Jewish law.

In the United States many Orthodox synagogues have joined together to form the Union of Orthodox Jewish Congregations of America. Most Orthodox rabbis are affiliated with the Rabbinical Council of America, the Union of Orthodox Rabbis of the United States and Canada, or the Rabbinical Alliance of America. Yeshiva University, in New York City, composed of a rabbinical seminary and departments for secular studies, is one of the leading centres of Orthodox Judaism in the United States. In the State of Israel, Orthodoxy is the official form of Judaism and has considerable power and status exercised through the Chief Rabbinate of Israel.

Orthodoxy, Feast of, feast celebrated on the first Sunday of Lent by the Eastern Orthodox Church and Eastern Catholics of the Byzantine Rite to commemorate the return of icons (sacred images) to the churches (843) and the end of the long iconoclastic controversy. Fear of idolatry had led to an official proscription against icons in 730. The restoration was effected by Empress Theodora after the death of her iconoclast husband, Theophilus.

Orthodoxy, Autocracy, and Nationality, Russian PRAVOSLAVIYE, SAMODERZHAVIYE, I NARODNOST, in Russian history, slogan created in 1832 by Count Sergey S. Uvarov, minister of education 1833–49, that came to represent the official ideology of the imperial government of Nicholas I (reigned 1825–55) and remained the guiding principle behind government policy during later periods of imperial rule.

Uvarov presented the phrase in a report to Nicholas on the state of education in the Moscow university and secondary schools (*gimnazii*). In the report he recommended that the state's future educational program stress the value of the Orthodox Church, the autocratic government, and the national character of the Russian people; he considered these to be the fundamental factors distinguishing Russian society and protecting it from the corrupting influence of western Europe.

As the official ideology became the basis of Russian education, the study of theology and the classics, as well as vocational training, received much emphasis. Philosophy, however, considered to be the main medium through which corrupting Western ideas were transmitted, was virtually eliminated from the curriculum. Outside the schools, strict censorship was imposed on all publications that were critical of the system of autocracy.

Furthermore, official adherence to the slogan "Orthodoxy, Autocracy, and Nationality" gave an impetus (not entirely approved of by the Emperor) to the cause of the Russian nationalists, many of whom were employed in government and other influential positions. Interpreting *narodnost* to mean "nationalism" rather than "nationality," they used their authority to institute Russification policies in schools in non-Russian areas of the empire, to pressure non-Orthodox religious groups to convert, and to enact various restrictive measures that suppressed non-Russian nationality groups. The nationalists also encouraged the government to support the efforts of other Slavic peoples to achieve national autonomy and, thereby, contributed to the developing rivalry between Russia and Austria (one of Russia's chief allies) for dominance in the Slavic-populated Balkans.

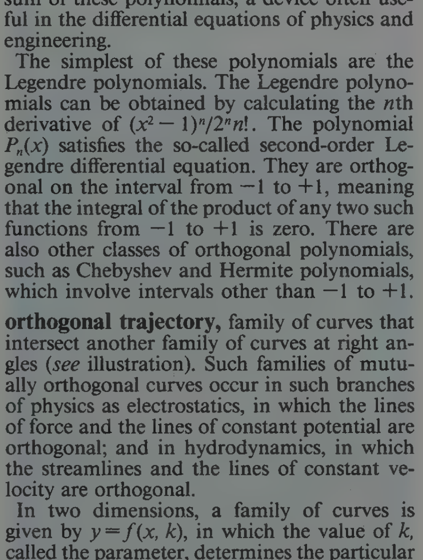
orthogenesis, also called STRAIGHT-LINE EVOLUTION, theory that successive members of an evolutionary series become increasingly modified in a single undeviating direction. That evolution frequently proceeds in orthogenetic fashion is undeniable, though many striking features developed in an orthogenetic group appear to have little if any adaptive value and may even be markedly disadvantageous. A variety of theories have attempted to explain orthogenesis, but with only partial success.

orthogonal polynomial, any of an infinite collection of special polynomials $P_n(x)$, with the subscript n indicating the degree of the polynomial. Their importance derives from their being solutions of differential equations and from the possibility of representing any (continuous) function as a (possibly infinite) sum of these polynomials, a device often useful in the differential equations of physics and engineering.

The simplest of these polynomials are the Legendre polynomials. The Legendre polynomials can be obtained by calculating the nth derivative of $(x^2-1)^n/2^n n!$. The polynomial $P_n(x)$ satisfies the so-called second-order Legendre differential equation. They are orthogonal on the interval from -1 to $+1$, meaning that the integral of the product of any two such functions from -1 to $+1$ is zero. There are also other classes of orthogonal polynomials, such as Chebyshev and Hermite polynomials, which involve intervals other than -1 to $+1$.

orthogonal trajectory, family of curves that intersect another family of curves at right angles (*see* illustration). Such families of mutually orthogonal curves occur in such branches of physics as electrostatics, in which the lines of force and the lines of constant potential are orthogonal; and in hydrodynamics, in which the streamlines and the lines of constant velocity are orthogonal.

In two dimensions, a family of curves is given by $y = f(x, k)$, in which the value of k, called the parameter, determines the particular member of the family. Two lines are perpendicular if their slopes are negative reciprocals of each other. To apply this to two curves, their tangents at the point of intersection must be perpendicular. The slope of the tangent to a curve at a point, called its derivative, can be found using calculus. This derivative, written as y', will also be a function of x and k. Solving the original equation for k in terms of x and y and substituting this expression into the equation for y' will give y' in terms of x and y, as some function $y' = g(x, y)$.



Orthogonal trajectories

As noted above, a member of the family of orthogonal trajectories, y_1, must have a slope satisfying $y'_1 = -1/y' = -1/g(x, y)$, resulting in a differential equation that will have the orthogonal trajectory as its solution. To illustrate, if $y = kx^2$ represents a family of parabolas, then $y' = 2kx$, and, because $k = y/x^2$, $y' = 2y/x$. For the orthogonal curve, $y'_1 = -1/y' = -x/2y$, which is a differential equation that can be solved to give the solution $y^2 + (x^2/2) = k$, which represents a family of ellipses orthogonal to the family of parabolas (*see* illustration).

orthographic projection, common method of representing three-dimensional objects, usually by three two-dimensional drawings, in each of which the object is viewed along parallel lines that are perpendicular to the plane of the drawing. For example, an orthographic projection of a house typically consists of a top view, or plan, and a front view and one side view (front and side elevations).

Where the same name may denote a person, place, or thing, the articles will be found in that order

orthonectid, any of a class (Orthonectida) of rare wormlike parasites of various marine invertebrates; they are sometimes included in the mesozoans, a group regarded as intermediate between protozoans (single-celled animals) and metazoans (multicellular animals). *See* mesozoan.

orthopedics, also called ORTHOPEDIC SURGERY, medical specialty concerned with the preservation and restoration of function of the skeletal system and its associated structures, *i.e.*, spinal and other bones, joints, and muscles.

Orthopedics began in the 18th century with the pioneering efforts of Jean André Venel, who established an institute in Switzerland for the treatment of crippled children's skeletal deformities. A vastly increased knowledge of muscular functions and of the growth and development of bone was gained in the 19th century. Significant advances at this time were the new operation of tenotomy (the cutting of tendons, which made correcting deformities easier), the surgical correction of clubfoot, the invention of the Thomas splint (which provided better support for fractures of long bones in the limbs), and the introduction of quick-setting plaster of Paris for use in orthopedic bandages. The efforts of Sir Robert Jones and the massive casualties of World War I led to the founding of many orthopedic training centres in the early 20th century.

Modern orthopedics has extended beyond the treatment of fractures, broken bones, strained muscles, torn ligaments and tendons, and other traumatic injuries to deal with a wide range of acquired and congenital skeletal deformities and with the effects of degenerative diseases such as osteoarthritis. A specialty that originally depended on the use of heavy braces and splints, orthopedics now utilizes bone grafts and artificial plastic joints for the hip and other bones damaged by disease, as well as artificial limbs, special footwear, and braces to return mobility to disabled patients. Orthopedics uses the techniques of physical medicine and rehabilitation and occupational therapy in addition to those of traditional medicine and surgery.

orthophosphoric acid: *see* phosphoric acid.

orthopteran, broadly, a member of one of four insect orders: the Dictyoptera, which include the cockroaches and mantids; the Grylloblattodea or Notoptera, comprising some 15 species of icebugs; the Phasmida (also called Cheleutoptera, or Phasmatoptera), comprising the walking sticks and leaf insects; and the Orthoptera proper, including katydids, crickets, grasshoppers, and locusts. The confusion in the use of the term orthopteran reflects changes in the taxonomy of the various types over time.

A brief treatment of orthopterans follows. For full treatment, *see* MACROPAEDIA: Insects.

There are about 24,000 known species of orthopterans (in the broad sense). They range in size from a few millimetres to more than 30 centimetres and exhibit a great variety of forms. The largest orthopteran families are worldwide in distribution, although they are concentrated in tropical zones. Most are terrestrial in habit, living amid ground litter or burrowing into the soil. The oldest orthopteran fossils known are from the Carboniferous Period (about 280,000,000 to 345,000,000 years ago); they are of cockroaches that differ hardly at all from present-day species.

The head of typical orthopterans is large and bears a pair of segmented antennae and a pair of compound eyes. They have strong mouthparts adapted to biting and chewing. The thorax bears three pairs of legs and two pairs of wings. The forewings are by far the larger and are usually elongated and leathery or parchmentlike. When folded they cover the hindwings, as well as most of the abdomen. Many species, however, are wingless. The abdomen of the females of most species ends in a long and conspicuous ovipositor, or egglaying organ.

Except for the Grylloblattodea, all major groups of orthopterans contain species that produce sounds of one sort or another that play a role in mating as well as in aggressive behaviour. Crickets, grasshoppers, and katydids produce the most audible sounds by stridulation, which is the rubbing of pegs or serrations on one bodily appendage across ridges on another. Most orthopterans lay eggs, frequently arranged in an egg case. The larval or nymph forms resemble the adults except in their size, and there is no pupa stage. From 4 to 13 molts are typical before the adult form is attained.

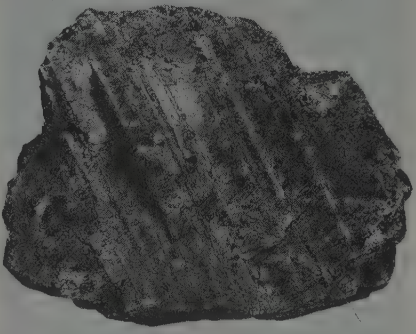
A few kinds of predatory orthopterans, such as mantids, help to control the population of undesirable insects. Many others, however, such as grasshoppers and locusts, may cause severe damage to crops as well as to natural vegetation. Cockroaches are chiefly household pests.

orthopyroxene, any of a series of common silicate minerals in the pyroxene family. Orthopyroxenes typically occur as fibrous or lamellar (thin-plated) green masses in igneous and metamorphic rocks and in meteorites.

These minerals differ in the ratio of magnesium to iron in the crystal structure; their composition ranges from pure magnesium silicate ($MgSiO_3$) to pure ferrous iron silicate ($FeSiO_3$). The series includes:

enstatite	0 to 10% Fe
bronzite	10 to 30% Fe
hypersthene	30 to 50% Fe
ferrohypersthene	50 to 70% Fe
eulite	70 to 90% Fe
ferrosilite	90 to 100% Fe

All except the theoretical end-member ferrosilite occur naturally. The magnesium-rich varieties commonly occur in ultrabasic igneous rocks, the iron-rich varieties in metamorphosed iron-rich sediments. Orthopyroxenes are essential constituents of norite; they also are characteristic of charnockite and granulite. Aside from olivine, magnesium-rich (less than 30 percent iron) orthopyroxene is the commonest silicate in meteorites; it is a major constituent of most chondrites and an important component of mesosiderites and calcium-poor achondrites. For detailed physical properties, *see* pyroxene (table).



Hypersthene from Labrador

By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

The orthopyroxene series crystallizes in the orthorhombic system (three crystallographic axes unequal in length and at right angles to each other). An analogue crystallizing in the monoclinic system (three crystallographic axes unequal in length with one oblique intersection), the clinoenstatite–clinoferrosilite series is found largely in meteorites (achondrites, chondrites, and mesosiderites).

orthorhombic system, one of the structural categories systems to which crystalline solids can be assigned. Crystals in this system are referred to three mutually perpendicular axes that are unequal in length. If the atoms or atom groups in the solid are represented by points and the points are connected, the resulting lattice will consist of an orderly stacking of blocks, or unit cells. The orthorhombic unit cell is distinguished by three lines called axes of 2-fold symmetry about which the cell can be rotated by 180° without changing its appearance. This characteristic requires that the angles between any two edges of the unit cell be right angles but the edges may be any length. Alpha-sulphur, cementite, olivine, aragonite, orthoenstatite, topaz, staurolite, barite, cerussite, marcasite, and enargite crystallize in the orthorhombic system.

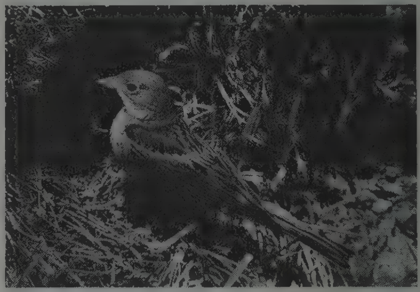
orthowater: *see* anomalous water.

Ortigão, José Duarte Ramalho (b. Nov. 24, 1836, Porto, Port.—d. Sept. 27, 1915, Lisbon), Portuguese essayist and journalist known for his mastery of Portuguese prose and his critical reflections on his native land.

Ortigão began his career as a teacher of French and as a contributor to the *Jornal do Porto* ("Porto Journal") at the age of 19. In 1868 he moved to Lisbon to take up an appointment in the office of the Academia Real das Ciências (Academy of Sciences). In Lisbon he continued writing assiduously for Portuguese journals and established contact with the progressive intellectuals and writers Antero de Quental, Oliveira Martins, Eça de Queirós, and others. Ortigão and his lifelong friend, Queirós, started the satirical review *As Farpas* ("The Darts") in 1871, and, after the departure overseas of Queirós late in 1872, Ortigão produced the review alone until 1888. In his hands, *As Farpas* gradually became less satirical and more didactic and descriptive, a vehicle for disseminating and popularizing such current intellectual doctrines as humanitarianism, positivism, and aesthetic realism.

Ortigão traveled widely throughout his life. His outstanding book is probably *A Holanda* (1885; "Holland"), in which he praises the mode of life and achievements of the Dutch people and upholds them as a model for the Portuguese. With advancing years his political outlook became more conservative; he was opposed to the revolution of 1910, which overthrew the monarchy and established a republic, and, in protest, resigned his public appointments as keeper of the Royal Ajuda Library and secretary to the Academia Real das Ciências. His complete works were published in 39 volumes (1943–49).

ortolan, also called ORTOLAN BUNTING (*Emberiza hortulana*), Eurasian garden and field bird of the subfamily Emberizinae, family Fringillidae. It grows fat in autumn, when large flocks gather for migration to northern Africa and the Middle East, and at that season it is a table delicacy. The bird is 16 centimetres (6½ inches) long, with streaked brown back, grayish head and breast, pale yellow throat, and pinkish belly. Its song resembles that of the related yellowhammer (*E. citrinella*) but is slower, more varied, and usually of six or seven clear notes followed by an occasional flourish. The nest is built on or near the ground and may contain four or five glossy greenish-white eggs, variously marked with purple and brown.



Ortolan (*Emberiza hortulana*)

K.J. Carlson—Ardea, London

Orton, Joe, byname of JOHN KINGSLEY ORTON (b. Jan. 1, 1933, Leicester, Leicestershire, Eng.—d. Aug. 9, 1967, London), British playwright noted for his outrageous and macabre farces.

Orton was originally an unsuccessful actor. He turned to writing in the late 1950s under the encouragement of his lifelong companion, K.L. Halliwell. A handful of novels the pair wrote at this time were not published, however, and it was not until 1964 that Orton had his first success, when his radio play *The Ruffian on the Stair* was broadcast by the BBC. From then until his death in 1967 Orton had a brilliant success as a playwright. His three full-length plays, *Entertaining Mr. Sloane* (1964), *Loot* (1965), and *What the Butler Saw* (produced posthumously, 1969), were outrageous and unconventional black comedies that scandalized audiences with their examination of moral corruption, violence, and sexual rapacity. Orton's writing was marked by epigrammatic wit and an incongruous polish, his characters reacting with comic propriety to the scandalous and disturbing situations in which they found themselves involved. He also wrote four one-act plays during these years, including *Funeral Games* (1968).

Orton's tragically brief career was cut short when he was battered to death by Halliwell, a less successful writer, who immediately afterward committed suicide. John Lahr's *Prick Up Your Ears: The Biography of Joe Orton* was published in 1978.

Ortona, formerly ORTONA A MARE, town, Chieti province, Abruzzi region, central Italy, on a promontory 230 feet (70 m) above sea level, on the Adriatic coast, about 11 miles (18 km) southeast of Pescara. An ancient settlement, it was placed by the 1st-century-BC Greek geographer Strabo and the 1st-century-AD Roman scholar Pliny the Elder in the territory of the Frentani, a clan that allied itself with Rome in the 4th century BC. Ortona later became a Roman municipality. It was severely damaged by earthquakes on several occasions. In the 18th century it was annexed to the Kingdom of Naples and was subsequently absorbed into the Kingdom of Italy. Landmarks include the town's cathedral, rebuilt after damage in World War II, and the Aragonese castle (1452).

A commercial and fishing port and seaside resort, Ortona also has facilities for the manufacture of bricks and macaroni; vines are cultivated in the area surrounding Ortona, and grapes are exported. Pop. (1984 est.) mun., 22,029.

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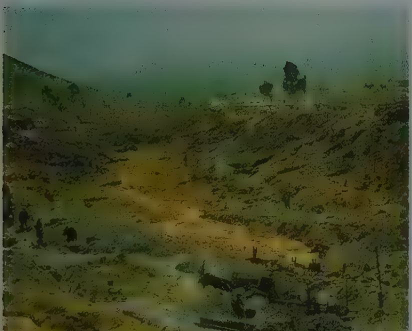
Orūmīyeh, also spelled URMIA, or URŪMIYEH, formerly REZ̧ĀʾĪYEH, or RIZ̧ĀIYEH, city, extreme northwestern Iran. It lies just west of Lake Urmia on a large fertile plain that yields grains, fruits, tobacco, and other crops. The population is mainly Azeri Turkish, with Kurdish, Assyrian Christian, and Armenian minorities. The remains of ancient settlements are scattered over the plain, as are traces of the ancient kingdom of Urartu.

For long periods the city belonged to the Ottoman Empire. In 1900, Christians formed nearly half the population, but in 1918 many left. Most of the remainder were massacred after the retreat of the Russians from the area. Some survivors were later repatriated by the Iranian government. Orūmīyeh is connected by primary roads with Tabriz, 75 miles (120 km) northeast, and with Kermānshāh, 250 miles (400 km) southeast. There is an airfield nearby. Pop. (1985 est.) 298,400.

Orūmīyeh, Daryācheh-ye (Iran): *see* Urmia, Lake.

Oruro, city, west-central Bolivia. It lies at 12,150 feet (3,702 m) above sea level in the Altiplano region, 30 miles (48 km) north of Poopó Lake. Founded in 1606 as Real Villa de San Felipe de Austria ("Royal Town of St. Philip of Austria"), Oruro rose to prominence during the Spanish colonial period as the centre of a rich silver-mining region. It lost importance with the decline of silver production in the 19th century but regained status with the development of tin mining. Tungsten and copper are also worked nearby. The city possesses a technical university (1892) and a refinery that processes much of the nation's tin. The hub of Bolivia's railway system, it is also accessible by road and by air. Pop. (1985 est.) 178,393.



Tin mining near Oruro, Bolivia
Stephanie Dinkins—Photo Researchers/EB Inc.

Oruzheinaya Muzey (Moscow): *see* Armoury Museum.

Orvieto, town, Terni *provincia,* in the Umbria *regione* of central Italy. The town is situated atop an isolated rock 640 feet (195 m) above the junction of the Paglia and Chiana rivers. An Etruscan and later a Roman city (in late Roman times it was called Urbs Vetus, from which its Italian name is derived), Orvieto was the seat of a Lombard duchy and of a Tuscan countship before becoming an independent commune in the 12th century. After much civil conflict and strife with neighbouring cities, the town passed under the dominion of the papacy in 1448.

Orvieto's Gothic cathedral, which is one of the most celebrated in Italy, was begun in 1290 to commemorate the miracle at Bolsena, a town situated just to the southwest, where in 1263 a priest witnessed the miraculous appearance of drops of blood on a Host that he was consecrating; a large silver shrine in the Cappella (chapel) del Corporale contains the Holy Corporal (linen altar cloth) from Bolsena. The cathedral's west facade, a fine polychrome monument of richly sculptured marble, is divided into three gables with intervening pinnacles. The interior of the building is richly decorated with the work of a number of medieval sculptors and painters, notably the frescoes by Luca Signorelli and Fra Angelico in the Cappella Nuova. Many 16th-century sculptures adorn the cathedral, which was completed in 1580.

Cathedral of Orvieto, Italy
SCALA—Art Resource/EB Inc.

The town's many fine 13th-century houses and palaces include the episcopal palace, the Palazzo del Popolo, and the Palazzo dei Papi, the last of which contains a civic museum with many works of art and a collection of antiquities from the nearby Etruscan necropolis of Volsinii. Also notable architecturally are the churches of San Andrea (11th–12th century) and San Domenico (1233–64); the old fortress (1364), which has been converted into public gardens; and the disused St. Patrick's Well, or Pozzo di San Patrizio (1527–40). A major civil-engineering program to consolidate the foundations of the city's buildings was undertaken following subsidence and landslides during the 1970s.

Orvieto is an agricultural centre noted for its white wines, especially a traditional delicate, semisweet variety aged in tufa cliffs and a more recent dry variety. The town's handicraft industries produce wrought iron, ceramics, and lace. Orvieto is linked to Rome and Florence (via Arezzo) by rail and road. Pop. (1984 est.) mun., 22,761.

Orvieto ware, Italian maiolica, a tin-glazed earthenware produced originally at Orvieto, in Umbria, from the 13th century onward. It was copied from, or inspired by, the faience produced in Paterna, Spain. The most common colours of Orvieto ware are the green and manganese purple of their Spanish prototype, though sometimes blue and yellow were added. The style of decoration is Gothic, sometimes with a Middle Eastern flavour. The most common shape is that of a *boccale,* or jug, that has a lip characteristically large and out of proportion with its size. Orvieto ware has almost become a generic term for any pottery in this style.

Orvieto maiolica *boccale*, first half of the 15th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

Orwell, George, pseudonym of ERIC ARTHUR BLAIR (b. 1903, Montihāri, Bengal, India—d. Jan. 21, 1950, London), English novelist, essayist, and critic famous for his novels *Animal Farm* (1945) and *Nineteen Eighty-four* (1949), the latter a profound anti-Utopian novel that examines the dangers of totalitarian rule.

Born Eric Arthur Blair, Orwell never entirely abandoned his original name, but his first book (*Down and Out in Paris and London*) appeared as the work of George Orwell (the surname he derived from the beautiful River Orwell in East Anglia). In time his nom de plume became so closely attached to him that few people but relatives knew his real name was Blair. The change in name corresponded to a profound shift in Orwell's life-style, in which he changed from a pillar of the British imperial establishment into a literary and political rebel.

He was born in Bengal, into the class of sahibs. His father was a minor British official in the Indian civil service; his mother, of French extraction, was the daughter of an unsuccessful teak merchant in Burma. Their attitudes were those of the "landless gentry," as Orwell later called lower-middle-class people whose pretensions to social status had little relation to their income. Orwell was thus brought up in an atmosphere of impoverished snobbery. After returning with his parents to

England, he was sent in 1911 to a preparatory boarding school on the Sussex coast, where he was distinguished among the other boys by his poverty and his intellectual brilliance. He grew up a morose, withdrawn, eccentric boy, and he was later to tell of the miseries of those years in his posthumously published autobiographical essay, *Such, Such Were the Joys* (1953).

Orwell
BBC Copyright

Orwell won scholarships to two of England's leading schools, Winchester and Eton, and chose the latter. He stayed from 1917 to 1921. Aldous Huxley was one of his masters, and it was at Eton that he published his first writing in college periodicals. Instead of accepting a scholarship to a university, Orwell decided to follow family tradition and, in 1922, went to Burma as assistant district superintendent in the Indian Imperial Police. He served in a number of country stations and at first appeared to be a model imperial servant. Yet from boyhood he had wanted to become a writer, and when he realized how much against their will the Burmese were ruled by the British, he felt increasingly ashamed of his role as a colonial police officer. Later he was to recount his experiences and his reactions to imperial rule in his novel *Burmese Days* and in two brilliant autobiographical sketches, "Shooting an Elephant" and "A Hanging," classics of expository prose.

In 1927 Orwell, on leave to England, decided not to return to Burma, and on Jan. 1, 1928, he took the decisive step of resigning from the imperial police. Already in the autumn of 1927 he had started on a course of action that was to shape his character as a writer. Having felt guilty that the barriers of race and caste had prevented his mingling with the Burmese, he thought he could expiate some of his guilt by immersing himself in the life of the poor and outcast people of Europe. Donning ragged clothes, he went into the East End of London to live in cheap lodging houses among labourers and beggars; he spent a period in the slums of Paris and worked as a dishwasher in French hotels and restaurants; he tramped the roads of England with professional vagrants and joined the people of the London slums in their annual exodus to work in the Kentish hopfields.

These experiences gave Orwell the material for *Down and Out in Paris and London* (1933), in which actual incidents are rearranged into something like fiction. The book's publication in 1933 earned him some initial literary recognition. Orwell's first novel, *Burmese Days* (1934), established the pattern of his subsequent fiction in its portrayal of a sensitive, conscientious, and emotionally isolated individual who is at odds with an oppressive or dishonest social environment. The main character of *Burmese Days* is a minor administrator who seeks to escape from the dreary and narrow-minded chauvinism of his fellow British colonialists in Burma. His sympathies for the Burmese, however, end in an unforeseen personal tragedy. The protagonist of Orwell's next novel, *A Clergyman's Daughter* (1935), is an unhappy spinster who achieves a brief and accidental liberation in her experiences among some agricultural labourers. *Keep the Aspidistra Flying* (1936) is about a literarily inclined bookseller's assistant who despises the empty commercialism and materialism of middle-class life but who in the end is reconciled to bourgeois prosperity by his forced marriage to the girl he loves.

Orwell's revulsion against imperialism led not only to his personal rejection of the bourgeois life-style but to a political reorientation as well. Immediately after returning from Burma he called himself an anarchist and continued to do so for several years; during the 1930s, however, he began to consider himself a socialist, though he was too libertarian in his thinking ever to take the further step—so common in the period—of declaring himself a communist.

Orwell's first socialist book was an original and unorthodox political treatise entitled *The Road to Wigan Pier* (1937). It begins by describing his experiences when he went to live among the destitute and unemployed miners of northern England, sharing and observing their lives; it ends in a series of sharp criticisms of existing socialist movements. It combines mordant reporting with a tone of generous anger that was to characterize Orwell's subsequent writing.

By the time *The Road to Wigan Pier* was in print, Orwell was in Spain; he went to report on the Civil War there and stayed to join the Republican militia, serving on the Aragon and Teruel fronts and rising to the rank of second lieutenant. He was seriously wounded at Teruel, damage to his throat permanently affecting his voice and endowing his speech with a strange, compelling quietness. Later, in May 1937, after having fought in Barcelona against communists who were trying to suppress their political opponents, he was forced to flee Spain in fear of his life. The experience left him with a lifelong dread of communism, first expressed in the vivid account of his Spanish experiences, *Homage to Catalonia* (1938), which many consider one of his best books.

Returning to England, Orwell showed a paradoxically conservative strain in writing *Coming Up for Air* (1939), in which he uses the nostalgic recollections of a middle-aged man to examine the decency of a past England and express his fears about a future threatened by war and fascism. When war did come, Orwell was rejected for military service, and instead he headed the Indian service of the British Broadcasting Corporation (BBC). He left the BBC in 1943 and became literary editor of the *Tribune*, a left-wing socialist paper associated with the British Labour leader Aneurin Bevan. At this period Orwell was a prolific journalist, writing many newspaper articles and reviews, together with serious criticism, like his classic essays on Charles Dickens and on boys' weeklies and a number of books about England (notably *The Lion and the Unicorn*, 1941) that combined patriotic sentiment with the advocacy of a libertarian, decentralist socialism very much unlike that practiced by the British Labour Party.

In 1944 Orwell finished *Animal Farm*, a political fable based on the story of the Russian Revolution and its betrayal by Joseph Stalin. In this book a group of barnyard animals overthrow and chase off their exploitative human masters and set up an egalitarian society of their own. Eventually the animals' intelligent and power-loving leaders, the pigs, subvert the revolution and form a dictatorship whose bondage is even more oppressive and heartless than that of their former human masters. ("All animals are equal, but some animals are more equal than others.") At first Orwell had difficulty finding a publisher for this small masterpiece, but when it appeared in 1945 *Animal Farm* made him famous and, for the first time, prosperous.

Animal Farm was one of Orwell's finest works, full of wit and fantasy and admirably written. It has, however, been overshadowed by his last book, *Nineteen Eighty-four* (1949), a novel he wrote as a warning after years of brooding on the twin menaces of Nazism and Stalinism. The novel is set in an imaginary future in which the world is dominated by three perpetually warring totalitarian police states. The book's hero, the Englishman Winston Smith, is a minor party functionary in one of these states. His longing for truth and decency leads him to secretly rebel against the government, which perpetuates its rule by systematically distorting the truth and continuously rewriting history to suit its own purposes. Smith has a love affair with a like-minded woman, but then they are both arrested by the Thought Police. The ensuing imprisonment, torture, and reeducation of Smith are intended not merely to break him physically or make him submit but to root out his independent mental existence and his spiritual dignity until he can love only the figure he previously most hated: the apparent leader of the party, Big Brother. Smith's surrender to the monstrous brainwashing techniques of his jailers is tragic enough, but the novel gains much of its power from the comprehensive rigour with which it extends the premises of totalitarianism to their logical end: the love of power and domination over others has acquired its perfected expression in the perpetual surveillance and omnipresent dishonesty of an unassailable and irresistible police state under whose rule every human virtue is slowly being suborned and extinguished. Orwell's warning of the potential dangers of totalitarianism made a deep impression on his contemporaries and upon subsequent readers, and the book's title and many of its coined words and phrases ("Big Brother is watching you," "newspeak," "doublethink") became bywords for modern political abuses.

Orwell wrote the last pages of *Nineteen Eighty-four* in a remote house on the Hebridean island of Jura, which he had bought from the proceeds of *Animal Farm*. He worked between bouts of hospitalization for tuberculosis, of which he died in a London hospital in January 1950. (G.W./Ed.)

BIBLIOGRAPHY. Two authorized biographies of Orwell are Bernard Crick, *George Orwell: A Life* (1980); and Michael Shelden, *Orwell* (1991). Two other important biographical works are by Peter Stansky and William Abrahams, *The Unknown Orwell* (1972), and *Orwell: The Transformation* (1979). Critical studies include George Woodcock, *The Crystal Spirit* (1966, reprinted 1984); John Atkins, *George Orwell: A Literary Study*, new ed. (1971); Richard Rees, *George Orwell: Fugitive from the Camp of Victory* (1961); Robert A. Lee, *Orwell's Fiction* (1969); Keith Alldritt, *The Making of George Orwell: An Essay in Literary History* (1969); Raymond Williams (compiler), *George Orwell: A Collection of Critical Essays* (1974); and Alex Zwerdling, *Orwell and the Left* (1974).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Ory, Kid, byname of EDWARD ORY (b. Dec. 25, 1886, Laplace, La., U.S.—d. Jan. 23, 1973, Honolulu, Hawaii), American trombonist and composer who was perhaps the first musician to codify, purely by precept, the role of the trombone in classic three-part contrapuntal jazz improvisation. Ory is often remembered as a "tailgate" trombonist, one whose style of playing fills in, or supports, other band instruments and is reminiscent of the styles of prejazz ragtime bands and cakewalk bands.

Ory began to play as a child on homemade instruments. By 1911 he was leading one of the best-known bands in New Orleans. Among

Kid Ory

By courtesy of *down beat* magazine

its members at various times were several musicians who later were highly influential in jazz development, including Sidney Bechet, Mutt Carey, Jimmy Noone, King Oliver, and Louis Armstrong.

In 1919 Ory moved to California, forming a new band in Los Angeles. After five years he joined King Oliver in Chicago and by the end of the 1920s had become a prolific jazz recording artist. He played with King Oliver's Dixie Syncopators, Louis Armstrong's Hot Five (later, Hot Seven), and Jelly Roll Morton's Red Hot Peppers.

In 1930 Ory retired from music to run a successful chicken farm, but on his comeback in 1939 he enjoyed even greater success. He worked with clarinetist Barney Bigard (1942) and trumpeter Bunk Johnson (1943), and his motion-picture credits include *Crossfire* (1947), *New Orleans* (1947), and *The Benny Goodman Story* (1956). A musician of rough, almost coarse, candour and naive sensibilities, he must be seen in the context of the early days of jazz, which he influenced heavily. His outstanding jazz composition is "Muskrat Ramble" (1926).

Oryān (Persian poet): *see* Bābā Ṭāher.

Oryol, also spelled OR'OL, or OREL, *oblast* (province), western Russia, occupying an area of rolling hills of the Central Russian Upland, into which are cut many broad, shallow river valleys. The greater part is in the basin of the upper Oka River. The *oblast,* centred on Oryol city, lies on the boundary of the mixed forest and forest-steppe zones. The soils indicate a former widespread forest cover, but this has been almost entirely cleared since the 16th century, and only small groves of oak or pine remain. Intensive soil erosion has resulted, and the hillsides are greatly cut up by ravines. The economy is mainly agricultural; but by the late 20th century more than half of the population had become urban. Rye, buckwheat, oats, and corn (maize) are the main crops, together with hemp, potatoes, and sugar beets. Area 9,550 square miles (24,700 square km). Pop. (1996 est.) 914,000.

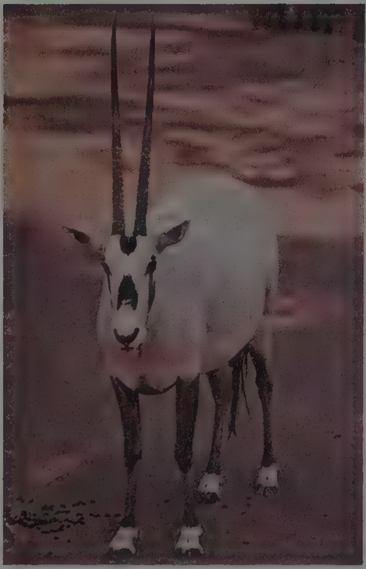
Oryol, also spelled OR'OL, or OREL, city and administrative centre of Oryol *oblast* (province), western Russia, on the headwaters of the Oka River at the Orlik confluence. Founded in 1564 as a fortress of the Muscovite State against Tatar attacks, it was the scene of heavy fighting during World War II. The city centre, with a street pattern of ring roads and radials and with a mixture of old and new buildings, lies on the high left bank of the Oka. Many of the streets of Oryol are named after writers and poets who were born or lived there, among them Ivan Turgenev, Leonid Andreyev, Ivan Bunin, and Nikolay Leskov. South of the Orlik and across the Oka lie the newer residential areas and industries, which include a range of engineering, clothing, and food processing. Turgenev's house is preserved as a museum. There are teacher-training and engineering institutes. Pop. (1997 est.) 348,000.

Monument to the Soviet tankmen who died liberating the town of Oryol, Russia

Vance Henry—Globe

oryx (genus *Oryx*), any of four large antelopes (family Bovidae, order Artiodactyla) living in herds on deserts and dry plains of Africa and Arabia.

The beisa and gemsbok, subspecies of *O. gazella,* inhabit eastern and southern Africa, respectively. The scimitar oryx (*O. dammah*), once found throughout northern Africa, was restricted to the southern rim of the Sahara by the early 1980s. The Arabian, or white, oryx once lived in the deserts of the Sinai and Arabian peninsulas and adjacent areas to the north; it had disappeared by the early 1970s but was reintroduced into Oman in 1982. Oryxes are stocky animals 102–120 cm (40–47 inches) tall at the shoulder. They have a mane and a tufted tail and have dark patches on the face and forehead, a dark streak on either side of the eye, and dark markings (varying with the species) on the body and legs. The coat is grayish brown in the beisa and gemsbok, whitish in the scimitar-horned oryx, and white in the Arabian oryx. Horns, present in both sexes, are long, sharp-tipped, and straight or curved. The Arabian and scimitar oryxes were ruthlessly hunted and are listed as endangered in the *Red Data Book.* They have been bred in various zoos.



Arabian oryx (*Oryx leucoryx*)

Rod Moon—The National Audubon Society Collection/Photo Researchers

The beisa is sometimes classified as *O. beisa,* the scimitar-horned oryx as *O. tao.*

Orzeszkowa, Eliza, *née* PAWŁOWSKA (b. May 25, 1841, Milkowszczyzna, Pol.—d. May 18, 1910, Grodno, Russia), novelist, one of the most popular in Poland of her day. Her writings are animated by the insurgents' ideals in the ill-fated antitsarist Polish uprising of 1863—social justice and equality, individual freedom, the brotherhood of man, and a faith in human perfectibility.

Born to a family of gentry, she was married at the age of 17 to a landowner, Piotr Orzeszko. When the marriage was annulled 11 years later, she settled in Grodno, where in 1879 she opened a bookshop and publishing house. In 1878 she had published *Meir Ezofowicz,* a novel that presented a lurid picture of Jewish life in a small town in Belorussia and preached not so much toleration as the assimilation of the Jewish community. The Russian authorities closed down her publishing and bookselling operation in 1882, placing her under police surveillance for five years. She remarried in 1894, but her second husband died two years later.

Eliza Orzeszkowa, woodcut by J. Holewiński

By courtesy of the Muzeum Narodowe, Krakow, Pol.

Orzeszkowa's well-known peasant novels include *Dziurdziowie* (1885), which presented a shocking picture of the ignorance and superstition of poor farmers; and *Cham* (1888; "The Boor"), the tragic story of a humble fisherman's love for a neurotic and sophisticated city girl. Considered her masterpiece, *Nad Niemnen* (1888; "On the Banks of the Niemen") depicts Polish society in Lithuania. *Bene nati* (1892; "Well Born"), describes the impoverished gentry of small villages.

During her lifetime many of Orzeszkowa's novels were translated into Russian, German, and Swedish, and three into English. Her collected works, *Pisma,* appeared in 22 volumes in 1937–39.

Oš (Kyrgyzstan): *see* Osh.

os penis, also called OS PRIAPI (bone): *see* baculum.

Osa, city and administrative centre of Osa *rayon* (sector), Perm *oblast* (province), Russia, on the left bank of the Kama River near its confluence with the Tulva River. The city is about 60 miles (100 km) southwest of the city of Perm. Originally a village of Khant (Ostyak), a Ugric-speaking people, it became the Russian town of Nikolskaya Sloboda in 1557 and was renamed Osa in 1737. Yemelyan Pugachov led his peasant rebels in a siege of Osa on June 18–21, 1774, and burned it after its surrender. Today there are oil wells in the area, and industries include logging and processing of agricultural products. Pop. (latest est.) 19,993.

Osa Gulf (Pacific Ocean): *see* Dulce, Gulf of.

Osa Peninsula, Spanish PENÍNSULA DE OSA, peninsula, southern Costa Rica, bounded on the northwest by Coronado Bay, on the west by the Pacific Ocean, and on the east by the Gulf of Dulce. Costa Rica's second largest peninsula, Osa measures about 20 miles (30 km) northeast-southwest and about 35 miles (55 km) northwest-southeast. The generally low-lying terrain, rising to an elevation of 2,566 feet (782 m) at Tigre Hill, is used for livestock raising. The principal town on the peninsula is the port of Puerto Jiménez, on the Gulf of Dulce. No major highways or railways lead onto the peninsula.

Osage, North American Indian tribe of the Dhegiha branch of the Siouan linguistic stock. They are now concentrated on a reservation in northeastern Oklahoma. Like other members of this subgroup (the Omaha, Ponca, Kansa, and Quapaw), the Osage migrated westward from the Atlantic coast, settling first in the Piedmont Plateau between the James and Savannah rivers in Virginia and the Carolinas. After a time they moved to the Ozark Plateau and the prairies of what is now western Missouri. At this point the five tribes separated, the Osage remaining in villages on the Osage River, where Jacques Marquette recorded their location in 1673. They remained there until the early 19th century, when they ceded their Missouri lands to the United States and moved west to the Neosho River valley in Kansas.

Osage culture was of the prairie type, marked by the characteristic combination of village agriculture and buffalo hunting. Other important game animals were deer, bear, and beaver. Their villages consisted of longhouses covered with mats or skins and arranged irregularly about an open space used for dances and council meetings. Tepees were used during the hunting season. Osage tribal life centred on religious ceremonials in which clans were divided into symbolic sky and earth groups, with the latter further subdivided to represent dry land and water. The Osage were remarkable for their poetic rituals. Among them was the custom of reciting the history of the creation of the universe to each newborn infant.

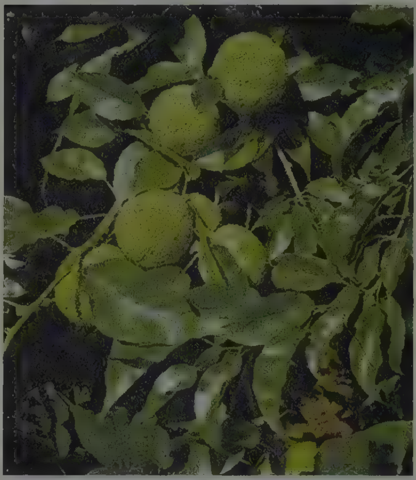
After settling on the Kansas reservation, the Osage were notable for their rejection of white culture; they continued to dress in animal skins and discouraged the drinking of whiskey.

Following the American Civil War (1861–65), pressure on the U.S. government to open all Indian lands to white settlement resulted in the sale of the Kansas reservation. The proceeds were used to purchase land for the Osage in Indian Territory (present-day Oklahoma). The discovery of oil on the Osage reservation in the late 19th century and an agreement with the U.S. government by which all mineral rights on the reservation were to be retained by the tribe, with royalties divided on a per capita basis, made the Osage a uniquely prosperous Indian tribe. In the late 20th century they numbered about 5,000.

Cler-mont, chief of the Osage, painting by George Catlin, 1834; in the National Museum of American Arts, Washington, D.C.

Museum of American Art (formerly National Collection of Fine Art), National Smithsonian Institution, Washington, D.C.

Osage orange, also called BOWWOOD, French BOIS D'ARC (*Maclura pomifera*), thorny tree with large, yellow-green, wrinkled fruit and a milky sap that can produce dermatitis in humans. It is the only species of its genus in the mulberry family (Moraceae). It is native to the south-central United States but has been planted extensively farther north in the Mississippi River valley and at points east of there.



Osage orange (*Maclura pomifera*)

John H. Gerard

The Osage orange is often trained as a hedge; when planted in rows along a boundary, it forms an effective spiny barrier. The tree also serves as a windbreak. Its hard yellow-orange wood, formerly used for bows and war clubs by the Osage and other Indian tribes, is now used for railway ties and fence posts. The wood yields a yellow dye. Attempts have been made to prepare an edible meal or flour from the fruit of the tree, which was long considered to be poisonous. The fruit often grows to more than 13 cm (5 inches) in diameter.

Osage River, river rising as the Marais des Cygnes (French: "Swan Marshes") in the Flint Hills near Eskridge, Kan., U.S. It becomes the Osage (named for the Osage Indians) after its junction with the Little Osage near Rich Hill, Mo., and then flows east through the Ozark highlands to enter the Missouri River near Jefferson City. The river is 500 miles (800 km) long and drains 15,300 square miles (39,600 square km). Along the middle of its course the Osage River is dammed by Bagnell Dam, which thereby impounds the Lake of the Ozarks (*q.v.*). The dam was built in 1931 to produce electricity for St. Louis.

Ōsaka, *fu* (urban prefecture), Honshu, Japan. It is bordered by Kyōto urban prefecture (north) and by the *ken* (prefectures) of Hyōgo (northwest), Nara (east), and Wakayama (south) and by Ōsaka Bay (southeast). It includes the industrial city of Ōsaka and numerous industrial and residential suburbs. The main industries in the urban prefecture manufacture iron and steel products, textiles, chemicals, and electrical machinery. Ōsaka urban prefecture does not, however, include the port of Kōbe, which lies in Hyōgo prefecture. Area 722 square miles (1,869 square km). Pop. (1999 est.) 8,800,979.

Ōsaka, city and capital of Ōsaka *fu* (urban prefecture), south-central Honshu, Japan. The city, together with its neighbouring city Kōbe and nearby Kyōto, are the centres of the Keihanshin Industrial Zone (*q.v.*), the second largest urban and industrial agglomeration in Japan. Area 85 square miles (220 square km). Pop. (1995) 2,602,421.

A brief treatment of Ōsaka follows. For full treatment, *see* MACROPAEDIA: Ōsaka-Kōbe Metropolitan Area.

Ōsaka lies along Ōsaka Bay at the eastern end of the Inland Sea, on the delta of the Yodo River. Its metropolitan area is spread over the deltas and into the alluvial uplands of the Yodo, Yamato, and other rivers. Kōbe lies on the northwestern shore of Ōsaka Bay, about 20 miles (32 km) west of Ōsaka. The climate is temperate, with cool winters and hot, humid summers; annual rainfall is about 54 inches (1,360 mm). The area is subject to typhoons in September, which occasionally are disastrous.

Ōsaka's streets are laid out in grid fashion, the north-south axis being Midō Street and the east-west axis Chūō Ōdōri ("Central Thoroughfare"). Hommachi Street runs east from the harbour to Ōsaka Castle, which was originally built by the warlord Toyotomi Hideyoshi in the 16th century. Parallel to Midō Street is the narrow Shinsaibashi Street, which contains the central shopping district. The main business district occupies the northern part of downtown, and the industrial areas are in the eastern and northeastern parts of the city and on the lower Yodo River delta. The central part of Ōsaka is primarily commercial. Green space is scarce, although there are several large parks in the city; the major recreational areas are in the suburbs, along the coastal beaches, and at Lake Biwa, near Kyōto.

Ōsaka was once noted for its large textile industry, but emphasis has shifted to a mixture of high-technology and light and heavy industry. While steel, shipbuilding, petrochemicals, and electric-power generation continue to be important, the computer and software industries have become more significant. Ōsaka is one of Japan's largest financial centres. Its port, long one of the most important in the nation, has been combined administratively with that of Kōbe since the early 1970s.

A dense network of railways winds throughout the area, which is a junction point for the national railway network. Ōsaka is served by private rail companies formed from the formerly government-owned Japanese National Railways. These companies operate local and interurban rapid-transit lines and provide regional passenger trains and national Shinkansen "bullet" express trains. Suburban and regional commuting service is also provided by other private electric railways. Express highways link Ōsaka with Kōbe, Kyōto, and Nagoya. Ōsaka has two major airports. The older one is located near suburban Itami, to the north of the city, and handles domestic air traffic. Kansai International Airport opened in 1994 to handle the city's growing international air traffic. This airport is built on a man-made island in Ōsaka Bay and is connected to the mainland by a highway bridge.

Ōsaka has long been a national centre of culture. There are numerous public and private universities and colleges in the city and urban prefecture, including Ōsaka University and Kansai University. Traditional and modern drama, music, and bunraku (puppet theatre) are performed throughout the area, as are Western music, operas, and plays. Ōsaka is a national centre of the news media.

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Osasco, city, southeastern São Paulo *estado* ("state"), Brazil. Located at 2,360 feet (720 m) above sea level, Osasco lies along the Tietê River. It is 12 miles (20 km) northwest of São Paulo city, the state capital, and is part of its metropolitan area. Osasco has experienced extremely rapid growth owing to the increasing concentration of heavy industry in the suburban regions of São Paulo, bringing with it the pollution and congestion problems associated with such growth. The city has meatpacking plants and numerous metallurgical plants. Other important industries include the manufacturing of auto accessories, railroad cars, textiles, and chemicals. Both highways and a railroad run from São Paulo to Osasco, thence west and northwest to communities farther inland. Pop. (1991 prelim.) 566,949.

Osawatomie, city, Miami county, eastern Kansas, U.S. It lies along the Marais des Cygnes River at the mouth of Pottawatomie Creek. Settled in 1854 with support of the New England Emigrant Aid Company, Osawatomie was the headquarters for John Brown's militant Free State operations in the Kansas Territory and was a station on the Underground Railroad (for escaped slaves). In retaliation for Brown's slaying of five proslavery settlers at Pottawatomie Creek, his stronghold was invaded on Aug. 30, 1856, by Missourians. Brown and 40 of his Abolitionist followers fled, and the town was ransacked and burned. The John Brown Memorial Park commemorates this skirmish and Brown's career. The name Osawatomie combines the names of the Osage and Potawatomi Indians. The city is on a division point of the Missouri Pacific Railroad and has railroad shops. It is near oil and gas fields and is a trading centre for an agricultural region. Osawatomie State (mental) Hospital was established in 1863. Inc. city, 1882. Pop. (1992 est.) 4,563.

Osborn, Henry Fairfield (b. Aug. 8, 1857, Fairfield, Conn., U.S.—d. Nov. 6, 1935, Garrison, N.Y.), American paleontologist and museum administrator who greatly influenced the art of museum display and the education of paleontologists in the United States and Great Britain.

At Princeton University, Osborn conducted studies of brain anatomy while serving as assistant professor of natural sciences (1881–83) and professor of comparative anatomy (1883–90). He spent the greater part of his career in New York City, as professor of biology (1891–96) and zoology (1896–1935) at Columbia University, but devoted most of his attention to the city's American Museum of Natural History. As curator of the department of mammalian (later changed to vertebrate) paleontology (1891–1910) and president of the museum (1908–35), Osborn accumulated one of the world's finest vertebrate-fossil collections. He introduced a highly successful instructional approach to museum display and was also an effective popularizer of paleontology.

Osborn

By courtesy of the American Museum of Natural History, New York

Osborn proposed the valuable concept of adaptive radiation, postulating that a primitive plant or animal in many cases evolves into several species by scattering over a large land area and adapting to different ecological niches. Osborn also served as vertebrate paleontologist (1900–24) and senior geologist (1924–35) with the U.S. Geological Survey. His works include *From the Greeks to Darwin* (1894), *The Age of Mammals* (1910), and *Origin and Evolution of Life* (1917).

Osborne, Dorothy, LADY TEMPLE (b. 1627, Chicksands Priory, Bedfordshire, Eng.—d. February 1695, Moor Park, near Farnham, Surrey), English gentlewoman best known for the letters she wrote to her future husband, William Temple, before their marriage. The letters are simply written in an easy, conversational style and present an interesting picture of the life of a young English gentlewoman in the Commonwealth period (1649–60). Lively and tender, they are full of good sense, humour, and keen observation.

Dorothy Osborne, detail of an oil painting by Sir Peter Lely; in the Broadlands Collection

By courtesy of the Courtauld Institute of Art, London

The daughter of Sir Peter Osborne, she met William Temple (later Sir William) in 1647, and, despite opposition from both families, they married in 1655. Thereafter she became a devoted wife, as a few surviving letters from later years testify. She bore him nine children, of whom seven died in infancy. A friend of Queen Mary, she was buried in Westminster Abbey.

Sir William Temple preserved the group of letters that were written to him during their courtship between December 1652 and October 1654, and they remained in manuscript until the 19th century. They were sold to the British Museum in 1891. The best edition of them was published in 1928 by G.C. Moore Smith.

Osborne, John, in full JOHN JAMES OSBORNE (b. Dec. 12, 1929, London, Eng.—d. Dec. 24, 1994, Shropshire), British playwright and film producer whose *Look Back in Anger* (performed 1956) ushered in a new movement in British drama and made him known as the first of the "Angry Young Men" (*q.v.*).

The son of a commercial artist and a barmaid, Osborne used insurance money from his father's death in 1941 for a boarding-school education at Belmont College, Devon. He hated it and left after striking the headmaster. He went home to his mother in London and briefly tried trade journalism until a job tutoring a touring company of juvenile actors introduced him to the theatre. He was soon acting himself, later becoming an actor-manager for various repertory companies in provincial towns and also trying his hand at playwriting. His first play, *The Devil Inside Him,* was written in 1950 with his friend and mentor Stella Linden, an actress and one of Osborne's first passions.

Osborne made his first appearance as a London actor in 1956, the same year that *Look Back in Anger* was produced by the English Stage Company. Although the form of the play was not revolutionary, its content was unexpected. On stage for the first time were the 20- to 30-year-olds of Great Britain who had not participated in World War II and found its aftermath shabby and lacking in promise. The hero, Jimmy Porter, although the son of a worker, has, through the state educational system, reached an uncomfortably marginal position on the border of the middle class from which he can see the traditional possessors of privilege holding the better jobs and threatening his upward climb. Jimmy Porter continues to work in a street-market and vents his rage on his middle-class wife and her middle-class friend. No solution is proposed for Porter's frustrations, but Osborne makes the audience feel them acutely.

Osborne's next play, *The Entertainer* (1957), projects a vision of a contemporary Britain diminished from its days of self-confidence. Its hero is a failing comedian, and Osborne uses the decline of the music-hall tradition as a metaphor for the decline of a nation's vitality. In 1958 Osborne and director Tony Richardson founded Woodfall Film Productions, which produced motion pictures of *Look Back in Anger* (1959), *The Entertainer* (1959), and, from a filmscript by Osborne that won an Academy Award, *Tom Jones* (1963), based on the novel by Henry Fielding.

Luther (1961), an epic play about the Reformation leader, again showed Osborne's ability to create an actably rebellious central figure. His two *Plays for England* (1962) include *The Blood of the Bambergs,* a satire on royalty, and *Under Plain Cover,* a study of an incestuous couple playing games of dominance and submission.

John Osborne

UPI/Bettmann Newsphotos

The tirade of Jimmy Porter is resumed in a different key by a frustrated solicitor in Osborne's *Inadmissible Evidence* (1964). *A Patriot for Me* (1965) portrays a homosexual Austrian officer in the period before World War I, based on the story of Alfred Redl, and shows Osborne's interests in the decline of empire and the perils of the nonconformist. *West of Suez* (1971) revealed a measure of sympathy for a type of British colonizer whose day has waned and antipathy for his ideological opponents, who are made to appear confused and neurotic.

As revealed in the first installment of Osborne's autobiography, *A Better Class of Person* (1981), much of the fire in *Look Back in Anger* was drawn from Osborne's own early experience. In it he attacks the mediocrity of lower-middle-class English life personified by his mother, whom he hated, and discusses his volatile temperament. The second part of his autobiography appeared in 1991 under the title *Almost a Gentleman*. Osborne was married five times.

Having come to the stage initially as an actor, Osborne achieved note for his skill in providing actable roles. He is also significant for restoring the tirade—or passionately scathing speech—to a high place among dramatic elements. Most significantly, however, he reoriented British drama from well-made plays depicting upper-class life to vigorously realistic drama of comtemporary life.

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Osborne, Sir Thomas, 2ND BARONET: *see* Leeds, Thomas Osborne, 1st duke of.

Osborne, Thomas Mott (b. Sept. 23, 1859, Auburn, N.Y., U.S.—d. Oct. 20, 1926, Auburn), U.S. penologist whose inauguration of self-help programs for prisoners through Mutual Welfare Leagues functioned as a model for the humanitarian programs of later penologists.

Osborne served two terms on the Auburn Board of Education and in 1903 was elected mayor of Auburn, serving one term. In 1913 he became chairman of the New York State Commission on Prison Reform, a post that inspired him to spend a week in Auburn Prison as "Tom Brown" to learn about conditions firsthand. Convinced thereby that (in the British statesman W.E. Gladstone's phrase) "it is liberty alone that fits men for liberty," he founded a Mutual Welfare League of the Auburn prisoners, which assumed such responsibilities as forming committees to judge violators of prison rules and to plan entertainment events.

Thomas Mott Osborne
By courtesy of the Osborne Association, New York

Osborne was warden of Sing Sing State Prison (now Ossining Correctional Facility), Ossining, N.Y., from 1914 to 1916 and, from 1917 to 1920, commander of the Portsmouth Naval Prison in New Hampshire; he instituted a Mutual Welfare League in both places. His administration at Sing Sing was a stormy one, culminating in an indictment by the Westchester County Grand Jury for perjury and neglect of duty. The charges, however, were dismissed. Osborne wrote many books on penology and founded a national society for dissemination of penal information.

Oscan language, one of the Italic languages closely related to Umbrian and Volscian and more distantly related to Latin and Faliscan. Spoken in southern and central Italy, it was probably the native tongue of the Samnite people of the central mountainous region of southern Italy. Oscan was gradually displaced by Latin and apparently became completely extinct by the end of the 1st century AD. Modern knowledge of Oscan comes from some 250 documents and inscriptions written in several alphabets: a rustic or colonial Latin alphabet, the Greek alphabet, and a native alphabet derived from Etruscan. Although similar to Latin, Oscan shows a series of different sound shifts (Oscan *aasa:* Latin *āra* "altar"; Oscan *pid:* Latin *quid* "what"), and a divergent vocabulary.

Oscar, also spelled OSKAR, name of Swedish kings grouped below chronologically and indicated by the symbol •.

Oscar I, detail from an oil painting by Sophia Adlersparre, 1847; in Krageholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

• Oscar I, in full JOSEPH-FRANÇOIS-OSCAR (b. July 4, 1799, Paris—d. July 8, 1859, Stockholm), king of Sweden and Norway from 1844 to 1859, son of Charles XIV John, formerly the French marshal Jean-Baptiste Bernadotte.

Oscar's early liberal outlook and progressive ideas on such issues as fiscal policy, freedom of the press, and penal reform fortuitously coincided with a period of social, political, and industrial change. After his accession (March 8, 1844) he furthered various reforms, although his attitude was paternalistic. Especially after the 1848 revolutions elsewhere in Europe, Oscar became increasingly conservative, particularly on constitutional issues. He became ill in 1857, and for the next two years his functions were performed by his son, the future Charles XV.

• Oscar II, in full OSCAR FREDRIK (b. Jan. 21, 1829, Stockholm—d. Dec. 8, 1907, Stockholm), king of Sweden from 1872 to 1907 and of Norway from 1872 to 1905.

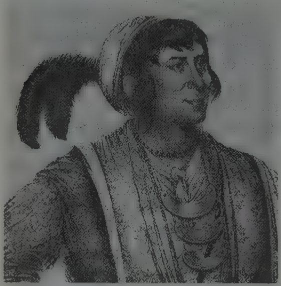
An outstanding orator and a lover of music and literature, Oscar published several books of verse and wrote on historical subjects. In home politics he proved a conservative; in foreign policy he favoured Scandinavian cooperation and after 1866 supported Germany in the hope of strengthening Sweden against Russia, encouraging the Germanophile trend that characterized Swedish political and cultural life from the 1870s until the outbreak of World War I. He tried hard to maintain the union of Norway with Sweden and was much grieved when he was obliged to abdicate the Norwegian throne in 1905. By his marriage (1857) to Sophie of Nassau he had four sons; the eldest succeeded him as Gustav V.

Oscar II, detail from an oil painting by Emil Osterman, 1904; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

Osceola (b. *c.* 1804, Georgia, U.S.—d. Jan. 30, 1838, Charleston, S.C.), American Indian leader during the Second Seminole War, which began in 1835 when the U.S. government attempted to force the Seminole Indians off their traditional lands in Florida and into the Indian territory west of the Mississippi River.

Osceola moved from Georgia to Florida, where, although not a chief, he came to be acknowledged as a leader of the Seminoles. He led the young Indians who opposed the Treaty of Payne's Landing (1832), by which some of the Seminole chiefs agreed to submit to removal from Florida. In 1835 he and a group of braves murdered Charley Emathla, a chief who was preparing to emigrate with his people, and Gen. Wiley Thompson, the U.S. Indian agent at Ft. King.

For the next two years, U.S. troops attempted to crush Seminole opposition. The Indians withdrew into the Everglades and fought back, employing guerrilla tactics. In October 1837 Osceola and several chiefs went to St. Augustine, Fla., under a flag of truce to attend a parley with Gen. T.S. Jesup. By special order of the General, the Indians were seized and imprisoned. Osceola was removed to Ft. Moultrie at Charleston, S.C., where he died.

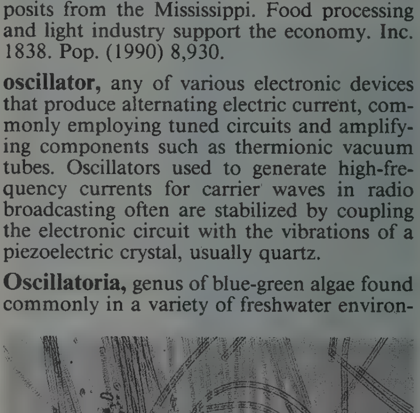

Osceola, detail of a lithograph by George Catlin, 1838
By courtesy of the Library of Congress, Washington, D.C.

The war continued until 1842, but only sporadically after Osceola's death.

Osceola, city, southern seat (1832) of Mississippi county (the northern seat is Blytheville), northeastern Arkansas, U.S., on the Mississippi River. It was founded in 1830 by William B. Edrington, who bartered the site (probably Plumb Point) from the Indians and developed it as a refuelling station for riverboats. It was named (1833) for the famed Seminole Indian chief and developed as a processing and shipping point for crops (especially cotton and, later, soybeans) grown on rich alluvial deposits from the Mississippi. Food processing and light industry support the economy. Inc. 1838. Pop. (1990) 8,930.

oscillator, any of various electronic devices that produce alternating electric current, commonly employing tuned circuits and amplifying components such as thermionic vacuum tubes. Oscillators used to generate high-frequency currents for carrier waves in radio broadcasting often are stabilized by coupling the electronic circuit with the vibrations of a piezoelectric crystal, usually quartz.

Oscillatoria, genus of blue-green algae found commonly in a variety of freshwater environ-

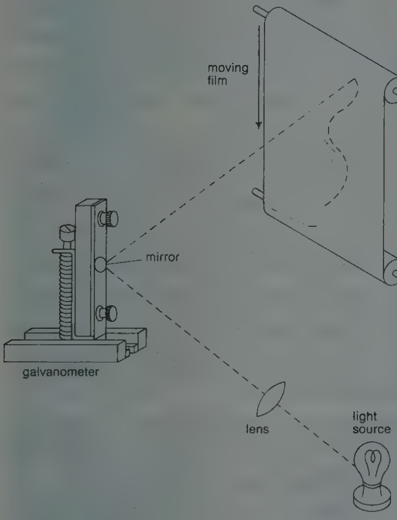

Oscillatoria (highly magnified)
Walter Dawn

ments, including hot springs. This unbranched filamentous alga, occurring singly or in tangled mats, derives its name from its rhythmic oscillating motion, which is thought to result from a secretion of mucilage that pushes the filament away from the direction of excretion. Reproduction is by fragmentation in which dead concave cells (separation disks) separate sections of the filament (hormogonia). When present, the mucilage sheath is very thin.

oscillograph, instrument for indicating and recording time-varying electrical quantities, such as current and voltage. The two basic forms of the instrument in common use are the electromagnetic oscillograph and the cathode-ray oscillograph; the latter is also known as a cathode-ray oscilloscope (*q.v.*), which, strictly speaking, is purely an indicating instrument, while the oscillograph can make permanent records.

The operation of an electromagnetic oscillograph, like the operation of a d'Arsonval galvanometer, depends on the interaction of the field of a permanent magnet and a coil of wire through which an electric current is flowing.

Some oscillographs are provided with a pen arm, attached to the coil, that traces an ink record on a moving paper chart. The most common device of this nature is the electrocardiograph, which employs a coil of fine wire with many turns and is used for studying heart action.



Light-beam oscillograph

From *Applied Electrical Measurements* by I.F. Kinnard. Copyright (1956)

The light-beam oscillograph has much less weight to move than does the pen-writing instrument and so responds satisfactorily to higher frequencies, about 500 Hz, or cycles per second, compared with 100 Hz for the pen assembly. It uses a coil to which a small mirror is attached. A beam of light is reflected from the mirror onto a photographic film moving at a constant speed. The cathode-ray oscillograph makes use of a sharply focused electron beam to display the relationship between variable quantities on a luminescent screen similar to that used in a television. It may be either a three- or a four-dimensional recording device, the latter being very versatile. Recording is by transfer of energy to a light-sensitive record, using either an optical-lens system or a fibre-optic faceplate. It can be employed at frequencies in the megahertz range.

oscine, any bird of the suborder Passeres (order Passeriformes), which includes all songbirds. *See* songbird.

Osco-Umbrian languages, language group proposed by some scholars to be included in the Italic branch of Indo-European languages. The group includes Oscan, Umbrian, and the minor dialects of central Italy—Marsian, Marrucinian, Paelignian, Sabine, Vestinian, and Volscian. Oscan, the language imposed by the Samnites on the Osci of Campania, is known from over 200 inscriptions dated between 400 and 89 BC. Umbrian, known chiefly from the Iguvine Tables (*q.v.*), diverges from Oscan in several phonological features. The Osco-Umbrian languages have much in common with the Latin-Faliscan languages (*q.v.*), the other subdivision of Italic.

Osee (king of Israel): *see* Hoshea.

Osei Tutu (d. 1712), founder and first ruler of the Ashanti nation (in present-day Ghana) who as chief of the small state of Kumasi came to realize (*c.* 1680–90) that a fusion of the small separate Ashanti kingdoms was necessary to withstand their powerful Denkyera (Denkyira) neighbours to the south.

Osei Tutu had been a hostage in the Denkyera court but had escaped eastward to the powerful state of Akwamu, where he was exposed to new ideas of political and military organization. When he returned to Kumasi, some Akwamu accompanied him. One was a priest, Okomfo Anokye, who is usually given credit for introducing the legendary Golden Stool, which, according to Ashanti tradition, was brought down from heaven by the priest and as the repository of the spirit of the nation became the symbol of the mystical bond between all Ashanti. With a spiritual as well as practical basis for unity, the other Ashanti kingdoms merged with Kumasi, and Osei Tutu led their combined forces in a successful war against the Denkyera about 1698/99–1701.

More wars followed, both to consolidate and to extend Ashanti conquests. During Osei Tutu's reign as Asantehene (king of Ashanti), the area of Ashanti approximately tripled, bringing Ashanti into contact with the coast and the important slave and gun trade and beginning its turbulent 200-year existence as a powerful and warlike nation.

Ösel (Estonia): *see* Saaremaa.

Osetiya (Russia): *see* North Ossetia.

Osh, also spelled oš, city, southwestern Kyrgyzstan. The city lies at an elevation of 3,300 feet (1,000 m) on the Akbura River where it emerges from the Alay foothills. First mentioned in writings of the 9th century, it was destroyed by the Mongols in the 13th century and subsequently rebuilt. In the 15th century, before the sea routes were discovered, it was an important post on the trade routes to China and India. Now it has a variety of industrial undertakings, including silk and cotton textiles and food processing, and is the starting point of the Osh-Khorog road, the main Pamirs Highway. The city has a teacher-training institute, a branch of the Bishkek Polytechnic Institute, a theatre, a museum, and a botanical garden. Takht-i-Suleyman ("Solomon's Throne"), a hill in the western part of the city, has long been a Muslim place of pilgrimage. The population in the surrounding area lives mainly in the foothill valleys, in which cotton, tobacco, cereal grains, and melons are grown on irrigated land. Pop. (1996 est.) 220,500.

O'Shaughnessy, Arthur, in full ARTHUR WILLIAM EDGAR O'SHAUGHNESSY (b. March 14, 1844, London, Eng.—d. Jan. 30, 1881, London), British poet best known for his much-anthologized "Ode" ("We are the music-makers").

O'Shaughnessy became a copyist in the library of the British Museum at age 17 and later became a herpetologist in the museum's zoological department. He published four volumes of verse: *An Epic of Women* (1870), *Lays of France* (1872), *Music and Moonlight* (1874), and *Songs of a Worker* (1881). O'Shaughnessy was strongly influenced by the work of Algernon Charles Swinburne and the artists and writers of the Pre-Raphaelite group. He is representative of many Victorian poets for whom a concentration on musicality and emotions was more important than intellectual content.

Oshawa, city, regional municipality of Durham county, southeastern Ontario, Canada. It lies on the north shore of Lake Ontario, just northeast of Toronto. Founded as Skea's Corners on the military Kingston Road in 1795, it was renamed Oshawa—an Indian word referring to a stream crossing—in 1842, when a post office was established there. The city, which is now a port of entry and a major manufacturing centre, is the home site of General Motors of Canada. There are also woolen mills, foundries, and plants that manufacture machine parts, fabricated metals, glass, plastics, pharmaceuticals, furniture, leather, and electrical appliances. Inc. village, 1850; town, 1879; city, 1924. Pop. (2001) city, 139,051.

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O'Shea, William Henry; and O'Shea, Katharine, Katharine O'Shea *née* KATHARINE PAGE WOOD, later married name (from 1891) MRS. CHARLES STEWART PARNELL (respectively b. 1840, Dublin, Ire.—d. April 22, 1905, Brighton, Sussex, Eng.; b. Jan. 30, 1846, Cressing, Essex, Eng.—d. Feb. 5, 1921, Littlehampton, Sussex), husband and wife from 1867 to 1890, whose relationship with the Irish nationalist leader Charles Stewart Parnell led to a divorce scandal that terminated Parnell's career, divided Irish public opinion, and very likely delayed the granting of Home Rule by Great Britain to Ireland.

William Henry O'Shea

National Library of Ireland, Dublin

William Henry O'Shea was the only son of a Roman Catholic solicitor in Dublin. Educated at Oscott and at Trinity College, Dublin, he became a cornet of the 18th Hussars in 1858 and was retired as captain in 1862. In 1867 he married Katharine, sixth daughter of the Reverend Sir John Page Wood of Rivenhall Place, Essex. The O'Sheas had one son, Gerard, and two daughters. It is not clear when O'Shea became aware of the existence of intimate relations between his wife and Parnell, though he and his wife are said to have ceased marital relations several years before 1880, when she and Parnell became acquainted. From 1881 Mrs. O'Shea and Parnell lived together at Eltham, near London. Neither she nor O'Shea, who did not object to this arrangement, contemplated divorce during the lifetime of her aunt, Mrs. Benjamin Wood, on whom the O'Sheas were financially dependent.

In the meantime, O'Shea was elected to the British House of Commons in 1880 as a Home Rule member from County Clare, Ire., and in the same year he supported Parnell's successful campaign for leadership of the Irish Nationalist Party. Although he helped obtain Parnell's release from prison for having attacked the Irish Land Act of 1881, Parnell came to mistrust him. In 1885 O'Shea claimed to have negotiated an agreement between Parnell and Joseph Chamberlain, at that time president of the Board of Trade, for a local government plan in substitution for Home Rule. In 1886 Parnell and Chamberlain arranged O'Shea's election to Parliament from Galway as a Home Ruler, but O'Shea (as Chamberlain evidently expected) thereupon refused to support a Home Rule Bill sponsored by the prime minister, William Ewart Gladstone. Throughout that decade, Mrs. O'Shea was the intermediary for correspondence between Parnell and Gladstone on the Irish problem.

Mrs. Wood, who died in 1889, left her considerable property to her niece, Mrs. O'Shea; but other relatives contested the will. When O'Shea saw that he could not share in the estate and had no further reason for preserving the appearance of marriage, he filed a petition for divorce on Dec. 24, 1889, charging adultery and naming Parnell as corespondent. No defense was offered, and the divorce was granted on Nov. 17, 1890. Parnell was blackguarded by English Nonconformists and by the Irish Catholic hierarchy and lost his political leadership. He married Mrs. O'Shea in June 1891, four months before his death.

Osheroff, Douglas D., in full DOUGLAS DEAN OSHEROFF (b. Aug. 1, 1945, Aberdeen, Wash., U.S.), American physicist who, along with David Lee and Robert Richardson, was the corecipient of the 1996 Nobel Prize for Physics for their discovery of superfluidity in the isotope helium-3.

Osheroff received a bachelor's degree (1967) from the California Institute of Technology and a doctorate (1973) from Cornell University in Ithaca, N.Y. He was a graduate student working with Lee and Richardson in the low-temperature laboratory at Cornell when the team made its discovery in 1972. The team was investigating the properties of helium-3 under temperatures of just a few thousandths of a degree above absolute zero (−273° C). Osheroff noticed minute jumps in the internal pressure of the sample of helium-3 under investigation, and he drew the team's attention to these small deviations. The researchers eventually concluded that the helium-3 had undergone a phase transition to a superfluid state, in which a liquid's atoms lose their randomness and move about in a coordinated manner. Such a substance lacks all internal friction, flows without resistance, and behaves according to quantum mechanical laws rather than to those of classical fluid mechanics. The discovery of superfluidity in helium-3 enabled scientists to study directly in macroscopic—or visible—systems the quantum mechanical effects that had previously been studied only indirectly in molecules, atoms, and subatomic particles.

Osheroff conducted research at Bell Telephone Laboratories from 1972 to 1982 and headed solid-state and low-temperature research there from 1982 to 1987. He became a professor at Stanford (Calif.) University in 1987.

Oshkosh, city, seat (1847) of Winnebago county, east-central Wisconsin, U.S. It lies on the west shore of Lake Winnebago at the mouth of the upper Fox River, 80 miles (130 km) north-northwest of Milwaukee. The French were active in the area from the late 17th century, and the lake and river formed an important link in a main route from the Great Lakes to the Mississippi River. Permanent settlement did not begin until 1836, when the Menominee Indians ceded their claims to the area. First called Athens, in 1840 it was renamed for a Menominee chief. In its early years, lumbering was the main occupation. The city's industries are now primarily service-oriented, although manufacturing is important. Its products include trucks and transportation equipment, plastic packaging, paper products, and apparel. The University of Wisconsin, Oshkosh, was founded in 1871 as a state normal school. Each summer the Experimental Aircraft Association (EAA), headquartered in Oshkosh, hosts the EAA Fly-In Convention at Wittman Regional Airport. The EAA also maintains an aviation museum there. Inc. village, 1846; city, 1853. Pop. (1994 est.) city, 56,229; Appleton-Oshkosh-Neenah MSA, 332,348.

Oshogbo, town and capital, Osun state, southwestern Nigeria. It lies along the Oshun River and on the railroad from Lagos, 182 miles (293 km) to the southwest, and at the intersection of roads from Ilesha, Ede, Ogbomosho, and Ikirun. The town is also served by a local airport.

Originally settled by the Ilesha (Ijesha, a subtribe of the Yoruba) from Ibokun, 12 miles (19 km) east, it remained a small town subservient to the Ijesha kingdom of Ilesha, to the southeast, until it was greatly enlarged in the early 19th century by an influx of Oyo-Yorubas fleeing from the Fulani conquerors. In 1840 Oshogbo was the scene of a battle that proved the turning point in the Fulani-Yoruba wars. Armed with European rifles bought from coastal tribes, infantrymen from Ibadan decisively defeated the Fulani cavalrymen; this victory made Ibadan, 50 miles (80 km) southwest, the largest and most powerful city of the Yoruba people. Oshogbo continued to pay tribute to Ibadan until 1951, when it became part of that province. It became part of Oyo state in 1976 and the capital of the newly created state of Osun in 1991.

The present Yoruba inhabitants of Oshogbo have an *oba* ("king") who functions in an advisory role. With the construction of the railway in 1906 from Lagos, Oshogbo became a major collecting point for cocoa and palm oil and kernels produced in the surrounding area. Weaving and dyeing of cotton cloth, cotton ginning, and tobacco growing are other local occupations. The town's trade is primarily in yams, cassava, corn (maize), beans, pumpkins, okra, palm produce, and cotton. Food-processing plants and a steel-rolling mill are local industries. Oshogbo is the site of a teacher-training college. Next to the *oba*'s market is the central mosque and the town hall. Pop. (1995 est.) 465,000.

Osiander, Andreas, original name ANDREAS HOSEMANN (b. Dec. 19, 1498, Gunzenhausen, Ansbach [now in Germany]—d. Oct. 17, 1552, Königsberg, Prussia [now Kaliningrad, Russia]), German theologian who helped introduce the Protestant Reformation to Nürnberg.

The son of a blacksmith, Osiander was educated at Leipzig, Altenburg, and the University of Ingolstadt. Ordained in 1520, he helped reform the imperial free city of Nürnberg on strictly Lutheran principles and in 1522 won over Albert von Hohenzollern, grand master of the Knights of the Teutonic Order, to the Lutheran movement. Osiander also helped write the influential Brandenburg-Nürnberg Church Order (1532) and compiled the liturgically conservative Pfalz-Neuberg Church Order (1543). By substituting his own preface in 1543 to Nicolaus Copernicus' *De revolutionibus orbium coelestium, libri VI* ("Six Books on the Revolutions of the Celestial Orbs"), which introduced Copernican theories in a purely hypothetical manner, he helped keep this controversial work off the *Index of Forbidden Books* until the next century.

In 1548, when the Holy Roman emperor compelled Nürnberg to accept the Augsburg Interim, a provisional imperial religious ordinance, Osiander fled, first to Breslau and then to Königsberg, where despite his lack of a theological degree he was appointed professor primarius of the new university's theological faculty (1549). The envy of his colleagues and apparently his own stubborn personality produced a violent controversy the next year. One Lutheran faculty and synod after another declared its opposition to Osiander's deprecation of forensic justification of sinners and his exaggerated stress on the indwelling of Christ himself as the essential factor in justification. In addition to his *Harmonia Evangelica* (1537), Osiander wrote several treatises expounding his theological views, which his followers, the Osiandrists, continued to promote until 1567.

Osijek, German ESSEG, Hungarian ESZÉK, industrial town and agricultural centre in Croatia, on the Drava River.

In Roman times the city site was known as Mursa. Its present name was first recorded in 1196. An important trade and transportation centre from early times, Osijek was controlled by the Ottoman Empire from 1526 to 1687. In the 19th century a brewery and a matchmaking factory were established in the town. Many of Osijek's buildings were damaged or destroyed during fighting between Serb and Croat forces in 1991.

A river port, the town also has good rail connections to neighbouring parts of the Balkans and to Hungary. The upper, or old, town centres on the fortress; the lower, or new, town is the commercial and main residential area. Osijek's industries manufacture electrical equipment, apparel, chemical products, furniture, agricultural machinery, and food products. Cereals, fodder crops, sugar beets, dairy cattle, and poultry are raised in the surrounding region. The Josip Juraj Strossmayer University of Osijek was founded in 1975. Pop. (1991) 129,792.

Osinniki, city, Kemerovo *oblast* (province), central Russia. It is situated at the confluence of the Kandalep and Kondoma rivers. The city developed in the 1930s as a mining centre in the Kuznetsk Coal Basin; it supplies coal to the Kuznetsk metallurgical complex located in Novokuznetsk. A college of mining technology is located there. Inc. city, 1938. Pop. (1991 est.) 63,200.

Osipenko (Ukraine): *see* Berdyansk.

Osiris, also called USIRI, one of the most important gods of ancient Egypt. The origin of Osiris is obscure; he was a local god of Busiris, in Lower Egypt, and may have been a personification of chthonic (underworld) fertility, or possibly a deified hero. By about 2400 BC, however, Osiris clearly played a double role: he was both a god of fertility and the embodiment of the dead and resurrected king. This dual role was in turn combined with the Egyptian concept of divine kingship: the king at death became Osiris, god of the underworld; and the dead king's son, the living king, was identified with Horus, a god of the sky. Osiris and Horus were thus father and son. The goddess Isis was the mother of the king and was thus the mother of Horus and consort of Osiris. The god Seth was considered the murderer of Osiris and adversary of Horus.

According to the form of the myth reported by the Greek author Plutarch, Osiris was slain or drowned by Seth, who tore the corpse into 14 pieces and flung them over Egypt. Eventually, Isis and her sister Nephthys found and buried all the pieces, except the phallus, thereby giving new life to Osiris, who thenceforth remained in the underworld as ruler and judge. Isis revived Osiris by magical means and conceived her son Horus by him. Horus later successfully fought against Seth and became the new king of Egypt.

Osiris was not only ruler of the dead but also the power that granted all life from the underworld, from sprouting vegetation to the annual flood of the Nile River. From about 2000 BC onward it was believed that every man, not just the deceased kings, became associated with Osiris at death. This identification with Osiris, however, did not imply resurrection, for even Osiris did not rise from the dead. Instead, it signified the renewal of life both in the next world and through one's descendants on Earth. In this universalized form Osiris' cult spread throughout Egypt, often joining with the cults of local fertility and underworld deities.

Osiris, bronze figurine of the Late Period; in the Egyptian Museum, Berlin

By courtesy of the Staatliche Museen Preussischer Kulturbesitz, Berlin; photograph, Art Resource

The idea that rebirth in the next life could be gained by following Osiris was maintained through certain cult forms. In the Middle Kingdom the god's festivals consisted of processions and nocturnal rites and were celebrated at the temple of Abydos, where Osiris had assimilated the very ancient god of the dead, Khenty-Imentin. This name, meaning "Foremost of the Westerners," was adopted by Osiris as an epithet. Because the festivals took place in the open, public participation was permitted, and by the early 2nd millennium BC it became fashionable to be buried on the processional road at Abydos or to erect a cenotaph there as a representative of the dead.

Osiris festivals symbolically reenacting the god's fate were celebrated annually in various towns throughout Egypt. A central feature of the festivals was the construction of the "Osiris garden," a mold in the shape of Osiris, filled with soil and various drugs. The mold was moistened with the water of the Nile and sown with grain. Later, the sprouting grain symbolized the vital strength of Osiris.

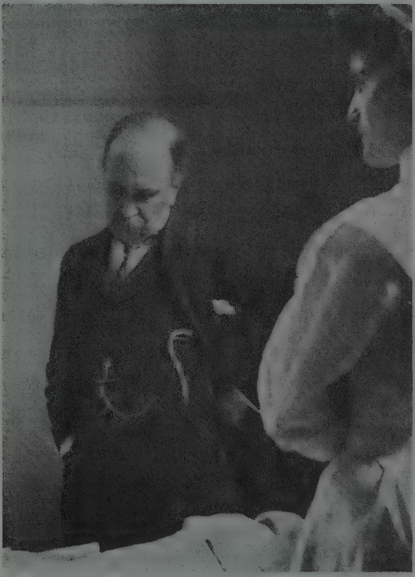
At Memphis the holy bull, Apis, was linked with Osiris, becoming Osiris-Apis, which eventually became the name of the Hellenistic god Sarapis. Greco-Roman authors connected Osiris with the god Dionysus. Osiris was also identified with Soker, an ancient Memphite god of the dead.

The oldest known depiction of Osiris dates to about 2300 BC, but representations of him are rare before the New Kingdom (1539–1075 BC), when he was shown in an archaizing form as a mummy with his arms crossed on his breast, one hand holding a crook, the other a flail. On his head was the atef-crown, composed of the white crown of Upper Egypt and two ostrich feathers.

Oskar (personal name): *see under* Oscar.

Osler, Sir William, BARONET (b. July 12, 1849, Bond Head, Canada West [now Ontario], Can.—d. Dec. 29, 1919, Oxford, Eng.), Canadian physician and professor of medicine who practiced and taught in Canada, the United States, and Great Britain and whose book *The Principles and Practice of Medicine* (1892) was a leading textbook. Osler played a key role in transforming the organization and curriculum of medical education, emphasizing the importance of clinical experience. He was created a baronet in 1911.

William Osler was the youngest of the nine children of the Reverend Featherstone Osler, who had gone to Canada as an Anglican missionary, and his wife, Ellen. William, like his father, was intended for the church. But while at school he became fascinated by natural history. He began to study at Trinity College, Toronto, but decided that the church was not for him and entered the Toronto Medical School in 1868. He subsequently transferred to McGill University in Montreal, Que., where he took his medical degree in 1872. During the following two years he visited medical centres in Europe, spending the longest period at University College, London, in the physiology laboratory of John Burdon-Sanderson, who was making experimental physiology preeminent in medical education.



Osler at the bedside of a patient while professor of medicine at Johns Hopkins, 1888–1904

By courtesy of the Osler Library, McGill University, Montreal

In 1873 Osler demonstrated that hitherto unidentified bodies in the blood were in fact the third kind of blood corpuscles, which were later named the blood platelets. These corpuscles had been observed before, but no one before Osler had studied them so thoroughly. Thus began what he called his periods of "brain dusting"—travel and studies that made him almost as much a part of Europe as of America.

Osler returned to Canada and began general practice in Dundas but was soon appointed lecturer in the institutes of medicine at McGill University. He became professor there in 1875. A year later he became pathologist to the Montreal General Hospital and in 1878 physician to that hospital. At McGill he taught physiology, pathology, and medicine. His research was conducted largely in the postmortem room. In 1884 he was invited to occupy the chair of clinical medicine at the University of Pennsylvania in Philadelphia. He decided to do so on the toss of a coin. While in Philadelphia he became a founding member of the Association of American Physicians.

In 1888 Osler accepted an invitation to be the first professor of medicine in the new Johns Hopkins University Medical School in Baltimore. There he joined William H. Welch, chief of pathology, Howard A. Kelly, chief of gynecology and obstetrics, and William S. Halsted, chief of surgery. Together, the four transformed the organization and curriculum of clinical teaching and made Johns Hopkins the most famous medical school in the world. Students studied their patients in the wards and presented the results to the "Chief." They were also encouraged to take their problems to the laboratory. Finally, the experts pooled their knowledge for the benefit of the patient and the student in public teaching sessions. Thus was born the pattern of clinical teaching that spread throughout the United States. Osler was not only professor of medicine but physician in chief to the hospital, an office first devised by the president of the university on the basis of his experience of running a large department store and later to spread to most of the medical centres of the United States. For the first four years there were no students at Johns Hopkins, and Osler used the time to write *The Principles and Practice of Medicine,* first published in 1892. In the same year, he married Grace Gross, widow of a surgical colleague at Philadelphia and great-granddaughter of Paul Revere.

Osler's textbook was lucid, comprehensive, interesting, and scholarly. It quickly became the most popular medical textbook of its day and has continued to be published since under a succession of editors, though never regaining the quality with which Osler endowed it. The textbook had an unexpected sequel. In 1897 it was read by F.T. Gates, who had been engaged by John D. Rockefeller to advise him in his philanthropic endeavours. As a result of his reading, Gates inspired Rockefeller to direct his foundation toward medical research and to establish the Rockefeller Institute of Medical Research in New York.

In 1904, while visiting in England, Osler was invited to succeed Sir John Burdon-Sanderson in the Regius chair of medicine at the University of Oxford. The Regius chair at Oxford is a crown appointment for which only citizens of the crown are eligible, but Osler had kept his Canadian nationality. He took up his chair in the autumn of 1905. In Oxford he taught only once a week, did a small amount of practice, and spent most of his time on his books. His library became one of the best of its kind, and after his death it passed intact to McGill, where it is specially housed. His scholarship was recognized by his election as president of the Classical Association. He was also active in medical affairs and inspired the formation of the Association of Physicians of Great Britain and Ireland and the establishment of the *Quarterly Journal of Medicine.* He was elected a fellow of the Royal College of Physicians of London in 1884 and a fellow of the Royal Society of London in 1898.

Osler gave many lectures on medicine, some of which were collected and published. *Aequanimitas,* which he regarded as the most desirable quality for doctors, was the title of the most famous of these. Osler had a puckish wit and wrote some admirable medical nonsense under the pseudonym of Egerton Yorrick Davis, whom he presented as a retired surgeon captain of the U.S. Army.

In medical terminology, Osler is immortalized in Osler's nodes (red, tender swellings of the hand characteristic of certain cardiac infections), a blood disorder known as Osler-Vaquez disease, and Osler-Rendu-Weber disease (a hereditary disorder marked by recurring nose bleeds with vascular involvement of the skin and mucous membranes).

The Oslers had one son, Revere, named after his great-great-grandfather, Paul Revere. His death in action during World War I took the spirit out of his father, who died of pneumonia in 1919. (G.Pi.)

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Osler-Rendu-Weber disease, also called RENDU-OSLER-WEBER DISEASE, or HEREDITARY HEMORRHAGIC TELANGIECTASIA, a hereditary disorder causing bleeding from local capillary lesions. The disorder is classed as a type of purpura. In the disease, capillaries (minute blood vessels) in the fingertips and around the oral and nasal cavities are enlarged and have unusually thin walls; they fill with bright red (well-oxygenated) blood and are easily broken by accidental bumping or jarring, resulting in the release of blood into the tissues or externally. Blood clotting is normal, but frequent bleeding from the nose and elsewhere can become very troublesome and cause severe anemia.

Oslo, formerly (1624–1877) CHRISTIANIA, or (1877–1925) KRISTIANIA, capital and largest city of Norway, forming also a separate *fylke* (county). It lies at the head of Oslo Fjord in the southeastern part of the country. The original site of Oslo was east of the Aker River. The city was founded by King Harald Hardraade about 1050, and about 1300 the Akershus fortress was built by Haakon V. After the city was destroyed by fire in 1624, Christian IV of Denmark-Norway built a new town farther west, under the walls of the Akershus fortress, and called it Christiania. The growth of Christiania's population in the 19th century was due in part to the absorption of surrounding municipalities, and the city replaced its rival, the west-coast port of Bergen, as Norway's largest and most influential city.

The city was renamed Oslo in 1925 and developed rapidly after World War II. In 1948 Oslo incorporated the nearby township of Aker, and in the following decades a number of satellite towns and residential areas grew up to the east of the city.

Oslo is the centre of Norwegian trade, banking, industry, and shipping. Oslo Harbour is the largest, as well as the busiest, in the country. The leading industries are the production of consumer goods, shipbuilding, and the electrotechnical and graphic industries. The Norwegian Trade Fair exhibition hall is located in Skøyen, to the west of the city. The important Norwegian fur auctions are held at Økern, to the northeast. Oslo is also the junction of road, rail, and airway networks of the country.

The leading Norwegian cultural institutions are to be found in Oslo. The city centre contains the National Theatre, the Norwegian Theatre, the Oslo New Theatre, and the Norwegian Opera. Near the oldest part of the university are found the Historical Museum (with the Ethnographic Museum) and the National Gallery, the latter of which contains an excellent collection of paintings. At Tøyen, in the east of the city, are the botanical gardens and several museums, including the Munch Museum. At Bygdøy, the Norwegian Folk Museum, a Viking ship hall, the Framhuset (containing the *Fram,* a famous polar exploration vessel used by Fridtjof Nansen and Roald Amundsen), the Kon-Tiki Museum (commemorating the Pacific expedition of Thor Heyerdahl), and the Norwegian shipping museum serve as reminders of Oslo's maritime connections. Frogner Park, located in the western section of the city, is noted for its display of works by the modern sculptor Gustav Vigeland.

A number of scientific institutions are attached to the University of Oslo, and the university's library is the main library in the country. The city's most distinguished auditorium is the university's Aula (Hall), decorated by the painter Edvard Munch, and it is there that the Philharmonic Society's concerts are held. There are also other national centres of higher education.

Oslo has exceptional natural advantages for winter sports, especially cross-country skiing. The city's annual Holmenkollen ski-jump competitions bring together participants from all the leading ski nations, and the site also houses an interesting ski museum. The Bislett arena, located in the city centre, is an internationally known speed-skating rink. Pop. (2000 est.) mun., 507,467.

Oslo Fjord, Norwegian OSLOFJORDEN, fjord on the Skagerrak (strait) penetrating the southern coast of Norway for 60 miles (100 km) from about Fredrikstad to Oslo. With an area of 766 square miles (1,984 square km), the fjord occupies a glacier-formed depression, or graben, that has been partially filled and partially reexcavated. The fjord's forested shoreline is dotted with numerous towns and seaports and is one of the most densely populated areas of Norway. The fjord carries considerable shipping to and from Oslo. Its northern part splits into several smaller fjords, including Sande Fjord, Dram Fjord, and Vest Fjord. Oslo Fjord has many islands, the largest and most famous of which is Jel Island, near Moss (*q.v.*). Most major rivers of southeastern Norway flow into Oslo Fjord.

Osman, also spelled OTHMAN, name of Ottoman sultans grouped below chronologically and indicated by the symbol •.

•Osman I, also called OSMAN GAZI (b. 1258—d. 1324, Sögüt, Ottoman Empire [now in Turkey]), ruler of a Turkmen principality in northwestern Anatolia who is regarded as the founder of the Ottoman Turkish state. Both the name of the dynasty and the empire that the dynasty established are derived from the Arabic form ('Uthmān) of his name.

Osman was descended from the Kayı branch of the Oğuz Turkmen. His father, Ertugrul, had established a principality centred at Sögüt. With Sögüt as their base, Osman and the Muslim frontier warriors (Ghazis) under his command waged a slow and stubborn conflict against the Byzantines, who sought to defend their territories in the hinterland of the Asiatic shore opposite Constantinople (now Istanbul). Osman gradually extended his control over several former Byzantine fortresses, including Yenişehir, which provided the Ottomans with a strong base to lay siege to Bursa and Nicaea (now Iznik), in northwestern Anatolia. The greatest success of Osman's reign was the conquest of Bursa shortly before his death.

Osman I, miniature from a 16th-century manuscript illustrating the dynasty; in Istanbul University Library (Ms. Yildiz 2653/261)

By courtesy of Istanbul University Library

•Osman II, also called GENÇ OSMAN ("Young Osman") (b. Nov. 15, 1603, Constantinople, Ottoman Empire [now Istanbul, Tur.]—d. May 20, 1622, Constantinople), Ottoman sultan who came to the throne as an active and intelligent boy of 14 and who during his short rule (1618–22) understood the need for reform within the empire.

Osman II, miniature, mid-17th century; in the Topkapı Saray Museum, Istanbul

By courtesy of the Topkapı Saray Museum, Istanbul

Ambitious and courageous, Osman undertook a military campaign against Poland, which had interfered in the Ottoman vassal principalities of Moldavia and Walachia. Realizing that his defeat at Chocim (Khotin, Ukraine) in 1621 largely stemmed from the lack of discipline and the degeneracy of the Janissary corps, he proceeded to discipline them by cutting their pay and closing their coffee shops. Then he announced a plan to go on a pilgrimage to Mecca, but his real purpose was to recruit a new army in Egypt and Syria to break the power of the Janissaries. Hearing of this scheme and already resentful because of Osman's previous policies, the Janissaries revolted, deposed Osman on May 19, 1622, and strangled him the next day.

Osman Ali, also called US̄MĀN ʿALĪ KHĀN, MĪR (b. April 6, 1886, Hyderābād, India—d. Feb. 24, 1967, Hyderābād), nizam (ruler) of Hyderābād in the period 1911–48 and its constitutional president until 1956. Once one of the richest men in the world, he ruled over a state the size of Italy.

After a private education, Osman Ali succeeded his father, Maḥbūb ʿAlī Khān, the sixth nizam, on Aug. 29, 1911. Encouraging financial reform, he led the state of Hyderābād to an enviable credit position; it issued its own currency notes and coins and acquired ownership of a major railway network. In 1918 he patronized the founding of Osmania University, Hyderābād. Unlike some neighbouring princes, he maintained the feudal character of his state and showed little interest in the increasing voice of the Hindu majority among his people, although he spent considerable sums to improve their living conditions. In World War II his state provided naval vessels and two Royal Air Force squadrons; in 1946 he was awarded the Royal Victorian Chain.

Supported by the Majlis Ittehad al-Muslimin (movement for Muslim unity) with its private army, the Razākārs, Osman Ali refused to submit to Indian sovereignty in 1947 when Britain withdrew. Appealing to the special alliance he claimed with the British, he placed his case for the full independence of his state before the United Nations. He rejected an Indian ultimatum that he surrender his authority but, in September 1948, was obliged to yield to Indian troops. He was made president (*rajpramukh*) of the state but had to accept the advice of Cabinet ministers responsible to an elected legislature until his state was absorbed by neighbouring states in the 1956 general reorganization of boundaries. He then lived in splendid retirement with 3 wives, 42 concubines, 200 children, 300 servants, and aging retainers, including a private army. He provided pensions for some 10,000 princelings and serfs of his former empire and aided Muslim refugees from Palestine. He was created Knight Grand Commander of the Star of India in 1911 and Knight Grand Cross of the British Empire in 1917.

Osman Dinga (b. *c.* 1840, Sawakin, the Sudan—d. 1926, Egypt), a leader of the Mahdist revolt that broke out in the Sudan in 1881.

Osman's father was a merchant of Kurdish descent; his mother, a member of the local Hadendowa tribe. Before the revolt of al-Mahdī, Osman traded in slaves. In 1877, however, the Egyptian government, which had nominal authority in the Sudan, began to take serious measures against the slave trade. Osman was jailed for a time and later joined an ecstatic mystical order. When in 1883 he learned of the advent of Muḥammad Aḥmad, al-Mahdī, he joined him and thereafter became a devoted follower. Al-Mahdī gave him the mission of raising the rebellion in the Red Sea hinterland. The Beja tribesmen who populated the area did not speak Arabic and had never been ruled by an Arab; they thus quickly gave their allegiance to Osman, who was their kinsman and through years of friendly commercial dealings with them had come to know their language and their ways. With his Beja tribal warriors, Osman destroyed two Egyptian columns near Tokar in November and December 1883, while Tokar itself, the chief city in the region, fell to him several months later. From then until 1891 Osman directed Mahdist activities in the eastern Sudan and thus protected its eastern borders from Egyptian forces. In February 1891, however, an Anglo-Egyptian force recaptured Tokar, and, abandoned by all of his allies, Osman fled to the mountains. He remained a general in the Mahdist army but did not play a decisive role in the battles that led to the defeat and death of al-Mahdī's successor, ʿAbd Allāh, in November 1899. Osman then fled, trying to reach the Hejaz. He was captured in the Red Sea hills in January 1900 and was imprisoned until 1908. Thereafter he lived in Egypt.

Osman Nuri Paşa (b. 1832, Tokat, Ottoman Empire—d. April 14, 1900, Constantinople), Ottoman paşa and *muşir* (field marshal) who became a national hero for his determined resistance at Plevna (modern Pleven, Bulg.) during the Russo-Turkish War of 1877–78.

After graduation from the military academy of Constantinople, Osman entered the cavalry in 1853 and served in the Crimean War (1853–56). Later, he took part in the campaigns in Lebanon (1860) and Crete (1866–69) and in the suppression of an insurrection in Yemen (1871). He was given command of an army corps at Vidin in 1876, and, following his successes against the Serbian Army, he was promoted to the rank of *muşir.* During the Russo-Turkish War, after the Russians had crossed the Danube in July 1877, Osman entrenched himself at Plevna on the right flank of the Russian line of communications and maintained his position until December 9, when, compelled to cut his way out, he was wounded and forced to capitulate. This famous defense earned him the title of *gazi* ("victor in the holy war"), and, after his return from imprisonment in Russia, he was appointed marshal of the sultan's court. Later, Osman served as war minister on four occasions.

Osmānābād, town, administrative headquarters of Osmānābād district, Mahārāshtra state, western India, north of Sholāpur. Part of the ancient Yādava Hindu kingdom, it fell to Bahmanī and Bijāpur kingdoms in the 14th and 16th centuries and was later incorporated into the territories of the Niẓāms of Hyderābād. It became a part of the Indian Union in 1947. Cotton ginning and pressing are its chief industries. It has two colleges affiliated with Marāṭhwādā University.

Osmānābād district (5,451 sq mi [14,117 sq km]) borders on Karnātaka state. It occupies the Osmānābād plateau, which is drained by the Mānjra River. Despite favourable annual rainfall, the district is sparsely populated. Most of the people are engaged in agriculture; the chief crops are millet, pulses, and oilseeds. Some cotton is grown, and it is the basis of the only large-scale industry. Osmānābād town, Lātūr, and Tuljāpur (a Hindu pilgrimage centre) are the chief towns. Pop. (1981) town, 39,068; district, 2,230,620.

Osmeña, Sergio (b. Sept. 9, 1878, Cebu City, Phil.—d. Oct. 19, 1961, Manila), Filipino statesman, founder of the Nationalist Party (Partido Nacionalista) and president of the Philippines from 1944 to 1946.

Osmeña received a law degree from the University of Santo Tomás, Manila, in 1903. He was also editor of a Spanish newspaper, *El Nuevo Día,* in Cebu City. In 1904 the U.S. colonial administration appointed him governor of the province of Cebu and *fiscal* (district attorney) for the provinces of Cebu and Negros Oriental. Two years later he was elected governor of Cebu. In 1907 he was elected delegate to the Philippine National Assembly and founded the Nationalist Party, which came to dominate Philippine political life.

Osmeña remained leader of the Nationalists until 1921, when he was succeeded by Manuel Quezon, who had joined him in a coalition. Made speaker of the House of Representatives in 1916, he served until his election to the Senate in 1923. In 1933 he went to Washington, D.C., to secure passage of the Hare–Hawes–Cutting independence bill, but Quezon differed with Osmeña over the bill's provision to retain U.S. military bases after independence. The bill, vetoed by the Philippine Assembly, was superseded by the Tydings–McDuffie Act of March 1934, making the Philippines a commonwealth with a large measure of independence. The following year Osmeña became vice president, with Quezon as president. He remained vice president during the Japanese occupation, when the government was in exile in Washington, D.C. On the death of Quezon in August 1944, Osmeña became president. He served as president until the elections of April 1946, when he was defeated by Manuel Roxas, who became the first president of the independent Republic of the Philippines.

osmiridium (mineral): *see* iridosmine.

osmium (Os), chemical element, one of the platinum metals of Group VIII of the periodic table and the densest naturally occurring element. A gray-white metal, osmium is very hard, brittle, and difficult to work, even at high temperatures. Of the platinum metals it has the highest melting point, so fusing and casting are difficult. Osmium wires were used for filaments of early incandescent lamps before the introduction of tungsten. It has been used chiefly as a hardener in alloys of the platinum metals, though ruthenium has generally replaced it. A hard alloy of osmium and iridium has been used for tips of fountain pens and phonograph needles, and osmium tetroxide is used in certain organic syntheses.

Pure osmium metal does not occur in nature. Though rare, osmium is found in native alloys with other platinum metals: in siserskite (up to 80 percent), in iridosmine (*q.v.*), in aurosmiridium (25 percent), and in slight amounts in native platinum. The English chemist Smithson Tennant discovered the element together with iridium in the residues of platinum ores not soluble in aqua regia. He announced its isolation (1804) and named it for the unpleasant odour of some of its compounds.

Of the platinum metals, osmium is the most rapidly attacked by air. The powdered metal, even at room temperature, exudes the characteristic odour of the poisonous, volatile tetroxide, OsO_4. Because solutions of OsO_4 are reduced to the black dioxide, OsO_2, by some biological materials, it is sometimes used to stain tissues for microscopic examinations. Osmium exhibits oxidation states from 0 to +8 in its compounds, with the exception of +1; well-characterized and stable compounds contain the element in +2, +3, +4, +6, and +8 states. Ruthenium is the only other element known to have a valence of 8. All compounds of osmium are easily reduced or decomposed by heating to form the free element as a powder or sponge. Natural osmium consists of a mixture of seven stable isotopes: osmium-184 (0.02 percent), osmium-186 (1.58 percent), osmium-187 (1.6 percent), osmium-188 (13.3 percent), osmium-189 (16.1 percent), osmium-190 (26.4 percent), osmium-192 (41.0 percent).

atomic number	76
atomic weight	190.2
melting point	3,000° C (5,432° F)
boiling point	about 5,000° C (9,032° F)
specific gravity	22.48 (20° C)
valence	2, 3, 4, 6, 8
electronic config.	2-8-18-32-14-2 or (Xe)$4f^{14}5d^{6}6s^{2}$

osmoregulation, in biology, maintenance by an organism of an internal balance between water and dissolved materials regardless of environmental conditions. In many marine organisms osmosis (the passage of solvent through a semipermeable membrane) occurs without any need for regulatory mechanisms because the cells have the same osmotic pressure as the sea. Other organisms, however, must actively take on, conserve, or excrete water or salts in order to maintain their internal water-mineral content.

osmosis, the spontaneous passage or diffusion of water or other solvents through a semipermeable membrane (one that blocks the passage of dissolved substances—*i.e.,* solutes). The process, important in biology, was first thoroughly studied in 1877 by a German plant physiologist, Wilhelm Pfeffer. Earlier workers had made less accurate studies of leaky membranes (*e.g.,* animal bladders) and the passage through them in opposite directions of water and escaping substances. The general term osmose (now osmosis) was introduced in 1854 by a British chemist, Thomas Graham.

If a solution is separated from the pure solvent by a membrane that is permeable to the solvent but not the solute, the solution will tend to become more dilute by absorbing solvent through the membrane. This process can be stopped by increasing the pressure on the solution by a specific amount, called the osmotic pressure. The Dutch-born chemist Jacobus Henricus van't Hoff showed in 1886 that, if the solute is so dilute that its partial vapour pressure above the solution obeys Henry's law (*i.e.,* is proportional to its concentration in the solution), then osmotic pressure varies with concentration and temperature approximately as it would if the solute were a gas occupying the same volume. This relation led to equations for determining molecular weights of solutes in dilute solutions through effects on the freezing point, boiling point, or vapour pressure of the solvent.

Osmund OF SALISBURY, SAINT (d. Dec. 3 or 4, 1099, England; canonized Jan. 1, 1457; feast day December 4), Norman priest, who was chancellor of England (*c.* 1072–78) and bishop of Salisbury (1078–99).

According to a 15th-century document, Osmund was the nephew of William the Conqueror. He certainly accompanied the Normans to England, where he was William's chaplain and one of the compilers of Domesday Book. A late document states, probably inaccurately, that he was earl of Dorset. Osmund completed and consecrated the cathedral at Old Sarum, Wiltshire, in 1092, and he organized a cathedral chapter of secular canons similar to Norman chapters, which was copied by other English cathedrals. His liturgical reforms became the basis for the later "Old Sarum" liturgy used throughout the British Isles. After Osmund was canonized, his remains were transferred from Old Sarum to Salisbury Cathedral.

Osmunda, fern genus of the family Osmundaceae, with divided fronds and often growing to a height of 1.5 metres (5 feet). The matted fibrous roots of these abundant ferns are called osmunda fibre, osmundine, or orchid peat; they are broken up and used as a rooting medium for epiphytic orchids; *i.e.*, those that derive moisture and nutrients from the air. For information on the *Osmunda* species, *see* Osmundaceae.

Osmundaceae, the royal fern family, only family of the fern order Osmundales (suborder Osmundineae in some classification systems). A primitive group consisting of three present-day genera of large ferns (*Osmunda, Todea,* and *Leptopteris*), the family contains about 20 species; 5 to 10 extinct genera date from the Late Permian Period (245,000,000 to 286,000,000 years ago). *Thamnopteris* and *Zalesskya* are the earliest known members of the family. The Osmundaceae family is characterized by spore-producing structures (sporangia) that are either scattered or in clusters (sori) on the lower sides of leaflets (pinnae) or on both sides of special fertile regions of some leaves (fronds), but the sori are without the membranous covering (indusium) found in many other fern families. The genera are distinguished by the disposition of the sporangia and sori.

Cinnamon fern (*Osmunda cinnamomea*)
Shunji Watari—EB Inc.

Osmunda, with about 12 species distributed in wet areas from Canada and Europe into the tropics, has sporangia on special fertile pinnae. It includes royal fern, cinnamon fern, and interrupted fern.

The genus *Todea,* represented by one species (*T. barbara*) of Africa, Australia, and New Zealand, has sporangia on the backs of ordinary green pinnae.

Leptopteris, with seven species distributed in New Guinea, Polynesia, and New Zealand, has sporangia positioned as in *Todea*, but its thin, filmy leaves are only two cell layers thick.

Economically, the roots and rhizomes (horizontal stems) of *Osmunda* species are the source of a fibre (osmundine, or Osmunda fibre) used as a growing medium for orchids and other epiphytes. The cinnamon fern and the interrupted fern are popular as greenhouse plants.

Osnabrück, city, Lower Saxony *Land* (state), northwestern Germany, on the canalized Hase River between the Teutoburger Wald (forest) and the Wiehengebirge (mountain range). Originally a Saxon settlement where Charlemagne established a bishopric in 785, the city was chartered in 1171 and was a member of the Hanseatic League, known especially for its "Osnaburg" linen. The city accepted the Reformation in 1543 and has been predominantly Protestant since. The Peace of Westphalia, signed there in 1648, stipulated that the bishopric was to be held alternately by Catholics and Protestants. Ernest Augustus I, elector of Hanover and the father of George I of England, was the first Protestant bishop. The see was secularized and given to Hanover in 1803, but it was reestablished as a Roman Catholic bishopric in 1858.

The palace of the elector bishops (1667–90) has survived. There was widespread destruction in World War II, but several buildings—including the historic town hall (1487–1512) with its peace hall (Friedenssaal) and the Gothic St. Mary's Church (1280–1324)—survived. Other medieval buildings include the 13th-century Romanesque cathedral and St. John's and St. Katherine's churches. There are town houses of the 13th–19th century, one of which was the birthplace of the writer and statesman Justus Möser (1720–94). The University of Osnabrück was founded in 1970. In the vicinity are several moated castles, such as Haus Gesmold, and spas, such as Melle (saline springs).

Osnabrück is a major rail junction with steel works and factories producing machinery, auto equipment, chemicals, textiles, and paper. Pop. (1989 est.) 154,594.

Osorno, capital of Osorno province, Los Lagos region, southern Chile, lying at the junction of the Damas and Rahue rivers, 40 mi (64 km) inland from the Pacific coast. It was founded in 1553 under the name Santa Marina de Gaete. This settlement failed, but it was refounded, effectively, in 1558 by García Hurtado de Mendoza, who named it Ciudad de San Mateo de Osorno. The settlement came under attack by Araucanian Indians in 1599 and was devastated in 1602. After several unsuccessful attempts, it was repopulated in 1796 by order of Ambrosio O'Higgins (the father of Bernardo O'Higgins).

Osorno's greatest growth followed the influx of German colonists, who began arriving in the mid-19th century and subsequently influenced the cultural life and architecture of the city. The opening of the Santiago–Puerto Montt railroad in 1895 alleviated Osorno's isolation. The city is also linked by road and ferry to San Carlos de Bariloche, in Argentina. Its industries include grain and lumber milling as well as milk and meat processing. Tourism is an added economic asset, for Osorno is a gateway to Chile's famed lake district. Pop. (1982 prelim.) 97,829.

osprey, also called FISH HAWK (*Pandion haliaetus*), large, long-winged hawk, about 65 centimetres (26 inches) long, that lives along seacoasts and larger interior waterways, where it catches fish. The osprey belongs to the family Pandionidae (sometimes considered a subfamily, Pandioninae, of the family Accipitridae).

Ospreys (*Pandion haliaetus*) at nest
Peter L. Ames

It is brown above and white below, with some white on the head. An osprey flies over the water, hovers above its prey, and then plunges feet first to seize a fish in its long, curved talons. With grip secured by sharp spicules on the underside of the toes, the bird carries its prey to a favourite perch to feed. Sometimes, after feeding, an osprey flies low over the water, dragging its feet as if to wash them.

Throughout its wide breeding range, which extends to all the continents except South America, where it occurs only in winter, the osprey nests singly or in colonies in tall trees, at ground level on small islands, or on ledges of cliffs. The North American population of this species declined greatly after 1900, especially in the mid-century—apparently because of the effects of DDT residues—but began to recover by the 1980s. Exterminated from the British Isles by 1910, the osprey reappeared there as a successfully breeding species in 1959.

The nest is a bulky structure, up to 2 metres (6.5 feet) across, composed of haphazardly arranged sticks. Two to four boldly marked eggs are laid; downy young hatch in about five weeks and are fed by both parents. The young birds fledge in six to eight weeks.

Osraighe (ancient kingdom, Ireland): *see* Ossory.

Osroëne, also spelled OSRHOENE, ancient kingdom in northwestern Mesopotamia, located between the Euphrates and Tigris rivers and lying across the modern frontier of Turkey and Syria. Its capital was Edessa (modern Urfa, Tur.). The name of the kingdom appears to have been ultimately derived from a certain Osroes of Orhai, who founded the state about 136 BC. Although Osroes was probably of Iranian origin, the rulers after him were Arabs.

Osroëne commanded the strategic east–west highway that followed the southern edge of the Kurdish plateau; it also controlled part of the trade route from Anatolia to Mesopotamia known as the old Persian Royal Road. Osroëne was, therefore, in a strong position during wars between Rome and Parthia from the 1st century BC to the 2nd century AD, and it formed alliances at different times with one or the other. Finally, the Roman emperor Trajan deposed Abgar VII, king of Osroëne, after quelling a Mesopotamian revolt of AD 116, and foreign princes occupied the throne. In AD 123, however, Maʿnu VII, brother of Abgar, became king under the protection of the emperor Hadrian. Thereafter the state maintained some autonomy until 216, when the emperor Caracalla occupied Edessa and abolished the kingdom.

Under its Arab dynasties, Osroëne became increasingly influenced by Aramaic culture and was a centre of national reaction against Hellenism. By the 5th century Edessa had become the headquarters of Chaldean Syriac literature and learning. In 608 Osroëne was taken by the Sāsānid Khosrow II, and in 638 it fell to the Muslims.

Oss, *gemeente* (commune), Noordbrabant *provincie,* south-central Netherlands, east-northeast of 's Hertogenbosch and about 3 miles (5 km) south of the Maas (Meuse) River. A food-processing town noted for margarine and meat products, it also manufactures pharmaceuticals (especially insulin and vitamins), electrical equipment, wool products, boxes, and metalware. Mainly Roman Catholic, it was chartered in 1399. Pop. (1992 est.) 52,132.

Ossa, Modern Greek ÓSSA, or KISSAVOS, mountain massif, *nomós* (department) of Larissa, eastern Thessaly, Greece. It lies on the Gulf of Thérmai and is separated on the north from the Olympus massif by the Vale of Tempe (Témbi). Rising from a broad, steep-sided plateau to a pyramidal peak of 6,489 feet (1,978 m), the mountain is noted in mythology for the attempt of the Aloads, sons of the sea god Poseidon, to climb to heaven by placing Ossa on Olympus and the Pelion mountains on Ossa.

Ossa, Mount, highest peak in Tasmania, Australia, rising to 5,305 feet (1,617 m), in the central highlands. At the northern end of the rugged Ducane Range, Mount Ossa, along with several other peaks surpassing 5,000 feet, lies within Cradle Mountain–Lake St. Clair National Park. Its slopes are deeply gouged by glacial corries (cirques). The name, with the adjacent Mounts Pelion and Achilles, is taken from Greek mythology.

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Osservatore romano, L' (Italian: "The Roman Observer"), daily newspaper published in Vatican City, one of the most influential papers in Italy and the de facto voice of the Holy See.

It was founded in Rome in 1861 with the approval of Pope Pius IX and took the name of a defunct Roman journal. The Vatican subsidized it from the time of its founding, and Pope Leo XIII bought it outright in 1890.

L'Osservatore publishes a regular column, "Nostre informazione" ("Our News"), detailing the pope's activities and appointments, and also prints the text of papal speeches as the Vatican newspaper of record. It is as widely and carefully read as are the official newspapers of many governments, for it provides insights into the attitudes of the Vatican on a wide range of subjects. It also reports and comments on political developments, and in such areas the editor in chief has considerable autonomy. In 1929 the paper was moved to a new plant inside the Vatican to protect it from marauding fascist bands. *L'Osservatore*'s candid reporting and editorial criticisms of Benito Mussolini's government enraged the dictator. He threatened to shut it down but never did, and its circulation rose during World War II to more than 350,000, as it was the only Italian paper publishing Allied war reports. *L'Osservatore* stresses editorials and comment rather than news, following its established policy of noting the religious and moral implications of events, institutions, and trends.

Ossetia (Russia): *see* North Ossetia.

Ossetic language, eastern Iranian language spoken in the northern Caucasus by the Ossetes. There are two major dialects: (1) eastern, called Iron, and (2) western, called Digor. The majority of the Ossetes speak Iron, which is the basis of the literary language now written in the Cyrillic alphabet. Ossetic is the modern descendant of the language of the ancient Alani, a Sarmatian people, and the medieval As. It preserves many archaic features of Old Iranian, such as eight cases and verbal prefixes. The phonology of the language has been greatly influenced by the non-Indo-European languages of the Caucasus, and the present vocabulary has many loanwords from Russian. There are many folk epics in Ossetic; the most famous are the tales about hero warriors, the Narts. The literary language was established by the national poet Kosta Khetagurov (1859–1906).

Ossian, Gaelic OISÍN, the Irish warrior-poet of the Fenian cycle of hero tales about Finn and his war band, the Fianna Éireann. (*See* Fenian cycle.) The name Ossian became known throughout Europe in 1762, when the Scottish poet James Macpherson (*q.v.*) "discovered" the poems of Oisín and published the epic *Fingal* and the following year *Temora,* supposedly translations from 3rd-century Gaelic originals. Actually, although based in part on genuine Gaelic ballads, the works were largely the invention of Macpherson and were full of similarities to Homer, John Milton, and the Bible. These so-called poems of Ossian won wide acclaim and were a central influence in the early Romantic movement. J.W. von Goethe was one of their many admirers, but they aroused the suspicions of some critics, such as Samuel Johnson. They infuriated Irish scholars because they mixed Fenian and Ulster legends indiscriminately and because Macpherson claimed that the Irish heroes were Caledonians and therefore a glory to Scotland's past, rather than to Ireland's.

The Ossianic controversy was finally settled in the late 19th century, when it was demonstrated that the only Gaelic originals that Macpherson had produced were translations in a barbarous Gaelic of his own English compositions. The name Ossian, popularized by Macpherson, superseded Oisín, though they are often used interchangeably. The term Ossianic ballads (*q.v.*) refers to genuine late Gaelic poems that form part of the common Scots-Irish Gaelic tradition and should not be confused with the romanticized epics of "Ossian."

Ossianic ballads, Irish Gaelic lyric and narrative poems dealing with the legends of Finn MacCumhaill and his war band. They are named for Oisín, the chief bard of the Fenian cycle (*q.v.*). These poems belong to a common Scots-Irish Gaelic tradition: some are found in the Scottish Highlands, others in Ireland, but their subjects are of Irish origin. Consisting of over 80,000 lines, they were formed from the 11th to the 18th century, although their themes of pursuits and rescues, monster slayings, internecine strife, elopements, and magic visitors go back to an earlier period (*c.* 3rd century AD). The tone of the Ossianic ballads is strikingly different from the earlier Fenian literature, which reflected a mutual respect between pagan and Christian tradition. The Ossianic ballads, usually introduced by a dialogue between Ossian and Patrick, are stubbornly pagan and anticlerical, full of lament for the glories of the past and contempt for the Christian present. St. Patrick is often portrayed as a bigoted cleric. The earliest collection of these late ballads was made by Sir James MacGregor between 1512 and 1526 and is known as *The Book of the Dean of Lismore.*

Ossietzky, Carl von (b. Oct. 3, 1889, Hamburg, Ger.—d. May 4, 1938, Berlin), German journalist and pacifist, winner of the Nobel Prize for Peace for 1935.

In 1912 Ossietzky joined the German Peace Society but was conscripted into the army and served throughout World War I. In 1920 he became the society's secretary in Berlin. Ossietzky helped to found the Nie Wieder Krieg (No More War) organization in 1922 and became editor of the *Weltbühne,* a liberal political weekly, in 1927, where in a series of articles he unmasked the Reichswehr leaders' secret preparations for rearmament. Accused of treason, Ossietzky was sentenced in November 1931 to 18 months' imprisonment but was granted amnesty in December 1932. When Adolf Hitler became chancellor, Ossietzky had resumed his editorship. Steadfastly refusing to flee Germany, he was arrested on Feb. 28, 1933, and sent to Papenburg concentration camp. He was transferred in May 1936 to a prison hospital and then to a private hospital, where he died of tuberculosis.

On Nov. 24, 1936, Ossietzky was awarded the Nobel Prize for Peace for 1935. The award was interpreted as an expression of worldwide censure of Nazism. Hitler's reply was a decree forbidding Germans to accept any Nobel Prize.

Ossining, village in the Town (township) of Ossining, Westchester county, southeastern New York, U.S., on the east bank of the Hudson River. The site was part of a land grant made in 1680 to Frederick Philipse by Charles II and known as Philipsburg Manor. It was included in Tory lands confiscated by New York State in 1779 and later sold mainly to patriot tenant farmers. Two hamlets, Sparta and Hunters Landing, developed, and these were incorporated as the Village of Sing Sing (for the Sin Sinck Indians) in 1813. Sing Sing was part of the Town of Mount Pleasant until 1845 when the Town of Ossining was formed. It became a boatbuilding centre from which farm produce was shipped to New York City (30 miles [48 km] south). In 1901 the village name was changed to Ossining to avoid too close identification with Sing Sing State Prison (established there in 1824—renamed Ossining Correctional Facility in 1969). Manufactures include plumbing and electrical equipment, wallpaper, drugs, and office furniture. Pop. (1991 est.) 22,666.

Ossius OF CÓRDOBA: *see* Hosius of Cordoba.

Ossory, also spelled OSRAIGHE, an ancient kingdom of Ireland that won for itself a semi-independent position as a state within the kingdom of Leinster, probably in the 1st century AD. In the 9th century it was ruled by an able king, Cerball, who allied himself with the Norse invaders and figured in later centuries as an ancestor of some important families in Iceland. When surnames were introduced, the dynasts descended from him in Ireland were known as Mac Gillápadraig, a name transformed under Norman influence into Fitzpatrick. In the 11th century they contended for the kingship of Leinster but were soon overwhelmed by the south Leinster family of MacMurrough. In feudal times the Butlers became the most powerful lords in that area. The modern diocese of Ossory, with its see at Kilkenny, indicates the extent of the ancient state.

Ostade, Adriaen van (b. Dec. 10, 1610, Haarlem, Neth.—buried May 2, 1685, Haarlem), painter and printmaker of the Baroque period known for his genre pictures of Dutch peasant life. He also did religious subjects, portraits, and landscapes. Van Ostade was a prolific artist, executing his small-scale works in oil, usually on wood panels. He also worked in watercolour, did spirited pen drawings, and produced about 50 etchings. His works won him much popularity during his lifetime, and in 1662 he was made president of the Haarlem painters' guild.

"Carousing Peasants in an Interior," oil painting by Adriaen van Ostade, c. 1638; in the Alte Pinakothek, Munich
Alte Pinakothek, Munich; photograph, Joachim Blauel—ARTOTHEK

Ostade and the Flemish genre painter Adriaen Brouwer may have been pupils of Frans Hals about 1627, although Hals's style was not a major influence on either of them. There is a much closer resemblance between the paintings of the two young artists than between their pictures and those of any older master. Brouwer was the most important influence in shaping Ostade's style. Like Brouwer, Ostade delighted in scenes of low peasant life, such as tavern brawls, usually in dimly lit interiors with a single source of light illuminating a principal group, as in "Carousing Peasants in an Interior" (*c.* 1638; Alte Pinakothek, Munich). He treated these themes with a broad and vigorous technique in a subdued range of colours that often borders on monochrome and used a considerable element of caricature to underline the coarseness of his peasant types. Ostade's colour schemes in his early period (1630s) are largely confined to a range of neutral bluish-grays and browns, sometimes enlivened by a single note of bright colour. From the 1640s on, he gradually adopted a brighter palette, and his subjects, still mostly from peasant life, tend to become less ribald and grotesque. In the works of his maturity (1650–70) are found more outdoor settings, such as peasants by a cottage door or figures making merry outside an inn, *e.g.,* "The Itinerant Fiddler" (1672; Mauritshuis, The Hague).

Ostade, Isack van, Isack also spelled IZAACK, or ISAK (baptized June 2, 1621, Haarlem, Neth.—buried Oct. 16, 1649, Haarlem), Dutch genre and landscape painter of the Baroque period, especially noted for his winter scenes and depictions of peasants and travelers at rustic inns.

Isack was a pupil of his brother Adriaen, whose manner he followed so closely that some of his early works have been confused with those of the elder Ostade. He soon branched out into a style more ambitious both in scale and in complexity of composition.

In the 1640s, his most distinguished period, he did a small number of winter landscapes, with sleighers and skaters; they can be ranked among the finest of all Dutch paintings of this type. His most characteristic pictures depict figures resting outside an inn or a cottage with carts and horses. These works, reminiscent of compositions by Salomon van Ruysdael, show a keen grasp of design in the disposition of the figures, together with a sense of vivacity. He also excels in rendering misty or smoke-laden atmosphere. Since he died at such an early age (28), Isack van Ostade had few if any pupils, yet his influence on the succeeding generation of Haarlem painters was by no means negligible. Philips Wouwerman in particular seems to have owed much to him.

Ostaijen, Paul van (b. Feb. 22, 1896, Antwerp, Belg.—d. March 18, 1928, near Namur), Belgian poet and man of letters whose avant-garde writings in Flemish were influential in Belgium and Holland.

While a clerk in the municipal service (1914–18), van Ostaijen began to contribute to newspapers and periodicals. His first volume of verse, *Music-hall* (1916), introduced modern city life as a subject for Flemish poetry. His second, *Het Sienjaal* (1918; "The Signal"), showed the influence of World War I and of German Expressionism and inspired other Expressionist writers in Flanders. Compromised as a political activist, van Ostaijen went into exile in Berlin (1918–21). The political and artistic climate there and the hardships he endured made him a nihilist, and he wrote Dadaist poetry such as that in *Bezette Stad* (1921; "Occupied City"). But he soon developed a poetic system of his own, aiming at a "pure poetry" that gave up personal and humanitarian confessions. Words were freed from their traditional syntactic relationships, and images were replaced by assocations. This style was embodied in *Gedichten* (1928; "Poems"), containing his best and most original poems, evocative fragments of exceptional sensibility and haunting musicality.

Van Ostaijen also wrote a number of influential essays on art and literature, and his criticism was collected in two volumes (1929–31). His creative prose, such as that in *Vogelvrij* (1927; "Outlawed") and *Diergaarde voor kinderen van nu* (1932; "Zoo for Today's Children"), consists mainly of grotesque sketches showing keen imagination. By its lucidity, stubborn analysis of a theme, and underlying restlessness, this prose sometimes recalls that of the writer Franz Kafka. Van Ostaijen was Kafka's first foreign translator, publishing five of his short prose pieces in Flemish in 1925.

After his return to Flanders, van Ostaijen worked in the book trade and then became an art dealer in Brussels (1925–26).

ostariophysan, any of about 6,000 species of bony fishes belonging to the superorder Ostariophysi. They are grouped into two orders: Cypriniformes (*e.g.,* characins, carps, and minnows) and Siluriformes (catfishes). Ostariophysans form the majority of freshwater fishes.

A brief treatment of ostariophysans follows. For full treatment, *see* MACROPAEDIA: Fishes.

Ostariophysans are distinguished by the Weberian apparatus, the precise function of which is not known. It consists of a chain of four paired bones, called ossicles, derived from the vertebrae immediately behind the skull. These ossicles connect the inner ear and swim bladder, which balances the fish in water. The Weberian apparatus provides a fish with sensitive hearing, as it transmits pressure changes in the water. Ichthyologists often use it to identify various ostariophysan families and orders; among members of the family Gymnotidae (knifefishes), for example, one of the ossicles is missing.

Most ostariophysans range in size from 2 to 30 cm (about 1 to 12 inches) long, but the Asian mahseer (family Cyprinidae) attains a length of 2 m (6.5 feet) and a weight of 90 kg (200 pounds). A giant Eurasian catfish called wels grows up to 4.5 m long and weighs up to 300 kg. Many species of ostariophysans provide humans with food, sport, or (as aquarium pets) entertainment. The best-known aquarium pets are the goldfish (*Carassius auratus*) and common carp (*Cyprinus carpio*).

Ostariophysans generally breed in the spring; the female deposits her eggs in the water, and the male fertilizes them with the milt produced in his testes. Tropical ostariophysans may breed year-round. Some species, such as the catfish, build nests in gravel or sand, while others deposit their eggs under logs or stones or among aquatic plants.

Certain species, such as the tigerfish and the piranha of South America, are ferocious and may even prey on humans. Others (*e.g.,* catfish) content themselves with bottom-dwelling. Most ostariophysans feed on phytoplankton, algae, and aquatic vegetation.

osteitis deformans: *see* Paget's disease of bone.

osteitis fibrosa cystica (disease): *see* parathyroid adenoma.

Ostend, Flemish OOSTENDE, French OSTENDE, municipality, West Flanders *province,* northwestern Belgium. It lies along the North Sea and at the end of the Ghent-Brugge Canal. A fishing village (originally Oostende-ter-Streepe) since the 9th century, it was fortified in 1583 and became the last Dutch stronghold in Belgium, falling to the Spanish in 1604 after a three-year siege. It entered a period of prosperity when the Holy Roman emperor Charles VI of Austria founded the Ostend Company (1722), which was dissolved in 1731. Commercial activity resumed under the Austrian emperor Joseph II (1780–90).

The harbour, Ostend, Belg., with the railway station in the foreground
Pier Giorgio Sclarandis—Black Star

After Belgian independence (1830), Ostend developed as a fashionable seaside resort, later patronized by Leopold II. It served as a major German submarine base in World War I until the sinking of the British blockship *Vindictive* sealed the port (1918). During World War II, serving as a German coastal fortress, it was severely damaged. It was liberated by

Canadian forces Sept. 9, 1944. Most of its public buildings have been rebuilt, and the city survived storm floods in 1953 that broke the dike between Ostend and Knokke.

A thriving resort and Belgium's most important fishing port, it has industries that include fish curing, oyster culture, shipbuilding, and tobacco and soap manufacturing. Landmarks include the Vismijn, or Minque (fish market), the 3-mile (5-km) Digue (promenade), the Kursaal (casino), the Chalet Royal, the Thermal Institute (for hydropathic and electrotherapeutic treatment), and the racecourse. Connected with England by cross-Channel boat and by air services (airport at Raversijde), Ostend is the railroad "gateway to Europe." Pop. (1992 est.) mun., 68,900.

Ostend Company, German OSTENDISCHE KOMPANIE, or OSTENDE-KOMPANIE, trading company that operated from the Austrian Netherlands from 1719 to 1731. Founded by the Holy Roman emperor Charles VI, it represented an attempt to cash in on the riches being won by the Dutch and English East India companies and stemmed from Charles VI's awareness of the importance of foreign trade and the recent acquisition (1714) by Austria of the port of Ostend. The initial charter was to run for 30 years, and trade was to be with the East and West Indies and with Africa. In return, the imperial treasury was to receive 3 to 6 percent of the profits. At first trade flourished, two settlements being founded in India while much smuggling into England occurred. The English and Dutch, however, feared trade rivalry; and their feelings were exacerbated by Spain's support for the venture (1725), which introduced political elements. In 1727 Charles VI, aiming for international recognition of his daughter Maria Theresa's eventual succession, suspended the company for seven years because of opposition from France, Russia, and Prussia as well as from Britain and the United Provinces. In 1731 the Treaty of Vienna dissolved the company in return for outright recognition of the Pragmatic Sanction (Maria Theresa's right of succession). Nevertheless, unofficial trading activities continued until 1744, when the company's servants lost their last Indian settlement.

osteoarthritis, also called OSTEOARTHROSIS, or DEGENERATIVE JOINT DISEASE, a disorder of the joints, characterized by progressive deterioration of the articular cartilage. It is the most common joint disease, affecting more than 80 percent of those who reach the age of 70. Although its suffix indicates otherwise, osteoarthritis is not characterized by excessive joint inflammation as is the case with rheumatoid arthritis. The disease may be asymptomatic, especially in the early years of its onset. As it progresses, however, pain, stiffness, and a limitation in movement may develop. Common sites of discomfort are the vertebrae, knees, and hips—joints that bear much of the weight of the body.

The genesis of this disorder is not completely understood, but biomechanical forces that place stress on the joints (*e.g.,* bearing weight, postural or orthopedic abnormality, or injury that causes chronic irritation of the bone) are thought to interact with biochemical and genetic factors to contribute to the degenerative process of aging. In its early stages there is softening and roughening of the cartilage, which eventually wears away. The bone, deprived of its protective cover, regenerates the destroyed tissue, resulting in an uneven remodeling of the surface of the joint. Thick bony outgrowths called spurs sometimes arise. Articulation of the joint becomes difficult.

Depending on the site and severity of the disease, various treatments are employed. Individuals who experience moderate symptoms can be treated by a combination approach that may include any or all of the following: analgesics, periodic rest, weight reduction, injection of corticosteroids, and physical therapy or a home exercise program. Surgical procedures such as hip or knee replacement, or joint debridement (the removal of unhealthy tissue), may be necessary to relieve pain and improve joint function.

osteoblast, large cell responsible for the synthesis of new bone during both initial formation and later remodeling of bone. Osteoblasts form a closely packed sheet on the surface of the bone, from which cellular processes extend through the developing bone. They arise from the differentiation of osteogenic cells in the periosteum, the tissue that covers the outer surface of the bone, and in the endosteum of the marrow cavity. This cell differentiation requires a regular supply of blood, without which cartilage-forming chondroblasts, rather than osteoblasts, are formed.

The osteoblasts produce only the organic, unmineralized component of the bone, called osteoid, which consists of two substances secreted in different regions of the cell: mucopolysaccharides from the Golgi apparatus and collagen fibres from the endoplasmic reticulum. Mucopolysaccharides are the basic component of osteoid, while the collagen strengthens the matrix just as steel rods are used to reinforce concrete.

Eventually the osteoblast is engulfed by the growing bone matrix, and as the material calcifies, the cell is trapped and can no longer lay down new bone. Thus entrapped, it becomes an osteocyte (*q.v.*), or stable bone cell. *See also* bone.

osteochondroma, also called EXOSTOSIS, solitary benign tumour that consists partly of cartilage and partly of bone. Osteochondromas are common and may develop following trauma (injury) or may have a hereditary basis. At least one type, occurring in the external ear canal (external auditory exostosis), occurs with varying frequency in different populations and is of interest to anthropologists. Osteochondromas are not serious unless they interfere with function, in which case they should be removed. Rarely, a solitary one will become malignant in adulthood, giving rise to a chondrosarcoma. It is morphologically identical with the lesions produced in osteochondromatosis.

Osteochondromatosis (also called hereditary multiple exostosis, or diaphyseal aclasis) is a relatively common disorder of skeletal development in children in which bony protrusions develop on the long bones, ribs, and vertebrae. If severe, the lesions may halt bone growth, and dwarfing will result. Pressure on tendons, blood vessels, or nerves may cause other disability. Normally, such lesions cease growing at the end of puberty; reactivation of growth in adulthood may indicate malignant change, which occurs in 5 to 15 percent of cases.

osteochondrosis, also called EPIPHYSEAL ISCHEMIC NECROSIS, poorly understood but relatively common orthopedic disorder of children in which the epiphysis (growing end) of a bone dies and then is gradually replaced over a period of years. The immediate cause of bone death is loss of blood supply, but why the latter occurs remains unclear. The most common form, coxa plana, or Legg-Calvé-Perthes syndrome, affects the hip and most often begins about the age of six. It is four times more frequent in boys than in girls. Crippling may result, and degenerative joint disease is a complication of middle age. Treatment is directed first toward protection of the part from injury, together with rest and immobilization. In severe cases, detached fragments from the joint are removed by surgery.

osteoclast, large, multinucleate cell responsible for the dissolution and absorption of bone during the process of bone remodeling, or renewal. Bone is a dynamic tissue, continuously being broken down and restructured in response to such influences as structural stress and the body's requirement for calcium. The osteoclasts are the mediators of the continuous destruction of bone. Osteoclasts occupy small depressions on the bone's surface called Howship's lacunae; the lacunae are thought to be caused by erosion of the bone by the osteoclast's enzymes. Osteoclasts appear to be formed by the fusion of many smaller cells and may have as many as 200 nuclei, although most have only 5 to 20. The side of the cell closest to the bone contains many small projections (microvilli) that extend into the bone's surface, forming a brush border that is the cell's active region. Osteoclasts produce a number of enzymes, chief among them acid phosphatase and collagenase, that dissolve both the organic collagen and the inorganic calcium and phosphorus of the bone. The solid bone is first broken into fragments by dissolving the mucopolysaccharide glue that holds it together; the osteoclast then engulfs the fragments and digests them within cytoplasmic vacuoles. Calcium and phosphorus liberated by the breakdown of the bone are released into the bloodstream.

Osteoclast function is regulated by parathyroid hormone released in response to changes in blood calcium levels. It was formerly thought that parathyroid hormone caused bone-forming cells, or osteoblasts (*q.v.*), to differentiate into osteoclasts, but it is now believed that the two cells, which have opposite functions in maintaining bone structure, originate independently of one another. *See also* bone.

osteoclastoma, also called GIANT-CELL TUMOUR OF BONE, a bone tumour found predominantly in the knee region, but also occurring in the wrist, hand, foot, arm, and pelvis. The giant cells (large, often multinucleated cells) found in these tumours resemble osteoclasts, for which the tumour is inappropriately named. Usually seen in young adults between the ages of 20 and 40, this relatively uncommon, painful tumour is considered potentially malignant. Most tumours are benign at the outset and are removed by curettage (scraping). Unfortunately, about 50 percent of the tumours removed in this way recur, of which a small percentage spread to other parts of the body (metastasize). This has prompted some physicians to recommend more aggressive treatment, such as complete excision or amputation.

osteocyte, a cell that lies within the substance of fully formed bone. It occupies a small chamber called a lacuna, contained in the calcified matrix of bone. Osteocytes derive from osteoblasts, or bone-forming cells, and are essentially osteoblasts surrounded by the products they secreted. Cytoplasmic processes of the osteocyte extend away from the cell toward other osteocytes in small channels called canaliculi. By means of these canaliculi, nutrients and waste products are exchanged to maintain the viability of the osteocyte.

The osteocyte is not actively engaged in synthesizing bone as is the osteoblast, but it is unclear what function it does perform. It has been suggested that the osteocyte may aid in calcium removal from bone when the body calcium level drops too low.

Osteodontokeratic tool industry, assemblage of fossilized animal bones found at Taung by Raymond Arthur Dart about 200 miles (320 km) from Johannesburg, S.Af., where the first specimen of *Australopithecus africanus* was found, and at Makapansgat, where other specimens of *A. africanus* were found. Dart proposed that these fossils were tools used by *A.africanus,* an early hominid species. He postulated that teeth were used as saws and scrapers, long bones as clubs, and so on. He explained his theory on the basis of the fact that certain bones turned up regularly while others were rarely found.

Later research, however, cast doubt on the general interpretation of altered bone-remains as tools. More likely, the accumulation studied by Dart at Makapansgat resulted from the natural break-up of skeletons, the preferences of predators, and damage to the bones by stones falling from the cave roof.

osteogenesis imperfecta, hereditary disease of connective tissue that involves bone, sclera, inner ear, ligamentous structures, and skin. Several syndromes have been described, but they probably represent different degrees of expression of the same heritable disorder. The principal variants are osteogenesis imperfecta congenita, osteogeneis imperfecta tarda, and the van der Hoeve syndrome.

In osteogenesis imperfecta congenita, still-birth is common, or fractures are evident at birth; severe crippling occurs as a result of numerous fractures, and survival to adulthood is uncommon. In osteogenesis imperfecta tarda, the infant is normal at birth, but, depending on the severity of disease, few or many fractures occur over the following years, usually as a result of trivial mishaps. The frequency of fractures tends to diminish after puberty. The van der Hoeve syndrome consists of osteogenesis imperfecta tarda, with bluish sclerae and deafness. The peculiar colour of the sclera is due to its abnormal thinness, which permits the pigmentation of the choroid (the middle coat of the eyeball) to show. Hearing loss may be due to deformities of the bones of the inner ear as well as to pressure on the auditory nerve because of deformity of its canal in the skull. Hyperextensibility of joints—double-jointedness—and abnormally thin skin are also characteristic.

osteogenic sarcoma: *see* osteosarcoma.

osteoglossomorph, any member of the superorder Osteoglossomorpha, a group of primarily primitive freshwater fishes, including the elephantsnout fish, mormyrid, pirarucu, and awawana.

A brief treatment of osteoglossomorphs follows. For full treatment, *see* MACROPAEDIA: Fishes.

Except for the family Hiodontidae (*e.g.,* goldeye and mooneye), the Osteoglossomorpha are tropical fishes. Their distinguishing features are mostly skeletal; they have strongly toothed jaws, a wide variety of head and mouth forms, and a characteristic caudal (tail) fin. Osteoglossomorph fishes have well-developed teeth on the tongue, skull base, and bones of the mouth cavity. They have existed since the Cretaceous Period (65,000,000 to 136,000,000 years ago), and it is believed that they descended from an early teleost (bony fishes) stock.

The breeding habits of some Osteoglossomorphs are quite interesting. *Gymnarchus niloticus,* one of the electrical species, prepares a large, floating nest from swamp grasses, biting off the stems and working them into a type of trough. The fish spawn in the nest and take turns guarding the developing young for about 18 days. Other species carry the eggs and young in their mouths. *Arapaima gigas,* the huge pirarucu of South America, digs a spawning pit; after about seven days, the young hatch and leave the pit, guarded by the male. The dark colour of the male's head is perhaps recognized by the young, which congregate around it, but there are probably other stimuli, such as taste and smell attractions, to keep the young nearby.

Members of the Mormyridae and Gymnarchidae families have electrical organs that allow the fish to distinguish prey, predators, its own species, and obstacles in the water. The electrical organs also probably account for the peculiar swimming habits of some mormyriforms. *Gymnarchus* swims with its long body held rigid, propelled entirely by undulations of its dorsal fin. Other rigid swimmers are the featherbacks (family Notopteridae), which use their long anal fin to propel them; as they have no electrical organs, this behaviour is probably associated with the long, gas-filled swim bladder that extends into the tail.

Osteolepis, extinct genus of lobe-finned fish generally regarded as very primitive, although it survived into later Devonian time (345,000,000 to 395,000,000 years ago) and was contemporaneous with more advanced relatives. Its body was covered with large rhomboid scales; the upper lobe of the tail was more strongly developed than the lower lobe.

Osteolepis, model

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

An advanced trait of *Osteolepis* is the general bone pattern in the skull and jaws, a pattern ancestral to that of early amphibians.

osteoma, a small mass of new bone found mainly on bones of the skull. Osteomas usually appear in late childhood or young adulthood; they are self-limiting and usually single. They do not become malignant and need be treated (by excision) only if they interfere with normal function.

osteomalacia, progressive loss of calcium and phosphorus from the bones in adult humans. The condition may occur after several pregnancies or in old age, resulting in softening and curving of the bones and increased susceptibility to fractures.

Depletion of the bone minerals may be caused by prolonged deficiency of calcium in the diet, lack of dietary vitamin D (or its precursor, ergosterol), impaired function of one of the body organs involved in the absorption or metabolism of the bone minerals or vitamin D, or too frequent ingestion of mineral oil in which vitamin D dissolves but is not absorbed from the intestines.

Dietary histories of cases of osteomalacia frequently disclose multiple nutrient deficiencies. Therapy consists of the administration of a well-balanced diet high in protein and calcium and supplemented in moderation with vitamin D concentrates or fish-liver oils.

osteomyelitis, infection of bone tissue, usually occurring in childhood, most commonly caused by *Staphylococcus aureus.* The infectious organism reaches the bone via the bloodstream or by extension from a local injury and produces an inflammation with destruction of the cancellous (porous) bone and marrow, loss of blood supply, and bone death. Living bone around the infected area walls it in, forming a sequestrum, the contents of which are gradually resorbed as the lesion is repaired. In chronic osteomyelitis, infection remains active, and periodic drainage to the surface via sinus tracts may occur. Symptoms include fever, chills, and bone pain; later, swelling and redness may develop around the area of infection. Formerly a disease with high mortality, osteomyelitis today is usually controlled with antibiotics. Osteomyelitis may occur as a complication of many diseases, such as typhoid, syphilis, tuberculosis, or sickle-cell anemia; in the middle-aged, spinal osteomyelitis may be associated with urinary bladder infection.

osteon, also called HAVERSIAN SYSTEM, the chief structural unit of compact bone, consisting of lamellae, or layers of bone, surrounding a long hollow passageway, the haversian canal. Osteons are quite evident in a cross section of a long bone (*e.g.,* the femur) as a pattern of many groups of concentric circles, with a haversian canal at the centre of each group of circles. The haversian canal contains small blood vessels responsible for the blood supply to osteocytes (individual bone cells). Osteons themselves are concentric cylindrical elements several millimetres long and about 0.2 millimetre in diameter. Both the canal and the system are named for Clopton Havers, a 17th-century English physician.

Osteons are formations characteristic of mature bone and take shape during the process of bone remodeling, or renewal. New bone may also take this structure as it forms, in which case the structure is called a primary osteon. The process of the formation of osteons and their accompanying haversian canals begins when immature, woven bone and primary osteons are destroyed by large cells called osteoclasts, which hollow out a channel through the bone, usually following existing blood vessels. Layers of bone-forming cells, or osteoblasts, follow the osteoclasts, laying down new bone on the sides of the channel; the layers of bone built up in this way slowly narrow the channel until a tunnel not much larger than the central blood vessel remains. The blood supply for the bone cells, or osteocytes, then passes through these channels, which are the haversian canals. The spaces between adjacent osteons are filled with interstitial lamellae, layers of bone that are often remnants of previous haversian systems. Transverse pathways called Volkmann's canals connect adjacent osteons and also connect the blood vessels of the haversian canals with the periosteum, the tissue covering the bone's outer surface. *See also* bone.

osteonecrosis, also called NECROSIS OF BONE, death of bone tissue that may result from infection, as in osteomyelitis, or deprivation of blood supply, as in fracture, dislocation, caisson disease, or radiation sickness. In all cases blood circulation in the affected area ceases, bone cells die, and the marrow cavity becomes filled with debris. Surrounding bone resorbs and replaces necrotic bone over a period of months or years. With widespread damage, orthopedic care may be required.

osteopathy, health care profession that emphasizes the relationship between the musculoskeletal structure and organ function. Osteopathic physicians develop skill in recognizing and correcting structural problems through manipulative therapy and other treatments.

Osteopathic medicine began in the United States in the 19th century as a reform movement against the then rather primitive armamentarium of drugs and surgical techniques. The founder, Andrew Taylor Still, developed a system of osteopathic medicine in reaction to the conditions and types of treatment that he observed while serving as an army physician during the American Civil War.

After failing to persuade various medical schools to incorporate his ideas into their teachings, Still established a new medical school in 1892 in Kirksville, Mo., where he began conferring the doctor of osteopathy degree (D.O.) upon those physicians who adhered to his concepts of medicine. Still's emphasis on treating the whole man has remained an ideal of the profession.

Osteopathic medicine still has its main base in the United States. Canadian osteopathic physicians have received their training in the United States, and osteopathic medicine in the British Isles is in part a form of postgraduate specialization by holders of the M.D. degree. Most osteopathic physicians who practice elsewhere in the world have also been trained in the United States.

General osteopathic hospitals provide health care of all kinds, and specialty-oriented hospitals include maternity centres, proctology clinics, arthritis centres, emergency clinics, and alcoholism and drug-abuse centres. In the United States, osteopathic institutions are accredited by the American Osteopathic Association (AOA), and most are members of the American Osteopathic Hospital Association.

Professional education leading to the degree of doctor of osteopathy is similar to that for doctors of medicine. The four years of osteopathic medical education cover the basic sciences and clinical work, with emphasis on the importance of body mechanics and the relationship of body structure to function.

In Great Britain there are two schools of osteopathic medicine. Entrants to the British School of Osteopathy require only a secondary-school education, and their four-year course is limited to manipulative therapy and diagnosis. Upon graduation, their practice is limited to these areas. The London College of Osteopathy limits its entrants to those who possess the M.D. degree, and the 14-month course is meant to be a postgraduate training that stresses the musculoskeletal system and manipulative therapy. Graduates are accepted into the British system of socialized medicine and have unlimited practice rights.

Osteopathic physicians are licensed to practice medicine in all states of the United States and have the same professional rights and responsibilities as do holders of the M.D. degree in most states. In most cases, physicians of both schools of medical practice take their examinations before a medical licensing board composed of both doctors of medicine and doctors of osteopathy. In other countries, regulation of the practice of osteopathy varies greatly.

Osteopathic research studies include anatomy and function of nerve-and-muscle junctions, transmission of nervous impulses, somatic reflex functions, renal (kidney) growth and function, and blood-flow dynamics. There are also clinical studies of structural findings in hospitalized patients, the effects of manipulation under anesthesia for specific orthopedic problems, the effect of osteopathic manipulation on hypertension, and management of chronic obstructive lung disease by regular medical means, with and without osteopathic manipulation.

osteopetrosis: *see* marble bone disease.

osteoporosis, disease characterized by the thinning of bones, with a consequent tendency to sustain fractures from minor stresses. The disorder is most common in women over the age of 50 and results from disturbances of mineral metabolism and nutrition.

In persons afflicted with osteoporosis, the tiny, rigid plates forming the honeycombed matrixes within bone gradually become thinner and rodlike, and the spaces between them grow larger. The bone thus becomes more porous, less dense, and less strong. These lighter and more fragile bones tend to fracture from minor traumas and stresses that ordinarily would have no ill effects. Over time the minute crush fractures that occur in the vertebrae of the spine cause the back to curve, resulting in the humped back and bent posture that can be observed in many elderly people afflicted with osteoporosis. The bones of the hip and forearm are also especially vulnerable to fractures. The other symptoms of osteoporosis are loss of height and back pain.

Osteoporosis results from changes in the balance between the amount of new bone that is formed within the body and the amount of bone that is resorbed, or broken down and assimilated. The latter process occurs because calcium in the bones is regularly drawn upon to maintain the calcium that circulates in the bloodstream and is needed for normal nerve and muscle functions. When, for whatever reason, the body has insufficient other supplies of calcium to draw upon, it will draw on the calcium held within the bones, and, as the calcium reservoir in the bones decreases, bone loss ensues. In persons with osteoporosis, the rate of bone formation is normal but bone resorption is accelerated, leading to a net loss of bone mass.

Bone mass in the body reaches its peak during young adulthood. Then, after a period of stability, there is a slow but steady loss of bone beginning about age 40. This bone loss occurs because, as people age, their bodies become less efficient in absorbing the calcium that is present in their diet. The lack of calcium leads to increased bone resorption. Women are subject to several additional causes of osteoporosis. First, osteoporotic vulnerability is partly dependent on the bone mass originally present; persons with larger, denser bones can lose more bone without becoming prone to fractures than can persons who had lighter bones as young adults. Since men have heavier bones to begin with than do women, their bones are still proportionally denser (and hence stronger) after the inevitable loss of bone mass due to aging. Second, women are subject to an accelerated rate of bone loss after they reach menopause, owing to the body's lack of estrogen and other sex hormones. The other common causes of osteoporosis are a simple dietary deficiency of calcium, markedly decreased physical activity, and a dietary imbalance between the amount of calcium and phosphorus ingested.

Osteoporosis in later life can best be prevented by ensuring an adequate dietary intake of calcium and by supplementing one's calcium intake if necessary. Moderate physical exercise is also useful. For women aged 40 or older, estrogen given with progesterone can act to slow the rate of bone loss, though it is not clear whether this therapy is advisable or necessary for all menopausal women. Evidence is emerging that a treatment using sodium fluoride and calcium can halt bone loss and actually stimulate the formation of new vertebral bone in osteoporotic patients.

osteosarcoma, also called OSTEOGENIC SARCOMA, the most common malignant tumour of bone. It is found more often in males than in females, occurs mostly under the age of 30, and affects mainly the large long bones, with a predilection for the knee area. Major symptoms include pain (intermittent at first, later severe and constant), swelling, limitation of joint motion, a high frequency of pathological fractures, and eventually fever and general debilitation. Metastases (seeding of the malignancy in other parts of the body) occur early, and death usually results from the spread of the disease to the lung. The average length of life after diagnosis is 18 months; the five-year survival rate is less than 10 percent. Treatment usually involves amputation of the affected limb. Osteosarcoma that occurs over age 50 is frequently associated with Paget's disease of bone (*q.v.*).

Österbotten (Finland): *see* Pohjanmaa.

Østerdalen, narrow valley, Hedmark *fylke* (county), southeastern Norway. It extends in a general north–south direction from the eastern flanks of the Dovre Mountains and is approximately 75 miles (120 km) long. The Glåma, Norway's longest river, flows through the valley. Lumbering, agriculture (grains and hay), and livestock raising are principal economic activities. Rena, at the junction of the Rena and Glåma rivers near the valley's southern end, has paper and cardboard mills, powered by hydroelectricity from dams on the Glåma. Other places of importance in the valley are Tynset and Alvdal, which are *herredskommuner* (rural municipalities), and Koppang. Fine fishing in the Glåma attracts many tourists.

Östergötland, *län* (county) of southeastern Sweden, between Vättern (lake) and the Baltic Sea. It has a land area of 4,078 square miles (10,582 square km) and consists of the *landskap* (province) of Östergötland and a small part of that of Södermanland. Lakes dot the countryside, which is drained by the Motala and other rivers. Although partly wooded, the county's land supports agriculture. Mineral deposits in the county include iron, zinc, and copper, and its industries range from textile weaving to stone quarrying. Most of the major towns, including Linköping, the capital, are in the lowland crossed by the Göta Canal. Pop. (1989 est.) 396,919.

Osterman, Andrey Ivanovich, Graf (Count), original German name HEINRICH JOHANN FRIEDRICH OSTERMANN (b. June 9 [May 30, Old Style], 1686, Bochum, Westphalia [Germany]—d. May 31 [May 20], 1747, Berëzovo, Siberia, Russia), statesman who dominated the conduct of Russia's foreign affairs from 1725 to 1740.

Having come to Russia in 1703, Osterman was appointed by Peter I the Great to be an interpreter for the Russian Foreign Office (1708) and was given the rank of secretary in 1710. He assisted in negotiating a peace settlement with the Turks in 1711 and subsequently played a major role in the peace conferences with Sweden (1718 and 1721) that preceded the conclusion of the Great Northern War (1721). In 1723 he signed a treaty with Persia by which Russia gained some territory along the shore of the Caspian Sea, including the cities of Baku and Derbent. For these diplomatic successes Osterman was made a baron and vice president of the Foreign Office.

Osterman, engraving after a portrait by I. Argunov

Novosti Press Agency

After Peter died and Catherine I ascended the throne (1725), Osterman became vice chancellor, a member of the Supreme Privy Council (which became the effective ruling body of Russia), postmaster general, and president of a special commission for commerce. Thus he became involved in the state's economic and financial concerns as well as master of its foreign affairs. He maintained his influence during the reign of Peter II (reigned 1727–30), and, as a reward for helping Anna Ivanovna retain her autocratic powers when she became empress (1730), he was made a count and Anna's "first cabinet minister" (1731). During Anna's reign (1730–40) Osterman strictly adhered to an alliance with Austria, guided Russia through the War of the Polish Succession (1733–38) and the Russo-Turkish War of 1736–39, concluded an Anglo-Russian commercial treaty in 1734, and generally raised Russia's prestige as a European power. But he was obliged to return some territory to Persia in 1732 and gained only a strip of steppe land between the Bug and Donets rivers for Russia as a result of the Turkish war.

After Anna died, Osterman helped his colleague Burkhard Münnich overthrow Ernst Biron, the regent for the infant emperor Ivan VI (Nov. 19–20 [Nov. 8–9, O.S.], 1740); Osterman then became admiral general. But after he and Münnich quarreled and thereby weakened the ruling clique, the French ambassador, who strongly objected to Osterman's persistently pro-Austrian policy, intrigued with Elizabeth, the daughter of Peter the Great. On Dec. 6 (Nov. 25), 1741, they overthrew Ivan, the regent Princess Anna Leopoldovna, and their chief advisers, including Osterman, who was banished to Siberia.

Osterode, in full OSTERODE AM HARZ, city, Lower Saxony *Land* (state), central Germany, at the southwestern edge of the Oberharz Mountains. The residence of the dukes of Braunschweig-Grubenhagen in the 14th–15th century, it has many medieval half-timbered houses and buildings. The 16th-century market church and the town hall (1552) are notable. The sculptor Tilman Riemenschneider was born there (*c.* 1460). Located near the Harz Nature Park and the Söse River reservoir, the city is a popular resort and manufactures chemicals, textiles, machinery, and furniture. Pop. (1989 est.) 26,631.

Österreich: *see* Austria.

Österreichische Gallery, art museum established in Belvedere Castle, Vienna, in 1903. The museum includes many works of art that had been in the imperial Austrian private collection. The gallery is organized into three principal divisions: the Austrian Baroque Museum; the Austrian Gallery of the 19th and 20th Centuries; and the Museum of Medieval Austrian Art.

Beginning in 1957 the gallery issued a yearbook, *Mitteilungen der österreichischen Galerie* ("Announcements of the Austrian Gallery"). Special exhibits of Austrian and international interest and focus, including collections of the works of Vincent van Gogh, Paul Gauguin, Paul Cézanne, and others, became features of the gallery's program after World War II.

Östersjön (Europe): *see* Baltic Sea.

Östersund, town and capital of the *län* (county) of Jämtland, northwestern Sweden, on the west shore of Lake Stor. It was founded in 1786 by King Gustav III. It was subordinate, however, to Levanger in Norway as a trading centre for Jämtland, until the coming of the railway in 1862.

Although primarily an agricultural and tourist centre, it has some industry, producing chemicals, machinery, furniture, and leather goods. The Jämtland County Museum houses archaeological and cultural exhibits; Fornbyn Jämtli is an open-air museum of many 15th- to 18th-century buildings from the area, notably the Pilgrimsstugan (1424). Near the bridge that connects the town with Frösön, an island in Lake Stor, is Sweden's northernmost runic stone, dating from the 11th century and telling of Jämtland's conversion to Christianity. Pop. (1987 est.) mun., 56,914.

Østfold, *fylke* (county), extreme southeastern Norway, extending from Oslo Fjord (west) to the Swedish border (east). Its total area is 1,615 square miles (4,183 square km). The county's hilly landscape, with forests to the north and east, rises gradually to about 800–1,000 feet (240–300 m). The principal rivers are the Glåma and the Tistedalselva, both flowing north–south through the glaciated topography. Glåma, the longest river in Norway, discharges into the Skager Strait at Fredrikstad. Østfold is perhaps the nation's oldest inhabited region, with rock drawings and mounds throughout the area that are relics of the Stone Age. Numerous stone churches date from shortly after Norway's conversion to Christianity in the 10th and 11th centuries AD. Østfold is, in its economy, essentially suburban to Oslo, the nation's capital; the chief towns—Moss (the county seat), Fredrikstad, Sarpsborg, and Halden—are all within 60 miles (100 km) of Oslo. These communities engage in manufacturing (wood products, pulp, chemicals, and rubber) and food processing. Moss and Fredrikstad also have important shipyards. The rural areas of the south produce large quantities of vegetables and dairy products for the Oslo market. Østfold's coast and offshore islets are a popular resort area. Pop. (1988 est.) 237,242.

Ostfriesland (Germany): *see* East Friesland.

Ostia, modern OSTIA ANTICA, Italy, ancient Roman town originally at the mouth of the Tiber but now about 4 miles (6 km) upstream; the modern seaside resort is about 3 miles (5 km) southwest of the ancient city. Ostia was a port of republican Rome and a commercial centre under the empire (after 27 BC). The Romans considered Ostia their first colony and attributed its founding (for the purpose of salt production) to their fourth king, Ancus Marcius (7th century BC). Archaeologists have found on the site a fort of the mid-4th century BC, but nothing older. The purpose of the fort was to protect the coastline, the first of the long series of Rome's maritime colonies. When Rome developed a navy Ostia became a naval station, and during the Punic Wars (264–201 BC) it served as the main fleet base on the west coast of Italy. It was the major port—especially significant in grain trade—for republican Rome until its harbour, partly obstructed by a sandbar, became inadequate for large vessels. During the empire Ostia was a commercial and storage centre for Rome's grain supplies and a service station for vessels going to Portus.

Excavated Roman ruins of Ostia
Authenticated News International

New baths, temples, and warehouses were built to support the prospering community. At the height of Ostia's prosperity in the early 2nd century AD, its population was approximately 50,000. The growing population was accommodated by means of tall brick apartment buildings of three, four, and five stories. The floors in these buildings were paved with mosaic, and the walls elaborately (and sometimes skillfully) painted; the larger flats had up to 12 rooms.

The growth in wealth raised the standard of public generosity of leading citizens. Public funds were restricted, but magistrates were expected to show their appreciation of honours in a practical way; it was they who provided most of the sculpture that adorned the public buildings and public places and who built most of the temples. Ostia also was sufficiently vital to Rome to expect the attention of emperors. Its three largest sets of public baths were owed to imperial generosity.

Little new building occurred after the end of the 2nd century. Ostia suffered from the decline of the Roman economy beginning in the 3rd century and from barbarian raids of the 5th and following centuries. It was abandoned after the erection of Gregoriopolis, site of Ostia Antica, by Pope Gregory IV (827–844). The Roman ruins were quarried for building materials in the Middle Ages and for sculptors' marble in the Renaissance. Archaeological excavation was begun in the 19th century under papal authority, and about two-thirds of the Roman town can now be seen.

ostinato (Italian: "obstinate"), plural OSTINATOS, or OSTINATI, in music, short melodic phrase repeated throughout a composition, sometimes slightly varied or transposed to a different pitch. A rhythmic ostinato is a short, constantly repeated rhythmic pattern. Ostinatos appear in Western composition from the 13th century onward, as in the motet *Emendemus in melius* (*Let Us Change for the Better*) by Cristóbal de Morales (*c.* 1500–53) and in the *Concerto,* Opus 38 (first performed 1925), of Paul Hindemith. Use of an ostinato was particularly common in 16th-century dance pieces, notably in the bass line, where it is called a basso ostinato, or ground bass (*q.v.*). A single-pitch ostinato governs the "Scarbo" movement in Maurice Ravel's piano work *Gaspard de la nuit* (1908).

Østlandet, geographical region, embracing the *fylker* (counties) of Østfold, Akershus, Hedmark, Oppland, Buskerud, Vestfold, Telemark, and Oslo, southeastern Norway. With an area of 36,548 square miles (94,660 square km), it ranges from the highest mountains in Norway, Jotunheimen, to coastal lowlands adjacent to the Skager Strait and Oslo Fjord. The region is quite mountainous, especially in the western and northern parts, and is heavily forested. The eastern part is the centre of Norway's timber industry. The area is drained by the Dramselva, Lågen, and Glåma rivers (the Glåma is the longest in Norway). Many lakes, including the Mjøsa, the largest in Norway, are located in the region.

The numerous towns in the region, including the city of Oslo, the national capital, comprise nearly one-half of Norway's population; it has much of the country's industrial capacity as well. The mountain scenery, winter-sports areas, summer resorts along the lakes and coasts, and the city of Oslo also make Østlandet a popular tourist destination. Transportation routes crisscross the lowlands and penetrate the interior via the valleys, rivers, and lakes. Pop. (1988 est.) 2,045,206.

ostomy (from Latin: *ostium,* "mouth"), any operation in which an artificial stoma, or opening, is surgically created; the term is also used for the opening itself. Usually ostomies are created through the abdominal wall to allow the discharge of bodily wastes when disease or injury has incapacitated a normal excretory channel. A rarer type of ostomy, such as the esophagostomy or the tracheostomy, is performed to introduce substances into the body or to aid breathing.

Ostomies are distinguished by the organ that connects to the outside; the most common types are colostomy, in which the lower part of the colon, or large bowel, is removed and the upper segment (usually) opened to the outside wall; ileostomy, in which the ileum is connected to the outside wall; and urostomy (or ureterostomy), in which a new channel for urine and liquid wastes is created (usually using a segment of small intestine), following removal of the bladder or ureters.

Ostomies may be temporary, to relieve strain on excretory organs damaged by disease or abdominal injuries, or permanent, to replace normal excretory channels that are congenitally missing or that must be removed as treatment for cancer or another debilitating intestinal disease. Temporary colostomies and ileostomies are generally created by bringing a loop of the bowel near the surface of the abdomen and severing it, opening both ends to the outside. Once the reason for the ostomy has been eliminated, the cut ends of the bowel are rejoined in a second surgical procedure. A temporary ostomy may be maintained in place by naturally forming adhesions between the loop of bowel and the mesentery, a membrane lining the abdomen, and by performing sutures.

All types of ostomy require careful attention to cleaning the opening and to evacuation of waste, usually through an ostomy appliance, a self-adhering bag worn over the abdominal opening. In some operations an internal collecting pouch made from body tissue may be created. One internal colostomy procedure allows the external opening to be covered by a simple patch but requires regular emptying by irrigation. Another internal procedure allows emptying through the anal sphincter.

Often the psychological impact of an ostomy is great, but most people with ostomies are able to lead normal lives.

ostracism, political practice in ancient Athens whereby a prominent citizen who threatened the stability of the state could be banished without bringing any charge against him. (A similar device existed at various times in Argos, Miletus, Syracuse, and Megara.) At a fixed meeting in midwinter, the people decided, without debate, whether they would hold a vote on ostracism (*ostrakophoria*) some weeks later. Any citizen entitled to vote in the assembly could write another citizen's name down, and, when a sufficiently large number wrote the same name, the ostracized man had to leave Attica within 10 days and stay away for 10 years. He remained owner of his property. Ostracism must be carefully distinguished from exile in the Roman sense, which involved loss of property and status and was for an indefinite period (generally for life).

Ostracism is said by Aristotle, in his *Constitution of Athens,* to have been introduced by Cleisthenes in his reform of the Athenian constitution after the expulsion of Hippias (*c.* 508 BC), but the first use of it seems to have been made in 488–487 BC, when Hipparchus, son of Charmus of Collytus, was ostracized. After Hipparchus, four more men, the last of them being Aristides, were ostracized before the amnesty in 481, preceding the invasion of Xerxes I. The institution was invoked less frequently after the Persian Wars, falling into disuse after it was used ineffectively, probably in 417, to resolve the political impasse caused by the rivalry of Nicias and Alcibiades. *Compare* exile and banishment.

ostracoderm, any of an extinct group of small, fishlike Paleozoic vertebrates, members of which belonged to several orders particularly abundant in Late Silurian and Early Devonian formations (387 to 421 million years old) of Europe and North America.

Jaws in the animals were not yet developed, and paired appendages were often absent. These primitive characteristics show that the ostracoderms were allied to the living Cyclostomata—hagfishes and lampreys—an order with which they are often grouped to form the vertebrate class Agnatha. Ostracoderms carried bony armour; internal bony areas also are sometimes present.

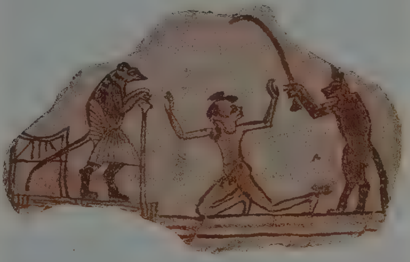
There were three major orders: Osteostraci, Anaspida, and Heterostraci. In the Osteostraci, such as *Cephalaspis,* the head and the gill region were covered by a broad crescent-shaped shield of bone. Dorsally, there were paired orbits, a median eye, and, anterior to this (as in lampreys), a median opening leading to the nasal organ and hypophysis. The mouth was small. Internally there was a large branchial, or gill, chamber; the animal appears to have been a filter feeder after the fashion of lower chordates.

The Anaspida included small spindle-shaped fishes with a narrower and deeper form than that of osteostracans. There was no expanded head shield, and this region was covered by a series of small oat-shaped scales. No internal structures are known, but the pattern of openings for sense organs and gills was similar to that of the Osteostraci.

In the Heterostraci, such as *Pteraspis,* the anterior part of the longer, slender body was enclosed in a set of large plates. The mouth was a transverse ventral slit, suggesting a mud-grubbing mode of feeding. No internal structures have been preserved, but impressions inside the plates indicate the presence of large gill chambers. There was a single external gill opening on either side.

Possibly related to the Heterostraci were *Thelodus* and other genera, in which no plates or large scales were present; instead, the whole body was covered with minute scales.

ostracon, potshard or limestone flake used in antiquity, especially by the ancient Egyptians, Greeks, and Hebrews, as a surface for drawings or sketches, or as an alternative to papyrus for writing as well as for calculating accounts. Of considerable artistic merit, the drawings on ostraca, which are usually coloured, depict scenes from nature and everyday life or scenes in which animals seem to parody human actions (it has been conjectured that the latter illustrated popular fables).



Limestone ostracon with a drawing of a cat bringing a boy before a mouse magistrate, New Kingdom Egypt, 20th dynasty (1200–1085 BC); in the Oriental Institute, University of Chicago

By courtesy of the Oriental Institute, University of Chicago

Ostrava, city, capital of Severomoravský *kraj* (region), eastern Czech Republic. It lies between the Ostravice and Oder rivers above their confluence at the southern edge of the Upper Silesian coalfield. It was founded about 1267 as a fortified town by Bruno, bishop of Olomouc, to protect the entry to Moravia from the north. Its castle was demolished in 1495. Historic buildings include the 13th-century St. Wenceslas' Church and the Old Town Hall tower (1687). There are several theatres, including a fine opera house; a philharmonic orchestra; and an art gallery.

Ostrava is surrounded by a rich black-coal basin that has made it a centre of heavy industry, with a long tradition dating from 1830, when the first blast furnace was built at the Vítkovice ironworks. Some of the coal pits extend into the city limits, and their derricks are common features of the skyline.

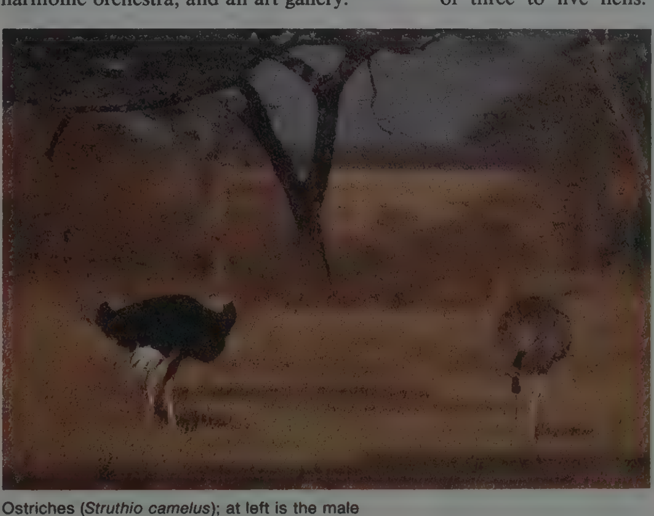
The conurbation of Greater Ostrava occupies an area of about 270 square miles (700 square km). The region receives a steady influx of workers, and many housing estates and new towns, such as Poruba and Havířov, have been built there. Most planned development is east of the Ostravice River, in Slezská ("Silesian") Ostrava. Settlements west of the Ostravice are in Moravská ("Moravian") Ostrava.

The population of the region is employed predominantly in mining (at Ostrava, Karviná, Orlová) and in metalworking (at Vítkovice, Kunčice, Třinec). Manufactures also include mining machinery at Opava, railway cars at Studénka, and automobiles at Kopřivnice. The coal mining also supports chemical (ammonia and nitrate fertilizers) and power industries. The Technical University of Mining and Metallurgy of Ostrava (1716) is located there. Pop. (1991 prelim.) 327,553.

ostrich (*Struthio camelus*), largest living bird, a flightless species found in Africa. It belongs to the family Struthionidae, order Struthioniformes. The adult male may be 2.5 m (nearly 8 feet) tall—almost half of its height is neck—and weigh 155 kg (345 pounds); the female is somewhat smaller. The ostrich's egg, averaging about 150 mm (6 inches) in length by 125 mm (5 inches) in diameter and weighing up to 1.35 kg (3 pounds), is presently the world's largest. The male is mostly black but has white plumes in the wings and tail; females are mostly brown. The head and most of the neck, reddish to bluish in colour, is lightly downed; the legs, including the powerful thighs, are naked. The head is small, the bill short and rather wide; the big brown eyes have thick black lashes.

The ostrich lives in flocks of 5 to 50, usually in the company of grazing animals. The ostrich relies on its strong legs—uniquely two-toed, with the main toe developed almost as a hoof—to escape its enemies, chiefly humans and the larger carnivores. A frightened ostrich can achieve a speed of 65 km per hour (40 miles per hour). If cornered it can deliver dangerous kicks.

Ostriches live mainly on plant matter but take some animal food; they can go without water for long periods. Breeding males emit roars and hisses as they fight for a harem of three to five hens. The communal nest



Ostriches (*Struthio camelus*); at left is the male

David C. Houston—Bruce Coleman Ltd.

scraped in the ground may contain 15 to 60 shiny, whitish eggs. The male sits by night; the females take turns by day. The chicks hatch in about 40 days and when a month old can keep up with running adults. To escape detection, chicks as well as adults may lie on the ground with neck outstretched, a habit that may have given rise to the legend that the ostrich buries its head in the sand when danger threatens. Ostrich plumes adorned the helmets of medieval European knights, and in the 19th century such plumes were sold for women's finery. This demand led to the establishment of ostrich farms in South Africa, the southern United States, Australia, and elsewhere, but the trade collapsed after World War I. The hide provides a soft, fine-grained leather. Ostriches have been trained for saddle and sulky racing, but they tire easily and are not well suited for training. They do well in captivity and may live 50 years.

The ostrich is typical of a special group of flightless birds (*see* ratite). The forms, differing slightly in skin colour, size, and egg features, formerly were considered separate species but are merely races of *S. camelus*. Most familiar is the North African ostrich, *S. camelus camelus*, ranging, in much-reduced numbers, from Morocco to The Sudan. The Syrian ostrich, *S. camelus syriacus*, of Syria and Arabia became extinct in 1941. Fossil ostriches are known from Early Pliocene rock (about 5 million years old) from southern Russia, India, and north-central China.

Ostrihom (Hungary): *see* Esztergom.

Ostrogorsky, Moisey (Yakovlevich) (b. 1854, Grodno, Russia—d. 1919), Russian political scientist known for his pioneering study of comparative party organization.

Ostrogorsky studied law at St. Petersburg, and after working for a number of years in the Russian Ministry of Justice studied at the Independent School of Political Science in Paris until 1885. He produced histories of Russia that were used in schools and, as a result of his studies in Paris, wrote in French a treatise on the rights of women in public law in 1892.

Ostrogorsky spent many years in the United States and Great Britain, where he studied political parties, his major scholarly concern. In 1902 he published *Democracy and the Organization of Political Parties* (originally written in French). Having returned to Russia, Ostrogorsky was elected to the first Duma in 1906 and played a major role in the caucus of the Constitutional Democratic Party, but he left active politics after its dissolution.

Ostrogorsky suggested the pathological tendencies of democratic mass parties toward bureaucratic-oligarchic organization, a theme that has been developed by his successors. He made the first major effort at a comparative analysis of political systems through his studies of the United States and Great Britain, including a detailed and authoritative account of the party systems in the two societies. Finally, he offered valuable hypotheses about electoral behaviour and the formation of opinion.

Consult the INDEX *first*

Ostrogoth, member of a division of the Goths (*see* Goth); the Ostrogoths developed an empire north of the Black Sea in the 3rd century AD and, in the late 5th century, under Theodoric the Great, established the Gothic kingdom of Italy.

Invading southward from the Baltic Sea, the Ostrogoths built up a huge empire stretching from the Don to the Dniester rivers (in present-day Ukraine) and from the Black Sea to the Pripet Marshes (southern Belarus). The kingdom reached its highest point under King Ermanaric, who is said to have committed suicide at an advanced age when the Huns attacked his people and subjugated them about 370. Although many Ostrogothic graves have been excavated south and southeast of Kiev, little is known about the empire. The Ostrogoths were probably literate in the 3rd century, and their trade with the Romans was highly developed.

After their subjugation by the Huns, little is heard of the Ostrogoths for about 80 years, after which they reappear in Pannonia on the middle Danube River as federates of the Romans. But a pocket remained behind in the Crimea when the bulk of them moved to central Europe, and these Crimean Ostrogoths preserved their identity through the Middle Ages. After the collapse of the Hun empire (455) the Ostrogoths under Theodoric the Great began to move again, first to Moesia (*c.* 475–488) and then to Italy. Theodoric became king of Italy in 493 and died in 526. A period of instability then ensued in the ruling dynasty, provoking the Byzantine emperor Justinian to declare war on the Ostrogoths in 535 in an effort to wrest Italy from their grasp. The war continued with varying fortunes for almost 20 years and caused untold damage to Italy, and the Ostrogoths thereafter had no national existence. They had been converted to Arian Christianity, it seems, soon after their escape from the domination of the Huns, and in this heresy they persisted until their extinction. All extant Gothic texts were written in Italy before 554.

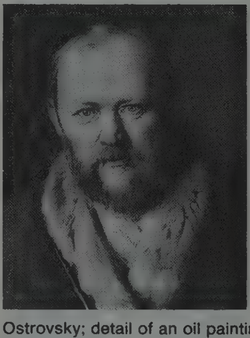
Ostrołęka, *województwo* (province), northeastern Poland, established in 1975. It is bordered by the provinces of Olsztyn and Suwałki on the north, Łomżza on the east, Siedlce and Warsaw on the south, and Ciechanów on the west. Physiographically, the province ranges from marshy lowlands in the north to forest-covered moraines in the south. The Narew River crosses Ostrołęka province northeast to southwest. Other rivers include the Rozoga, the Szkwa, the Bug, the Omulew, the Płodownica, and the Orzyc. A thermoelectric-power plant is located near Ostrołęka city, the provincial capital. During World War II the Nazis established the Treblinka (*q.v.*) labour and extermination camps outside a railroad village of that name some 6 miles (10 km) south of the village of Małkinia Górna in the southeastern corner of present Ostrołęka.

The economy of the province is based on the manufacture of cellulose and paper products, food processing, and textiles; agriculture (rye, potatoes); and the production of building materials, ceramics, and glass. One-fourth of the inhabitants are urban dwellers living near Ostrołęka city. Other major cities are Wyszków, Przasnysz, Różan, and Ostrów Mazowiecka. Area 2,509 square miles (6,498 square km). Pop. (1991 est.) 397,300.

Ostrołęka, city, capital of Ostrołęka *województwo* (province), northeastern Poland. It lies on the eastern bank of the Narew River, 20 miles (32 km) southwest of Łomża city. Ostrołęka, one of the oldest cities in the Mazovian Lowland, received its city rights in 1373. It flourished in the 16th and 17th centuries as a craftsmen's trading centre for the Kurpie Forest region. In 1708 the people of the region successfully resisted Swedish invaders. After Ostrołęka suffered extensive damage during World War II, many of its public buildings and two 17th-century Baroque churches were restored. The economy of the city is based on the paper and cellulose industries and on food processing. Pop. (1991 est.) 51,300.

Ostrovsky, Aleksandr Nikolayevich (b. March 31 [April 12, New Style], 1823, Moscow, Russia—d. June 2 [June 14], 1886, Shchelykovo), Russian dramatist who is generally considered the greatest representative of the Russian realistic period.

The son of a government clerk, Ostrovsky attended the University of Moscow law school. From 1843 to 1848 he was employed as a clerk at the Moscow juvenile court. He wrote his first play, *Kartiny semeynogo schastya* ("Scenes of Family Happiness"), in 1847. His next play, *Bankrot* ("The Bankrupt"), later renamed *Svoi lyudi sochtemsya* (*It's a Family Affair, We'll Settle It Among Ourselves*), written in 1850, provoked an outcry because it exposed bogus bankruptcy cases among Moscow merchants and brought about Ostrovsky's dismissal from the civil service. The play was banned for 13 years.



Ostrovsky; detail of an oil painting by V.G. Perov, 1871; in the State Tretyakov Gallery, Moscow

State Tretyakov Gallery, Moscow

Ostrovsky wrote several historical plays in the 1860s. His main dramatic work, however, was concerned with the Russian merchant class and included two tragedies and numerous comedies, including the masterpiece *Bednost ne porok* (1853; "Poverty Is No Disgrace"). His *Snegurochka* (1873; "The Snow Maiden") was adapted as an opera by Nikolay Rimsky-Korsakov in 1880–81.

Ostrovsky was closely associated with the Maly ("Little") Theatre, Moscow's only dramatic state theatre, where all his plays were first performed under his supervision. He served as the first president of the Society of Russia Playwrights, which was founded on his initiative in 1874, and in 1885 he became artistic director of the Moscow imperial theatres. The author of 47 original plays, Ostrovsky almost single-handedly created a Russian national repertoire. His dramas are among the most widely read and frequently performed stage pieces in Russia.

Ostrów Wielkopolski, city, Kalisz *województwo* (province), west-central Poland. A rail junction and industrial town, it produces machine tools and railroad cars, lumber, ceramics, and textiles. The town, which lies in the south of the great Polish plain, was first chronicled in the 13th century but received municipal rights only in the 18th. It passed to Prussia in 1793 and was returned to Poland in 1918. Pop. (1991 est.) 73,700.

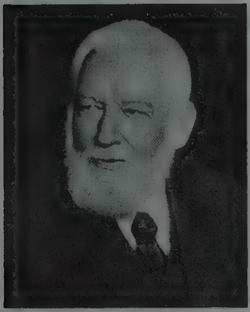
Ostrowiec Świętokrzyski, town, Kielce *województwo* (province), southeastern Poland. The town lies along the Kamienna River, a tributary of the Vistula. It is situated in the Polish Uplands just north of the Holy Cross Mountains. Ostrowiec Świętokrzyski is noted for its iron industry and has road connections with Lublin and Kielce. The town was settled in the 15th century and developed during the 19th century after the establishment of its ironworks. Its other industries include food processing and the production of ceramics and building materials. Pop. (1991 est.) 79,200.

Ostsee (Europe): *see* Baltic Sea.

Ostwald, Wilhelm, in full FRIEDRICH WILHELM OSTWALD (b. Sept. 2, 1853, Riga, Latvia, Russian Empire—d. April 4, 1932, near Leipzig, Ger.), German chemist who almost single-handedly organized physical chemistry

into a nearly independent branch of chemistry and who won the Nobel Prize for Chemistry in 1909 for his work on catalysis, chemical equilibrium, and reaction velocities. Strongly philosophical in his approach to science, he preferred energy as the explanation for all physical phenomena and refused to believe in atoms.

Ostwald took his doctorate from the University of Dorpat (now Tartu State University, Tartu, Estonia) in 1878 and taught at Riga before going to the University of Leipzig (1887–1906). He was quick to espouse the theories of Svante August Arrhenius and Jacobus Henricus van't Hoff, with whom he placed physical chemistry on a firm basis. It was probably as author and editor, however, that he most helped to advance the science. He wrote *Lehrbuch der allgemeinen Chemie,* 2 vol. (1885–87; "Textbook of General Chemistry") and other influential texts and was chiefly responsible for the founding (1887) of the *Zeitschrift für physikalische Chemie* ("Journal of Physical Chemistry"), long the most influential publication in the field. In 1889 he began issuing *Klassiker der exakten Wissenschaften* ("Classics of Exact Science"), an important series of reprints of significant papers in physics and chemistry that had appeared up to that time.



Wilhelm Ostwald
Bavaria-Verlag

He began his laboratory researches with studies on the dynamics of reactions in solution and then turned to electrochemistry. In 1894 he gave the first modern definition of a catalyst and turned his attention to catalytic reactions. His process for the conversion of ammonia to nitric acid, patented in 1902, became of great industrial importance. Following his resignation from Leipzig, he wrote on the philosophy of science and, in the book *Grosse Männer* (1909; "Great Men"), he investigated the psychological causes of scientific productivity.

Ostyak (people): *see* Khant and Mansi.

Ostyako-Vogulsk (Russia): *see* Khanty-Mansiysk.

O'Sullivan, Timothy H. (b. *c.* 1840, New York, N.Y., U.S.—d. Jan. 14, 1882, Staten Island, N.Y.), American photographer best known for his Civil War subjects and for his landscapes of the American West.

O'Sullivan learned photography at Mathew Brady's gallery in New York City, and during the Civil War he photographed on many fronts as one of the team sent out by Brady. One of his best-known pictures, "Harvest of Death," showing Confederate dead at Gettysburg, was taken in the early morning of July 4, 1863. From 1867 to 1869 he was official photographer on the United States Geological Exploration of the 40th Parallel, which began at Virginia City, Nev. (where he photographed the mines), and worked eastward. In 1870 he went to Panama as part of a team to survey for a canal across the isthmus. In 1871, 1873, and 1874 he was associated with a series of surveys in the southwestern United States. On the recommendation of Brady and Alexander Gardner, another Washington, D.C., photographer, he was appointed chief photographer for the Department of the Treasury in 1880.

Timothy H. O'Sullivan in Panama, 1870, self-portrait (detail of a stereograph)
By courtesy of the George Eastman House, Rochester, New York

Ōsumi, first Earth satellite orbited by Japan. It was launched on Feb. 11, 1970, from Kagoshima Space Center on Kyushu and was named for the peninsula on which the centre is located. Ōsumi consisted of the fourth stage of the U.S.-built Lambda-4S launch rocket that was used to place it into an elliptic orbit 250 miles (400 km) above the Earth. The primary function of this scientific satellite was to explore the upper atmosphere.

Ōsumi Archipelago, Japanese Ōsumi-gunto, archipelago, Kagoshima *ken* (prefecture), Japan, lying south of the Ōsumi Peninsula of Kyushu. It consists of Tanega Island and Yaku Island and several smaller isles, with a combined area of about 475 square miles (1,230 square km). The chief town is Nishinoomote on the northwest coast of Tanega. In 1543 the Portuguese landed on Tanega and introduced the first sugarcane and guns into Japan. Pop. (1990) 53,033.

Osun, state, western Nigeria. Osun state was created in 1991 from the eastern third of Oyo state. It is bounded by the states of Kwara on the northeast, Ondo on the east, Ogun on the south, and Oyo on the west and northwest. The Yoruba Hills run through the northern part of Osun state. The state has a covering of tropical rain forest, and the Oshun is the most important river. Osun state is inhabited mainly by the Yoruba people.

Osun's economy is based mainly on agriculture. Major crops include yams, cassava, corn (maize), beans, millet, plantains, cacao, palm oil and kernels, and fruits. Cottage industries produce brass work, woven cloth, and wood carvings. Oshogbo, the state capital, has a textile industry, a food-processing plant, and a steel-rolling mill. The state's tourist attractions include the Mbari Arts Centre at Oshogbo and the residential palaces of Yoruba rulers in Ilesha and Ile-Ife. The Obafemi Awolowo University (founded in 1961) is at Ile-Ife. Oshogbo is linked by road and railway to Ibadan in Oyo state. Pop. (1991) 2,203,016.

Oswald, Saint (b. *c.* 604—d. 642, Maserfeld, Eng.; feast day August 5), Anglo-Saxon king of Northumbria from 633 to 642 who introduced Celtic Christian missionaries to his kingdom and gained ascendancy over most of England.

Oswald's father, King Aethelfrith (d. 616), had ruled the two ancient Northumbrian kingdoms of Bernicia and Deira. Expelled from Northumbria upon the accession of his uncle Edwin in 616, Oswald and his brother Oswiu took refuge in Iona in the Hebrides, where they were converted to Christianity.

Edwin was killed fighting King Cadwallon of Gwynedd (in northern Wales) and Penda of Mercia in 632, but the next year Oswald defeated and killed Cadwallon near Hexham (in present-day Northumberland). The historian Bede says that he asserted his authority over all the peoples of southern England. The pagan king Penda defeated and killed Oswald at Maserfelth (probably near Oswestry, in present-day Shropshire). The dead king was venerated as a martyr of the Northumbrian church, and it was believed that his remains worked miracles.

Oswald of York, Saint, also called Oswald of Ramsey (b. *c.* 925, Britain—d. Feb. 29, 992, Worcester; feast day February 28), Anglo-Saxon archbishop of Danish parentage who was a leading figure in the 10th-century movement of monastic and feudalistic reforms.

Under the spiritual direction of his uncle, Archbishop Odo of Canterbury, Oswald entered the monastery of Fleury, France, then a great centre of reformed Benedictinism. Returning just after Odo's death (June 958), Oswald was, in 961, consecrated bishop of Worcester by Dunstan, archbishop of Canterbury. Soon after his appointment, Oswald founded a small Benedictine monastery at Westbury-on-Trym, Gloucestershire. About 965, when King Edgar (Eadgar) of the Mercians and Northumbrians ordered the establishment of many new monasteries, Oswald founded Ramsey Abbey, Huntingdonshire. From Ramsey, which had close ties with Fleury and became a great religious centre, Oswald founded several other Benedictine houses, including those at Winchcombe, Gloucestershire, and at Pershore, Worcestershire. He also brought monks from Ramsey to his cathedral at Worcester, where they gradually replaced the secular clerks.

In 972 Oswald was transferred to the archbishopric of York, being allowed to retain the see of Worcester, where he mainly resided. As an ecclesiastical landlord, he practiced the leasing of land to certain men and to their heirs on condition that they perform various services for him. He created leasehold tenures limited to three generations for tenants who owed him various services, especially riding services as messengers and escorts.

A near-contemporary biography of Oswald notes his esteemed goodness. His support of Dunstan's apostolate and his collaboration with Bishop Aethelwold of Winchester, Hampshire, in establishing religious centres rank Oswald among the chief contributors to Anglo-Saxon monastic reform.

Oswald, Lee Harvey (b. Oct. 18, 1939, New Orleans, La., U.S.—d. Nov. 24, 1963, Dallas, Texas), accused assassin of U.S. President John F. Kennedy in Dallas on Nov. 22, 1963. He himself was fatally shot two days later by Jack Ruby (1911–67) in the Dallas County Jail. A special President's Commission on the Assassination of President John F. Kennedy, headed by Chief Justice Earl Warren, investigated from Nov. 29, 1963, to Sept. 24, 1964, and concluded that Oswald alone had fired the shots killing Kennedy and that there was no evidence that either Oswald or Ruby had been part of any conspiracy. In January 1979 a special U.S. House of Representatives Assassinations Committee, after a two-year investigation, reported that a second assassin may also have fired a shot and that there may have been a conspiracy. The evidence has remained highly debatable.

Oswald was born two months after his father's death; his mother subsequently remarried for three years, but the family moved frequently between 1939 and 1956. In October 1956 Oswald dropped out of high school and joined the U.S. Marines. A competent sharpshooter but an indifferent soldier, he began expressing pro-Soviet and politically radical views and, on a hardship plea, secured release from the corps on Sept. 11, 1959. Nine days later he left for the Soviet Union, where he tried unsuccessfully to become a citizen.

In Minsk, where he was assigned to work, he met and married (April 30, 1961) Marina Nikolayevna Prusakova. Thirteen months later, in June 1962, he was able to return to the United States with his wife and three-month-old daughter, June Lee.

In January 1963 Oswald bought a .38 revolver and, in March, a rifle and telescopic sight, through the mails. On April 10 in Dallas he allegedly shot at but missed an ultrarightist, Edwin A. Walker, a resigned army general. Later that month he left his wife with a friend in Dallas and went to New Orleans, where he set up a one-man branch of the Fair Play for Cuba Committee and distributed pro-Castro leaflets. In September he went to Mexico City, where, according to the Warren Commission, he tried vainly to get a visa for Cuba and to get Soviet permission to return to the U.S.S.R. In October he returned to Dallas and secured a job at the Texas School Book Depository.

At 12:30 PM on Nov. 22, 1963, from a window on the sixth floor of the depository building, Oswald, using his mail-order rifle, allegedly fired three shots that killed President Kennedy and wounded Texas Governor John B. Connally in an open-car motorcade in Dealey Plaza. Oswald took a bus and a taxi to his rooming house, departed, and about a mile away was stopped by Patrolman J.D. Tippit, who believed that Oswald resembled the suspect already being described over the police radio. Oswald killed Tippit with his mail-order revolver (1:15 PM). At about 1:45 PM Oswald was seized in the Texas Theatre by police officers responding to reports of a suspect. At 1:30 AM on November 23 he was formally arraigned for the murder of President Kennedy.

On the morning of November 24, while being transferred from a jail cell to an interrogation office, Oswald was shot by a Dallas nightclub owner, Jack Ruby, acting allegedly out of rage and anguish over the death of the president. Ruby was tried and found guilty of murder (March 14, 1964) and sentenced to death. In October 1966 a Texas appeals court reversed the conviction, but, before a new trial could be held, Ruby died of a blood clot, complicated by cancer (Jan. 3, 1967).

Oswego, port city, seat (1816) of Oswego county, north-central New York, U.S. It lies along Lake Ontario at the mouth of the Oswego River, 35 miles (56 km) northwest of Syracuse. The name derives from Osh-we-geh, Iroquois, meaning "pouring out place." It was the site of two forts that were strategically important during the French and British colonial wars. A British fur-trading post, founded there in 1722 and fortified (1727) as Fort Oswego, was the western terminus of the water route connecting the Mohawk and Hudson rivers with Lake Ontario. The second fort, Ontario, was built in 1755; it was destroyed by the French in 1756, was rebuilt in 1759, and was ceded to the United States in 1796 by the British, who recaptured it in the War of 1812.

Permanent settlement of the site dates from 1796. The opening of the Oswego Canal in 1828 (linking Lake Ontario to the Erie Canal) stimulated Oswego's commercial growth, but by the 1880s railroad competition had practically killed the port and forced the city to industrialize. The easternmost U.S. port on the Great Lakes, Oswego revived when it became the northern terminus of the New York State Barge Canal system (completed 1917). With the opening of the St. Lawrence Seaway in 1959, Oswego became a world port, handling principally cement, lumber, wood pulp, coal, and grains. The city's varied manufactures now include textiles, paper, marine engines, clothing, aluminum, and sheet metals. Major power installations make it an important source of electric-power generation for upstate New York. The State University of New York College at Oswego originated in 1861 as a normal (teachers') school. Inc. village, 1828; city, 1848. Pop. (1992 est.) 19,331.

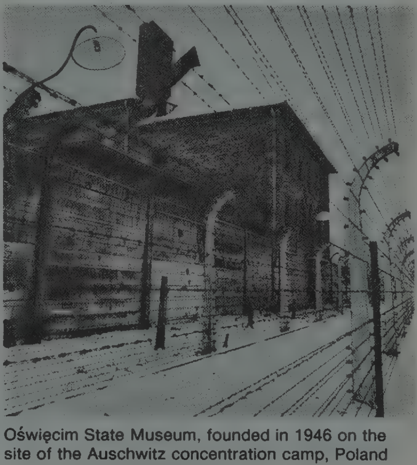
Oswestry, district and borough, county of Shropshire, England, near the border of Wales. Oswestry lies in a scenic setting in the foothills of the Berwyn Mountains between Wat's Dyke (*c.* 700) and Offa's Dyke (*c.* 784), defensive earthworks formerly separating England and Wales. "Old" Oswestry, an Iron Age hill fort with complicated defenses reflecting a long history, stands 1 mile (1.6 km) from the town.

The Iron Age hill fort of "Old" Oswestry, Oswestry, Eng.
English Heritage

Oswestry is thought to derive its name from Oswald, king of Northumbria, who was killed by Penda, king of Mercia, in 641 at the Battle of Maserfelth (or Maserfeld), probably near the present town. The scene of much border warfare between the Welsh and the English, the town was twice burned to the ground in the Middle Ages. On Castle Bank are the ruins of a castle built by Madog ap Maredudd, Welsh king of the adjacent region of Powys.

A grammar school was founded in Oswestry town in 1407 and was moved to larger premises in 1776, but the old building still stands. For centuries Oswestry has been a market centre for Welsh goods, especially wool, and the modern town has a large cattle market and also light industry. Area 99 square miles (256 square km). Pop. (1981) town, 12,448; (1991 prelim.) district, 33,600.

Oświęcim, German AUSCHWITZ, city, Bielsko-Biała *województwo* (province), southern Poland. It lies at the confluence of the Vistula and Soła rivers. A rail junction and industrial centre, the town became known as the site of an infamous Nazi extermination camp, Auschwitz-Birkenau (Oświęcim-Brzezinka), established in 1940 (*see* Auschwitz). The Oświęcim State Museum, founded there in 1946, serves as a memorial to those victims of World War II. A chemical factory built by the prisoners was rebuilt after the war and is now a major industrial plant.



Oświęcim State Museum, founded in 1946 on the site of the Auschwitz concentration camp, Poland
Gianni Tortoli—Photo Researchers

The town began in the 12th century and received municipal rights in the 13th century. It served as the capital of a sovereign duchy that in 1307 swore allegiance to Bohemia. Annexed to Poland in 1457 and passed to Austria in 1772, it was returned to Poland in 1918. After World War II a new industrial town was built. Pop. (1992 est.) 45,100.

Oswiu, also spelled OSWY (b. 612—d. Feb. 15, 670), Anglo-Saxon king of Northumbria from 655 to 670.

Oswiu's father, King Aethelfrith (d. 616), had ruled the two ancient Northumbrian kingdoms of Bernicia and Deira, but after the death of Oswiu's brother, King Oswald, in 642, Northumbria was again divided, Oswiu assuming control of Bernicia. For 13 years he was subordinate to King Penda of Mercia. Finally, in 655 Penda invaded Bernicia and was killed by Oswiu's forces in the Battle of the Winwaed near Leeds in modern West Yorkshire. Oswiu then reunited Northumbria and became overlord of southern England. He annexed northern Mercia but gave southern Mercia to Penda's son Peada. Peada was murdered in 656, and a revolt by Mercian nobles in 657 brought an end to Oswiu's rule in southern England. In 663/664 Oswiu, who was a staunch Christian, helped reconcile differences in modes of worship between the Celtic churches and the Roman Catholic church at the Synod of Whitby. He also founded a number of monasteries. Upon his death he was succeeded by his son Ecgfrith.

Ōta, city, Gumma *ken* (prefecture), Honshu, Japan, on the Tone River. During the Tokugawa period (1603–1867) it was a market town, a post town on the Nikkō Highway, and a temple town for the Daiko Temple. Japan's first civil-aircraft manufacturing plant was established in Ōta in 1918. During World War II, aircraft factories moved to Ōta, and the population subsequently grew. Industrial products now include automobiles, electrical machinery, rubber, plastics, and knitted clothing. Pop. (1992 est.) 142,949.

Otago, local government region, southeastern South Island, New Zealand, encompassing the Otago Mountains, a fragmented schist plateau. The region stretches westward across South Island from the south Pacific Ocean to include the eastern slopes of the Southern Alps. It also includes the glacially excavated lakes of Wakatipu, Wanaka, and Hawea; the Remarkables (rising to 6,798 feet [2,072 m]) and other inland ranges; and the Clutha River, New Zealand's largest river by volume, which empties into the Pacific near the towns of Balclutha and Kaitangata.

European settlement of the eastern part of the region began in the late 1830s and was spurred on by a gold rush in 1861. Noted for its spectacular scenery, the western portion of the region remains relatively unpopulated. Tourism, sheep raising, and mixed farming are important economic activities. The port city of Dunedin, founded by Scottish settlers in 1848, is the region's largest settlement and an industrial and educational centre. The town of Oamaru is known for its white limestone buildings. Pop. (1991) 186,067.

Otakar, also spelled OTTOKAR, in full PŘEMYSL OTAKAR, name of kings of Bohemia grouped below chronologically and indicated by the symbol •.

•Otakar I (b. *c.* 1155—d. Dec. 15, 1230), king of Bohemia (1198–1230), who won both Bohemia's autonomy from the German king and the hereditary rights to the Bohemian crown for his house of Přemysl.

Initially confirmed as duke of Bohemia in 1192 by the Holy Roman emperor Henry VI, Otakar was deposed the following year but subsequently regained possession of the fief of Bohemia in 1197. He obtained the title of king in 1198 and almost total autonomy for Bohemia from the emperor Philip of Swabia. His title was subsequently confirmed by the emperor Frederick II (1212), who thereby all but extinguished the control of the empire in Bohemian affairs. Otakar's reign thus established the basis of a strong Bohemian state, which was to reach the height of its power later in the 13th century.

•Otakar II (b. 1230—d. Aug. 26, 1278, Dürnkrut, Austria), king of Bohemia (1253–78), who briefly established his crownland as the most powerful state of the Holy Roman Empire.

The son of King Wenceslas I of Bohemia, Otakar was elected duke of Austria in November 1251 and succeeded his father as king of Bohemia and Moravia in September 1253. In 1254 he conducted a crusade against the pagans of East Prussia, where later the Teutonic Knights named their citadel of Königsberg after him. He also conducted another crusade against the Lithuanians (1266–67). He seized Styria (1260) from the Hungarians and in 1269 took possession of Carinthia, Carniola, and Istria. His domains then stretched from Silesia to the Adriatic, and he stood as the strongest prince of the Holy Roman Empire. His fortunes changed soon after the election of Rudolf of Habsburg as German king (1273). After having incurred the enmity both of rival princes and of his own nobility, Otakar was first divested of his rights to Austria, Styria, and Carinthia by the Diet of Regensburg (1274), then placed under the ban of the empire (June 1276). Finally Rudolf invaded Austria and forced him to renounce all his territories save Bohemia and Moravia (Treaty of Vienna, November 1276). Two years later, in an attempt to reassert his rights, Otakar marched on Vienna but was killed at the Battle of Dürnkrut.

Otaru, city, Hokkaido, Japan, on Ishikari Bay of the Sea of Japan. Its name is a corruption of the Ainu word *otarunai,* meaning "sandy beach." Otaru developed as a modern town in the late 19th century. Provided with a good natural harbour, it is now the second most important seaport after Hakodate and the largest industrial and commercial city on the west coast of Hokkaido. The city is also a recreation centre for Asarigawa Spa, Otamoi Park, and the Otaru Aquarium, one of the largest in Japan. Pop. (1990) 163,215.

Otavalo, town, north-central Ecuador, in the Andean highlands at an elevation of 8,441 feet (2,573 m). It was originally settled by the Otavalo Indians, later conquered by the Incas, and became a Spanish-controlled settlement in the 16th century. Largely destroyed in the 1868 earthquake, the town has since been rebuilt.

The surrounding land, owned in small parcels by the Otavalo Indians, produces coffee, sugarcane, cotton, cereals, potatoes, fruit, and livestock. The weekly Indian market is famous as a tourist attraction for its cotton and woolen textiles (ponchos, carpets), leather goods, and native jewelry. Otavalo is connected by railway and the Pan-American Highway to Quito. Pop. (1990 prelim.) 21,542.

Otetiani (Seneca Indian): *see* Red Jacket.

Otfrid, also spelled OTFRIED (fl. 9th century), monk of Weissenburg in Alsace and the first German poet whose name is known.

Otfrid was trained in the monastery school of Fulda under Rabanus Maurus, who directed the school from 802 to 824. His fame rests on his *Evangelienbuch* (*c.* 870; "Book of the Gospels"), a poem of 7,416 lines, which is extant in three good contemporary manuscripts. It is an exceptionally valuable document, not only linguistically as the most extensive work in the South Rhine Franconian dialect of Old High German but also theologically as an introduction to early Christian thought in Germany. In German literary history it is also a milestone since it is the first poem to depart from traditional German alliterative verse and to use end rhymes.

The *Evangelienbuch* is a selective paraphrase of the Gospels, interposed by short passages of commentary. In a Latin dedication, Otfrid describes his concern over treating the life of Christ in the barbarous German tongue and explains that he did so to combat the native love for vernacular hero poetry. The work, which occupied him for a number of years, shows a development from crude attempts at rhyming to a skillful and graceful style of versification.

other minds, in philosophy, the object of the commonsensical belief that others besides oneself possess minds and are capable of thinking or feeling somewhat as one does oneself. The philosophical problem arising from the difficulty of providing adequate justification for such a belief has been discussed within the British philosophical tradition and also by the existentialists, and in the 20th century it has provided a matter for dispute in epistemology, logic, and philosophy of mind.

The traditional philosophical justification for belief in other minds is the argument from analogy, which, as cogently stated by John Stuart Mill, a 19th-century empiricist, in first-person terms, argues that because my body and outward behaviour are observably similar to the bodies and behaviour of others, I am justified by analogy in believing that others have feelings like my own and not simply the bodies and behaviour of automatons.

This argument has been repeatedly attacked since the 1940s, although some philosophers continue to defend certain forms of it. Norman Malcolm, an American disciple of Ludwig Wittgenstein, asserts that the argument is either superfluous or its conclusion unintelligible to the person who would use it, because, in order to know what the conclusion "that human figure has thoughts and feelings" means, the I would have to know what criteria are involved in correctly or incorrectly stating that someone has thoughts or feelings—and knowledge of these criteria would render the argument from analogy unnecessary. Defenders of the argument have maintained, however, that, since both the I and others describe inner feelings in similar ways and seemingly understand each other, reference to a common language justifies the argument from analogy better than does observation of similarities of bodies and outward behaviour.

Another objection to the argument is that it seems to assume that one in fact knows what it is to have feelings simply by introspection. This assumption has been objected to by followers of Wittgenstein, who think that it leads to the possibility of a "private language" to describe one's own sensations, a possibility that Wittgenstein rejected on various grounds. Such philosophers maintain that the I simply does not know what its own feelings are in a way appropriate to the argument until the I has learned from experience with others how to describe such feelings in appropriate language. Some philosophers have thought, however, that this situation leads to the conclusion that the I can be wrong when it says, "My tooth aches" in the same way that the I can be mistaken when the I says, "John's tooth aches." This thesis is unacceptable to many, who hold that sincere first-person present-tense statements about sensations can only be true; *i.e.,* they are "incorrigible."

Discussion of such problems tends to lead quickly into difficulties of providing an adequate analysis of statements about one's own sensations. The existentialist approach to the problem of other minds is exemplified by Jean-Paul Sartre in a long chapter of *L'Être et le néant* (1943; *Being and Nothingness*).

Othman: (Turkish personal name): *see* Osman.

Otho (Greek personal name): *see under* Otto, except as below.

Otho, in full MARCUS OTHO CAESAR AUGUSTUS, original name MARCUS SALVIUS OTHO (b. AD 32—d. April 16, 69, near Cremona, Venetia [Italy]), Roman emperor from January to April 69.

Otho was born into a family that had held the consulship under Augustus. He married Poppaea Sabina, but when the emperor Nero took Poppaea for his mistress—she later became his wife—Otho was sent from Rome to govern Lusitania (58). For 10 years he ruled this province with integrity. Then, in 68, Otho joined the rebellion against Nero led by Galba, governor of the neighbouring province of Tarraconensis. He had hoped to be designated Galba's successor, but when Galba disappointed him by adopting Lucius Piso Licinianus (January 69), Otho prepared to seize power. The Praetorian Guard rebelled, Galba and Piso were murdered in the Forum, and Otho was acclaimed emperor (January 15).

Before Galba's death, however, the legions in Germany had declared for Aulus Vitellius, whose troops were already moving toward Italy. Acting with speed and determination, Otho sent a naval expedition to Narbonensis (a region in southern Gaul), summoned the Danube legions, and himself marched out on March 14. Although substantial forces joined Otho from Illyricum, by early April the Vitellian forces were far stronger. Experienced advisers counseled delay, but Otho insisted on action. His army was completely defeated east of Cremona, and Otho committed suicide.

Oti River, river in West Africa, rising in the southern plain of Burkina Faso. It meanders southward, briefly flowing along the Togo-Benin border. It cuts south-southwest across northern Togo and then forms the Ghana-Togo border for about 60 miles (100 km) before continuing southward through Ghana to empty into Lake Volta (created in the dammed Volta River). It is approximately 320 miles (520 km) long, and its basin is about 500 feet (150 m) above sea level. The river may have once been a tributary of the Niger. Its major riparian towns are Mango (Togo) and Nambiri (Ghana).

Otis, Elisha Graves (b. Aug. 3, 1811, Halifax, Vt., U.S.—d. April 8, 1861, Yonkers, N.Y.), American inventor of the safety elevator.

A descendant of a James Otis who immigrated from England to New England in 1631, the young Otis grew up in Vermont and, at age 19, moved to Troy, N.Y., and later to Brattleboro, Vt., working at various jobs. From 1838 to 1845, in Brattleboro, he manufactured wagons and carriages and then moved his family to Albany, N.Y., where, while employed as a master mechanic in a bedstead factory, he invented several labour-saving machines. In 1851 he was in Bergen, N.J., again as master mechanic in a bedstead factory. The Bergen firm sent him to Yonkers, N.Y., in 1852 to operate a new factory and to install its machinery. There he designed and installed what he called the "safety hoist," the first elevator equipped with an automatic safety device to prevent it from falling if the lifting chain or rope broke. The next year he resigned from his job and set up a small elevator shop in Yonkers, selling his first elevator machine on Sept. 20, 1853. It hauled freight. Orders were few until May 1854, when, at the Crystal Palace in New York City, he demonstrated his elevator by riding the platform high in the air and ordering the rope cut. On March 23, 1857, he installed the first safety elevator for passenger service in the store of E.V. Haughwout & Co. in New York City. On Jan. 15, 1861, he patented an independently controlled steam engine for elevator use (installed in 1862). This invention laid the foundation for the business that his two sons, Charles and Norton, carried on after his death as owners of what eventually became the Otis Elevator Company.

Elisha Otis, engraving
By courtesy of Otis Elevator Co.

Otis also devised a number of other mechanical contrivances. In 1852 he patented some railroad-car trucks and brakes. In 1857 he patented a steam plow, and in 1858 he patented a bake oven.

Otis, Harrison Gray (b. Oct. 8, 1765, Boston, Mass. [U.S.]—d. Oct. 28, 1848, Boston), Federalist political leader who championed the Hartford Convention in its opposition to mercantilist policies and the War of 1812.

He was a nephew of James Otis and the son of Samuel Allyne Otis (1740–1814), who was a member of the Confederation Congress in 1787–88 and secretary of the U.S. Senate from its first session in 1789 until his death. Young Otis graduated from Harvard College in 1783, was admitted to the bar in 1786, and soon became prominent as a Federalist in politics. He served in the Massachusetts House of Representatives in 1796–97 and 1802–05, in the U.S. House of Representatives in 1797–1801, as a member of the Massachusetts Senate in 1805–13 and 1814–17, as a member of the U.S. Senate in 1817–1822, and as mayor of Boston in 1829–32. Otis was strongly opposed to the War of 1812 and was a leader in the states' rights Hartford Convention, which he defended in a series of open letters published in 1824 and in his inaugural address as mayor of Boston.

Otis, Harrison Gray (b. Feb. 10, 1837, near Marietta, Ohio, U.S.—d. July 30, 1917, Los Angeles, Calif.), American newspaper publisher who directed the *Los Angeles Times* from 1886 until after World War I.

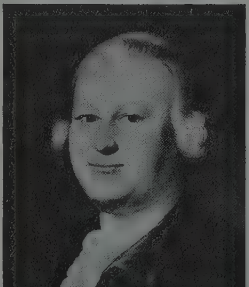
Otis was a descendant of the colonial political activist James Otis. He received little formal education but worked as a printer's apprentice in his teens and studied briefly at a commercial college in Columbus, Ohio. Moving to Kentucky, he became a member of the new Republican Party and in 1860 served as a delegate to its national convention, which nominated Abraham Lincoln. During the Civil War he served in the eastern theatre, rising to the rank of lieutenant colonel.

After the war he held a variety of jobs in Ohio and Washington, D.C., before migrating in 1876 to Santa Barbara, Calif., where he edited the *Santa Barbara Press* for several years. Moving to Los Angeles, he acquired part interest (1882) and then full control (1886) of the *Los Angeles Times,* which he edited with an iron hand for the next three decades, becoming one of the most powerful figures in southern California. He made his newspaper a voice of ultraconservative Republicanism and fiercely opposed labour unions. (On Oct. 1, 1910, the offices of his paper were bombed, killing 21 employees. Three union radicals, including two brothers, James B. and John L. McNamara, eventually confessed to the crime. Otis headlined the case relentlessly.) Otis also championed the declaration of war on Spain in 1898 and served briefly in the summer war as a major general.

In 1914 Otis legally transferred his controlling interest to his daughter and son-in-law, Marian and Harry Chandler, but continued in practice to direct the day-to-day operations of the *Los Angeles Times* until his death.

Otis, James (b. Feb. 5, 1725, West Barnstable, Mass. [U.S.]—d. May 23, 1783, Andover, Mass.), American political activist during the period leading up to the American Revolution. He helped formulate the colonists' grievances against the British government in the 1760s.

Son of the elder James Otis, who was already prominent in Massachusetts politics, the younger Otis graduated from Harvard College in 1743 and was admitted to the bar in 1748. He moved his law practice from Plymouth to Boston in 1750. His reputation was built mainly upon his famous challenge in 1761 to the British-imposed writs of assistance—general search warrants designed to enforce more strictly the trade and navigation laws in North America. These search warrants authorized customhouse officers to search any house for smuggled goods; neither the house nor the goods had to be specifically mentioned in the writs. Arguing before the Superior Court in Boston, Otis raised the doctrine of natural law underlying the rights of citizens and argued that such writs, even if authorized by Parliament, were null and void. In harking back to fundamental English constitutional law, Otis offered the colonists a basic doctrine upon which their publicists could draw for decades to come. At this time he also reportedly coined the oft-quoted phrase "Taxation without representation is tyranny."



James Otis, portrait by J. Blackburn, 1755; in the Library of Congress, Washington, D.C.
By courtesy of the Library of Congress, Washington, D.C.

Otis was elected in May 1761 to the General Court (provincial legislature) of Massachusetts and was reelected nearly every year thereafter during his active life. In 1766 he was chosen speaker of the house, though this choice was negated by the royal governor of the province.

In September 1762 Otis published *A Vindication of the Conduct of the House of Representatives of the Province of Massachusetts Bay* in defense of that body's rebuke of the governor for asking the assembly to pay for ships not authorized by them—though sent to protect New England fisheries against French privateers. Otis also wrote various state papers addressed to the colonies to enlist them in the common cause, and he also sent such papers to the government in England to uphold the rights or set forth the grievances of the colonists. His influence at home in controlling and directing the movement of events toward freedom was universally felt and acknowledged, and few Americans were so frequently quoted, denounced, or applauded in Parliament and the British press before 1769. In 1765 he was a delegate to the Stamp Act Congress in New York City, and there he was a conspicuous figure, serving on the committee that prepared the address sent to the House of Commons.

Already prone to fits of insanity, Otis was struck on the head during an altercation with a crown officer in 1769 and was rendered harmlessly insane, with only occasional lucid intervals, until his death. He died in 1783 after being struck by lightning.

otitid fly, also called PICTURE-WINGED FLY, any species of insect belonging to the family Otitidae (order Diptera). The wings are spotted or banded with black, brown, or yellow. These small flies are common in moist places. Little is known about their larvae; some are parasites, and some are plant feeders that may damage cultivated plants.

otitis externa, dermatitis of the external auditory canal and sometimes also of the exposed ear. The skin on these ear parts becomes dry, scaling, and itchy, and there may be foul-smelling watery or purulent discharge, pain, fever, and intermittent deafness. Predisposing factors include excessive perspiration, trauma, allergy, underwater swimming and diving, and a warm, damp environment. The infection, which may be recurrent, is usually bacterial in origin.

otitis media, acute or chronic inflammation of the middle ear. The inflammation may be due to allergic disease of the middle ear or to infection with a virus or with bacteria. Allergic otitis media, if not complicated by bacterial invasion, usually subsides after elimination of the substance to which the person is allergic. Viral meningitis is usually an extension of common cold virus to the ear and usually subsides with disappearance of the cold. Acute bacterial otitis media causes earache, fever, and suppuration (discharge of pus). Treatment includes administration of antibiotics. Chronic otitis media may be relatively benign and respond to local medical treatment, or it may invade the bone and require surgical treatment. *See also* mastoiditis.

Otjiwarongo, town, north-central Namibia. Otjiwarongo town (at an elevation of 4,790 feet [1,460 m]) is located in a generally flat, semiarid region of varied grasses, scrub bush, and thorn trees. Sheep and cattle are grazed in the region, which was originally inhabited by the Bergdama (Damara) and San (Bushmen). The latter were displaced in the early 19th century by the cattle-grazing Herero people, who, when moving into the area, gave Otjiwarongo its present name, meaning "the place of the fat cattle." A Rhenish (German Lutheran) mission station was established in the area in 1891. Between 1904 and 1907 the white settlement of Otjiwarongo evolved around a German military station established to fight the rebellious Herero. Boer trekkers returning from Angola settled in the vicinity in 1933, and the settlement of Otjiwarongo became a municipality in 1939. Otjiwarongo is a local market and railway centre and has a creamery. Corn (maize) and cereals are grown in the area. Pop. (1988 est.) 11,000.

Otlet, Paul(-Marie-Ghislain) (b. Aug. 23, 1868, Brussels—d. Dec. 10, 1944, Brussels), Belgian lawyer and bibliographer who, with Henri-Marie Lafontaine, devised the Universal Decimal Classification (UDC) system of subject groups for library collections.

Otlet was educated at the University of Louvain and at the Free University of Brussels, where he earned a law degree in 1890. Bored with law and absorbed with books and libraries, he found employment at the new Société des Études Sociales et Politiques. He soon became friends with Lafontaine, who was also a lawyer and bibliophile. Together they were instrumental in forming the first international bibliographic conference and the Institut International de Bibliographe (later the Fédération Internationale de Documentation [FID]).

Both Otlet and Lafontaine saw the need for an international index for documentation. Strongly influenced by the Dewey Decimal System of Classification developed by Melvil Dewey (published in 1876), the two men eventually developed the UDC. First published in 1899, the UDC appeared in French as *Manuel du répertoire universel bibliographique* (*Manual of the Universal Library Index*). A second edition of the index appeared in the years 1927–33 under the title *Classification décimale universelle* (*Universal Decimal Classification*). The system is the classification scheme most widely used on the European continent. Translation of the UDC into English was begun in 1931; an abridged English-language edition appeared in 1948. Otlet's *Traité de la documentation* (*Treatise on Documentation*) appeared in 1934.

Oto, North American Indian people of the Chiwere branch (including the Missouri and Iowa) of the Siouan linguistic family. In their historic past the Oto, together with the Iowa and the Missouri, separated from the Winnebago and moved southwest. In 1673, when met by the Jacques Marquette expedition, they were some distance up the Des Moines River in present-day Iowa. By 1804 they were living near the mouth of the Platte River. In 1830 they ceded all their land in Missouri and Iowa to the United States and ultimately sold off their remaining land in Kansas and Nebraska. In 1882 they were removed to Indian Territory (present-day Oklahoma). In the late 20th century several hundred of them were reported in Oklahoma, most of them of mixed blood.

Oto-Manguean languages, a phylum, or stock, of American Indian languages made up of the following language families and groups: Oto-Pamean, Popolocan, Mixtecan, Zapotecan, Chinantecan, and Manguean. The Tlapanec and Huave language groups are sometimes also included in Oto-Manguean. The living languages of these groups are spoken in Mexico, although varieties of Mangue, all of which are extinct, were spoken along the western coast of Central America from El Salvador through Costa Rica.

The most important of the Oto-Manguean languages are Otomí, of the Oto-Pamean family, spoken in the Mexican states of Hidalgo, México, Veracruz, Querétaro, and adjacent states; Mixtec dialects, of the Mixtecan family, spoken in the states of Guerrero, Puebla, and Oaxaca; Zapotec dialects (or languages), of the Zapotecan family, spoken in Oaxaca; and Mazahua, of the Oto-Pamean family, spoken in the states of Michoacán and México. Many Oto-Manguean languages use a complex system of pitches or intonations to distinguish otherwise identical utterances.

otolaryngology, also called OTORHINOLARYNGOLOGY, medical specialty concerned with the diagnosis and treatment of diseases of the ear, nose, and throat. Traditionally, treatment of the ear was associated with that of the eye in medical practice. With the development of laryngology in the late 19th century, the connection between the ear and throat became known, and otologists became associated with laryngologists.

The study of ear diseases did not develop a clearly scientific basis until the first half of the 19th century, when Jean-Marc-Gaspard Itard and Prosper Ménière made ear physiology and disease a matter of systematic investigation. The scientific basis of the specialty was first formulated by William R. Wilde of Dublin, who in 1853 published *Practical Observations on Aural Surgery, and the Nature and Treatment of Diseases of the Ear.* Further advances were made with the development of the otoscope, an instrument that enabled visual examination of the tympanic membrane (eardrum).

The investigation of the larynx and its diseases, meanwhile, was aided by a device that was invented in 1855 by Manuel García, a Spanish singing teacher. This instrument, the laryngoscope, was adopted by Ludwig Türck and Jan Czermak, who undertook detailed studies of the pathology of the larynx; Czermak also turned the laryngoscope's mirror upward to investigate the physiology of the nasopharyngeal cavity, thereby establishing an essential link between laryngology and rhinology. One of Czermak's assistants, Friedrich Voltolini, improved laryngoscopic illumination and also adapted the instrument for use with the otoscope.

In 1921 Carl Nylen pioneered in the use of a high-powered binocular microscope to perform ear surgery; the operating microscope opened the way to several new corrective procedures on the delicate structures of the ear. Another important 20th-century achievement was the development in the 1930s of the electric audiometer, an instrument used to measure hearing acuity.

Otomí, Middle American Indian population living in the central plateau region of Mexico. The Otomí peoples speak at least four closely related languages, all called Otomí. A rather large number of modern Otomí no longer speak the Otomí language but continue to consider themselves Otomí. All the Otomí peoples are culturally similar.

Their subsistence is based on farming and livestock raising; staple crops are corn (maize), beans, and squash. Fields are cleared by slash-and-burn methods, and planting is done with a *coa,* a sort of combination hoe and digging stick. The less conservative Otomí also plant cash crops such as wheat and barley, which are cultivated using plow and oxen. The maguey (Mexican century plant) is also cultivated for a variety of uses. Sheep, goats, chickens, turkeys, and hogs are the most commonly raised livestock. Settlements vary in composition from the concentrated central village with surrounding farmlands to the dispersed type in which each family lives on its land and only public buildings are congregated. Crafts include spinning, weaving, pottery, basketry, and rope making. Dress varies from completely traditional to completely modern. Common dress in conservative areas consists of white cotton shirt and pants, serape, sandals, and hat for men and long tubular skirt, embroidered cotton blouse, and rebozo or cape (*quechquemitl*) for women.

Ritual kinship institutions, based on a godparent relationship between the adults of one family and a child of another, is a central and essentially universal custom. Close ties exist between the parents and godparents of a child, and a series of ritual obligations obtain between them. The Otomí are Roman Catholic, and, although certain identifications between Christian figures and pre-Christian gods exist, the major religious rituals, myths, and ceremonies are basically Christian.

O'Toole, Peter (b. Aug. 2, 1932, Connemara, County Galway, Ire.), British stage actor who rose to international fame with his successful motion-picture portrayal of T.E. Lawrence in *Lawrence of Arabia* (1962).

O'Toole grew up in Leeds, Eng., and was educated at the Royal Academy of Dramatic Art in London. He was a reporter for the Yorkshire *Evening Post* in his teens and made his amateur stage debut at Leeds Civic Theatre. After serving two years in the Royal Navy, he played with the Bristol Old Vic Company (1955–58). He made his debut in London as Peter Shirley in *Major Barbara* (1956). He acted with the Shakespeare Memorial Theatre Company at Stratford-upon-Avon in 1960 in an acclaimed performance as Shylock and played Hamlet in the inaugural production of the National Theatre in London in 1963. His later appearances included roles in *Ride a Cock Horse* (1965) and *Juno and the Paycock, Man and Superman,* and *Pictures in the Hallway* in Dublin (1967); *Waiting for Godot, Uncle Vanya, Plunder, The Apple Cart,* and *Judgement* at the Bristol Old Vic (1973); and *Present Laughter* in Chicago (1978). O'Toole became associate director of the Old Vic in 1980.

O'Toole made his motion-picture debut in *Kidnapped* in 1960 and just two years later won international acclaim for *Lawrence of Arabia.* Although he preferred classical roles in his earlier theatre career, on the screen he became known for his intense portrayals of troubled and complex characters uneasily holding positions of power or responsibility. He played Henry II in *Becket* and had the title role in *Lord Jim* in 1964. His later films included *The Lion in Winter* (1968), *The Ruling Class* (1972), *The Stunt Man* (1980), and *My Favorite Year* (1982).

otosclerosis, ear disorder characterized by the growth of excess bone in the middle ear in the region of the oval window. It is at the oval window that the footplate of the stapes (stirrup) comes into contact with the fluids of the inner ear and acts as a piston to conduct sound energy from the eardrum into the fluids of the inner ear. In otosclerosis, a gradual buildup of new spongy bony tissue around the stapes welds it against the wall of the surrounding bone and immobilizes it, causing deafness. A hereditary disorder, it is the most common type of progressive hearing impairment in young adults, usually affects one ear before the other (but both eventually), and occurs more frequently in females than in males. Surgery is generally the most effective treatment and usually today consists of a stapedectomy, in which the encrusted stapes is removed and replaced by a plastic or wire substitute.

Otranto, Latin HYDRUNTUM, town and archiepiscopal see, Lecce province, Puglia (Apulia) region, southeastern Italy, on the east coast of the Salentine Peninsula (the "heel" of Italy), on the Strait of Otranto (40 miles [64 km] wide), opposite Albania. It is the easternmost town in Italy and is an old port of communication with Greece. Originally the ancient Greek settlement of Hydrus, it was known as Hydruntum by the Romans, under whom it was second in importance to Brundisium (now Brindisi) as a port of embarkation. Otranto retained its Greek language and culture until the 11th century. Taken by the Norman Robert Guiscard in 1068, it was destroyed by the Turkish fleet in 1480 and never recovered its previous importance. In the latter half of the 20th century, its sea communications with Greece have been revived with the opening of a hydrofoil ferry to Corfu during the summer. Pop. (1984 est.) mun., 4,986.

Ōtsu, capital, Shiga Prefecture (*ken*), southern Honshu, Japan, on the shore of Lake

Biwa. A castle town established by Toyotomi Hideyoshi in the 16th century, it is situated at the junction of ancient highways, including the Tōkaidō (Eastern Sea Highway). Ōtsu has long been a gateway to Kyōto and a centre of transportation. The city contains the Ishiyama-dera (Ishiyama Temple), associated with Murasaki Shikibu, author of the 11th-century novel *Genji monogatari* (*The Tale of Genji*), one of the great classics of Japanese literature. Industries produce electrical appliances and textiles. Pop. (1995) 276,332.

ottava rima, Italian stanza form composed of eight 11-syllable lines, rhyming *abababcc.* It originated in the late 13th and early 14th centuries and was developed by Tuscan poets for religious verse and drama and in troubadour songs. The form appeared in Spain and Portugal in the 16th century. It was used in 1600 in England (where the lines were shortened to 10 syllables) by Edward Fairfax in his translation of Torquato Tasso. In his romantic epics *Il filostrato* (written *c.* 1338) and *Teseida* (written 1340–41) Boccaccio established ottava rima as the standard form for epic and narrative verse in Italy. The form acquired new flexibility and variety in Ludovico Ariosto's *Orlando furioso* (*c.* 1507–32) and Tasso's *Gerusalemme liberata* (published 1581). In English verse ottava rima was used for heroic poetry in the 17th and 18th centuries but achieved its greatest effectiveness in the work of Byron. His *Beppo* (1818) and *Don Juan* (1819–24) combined elements of comedy, seriousness, and mock-heroic irony. Shelley employed it for a serious subject in *The Witch of Atlas* (1824).

Ottaviano: *see* John XII *under* John (Papacy).

Ottaviano DE MONTICELLO (antipope): *see* Victor (IV).

Ottawa, Algonkian-speaking Indians whose territory included what is now part of the Ottawa River, the French River, Georgian Bay, northern Michigan, and adjacent areas. According to tradition, the Ottawa, Ojibwa, and Potawatomi (*qq.v.*) were formerly one tribe, having migrated from the northwest and separated at what is now Mackinaw, Mich. The earliest known location of the Ottawa was on Manitoulin Island. They were widely known as traders, their location enabling them to become middlemen in intertribal commerce; their canoes traveled as far west as Green Bay, Wis., and as far east as Quebec to buy and sell such merchandise as cornmeal, furs, sunflower oil, mats, tobacco, and medicinal herbs. The Ottawa were semisedentary, living in agricultural villages in summer and separating into family groups for winter hunts. Planting and harvesting crops were female occupations; hunting and fishing were the responsibility of men. Ottawa villages were sometimes palisaded for protection.

In the late 17th century the tribe comprised four, or possibly five, major divisions, which were subdivided into local bands; they are believed to have had several clans distributed among the bands. Attacked by the Iroquois, the Ottawa fled, some joining the Potawatomi at Green Bay, others finally scattering throughout the lower peninsula of Michigan, Wisconsin, and northern Illinois.

Ottawa, capital of Canada and seat of Carleton County, southeastern Ontario, at the confluence of the Ottawa, Gatineau, and Rideau rivers. Its metropolitan area lies astride the Ontario–Quebec border.

The first descriptions of Ottawa's future site were written by the founder of New France, Samuel de Champlain, in 1613. The rivers served as passageways for explorers and traders over the following two centuries. The Napoleonic Wars increased Britain's need for shipbuilding timber, and the Ottawa Valley offered just such resources. In 1800 an American, Philemon Wright, had begun timbering across the Ottawa River in what became the city of Hull. During the War of 1812 between Britain and the United States, the Rideau provided the British with a safe shipping route from the Ottawa River to Kingston, on Lake Ontario, thus spurring settlement of Ottawa. It was hastened by the arrival in 1826 of Lt. Col. John By of the Royal Engineers to work on canalizing the river, and the town became Bytown.

Peace Tower, the Parliament building, Ottawa, Ont.
National Film Board of Canada Phototheque

Ottawa might still be a modest city had not political quarrels between Quebec city and Toronto and between Montreal and Kingston induced leaders to call upon Queen Victoria to designate a capital for United Canada. In 1855 Bytown was incorporated and rechristened Ottawa after the Indian tribe. It became the fastest growing metropolis in eastern Canada, a development due largely to the presence of the national government. In 1937 Prime Minister William L. Mackenzie King brought the architect Jacques Gréber from France to begin the redevelopment of the national capital district.

The fur trade and lumbering have diminished in importance, and industry now employs only a small fraction of the labour force. The federal government is the major employer. Many commercial and financial associations from around the country as well as embassies and trade associations are also located there.

Ottawa is served by both of Canada's major railroads and several airlines. There is bus service throughout the city. Navigation on the Ottawa and Rideau rivers, except for pleasure craft, is a thing of the past.

The major cultural centres remain the city's three universities. The University of Ottawa and St. Paul University are bilingual institutions, whereas instruction at Carleton University is entirely in English. A large community college, Algonquin, provides technical training. Ottawa also houses the National Arts Centre, which includes an opera house and two theatres, the National Library and Public Archives Building, the National Museum of Science and Technology, and the National Gallery of Canada. Pop. (2001) city, 774,072; Ottawa-Hull metropolitan area, 1,063,664.

Ottawa, city, seat (1831) of La Salle county, north central Illinois, U.S., at the confluence of the Fox and Illinois rivers. The site was visited by French explorers and missionaries in the 17th century; the town was laid out in 1830. Originally called Carbonia, from coal deposits nearby, it was renamed Ottawa for the Indian tribe. Situated in a rich agricultural area, it developed as a grain and trading centre. Growth was stimulated by completion of the Illinois and Michigan Canal (1848) and the arrival of the Rock Island Railroad (1853). The opening of the Illinois Waterway (1933) increased navigation to Chicago. Local industries depend on nearby deposits of silica sand, clay, coal, and gravel. Chief products are glass and plastic materials. Inc. town, 1837; city, 1853. Pop. (2000) 18,307.

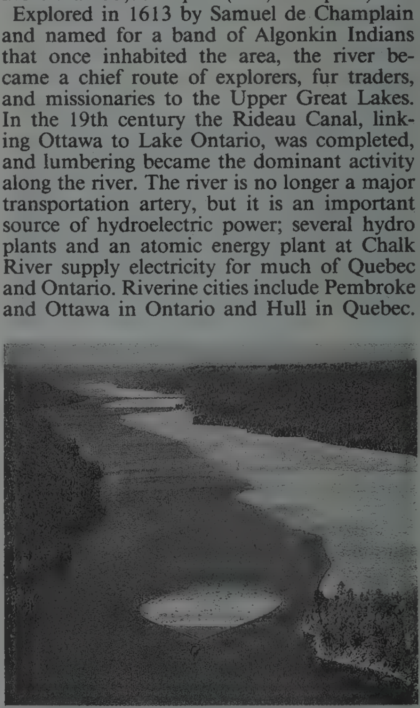
Ottawa, city, seat (1864) of Franklin county, eastern Kansas, U.S., on the Marais des Cygnes River. It was founded in 1864 near the Ottawa Indian Baptist Mission, which had been established in 1837 on lands given (1832) to the Ottawa Indians in exchange for their Ohio lands. When the Indians were moved to Oklahoma in 1867, settlers rushed to the site; prosperity followed construction of railroad machine shops in 1872.

Ottawa is now the trading centre for a grain, poultry, and livestock area; manufactures include textiles and plastic and metal products. Inc. 1866. Pop. (2000) 11,921.

Ottawa Agreements, trade policies, based on the system of imperial preference, negotiated between the United Kingdom and Commonwealth nations in 1932. *See* imperial preference.

Ottawa River, river in east central Canada, the chief tributary of the St. Lawrence River. It rises in the Laurentian Plateau of western Quebec and flows swiftly westward to Lake Timiskaming and then southeastward, forming for most of its course the Quebec–Ontario provincial border before it joins the St. Lawrence west of Montreal. Through its total course of 790 mi (1,271 km), the river forms innumerable lakes, the largest being Grand Victoria, Simard, Timiskaming, Allumette, Chats, and Deschenes. The Ottawa and its main tributaries, including the Rouge (115 mi long), Lièvre (205), Gatineau (240), Coulonge (135), Rideau (91), Mississippi (105), and Madawaska (143) rivers, drain an area of more than 55,000 sq mi (142,000 sq km).

Explored in 1613 by Samuel de Champlain and named for a band of Algonkin Indians that once inhabited the area, the river became a chief route of explorers, fur traders, and missionaries to the Upper Great Lakes. In the 19th century the Rideau Canal, linking Ottawa to Lake Ontario, was completed, and lumbering became the dominant activity along the river. The river is no longer a major transportation artery, but it is an important source of hydroelectric power; several hydro plants and an atomic energy plant at Chalk River supply electricity for much of Quebec and Ontario. Riverine cities include Pembroke and Ottawa in Ontario and Hull in Quebec.



Log boom being towed on Lake Timiskaming, an expansion of the Ottawa River, Quebec
George Hunter

List of Abbreviations

A.B.	Bachelor of Arts (Latin *Artium Baccalaureus*); Army Base
Ac	actinium
AC	alternating current
A.C.T.	Australian Capital Territory
AD	in the year of the Lord (Latin *anno Domini*)
A.F.B.	Air Force Base
Afg.	Afghanistan
A.F.S.	Air Force Station
Ag	silver (Latin *argentum*)
AG	Limited-liability Company (German *Aktiengesellschaft*)
AH	in the year of the Hegira, or Muslim era (Latin *anno Hegirae*)
Al	aluminum, aluminium
Ala.	Alabama
Alb.	Albania
Alg.	Algeria
Alta.	Alberta
Am	Americium
AM	before noon (Latin *ante meridiem*)
AM	amplitude modulation
A.M.	Master of Arts (Latin *Artium Magister*)
Amer.	American
Ant.B.	Antigua and Barbuda
Ar	argon
Arg.	Argentina
Ariz.	Arizona
Ark.	Arkansas
Arm.	Armenia
Arpt.	Airport
As	arsenic
A.S.	Air Station
A.S.S.R.	Autonomous Soviet Socialist Republic
At	astatine
Au	gold (Latin *aurum*)
Aug.	August
Austl.	Australia
Av.	Avenida (Spanish: "Avenue")
Ave.	Avenue
Azer.	Azerbaijan
b.	born
B	boron
Ba	barium
B.A.	Bachelor of Arts
Bah.	The Bahamas
Bangl.	Bangladesh
Barb.	Barbados
BC	before Christ
B.C.	British Columbia
BCE	before the Common Era, or Christian era
Be	beryllium
B.Ed.	Bachelor of Education
Bela.	Belarus
Belg.	Belgium
Bfld.	Battlefield
Bge.	Bridge
Bi	bismuth
Bk	berkelium
Bldg.	Building
Bldgs.	Buildings
Blvd.	Boulevard
Bol.	Bolivia
Bos.-Her.	Bosnia and Hercegovina
Bots.	Botswana
BP	before the present
Br	bromine
Braz.	Brazil
Brit.	British
B.S.	Bachelor of Science
B.Sc.	Bachelor of Science
Bulg.	Bulgaria
Burk.	Burkina Faso
c.	about, approximately (Latin *circa*)
C	carbon; Celsius
C.	Cape
Ca	calcium
C.A.R.	Central African Republic
Calif.	California
Camb.	Cambodia
Camer.	Cameroon
Can.	Canada
Cay.Is.	Cayman Islands
Cb	columbium
Cd	cadmium
C.d'I.	Côte d'Ivoire
Ce	cerium
CE	Common era, Christian era
cf.	compare (Latin *confer*)
Cf	californium
cg	centigram(s)
Cia.	Company (Italian *Compagnia;* Portuguese *Companhia;* Spanish *Compañia*)
Cie.	Company (French *Compagnie*)
Cl	chlorine
cm	centimetre(s)
Cm	curium
CMSA	consolidated metropolitan statistical area
Co	cobalt
Co.	Company; County
Colo.	Colorado
Colom.	Colombia
Conn.	Connecticut
Cord.	Cordillera
Corp.	Corporation
cos	cosine
cot	cotangent
Cr	chromium
C.Rica	Costa Rica
Cro.	Croatia
Cs	cesium
csc	cosecant
Cu	copper (Latin *cuprum*)
Czech.	Czechoslovakia
Cz.Rep.	Czech Republic
d.	died
DC	direct current
D.C.	District of Columbia
Dec.	December
Del.	Delaware
Den.	Denmark
Dept.	Department
D.F.	Federal District (Spanish *Distrito Federal*)
Djib.	Djibouti
D.Litt.	Doctor of Letters (Latin *Doctor Litterarum*)
Dom.Rep.	Dominican Republic
Dr.	Doctor; Drive
Dy	dysprosium
E	east
Ecua.	Ecuador
ed.	edited; edition; editor
Ed.	*Britannica* editor, or editors
eds.	editors
e.g.	for example (Latin *exempli gratia*)
E.Ger.	East Germany
El Salv.	El Salvador
Eng.	England; English
Eq.Guin.	Equatorial Guinea
Er	erbium
Es	einsteinium
est.	estimate; estimated
Est.	Estonia
et al.	and others (Latin *et alli,* or *aliae*)
et seq.	and following page(s) (Latin *et sequens, sequentese,* or *sequentia*)
etc.	and so forth (Latin *et cetera*)
Eth.	Ethiopia
Eu	europium
Expwy.	Expressway
F	Fahrenheit; fluorine
Fe	iron (Latin *ferrum*)
Feb.	February
ff.	and following pages
Fig.	Figure
Fin.	Finland
fl.	flourished (Latin *floruit*)
Fm	fermium
Fla.	Florida
FM	frequency modulation
Fr	francium
Fr.	France
Fr.Guia.	French Guiana
Fr.Poly.	French Polynesia
Ft.	Fort
g	gram(s)
Ga	gallium
Ga.	Georgia (U.S.)
Gd	gadolinium
Ge	germanium
Geo.	Georgia (country)
Ger.	Germany
Gib.	Gibraltar
GmbH	Company with Limited Liability (German *Gesellschaft mit beschränkter Haftung*)
Green.	Greenland
Gren.	Grenada
Guad.	Guadeloupe
Guat.	Guatemala
Guin.Bis.	Guinea-Bissau
h	hour(s)
H	hydrogen
Ha	hahnium
Hbr.	Harbour
He	helium
Hf	hafnium
Hg	mercury (Latin *hydrargyrum*)
H.K.	Hong Kong
HMS	His, or Her, Majesty's Ship, or Service
Ho	holmium
Hond.	Honduras
Hosp.	Hospital
Hung.	Hungary
Hwy.	Highway
I	iodine
I.	Island
ibid.	in the same place (Latin *ibidem*)
Ice.	Iceland
i.e.	that is (Latin *id est*)
Ill.	Illinois
In	indium
Inc.	Incorporated
Ind.	Indiana
Ind. Res.	Indian Reservation
Indon.	Indonesia
Inst.	Institute
Intl.	International
Ir	iridium
Ire.	Ireland
Is.	Islands
Jam.	Jamaica
Jan.	January
Jr.	Junior
K	potassium (Latin *kalium*); Kelvin; Köchel catalog number
Kazakh.	Kazakhstan
Kan.	Kansas
kg	kilogram
KG	Limited Partnership (German *Kommandit Gesellschaft*)
Kiri.	Kiribati
Kitts/N.	Saint Kitts and Nevis
KK	Limited-liability Company (Japanese *Kabushiki Kaisha*)
km	kilometre(s)
Kr	krypton
Ky.	Kentucky
Kyrgyz.	Kyrgyzstan
L.	Lake
La	lanthanum
La.	Louisiana
Leb.	Lebanon
Leso.	Lesotho
Liech.	Liechtenstein
Lith.	Lithuania
LL.B.	Bachelor of Laws (Latin *Legum Baccalaureus*)
LL.D.	Doctor of Laws (Latin *Legum Doctor*)
log	logarithm
Lr	lawrencium
Ltd.	Limited
Lu	lutetium
Lucia	Saint Lucia
Lux.	Luxembourg
m	metre(s)
MA	metropolitan area
M.A.	Master of Arts
Maced.	Macedonia
Madag.	Madagascar
Malay.	Malaysia
Mald.	Maldives
Man.	Manitoba
Marsh.Is.	Marshall Islands
Mart.	Martinique
Mass.	Massachusetts
Maurits.	Mauritius
mbH	Limited; with Limited Liability (German *mit beschränkter Haftung*)
Md.	Maryland
M.D.	Doctor of Medicine (Latin *Medicinae Doctor*)
Mem.	Memorial
Mex.	Mexico
mg	milligram(s)
Mg	magnesium
Mich.	Michigan
Micron.	Micronesia
Mil.	Military
min	minute(s)
Minn.	Minnesota
Miss.	Mississippi
Mlle	Mademoiselle
mm	millimetre(s)
Mme	Madame
Mn	manganese
Mo	molybdenum
Mo.	Missouri
Moldv.	Moldova
Mon.	Monument
Mong.	Mongolia
Mont.	Montana
Monts.	Montserrat
Mor.	Morocco
Mozam.	Mozambique
MP	member of Parliament
Mr.	Mister
Mrs.	"Missus"
M.S.	Master of Science
MSA	metropolitan statistical area
M.Sc.	Master of Science
Mt.	Mount
Mtania.	Mauritania
Mtn.	Mountain
Mts.	Mountains
mun.	municipality
Mus.	Museum
MV	Motor Vessel
Myan.	Myanmar
N	nitrogen; north
Na	sodium (Latin *natrium*)
NA	National Association
Namib.	Namibia
Natl.	National
Natl. Pk.	National Park
Nat. Res.	Nature Reserve
Nb	niobium
N.B.	New Brunswick; Naval Base
N.C.	North Carolina
Nd	neodymium
N.D.	North Dakota
Ne	neon
NE	northeast

Neb.	Nebraska
NECMA	New England county metropolitan area
Neth.	The Netherlands
Neth.Ant.	Netherlands Antilles
Nev.	Nevada
New Cal.	New Caledonia
Nfd.	Newfoundland
N.H.	New Hampshire
Ni	nickel
Nic.	Nicaragua
N.Ire.	Northern Ireland
N.J.	New Jersey
N.Kor.	North Korea
N.M.	New Mexico
no.	number
No	nobelium
Nor.	Norway
Nov.	November
Np	neptunium
NS	Nuclear Ship
N.S.	New Style (calendar)
N.S.W.	New South Wales
N.Terr.	Northern Territory
NV	Limited-liability Company (Dutch *Naamloze Vennootschap*)
NW	northwest
N.W.Terrs.	Northwest Territories
N.Y.	New York
N.Y.C.	New York City
N.Z.	New Zealand
O	oxygen
Oct.	October
Okla.	Oklahoma
Ont.	Ontario
op.	opus
Ore.	Oregon
Os	osmium
O.S.	Old Style (calendar)
p.	page
P	phosphorus
pA	Limited (Italian *per Azioni*)
Pa	protactinium
Pa.	Pennsylvania
Pak.	Pakistan
Pal.	Palace
Pan.	Panama
Para.	Paraguay
Pb	lead (Latin *plumbum*)
Pd	palladium
P.E.I.	Prince Edward Island
Pen.	Peninsula
perf.	performed; performance
pH	potential of hydrogen (acidity-alkalinity factor)
Ph.D.	Doctor of Philosophy (Latin *Philosophiae Doctor*)
Phil.	Philippines
Pk.	Park; Peak
Pkwy.	Parkway
Pl.	Place
Plat.	Plateau
PLC	Public Limited Company
Pm	promethium
PM	afternoon (Latin *post meridiem*)
PMSA	primary metropolitan statistical area
P.N.G.	Papua New Guinea
Po	polonium
Pol.	Poland
pop.	population
Port.	Portugal
pp.	pages
Pr	praseodymium
P.R.	Puerto Rico
prelim.	preliminary (census)
Prov.	Province
Prov. Pk.	Provincial Park
Pt	platinum
Pt.	Point
Pu	plutonium
qq.v.	which see (plural; Latin *quae vide*)
Que.	Quebec
Queen.	Queensland
q.v.	which see (singular; Latin *quod vide*)
R	Rankine
R.	River
Ra	radium
Rb	rubidium
Rd.	Road
Re	rhenium
Res.	Reservoir; Reservation
rev.	revised; revision
Rf	rutherfordium
Rh	rhodium
R.I.	Rhode Island
Rn	radon
Rom.	Romania
Ru	ruthenium
s	second(s)
S	South; sulfur
SA	Limited-liability Company (French *Société Anonyme;* Italian *Società Anònima;* Portuguese *Sociedade Anónima;* Spanish *Sociedad Anónima*)
S.Af.	South Africa
Sask.	Saskatchewan
Saud.Ar.	Saudi Arabia
S.Aus.	South Australia
Sb	antimony (Latin *stibium*)
Sc	scandium
S.C.	South Carolina
Scot.	Scotland
SCSA	standard consolidated statistical area
S.D.	South Dakota
Se	selenium
SE	southeast
sec	secant; second(s)
Seneg.	Senegal
Sept.	September
Seych.	Seychelles
S.F.S.R.	Soviet Federated Socialist Republic
Si	silicon
sin	sine
Sing.	Singapore
S.Kor.	South Korea
Slvk.	Slovakia
Slvn.	Slovenia
Sm	samarium
Sn	tin (Latin *stannum*)
Solo.Is.	Solomon Islands
Som.	Somalia
SpA	Limited-liability Company (Italian *Società per Azioni*)
Spr.	Spring
Sprs.	Springs
Sq.	Square
Sr	strontium
Sr.	Senior
Sri L.	Sri Lanka
SS	Steamship
SS.	Saints
S.S.R.	Soviet Socialist Republic
St.	Saint; State; Street
St. Pk.	State Park
Ste.	Saint (French *Sainte*)
S.Tomé/P.	São Tomé and Príncipe
Str.	Strait
Strs.	Straits
Suri.	Suriname
SW	southwest
Swaz.	Swaziland
Swed.	Sweden
Switz.	Switzerland
Ta	tantalum
Tajik.	Tajikistan
tan	tangent
Tanz.	Tanzania
Tas.	Tasmania
Tb	terbium
Tc	technetium
Te	tellurium
Tenn.	Tennessee
Terr.	Territory; Terrace
Terrs.	Territories
Th	thorium
Thai.	Thailand
Ti	titanium
Tl	thallium
Tm	thulium
Tpk.	Turnpike
trans.	translated; translation; translator(s)
Trin.	Trinidad
Trin./Tob.	Trinidad and Tobago
Tun.	Tunisia
Tur.	Turkey
Turkm.	Turkmenistan
U	uranium
U.A.E.	United Arab Emirates
Ugan.	Uganda
U.K.	United Kingdom
Ukr.	Ukraine
UN	United Nations
Univ.	University
Uru.	Uruguay
U.S.	United States
USGPO	United States Government Printing Office
USS	United States Ship
U.S.S.R.	Union of Soviet Socialist Republics
Uzbek.	Uzbekistan
v.	versus
V	vanadium
Va.	Virginia
var.	variant
Venez.	Venezuela
Vic.	Victoria
Viet.	Vietnam
Vinc./G.	Saint Vincent and the Grenadines
Vir.Is.	Virgin Islands
vol.	volume(s)
Vol.	Volcano
Vt.	Vermont
W	west; tungsten (wolfram)
Wash.	Washington
W.Aus.	Western Australia
W.Ger.	West Germany
Wis.	Wisconsin
W.Samoa	Western Samoa
W.Va.	West Virginia
Wyo.	Wyoming
Xe	xenon
Y	yttrium
Yb	ytterbium
Yugos.	Yugoslavia
Zamb.	Zambia
Zimb.	Zimbabwe
Zn	zinc
Zr	zirconium

Table of Measurement Conversions

To convert	Into	Multiply by
acres	hectares	0.40468564
Celsius (centigrade)	Fahrenheit	(C° × 9/5) + 32
centimetres	inches	0.3937008
cubic feet	cubic metres	0.028316847
cubic metres	cubic feet	35.31467
Fahrenheit	Celsius (centigrade)	5/9(F° − 32)
feet	metres	0.3048
gallons (U.S. liquid)	litres	3.785412
grams	ounces (troy)	0.032150747
hectares	acres	2.471054
inches	centimetres	2.54
inches	millimetres	25.4
kilograms	pounds	2.2046226
kilometres	miles (nautical)	0.5399568
kilometres	miles (statute)	0.6213712
litres	gallons (U.S. liquid)	0.26417205
metres	feet	3.2808399
metres	yards	1.093613298
miles (nautical)	kilometres	1.852
miles (statute)	kilometres	1.609344
millilitres	ounces (U.S. fluid)	0.03381402
millimetres	inches	0.03937008
newtons	pounds (of force)	0.224809
ounces (troy)	grams	31.1034768
ounces (U.S. fluid)	millilitres	29.57353
pounds	kilograms	0.45359237
pounds (of force)	newtons	4.44822
square kilometres	square miles	0.38610216
square miles	square kilometres	2.58998811
yards	metres	0.9144

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